MDO4000B, MDO4000, MSO4000B, DPO4000B and MDO3000 Series Oscilloscopes

Programmer Manual

077-0510-06

Tektronix

MDO4000B, MDO4000, MSO4000B, DPO4000B and MDO3000 Series Oscilloscopes

Programmer Manual

Revision A

MSO4000B, DPO4000B, MDO4000 and MDO4000B models should have firmware version 3.10 or above to use some of the commands listed in this document.

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Getting Started

Getting Started

This manual explains the use of commands for remotely controlling your oscilloscope. With this information, you can write computer programs to perform functions, such as setting the front-panel controls, taking measurements, performing statistical calculations, and exporting data for use in other programs.

Familiarity with the User Manual for your oscilloscope is assumed. You can download the User Manual from the Tektronix website at www.tektronix.com.

NOTE. *Most examples in this document assume that both HEADer\|:HDR and VERBose are set to ON.*

New in the Programmer Manual

The following major changes were made to this version of the programmer manual (077-0510-06):

Added MDO3000 series models:

Model	Analog Channels	Analog Bandwidth	Spectrum Analyzer Channel	Digital Channels	AFG Channels	Maximum Record Length	Aux Input connector
MDO3012	2	100 MHz	1 at 9 kHz - 100 MHz *9 kHz - 3 GHz Optional*	*16 Optional 8.25 GS/s max*	*1 Optional 50 MHz max.*	10 M Samples on all channels	Y
MDO3014	4	100 MHz	1 at 9 kHz - 100 MHz *9 kHz - 3 GHz Optional*				N
MDO3022	2	200 MHz	1 at 9 kHz - 200 MHz *9 kHz - 3 GHz Optional*				Y
MDO3024	4	200 MHz	1 at 9 kHz - 200 MHz *9 kHz - 3 GHz Optional*				N
MDO3032	2	350 MHz	1 at 9 kHz - 350 MHz *9 kHz - 3 GHz Optional*				Y
MDO3034	4	350 MHz	1 at 9 kHz - 350 MHz *9 kHz - 3 GHz Optional*				N
MDO3052	2	500 MHz	1 at 9 kHz - 500 MHz *9 kHz - 3 GHz Optional*				Y
MDO3054	4	500 MHz	1 at 9 kHz - 500 MHz *9 kHz - 3 GHz Optional*				N
MDO3102	2	1 GHz	1 at 9 kHz - 1 GHz *9 kHz - 3 GHz Optional*				Y
MDO3104	4	1 GHz	1 at 9 kHz - 1 GHz *9 kHz - 3 GHz Optional*				N

Each of the new MDO3000 series models have the following options available:

Option	Description
MDO3AFG	Arbitrary Function Generator
MDO3MSO	16-channel digital acquisition
MDO3SA	Spectrum analyzer input range increased to 9 kHz - 3 GHz.
MDO3SEC	Add password protected security to enable or disable all communication ports and firmware upgrades to any MDO3000 series oscilloscope

New or Changed Functionality Updates that Impact the Programmatic Command Set

For your convenience, the table below lists the new and changed functionality that impacts the programmatic command set for the MDO4000B, MDO4000, MSO4000B, DPO4000B and MDO3000 Series Oscilloscopes, along with a hot-linked list of the applicable commands.

NOTE. *The terms "waveform" and "trace" are used interchangeably.*

Table 1-1: Updates to the MDO4000, MSO4000B, DPO4000B, and MDO3000 Series Oscilloscopes

Feature	Use these commands
Arbitrary Function Generator functionality (MDO3000 series only)	AFG:AMPLitude AFG:FREQuency AFG:FUNCtion AFG:HIGHLevel AFG:LEVELPreset AFG:LOWLevel AFG:NOISEAdd:PERCent AFG:NOISEAdd:STATE AFG:OFFSet AFG:OUTPut:LOAd:IMPEDance AFG:OUTPut:STATE AFG:PERIod AFG:PHASe AFG:PULse:WIDth AFG:RAMP:SYMmetryAFG:SQUare:DUty
Arbitrary Waveform Generator functionality (MDO3000 series only) – Sine, Square Pulse, Ramp and Noise functions available – Ability to save and recall to or from ARB slots and .csv files	AFG:ARBitrary:ARB<x>:DATE? AFG:ARBitrary:ARB<x>:LABel AFG:ARBitrary:ARB<x>:TIMe? AFG:ARBitrary:EMEM:FUNCtion? AFG:ARBitrary:EMEM:GENerate AFG:ARBitrary:EMEM:NUMPoints? AFG:ARBitrary:EMEM:POINTS AFG:ARBitrary:EMEM:POINTS:ENCdg SAVe:WAVEform RECAll:WAVEform
Digital Voltmeter functionality (MDO3000 series only)	DVM DVM:AUTORange DVM:DISPLAYSTYle DVM:MEASUrement:FREQuency? DVM:MEASUrement:HIStory:AVErage? DVM:MEASUrement:HIStory:MAXimum? DVM:MEASUrement:HIStory:MINImum? DVM:MEASUrement:INFMAXimum? DVM:MEASUrement:INFMINimum? DVM:MEASUrement:VALue? DVM:MODe DVM:SOUrce

Table 1-1: Updates to the MDO4000, MSO4000B, DPO4000B, and MDO3000 Series Oscilloscopes (cont.)

Feature	Use these commands
Act on Event functionality	ACTONEVent:ACTION:AUXOUT:STATE
Available actions:	ACTONEVent:ACTION:PRINT:STATE
– Stop acquisitions	ACTONEVent:ACTION:SAVEIMAGE:STATE
– Save waveform data to a file	ACTONEVent:ACTION:SAVEWFM:STATE
– Save a screen image to a file	ACTONEVent:ACTION:SRQ:STATE
– Send a screen image to a printer	ACTONEVent:REPEATCount
– Send a pulse to the Aux Out port	ACTONEVent:ACTION:VISUAL:STATE
– Generate a service request	ACTONEVent:EVENTTYPe
– Send an email	ACTONEVent:NUMACQs
– Display a visual notification	ACTONEVent:REPEATCount
Available events:	
– Upon trigger	
– When a certain number of acquisitions have completed	
– None	
Email settings for both email printer support and Act on Event "send an email" action	EMAIL:SETUp:FROMADDRess EMAIL:SETUp:HOSTALIASNAMe EMAIL:SETUp:SMTPLOGIn EMAIL:SETUp:SMTPPASSWord EMAIL:SETUp:SMTPPort EMAIL:SETUp:SMTPServer
Video Picture functionality (Standard on MDO3000. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models)	VIDPic:AUTOContrast VIDPic:AUTOContrast:UPDATERate VIDPic:BRIGHTNess VIDPic:CONTRast VIDPic:DISplay VIDPic:FRAMETYPe VIDPic:LOCation:HEIght VIDPic:LOCation:OFFSet VIDPic:LOCation:STARt:LINE VIDPic:LOCation:STARt:PIXel VIDPic:LOCation:WIDth VIDPic:LOCation:X VIDPic:LOCation:Y VIDPic:SOUrce VIDPic:STANdard
Dual edge trigger/search functionality	TRIGger:A:EDGE:SLOpe SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe

Table 1-1: Updates to the MDO4000, MSO4000B, DPO4000B, and MDO3000 Series Oscilloscopes (cont.)

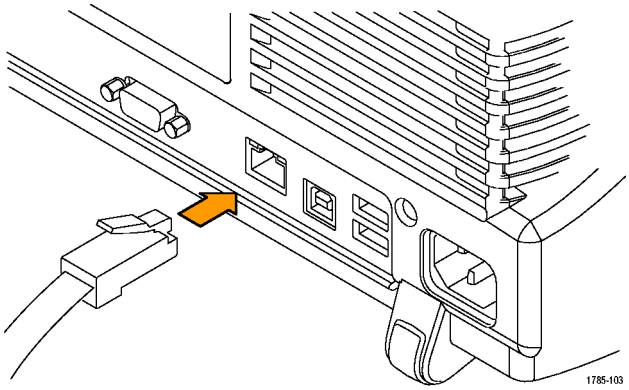
Feature	Use these commands
FastAcq™ high-speed waveform acquisition mode	ACQuire:FASTAcq:STATE
New color palettes (Temperature, Spectral, Normal, Inverted)	ACQuire:FASTAcq:PALEtte
Digital Channel Activity Monitor	DISplay:DIGital:ACTIVity
Additional calibration status queries	CALibrate:INTERNal:STATus:RF? CALibrate:INTERNal:STATus:SCOPE? CALibrate:RESults:FACtory:AFG? CALibrate:RESults:FACtory:RF? CALibrate:RESults:FACtory:SCOPE? CALibrate:RESults:SPC:RF? CALibrate:RESults:SPC:SCOPE?
Additional configuration queries (AFG, ARB, DVM, and VidPic are available for MDO3000 series. VidPic requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models)	CONFIGuration:AFG? CONFIGuration:APPLications:CUSTOMMask? CONFIGuration:APPLications:STANDARDMask? CONFIGuration:APPLications:VIDPIC? CONFIGuration:ARB? CONFIGuration:DVM?
Math vertical autoscale feature	MATH[1]:AUTOSCale
Total overshoot measurement type	MEASUrement:IMMed:TYPe MEASUrement:MEAS<x>:TYPe
Additional RF Spectrogram and Spectrum Trace commands	RF:SPECTRogram RF:SPECTRogram:SLICETIMe? RF:SPECTRogram:TIMe? RF:SPECTRUMTrace
Ability to save RF baseband I & Q data to a Matlab level 5 file or .TIQ file	SAVe:WAVEform:FILEFormat:RF_BB_IQ

Setting Up Remote Communications Hardware

You can remotely control communications between your oscilloscope and a PC via Ethernet, USB, or GPIB cables.

Ethernet

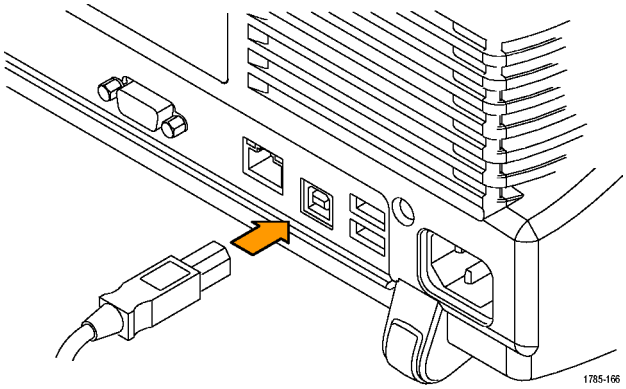
If you are using Ethernet, start by connecting an appropriate Ethernet cable to the Ethernet port (RJ-45 connector) on the rear panel of your oscilloscope. This connects the oscilloscope to a 10BASE-T/100BASE-TX/1000BASE-T local area network.



To change the Ethernet settings on your oscilloscope, do the following:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **Network Configuration**.
5. On the side menu, if you are on a DHCP Ethernet network and using a through cable, push **Automatic (DHCP & Auto-IP)**.
6. If you are using a cross-over cable, push **Manual**, and press **Set IP Addresses Manually** to set a hard coded TCP/IP address.

USB If you are using USB, start by connecting the appropriate USB cable to the USB 2.0 high-speed (HS) device port on the rear panel of your oscilloscope. This port requires that the cable connected from the port to the host computer meets the USB 2.0 specification for high speed connections. Typically, such cables should be 3 feet or shorter in length, but this is determined by the quality of the cable and, with higher quality cables, this length can be extended. (It is also dependent upon the drive capability of the host USB port to which the instrument is connected.) The use of high quality short cables is recommended to avoid USB connection problems.



With USB, the system automatically configures itself. To verify that the USB is enabled:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **USB**, and verify that USB is enabled.
5. If USB is disabled, push **Connect to Computer** on the side menu.

After connection, the host, with appropriate software, can list the oscilloscope as a USB device with the following parameters: (See Table 1-2.)

Table 1-2: USB Device Parameters

Parameter	Value
Manufacturer ID	0x0699 (decimal 1689)
Product ID The product id varies by model number as follows: (You can send the USBTMC:PRODUCTID:HEXadecimal? query to read the value)	DPO4104B 0x0405 (decimal 1029) DPO4054B 0x0406 (decimal 1030) DPO4034B 0x0407 (decimal 1031) MSO4104B 0x0409 (decimal 1033) MSO4054B 0x040A (decimal 1034) MSO4034B 0x040B (decimal 1035) MDO4104-6 0x040C (decimal 1036) MDO4104-3 0x040D (decimal 1037) MDO4054-6 0x040E (decimal 1038) MDO4054-3 0x040F (decimal 1039) DPO4102B 0x0417 (decimal 1047) DPO4102B-L 0x0418 (decimal 1048) DPO4104B-L 0x0419 (decimal 1049) MSO4102B 0x041A (decimal 1050) MSO4102B-L 0x041B (decimal 1051) MSO4104B-L 0x041C (decimal 1052) DPO4014B 0x0426 (decimal 1062) MSO4014B 0x0428 (decimal 1064) MDO4014-3 0x042a (decimal 1066) MDO4034-3 0x042e (decimal 1070) MDO3000 (all) 0x408 (decimal 1032)
Serial number	Serial number
Manufacturer description	“Tektronix”
Interface description	“USBTMC-USB488”

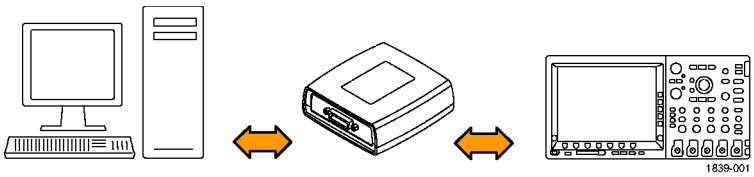
GPIB

To use GPIB (General Purpose Interface Bus), start by connecting an appropriate USB cable to the USB 2.0 high-speed (HS) device port on the rear panel of your oscilloscope. Connect the other end to the TEK-USB-488 Adapter host port. Then connect a GPIB cable from the TEK-USB-488 Adapter to your PC.

Supply power to the Adapter in either of these two ways:

1. Use the optional 5 V_{DC} power adapter connected to the 5 V_{DC} power input on the Adapter.
2. Use an appropriate USB cable connected to a powered USB host port on your PC and the Device port on the TEK-USB-488 Adapter.

The oscilloscope has a USB 2.0 high-speed (HS) device port to control the oscilloscope through USBTMC or GPIB with a TEK-USB-488 Adapter. The USBTMC protocol allows USB devices to communicate using IEEE488 style messages. This lets you run your GPIB software applications on USB hardware.



Before setting up the oscilloscope for remote communication using the electronic (physical) GPIB interface, you should familiarize yourself with the following GPIB requirements:

- A unique device address must be assigned to each device on the bus. No two devices can share the same device address.
- No more than 15 devices can be connected to any one line.
- One device should be connected for every 6 feet (2 meters) of cable used.
- No more than 65 feet (20 meters) of cable should be used to connect devices to a bus.
- At least two-thirds of the devices on the network should be powered on while using the network.
- Connect the devices on the network in a star or linear configuration. Do not use loop or parallel configurations.

To function correctly, your oscilloscope must have a unique device address. The default setting for the GPIB configuration is GPIB Address 1.

To change the GPIB address settings, do the following:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **GPIB**.
5. Enter the GPIB address on the side menu, using the multipurpose knob. This will set the GPIB address on an attached TEK-USB-488 Adapter.

The oscilloscope is now set up for bidirectional communication with your controller.

Setting Up Remote Communications Software

Connect your oscilloscope directly to a computer to let the PC analyze your data, collect screen images, or to control the oscilloscope using a program of your own creation. Three ways to connect your oscilloscope to a computer are through the VISA drivers, the e*Scope Web-enabled tools, or via a socket server.

Using VISA

VISA lets you use your MS-Windows computer to acquire data from your oscilloscope for use in an analysis package that runs on your PC, such as Microsoft Excel, National Instruments LabVIEW, Tektronix OpenChoice Desktop software, or your own custom software. You can use a common communications connection, such as USB, Ethernet, or GPIB, to connect the computer to the oscilloscope.

To set up VISA communications between your oscilloscope and a computer:

1. Load the VISA drivers on your computer. Also, load your application, such as OpenChoice Desktop. You will find the drivers and OpenChoice Desktop software on the appropriate CD that comes with your oscilloscope or at the Tektronix software finder Web page (www.tektronix.com\downloads).
2. Connect the oscilloscope to your computer with the appropriate USB or Ethernet cable. To communicate between the oscilloscope and a GPIB system, connect the oscilloscope to the TEK-USB-488 GPIB-to-USB Adapter with a USB cable. Then connect the adapter to your GPIB system with a GPIB cable. Cycle the power on the oscilloscope.
3. Push **Utility.**
4. Push **Utility Page.**
5. Turn multipurpose knob **a** and select **I/O.**
6. If you are using USB, the system sets itself up automatically for you, if USB is enabled. Check **USB** on the lower menu to be sure that USB is enabled. If it is not enabled, push **USB.** Then push **Connect to Computer** on the side menu.
7. To use Ethernet, push **Ethernet & LXI** on the lower menu. Use the side menu buttons to adjust your network settings, as needed. For more information, see the e*Scope setup information below.
8. If you want to change socket server parameters, push **Socket Server** and enter new values through the resulting side menu.
9. If you are using GPIB, push **GPIB**. Enter the GPIB address on the side menu, using multipurpose knob **a.** This will set the GPIB address on an attached TEK-USB-488 Adapter.
10. Run your application software on your computer.

Quick Tips

- Your oscilloscope shipped with a CD containing a variety of Windows-based software tools for efficient connectivity between your oscilloscope and your computer. These include toolbars that speed connectivity with Microsoft Excel and Word. There are also two standalone acquisition programs called NI LabVIEW SignalExpress™, Tektronix Edition and Tektronix OpenChoice Desktop.
- The rear-panel USB 2.0 high-speed (HS) device port is the correct USB port for computer connectivity. Use the rear- and front-panel USB 2.0 host ports to connect your oscilloscope to USB flash drives, hard drives, printers and keyboards. Use the USB Device port to connect your oscilloscope to a PC or a PictBridge printer.

Using the LXI Web Page and e*Scope

With e*Scope, you can access any Internet-connected MSO/DPO4000B, MDO4000/B or MDO3000 Series oscilloscope from a web browser. To set up e*Scope communications between your oscilloscope and a Web browser running on a remote computer:

1. Connect the oscilloscope to your computer network with an appropriate Ethernet cable.
2. Push **Utility.**
3. Push **Utility Page.**
4. Turn multipurpose knob **a** and select **I/O**.
5. Push **Ethernet & LXI**.
6. On top of the side menu, there is an indicator light which turns green for good status and red if the device detects a fault. Look at it to determine the condition of the LAN.
7. Push **LAN Settings** to display the network parameters configured on your oscilloscope.
8. Push **LAN Reset** to restore the LAN defaults to your oscilloscope.
9. Push **Test Connection** to check if your oscilloscope can find an attached network.
10. Push **More** to see another page of side-menu items.
11. Push **Change Names** to change the name of the oscilloscope, the network domain, or the service name.
12. Push **Change Ethernet & LXI Password** to use the LXI password to also protect your oscilloscope from changes made to LAN settings from a Web browser.
13. Start your browser on your remote computer. In the browser address line, enter the host name, a dot, and the domain name together. Alternatively, just enter the IP address of the instrument. Either way, you should then see the LXI Welcome page on your Web browser on your computer screen.
14. Click “Network Configuration” to view and edit the network configuration settings. If you are using a password and changing your settings, you need to know that the default user name is “lxiuser”.
15. For e*Scope, click the Instrument Control (e*Scope) link on the left side of the LXI Welcome page. You should then see a new tab (or window) open in your browser with e*Scope running.

Using a Socket Server

A socket server provides two-way communication over an Internet Protocol-based computer network. You can use your oscilloscope’s socket server feature to let your oscilloscope talk to a remote-terminal device or computer.

To set up and use a socket server between your oscilloscope and a remote terminal or computer:

1. Connect the oscilloscope to your computer network with an appropriate Ethernet cable.
2. Push **Utility**.
3. Push **Utility Page**.
4. Turn multipurpose knob **a** and select **I/O**.
5. Push **Socket Server**.
6. On the resulting Socket Server side menu, push the top entry to highlight **Enabled**.
7. Choose whether the protocol should be **None** or **Terminal**. A communication session run by a human at a keyboard typically uses a terminal protocol. An automated session might handle its own communications without using such a protocol.
8. If required, change the port number by rotating multipurpose knob **a.**
9. If required, press **OK** to set the new port number.
10. After setting up the socket server parameters, you can now have the computer "talk" to the oscilloscope. If you are running an MS Windows PC, you could run its default client with its command-like interface. One way to do this is by typing " `Telnet` " in the Run window. The Telnet window will open on the PC.

NOTE. *On MS Windows 7, you must first enable Telnet in order for it to work.*

11. Start a terminal session between your computer and your oscilloscope by typing in an open command with the oscilloscope's LAN address and port #. You can obtain the LAN address by pushing the **Ethernet & LXI** bottom menu item and the resulting **LAN Settings** side menu item to view the resulting Ethernet and LXI Setting screen. You can obtain the port # by pushing the **Socket Server** bottom menu item and viewing the **Current Port** side menu item.

    For example, if the oscilloscope IP address was `123.45.67.89` and the port # was the default of `4000`, you could open a session by writing into the MS Windows Telnet screen:

    ```
    o 123.45.67.89 4000
    ```

    The oscilloscope will send a help screen to the computer when it is done connecting.

12. You can now type in a standard query, as found in the programmer manual, such as `*idn?`

    The Telnet session window will respond by displaying a character string describing your instrument. You can type in more queries and view more results on this Telnet session window. You can find the syntax for relevant queries and related status codes in other sections of this manual.

NOTE. *Do not use the computer's backspace key during an MS Windows' Telnet session with the oscilloscope.*

Socket Server Terminal Protocol Mode Commands. Following are Tektronix Instrument Control Terminal Session Control commands:

!t <timeout> : set the response timeout in milliseconds.

!d : send device clear to the instrument.

!r : read response from instrument.

!h : print this usage info.

NOTE. *Commands containing a ? are treated as queries, and the responses are read automatically.*

Documentation

The following documents are available for download at *www.tektronix.com*:

MDO4000B Series Mixed Domain Oscilloscopes User Manual. Information about installing and operating the oscilloscope.

MDO4000B Series Mixed Domain Oscilloscopes Specifications and Performance Verification Technical Reference. Oscilloscope specifications and a performance verification procedure.

MDO4000 Series Mixed Domain Oscilloscopes User Manual. Information about installing and operating the oscilloscope.

MDO4000 Series Mixed Domain Oscilloscopes Specifications and Performance Verification Technical Reference. Oscilloscope specifications and a performance verification procedure.

MSO4000B and DPO4000B Series Digital Phosphor Oscilloscopes User Manual. Information about installing and operating the oscilloscope.

MSO4000B and DPO4000B Series Digital Phosphor Oscilloscopes Technical Reference. Oscilloscope specifications and a performance verification procedure.

MDO3000 Series Mixed Domain Oscilloscopes User Manual. Information about installing and operating the oscilloscope.

MDO3000 Series Mixed Domain Oscilloscopes Specifications and Performance Verification Technical Reference. Oscilloscope specifications and a performance verification procedure.

Getting Started with OpenChoice ™ Solutions Manual. Options for getting data from your oscilloscope into any one of several available analysis tools.

TekVISA Programmer Manual. Description of TekVISA, the Tektronix implementation of the VISA Application Programming Interface (API). TekVISA is industry-compliant software for writing interoperable oscilloscope drivers in a variety of Application Development Environments (ADEs).

Syntax and Commands

Command Syntax

You can control the operations and functions of the oscilloscope through the Ethernet port or the USB 2.0 high-speed (HS) device port using commands and queries. The related topics listed below describe the syntax of these commands and queries. The topics also describe the conventions that the oscilloscope uses to process them. See the *Command Groups* topic in the table of contents for a listing of the commands by command group, or use the index to locate a specific command.

Backus-Naur Form Notation

This documentation describes the commands and queries using Backus-Naur Form (BNF) notation. Refer to the following table for the symbols that are used.

Table 2-1: Symbols for Backus-Naur Form

Symbol	Meaning
< >	Defined element
=	Is defined as
|	Exclusive OR
{ }	Group; one element is required
[ ]	Optional; can be omitted
. . .	Previous element(s) may be repeated

Command and Query Structure

Commands consist of set commands and query commands (usually called commands and queries). Commands modify oscilloscope settings or tell the oscilloscope to perform a specific action. Queries cause the oscilloscope to return data and status information.

Most commands have both a set form and a query form. The query form of the command differs from the set form by its question mark at the end. For example, the set command `ACQuire:MODe` has a query form `ACQuire:MODe?`. Not all commands have both a set and a query form. Some commands have set only and some have query only.

Messages

A command message is a command or query name followed by any information the oscilloscope needs to execute the command or query. Command messages may contain five element types, defined in the following table.

Table 2-2: Command Message Elements

Symbol	Meaning
<Header>	This is the basic command name. If the header ends with a question mark, the command is a query. The header may begin with a colon (:) character. If the command is concatenated with other commands, the beginning colon is required. Never use the beginning colon with command headers beginning with a star (*).
<Mnemonic>	This is a header subfunction. Some command headers have only one mnemonic. If a command header has multiple mnemonics, a colon (:) character always separates them from each other.
<Argument>	This is a quantity, quality, restriction, or limit associated with the header. Some commands have no arguments while others have multiple arguments. A <space> separates arguments from the header. A <comma> separates arguments from each other.
<Comma>	A single comma is used between arguments of multiple-argument commands. Optionally, there may be white space characters before and after the comma.
<Space>	A white space character is used between a command header and the related argument. Optionally, a white space may consist of multiple white space characters.

Commands

Commands cause the oscilloscope to perform a specific function or change one of the settings. Commands have the structure:

```
[:]<Header>[<Space><Argument>[<Comma> <Argument>]...]
```

A command header consists of one or more mnemonics arranged in a hierarchical or tree structure. The first mnemonic is the base or root of the tree and each subsequent mnemonic is a level or branch off the previous one. Commands at a higher level in the tree may affect those at a lower level. The leading colon (:) always returns you to the base of the command tree.

Queries

Queries cause the oscilloscope to return status or setting information. Queries have the structure:

- `[:]<Header>`
- `[:]<Header>[<Space><Argument> [<Comma><Argument>]...]`

You can specify a query command at any level within the command tree unless otherwise noted. These branch queries return information about all the mnemonics below the specified branch or level.

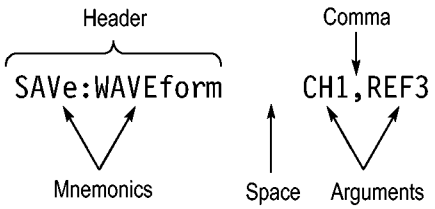
Headers

Use the `HEADer` command to control whether the oscilloscope returns headers as part of the query response. If header is on, the query response returns command headers, then formats itself as a valid set command. When header is off, the response includes only the values. This may make it easier to parse and extract the information from the response. The table below shows the difference in responses.

Table 2-3: Comparison of Header Off and Header On Responses

Query	Header Off	Header On
TIME?	14:30:00	:TIME “14:30:00”
ACQuire:NUMAVg?	100	:ACQUIRE:NUMAVG 100

Command Parts



Clearing the oscilloscope

You can clear the Output Queue and reset the oscilloscope to accept a new command or query by using the selected Device Clear (DCL) function.

Command Entry

The following rules apply when entering commands:

- You can enter commands in upper or lower case.
- You can precede any command with white space characters. White space characters include any combination of the ASCII control characters 00 through 09 and 0B through 20 hexadecimal (0 through 9 and 11 through 32 decimal).
- The oscilloscope ignores commands consisting of any combination of white space characters and line feeds.

Abbreviating

You can abbreviate many oscilloscope commands. Each command in this documentation shows the minimum acceptable abbreviations in capitals. For example, you can enter the command ACQuire:NUMAvg simply as ACQ:NUMA or acq:numa.

Abbreviation rules may change over time as new oscilloscope models are introduced. Thus, for the most robust code, use the full spelling.

If you use the HEADer command to have command headers included as part of query responses, you can further control whether the returned headers are abbreviated or are full-length with the VERBose command.

Concatenating

You can concatenate any combination of set commands and queries using a semicolon (;). The oscilloscope executes concatenated commands in the order received.

When concatenating commands and queries, you must follow these rules:

1. Separate completely different headers by a semicolon and by the beginning colon on all commands except the first one. For example, the commands TRIGger:MODe NORMal and ACQuire:NUMAVg 8, can be concatenated into the following single command:

   ```
   TRIGger:MODe NORMal;:ACQuire:NUMAVg 8
   ```

2. If concatenated commands have headers that differ by only the last mnemonic, you can abbreviate the second command and eliminate the beginning colon. For example, you can concatenate the commands ACQuire:MODe ENVelope and ACQuire:NUMAVg 8 into a single command:

   ```
   ACQuire:MODe ENVelope; NUMAVg 8
   ```

   The longer version works equally well:

   ```
   ACQuire:MODe ENVelope;:ACQuire:NUMAVg 8
   ```

3. Never precede a star (*) command with a colon:

   ```
   ACQuire:STATE 1;*OPC
   ```

   Any commands that follow will be processed as if the star command was not there so the commands, ACQuire:MODe ENVelope;*OPC;NUMAVg 8 will set the acquisition mode to envelope and set the number of acquisitions for averaging to 8.

4. When you concatenate queries, the responses to all the queries are concatenated into a single response message. For example, if the display graticule is set to Full and the display style is set to dotsonly, the concatenated query DISplay:GRAticule?;STYle:DOTsonly? will return the following.

If the header is on:

```
DISPLAY:GRATICULE FULL;:DISPLAY:STYLE:DOTSONLY 1
```

If the header is off:

```
FULL;1
```

1. Set commands and queries may be concatenated in the same message. For example,

   ```
   ACQuire:MODe SAMple;NUMAVg?;STATE?
   ```

   is a valid message that sets the acquisition mode to sample. The message then queries the number of acquisitions for averaging and the acquisition state. Concatenated commands and queries are executed in the order received.

   Here are some invalid concatenations:

   `DISPlay:STYle:DOTsonly OFF;ACQuire:NUMAVg 8` (no colon before `ACQuire`)

   `DISPlay:GRAticule FULL;:STYle:DOTSONLY OFF` (extra colon before `STYle`.

   `DISPlay:GRAticule FULL;:*TRG` (colon before a star (*) command)

   `MATH:HORizontal:SCAle 1.0e-1;HORizontal:POSition 5.0el` (levels of the mnemonics are different; either remove the second use of `HORizontal:` or place `:MATH` in front of `HORizontal:POSition`)

Terminating

This documentation uses <EOM> (End of Message) to represent a message terminator.

Table 2-4: End of Message Terminator

Symbol	Meaning
<EOM>	Message terminator

The end-of-message terminator must be the END message (EOI asserted concurrently with the last data byte). The last data byte may be an ASCII line feed (LF) character.

This oscilloscope does not support ASCII LF only message termination. The oscilloscope always terminates outgoing messages with LF and EOI.

Constructed Mnemonics

Some header mnemonics specify one of a range of mnemonics. For example, a channel mnemonic can be CH1, CH2, CH3, or CH4. You use these mnemonics in the command just as you do any other mnemonic. For example, there is a `CH1:POSition` command, and there is also a `CH2:POSition` command. In the command descriptions, this list of choices is abbreviated as CH<x>.

Cursor Position Mnemonics

When cursors are displayed, commands may specify which cursor of the pair to use.

Table 2-5: Channel Mnemonics

Symbol	Meaning
CH<x>	A channel specifier; <x> is 1 through 4.

Table 2-6: Cursor Mnemonics

Symbol	Meaning
CURSOR<x>	A cursor selector; <x> is either 1 or 2.
POSITION<x>	A cursor selector; <x> is either 1 or 2.
HPOS<x>	A cursor selector; <x> is either 1 or 2.

Math Specifier Mnemonics

Commands can specify the mathematical waveform to use as a mnemonic in the header.

Table 2-7: Math Specifier Mnemonics

Symbol	Meaning
Math<x>	A math waveform specifier; <x> is 1.

Measurement Specifier Mnemonics

Commands can specify which measurement to set or query as a mnemonic in the header. Up to eight automated measurements may be displayed.

Table 2-8: Measurement Specifier Mnemonics

Symbol	Meaning
MEAS<x>	A measurement specifier; <x> is 1 through 8.

Channel Mnemonics

Commands specify the channel to use as a mnemonic in the header.

Reference Waveform Mnemonics

Commands can specify the reference waveform to use as a mnemonic in the header.

Table 2-9: Reference Waveform Mnemonics

Symbol	Meaning
REF<x>	A reference waveform specifier; <x> is 1, 2, 3, or 4 for 4-channel oscilloscopes and 1 or 2 for 2-channel oscilloscopes.

Argument Types

Commands use arguments such as enumeration, numeric, quoted string and block. Each of these arguments are listed in detail below.

Enumeration

Enter these arguments as unquoted text words. Like key words, enumeration arguments follow the same convention where the portion indicated in uppercase is required and that in lowercase is optional.

For example: `SAVe:WAVEform:FILEFormat INTERNal`

Numeric

Many oscilloscope commands require numeric arguments. The syntax shows the format that the oscilloscope returns in response to a query. This is also the preferred format when sending the command to the oscilloscope, though any of the formats will be accepted. This documentation represents these arguments as described below.

Table 2-10: Numeric Arguments

Symbol	Meaning
<NR1>	Signed integer value
<NR2>	Floating point value without an exponent
<NR3>	Floating point value with an exponent
<bin>	Signed or unsigned integer in binary format

Most numeric arguments will be automatically forced to a valid setting, by either rounding or truncating, when an invalid number is input, unless otherwise noted in the command description.

Quoted String

Some commands accept or return data in the form of a quoted string, which is simply a group of ASCII characters enclosed by a single quote (') or double quote ("). The following is an example of a quoted string: `"This is a quoted string"`. This documentation represents these arguments as follows:

Table 2-11: Quoted String Argument

Symbol	Meaning
<QString>	Quoted string of ASCII text

A quoted string can include any character defined in the 7-bit ASCII character set. Follow these rules when you use quoted strings:

1. Use the same type of quote character to open and close the string. For example: `"this is a valid string"`.
2. You can mix quotation marks within a string as long as you follow the previous rule. For example: `"this is an 'acceptable' string"`.
3. You can include a quote character within a string by repeating the quote. For example: `"here is a "" mark"`.
4. Strings can have upper or lower case characters.
5. If you use a GPIB network, you cannot terminate a quoted string with the END message before the closing delimiter.
6. A carriage return or line feed embedded in a quoted string does not terminate the string. The return is treated as another character in the string.
7. The maximum length of a quoted string returned from a query is 1000 characters.

Here are some invalid strings:

- `"Invalid string argument'` (quotes are not of the same type)
- `"test<EOI>"` (termination character is embedded in the string)

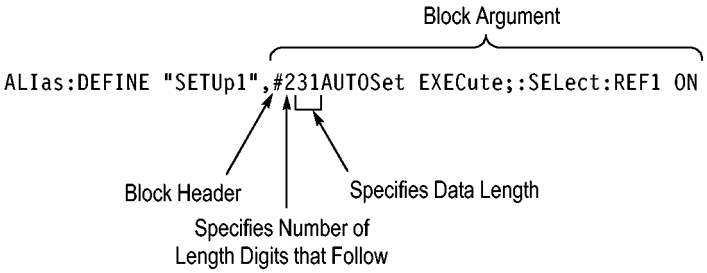
Block

Several oscilloscope commands use a block argument form, as defined in the table below.

Table 2-12: Block Argument

Symbol	Meaning
<NZDig>	A nonzero digit character in the range of 1–9
<Dig>	A digit character, in the range of 0–9
<DChar>	A character with the hexadecimal equivalent of 00 through FF (0 through 255 decimal)
<Block>	A block of data bytes defined as: <Block> ::= {#<NZDig><Dig>[<Dig>...][<DChar>...] |#0[<DChar>...]<terminator>}

<NZDig> specifies the number of <Dig> elements that follow. Taken together, the <NZDig> and <Dig> elements form a decimal integer that specifies how many <DChar> elements follow.


Block Argument
ALIas:DEFINE "SETUp1",#231AUTOSet EXECute;:SELect:REF1 ON
Block Header
Specifies Number of
Length Digits that Follow
Specifies Data Length

Command Groups

This manual lists the MDO4000B, MDO4000, MSO4000B, DPO4000B and MDO3000 Series IEEE488.2 commands in two ways. First, it presents them by functional groups. Then, it lists them alphabetically. The functional group list starts below. The alphabetical list provides detail on each command.

Acquisition Command Group

Use the commands in the Acquisition Command Group to set up the modes and functions that control how the oscilloscope acquires signals input to the channels, and processes them into waveforms.

Using the commands in this group, you can do the following:

- Start and stop acquisitions.
- Control whether each waveform is simply acquired, averaged, or enveloped over successive acquisitions of that waveform.
- Set the controls or conditions that start and stop acquisitions.
- Control acquisition of channel waveforms.
- Set acquisition parameters.

Table 2-13: Acquisition Commands

Command	Description
ACQuire?	Returns acquisition parameters
ACQuire:FASTAcq	Sets or queries the fast acquisition feature.
ACQuire:FASTAcq:PALEtte	Sets (or queries) which palette to use for fast acquisition mode.
ACQuire:FASTAcq:STATE	Turns fast acquisition mode on or off, or queries the state of the mode.
ACQuire:MAGnivu	This command specifies the MagniVu feature
ACQuire:MAXSamplerate?	Returns the maximum real-time sample rate
ACQuire:MODe	Specifies the acquisition mode of the oscilloscope for all analog channel waveforms.
ACQuire:NUMACq?	Returns number of acquisitions that have occurred
ACQuire:NUMAVg	This command specifies the number of acquisitions for an averaged waveform
ACQuire:NUMEnv	This command controls the number of envelopes (when acquisition mode is set to ENVelope using ACQuire:MODe).
ACQuire:STATE	Starts or stops the acquisition system
ACQuire:STOPAfter	This command specifies whether the acquisition is continuous or single sequence

Act on Event Command Group

Use the Act on Event commands to ***Act*** once a certain type of ***Event*** has happened.

Available actions:

- Stop acquisitions
- Save waveform data to a file
- Save a screen image to a file
- Send a screen image to a printer
- Send a pulse to the Aux Out port
- Generate a service request
- Send an email
- Display a visual notification

Available events:

- Upon trigger

-When a certain number of acquisitions have completed

- None

Table 2-14: Act on Event

Command	Description
ACTONEVent:ACTION:AUXOUT:STATE	Sends a pulse to the AUX OUT port when a specified event occurs, or queries the state of the “pulse to aux out” action.
ACTONEVent:ACTION:EMAIL:STATE	Sends an email when a specified event occurs, or queries the state of the “send email” action.
ACTONEVent:ACTION:PRINT:STATE	Sends a screen image to a printer when a specified event occurs, or queries the state of the “send screen image” action.
ACTONEVent:ACTION:SAVEIMAGE:STATE	Saves a screen image to file when a specified event occurs, or queries the state of the “save screen image to a file” action.
ACTONEVent:ACTION:SAVEWFM:STATE	Saves the currently selected waveform data to a file when a specified event occurs, or queries the state of the “save waveform to file” action.
ACTONEVent:ACTION:SRQ:STATE	Sets or returns the enabled state of the generate service request (SRQ) action when a specified event occurs. The default state is 0.
ACTONEVent:ACTION:STOPACQ:STATE	Stops acquisitions when a specified event occurs, or queries the state of the “stop acquisition” action.
ACTONEVent:ACTION:VISUAL:STATE	Sends a visual notification when a specified event occurs, or queries the state of the “send a visual notification” action.
ACTONEVent:EVENTTYPe	Specifies (or queries) which event to act on (TRIGger, ACQCOMPLete, or NONe) when using an Act on Event command.
ACTONEVent:NUMACQs	Sets (or queries) the number of acquisitions to complete for the event type `ACQCOMPLete`.
ACTONEVent:REPEATCount	Sets or returns the number of events to run.

AFG Command Group

Use the AFG commands for Arbitrary Function Generator functionality.

Available for the MDO3000 series only. Requires the MDO3AFG option to be installed.

The AFG functionality is available when either the time domain acquisition or RF acquisition is active.

Table 2-15: AFG Commands

Command	Description
AFG:AMPLitude	Sets (or queries) the AFG amplitude in volts, peak to peak.
AFG:FREQuency	Sets (or queries) the AFG frequency.
AFG:FUNCtion	Sets (or queries) which AFG function to execute.
AFG:HIGHLevel	Sets (or queries) the AFG high level, in volts.
AFG:LEVELPreset	Sets (or queries) the AFG preset levels to values that correspond to the logic standard specified by the argument The presets set the vertical controls for AMPLitude, OFFSet , HIGHLevel, and LOWLevel.
AFG:LOWLevel	Sets (or queries) the AFG low level, in volts.
AFG:NOISEAdd:PERCent	Sets (or queries) the AFG additive noise level as a percentage.
AFG:NOISEAdd:STATE	Sets (or queries) the AFG additive noise state.
AFG:OFFSet	Sets (or queries) the AFG offset, in volts.
AFG:OUTPut:LOAd:IMPEDance	Sets (or queries) the AFG output load impedance.
AFG:OUTPut:STATE	Sets (or queries) the AFG output state.
AFG:PERIod	Sets (or queries) the period of the AFG waveform, in seconds.
AFG:PHASe	Sets (or queries) the AFG phase.
AFG:PULse:WIDth	Sets (or queries) the AFG pulse width, in seconds.
AFG:RAMP:SYMmetry	Sets (or queries) the AFG ramp symmetry as a percentage.
AFG:SQUare:DUty	Sets (or queries) the AFG duty cycle, as a percentage.

Alias Command Group

Use the Alias commands to define new commands as a sequence of standard commands. You may find this useful when repeatedly using the same commands to perform certain tasks like setting up measurements.

Aliases are similar to macros but do not include the capability to substitute parameters into alias bodies. To use Alias commands, first define the alias, then turn on the alias state.

The alias mechanism obeys the following rules:

- the alias name must consist of a valid IEEE488.2 message unit, which may not appear in a message preceded by a colon, comma, or a command or query program header.
- the alias name may not appear in a message followed by a colon, comma, or question mark.
- an alias name must be distinct from any keyword or keyword short form.
- an alias name cannot be redefined without first being deleted using one of the alias deletion functions.
- alias names do not appear in response messages.

Table 2-16: Alias Commands

Command	Description
ALIas:CATalog?	Returns a list of the currently defined alias labels
ALIas:DEFine	Assigns a sequence of program messages to an alias label
ALIas:DELEte:ALL	Deletes all existing aliases
ALIas:DELEte[:NAMe]	Removes a specified alias
ALIas[:STATE]	This command specifies the alias state

ARB Command Group

Use the ARB commands for Arbitrary Waveform Generator functionality.

Available for the MDO3000 series only. Requires the MDO3AFG option to be installed.

Table 2-17: ARB Commands

Command	Description
AFG:ARBitrary:ARB<x>:DATE?	Returns the date that the data in the specified arbitrary waveform slot 1-4 was saved.
AFG:ARBitrary:ARB<x>:LABel	Sets (or queries) the waveform label for arbitrary waveform slots 1- 4.
AFG:ARBitrary:ARB<x>:TIMe?	Returns the time that the data in the specified arbitrary waveform slot was saved.
AFG:ARBitrary:EMEM:FUNCtion?	Returns the currently selected arbitrary waveform pre-defined function.
AFG:ARBitrary:EMEM:GENerate	This command generates the arbitrary waveform function specified by the enumeration argument, with the number of points optionally specified by the NR1 argument. To query the arbitrary waveform function set by this command, use AFG:ARBitrary:EMEM:FUNCtion?
AFG:ARBitrary:EMEM:NUMPoints?	Returns the number of points in the AFB arbitrary waveform edit memory.
AFG:ARBitrary:EMEM:POINTS	Specifies which points to load into the AFG arbitrary waveform edit memory.
AFG:ARBitrary:EMEM:POINTS:ENCdg	This command specifies the data encoding format for the AFG:ARBitrary:EMEM:POINTS query (either ASCII or binary).

Bus Command Group

Use the Bus commands when working with serial or parallel bus measurements. Bus commands let you specify the bus number (B1-B4), except for MDO3000, which has only two buses (B1-B2).

Parallel bus trigger and analysis functionality is included standard with the MSO and MDO Series. All other bus triggers require installation of an application module.

A table is available that lists all commands enabled by each application module (See page G-1, *Application Module-enabled Commands*.)

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3COMP.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals, when tested with the MDO4000/B and MSO/DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

NOTE. *The Search Command Group and the Trigger Command Group also contain bus-related commands.*

Table 2-18: Bus Commands

Commands	Description
BUS?	Returns the parameters for each serial (if installed) and parallel bus.
BUS:B<x>:AUDio:BITDelay	This command specifies the number of delay bits for the AUDIO bus
BUS:B<x>:AUDio:BITOrder	This command specifies the bit order for the AUDIO bus
BUS:B<x>:AUDio:CHANnel:SIZe	This command specifies the number of bits per channel for the AUDIO bus

Table 2-18: Bus Commands (cont.)

Commands	Description
BUS:B<x>:AUDio:CLOCk:POLarity	This command specifies the clock polarity for the AUDIO bus
BUS:B<x>:AUDio:CLOCk:SOUrce	This command specifies the clock source waveform for the AUDIO bus
BUS:B<x>:AUDio:DATa:POLarity	This command specifies the data polarity for the AUDIO bus
BUS:B<x>:AUDio:DATa:SIZe	This command specifies the number of bits per word for the AUDIO bus
BUS:B<x>:AUDio:DATa:SOUrce	This command specifies the data source waveform for the AUDIO bus
BUS:B<x>:AUDio:DISplay:FORMat	This command specifies the display format for the AUDIO bus
BUS:B<x>:AUDio:FRAME:SIZe	This command specifies the number of channels in each frame for the AUDIO bus
BUS:B<x>:AUDio:FRAMESync:POLarity	This command specifies the frame sync polarity for the AUDIO bus
BUS:B<x>:AUDio:FRAMESync:SOUrce	This command specifies the frame sync source waveform for the AUDIO bus
BUS:B<x>:AUDio:TYPe	This command specifies the audio format (type) for the AUDIO bus
BUS:B<x>:AUDio:WORDSel:POLarity	This command specifies the word select polarity for the AUDIO bus
BUS:B<x>:AUDio:WORDSel:SOUrce	This command specifies the word select source waveform for the AUDIO bus
BUS:B<x>:CAN:BITRate	This command specifies the bit rate for the CAN bus
BUS:B<x>:CAN:PRObe	This command specifies the probing method for the CAN bus
BUS:B<x>:CAN:SAMPLEpoint	This command specifies the sample point (in %) to sample during each bit period
BUS:B<x>:CAN:SOUrce	This command specifies the CAN bus data source
BUS:B<x>:DISplay:FORMat	Sets the display format for the numerical information in the specified bus waveform
BUS:B<x>:DISplay:TYPe	Sets the display type for the specified bus
BUS:B<x>:ETHERnet:PRObe	This command specifies the Ethernet probe type: differential or single-ended.
BUS:B<x>:ETHERnet:PROTOcol	Use this command to set the Ethernet protocol type to TCP/IPv4, or to OTHER.
BUS:B<x>:ETHERnet:SOUrce:DIFFerential	This command specifies the Ethernet data source for differential input.
BUS:B<x>:ETHERnet:SOUrce:DMINus	This command specifies the Ethernet data source for D- input for single-ended probing.
BUS:B<x>:ETHERnet:SOUrce:DPLUs	This command specifies the Ethernet data source for the D+ input for single-ended probing.
BUS:B<x>:ETHERnet:TYPe	This command specifies the Ethernet standard type: 10Base-T or 100Base-T.
BUS:B<x>:FLEXray:BITRate	This command specifies the bit rate for the FlexRay bus signal
BUS:B<x>:FLEXray:CHannel	This command specifies the FlexRay bus ID format
BUS:B<x>:FLEXray:SIGnal	This command specifies the FlexRay bus standard
BUS:B<x>:FLEXray:SOUrce	This command specifies the FlexRay bus data source
BUS:B<x>:I2C:ADDRess:RWINClude	Sets and returns whether the read/write bit is included in the address
BUS:B<x>:I2C{:CLOCk|:SCLk}:SOUrce	This command specifies the I2C bus SCLK source
BUS:B<x>:I2C{:DATa|:SDAta}:SOUrce	This command specifies the I2C bus SDATA source

Table 2-18: Bus Commands (cont.)

Commands	Description
BUS:B<x>:LABel	This command specifies the waveform label for the specified bus
BUS:B<x>:LIN:BITRate	This command specifies the bit rate for the LIN bus.
BUS:B<x>:LIN:IDFORmat	This command specifies the LIN bus ID format
BUS:B<x>:LIN:POLarity	This command specifies the LIN bus polarity
BUS:B<x>:LIN:SAMPLEpoint	This command specifies the point to sample during each bit period, as a percent, for the LIN bus.
BUS:B<x>:LIN:SOUrce	This command specifies the LIN bus data source
BUS:B<x>:LIN:STANDard	This command specifies the LIN bus standard
BUS:B<x>:MIL1553B:POLarity	This command sets the MIL-STD-1553 bus polarity to normal or inverted.
BUS:B<x>:MIL1553B:RESPonsetime:MAXimum	This command specifies the maximum response time to a valid command issued for the MIL-STD-1553 bus.
BUS:B<x>:MIL1553B:RESPonsetime:MINimum	This command specifies the minimum response time to a valid command issued for the MIL-STD-1553 bus.
BUS:B<x>:MIL1553B:SOUrce	This command specifies the source for differential input for the MIL-STD-1553 bus.
BUS:B<x>:PARallel:BIT<x>:SOUrce	This command specifies the bit source for the parallel bus.
BUS:B<x>:PARallel:CLOCk:EDGE	This command specifies the clock edge for the parallel bus
BUS:B<x>:PARallel:CLOCk:ISCLOCKed	This command specifies the state of the clock function for the parallel bus.
BUS:B<x>:PARallel:CLOCk:SOUrce	This command specifies the clock source waveform for the parallel bus.
BUS:B<x>:PARallel:WIDth	This command specifies the number of bits to use for the width of the parallel bus.
BUS:B<x>:POSition	This command specifies the position of the bus waveform on the display.
BUS:B<x>:RS232C:BITRate	This command specifies the bit rate for the RS-232 bus.
BUS:B<x>:RS232C:DATABits	This command specifies the number of bits in the data frame for the RS-232 bus.
BUS:B<x>:RS232C:DELIMiter	This command specifies the delimiting value for a packet on the RS-232 bus.
BUS:B<x>:RS232C:DISplaymode	This command specifies the display mode for the RS-232 bus (frame or packet).
BUS:B<x>:RS232C:PARity	This command specifies parity for the RS-232 bus
BUS:B<x>:RS232C:POLarity	This command specifies the polarity for the RS-232C bus
BUS:B<x>:RS232C:RX:SOUrce	This command specifies the RX source waveform for the RS-232 bus.
BUS:B<x>:RS232C:TX:SOUrce	This command specifies the TX source waveform for the RS-232 bus.
BUS:B<x>:SPI:BITOrder	This command specifies the bit order for the SPI bus
BUS:B<x>:SPI{:CLOCk|:SCLk}:POLarity	This command specifies the SCLK polarity for the SPI bus.
BUS:B<x>:SPI{:CLOCk|:SCLk}:SOUrce	This command specifies the SCLK source for the SPI bus.
BUS:B<x>:SPI:DATa{:IN|:MISO}:POLarity	This command specifies the MISO polarity for the SPI bus.
BUS:B<x>:SPI:DATa{:IN|:MISO}:SOUrce	This command specifies the MISO source for the SPI bus.

Table 2-18: Bus Commands (cont.)

Commands	Description
BUS:B<x>:SPI:DATa{:OUT|:MOSI}:POLarity	This command specifies the MOSI polarity for the SPI bus.
BUS:B<x>:SPI:DATa{:OUT|:MOSI}:SOUrce	This command specifies the MOSI source for the SPI bus.
BUS:B<x>:SPI:DATa:SIZe	This command specifies the number of bits per word (data size) for the specified SPI bus.
BUS:B<x>:SPI:FRAMING	This command specifies the type of framing to use for the SPI bus.
BUS:B<x>:SPI:IDLETime	This command specifies the idle time, in seconds, for the SPI bus.
BUS:B<x>:SPI{:SELect|:SS}:POLarity	This command specifies the polarity for the SPI bus.
BUS:B<x>:SPI{:SELect|:SS}:SOUrce	This command specifies the source waveform for the SPI bus.
BUS:B<x>:STATE	This command specifies the on/off state of the bus.
BUS:B<x>:TYPe	This command specifies the bus type
BUS:B<x>:USB:BITRate	This command specifies the bit rate for the USB bus.
BUS:B<x>:USB:PRObe	This command specifies the type of probe connected to the USB bus.
BUS:B<x>:USB:SOUrce:DIFFerential	This command specifies the source waveform for the eUSB bus when using a differential probe.
BUS:B<x>:USB:SOUrce:DMINus	This command specifies the source waveform for the USB bus D- input.
BUS:B<x>:USB:SOUrce:DPLUs	This command specifies the source for the USB D+ input.
BUS:LOWerthreshold:CH<x>	This command specifies the lower threshold for each channel.
BUS:LOWerthreshold{:MATH|:MATH1}	This command specifies the lower threshold for the math waveform.
BUS:LOWerthreshold:REF<x>	This command sets the lower threshold for each reference waveform.
BUS:THReshold:CH<x>	This command specifies the threshold for a channel.
BUS:THReshold:D<x>	This command specifies the threshold for a digital channel.
BUS:UPPerthreshold:CH<x>	This command specifies the upper threshold for each channel.
BUS:UPPerthreshold{:MATH|:MATH1}	This command specifies the upper threshold for the math waveform.
BUS:UPPerthreshold:REF<x>	This command sets the upper threshold for each reference waveform.

Calibration and Diagnostic Command Group

The Calibration and Diagnostic commands provide information about the current state of oscilloscope calibration. They also initiate internal signal path calibration (SPC) or execute diagnostic tests. Commands that are specific to factory calibration are not described in this manual. Instead, they are described in the Service Manual Documentation CD-ROM in PDF format. You can also order a printed copy.

Table 2-19: Calibration and Diagnostic Commands

Command	Description
*CAL?	Instructs the oscilloscope to perform self-calibration and returns the oscilloscope self calibration status.
CALibrate:FACtory:STATus?	Returns the factory calibration status value saved in nonvolatile memory.
CALibrate:FACtory:STATus:AFG?	Returns the factory calibration status for the Arbitrary Function Generator portion of the instrument, if present.
CALibrate:FACtory:STATus:RF?	Returns the factory calibration status value saved in nonvolatile memory for the RF portion of the oscilloscope.
CALibrate:FACtory:STATus:SCOPE?	Returns the factory calibration status value saved in nonvolatile memory for the non-RF portion of the oscilloscope.
CALibrate:INTERNal	Starts a signal path compensation
CALibrate:INTERNal:STARt	Starts the internal signal path calibration.
CALibrate:INTERNal:STATus?	Returns the current status of the internal signal path calibration.
CALibrate:INTERNal:STATus:RF?	This query returns the status of the last SPC run for the RF portion of the instrument: (doesn't include the analog channels).
CALibrate:INTERNal:STATus:SCOPE?	This query returns the status of the last SPC run for the oscilloscope portion of the instrument (doesn't include the RF portion).
CALibrate:RESults?	Returns the status of all calibration subsystems without performing an SPC operation.
CALibrate:RESults:FACtory?	Returns the status of internal and factory calibration.
CALibrate:RESults:FACtory:AFG?	This query returns the factory calibration status for the Arbitrary Function Generator portion of the instrument, if present.
CALibrate:RESults:FACtory:RF?	This query returns the factory calibration status for the RF portion of the instrument, if present.
CALibrate:RESults:FACtory:SCOPE?	This query returns the factory calibration status for the oscilloscope (doesn't include RF or AFG) of the instrument.
CALibrate:RESults:SPC?	Returns the results of the last SPC operation.
CALibrate:RESults:SPC:RF?	This query returns the status of the last SPC run for the RF portion of the instrument (doesn't include analog channels) . This query is synonymous with `CALibrate:INTERNal:STATus:RF?`
CALibrate:RESults:SPC:SCOPE?	This query returns the status of the last SPC run for the oscilloscope portion of the instrument (doesn't include the RF portion). This query is synonymous to `CALibrate:INTERNal:STATus:SCOPE?`
CALibrate:RF	This command begins the RF calibration process.
CALibrate:RF:STARt	This command is identical to `CALIBRATE:RF`.
CALibrate:RF:STATus?	This query returns the status of the last RF calibration.
DIAg:LOOP:OPTion	Sets the self-test loop option.
DIAg:LOOP:OPTion:NTIMes	Sets the self-test loop option to run N times.
DIAg:LOOP:STOP	Stops the self-test at the end of the current loop.
DIAg:RESUlt:FLAg?	Returns the pass/fail status from the last self-test sequence execution.
DIAg:RESUlt:LOG?	Returns the internal results log from the last self-test sequence execution.
DIAg:SELect	Runs self tests on the specified system subsystem.

Table 2-19: Calibration and Diagnostic Commands (cont.)

Command	Description
DIAg:SELect:<function>	Specifies which of the subsystems will be tested when the `DIAg:STATE EXECute` command is run.
DIAg:STATE	Sets the oscilloscope operating state.

Configuration Command Group

Use the queries in the Configuration Command Group to determine whether a particular feature is present. “RF” commands work on MDO models only

Table 2-20: Configuration Commands

Command	Description
CONFIGuration:ADVMATH?	This query returns a boolean value to indicate whether the instrument supports the advanced math feature.
CONFIGuration:AFG?	Indicates whether or not the arbitrary function generator hardware is present, and the arbitrary function generation feature is enabled.
CONFIGuration:ANALOg:BANDWidth?	This query returns the maximum bandwidth for analog channels.
CONFIGuration:ANALOg:GNDCPLG?	This query returns a boolean value to indicate whether the instrument supports the ground coupling feature for analog channels. As this feature is not supported on MSO/DPO4000B or MDO4000/B models, this query always returns 0.
CONFIGuration:ANALOg:MAXBANDWidth?	Returns the maximum bandwidth for analog channels.
CONFIGuration:ANALOg:MAXSAMPLERate?	This query returns the maximum sample rate for analog channels.
CONFIGuration:ANALOg:NUMCHANnels?	This query returns the number of analog channels.
CONFIGuration:ANALOg:RECLENS?	This query returns a list of supported record lengths for analog channels.
CONFIGuration:ANALOg:VERTINVert?	This query returns a boolean value to indicate whether the instrument supports the vertical invert feature for analog channels.
CONFIGuration:APPLications:CUSTOMMask?	Indicates whether the Custom Mask test feature is present and enabled.
CONFIGuration:APPLications:LIMITMask?	This query returns a boolean value to indicate whether the instrument supports the mask/limit test application feature.

Table 2-20: Configuration Commands (cont.)

Command	Description
CONFIGuration:APPLications:POWer?	This query returns a boolean value to indicate whether the optional power application feature is present.
CONFIGuration:APPLications:STANDARDMask?	Indicates whether the Standard Mask test feature is present and enabled.
CONFIGuration:APPLications:VIDPIC?	Indicates whether the Video Picture feature is present and enabled.
CONFIGuration:ARB?	Indicates whether or not the arbitrary function generator hardware is present, and the user-defined arbitrary waveform generation feature is enabled. Note that this is different than the `CONFIGuration:AFG?` query.
CONFIGuration:AUXIN?	This query returns a boolean value to indicate whether the instrument has an Aux Input connector.
CONFIGuration:BUSWAVEFORMS:AUDIO?	This query returns a boolean value to indicate whether the optional audio bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:CAN?	This query returns a boolean value to indicate whether the optional CAN bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:ETHERNET?	This query returns a boolean value to indicate whether the optional Ethernet triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:FLEXRAY?	This query returns a boolean value to indicate whether the optional FlexRay bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:I2C?	This query returns a boolean value to indicate whether the optional I^2C bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:LIN?	This query returns a boolean value to indicate whether the optional LIN bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:MIL1553B?	This query returns a boolean value to indicate whether the optional MIL-STD-1553 bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:NUMBUS?	This query returns the number of bus waveforms.
CONFIGuration:BUSWAVEFORMS:PARallel?	This query returns a boolean value to indicate whether the parallel bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:RS232C?	This query returns a boolean value to indicate whether the optional RS232 bus triggering and analysis feature is present.

Table 2-20: Configuration Commands (cont.)

Command	Description
CONFIGuration:BUSWAVEFORMS:SPI?	This query returns a boolean value to indicate whether the optional SPI bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:USB?	This query returns a boolean value to indicate whether the USB bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:USB:HS?	This query returns a boolean value to indicate whether the high-speed USB bus triggering and analysis feature is present.
CONFIGuration:DIGITAI:MAGnivu?	This query returns a boolean value to indicate whether the instrument supports the MagniVu feature for digital channels. If there are no digital channels, the value returned is 0.
CONFIGuration:DIGITAI:MAXSAMPLERate?	This query returns the maximum sample rate for digital channels, in samples per second.
CONFIGuration:DIGITAI:NUMCHANnels?	This query returns the number of digital channels.
CONFIGuration:DVM?	Indicates whether the Digital Voltmeter hardware is present. and the DVM feature is enabled.
CONFIGuration:EXTVIDEO?	This query returns a boolean value to indicate whether the optional extended video trigger features are present.
CONFIGuration:HISTOGRAM?	This query returns a boolean value to indicate whether the waveform histogram feature is present.
CONFIGuration:NETWORKDRIVES?	This query returns a boolean value to indicate whether network drives are present.
CONFIGuration:NUMMEAS?	This query returns the number of periodic measurements.
CONFIGuration:REFS:NUMREFS?	This query returns the number of reference waveforms.
CONFIGuration:RF:ADVTRIG?	This query returns a boolean value to indicate whether the advanced RF trigger and analysis feature is present.
CONFIGuration:RF:BANDWidth?	This query returns the maximum bandwidth, in hertz, for RF channels. If there are no RF channels, the value returned is 0.
CONFIGuration:RF:MAXBANDWidth?	Returns the maximum bandwidth, in hertz, for RF channels.

Table 2-20: Configuration Commands (cont.)

Command	Description
CONFIGuration:RF:NUMCHANnels?	This query returns the number of RF channels present.
CONFIGuration:ROSC?	This query returns a boolean value to indicate whether the instrument has an external reference oscillator (ROSC) input.

Cursor Command Group

Use the commands in the Cursor Command Group to control the cursor display and readout. You can use these commands to control the setups for cursor 1 and cursor 2, such as cursor position.

You can also use the commands to select one of the following cursor functions:

- **Off.** Turns off the display of all cursors.
- **Waveform Cursors.** Consists of two cursors. Waveform cursors enable you to conveniently measure waveform amplitude and time.
- **Screen Cursors.** Consists of two pairs of independent horizontal and vertical cursors. You can use these cursors to indicate an arbitrary position within the waveform display area.

Table 2-21: Cursor Commands

Command	Description
CURSor?	Returns cursor settings
CURSor:DDT?	Returns the cursor deltaY/deltaT (dY/dT) readout
CURSor:FUNCtion	This command specifies the cursor type
CURSor:HBArs?	Returns hbar cursor settings
CURSor:HBArs:DELTa?	Returns hbars cursors vertical difference
CURSor:HBArs:POSITION<x>	This command specifies the hbar cursor<x> vertical position
CURSor:HBArs:UNIts	Returns hbar cursor units
CURSor:HBArs:USE	Sets the horizontal bar cursor measurement scale, for use with ratio cursors
CURSor:MODe	This command specifies whether cursors move in unison or separately
CURSor:SOUrce	This command specifies the cursor source, which can be one of channels 1–4, reference waveforms 1–4, math waveform, bus 1–4, digital channels 0– 15 (MSO/MDO4000 models and MDO3000 models with option MDO3MSO installed), the RF time domain traces, (MDO4000/B models) or AUTO.
CURSor:VBArs?	This command specifies the position of vertical bar cursors
CURSor:VBArs:ALTERNATE<x>?	Returns the alternate readout for the waveform (Vbar) cursors
CURSor:VBArs:DELTa?	Returns the horizontal difference between vbar cursors
CURSor:VBArs:HPOS<x>?	Returns the vertical value of the specified vertical bar tick

Table 2-21: Cursor Commands (cont.)

Command	Description
CURSor:VBArs:POSITION<x>	This command specifies the vbar cursor<x> horizontal position
CURSor:VBArs:UNIts	This command specifies the horizontal units for vbar cursors
CURSor:VBArs:USE	Sets the vertical bar cursor measurement scale
CURSor:VBArs:VDELTa?	Returns the vertical difference between the two vertical bar cursor ticks
CURSor:XY:POLar:RADIUS:DELta?	Returns the difference between the cursors X radius and the cursor Y radius
CURSor:XY:POLar:RADIUS:POSITION<x>?	Returns the polar radius of the specified cursor
CURSor:XY:POLar:RADIUS:UNIts?	Returns the polar radius units
CURSor:XY:POLar:THETA:DELta?	Returns the XY cursor polar coordinate delta
CURSor:XY:POLar:THETA:POSITION<x>?	Returns the cursor X or cursor Y polar coordinate
CURSor:XY:POLar:THETA:UNIts?	Returns the cursor polar coordinate units
CURSor:XY:PRODUCT:DELta?	Returns the difference between the cursors X position and cursor Y position
CURSor:XY:PRODUCT:POSITION<x>?	Returns the position of the X or Y cursor used to calculate the X × Y cursor measurement
CURSor:XY:PRODUCT:UNIts?	Returns the XY cursor product units
CURSor:XY:RATIO:DELta?	Returns the ratio of the difference between the cursor X position and cursor Y position
CURSor:XY:RATIO:POSITION<x>?	Returns the X or Y position for the specified cursor
CURSor:XY:RATIO:UNIts?	Returns the X and Y cursor units for the ratio measurement
CURSor:XY:READOUT	This command specifies the XY cursor readout selection.
CURSor:XY:RECTangular:X:DELta?	Returns the cursor X delta value in rectangular coordinates
CURSor:XY:RECTangular:X:POSITION<x>	This command specifies the cursor X rectangular coordinates
CURSor:XY:RECTangular:X:UNIts?	Returns the Cursor X rectangular units
CURSor:XY:RECTangular:Y:DELta?	Returns The cursor Y delta value in rectangular coordinates
CURSor:XY:RECTangular:Y:POSITION<x> >	This command specifies the cursor Y rectangular coordinate
CURSor:XY:RECTangular:Y:UNIts?	Returns the cursor Y rectangular units

Display Command Group

Use the commands in the Display Command Group to change the graticule style, the display intensities, and to set the characteristics of the waveform display.

NOTE. *Your settings globally affect all displayed waveforms.*

Table 2-22: Display Commands

Command	Description
DISplay?	Returns current display settings
DISplay:CLOCk	This command specifies the display of the date/time stamp
DISplay:DIGital:ACTIVity	Sets or returns the state of the digital channel monitor display.
DISplay:DIGital:HEIght	This command specifies the number of available digital waveform position slots.
DISplay:GRAticule	This command specifies the type of graticule that is displayed
DISplay:INTENSITy?	Returns all display intensity settings
DISplay:INTENSITy:BACKLight	This command specifies the backlight intensity for the display
DISplay:INTENSITy:BACKLight:AUTODim:ENAble	Sets or returns the state of the display auto-dim feature. The default is enabled.
DISplay:INTENSITy:BACKLight:AUTODim:TIMe	Sets or returns the amount of time, in minutes, to wait for no UI activity before automatically dimming the display.
DISplay:INTENSITy:GRAticule	This command specifies the graticule intensity for the display
DISplay:INTENSITy:WAVEform	This command specifies the intensity of the waveforms
DISplay:PERSistence	This command specifies the display persistence for analog waveforms. This affects the display only.
DISplay:STYle:DOTsonly	This command turns on or off the dots-only mode for the waveforms displayed in the time domain.
DISplay:TRIGFrequency	This command switches the trigger frequency readout on or off.
DISplay:XY	This command turns on or off the XY display mode.
DISplay:XY:WITHYT	Sets or returns the state of simultaneous display of the XY and YT waveforms when in TRIGgered XY display mode. When both are displayed, the YT waveform is displayed in the upper graticule, and the XY waveform is displayed in the lower graticule.
MESSage	Sets or queries message box (screen annotation) parameters
MESSage:BOX	This command specifies the coordinates of the message box
MESSage:CLEAR	Clears the contents of the message box.
MESSage:SHOW	This command specifies the contents of the message box
MESSage:STATE	Controls the display of the message box

DVM Command Group

Use the commands in the DVM command group for Digital Voltmeter functionality.

Available for the MDO3000 series only.

Table 2-23: DVM Commands

Command	Description
DVM	Resets the Digital Voltmeter measurements and history
DVM:AUTORange	Sets (or queries) the auto range state for the Digital Voltmeter.

Table 2-23: DVM Commands (cont.)

Command	Description
DVM:DISPLAYSTYle	Sets (or queries) the display style for the Digital Voltmeter.
DVM:MEASUrement:FREQuency?	Returns the current frequency value for the Digital Voltmeter.
DVM:MEASUrement:HIStory:AVErage?	Returns the average readout value for the Digital Voltmeter function over the history period.
DVM:MEASUrement:HIStory:MAXimum?	Returns the maximum readout value for the DVM function over the history period.
DVM:MEASUrement:HIStory:MINImum?	Returns the minimum readout value for the DVM function over the history period.
DVM:MEASUrement:INFMAXimum?	Returns the maximum DVM readout value over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or DVM RESET.
DVM:MEASUrement:INFMINimum?	Returns the minimum readout value of the DVM function over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or DVM RESET.
DVM:MEASUrement:VALue?	Returns the DVM readout value (the large displayed value at the top of the DVM screen).
DVM:MODe	Specifies (or queries) the mode to use for the Digital Voltmeter (ACRMS, ACDCRMS, DC, Frequency, or OFF).
DVM:SOUrce	Sets (or queries) the source for the Digital Voltmeter: Channel 1 - 4.

Email Command Group

Use the email commands for both email printer support and Act on Event "send an email" actions.

Different email systems require different information. See your system administrator to determine which commands are necessary for your email system.

Table 2-24: EmailCommands

Command	Description
EMAIL:SETUp:FROMADDRess	Sets (or queries) the sender's email address for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.
EMAIL:SETUp:HOSTALIASNAMe	Sets (or queries) the email host alias name for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.
EMAIL:SETUp:SMTPLOGIn	Sets or returns the email SMTP server login ID for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.
EMAIL:SETUp:SMTPPASSWord	Sets the email SMTP server login password for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.
EMAIL:SETUp:SMTPPort	Sets or returns the email SMTP server port number for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands
EMAIL:SETUp:SMTPServer	Sets or returns the email SMTP server DNS name for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.

Ethernet Command Group

Use the commands in the Ethernet Command Group to set up the 10BASE-T or 100BASE-TX Ethernet remote interface.

Table 2-25: Ethernet Commands

Command	Description
ETHERnet:DHCPbootp	This command specifies the network initialization search for a DHCP/BOOTP server
ETHERnet:DNS:IPADDress	This command specifies the network Domain Name Server (Dns) IP address
ETHERnet:DOMAINname	This command specifies the network domain name
ETHERnet:ENET:ADDress?	Returns the Ethernet address value assigned to the oscilloscope
ETHERnet:GATEWay:IPADDress	This command specifies the remote interface gateway IP address
ETHERnet:HTTPPort	This command specifies the remote interface HTTP port value
ETHERnet:IPADDress	This command specifies the IP address assigned to the oscilloscope
ETHERnet:NAME	This command specifies the network name assigned to the oscilloscope
ETHERnet:PASSWord	This command specifies the Ethernet access password
ETHERnet:PING	Causes the oscilloscope to ping the gateway IP address
ETHERnet:PING:STATus?	Returns the results from pinging the gateway IP address
ETHERnet:SUBNETMask	This command specifies the remote interface subnet mask value

File System Command Group

Use the commands in the File System Command Group to help you use USB media. You can use the commands to do the following:

- List the contents of a directory
- Create and delete directories
- Create, read, rename, or delete a file
- Format media

When using these commands, keep the following points in mind:

- File arguments are always enclosed within double quotes: "E:/MYDIR/TEK00001.SET"
- File names follow the non-case sensitive, MSDOS format: [DRIVE:][\PATH\]filename
- Path separators may be either forward slashes (/) or back slashes (\)

NOTE. Using back slash as a path separator may produce some unexpected results, depending on how your application treats escaped characters. Many applications recognize the sequence of back slash followed by an alphabetic character as an escaped character, and, as such, interpret that alphabetic character as a control character. For example, the sequence "\n" may be interpreted as a newline character; "\t" may be interpreted as a tab character. To ensure that this interpretation does not occur, you can use double back slashes. For example, "E:\\testfile.txt".

Table 2-26: File System Commands

Command	Description
FILESystem?	Returns the file system state
FILESystem:COPy	This command copies a named file to a new file.
FILESystem:CWD	This command specifies the current working directory for FILESystem commands
FILESystem:DELEte	Deletes a named file or directory
FILESystem:DIR?	Returns a list of directory contents
FILESystem:FORMat	Formats a named drive
FILESystem:FREESpace?	Returns the number of bytes of free space on the current drive
FILESystem:LDIR?	Returns a semicolon separated list of every file and directory in a folder.
FILESystem:MKDir	Creates a new directory
FILESystem:MOUNT:AVAILable?	This query returns a comma-separated list of available drive letters that can be used for mounting network drives.
FILESystem:MOUNT:DRIve	This command attempts to mount the network drive specified by the quoted string argument.
FILESystem:MOUNT:LIST?	This query returns a comma-separated list of the mounted network drives, including the drive letter, server identity (DNS name or IP address), mount path and type. If no network drives are mounted, an empty string is returned.
FILESystem:READFile	Writes the contents of the specified file to the specified interface
FILESystem:REName	Assigns a new name to an existing file
FILESystem:RMDir	Deletes a named directory
FILESystem:UNMOUNT:DRIve	This command attempts to un-mount the network drive specified by the quoted string argument.
FILESystem:WRITEFile	Writes the specified block data to the oscilloscope current working directory

Hard Copy Command Group

Use the commands in the Hard Copy Command Group to make hard copies. PictBridge commands belong to a separate group. (See page 2-40, *PictBridge Command Group*.)

Table 2-27: Hard Copy Commands

Command	Description
HARDCopy	Sends a copy of the screen display to the selected printer
HARDCopy:ACTIVeprinter	This command specifies the currently active printer
HARDCopy:INKSaver	Changes hard copy output to print color traces and graticule on a white background
HARDCopy:LAYout	This command specifies the page orientation for hard copy
HARDCopy:PREVIEW	Previews the current screen contents with the InkSaver palette applied
HARDCopy:PRINTer:ADD	This command is used to add a network or email printer to the list of available printers.
HARDCopy:PRINTer:DELete	Removes a network printer from the list of available printers
HARDCopy:PRINTer:LIST?	Displays the list of currently defined printers.
HARDCopy:PRINTer:REName	Renames a network or email printer on the list of available printers, replacing the currently stored settings with the settings specified in the command.

Histogram Command Group

Use the commands in the Histogram Command Group to set up a histogram for measurements.

Table 2-28: Histogram Commands

Command	Description
HIStogram?	Returns all histogram parameters
HIStogram:BOX	This command specifies the histogram box coordinates
HIStogram:BOXPcnt	Specifies the histogram box coordinates in terms of percentages of the full screen extents of the source waveform.
HIStogram:COUNt	Clears the histogram count and statistics
HIStogram:DATa?	Returns the histogram data
HIStogram:DISplay	This command specifies the scaling of the histogram display
HIStogram:END?	Returns the time of the last bin of the histogram
HIStogram:MODe	This command specifies the type of the histogram, vertical or horizontal
HIStogram:SOUrce	Sets or queries the source used to create the histogram
HIStogram:STARt?	Returns the time of the first bin of the histogram

Horizontal Command Group

Use the commands in the Horizontal Command Group to control the oscilloscope horizontal parameters.

Table 2-29: Horizontal Commands

Command	Description
HORizontal?	Returns settings for the horizontal commands
HORizontal:DELay:MODe	This command specifies the horizontal delay mode
HORizontal:DELay:TIMe	This command specifies the horizontal delay time
HORizontal:DIGital:RECOrdlength:MAGnivu?	Returns the record length of the MagniVu digital acquisition
HORizontal:DIGital:RECOrdlength:MAIn?	Returns the record length of the main digital acquisition.
HORizontal:DIGital:SAMPLERate:MAGnivu?	Returns the sample rate of the Magnivu digital acquisition
HORizontal:DIGital:SAMPLERate:MAIn?	Returns the sample rate of the main digital acquisition
HORizontal:POSition	This command specifies the horizontal position, in percent, that is used when delay is off
HORizontal:PREViewstate?	Returns the display system preview state
HORizontal:RECOrdlength	This command specifies the record length.
HORizontal:SCAle	This command specifies the horizontal scale

Mark Command Group

Use the commands in the Mark Command Group to identify areas of the acquired waveform that warrant further investigation.

Table 2-30: Mark Commands

Command	Description
MARK	Move to the next or previous mark on the waveform or returns all learnable settings from the mark commands
MARK:CREATE	Creates a mark on a particular waveform or all waveforms in a column
MARK:DELEte	Deletes a mark on a particular waveform, all waveforms in a column, or all marks
MARK:FREE?	Returns how many marks are free to be used
MARK:SAVEALL	This command saves all current marks on waveforms in the time domain to an internal memory location. (This is equivalent to pressing the “Save All Marks" button in the Search button menu on the front panel.) In order to retrieve the information, use the query form of MARK:USERLIST.
MARK:SELected:END?	Returns the end of the selected mark, in terms of 0 to 100% of the waveform
MARK:SELected:FOCUS?	Returns the focus of the selected mark, in terms of 0 to 100% of the waveform
MARK:SELected:MARKSINCOLumn?	Returns how many marks are in the current zoom pixel column
MARK:SELected:OWNer?	Returns the owner of the selected mark
MARK:SELected:SOURCe?	Returns the source waveform of the selected mark
MARK:SELected:STARt?	Returns the start of the selected mark, in terms of 0 to 100% of the waveform

Table 2-30: Mark Commands (cont.)

Command	Description
MARK:SELected:STATE?	Returns the on or off state of the selected mark
MARK:SELected:ZOOm:POSition?	Returns the position of the selected mark, in terms of 0 to 100% of the upper window
MARK:TOTal?	Returns how many marks are used
MARK:USERLIST	The command creates a single user mark on a waveform in the time domain. The arguments consist of an enumeration specifying the source waveform, followed by 7 time mark parameters. You can create up to 1,024 marks. To save all the marks to memory, use the command MARK:SAVEALL TOUSER.

Mask Command Group

Use the commands in the Mask Command Group to perform mask and limit testing, useful for long-term signal monitoring, characterizing signals during design, or testing on a production line. The commands simplify many tasks, such as conducting pass/fail tests in search of glitches or other waveform anomalies, comparing a signal against a known good signal, or against a standard or custom mask, counting hits against specific mask segments, and much more.

NOTE. *In order to use Mask commands, you need to install an optional Limit and mask test application module, Tektronix part number DPO4LMT. Also, ≥350 MHz bandwidth models are recommended for telecommunication standards >55 Mb/s.*

NOTE. *To ensure that Mask commands are enabled, use the command APPLication:TYPe LIMITMask.*

There are three categories of masks available:

Standard The instrument has a built-in set of pre-defined standard telecommunications masks (see the MASK:STANdard command for a complete list). Although these masks are non-editable, they can be copied and used to initialize user-defined custom masks.

Limit Test: Limit testing is used to compare a tested signal against a known good or "golden" version of the same signal with user-defined vertical and horizontal tolerances. These non-editable masks are created using a Reference waveform or template. Use the MASK:TEMPLate commands for limit testing.

Custom: (also referred to in this document as “user mask”). You can create custom masks and tailor them to your own specific testing requirements. These commands provide granular control over the points of the mask and offer a variety of testing options. For instance, you can specify test duration either by number of waveforms or by time, or specify a violation threshold that must be met before considering a test a failure, or specify an action (such as writing to a

file or sending an SRQ) that is to be performed upon a violation, a test failure, or test completion. Use MASK:CUSTom and then the :MASK:USER commands to create user-defined custom masks.

A series of examples showing how to use mask commands for typical tasks is included as an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Table 2-31: Mask commands

Command	Description
APPLication:TYPe	When a mask/limit or power test application module is installed, one of the associated test types is always selected by default. This command allows the test type to be changed from the default.
MASK:COPy:SOUrce	Specifies the standard mask that is to be copied to a user created custom mask.
MASK:COPy:USER	Copies the specified standard mask to a user created custom mask.
MASK:COUNt	Resets to zero the number of hits and failures for all mask segments.
MASK:COUNt:FAILURES?	Returns the number of pass/fail mask tests that have failed
MASK:COUNt:HITS?	This query returns the sum of all hits in all mask segments.
MASK:COUNt:SEG<x>:HITS?	This query returns the number of hits for the specified mask segment.
MASK:COUNt:TESTS?	Returns the number of pass/fail tests that have occurred
MASK:COUNt:VIOLATIONS?	Returns the number of test violations that have occurred in the current pass/fail test.
MASK:COUNt:WAVEFORMS?	Returns the number of waveforms that have been acquired and processed during pass/fail mask testing.
MASK:CUSTom	Sets the user-defined custom mask to its initialized state, or copies the currently active mask to the user-defined custom mask.
MASK:DISplay	Controls whether a user-defined custom mask is displayed on the screen.
MASK:LOCk	Locks the mask to the waveform so that any changes made to the horizontal and/or vertical scale settings of the waveform will redraw the mask segments in proportion.
MASK:MARgin:PERCent	Sets or returns the tolerance for the mask test. A positive value expands the mask and a negative margin shrinks the mask by the specified percentage.
MASK:SOUrce	Specifies the mask source waveform to be used during pass/fail mask testing
MASK:STANdard	Replaces the existing mask, if any, with a specified standard mask.
MASK:STOPOnviolation	Stops the waveform acquisitions upon the first occurrence of a waveform violation.
MASK:TEMPLate:CREATEmask	Causes a template mask to be created for limit testing, based on the settings of the MASK:TEMPLate:SOUrce, MASK:TEMPLate:TOLerance:HORizontal, and MASK:TEMPLate:VERTical commands.
MASK:TEMPLate:SOUrce	Specifies the source waveform to be used to create a mask template for limit testing.
MASK:TEMPLate:TOLerance:HORizontal	Specifies the +/- horizontal limit (tolerance) for a mask template to be used for limit testing.
MASK:TEMPLate:TOLerance:VERTical	Specifies the +/- vertical limit (tolerance) for a mask template to be used for limit testing.
MASK:TESt:AUXout:COMPLetion	Causes the instrument to send a TTL signal to the AUX:out port whenever a pass/fail mask test completes.

Table 2-31: Mask commands (cont.)

Command	Description
MASK:TESt:AUXout:FAILure	Causes the instrument to send a TTL signal to the AUX:out port whenever a pass/fail mask test fails.
MASK:TESt:COMPLetion:CRITerion	Specifies the criterion to be used for test completion (either by waveform or time) during pass/fail mask testing.
MASK:TESt:DELay	Specifies the amount of time, in seconds, the instrument should wait after the start of pass/fail mask testing before it evaluates the waveforms.
MASK:TESt:HARDCopy	Causes the instrument to generate a screen hard copy to the default printer as soon as a pass/fail mask test fails, using the current instrument hard copy settings
MASK:TESt:REPeat	Causes the mask test cycle to continuously repeat upon the completion of the previous test cycle.
MASK:TESt:SAVEIMAGE	Causes the instrument to copy the screen image to a USB media file or a mounted network drive if a pass/fail mask test fails.
MASK:TESt:SAVEWFM	Copies the waveform data from all active channels to a file if a pass/fail mask test fails.
MASK:TESt:SRQ:COMPLetion	Causes the instrument to send an SRQ command when a pass/fail mask test completes
MASK:TESt:SRQ:FAILure	Causes the instrument to send an SRQ command when a pass/fail mask test fails.
MASK:TESt:STATE	Turns the pass/fail mask test on or off.
MASK:TESt:STATus?	Indicates the result of a pass/fail mask test.
MASK:TESt:STOP:FAILure	Causes the instrument to stop acquiring data when a pass/fail mask test fails.
MASK:TESt:THReshold	Specifies the number of failed tested waveforms needed in a pass/fail mask test to cause the test status to change to 'Failing'.
MASK:TESt:TIME	Specifies the duration, in seconds, the instrument should run a pass/fail mask test.
MASK:TESt:WAVEform	Specifies the number of waveforms the instrument should test during a pass/fail mask test.
MASK:USER:AMPLitude	Specifies the nominal pulse amplitude, in volts, to be used for a user-defined custom mask.
MASK:USER:HSCAle	Specifies the nominal timing resolution, in time/division, to be used to draw a user-defined custom mask pulse shape.
MASK:USER:HTRIGPOS	Specifies the nominal trigger position (pulse leading edge) to be used to draw a user-defined custom mask, as a fraction of the display width.
MASK:USER:LABel	This command specifies a user-defined label for a custom mask.
MASK:USER:RECOrdlength	Specifies the nominal record length to be used for pulse mask testing with a user-defined custom mask.
MASK:USER{:SEG<x>|:MASK<x>}	This command deletes the specified mask segment from the current mask segment. There can be up to 8 segments.
MASK:USER{:SEG<x>|:MASK<x>}:NR_Pt?	This query returns the number of points that make up the specified mask segment of a user-defined custom mask. There can be up to 8 segments.
MASK:USER{:SEG<x>|:MASK<x>}:POINTS	This command specifies the x and y coordinates of the points that make up the segment 1–8. The units are normal waveform units. The x-coordinate is specified relative to the trigger. The points are specified as a sequence of (x,y) points which traverse the boundary of the segment in a counter-clockwise direction.
MASK:USER:TRIGTOSAMP	Specifies the nominal time, in seconds, from the (leading edge) trigger position to the pulse bit sampling position, to be used for testing with a user-defined custom mask.

Table 2-31: Mask commands (cont.)

Command	Description
MASK:USER:VOFFSet	Specifies the nominal value, in volts, to be used to vertically offset the input channels for a user-defined custom mask.
MASK:USER:VPOS	Specifies the nominal value, in divisions, to be used to vertically position the input channels for a user-defined custom mask.
MASK:USER:VSCAle	Specifies the nominal value, in volts per division, to be used to vertically scale the input channels for a user-defined custom mask.
MASK:USER:WIDth	Specifies the nominal bit width value, in seconds, to be used for a user-defined custom mask.
RECAll:MASK	This command recalls the mask from a specified file that was saved to the current working directory using the SAVe:MASK command.
SAVe:MASK	This command saves the current mask definition to the file specified with a quoted string, into the current working directory. You can recall the mask from the file by using the command RECAll:MASK.

Math Command Group

Use the commands in the Math Command Group to create and define a math waveform. First, specify the math type using MATH[1]:TYPe – either dual waveform, FFT, advanced math, or spectrum math. Then, using the MATH[1]:DEFine command, you can build simple math expressions that contain no computation, such as `:MATH:DEFine CH1`. You can also build complex expressions that consist of up to 128 characters in a quoted string, and comprise many sources, functions, and operands, such as `:MATH:DEFINE "SINE(CH1)*(VAR1+CH2)*CH3 - CAREA(CH4)".`

Note that when your program updates a live waveform or alters a reference waveform, the math waveforms containing those waveforms as sources are also updated to reflect the changes.

NOTE. *If you set the math type to `FFT`, your math expression can only be the FFT of a live analog or reference waveform. However, if the math type is set to `ADVanced`, then you can include FFT as part of a math expression. See the examples of advanced math in MATH[1]:DEFine for more information.*

Table 2-32: Math Commands

Command	Description
MATH[1]?	Returns the definition of the math waveform
MATH[1]:AUTOSCale	Sets (or queries) the state of automatic vertical scaling of the math waveform.
MATH[1]:DEFine	This command specifies the current math function as a text string.
MATH[1]:HORizontal:POSition	This command specifies the math horizontal display position for FFT or (non-live) math reference waveforms
MATH[1]:HORizontal:SCAle	This command specifies the math horizontal display scale for FFT or for Dual Math waveforms
MATH[1]:HORizontal:UNIts	Returns the math waveform horizontal unit value
MATH[1]:LABel	Sets or queries the waveform label for the math waveform
MATH[1]:SPECTral:MAG	This command specifies the units of spectral magnification in the math string
MATH[1]:SPECTral:WINdow	This command specifies the window function for math waveform spectral input data
MATH[1]:TYPe	This command specifies the math waveform type (`DUAL, FFT, ADVanced or SPECTRUM`). This command is used along with `MATH:DEFine.`
MATH[1]:VERTical:POSition	This command specifies the vertical position of the currently selected math type
MATH[1]:VERTical:SCAle	This command specifies the vertical scale of the currently selected math type
MATH[1]:VERTical:UNIts	Returns the math waveform vertical units
MATHVAR?	Returns all numerical values used within math expressions
MATHVAR:VAR<x>	This command specifies numerical values you can use within math expressions

Measurement Command Group

Use the commands in the Measurement Command Group to control the automated measurement system.

Up to eight automated measurements can be displayed on the screen. In the commands, these measurement readouts are named MEAS<x>, where <x> is the measurement number.

In addition to the eight displayed measurements, the measurement commands let you specify an additional measurement, IMMed. The immediate measurement has no front-panel equivalent. Immediate measurements are never displayed. Because they are computed only when needed, immediate measurements slow the waveform update rate less than displayed measurements.

To obtain measurement results, use the MEASUrement:MEAS<x>:VALue? query for displayed results or the MEASUrement:IMMed:VALue? query for immediate measurements.

Measurement commands can set and query measurement parameters. You can assign some parameters, such as waveform sources, differently for each measurement. Other parameters, such as reference levels, have only one value, which applies to all measurements.

Readout values for the 8 displayed measurements are updated periodically. As such, queries of these measurement values may return 9.91E+37, which represents NaN (not a number) and a measurement warning event (e.g. 2225. “Measurement error. No waveform to measure”) when the measurement is not yet computed. Immediate measurement queries will return values once the measurement has been computed.

Example of Immediate Measurements

An example command sequence follows that illustrates immediate measurements of Cycle Mean on channel 1:

```
:MEASUrement:IMMed:SOUrce1 CH1

:MEASUrement:IMMed:TYPe CMEan

:MEASUrement:IMMed:VALue?  -18.5568E-3

:MEASUrement:IMMed:VALue?;VALue?;VALue?
-21.6400E-3;-23.8023E-3;-21.0064E-3
```

Table 2-33: Measurement Commands

Command	Description
MEASUrement?	Returns all measurement parameters
MEASUrement:CLEARSNapshot	Removes the measurement snapshot display
MEASUrement:GATing	This command specifies the measurement gating
MEASUrement:IMMed?	Returns all immediate measurement setup parameters

Table 2-33: Measurement Commands (cont.)

Command	Description
MEASUrement:IMMed:DELay?	Returns information about the immediate delay measurement
MEASUrement:IMMed:DELay:DIRection	This command specifies the search direction to use for immediate delay measurements
MEASUrement:IMMed:DELay:EDGE<x>	This command specifies the slope of the edge used for immediate delay “from” and “to” waveform measurements
MEASUrement:IMMed:SOUrce<x>	This command specifies the “from” source for all single channel immediate measurements This command specifies the source to measure “to” for two-channel measurements
MEASUrement:IMMed:TYPe	This command specifies the type of the immediate measurement
MEASUrement:IMMed:UNIts?	Returns the units of the immediate measurement
MEASUrement:IMMed:VALue?	Returns the value of the immediate measurement
MEASUrement:INDICators?	Returns all measurement indicator parameters
MEASUrement:INDICators:HORZ<x>?	Returns the position of the specified horizontal measurement indicator
MEASUrement:INDICators:NUMHORZ?	Returns the number of horizontal measurement indicators currently being displayed
MEASUrement:INDICators:NUMVERT?	Returns the number of vertical measurement indicators currently being displayed
MEASUrement:INDICators:STATE	This command specifies the state of visible measurement indicators
MEASUrement:INDICators:VERT<x>?	Returns the value of the specified vertical measurement indicator
MEASUrement:MEAS<x>?	Returns all measurement parameters
MEASUrement:MEAS<x>:COUNt?	Returns the number of values accumulated since the last statistical reset
MEASUrement:MEAS<x>:DELay?	Returns the delay measurement parameters for the specified measurement
MEASUrement:MEAS<x>:DELay:DIRection	This command specifies the search direction to use for delay measurements
MEASUrement:MEAS<x>:DELay:EDGE<x>	This command specifies the slope of the edge to use for delay “from” and “to” waveform measurements
MEASUrement:MEAS<x>:MAXimum?	Returns the maximum value found since the last statistical reset
MEASUrement:MEAS<x>:MEAN?	Returns the mean value accumulated since the last statistical reset
MEASUrement:MEAS<x>:MINImum?	Returns the minimum value found since the last statistical reset
MEASUrement:MEAS<x>:SOUrce<x>	This command specifies the “from” source for all single channel immediate measurements This command specifies the source to measure “to” for two-channel measurements
MEASUrement:MEAS<x>:STATE	This command specifies whether the specified measurement slot is computed and displayed
MEASUrement:MEAS<x>:STDdev?	Returns the standard deviation of values accumulated since the last statistical reset
MEASUrement:MEAS<x>:TYPe	This command specifies the measurement<x> type
MEASUrement:MEAS<x>:UNIts?	Returns measurement<x> units
MEASUrement:MEAS<x>:VALue?	Returns the value of measurement<x>

Table 2-33: Measurement Commands (cont.)

Command	Description
MEASUrement:METHod	This command specifies the method used for calculating reference levels
MEASUrement:REFLevel?	Returns the current reference level parameters
MEASUrement:REFLevel:ABSolute:HIGH	This command specifies the top reference level for rise time
MEASUrement:REFLevel:ABSolute:LOW	This command specifies the low reference level for rise time
MEASUrement:REFLevel:ABSolute:MID<x>	This command specifies the mid reference level for the specified channel in absolute volts
MEASUrement:REFLevel:METHod	This command specifies the method for assigning high and low reference levels
MEASUrement:REFLevel:PERCent:HIGH	This command specifies the top reference percent level for rise time
MEASUrement:REFLevel:PERCent:LOW	This command specifies the low reference percent level for rise time
MEASUrement:REFLevel:PERCent:MID<x>	This command specifies the mid reference level for the specified channel in percent
MEASUrement:STATIstics	Clears or returns all of the statistics accumulated for all period measurements (MEAS1 through MEAS4)
MEASUrement:STATIstics:MODe	Turns measurement statistics on or off
MEASUrement:STATIstics:WEIghting	Controls the responsiveness of the mean and standard deviation to waveform changes

Miscellaneous Command Group

Use the commands in the Miscellaneous Command Group to perform actions that do not fit into other categories.

Table 2-34: Miscellaneous Commands

Command	Description
APPLication:LICENSE:SLOT<x>:LOCation?	This query returns the application license location. < x> can be slot number 1–4.
APPLication:LICENSE:SLOT<x>:TRANSFER	You can use this command to transfer an application license from the module to internal memory in the oscilloscope, and transfer it back.
APPLication:LICENSE:SLOT<x>:TYPe?	This query returns the application license type of the module that is currently inserted in the specified application module slot.
APPLication:TYPe	When a mask/limit or power test application module is installed, one of the associated test types is always selected by default. This command allows the test type to be changed from the default.
AUTOSet	Sets the vertical, horizontal and trigger controls to provide a stable display of the appropriate waveform. This is equivalent to pressing the front panel Autoset button
AUTOSet:ENAble	Enables or disables the autoset feature

Table 2-34: Miscellaneous Commands (cont.)

Command	Description
AUXOut:SOUrce	This command specifies the source for the auxiliary-out port.
CLEARMenu	Clears the current menu from the display
DATE	This command specifies the date displayed by the oscilloscope
*DDT	This command specifies the commands that will be executed by the group execute trigger
DESkew	Causes the deskew values for all channels to be set to the recommended values
DISplay:INTENSITy:BACKLight:AUTODim:TIMe	This command specifies the state of the deskew table display
ETHERnet:LXI:LAN:PASSWord:ENABle	This command controls whether LXI (LAN eXtensions for Instrumentation) is password protected.
ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle	This command controls whether to use the LXI password for e*Scope (effectively equal to enabling password protection for e*Scope). With e*Scope, you can access any Internet-connected MSO/DPO4000B or MDO4000/B Series Oscilloscope from a web browser.
ETHERnet:LXI:LAN:RESET	This command resets the LXI local area network. The items which this command reset include: DHCP/BOOTP, mDNS and DNS-SD, e*Scope password protection, LXI password protection, and e*Scope and LXI password.
ETHERnet:LXI:LAN:SERVICENAMe	This command specifies the mDNS service name used for the LXI interface.
ETHERnet:LXI:LAN:STATus?	This query returns the LXI network status.
ETHERnet:NETWORKCONFig	This command specifies the Ethernet network configuration setting.
FPAnel:HOLD	This command is used to emulate the push-and-hold feature of the Cursor button.
FPAnel:PRESS	Simulates the action of pressing a specified front-panel button
FPAnel:TURN	Simulates the action of turning a specified front-panel control knob
GPIBUsb:ADDress?	Returns the current GPIB address
GPIBUsb:ID?	Returns the identification string of the connected adaptor module and firmware version
HEADer|:HDR	This command specifies the Response Header Enable State
ID?	Returns the instrument identification data similar to that returned by the *IDN? IEEE488.2 common query, including the addition of any enabled application modules. However, it does not include the instrument serial number.
*IDN?	Returns the same information as the ID? command except the data is formatted according to Tektronix Codes & Formats
LANGuage	This command specifies the user interface display language
LOCk	This command specifies the front panel lock state
*LRN?	Returns a listing of oscilloscope settings
NEWpass	Changes the password for user protected data
PASSWord	Enables the *PUD and NEWpass set commands
PAUSe	This command causes the interface to pause the specified number of seconds before processing any other commands.
REM	Specifies a comment, which is ignored by the oscilloscope

Table 2-34: Miscellaneous Commands (cont.)

Command	Description
ROSc:SOUrce	This command specifies the source for the time base reference oscillator. The reference oscillator locks to this source. Depending on the command argument that you specify, you can use an external reference or use the internal crystal oscillator as the time base reference.
ROSc:STATE?	This query returns an enumeration value that indicates the lock state of the reference oscillator specified by the `ROSc:SOUrce` command.
SET?	Returns a listing of oscilloscope settings
SOCKETServer:ENAble	This command enables or disables the socket server which supports a Telnet or other TCPIP socket connection to send commands and queries to the instrument.
SOCKETServer:PORT	This command sets the TCPIP port for the socket server connection.
SOCKETServer:PROTOCol	This command sets the protocol for the socket server.
TEKSecure	Initializes both waveform and setup memories
TIMe	This command specifies the time displayed by the oscilloscope
TOTaluptime?	Returns the total number of hours that the oscilloscope has been turned on since the nonvolatile memory was last programmed
*TRG	Performs the group execute trigger (GET)
*TST?	Tests the interface and returns the status
UNLock	Unlocks front panel
USBTMC?	Returns the USBTMC information used by the USB hosts to determine the instrument interfaces.
USBTMC:PRODUCTID:DECimal?	This query returns the product ID number as a decimal.
USBTMC:PRODUCTID:HEXadecimal?	This query returns the product ID number as a decimal.
USBTMC:SERIALnumber?	This query returns the serial number of the oscilloscope.
USBTMC:VENDORID:DECimal?	This query returns the vendor ID number as a decimal.
USBTMC:VENDORID:HEXadecimal?	This query returns the vendor ID number as a hexadecimal value. The hexadecimal vendor ID for Tektronix instruments is 0x699.
VERBose	This command specifies the verbose state

PictBridge Command Group

Use the commands in the PictBridge Command Group to store printer settings.

Table 2-35: PictBridge Commands

Command	Description
PICTBridge:DATEPrint	Enables or disables printing the date on the print output
PICTBridge:DEFault	Sets the arguments for all PICTBridge commands to their default values
PICTBridge:IDPrint	Enables or disables printing the oscilloscope model and serial number on the print output
PICTBridge:IMAGESize	This command specifies the image print size

Table 2-35: PictBridge Commands (cont.)

Command	Description
PICTBridge:PAPERSize	Sets the output print paper size
PICTBridge:PAPERType	This command specifies the paper type
PICTBridge:PRINTQual	This command specifies the output print quality
USBDevice:CONFigure	Enables or disables the rear USB port for use with Pictbridge printers

Power Command Group

Use the commands in the Power Command Group for power analysis. The power measurements include:

- Power quality
- Switching loss
- Safe operating area
- Harmonics
- Ripple
- Modulation analysis

This command group is available when the DPO4PWR application module is installed, except for the MDO3000 series, which requires the MDO3PWR application module..

NOTE. *To ensure that the power commands are enabled, use the command APPLication:TYPe LIMITMask.*

Table 2-36: Power Commands

Command	Description
APPLication:TYPe	When a mask/limit or power test application module is installed, one of the associated test types is always selected by default. This command allows the test type to be changed from the default.
POWer:CURRENTSOurce	This command specifies the current source for the power application
POWer:DISplay	This command controls whether or not to display the power test results.
POWer:QUALity:VCRESTfactor?	This query returns the measurement for the voltage crest factor.
POWer:GATESOurce	This command specifies the gate source for the power application
POWer:GATing	This command specifies the power application gating
POWer:HARMonics:DISplay:SELect	This command specifies the harmonics to be displayed when the harmonics standard is None
POWer:HARMonics:DISplay:TYPe	This command specifies the display type for harmonics tests
POWer:HARMonics:FREQRef	This command specifies the frequency reference waveform for harmonics tests

Table 2-36: Power Commands (cont.)

Command	Description
POWer:HARMonics:FREQRef:FIXEDFREQValue	This command specifies the fixed reference frequency value for harmonics measurements
POWer:HARMonics:IEC:CLAss	This command specifies the filtering class for IEC harmonics
POWer:HARMonics:IEC:FILter	This command specifies the enabled state for filtering of IEC harmonics
POWer:HARMonics:IEC:FUNDamental	This command specifies the fundamental current for IEC harmonics
POWer:HARMonics:IEC:GROUPing	This command specifies the enabled state for grouping of IEC harmonics
POWer:HARMonics:IEC:INPUTPOWer	Sets of returns the class D input power for IEC harmonics
POWer:HARMonics:IEC:LINEFREQuency	This command specifies the line frequency for the IEC standard
POWer:HARMonics:IEC:OBSPERiod	This command specifies the IEC observation period
POWer:HARMonics:IEC:POWERFACtor	This command specifies the power factor for IEC harmonics
POWer:HARMonics:MIL:FUNDamental:CALCmethod	This command specifies the measurement method for the MIL harmonics fundamental frequency
POWer:HARMonics:MIL:FUNDamental:USER:CURrent	This command specifies RMS amperes for User calculation method
POWer:HARMonics:MIL:LINEFREQuency	This command specifies the line frequency for MIL-STD-1399 Section 300A harmonics tests
POWer:HARMonics:MIL:POWERLEVel	This command specifies the power level for MIL-STD-1399 Section 300A harmonics tests
POWer:HARMonics:NR_HARMonics	Sets of returns the number of harmonics (a value in the range of 20 to 400) when the harmonics standard is NONe
POWer:HARMonics:RESults:HAR<1-400>:FREQuency?	Returns the frequency of the harmonic
POWer:HARMonics:RESults:HAR<1-400>:IECMAX?	The IEC standard specifies harmonics measurements to be computed in windows of time, with each time window being nominally 200 ms. This returns the maximum of the RMS magnitude of the harmonic, computed across successive 200 ms time windows within an observation period entered by the user
POWer:HARMonics:RESults:HAR<1-400>:LIMit?	The IEC and MIL standards specify a limit for each harmonic magnitude. Returns the limit in absolute units, or as a percentage of the fundamental as specified by the standard. IEC Class C (Table 2) and MIL standards specify the limit as a percentage of the fundamental
POWer:HARMonics:RESults:HAR<1-400>:PHASe?	Returns the phase of the harmonic in degrees. The phase is measured relative to the zero-crossing of the reference waveform. When there is no reference waveform, the phase is relative to the fundamental component
POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute?	Returns the RMS magnitude of the harmonic expressed in absolute units
POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent?	Returns the RMS magnitude of the harmonic expressed as a percentage of the fundamental

Table 2-36: Power Commands (cont.)

Command	Description
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit?	Returns PASS, FAIL or NA. Specifies if the IEC Class A higher harmonic limit (and conditions) are met
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL?	Returns PASS, FAIL or NA. Specifies if the Normal IEC harmonic limits are met
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit?	Returns PASS, FAIL or NA. Specifies if the higher harmonic limit (and conditions) for the 21st and higher order odd harmonics are met
POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL?	Returns the test result for the specified harmonic for the MIL-STD-1399 Section 300A testing standard
POWer:HARMonics:RESults:IEC:FUNDamental?	Returns the IEC fundamental frequency
POWer:HARMonics:RESults:IEC:HARM3ALTernate?	Returns the IEC harmonics test result for the 3rd harmonic: PASS, FAIL or NA
POWer:HARMonics:RESults:IEC:HARM5ALTernate?	Returns the IEC harmonics test result for the 5th harmonic: PASS, FAIL or NA
POWer:HARMonics:RESults:IEC:POHC?	Returns the IEC POHC measurement
POWer:HARMonics:RESults:IEC:POHL?	Returns the IEC POHL measurement
POWer:HARMonics:RESults:IEC:POWer?	Returns the IEC input power measurement
POWer:HARMonics:RESults:IEC:POWERFactor?	Returns the IEC power factor measurement
POWer:HARMonics:RESults:PASSFail?	Returns the overall harmonics test result: PASS, FAIL or NA
POWer:HARMonics:RESults:RMS?	Returns the root mean square value of the source waveform
POWer:HARMonics:RESults:SAVe	Saves the harmonic results to the specified file in CSV format
POWer:HARMonics:RESults:THDF?	Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the fundamental component of the source waveform
POWer:HARMonics:RESults:THDR?	Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the source waveform
POWer:HARMonics:SOURce	This command specifies the source waveform for harmonics tests
POWer:HARMonics:STANDard	This command specifies the standard for harmonics tests
POWer:INDICators	This command specifies the state of the measurement indicators for the power application
POWer:MODulation:SOUrce	This command specifies the source waveform for modulation tests
POWer:MODulation:TYPe	This command specifies the modulation type
POWer:QUALity:APPpwr?	Returns the apparent power measurement
POWer:QUALity:DISplay:APPpwr	This command specifies the display state for the apparent power readout
POWer:QUALity:DISplay:FREQuency	This command specifies the display state for the frequency readout

Table 2-36: Power Commands (cont.)

Command	Description
POWer:QUALity:DISplay:ICRESTfactor	This command specifies the display state for the current crest factor readout
POWer:QUALity:DISplay:IRMS	This command specifies the display state for the rms current (IRMS) readout
POWer:QUALity:DISplay:PHASEangle	This command specifies the display state for the phase angle readout
POWer:QUALity:DISplay:POWERFACtor	This command specifies the display state for the power factor readout
POWer:QUALity:DISplay:REACTpwr	This command specifies the display state for the reactive power readout
POWer:QUALity:DISplay:TRUEpwr	This command specifies the display state for the true power readout
POWer:QUALity:DISplay:VCRESTfactor	This command specifies the display state for the voltage crest factor readout
POWer:QUALity:DISplay:VRMS	This command specifies the display state for the rms voltage (VRMS) readout
POWer:QUALity:FREQREFerence	This command specifies the power quality frequency reference
POWer:QUALity:FREQuency?	Returns the frequency measurement
POWer:QUALity:ICRESTfactor?	Returns the current crest factor measurement
POWer:QUALity:IRMS?	Returns the rms current measurement
POWer:QUALity:PHASEangle?	Returns the phase angle measurement
POWer:QUALity:POWERFACtor?	Returns the power factor measurement
POWer:QUALity:REACTpwr?	Returns the reactive power measurement
POWer:QUALity:TRUEpwr?	Returns the true power measurement
POWer:QUALity:VRMS?	Returns the rms voltage measurement
POWer:REFLevel:ABSolute	Sets the reference levels to their default unit values
POWer:REFLevel:ABSolute:HIGH	This command specifies the top reference level for rise time
POWer:REFLevel:ABSolute:LOW	This command specifies the low reference level for rise time
POWer:REFLevel:ABSolute:MID<x>	This command specifies the mid reference level for measurements
POWer:REFLevel:HYSTeresis	This command specifies the measurement reference level hysteresis value
POWer:REFLevel:METHod	This command specifies the method used to calculate the 0% and 100% reference level
POWer:REFLevel:PERCent	Sets the reference levels to the default percentage values
POWer:REFLevel:PERCent:HIGH	This command specifies the top reference percent level for rise time
POWer:REFLevel:PERCent:LOW	This command specifies the low reference percent level for rise time
POWer:REFLevel:PERCent:MID<x>	This command specifies the mid reference percent level for waveform measurements
POWer:RIPPle	Sets the vertical offset of the source waveform
POWer:RIPPle:RESults:AMPLitude?	Returns the peak-to-peak ripple measurement
POWer:RIPPle:RESults:MAX?	Returns the maximum of the peak-to-peak ripple measurements
POWer:RIPPle:RESults:MEAN?	Returns the mean of the peak-to-peak ripple measurements
POWer:RIPPle:RESults:MIN?	Returns the minimum of the peak-to-peak ripple measurement
POWer:RIPPle:RESults:STDdev?	Returns the standard deviation of the peak-to-peak ripple measurements
POWer:RIPPle:SOUrce	This command specifies the source waveform for ripple tests

Table 2-36: Power Commands (cont.)

Command	Description
POWer:SOA:LINear:XMAX	This command specifies the user XMAX value for use in linear SOA calculations
POWer:SOA:LINear:XMIN	This command specifies the user XMIN value for use in linear SOA calculations
POWer:SOA:LINear:YMAX	This command specifies the user YMAX value for use in linear SOA calculations
POWer:SOA:LINear:YMIN	This command specifies the user YMIN value for use in linear SOA calculations
POWer:SOA:LOG:XMAX	This command specifies the user XMAX value for use in log SOA calculations
POWer:SOA:LOG:XMIN	This command specifies the user XMIN value for use in log SOA calculations
POWer:SOA:LOG:YMAX	This command specifies the user YMAX value for use in log SOA calculations
POWer:SOA:LOG:YMIN	This command specifies the user YMIN value for use in log SOA calculations
POWer:SOA:MASK:DEFine	This command specifies the X (volts) and Y (Amps) coordinates of the current SOA mask
POWer:SOA:MASK:MAXAmps	This command specifies the maximum current applied to SOA mask testing
POWer:SOA:MASK:MAXVolts	This command specifies the maximum voltage applied to SOA mask testing
POWer:SOA:MASK:MAXWatts	This command specifies the maximum power applied to SOA mask testing
POWer:SOA:MASK:NR_Pt?	Returns the number of mask points defined
POWer:SOA:MASK:STATE	This command specifies the state of the mask for SOA calculations
POWer:SOA:MASK:STOPOnviol	This command specifies the enabled state of the mask stop on violation condition
POWer:SOA:PLOTTYPe	This command specifies the SOA plot type
POWer:SOA:RESult:FAILures:QTY?	Returns the number of failures in the test
POWer:SOA:RESult:NUMACq?	Returns the number of acquisitions in the test
POWer:SOA:RESult:STATE?	Returns the pass/fail state of the SOA test
POWer:STATIstics	Clears all the accumulated statistics of all measurements
POWer:STATIstics:MODe	Enables or disables the display of the measurement statistics
POWer:STATIstics:WEIghting	Sets the number of samples which are included for the statistics computations for mean and the standard deviation
POWer:SWLoss:CONDCALCmethod	This command specifies the power application switching loss conduction calculation method
POWer:SWLoss:CONDuction:ENERGY:MAX?	Returns the maximum conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:ENERGY:MEAN?	Returns the mean conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:ENERGY:MIN?	Returns the minimum conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:POWer:MAX?	Returns the maximum conduction power for the switching loss calculation
POWer:SWLoss:CONDuction:POWer:MEAN?	Returns the mean conduction power for the switching loss calculation
POWer:SWLoss:CONDuction:POWer:MIN?	Returns the minimum conduction power for the switching loss calculation
POWer:SWLoss:DISplay	This command specifies the display selection for switching loss results
POWer:SWLoss:GATe:POLarity	This command specifies the switching loss gate polarity

Table 2-36: Power Commands (cont.)

Command	Description
POWer:SWLoss:GATe:TURNON	This command specifies the gate turn on level for switching loss power measurements
POWer:SWLoss:NUMCYCles?	Returns the number of cycles counted for the switching loss calculation
POWer:SWLoss:RDSon	This command specifies RDSON value for use in switching loss calculations when the conduction calculation method is RDSON
POWer:SWLoss:REFLevel:ABSolute:GATEMid	This command specifies the mid voltage reference level used in switching loss power measurements in volts
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent	This command specifies the low current reference level used in switching loss power measurements in amperes
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage	This command specifies the low voltage reference level used in switching loss power measurements in volts
POWer:SWLoss:REFLevel:PERCent:GATEMid	This command specifies the mid voltage reference level used in switching loss power measurements in percentage
POWer:SWLoss:REFLevel:PERCent:LOWCurrent	This command specifies the low current reference level used in switching loss power measurements in percentage
POWer:SWLoss:REFLevel:PERCent:LOWVoltage	This command specifies the low voltage reference level used in switching loss power measurements in percentage
POWer:SWLoss:TOFF:ENERGY:MAX?	Returns the maximum Toff energy switching loss calculation
POWer:SWLoss:TOFF:ENERGY:MEAN?	Returns the mean Toff energy switching loss calculation
POWer:SWLoss:TOFF:ENERGY:MIN?	Returns the minimum Toff energy switching loss calculation
POWer:SWLoss:TOFF:POWer:MAX?	Returns the maximum Toff power switching loss calculation
POWer:SWLoss:TOFF:POWer:MEAN?	Returns the mean Toff power switching loss calculation
POWer:SWLoss:TOFF:POWer:MIN?	Returns the minimum Toff power switching loss calculation
POWer:SWLoss:TON:ENERGY:MAX?	Returns the maximum Ton energy switching loss calculation
POWer:SWLoss:TON:ENERGY:MEAN?	Returns the mean Ton energy switching loss calculation
POWer:SWLoss:TON:ENERGY:MIN?	Returns the minimum Ton energy switching loss calculation
POWer:SWLoss:TON:POWer:MAX?	Returns the maximum Ton power switching loss calculation
POWer:SWLoss:TON:POWer:MEAN?	Returns the mean Ton power switching loss calculation
POWer:SWLoss:TON:POWer:MIN?	Returns the minimum Ton power switching loss calculation
POWer:SWLoss:TOTal:ENERGY:MAX?	Returns the maximum total energy switching loss calculation
POWer:SWLoss:TOTal:ENERGY:MEAN?	Returns the mean total energy switching loss calculation

Table 2-36: Power Commands (cont.)

Command	Description
POWer:SWLoss:TOTal:ENERGY:MIN?	Returns the minimum total energy switching loss calculation
POWer:SWLoss:TOTal:POWer:MAX?	Returns the maximum total power switching loss calculation
POWer:SWLoss:TOTal:POWer:MEAN?	Returns the mean total power switching loss calculation
POWer:SWLoss:TOTal:POWer:MIN?	Returns the minimum total power switching loss calculation
POWer:SWLoss:VCEsat	This command specifies VCESAT value for use in switching loss calculations when the conduction calculation method is VCESAT
POWer:TYPe	This command specifies the power application measurement type
POWer:VOLTAGESOurce	This command specifies the voltage source for the power application

RF Command Group

The Tektronix MDO4000/B and MDO3000 Series Mixed Domain Oscilloscopes have a built-in RF input, in addition to analog and digital channels, which allows you to display, measure, perform math on and analyze both time and frequency domain signals with one instrument.

The MDO4000/B combines the functionality of a mid-range oscilloscope and a standard spectrum analyzer, which makes it able to provide several time-correlated display and measurement options for RF traces.

The MDO3000 allows frequency domain measurements but does not offer time-correlated display and measurement options for RF traces.

The RF commands are concentrated in the RF Command Group, but also appear in other command groups, including Save and Recall, Waveform Transfer, Trigger and Search. A table is available that links the RF features to their corresponding commands, regardless of command group. (See page 1-2, *New or Changed Functionality Updates that Impact the Programmatic Command Set*.)

Frequency Domain Trace Types

The MDO4000/B and MDO3000 support four frequency waveform types:

The frequency domain window provides support for four spectrum traces, which may be turned on and off independently.

1. RF Normal trace: Each acquisition is discarded as new data is acquired.

2. RF Max Hold trace: The maximum data values are accumulated over multiple acquisitions of the RF Normal trace.

3. RF Min Hold trace: The minimum data values are accumulated over multiple acquisitions of the RF Normal trace.

4. RF Average trace: Data from the RF Normal trace is averaged over multiple acquisitions. This is true power averaging, which occurs before the log conversion. Each power of 2 average reduces the displayed noise by 3 dB.

Time Domain Trace Types

The MDO4000/B offers three additional time domain trace types in addition to the usual analog and digital waveforms one expects on an oscilloscope. On these instruments, the time domain window can also display three RF time domain traces derived from the time-domain I&Q data acquired for the RF input. They are time-correlated with the analog and digital channels, and represent a continuous time domain data stream. The time domain trace options are:

1. The RF Amplitude vs. Time trace: The instantaneous amplitude of the input, after band-pass filtering, relative to the current frequency range (as defined by the center frequency and span settings.)

2. The RF Frequency vs. Time trace: The instantaneous frequency of the input, relative to the center frequency. The vertical axis displays frequency. The frequency versus time waveform handle (baseline indicator) indicates the center frequency. When the trace is above the waveform handle, it is above the center frequency. When the trace is below the waveform handle, it is below the center frequency.

3. The RF Phase vs. Time trace: The instantaneous phase of the input, relative to the center frequency. The vertical axis displays phase, with wrapping at roughly +/- 180°.

The squelch function is used to suppress the phase and frequency information when the amplitude of the RF input is below a user-specified value. This keeps both the RF Frequency vs. Time and the RF Phase vs. Time traces from displaying broad bands of noise when there is no signal present on the RF input.

Time-Correlated Multi-Domain Display

(MDO4000/B only.)

A single trigger event coordinates acquisition across all analog, digital, and RF inputs. This enables a time-correlated view of both the time and frequency domain signals in a single instrument.

Spectrum Time: This is the period of time used to calculate the spectrum shown in the frequency domain graticule.

Analog Time: This is the amount of time acquired in the time domain graticule.

RF Acquisition Time: This is the amount of time acquired by the RF system. At mid-to-fast time base settings, it equals analog time. At slower time base settings, it can be less than analog time.

Acquisition Stages

RF acquisitions travel through their own signal path before being digitized by the oscilloscope. This signal path includes a combination of analog amplification,

attenuation, filtering and down-conversion, depending on the parameters set by the user (frequency, span, reference level, and so forth.)

For the MDO4000/B series models, the acquisition system uses one of three frequency bands to acquire RF data depending on where the center frequency and span are set. The bands are: 50 kHz to 3.75 GHz, 2.75 GHz to 4.5 GHz, and 3.5 GHz to 6.0 GHz.

For the MDO3000 series models, there is one frequency band (up to 3 GHz depending on the model and installed options).

Specifying the Reference Level and Resolution Bandwidth (RBW) Settings

For the MDO4000/B series models, the reference level is adjustable from –140 dBm to +30 dBm. For the MDO3000 series models, the reference level is adjustable from –140 dBm to +20 dBm. For all series, attenuation is set automatically with the reference level. The RBW setting is adjustable down to 20 Hz. By default, the RBW tracks span in automatic mode in a 1000:1 ratio; this ratio is adjustable.

Detection Types

All MDO instruments calculate Fast Fourier Transform calculations (FFTs) with a 1,000 to ~2,000,000 point output, depending on the acquisition settings. It then reduces that FFT output into a 1,000 pixel-wide display (for the MDO4000/B) or 750 pixel-wide display (for the MDO3000). This means that approximately 1 to 2,000 FFT points get compressed into each pixel column. There are four choices as to how this compression is done: +peak, sample, average, and -peak.

Triggering Using RF Power Level as a Source

You can use the RF power level as a source for triggering with the MDO4000/B series models (but not the MDO3000 models). The MDO4000/B triggered acquisition system is fully integrated with both the frequency and time domains. This means that a single event can trigger all of the analog, digital and RF acquisitions, regardless of whether that event came from an analog, digital or RF input. The RF power level has been distilled through special processing and may be used as a trigger. RF Power may be used as a source for Edge triggering. With an MDO4TRIG application module installed, the RF Power level can also be used as a source for pulse width, timeout, runt, logic and sequence triggering. (For more information, see Triggering on the RF input. (See page 2-75, *Trigger Command Group*.)

Spectrogram Display

(MDO4000/B and MDO3000). The spectrogram is a graph of frequency domain traces over time. It provides an intuitive display that is useful for monitoring slowly changing RF events, and for identifying low amplitude signals too subtle for the eye to catch in a regular spectrum display. The x-axis shows frequency, and the y-axis shows time. Amplitude is represented by the color of the trace. Cold colors (blue, green) indicate low amplitude, and hot colors (red, yellow) indicate high amplitude.

Spectrogram slices are generated by taking each spectrum and flipping it on its edge, so that it is one pixel row tall. Each new acquisition adds another slice at the bottom of the spectrogram, and the previous acquisitions (slices) move up one row; you can then navigate backwards through the history of the spectrogram by selecting slice numbers to view. (The spectrogram slice trace is displayed as the RF Normal trace.)

Spectrum Mode: Triggered and Free Run

When only the frequency domain waveforms are displayed (no time domain waveforms), you can choose whether the MDO4000/B should use Triggered mode or Free Run mode. (MDO3000 only uses Free Run mode.) When Triggered mode is selected, you can control all trigger settings, including Normal and Auto triggering. When Free Run mode is selected, the oscilloscope generates RF acquisitions as fast as possible. (To display only the frequency domain waveforms, turn off all time domain waveforms, including channels 1- 4, digital channels 0 - 15, buses, time domain math waveforms, time domain reference waveforms, and any RF vs. Time traces.)

When the oscilloscope displays both time and frequency domain waveforms, then the instrument's trigger system is in control of the Triggered mode and the RF acquisitions.

Using Markers in the Frequency Domain for Measurement and Analysis

For frequency domain measurements, up to 11 automatic markers are available to assist with quickly identifying the frequency and amplitude of peaks in the spectrum based upon user threshold and excursion settings. If more peaks meet the criteria than the desired number of markers, then the highest amplitude peaks are shown. Two manual markers are also available for measuring non-peak areas of interest, and to measure Noise Density and Phase Noise. If manual markers are off, the reference marker is automatically placed on the highest amplitude peak. With manual markers on, the reference marker becomes the "A" manual marker. Automatic peak markers are on by default.

Each automatic marker has a readout associated with it. These can be absolute or delta readouts. An absolute marker readout shows the actual frequency and amplitude of the associated marker. A delta marker readout shows the frequency and amplitude of the automatic markers relative to the Reference Marker. The Reference Marker's readout indicates absolute frequency and amplitude, regardless of the readout type. (It is marked on the display with a red R in a triangle.) The marker measurement readouts are absolute in dBm or relative to the reference marker in dBc (dB below carrier amplitude).

The threshold and excursion settings define which peaks are marked automatically. The threshold is a minimum amplitude that a signal must cross to be a valid peak. If the threshold is lower, more peaks will tend to qualify for markers. If the threshold is higher, fewer peaks tend to qualify for markers. The excursion is how far a signal needs to fall in amplitude between marked peaks to be another valid peak. If the excursion is low, more peaks will tend to qualify for markers. If the excursion is high, fewer peaks will tend to qualify for markers.

When the two manual markers are turned on, the Reference Marker is no longer automatically attached to the highest amplitude peak. It can now be moved to any desired location. This enables easy measurement of any part of the spectrum, as well as delta measurements to any part of the spectrum. This also lets you measure non-peak spectral content of interest. The readouts for manual markers indicate frequency, amplitude and noise (just like automatic marker readouts).

Taking Automatic Measurements in the Frequency Domain

You can take three automatic measurements in the frequency domain:

1. Channel Power (CP) — The total power within the bandwidth, defined by the Channel Width.

2. Adjacent Channel Power Ratio (ACPR) — The power in the main channel and the ratio of channel power to main power, for the upper and lower halves of each adjacent channel.

3. Occupied Bandwidth (OBW) — The bandwidth that contains the specified percentage of power within the analysis bandwidth.

Triggering using RF Power Level as a Source; Searching

The ability to use the RF power level as the source for edge triggering and searching is provided standard with the MDO4000/B series. With the MDO4TRIG (Advanced Trigger) application module installed, the RF power level can also be used as the source for pulse width, time-out, runt, logic, and sequence triggering. (See page 2-75, *Trigger Command Group*.) A number of search commands are also available. (See page 2-61, *Search Command Group*.)

Transferring and Saving RF Trace Information

You can perform waveform transfer commands and queries using RF traces. (See page 2-93, *Waveform Transfer Command Group*.)

RF traces can be saved to an .ISF or .CSV file for subsequent recall to any of the 4 internal reference memory locations. The oscilloscope can also save, but not recall, RF acquisitions as .TIQ files. You can import .TIQ files into Tektronix SignalVu-PC software (PC based), SignalVu software (oscilloscope based), RSAVu software (PC based) or into a Tektronix real-time spectrum analyzer for pulse analysis and demodulation analysis. (See page 2-58, *Save and Recall Command Group*.)

NOTE. *The RF input replaces the Aux Input connector on the front panel, therefore aux-in commands and arguments are not supported on the MDO4000/B and MDO3000 models with 4-channels.*

Table 2-37: RF Commands

Item	Description
MARKER:M<x>:AMPLitude:ABSolute?	This query returns the actual amplitude (vertical) value of the either of the two manual markers that are available for frequency domain traces, in dBm.
MARKER:M<x>:AMPLitude:DELTa?	This query returns the delta amplitude (vertical) value of either of the two manual markers that are available for frequency domain traces, in relation to the Reference Marker.
MARKER:M<x>:FREQuency:ABSolute	This command specifies the actual frequency (horizontal) value of either of the two manual markers that are available for frequency domain traces.
MARKER:M<x>:FREQuency:DELTa?	This query returns the delta frequency (horizontal) value of either of the two manual markers that are available for frequency domain traces, in relation to the Reference Marker.
MARKER:M<x>:NOISEDensity?,	This command returns the noise density of the RF_NORMal trace at the specified marker position in <RF Units>/Hz units, where <RF Units> are the units specified by the command RF:UNIts.
MARKER:M<x>:PHASENoise?	This command returns the phase noise of the RF_NORMal trace at the specified marker position in dBc/Hz units.
MARKER:MANual	This command switches on or off the manual markers **a** and **b** that are available for frequency domain traces.
MARKER:PEAK:EXCURsion	This command specifies the excursion value, in user-selected units, for the frequency domain trace automatic peak markers. You can select the units with the command RF:UNIts.
MARKER:PEAK:MAXimum	This command specifies the maximum number of frequency domain trace peaks that should have automatic markers associated with them. This can be a number between 1 and 11.
MARKER:PEAK:STATE	This command switches on or off the automatic peak markers that are available for frequency domain traces. The default is 1 (on). There are up to 11 automatic markers.
MARKER:PEAK:THReshold	This command specifies the threshold value, in the same vertical units as the source waveform, of the automatic peak markers available for frequency domain traces. (Use the RF:UNIts to specify the units.)
MARKER:REFERence	This command changes the Center Frequency to the frequency indicated by the Reference Marker, in effect moving the Reference Marker to the center of the screen.
MARKER:REFERence:AMPlitude?	This query returns the amplitude (vertical) value of the Reference Marker in dBm when markers are turned on (using the command MARKER:PEAK:STATE or MARKER:MANual).
MARKER:REFERence:FREQuency?	This query returns the frequency of the Reference Marker when the frequency domain trace markers have been turned on (using either the command MARKER:PEAK:STATE or MARKER:MANual).
MARKER:TYPe	This command specifies the marker type (either DELTa or ABSolute) to use when the automatic markers for the frequency domain traces are turned on. To turn on the automatic markers, use the command MARKER:PEAK:STATE.
RF:CLIPPing?	Returns a boolean indicating whether the RF input is “clipping” due to input over/under-range detection.
RF:DETECTionmethod:MODe	This command specifies whether the RF detection within the oscilloscope occurs automatically or manually. The default is AUTO. If you set the detection method mode to MANual, you are then able to use the related `RF:DETECTionmethod` commands to specify detection method options for the frequency domain traces (the options are `MINUSpeak`, `SAMple`, `PLUSpeak` and `AVErage`).

Table 2-37: RF Commands (cont.)

Item	Description
RF:DETECTionmethod: RF_AVErage	This command specifies the detection method the oscilloscope should use when creating an RF Average trace in the frequency domain. The Average trace displays the average of values from multiple acquisitions at each trace point.
RF:DETECTionmethod: RF_MAXHold	This command specifies the detection method the oscilloscope should use when creating an RF Max Hold trace in the frequency domain. The Max Hold trace displays the largest value in all acquisition history at each trace point.
RF:DETECTionmethod: RF_MINHold	This command specifies the detection method the oscilloscope should use when creating an RF Min Hold trace in the frequency domain. The Min Hold trace displays the smallest value throughout the acquisition history at each trace point.
RF:DETECTionmethod: RF_NORMal	This command specifies the detection method the oscilloscope should use when creating an RF Normal trace in the frequency domain. The Normal trace displays the most recently acquired sample at each trace point.
RF:FREQuency	This command specifies the center frequency of the RF acquisition system. The center frequency range varies with the model:
RF:LABel	This command specifies a general label for the RF frequency domain traces.
RF:MEASUre:ACPR: ADJACENTPAIRs	When the RF measurement type has been set to ACPR, the frequency domain displays a Main channel in the center (Ch:Main), and a side channel group on either side of the Main Channel. There can be either 1, 2 or 3 channels within each side group; this command specifies that number. (Lower Area 1, 2 and 3 would be on the left side of the Main channel; Upper Area 1, 2 and 3 would be on the right side). To set the measurement type to ACPR, use the command `RFMEASUre:TYPe ACPR`.
RF:MEASUre:ACPR:CHANBW	This command configures the measurement bandwidth to use for the Main channel, as well as the adjacent side channels, when performing ACPR measurements using a frequency domain trace. The RF measurement type must first be set to ACPR using the command `RFMEASUre:TYPe ACPR`.
RF:MEASUre:ACPR: CHANSPACing	This command specifies the center-to-center spacing between the Main channel and adjacent channels when performing ACPR measurements using a frequency domain trace. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.) Note that if the channel spacing is adjusted to be more narrow than the channel bandwidth, then the oscilloscope will automatically decrease the channel bandwidth. ***NOTE.*** *The oscilloscope will maintain the span to fit all the channels on-screen, plus a margin of 10% (5% on either side.)*
RF:MEASUre:ACPR:LA1DB?	This query measures a ratio between the first lower adjacent side channel and the Main channel when performing ACPR measurements. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe)
RF:MEASUre:ACPR:LA2DB?	This query measures a ratio between the second lower side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe)

Table 2-37: RF Commands (cont.)

Item	Description
RF:MEASUre:ACPR:LA3DB?	This query measures a ratio between the third lower side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)
RF:MEASUre:ACPR:POWer?	This query returns the measure of the total RF power in the Main channel when performing ACPR measurements using a frequency domain trace. It uses the units that have been selected with the command RF:UNIts.
RF:MEASUre:ACPR:UA1DB?	This query measures a ratio between the first upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)
RF:MEASUre:ACPR:UA2DB?	This query measures a ratio between the second upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)
RF:MEASUre:ACPR:UA3DB?	This query measures a ratio between the third upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)
RF:MEASUre:CP:CHANBW	This command specifies the channel bandwidth to use when the RF measurement type has been set to Channel Power (CP) using the command RF:MEASUre:TYPe.
RF:MEASUre:CP:POWer?	This query returns the total channel power within the displayed channel bandwidth, when the RF measurement type has been set to CP (using the command RF:MEASUre:TYPe).
RF:MEASUre:OBW:CHANBW	This command specifies the Analysis Bandwidth to use, when the measurement type has been set to OBW (using the command RF:MEASUre:TYPe). Note that the span automatically increases or decreases to be 10% more than the Analysis Bandwidth (providing some room around the signal of interest).
RF:MEASUre:OBW:LOWERFreq?	This query returns the lower frequency threshold (on the display, the white line to the left bracketing OBW power). The RF measurement type must be set to OBW using the command RF:MEASUre:TYPe.
RF:MEASUre:OBW:PERCENTdown	This command specifies the percentage of total power within the Analysis Bandwidth (the OBW power) such that half of the remaining power will be below the OBW:LOWERFreq level and the other half of the remaining power will be above the OBW:UPPERFreq level.
RF:MEASUre:OBW:POWer?	This query returns the total channel power within the occupied bandwidth, when the RF measurement type has been set to OBW (using the command RF:MEASUre:TYPe).
RF:MEASUre:OBW:UPPERFreq?	This query returns the upper frequency threshhold (on the display, the white line to the right bracketing OBW power). The RF measurement type must be set to OBW using the command RF:MEASUre:TYPe.
RF:MEASUre:TYPe	This command specifies the RF measurement type: Channel Power, Adjacent Channel Power Ratio, Occupied Bandwidth, or none.

Table 2-37: RF Commands (cont.)

Item	Description
RF:POSition	This command specifies the vertical position for the frequency domain traces. The vertical position is the location of the Reference Level with respect to the top of the graticule, in divisions. The lower limit is –10 divisions. The upper limit is +10 divisions.
RF:PRObe:AUTOZero	This command executes the attached probe's AutoZero function, for probes that support this feature.
RF:PRObe:CALibrate	This command executes a calibration or initialization for a probe attached to the RF input, if the probe is calibratable.
RF:PRObe:CALibrate:CALIBRATABLe?	This query returns a boolean value that indicates whether the attached probe is calibratable.
RF:PRObe:CALibrate:STATE?	This command returns the calibration state of the probe connected to the RF input.
RF:PRObe:COMMAND	This command sets the state of the probe control specified with the first argument to the state specified with the second argument.
RF:PRObe:DEGAUss	This command starts a degauss/AutoZero cycle on a TekVPI current probe attached to the RF input.
RF:PRObe:DEGAUss:STATE?	This command returns the state of the probe degauss for the RF input.
RF:PRObe:FORCEDRange	This command specifies the range of a TekVPI probe attached to the RF input.
RF:PRObe:GAIN	This command specifies the scale factor for the probe attached to the RF input.
RF:PRObe:ID:SERnumber?	This query returns the serial number of the probe attached to the RF input.
RF:PRObe:ID:TYPe?	This query returns the type of probe attached to the RF input.
RF:PRObe:PREAmp:MODe	Sets or returns the user selected mode for an RF pre-amp connected to the RF input. BYPass or AUTO
RF:PRObe:PREAmp:STATus?	Returns the actual state of the RF pre-amp connected to the RF input. NONe, ON, or BYPass
RF:PRObe:RESistance?	This query returns the input resistance of the probe attached to the RF input, if the probe supports it (otherwise, it returns 0.0). The RF input is 50 Ω impedance.
RF:PRObe:SIGnal	This command specifies the input bypass setting of a TekVPI probe attached to the RF input. The probe must support input bypass.
RF:PRObe:UNIts?	This query returns a quoted string that describes the units of measure for the probe attached to the RF input.
RF:RBW	This command specifies the resolution bandwidth (RBW) setting when the RBW mode has been set to MANUAL (using the command RF:RBW:MODe). The resolution bandwidth is the width of the narrowest measurable band of frequencies in a frequency domain trace. The RBW is adjustable down to 20Hz. By default, the RBW tracks the span value in a 1000:1 ratio.
RF:RBW:MODe	This command specifies the resolution bandwidth (RBW) mode, either automatic or manual.
RF:REFLevel	This command sets the Reference Level of the RF input. The Reference Level can either be specified as a numeric floating point value, or set automatically.
RF:RF_AMPlitude:LABel	This command specifies the label for the RF Amplitude vs. Time trace.
RF:RF_AMPlitude:VERTical:POSition	This command specifies the vertical position of the RF Amplitude vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.

Table 2-37: RF Commands (cont.)

Item	Description
RF:RF_AMPlitude:VERTical:SCAle	This command specifies the vertical scale for the RF Amplitude vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.
RF:RF_AVErage:COUNt?	This query returns the number of RF traces that have been accumulated to create an RF Average frequency domain trace.
RF:RF_AVErage:NUMAVg	This command specifies the number of acquisitions to be used when creating an RF Average frequency domain trace, which displays the average of values from multiple acquisitions at each trace point. The default is 16. The range is 2 – 512, in exponential increments.
RF:RF_FREQuency:LABel	This command specifies the label for the RF Frequency vs. Time trace.
RF:RF_FREQuency:VERTical:POSition	This command specifies the vertical position for the RF Frequency vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.
RF:RF_FREQuency:VERTical:SCAle	This command specifies the vertical scale for the RF Frequency vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.
RF:RF_PHASe:LABel	This command specifies the label for the RF Phase vs. Time trace.
RF:RF_PHASe:REFERence:DEGrees	Sets or returns the phase, in degrees, at the trigger point for the RF_PHASe time domain trace.
RF:RF_PHASe:VERTical:POSition	This command specifies the vertical position for RF Phase vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.
RF:RF_PHASe:VERTical:SCAle	This command specifies the vertical scale for RF Phase vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.
RF:RF_PHASe:WRAP:DEGrees	Sets or returns the number of degrees to wrap the RF_PHASe time domain trace.
RF:RF_PHASe:WRAP:STATE	Sets or returns the state of the phase wrap control for the RF_PHASE time domain trace.
RF:RF_V_TIMe:BANDWidth	Sets or returns the RF versus time bandwidth as an NR3 value in Hz.
RF:SCAle	This command specifies the overall vertical scale setting of the frequency domain window. The lower limit is 0.1 dB/division. The upper limit is 100dB/division. The vertical scale is adjustable in a 1–2–5 sequence.
RF:SPAN	This command specifies the span setting. The span is the range of frequencies that can be observed around the center frequency. This is the width of the frequency domain trace, which is equal to the stop frequency minus the start frequency. The span maximum varies according to the oscilloscope model; either 3GHz or 6GHz.
RF:SPANRbwratio	This command specifies the ratio of the span to the resolution bandwidth (RBW) that will be used when the RBW Mode is set to AUTO. (In order to set the RBW Mode to AUTO, use the command RF:RBW:MODe.)
RF:SPECTRogram	Clears the spectrogram.

Table 2-37: RF Commands (cont.)

Item	Description
RF:SPECTRogram:NUMSLICEs?	This query returns the number of spectrogram slices that are currently being rendered. A spectrogram slice is a section of the spectrogram representing one interval, or slice, of time in the spectrogram record.
RF:SPECTRogram:SLICESELect	This command specifies the spectrogram slice number that is to be displayed. Allowable slice numbers range from 0 to –327 in full-screen mode, and 0 to –147 in split-screen mode. (The range is negative because the numbering starts with the latest slice (0) and proceeds backwards in time.) The slice can only be selected or changed when acquisitions have been stopped. As soon as acquisitions start again, the slice number is reset to 0 (the latest slice). Attempts to select a slice number outside of range, or when acquisitions are running, are ignored. The query form returns the currently selected spectrogram slice. To use this command, first turn on the spectrogram (RF:SPECTRogram:STATE). Then query the number of slices (RF:SPECTRogram:NUMSLICEs?). Stop the acquisition when you've reached the number of desired slices. Then select the slice to display (RF:SPECTRogram:SLICESELect). Each slice of the spectrogram corresponds to a single RF acquisition. The FFT samples the entire spectrum for the incoming signal (at the rate with which new spectrums are acquired). The newest spectrum is on the bottom edge of the spectrogram, and the oldest is on the top edge. When the oscilloscope is stopped, you can scroll "back in time" through the spectrogram using the spectrum slice control. When you select a spectrogram slice, it is displayed in the bottom window as the RF Normal trace.
RF:SPECTRogram:SLICETIMe?	Returns the time stamp of the selected spectrogram slice, as specified by the command `:RF:SPECTRogram:SLICESELect`.
RF:SPECTRogram:STATE	This command switches the frequency domain spectrogram display on or off.
RF:SPECTRogram:TIMe?	Queries the number of seconds in the spectrogram since continuous acquisition started. The value returned is always <= 0.
RF:SPECTRUMMode	When only the frequency domain waveforms are displayed, this command specifies the RF spectrum mode: either `TRIGgered` or `FREErun`. The default is `FREErun`.
RF:SPECTRUMTrace	Resets the spectrum traces, `RF_MINHold, RF_MAXHold and RF_AVErage`.
RF:SQUELCH:STATE	This command turns the squelch control on or off for the RF Frequency vs. Time and RF Phase vs. Time traces. When squelch is on, only the portions of these traces where the amplitude exceeds the squelch threshold are displayed. This prevents the display of Phase and/or Frequency for signals that are at or near noise levels. The RF amplitude can be observed in the RF Amplitude vs. Time trace.
RF:SQUELCH:THReshold	This command specifies the squelch threshold level, in volts, for the RF Frequency vs. Time and RF Phase vs. Time traces.
RF:STARt	This command specifies to exclude frequencies below a certain level from use.
RF:STOP	This command specifies to exclude frequencies above a certain level from use.
RF:UNIts	This command specifies the vertical units to be used in all RF-related absolute logarithmic amplitudes.
RF:WINdow	This command specifies which window will be used for the windowing function, which is only used for the three time domain RF traces (Amplitude vs. Time, Frequency vs. Time and Phase vs. Time). The default window is Kaiser.

Table 2-37: RF Commands (cont.)

Item	Description
SEARCH:SPECTral:LIST?	This query will return a list of all automatically placed peak markers displayed in the frequency domain graticule. (To return information about manual markers, use the MARKER:M<x> commands.)
SELect:RF_AMPlitude	This command switches the RF Amplitude vs. Time trace display on or off in the time domain graticule.
SELect:RF_AVErage	This command switches the RF Average trace display on or off in the frequency domain graticule.
SELect:RF_FREQuency	This command switches the RF Frequency vs. Time trace display on or off in the time domain graticule.
SELect:RF_MAXHold	This command switches the frequency domain Max Hold trace display on or off in the frequency domain graticule.
SELect:RF_MINHold	This command switches the frequency domain Min Hold trace display on or off in the frequency domain graticule.
SELect:RF_NORMal	This command switches the frequency domain Normal trace display on or off in the frequency domain graticule.
SELect:RF_PHASe	This command switches the RF Phase vs. Time trace display on or off in the time domain graticule.

Save and Recall Command Group

Use the commands in the Save and Recall Command Group to store and retrieve waveforms and settings. When you save a setup, you save all the settings of the oscilloscope. When you recall a setup, the oscilloscope restores itself to the state it was in when you originally saved the setting.

NOTE. *External file structure is as follows:*

E: is the USB memory device plugged into the first USB port on the front of the oscilloscope.

F: is the USB memory device plugged into the second USB port on the front of the oscilloscope. (Not available for MDO3000 models).

G: and H: are the USB memory device plugged into the USB ports on the rear of the oscilloscope. (Not available for MDO3000 models.)

I: — Z are for network storage.

NOTE. Analog, digital, and RF waveforms and traces and those waveforms and traces derived from them (such as math and reference) can be saved to an ISF file. When saving all channels in ISF format, a group of files will be saved. Each will have the same value for XXXX, but the YYY values will be set to the different channels that were turned on when the Save All Waveforms operation was performed.

The oscilloscope can save, but not recall, RF acquisitions as .TIQ files. You can import .TIQ files into Tektronix SignalVu-PC software (PC based), SignalVu software (oscilloscope based), RSAVu software (PC based) or into a Tektronix real-time spectrum analyzer for pulse analysis and demodulation analysis.

Table 2-38: Save and Recall Commands

Command	Description
FACtory	Resets the oscilloscope to factory default settings
*RCL	Recalls saved oscilloscope settings
RECAll:SETUp	Recalls saved oscilloscope settings
RECAll:SETUp:DEMO<x>	This command recalls one of the 6 specified built-in demonstration setups of RF functionality. <x> can be 1 through 6. The demonstrations include 1. Multiple Peaks, 2. spectrogram, 3. VCO/PLL Turn On, 4. ASK Modulation, 5. Frequency Hop and 6. Capture BW.
RECAll:WAVEform	This command (no query form) recalls a stored waveform to a reference memory location, and, for instruments with the arbitrary waveform feature, to arbitrary waveform edit memory (EMEM). Only the first waveform in the .CSV file is recalled for multiple waveform .CSV files. Recall of digital waveforms (D0 through D15) is not supported.
*SAV	Stores the state of the oscilloscope to a specified memory location
SAVe:ASSIgn:TYPe	This command specifies the assignment of the save button
SAVe:EVENTtable:{BUS<x>|B<x>}	Saves event table data from bus<x> to a specified file
SAVe:IMAGe	Saves a capture of the screen image to the specified file
SAVe:IMAGe:FILEFormat	This command specifies the file format to use for saving screen images. The file format is not automatically determined by the file name extension. You need to choose a file name with an extension which is consistent with the selected file format
SAVe:IMAGe:INKSaver	This command specifies the current inksaver setting for the SAVe:IMAGe command
SAVe:IMAGe:LAYout	This command specifies the layout to use for saved screen images
SAVe:SETUp	Saves the state of the oscilloscope to a specified memory location or file
SAVe:WAVEform	This command saves the specified waveform to the specified destination reference memory slot, or saves the specified waveform(s) to the specified destination file. The same function can be accomplished from the front panel Menu->save waveform menu. The type of file saved is dependent upon the SAVe:WAVEform:FILEFormat command.
SAVe:WAVEform:FILEFormat	This command specifies the format for saving waveforms. This command specifies the file format to be used when saving waveforms — either an internal format, .ISF, or an external comma-delimited spreadsheet format, .CSV, that includes waveform header and timing information.
SAVe:WAVEform:FILEFormat:RF_BB_IQ	This command specifies the file format for saving the RF baseband I & Q data. The default format is TIQ.

Table 2-38: Save and Recall Commands (cont.)

Command	Description
SAVe:WAVEform:GATIng	Specifies whether save waveform operations should save the entire waveform or a specified portion of the waveform
SETUP<x>:DATE?	Returns the date when the specified oscilloscope setup was saved
SETUP<x>:LABEL	This command specifies the specified oscilloscope setup label
SETUP<x>:TIME?	Returns the time when the specified oscilloscope setup was saved

Search Command Group

The search commands let you analyze your source waveform record for conditions specified by a search's criteria. Once these criteria are matched, the oscilloscope places a search mark at that location in the waveform record. You can then navigate or save the marks. (See page 2-30, *Mark Command Group*.)

When performing an edge, pulse width, runt, transition (rise/fall time), time-out, or bus search, you can use only one waveform at a time.

When performing a logic or a setup/hold search, you can use any or all of the displayed waveforms at the same time. For example, with a logic search, you can search for instances when CH1 is high and CH2 is low. Likewise, with a setup and hold search, you can search for instances when the clock source is CH1 and the data sources are CH2 and CH3.

With pulse width searching, the oscilloscope can search for pulses with widths less than, greater than, equal to, or not equal to a specified time. Additionally, it can search for pulses with widths within, or outside of a range of two different specified times. Searching can take place on either positive or negative pulses.

Searches on RF waveforms can only use time domain traces (RF Amplitude vs. Time, RF Frequency vs. Time and RF Phase vs. Time). (MDO4000/B only.)

A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, *Search and Trigger Command Sequence Examples*.)

Searching using Thresholds

All search types except bus searches use thresholds, which are vertical values that the source waveform must cross in order for a mark to be placed. For example, if you set the search type to EDGE, and the search source to CH1, the search's slope to RISE, and the search's threshold value to 1.5V, then that search will find all places where CH1 transitions from below 1.5 volts to above 1.5 volts.

Each individual search source waveform has two threshold values: a low threshold and a high threshold. Note that if you change the search source waveform, you must explicitly set the thresholds. For example, if you set the search's CH1 lower threshold to 1.5 volts, and then decide to change the search's source waveform to CH2, you must then explicitly set CH2's lower threshold value to the value you would like (it will not automatically be 1.5 volts). If you have an edge search set up on CH1 with the threshold you'd like, then decide to change to a logic search and change the threshold on CH1 to fit your logic search, and then change back to an edge search, your initial threshold setting on the edge search will be lost.

Bus, Video, and RF application modules

A table is available that lists all commands enabled by each application module (See page G-1, *Application Module-enabled Commands*.)

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3AUDIO.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals, when tested with the MDO4000/B and MSO/DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.
- For video signals, install the DPO4VID module, except for the MDO3000 models, which do not require a module.
- For RF signals (MDO4000/B Series only), install the MDO4TRIG module.

Search Commands

Command	Description
SEARCH?	Returns all search-related settings
SEARCH:SEARCH<x>:COPy	Copies the search criteria to the trigger, or the trigger criteria to the search
SEARCH:SEARCH<x>:LIST?	This query returns a list of all automatically created search marks on waveforms in the time domain (leaving out any manually created marks). These automatic marks are created using a search command. The entries returned are in the form of an enumeration representing the source waveform, followed by 7 time mark parameters.
SEARCH:SEARCH<x>:STATE	Sets the search state to on or off
SEARCH:SEARCH<x>:TOTal?	Returns the total number of matches for search <x>
SEARCH:SEARCH<x>:TRIGger:A:BUS?	Queries the `SEARCH:SEARCH<x>:TRIGger:A:BUS` settings.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition	This command sets the condition (start of frame or matching data) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue	This command sets the upper word value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet	This commands sets the data offset value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier	This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue	This command sets the lower word value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD	This command sets the alignment of the data (left, right or either) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition	This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection	This command sets the data direction (read, write or either) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier	This command sets the qualifier (<, >, =, not =, <=) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe	This command sets the length of the data string, in bytes, to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue	This command sets the binary data value to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype	This command sets the frame type (data, remote, error or overload) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe	This command sets the addressing mode (standard or extended format) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue	This command sets the binary address value to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition	When searching through Ethernet data, this command specifies the field or condition to search on.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue	When the search condition is set to `DATa`, and the qualifier is set to either `INrange` or `OUTrange`, this command specifies the upper data value of the range.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet	When the search condition is set to `DATa`, this command specifies where in the data field to look for the data search value.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe	When the search condition is set to `DATa`, this command specifies the number of contiguous TCP/IPv4/MAC client data bytes to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue	When the search condition is set to `DATa`, and the qualifier is set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`, this command specifies the value to search on.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe	This command specifies which Ethernet frame type to search on: either Basic or QTAG (IEEE 802.1Q, or VLAN tagging).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue	When the Ethernet search condition is set to IPHeader, this command specifies the value of the 32–bit destination address that is to be used in the search (along with the protocol and source address).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue	When the Ethernet search condition is set to IPHeader, this command specifies the value of the 8–bit protocol field that is to be used in the search (along with the source and destination addresses).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue	When the Ethernet search condition is set to IPHeader, this command specifies the value of the 32–bit source address that will be used in the search (along with the protocol and destination address).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue	When the Ethernet search condition is set to MACADDress, this command specifies the 48–bit MAC destination address value that is to be used in the search (along with the source address value).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue	When the Ethernet search condition is set to MACADDress, this command specifies the 48–bit MAC source address value that is to be used in the search (along with the destination address value).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue	When the Ethernet search condition is set to MACLENgth, and the qualifier is set to either INrange or OUTrange, this command specifies the upper data value of this range.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue	When the Ethernet search condition is set to MACLENgth, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the 16–bit value to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue	When the Ethernet search condition is set to QTAG, this command specifies the 32–bit QTAG value to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier	This command specifies the qualifier to be used when the Ethernet search condition is set to MACLENgth or DATa.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue	When the Ethernet search condition is set to TCPHeader, this command specifies the 32–bit acknowledgement value that is to be used in the search (along with the destination and source port addresses and the sequence number). The default is all X's (don't care).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue	When the Ethernet search condition is set to TCPHeader, this command specifies the 16–bit destination port address that is to be used in the search (along with the acknowledgement value, source port address and the sequence number).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue	When the Ethernet search condition is set to TCPHEADER, this command specifies the 32–bit sequence number that is to be used in the search (along with the destination and source port addresses and the acknowledgement value).

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue	When the Ethernet search condition is set to TCPHEADER, this command specifies the 16–bit source port address that is to be used in the search (along with the destination port address, the sequence number and the acknowledgement number).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition	This command specifies the condition to use when searching on FlexRay bus data (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue	This command specifies the upper data value of the range to be used when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue	This command specifies the low data value to be used when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue	This command specifies the high value to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet	This command specifies the offset of the data string in bytes to be used when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe	This command specifies the length of the data string, in bytes, to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue	This command specifies the low value to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE	This command specifies which end of file type to use (static, dynamic or any) when searching on the FlexRay bus EOF field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE	This command specifies the error type to use when searching on the FlexRay bus signal.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue	This command specifies the high value to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier	This command specifies the qualifier to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue	This command specifies the low value to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType	This command specifies the frame type (normal, payload, null, sync or startup) to use when searching on FlexRay bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC	This command specifies the CRC portion of the binary header string to be used when searching on FlexRay bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount	This command specifies to use the cycle count portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID	This command specifies to use the frame ID portion of the binary header string when searching on the FlexRay bus header.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits	This command specifies to use the indicator bits portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength	This command specifies to use the payload length portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe	This command specifies the I2C address mode to 7 or 10-Bit
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe	This command specifies the I2C address type to I2C special addresses
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue	This command specifies the binary address string to be used for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition	This command specifies the search condition for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection	This command specifies the I2C search condition to be valid on a READ, WRITE or either
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe	This command specifies the length of the data string in bytes to be used for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue	This command specifies the binary data string to be used for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition	This command specifies the search condition for a LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue	This command specifies the binary data string
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier	This command specifies the LIN data qualifier
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe	This command specifies the length of the data string in bytes
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue	This command specifies the binary data string used for a LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE	This command specifies the error type used for a LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue	This command specifies the binary address string used for LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue	When the MIL-STD-1553 bus search condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the qualifier to be used with the remote terminal address field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue	When the MIL-STD-1553 bus search condition is set to COMMAND, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the search.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the Command word parity that is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies that the transmit/receive bit (bit 9) is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition	This command specifies a word type or condition within a MIL-STD-1553 bus word to search for. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity	When the MIL-STD-1553 bus search condition is set to DATa, this command specifies the data parity bit to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue	When the MIL-STD-1553 bus search condition is set to DATa, this command specifies the data binary pattern to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE	When the MIL-STD-1553 bus search condition is set to ERRor, this command specifies the signaling error type to be used in the search: Parity, Sync, Manchester or Data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue	When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue	When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the qualifier to be used with the address field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the search.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF	When theMIL-STD-1553 bus search condition is set to STATus, this command specifies the status word terminal flag bit value (bit 19) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status parity bit value to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies the trigger data time qualifier.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue	This command specifies the binary data string to be used for a Parallel search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition	This command specifies the search condition for an RS-232 trigger
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe	This command specifies the length of the data string for an RS-232search, if the search condition is RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue	This command specifies the binary data string for an RS-232 search, if the condition involves RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe	This command specifies the length of the data string to be used for an RS-232 search, if the search condition is TX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue	This command specifies the binary data string to be used for an RS-232 search, if the condition involves RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition	This command specifies the search condition for SPI search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:VALue	This command specifies the binary data string to be used for SPI search if the search condition is MISO or MISOMOSI

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:VALue	This command specifies the binary data string for an SPI search if the search condition is MISO or MISOMOSI
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe	This command specifies the length of the data string in bytes to be used for SPI search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue	This command specifies the high limit for USB address searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue	This command specifies the value for USB address searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition	This command specifies the USB search condition.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:HIVALue	This command specifies the high limit for USB data searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:OFFSet	This command specifies the data offset for USB data searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:SIZe	This command specifies the number of data bytes for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:TYPe	This command specifies the data type for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue	This command specifies the data value for USB data searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue	This command specifies the endpoint value for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ERRTYPE	This command specifies the error type for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:HANDSHAKEType	This command specifies the handshake type for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:QUALifier	This command specifies the qualifier for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber	This command specifies the SOF number for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType	This command specifies the special packet type for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue	When searching on a high-speed USB split transaction, this command specifies the split transaction endpoint type value to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue	When searching on a high-speed USB split transaction, this command specifies the split transaction hub address value to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue	When searching on a high-speed USB split transaction, this command specifies the split transaction port address value to search for.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue	When searching on a high-speed USB split transaction, this command specifies whether to search for the start or complete phase of the split transaction, based on the Start/Complete bit field value.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue	When searching for a high-speed USB split transaction, this command specifies the split transaction start/end bit value to search for.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType	This command specifies the token type for USB searches
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce	This command specifies the bus for a serial search
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe	This command specifies the slope to be used in an edge search: rising, falling or either
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce	This command specifies the source waveform for an edge search
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>	Sets the threshold level to use when searching on an analog waveform.
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH	Sets the threshold level to use when searching on the math waveform.
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>	Sets the threshold level to use when searching on a reference waveform.
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_AMPlitude	Sets the threshold level to use when searching on the RF Amplitude vs. Time trace.
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_FREQuency	Sets the threshold level to use when searching on the RF Frequency vs. Time trace.
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_PHASe	Sets the threshold level to use when searching on the RF Phase vs. Time trace.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion	Specifies the logic operator to be used in a logic search.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>	This command specifies the logic operator for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>	Specifies the logic condition to be used in a logic search when the input is an analog channel.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE	This command specifies whether the clock edge is rise or fall for a logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce	This command specifies the clock source definition for logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>	This command specifies the criteria for a logic search to determine where to place a mark for digital channel <x>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH	This command specifies the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>	This command specifies the Boolean logic criteria for the logic search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude	This command specifies the logic criteria to search for when searching using the RF Amplitude vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency	This command specifies the logic criteria to search for when searching using the RF Frequency vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe	This command specifies the logic criteria to search for when searching using the RF Phase vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn	This command specifies the condition for generating a logic pattern search.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit	This command specifies the maximum time that the selected pattern may be true.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit	This command specifies the minimum time that the selected pattern may be true.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>	This command specifies the channel threshold level for a logic search.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH	This command specifies the math waveform threshold level for a logic search.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>	This command specifies the reference waveform threshold level for a logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude	This command specifies the threshold to use when searching the RF Amplitude vs. Time waveform. (Same as the command `SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude`.) This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude to search for an instance when the RF Amplitude vs. Time waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency	This command specifies the threshold to use when searching the RF Frequency vs. Time waveform. (It does the same thing as the command `SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency`.) This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency to search for an instance when the RF Frequency vs. Time waveform goes higher or lower than the specified threshold.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe	This command specifies the threshold, in degrees, to use when searching the RF Phase vs. Time waveform. (It does the same thing as `SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe`.) This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe to search for an instance when the RF Phase vs. Time waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>	This command specifies the lower waveform threshold level for all channel waveform searches
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH	This command specifies the lower waveform threshold level for all math waveform searches
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>	This command specifies the lower waveform threshold level for all reference waveform searches
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude	This command specifies the threshold for RF Amplitude vs. Time trace searches. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency	This command specifies the threshold for RF Frequency vs. Time trace searches. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe	This command specifies the lower threshold, in degrees, for searching the RF Phase vs. Time waveform. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe to search for an instance when the waveform goes higher or lower than the specified threshold.
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit	This command specifies the upper limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit to specify the lower limit of the range.)
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit	This command specifies the lower limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity	This command specifies the polarity for a pulse search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce	This command specifies the source waveform for a pulse search
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn	This command specifies to search the waveform record for pulses with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth), OR whose widths fall outside of or within a specified range of two values (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit).
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth	This command specifies the width setting to use, in seconds, when searching the waveform record for pulses of a certain width (duration).
SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity	This command specifies the polarity setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce	This command specifies the source setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn	This command specifies the condition setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth	This command specifies the width setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE	This command specifies the clock slope setting for a setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce	This command specifies the clock source setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold	This command specifies the clock threshold setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce	This command specifies the data source setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold	This command specifies the data threshold setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime	This command specifies the hold time setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime	This command specifies the setup time setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}	This command specifies the search setup and hold threshold for the math waveform
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>	This command specifies the search setup and hold threshold for the selected reference waveform
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity	When searching using the `TIMEOut` search type, this commands specifies the polarity to be used.
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce	When searching using the `TIMEOut` search type, this command specifies the source.
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe	When searching using the `TIMEOut` search type, this command specifies the timeout time, in seconds.
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime	This command specifies the transition time setting for an transition search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity	This command specifies the polarity setting for a transition search
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce	This command specifies the source setting for a transition search
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn	This command specifies the condition setting for a transition search
SEARCH:SEARCH<x>:TRIGger:A:TYPe	This command specifies the search type, ie. EDGe|PULSEWidth|SETHold|RUNt|TRANsition|LOGIc|TIMEOut|BUS.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>	This command specifies the waveform upper threshold level for all channel waveform searches.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH	This command specifies the waveform upper threshold level for all math waveform searches.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>	This command specifies the waveform upper threshold level for all reference waveform searches.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_AMPlitude	For a runt or transition search using the RF Amplitude vs. Time trace, this command specifies the upper threshold to be used by the search engine.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency	For a runt or transition search using the RF Frequency vs. Time trace, this command specifies the upper threshold to be used by the search engine.
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_PHASe	This command specifies the upper threshold to be used by the search engine when performing a runt or transition search using the RF Phase vs. Time trace.

Status and Error Command Group

Use the commands in the Status and Error Command Group to determine the status of the oscilloscope and control events.

Several commands and queries used with the oscilloscope are common to all IEEE488.2 compliant devices. The IEEE Std 488.2-1987 defines these commands and queries. The common commands begin with an asterisk (*) character.

Table 2-39: Status and Error Commands

Command	Description
ALLEv?	Returns all events and their messages
BUSY?	Returns oscilloscope status
*CLS	Clears status
DESE	This command specifies the bits in the Device Event Status Enable Register
*ESE	This command specifies the bits in the Event Status Enable Register
*ESR?	Returns the contents of the Standard Event Status Register

Table 2-39: Status and Error Commands (cont.)

Command	Description
EVENT?	Returns event code from the event queue
EVMsg?	Returns event code, message from the event queue
EVQty?	Return number of events in the event queue
*OPC	Generates the operation complete message in the standard event status register when all pending operations are finished Or returns "1" when all current operations are finished
*OPT?	Returns a comma-separated list of installed options (not to be confused with application modules) as an arbitrary ASCII string.
*PSC	This command specifies the power on status flag
*PUD	This command specifies a string of protected user data
*RST	Resets the oscilloscope to factory default settings
*SRE	This command specifies the bits in the Service Request Enable Register
*STB?	Returns the contents of the Status Byte Register
*WAI	Prevents the oscilloscope from executing further commands until all pending operations finish

Trigger Command Group

Use the commands in the Trigger Command Group to control all aspects of triggering the oscilloscope. You can perform edge, pulse width, logic, video, runt, timeout, transition (rise/fall time), setup & hold and bus triggering using the A trigger. You can perform sequence edge triggering using the A and B triggers.

The MDO4000/B allows you to use a change in the RF power level as a source for edge triggering. Using an MDO4000/B oscilloscope with a MDO4TRIG application module installed, a change in the RF power level can also be used as a source for pulse width, timeout, runt, logic and sequence triggers.

With the MDO4000/B, the acquisition system is fully integrated with both the time and frequency domain channels. This means that a single event triggers all of the analog, digital and RF acquisitions, regardless of where that trigger event came from.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Example command sequences that show different triggers and searches are available. (See page F-1, *Search and Trigger Command Sequence Examples*.)

Edge Trigger

Edge triggering lets you display a waveform at or near the point where the signal passes through a voltage level of your choosing.

To set up an edge trigger, set the A trigger type to `EDGe` using the command TRIGger:A:TYPe. Then use the commands TRIGger:A:EDGE:COUPling, TRIGger:A:EDGE:SLOpe, and TRIGger:A:EDGE:SOUrce You can set the threshold voltage levels using TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Using an MDO4000/B oscilloscope, you can use the RF power level as a source in an edge trigger without installing an MDO4TRIG application module. To do this, set the oscilloscope to trigger on a rising edge with the RF power level as the source, in order to trigger on events where the RF turns on. Conversely, set it to trigger on a falling edge in order to trigger on events where the RF turns off.

Logic Trigger

Logic triggering lets you logically combine the signals on one or more channels; the oscilloscope then triggers when it detects a certain combination of signal levels (set using one of the `TRIGger:A:LOGIc:INPut` commands as well as TRIGger:A:LOGIc:FUNCtion). Using an MDO4000/B oscilloscope with an MDO4TRIG application module installed, you can use the RF power level as a source in a logic trigger.

To set up a logic trigger, first set the trigger type to `LOGIc` using the command TRIGger:A:TYPe, and then use the command TRIGger:A:LOGIc:CLAss to select `LOGIC`.

You can perform logic triggering using a clock (by setting TRIGger:A:LOGIc:INPut:CLOCk:SOUrce to one of the channels), so that the oscilloscope triggers when the specified logical combination of data channels is true during a transition on the clock channel. The specified data sources cannot include the waveform specified as the clock source. (Use TRIGger:A:LOGIc:INPut:CH<x>, TRIGger:A:LOGIc:INPut:D<x>, etc.)

You can also perform logic triggering without using a clock (by setting TRIGger:A:LOGIc:INPut:CLOCk:SOUrce to `NONE`), so that the oscilloscope triggers when the specified logical pattern of data channels is met. (Use the commands TRIGger:A:LOGIc:PATtern:WHEn and TRIGger:A:LOGIc:PATtern:DELTatime.)

Setup and Hold Trigger

A setup and hold trigger occurs when a logic data input changes state inside of the setup or hold time relative to a clock edge.

To set up a setup/hold trigger, first set the trigger type to `LOGIc` using the command TRIGger:A:TYPe, and then use the command TRIGger:A:LOGIc:CLAss to select `SETHold`. Then use TRIGger:A:SETHold:DATa:SOUrce,

TRIGger:A:SETHold:CLOCk:SOUrce, TRIGger:A:SETHold:CLOCk:EDGE and related commands.

Pulse width Trigger

A pulse width trigger occurs whenever the oscilloscope detects a pulse that is less than, greater than, equal to, or not equal to a specified time. Additionally, it can occur when the pulse width is within, or outside of a specified range. You can trigger on either positive or negative pulses. Using an MDO4000/B oscilloscope with an MDO4TRIG application module installed, you can use the RF power level as a source in a pulse width trigger.

To set up a pulse width trigger, first set the trigger type to `PULSe` using the command TRIGger:A:TYPe. Then select `WIDth` using the command TRIGger:A:PULse:CLASs. Then use TRIGger:A:PULSEWidth:SOUrce, TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:WIDth and related commands. You can set the threshold voltage levels using TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Runt Trigger

Runt triggering lets you trigger on a pulse amplitude that crosses one threshold but fails to cross a second threshold before recrossing the first. Using an MDO4000/B oscilloscope with an MDO4TRIG application module installed, you can use the RF power level as the source in a runt trigger.

To set up a runt trigger, first set the trigger type to `PULSe` using the command TRIGger:A:TYPe. Then select `RUNt` using the command TRIGger:A:PULse:CLASs. Then use TRIGger:A:RUNT:SOUrce, TRIGger:A:RUNT:WIDth, TRIGger:A:RUNT:WHEn, TRIGger:A:UPPerthreshold:CH<x> and related commands. You can set the threshold voltage levels using TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Timeout Trigger

Timeout triggering causes a trigger when a signal stays above or below a specified threshold for a specified amount of time. Using an MDO4000/B oscilloscope with an MDO4TRIG application module installed, you can use the RF power level as a source in a timeout trigger.

To set up a timeout trigger, first set the trigger type to `PULSe` using the command TRIGger:A:TYPe. Then select `TIMEOut` using the command TRIGger:A:PULse:CLASs. Then use TRIGger:A:TIMEOut:SOUrce, TRIGger:A:TIMEOut:TIMe and related commands.

Transition Trigger

Transition triggering (also called rise/fall time, and once known as slew rate) causes a trigger on pulse edges that traverse between two thresholds at a rate faster than or slower than the specified time.

To set up a transition trigger, first set the trigger type to `PULSe` using the command TRIGger:A:TYPe. Then select `TRANsition` using the command TRIGger:A:PULse:CLAss. Then use TRIGger:A{:TRANsition|:RISEFall}:SOUrce, TRIGger:A{:TRANsition|:RISEFall}:DELTatime and related commands. You can set the threshold voltage levels using TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Bus Trigger

Bus triggering can be performed if you have one or more appropriate application modules installed (see below for application module list), except for parallel bus trigger and analysis, which is included standard with the MSO and MDO Series.

To set up a bus trigger, set the A trigger type to `BUS` using the command TRIGger:A:TYPe. Specify which bus (1-4) to trigger on using TRIGger:A:BUS:SOUrce. Set the bus type (i.e., parallel, I²C, etc. using the command TRIGger:A:BUS. Then set the appropriate trigger criteria according to bus type (using TRIGger:A:BUS:B<x>:AUDio:CONDition, etc.)

Video Trigger

Video triggering enables you to trigger on the most common Standard Definition video standards. With the DPO4VID module installed, you can also trigger on the most common HDTV standards and non-standard video (bi-level sync and trilevel sync). This feature is standard for the MDO3000 series models and does not require a module.

To set up a video trigger, set the A trigger type to `VIDeo` using the command TRIGger:A:TYPe. Then use TRIGger:A:VIDeo:SOUrce, TRIGger:A:VIDeo:STANdard,TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}, and related commands.

Sequence Trigger

Sequence triggering occurs when both the A and B triggers are used in edge triggering. Using an MDO4000/B oscilloscope with an MDO4TRIG application module installed, you can use the RF power level as a source in a sequence trigger.

To set up a sequence trigger, first set up an edge trigger for the A channel as above. Then use TRIGger:B:EDGE:COUPling, TRIGger:B:EDGE:SLOpe, and TRIGger:B:EDGE:SOUrce.

Triggering on the RF Power Level (MDO4000/B Series Models Only)

The MDO4000/B allows you to trigger on a change in the RF power level as a source for Edge triggering. This enables your oscilloscope to trigger as the RF power envelope passes through a specific power level. Using an MDO4000/B model with an MDO4TRIG application module installed, the RF power level can also be used as a source for pulse width, timeout, runt, logic and sequence (A and B) triggers.

To do this, use TRIGger:A:PULSEWidth:SOUrce, TRIGger:A:TIMEOut:SOUrce, TRIGger:A:RUNT:SOUrce, TRIGger:A:LOWerthreshold:RF,

TRIGger:A:UPPerthreshold:RF, TRIGger:A:LOGIc:INPut:CLOCk:SOUrce, TRIGger:A:LOGIc:INPut:RF, TRIGger:A:LOGIc:THReshold:RF, etc.

The RF power level being triggered on is the total power acquired within the band, not just the current span.

Bus, Video and RF application modules

A table is available that lists all commands enabled by each application module (See page G-1, *Application Module-enabled Commands*.)

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3COMP.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals, when tested with the MDO4000/B and MSO/DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.
- For video signals, install the DPO4VID module, except for the MDO3000 models, which do not require a module.
- For RF signals (MDO4000/B Series only), install the MDO4TRIG module.

Table 2-40: Trigger Commands

Command	Description
TRIGger	Forces a trigger event to occur
TRIGger:A	Sets A trigger level to 50% or returns current A trigger parameters
TRIGger:A:BANDWidth:RF:HIGH?	Returns the high end of the power level trigger bandwidth range as an NR3 value in hertz.
TRIGger:A:BANDWidth:RF:LOW?	Returns the low end of the power level trigger bandwidth range as an NR3 value in hertz.
TRIGger:A:BUS	This command specifies the bus type to trigger on.

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:AUDio:CONDition	This command sets the condition (start of frame or matching data) to be used when triggering on an audio bus signal.
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue	This command sets the upper word value to be used when triggering on an audio bus signal.
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet	This command sets the data offset value to be used when triggering on an audio bus signal.
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier	This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used when triggering on an audio bus signal.
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue	This command sets the lower word value to be used when triggering on an audio bus signal.
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD	This command sets the alignment of the data (left, right or either) to be used to trigger on an audio bus signal.
TRIGger:A:BUS:B<x>:CAN:CONDition	This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection	This command sets the data direction (read, write or “nocare”) to be used to search on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier	This command sets the qualifier (<, >, =, not =, <=) to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe	This command sets the length of the data string, in bytes, to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN:DATa:VALue	This command sets the binary data value to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN:FRAMEtype	This command sets the frame type (data, remote, error or overload) to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe	This command sets the addressing mode (standard or extended format) to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue	This command sets the binary address value to be used when triggering on a CAN bus signal.
TRIGger:A:BUS:B<x>:ETHERnet:CONDition	This command specifies a field or condition within an Ethernet frame to trigger on.
TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue	When the Ethernet trigger condition is set to `DATa`, and the qualifier is set to either `INrange` or`OUTrange`, this command specifies the upper data value of the range.
TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet	When the Ethernet trigger condition is set to `DATa`, this command specifies where in the data field to look for the data trigger value.
TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe	When the Ethernet trigger condition is set to `DATa`, this command specifies the number of contiguous TCP/IPv4/MAC client data bytes to trigger on.
TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue	When the Ethernet trigger condition is set to `DATa`, and the qualifier is set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`, this command specifies the value to trigger on.

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe	This command specifies the Ethernet frame type: either Basic or QTag (IEEE 802.1Q, or VLAN tagging).
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue	When the Ethernet trigger condition is set to IPHeader, this command specifies the value of the 32–bit destination address that is to be used in the trigger (along with the source address and protocol value).
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue	When the Ethernet trigger condition is set to IPHeader, this command specifies the value of the 8–bit protocol field that is to be used in the trigger (along with the source and destination addresses).
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue	When the Ethernet trigger condition is set to IPHeader, this command specifies the value of the 32–bit source address that is to be used in the trigger (along with the destination address and protocol value).
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue	When the Ethernet trigger condition is set to MACADDress, this command specifies the 48–bit MAC destination address that is to be used in the trigger (along with the source address value).
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue	When the Ethernet trigger condition is set toMACADDress, this command specifies the 48–bit MAC source address value that is to be used in the trigger (along with the destination address value).
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue	When the Ethernet trigger condition is set to MACLENgth, and the qualifier is set to INrange or OUTrange, this command specifies the upper data value of the range.
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue	When the Ethernet trigger condition is set to MACLENgth, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the 16–bit value to trigger on.
TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue	When the Ethernet trigger condition is set to QTAG, this command specifies the 32–bit Q-Tag value to trigger on.
TRIGger:A:BUS:B<x>:ETHERnet:QUALifier	This command specifies the qualifier to be used when the Ethernet trigger condition is set to MACLENgth or DATa.
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue	When the Ethernet trigger condition is set to TCPHeader, this command specifies the 32–bit acknowledgement number that is to be used in the trigger (along with the destination and source port addresses and the sequence number).
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue	When the Ethernet trigger condition is set TCPHeader, this command specifies the 16–bit destination port address value that is to be used in the trigger (along with the acknowledgement value, source port address and the sequence number).
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue	When the Ethernet trigger condition is set to TCPHeader, this command specifies the 32–bit sequence number that is to be used in the trigger (along with the destination and source port addresses and the acknowledgement value).
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue	When the Ethernet trigger condition is set to TCPHeader, this command specifies the 16–bit source port address that is to be used in the trigger (along with the destination port address, the sequence number and the acknowledgement number).

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:FLEXray:CONDition	This command specifies the condition to use when triggering on a FlexRay bus signal (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error).
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue	This command specifies the high value when triggering on a FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue	This command specifies the low value when triggering on the FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue	This command specifies the high value when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet	This command specifies the offset of the data string, in bytes, when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe	This command specifies the length of the data string, in bytes, when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue	This command specifies the low value when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE	This command specifies the end of file type (static, dynamic or any) when triggering on the FlexRay bus EOF field.
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE	This command specifies the error type when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue	This command specifies the high value when triggering on the FlexRay bus frame ID field.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier	This command specifies the qualifier to use when triggering on the FlexRay bus frame ID field.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue	This command specifies the low value when triggering on the FlexRay bus frame ID field.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEType	This command specifies the frame type (normal, payload, null, sync or startup) when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC	This command specifies the CRC portion of the binary header string when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount	This command specifies the cycle count portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID	This command specifies the frame ID portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits	This command specifies the indicator bits portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength	This command specifies the payload length portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe	This command specifies the I2C address mode to 7 or 10-bit

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe	This command specifies the I2C address type to USER
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue	This command specifies the binary address string used for the I2C trigger
TRIGger:A:BUS:B<x>:I2C:CONDition	This command specifies the trigger condition for I2C trigger
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection	This command specifies the I2C trigger condition valid on a READ, WRITE, or either
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe	This command specifies the length of the data string in bytes to be used for I2C trigger
TRIGger:A:BUS:B<x>:I2C:DATa:VALue	This command specifies the binary data string used for I2C triggering
TRIGger:A:BUS:B<x>:LIN:CONDition	This command specifies the trigger condition for LIN
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue	This command specifies the binary data string to be used for LIN trigger
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier	This command specifies the LIN data qualifier
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe	This command specifies the length of the data string in bytes to be used for LIN trigger
TRIGger:A:BUS:B<x>:LIN:DATa:VALue	This command specifies the binary data string
TRIGger:A:BUS:B<x>:LIN:ERRTYPE	This command specifies the error type
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue	This command specifies the binary address string used for LIN trigger
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue	When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the qualifier to be used with the remote terminal address field.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue	When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the Command word parity that is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies that the transmit/receive bit (bit 9) is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:CONDition	This command specifies a word type or condition within a MIL-STD-1553 bus word to trigger on.
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity	When the MIL-STD-1553 bus trigger condition is set to DATa, this command specifies the data parity bit to be used in the trigger.

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue	When the MIL-STD-1553 bus trigger condition is set to DATa, this command specifies the data binary pattern to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE	When the MIL-STD-1553 bus trigger condition is set to ERRor, this command specifies the signaling error type to be used in the trigger: Parity, Sync, Manchester or Data.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue	When the MIL-STD-1553 bus trigger condition is set to STATus, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the qualifier to be used with the address field.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue	When the MIL-STD-1553 bus trigger condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word terminal flag bit value (bit 19) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status parity bit value to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit	When the MIL-STD-1553 bus trigger condition is set to TIMe, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG).

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit	When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG).
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier	When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies the trigger data time qualifier.
TRIGger:A:BUS:B<x>:PARallel:VALue	This command specifies the binary data string to be used for a Parallel trigger
TRIGger:A:BUS:B<x>:RS232C:CONDition	This command specifies the condition for an RS-232C trigger
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe	This command specifies the length of the data string in Bytes for an RX RS-232 Trigger
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue	This command specifies the binary data string for an RX RS-232 trigger
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe	This command specifies the length of the data string for a TX RS-232 trigger
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue	This command specifies the binary data string for an RS-232 trigger if the trigger condition involves TX
TRIGger:A:BUS:B<x>:SPI:CONDition	This command specifies the trigger condition for SPI triggering
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue	This command specifies the binary data string to be used for SPI trigger
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue	This command specifies the binary data string used for the SPI trigger
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe	This command specifies the length of the data string in bytes to be used for SPI trigger
TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue	This command specifies the high limit for the USB trigger address
TRIGger:A:BUS:B<x>:USB:ADDRess:VALue	This command specifies the value for the USB trigger address
TRIGger:A:BUS:B<x>:USB:CONDition	This command specifies the USB trigger condition
TRIGger:A:BUS:B<x>:USB:DATa:HIVALue	This command specifies the high limit for the USB trigger data
TRIGger:A:BUS:B<x>:USB:DATa:OFFSet	This command specifies the data offset for the USB trigger data
TRIGger:A:BUS:B<x>:USB:DATa:SIZe	This command specifies the number of data bytes for the USB trigger
TRIGger:A:BUS:B<x>:USB:DATa:TYPe	This command specifies the data type for the USB trigger
TRIGger:A:BUS:B<x>:USB:DATa:VALue	This command specifies the data value for the USB trigger
TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue	This command specifies the endpoint value for the USB trigger
TRIGger:A:BUS:B<x>:USB:ERRTYPE	This command specifies the error type for the USB trigger
TRIGger:A:BUS:B<x>:USB:HANDSHAKEType	This command specifies the handshake type for the USB trigger
TRIGger:A:BUS:B<x>:USB:QUALifier	This command specifies the qualifier for USB trigger
TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber	This command specifies the SOF number for the USB trigger
TRIGger:A:BUS:B<x>:USB:SPECIALType	This command specifies the special packet type for the USB trigger
TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue	When triggering on a high-speed USB split transaction, this command specifies the split transaction endpoint type value to trigger on.
TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue	When triggering on a high-speed USB split transaction, this command specifies the split transaction hub address value to trigger on.

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue	When triggering on a high-speed USB split transaction, this command specifies the split transaction port address value to trigger on.
TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue	When triggering on a high-speed USB split transaction, this command specifies whether to trigger on the start or complete phase of the split transaction, based on the Start/Complete bit field value.
TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue	When triggering on a high-speed USB split transaction, this command specifies the split transaction start/end bit value to trigger on.
TRIGger:A:BUS:B<x>:USB:TOKENType	This command specifies the token type for the USB trigger
TRIGger:A:BUS:SOUrce	This command specifies the source for a bus trigger
TRIGger:A:EDGE?	Returns the source, coupling and source for the A edge trigger
TRIGger:A:EDGE:COUPling	This command specifies the type of coupling for the A edge trigger
TRIGger:A:EDGE:SLOpe	This command specifies the slope for the A edge trigger: rising, falling or either.
TRIGger:A:EDGE:SOUrce	This command specifies the source for the A edge trigger
TRIGger:A:HOLDoff?	Returns the A trigger holdoff parameters
TRIGger:A:HOLDoff:TIMe	This command specifies the A trigger holdoff time
TRIGger:A:LEVel:AUXin	Sets the threshold voltage level for an Edge, Pulse Width, Runt or Rise/Fall (aka Transition, aka Slew Rate) trigger to use when triggering on the Aux Input connector signal.
TRIGger:A:LEVel:CH<x>	Sets the threshold voltage level for an Edge, Pulse Width, Runt or Rise/Fall (aka Transition, aka Slew Rate) trigger to use when triggering on an analog channel waveform.
TRIGger:A:LEVel:D<x>	Sets the threshold voltage level for an Edge, Pulse Width, Runt or Rise/Fall (aka Transition, aka Slew Rate) trigger to use when triggering on a digital channel waveform.
TRIGger:A:LOGIc?	Returns all A trigger logic settings
TRIGger:A:LOGIc:CLAss	This command sets the class of the logic trigger (either logic or setup/hold). You also need to set the trigger type using the command TRIGger:A:TYPe.
TRIGger:A:LOGIc:FUNCtion	This command specifies the logical combination of the input channels for the A logic trigger
TRIGger:A:LOGIc:INPut?	Returns the logic input values for all channels
TRIGger:A:LOGIc:INPut:CH<x>	Specifies or returns the logic setting for the specified channel
TRIGger:A:LOGIc:INPut:CLOCk:EDGE	Sets the polarity of the clock channel
TRIGger:A:LOGIc:INPut:CLOCk:SOUrce	This command specifies the channel to use as the clock source
TRIGger:A:LOGIc:INPut:D<x>	This command specifies the logic pattern for a trigger on digital channel <x>
TRIGger:A:LOGIc:INPut:RF	This command specifies the logic level to use when the internal RF power level is the source for a logic pattern trigger.
TRIGger:A:LOGIc:PATtern?	Returns the conditions for generating an A logic pattern trigger
TRIGger:A:LOGIc:PATtern:DELTatime	This command specifies the pattern trigger delta time value

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:LOGIc:PATtern:WHEn	This command specifies the pattern logic condition on which to trigger the oscilloscope
TRIGger:A:LOGIc:THReshold:CH<x>	Sets or queries the trigger A logic threshold voltage for the specified channel.
TRIGger:A:LOGIc:THReshold:RF	This command specifies the threshold to use when the internal RF power level is the source for a logic trigger. It will affect all trigger types using the channel.
TRIGger:A:LOGIc:THReshold:D<x>	This command specifies the trigger A logic threshold level for the specified digital channel.
TRIGger:A:LOWerthreshold:CH<x>	This command specifies the lower threshold for the channel selected.
TRIGger:A:LOWerthreshold:D<x>	Sets the A trigger lower threshold for the digital channel selected.
TRIGger:A:LOWerthreshold{:AUX|:EXT}	This command specifies the lower threshold for the Aux Input connector.
TRIGger:A:LOWerthreshold:RF	This command specifies the lower threshold when using the internal RF power level for a RUNT trigger, or the single threshold in the cases of the PULSE and TIMEOUT triggers.
TRIGger:A:MODe	This command specifies the A trigger mode – either AUTO or NORMAL.
TRIGger:A:PULse:CLAss	This command specifies which kind of pulse to trigger on (either runt, width, transition (rise/fall or slew rate) or timeout). You also need to set the trigger type to `PULSe` using the command TRIGger:A:TYPe.
TRIGger:A:PULSEWidth:HIGHLimit	This command specifies the upper limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:LOWLimit to specify the lower value of the range.)
TRIGger:A:PULSEWidth:LOWLimit	This command specifies the lower limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)
TRIGger:A:PULSEWidth:POLarity	This command specifies the polarity for the A pulse width trigger
TRIGger:A:PULSEWidth:SOUrce	This command specifies the source for the pulse width trigger
TRIGger:A:PULSEWidth:WHEn	This command specifies to trigger when a pulse is detected with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using TRIGger:A:PULSEWidth:WIDth), OR whose width falls outside of or within a specified range of two values (set using TRIGger:A:PULSEWidth:LOWLimit and TRIGger:A:PULSEWidth:HIGHLimit).
TRIGger:A:PULSEWidth:WIDth	This command specifies the pulse width (duration), in seconds, for triggering on pulses whose widths are greater than, less than, equal to, or not equal to the specified value.
TRIGger:A:RUNT?	Returns the current A runt pulse trigger logic parameters
TRIGger:A:RUNT:POLarity	This command specifies the polarity for the A pulse runt trigger
TRIGger:A:RUNT:SOUrce	This command specifies the source for the A pulse trigger
TRIGger:A:RUNT:WHEn	This command specifies the type of pulse width the trigger checks for when it uncovers a runt
TRIGger:A:RUNT:WIDth	This command specifies the minimum width for A pulse runt trigger
TRIGger:A:SETHold?	Returns settings for setup and hold violation triggering

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:SETHold:CLOCk?	Returns clock edge polarity, voltage threshold and source input for setup/hold triggering
TRIGger:A:SETHold:CLOCk:EDGE	This command specifies the clock edge polarity for setup and hold triggering
TRIGger:A:SETHold:CLOCk:SOUrce	This command specifies the clock source for the A logic trigger setup and hold input
TRIGger:A:SETHold:CLOCk:THReshold	This command specifies the clock voltage threshold for setup and hold trigger
TRIGger:A:SETHold:DATa?	Returns the voltage threshold and data source for the setup/hold trigger
TRIGger:A:SETHold:DATa:SOUrce	This command specifies the data source for the setup and hold trigger
TRIGger:A:SETHold:DATa:THReshold	This command specifies the data voltage threshold for setup and hold trigger
TRIGger:A:SETHold:HOLDTime	This command specifies the hold time for the setup and hold violation triggering
TRIGger:A:SETHold:SETTime	This command specifies the setup time for setup and hold violation triggering
TRIGger:A:SETHold:THReshold:CH<x>	Sets or queries the threshold for the channel
TRIGger:A:SETHold:THReshold:D<x>	Sets the A trigger setup and hold threshold for the selected digital channel
TRIGger:A:TIMEOut:POLarity	When triggering using the `TIMEOut` trigger type, this commands specifies the polarity to be used.
TRIGger:A:TIMEOut:SOUrce	When triggering using the `TIMEOut` trigger type, this command specifies the source. The available sources are live channels, external (or auxillary) input, and digital channels. The default is channel 1.
TRIGger:A:TIMEOut:TIMe	When triggering using the `TIMEOut` trigger type, this command specifies the timeout time, in seconds. The default and minimum is 4.0E-9 seconds and the maximum is 8.0 seconds. The resolution is 800.0E-12 which means that the increments of time specified is 800 picoseconds.
TRIGger:A:TYPe	This command sets the type of A trigger (edge, logic, pulse, bus or video). If you set the trigger type to LOGIc, you also need to set the logic trigger class (logic or setup/hold) using the command TRIGger:A:LOGIc:CLAss. If you set the trigger type to PULSe, you also need to set the pulse trigger class (runt, width, transition or timeout), using the command TRIGger:A:PULse:CLAss.
TRIGger:A{:TRANsition|:RISEFall}?	Returns the delta time, polarity, and both upper and lower threshold limits for the transition time trigger
TRIGger:A{:TRANsition|:RISEFall}:DELTatime	This command specifies the delta time used in calculating the transition value
TRIGger:A{:TRANsition|:RISEFall}:POLarity	This command specifies the polarity for the A pulse transition trigger
TRIGger:A{:TRANsition|:RISEFall}:SOUrce	This command specifies the source for transition trigger.
TRIGger:A{:TRANsition|:RISEFall}:WHEn	This command specifies the relationship of delta time to transitioning signal
TRIGger:A:TYPe	This command specifies the type of A trigger. Once you have set the trigger type, you may also need to identify the associated trigger class. For details on selecting Logic and Pulse trigger classes, see TRIGger:A:LOGIc:CLAss and TRIGger:A:PULse:CLAss respectively.
TRIGger:A:UPPerthreshold:CH<x>	Sets the upper threshold for the channel selected
TRIGger:A:UPPerthreshold:RF	This command specifies the upper threshold when the internal RF power level is used as a trigger. This is only applicable to the RUNT trigger type.
TRIGger:A:VIDeo?	Returns the video parameters for the A trigger

Table 2-40: Trigger Commands (cont.)

Command	Description
TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}	This command sets the video trigger format (either interlaced or progressive) to use for triggering on video signals.
TRIGger:A:VIDeo:CUSTom:LINEPeriod	This command sets the line period for the standard under test.
TRIGger:A:VIDeo:CUSTom:SYNCInterval	This command sets the sync interval for the standard under test to use for triggering on video signals. This is only required for BiLevel Custom.
TRIGger:A:VIDeo:HOLDoff:FIELD	This command sets the video trigger holdoff, in terms of video fields, to use for triggering on video signals.
TRIGger:A:VIDeo:LINE	This command sets the video line number to use for triggering on video signals.
TRIGger:A:VIDeo:POLarity	This command sets the polarity to use for triggering on video signals.
TRIGger:A:VIDeo:SOUrce	This command sets the source channel to use for triggering on video signals (CH1–4).
TRIGger:A:VIDeo:STANdard	This command sets the standard to use for triggering on video signals.
TRIGger:A:VIDeo{:SYNC|:FIELD}	This command sets the video field to use for triggering on video signals (odd, even, all fields, all lines, numeric).
TRIGger:B	Sets the B trigger level to 50% or returns the B trigger parameters
TRIGger:B:BY	This command specifies B trigger time or event qualifiers
TRIGger:B:EDGE?	Returns B trigger edge type parameters
TRIGger:B:EDGE:COUPling	This command specifies the type of B trigger coupling
TRIGger:B:EDGE:SLOpe	This command specifies the B edge trigger slope
TRIGger:B:EDGE:SOUrce	This command specifies the B edge trigger source
TRIGger:B:EVENTS?	Returns the current B trigger events parameter
TRIGger:B:EVENTS:COUNt	This command specifies the number of events that must occur before the B trigger occurs
TRIGger:B:LEVel	This command specifies the level for the B trigger
TRIGger:B:LEVel:CH<x>	This command specifies the level for the B trigger for a specific channel
TRIGger:B:LEVel:D<x>	This command specifies the B trigger level for digital channel <x>
TRIGger:B:LOWerthreshold:CH<x>	This command specifies the B trigger lower threshold for the channel selected
TRIGger:B:LOWerthreshold:D<x>	Sets or queries the B trigger lower threshold for the digital channel selected
TRIGger:B:STATE	Returns the current state of the B trigger
TRIGger:B:TIMe	This command specifies the B trigger delay time
TRIGger:B:TYPe	This command specifies the type of B trigger
TRIGger:EXTernal?	Returns all external trigger-related parameters for the probe connected to the Aux Input connector connector.
TRIGger:EXTernal:PRObe	This command specifies the attenuation factor value of the probe connected to the Aux Input connector connector.
TRIGger:EXTernal:YUNIts?	Returns the external trigger vertical (Y) units value
TRIGger:FREQuency?	Returns the trigger frequency in hertz, if available
TRIGger:STATE?	Returns the current state of the triggering system

Vertical Command Group

Use the commands in the Vertical Command Group to control the vertical setup of all live (channel) waveforms for acquisition and display of channel, reference, and math waveforms.

Use the command CH<x>:YUNits to set the vertical units for each channel. The vertical units affect the "Probe Type" that is shown in the "Probe Setup" menu:

- Setting `CH<x>:YUNits` to "`V`" causes the probe type to be displayed as "Voltage".
- When `CH1:AMSVIAVOLTs:ENAble` is set to `OFF`, setting `CH<x>:YUNits` to "`A`" causes the probe type to be displayed as "Current".
- Setting `CH<x>:YUNits` to anything else causes the probe type not to be displayed (neither "Voltage" nor "Current" are highlighted).

Table 2-41: Vertical Commands

Command	Description
AUXin?	Returns Aux Input connector parameters
AUXin:PRObe	Returns all information concerning the probe attached to Aux Input connector
AUXin:PRObe:AUTOZero	Sets the TekVPI probe attached to the Aux Input connector to autozero
AUXin:PRObe:CALibrate:CALIBRATABLe?	This query indicates whether the attached probe is calibratable.
AUXin:PRObe:COMMAND	Sets the state of the specified probe control
AUXin:PRObe:DEGAUss	Starts a degauss/autozero cycle on a TekVPI current probe attached to the Aux Input connector
AUXin:PRObe:DEGAUss:STATE?	Returns the degauss state of the TekVPI current probe attached to the Aux Input connector
AUXin:PRObe:FORCEDRange	This command specifies the range of the TekVPI probe attached to the Aux Input connector
AUXin:PRObe:GAIN	This command specifies the gain factor of the probe that is attached to the Aux Input connector
AUXin:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the Aux Input connector
AUXin:PRObe:ID:TYPe?	Returns the type of probe that is attached to the Aux Input connector
AUXin:PRObe:RESistance?	Returns the resistance of the probe that is attached to the Aux Input connector
AUXin:PRObe:SIGnal	This command specifies the input bypass setting on VPI probes that support input bypass
AUXin:PRObe:UNIts?	Returns the units of measure of the probe that is attached to the Aux Input connector
CH<x>?	Returns vertical parameters for the specified channel
CH<x>:AMPSVIAVOLTs:ENAble	This command specifies the state of the amps via volts feature for the specified channel
CH<x>:AMPSVIAVOLTs:FACtor	This command specifies the amps via volts factor for the specified channel
CH<x>:BANdwidth	This command specifies the bandwidth of the specified channel

Table 2-41: Vertical Commands (cont.)

Command	Description
CH<x>:COUPling	This command specifies the coupling setting for the specified channel
CH<x>:DESKew	This command specifies the deskew time for the specified channel
CH<x>:INVert	This command specifies the invert function for the specified channel
CH<x>:LABel	This command specifies the waveform label for channel <x>
CH<x>:OFFSet	This command specifies the channel offset
CH<x>:POSition	This command specifies the channel vertical position
CH<x>:PRObe?	Returns the gain, resistance, units, and ID of the probe that is attached to the specified channel
CH<x>:PRObe:AUTOZero	Sets the TekVPI probe attached to the specified channel input to autozero
CH<x>:PRObe:CALibrate	This command executes a calibration or initialization for the probe attached to the auxilliary input, if the probe is calibratable.
CH<x>:PRObe:CALibrate:CALIBRATABLe?	This query returns the state of the probe attached to channel 1–4, either 0 if the probe is not calibratable, or 1 if the probe is calibratable.
CH<x>:PRObe:CALibrate:STATE?	This query returns the calibration state of the probe connected to the specified channel.
CH<x>:PRObe:COMMAND	Sets the state of the specified probe control
CH<x>:PRObe:DEGAUss	Starts a degauss/autozero cycle on a TekVPI current probe attached to the specified channel input
CH<x>:PRObe:DEGAUss:STATE?	Returns the state of the probe degauss
CH<x>:PRObe:FORCEDRange	This command specifies the range on a TekVPI probe attached to the specified channel
CH<x>:PRObe:GAIN	This command specifies the gain factor of the probe that is attached to the specified channel
CH<x>:PRObe:ID?	Returns the type and serial number of the probe that is attached to the specified channel
CH<x>:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the specified channel
CH<x>:PRObe:ID:TYPe?	Returns the type of probe that is attached to the specified channel
CH<x>:PRObe:MODel	This command specifies the probe model for the specified channel
CH<x>:PRObe:PROPDELay	This command specifies the propagation delay for the probe connected to the specified channel
CH<x>:PRObe:RECDESkew?	Returns the recommended deskew for the probe connected to the specified channel
CH<x>:PRObe:RESistance?	Returns the resistance of the probe that is attached to the specified channel
CH<x>:PRObe:SIGnal	This command specifies the input bypass setting of channel <x>TekVPI probe
CH<x>:PRObe:UNIts?	Returns the units of measure of the probe that is attached to the specified channel
CH<x>:SCAle	This command specifies the vertical scale of the specified channel
CH<x>:TERmination	This command specifies channel input termination
CH<x>:YUNits	This command specifies the units for the specified channel

Table 2-41: Vertical Commands (cont.)

Command	Description
D<x>	Returns parameters for digital channel <x>
D<x>:LABel	This command specifies the waveform label for digital channel<x>
D<x>:THReshold	This command specifies the logical threshold for the digital channel <x>, where x is the digital channel number D0 – D15.
D<x>:POSition	This command specifies the vertical position for digital channel <x>
DESkew	Causes the deskew values for all channels to be set to the recommended values
DESkew:DISPlay	Specifies the state of the deskew table display.
DISplay:INTENSITy:BACKLight:AUTODim:TIMe	This command specifies the state of the deskew table display
REF<x>?	Returns reference waveform data for channel <x>
REF<x>:DATE?	Returns the date that a reference waveform was stored
REF<x>:HORizontal:DELay:TIMe	This command specifies the horizontal position of the specified reference waveform in percent of the waveform that is displayed to the right of the center vertical graticule
REF<x>:HORizontal:SCAle	This command specifies the horizontal scale for a reference waveform
REF<x>:LABel	This command specifies the specified reference waveform label
REF<x>:TIMe?	Returns the time that a reference waveform was stored
REF<x>:VERTical:POSition	This command specifies the vertical position of the specified reference waveform
REF<x>:VERTical:SCAle	This command specifies the reference waveform vertical scale in vertical units/div
SELect?	Returns information on which waveforms are on or off and which waveform is selected.
SELect:{BUS<x>|B<x>}	Turns on or off the specified bus waveform or returns whether the specified bus channel is on or off
SELect:CH<x>	Turns on or off the specified waveform or returns whether the specified channel is on or off
SELect:CONTROl	This command specifies the waveform that is selected as the implied recipient of channel-related commands
SELect:DAll	This command turns on or off all digital channels (D0 — D15).
SELect:D<x>	Turns on the display of digital channel <x> and resets the acquisition
SELect{:MATH|:MATH1}	Turns on or off the math waveform or returns whether the math waveform is on or off
SELect:REF<x>	Turns on or off the specified reference waveform or returns whether the specified reference waveform is on or off

Video Picture Command Group

The video picture features as well as triggering on a video signal are included standard with the MDO3000 series models. They require the DPO4VID

application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Use the video picture commands for video picture functionality.

Table 2-42: Video Picture Commands

Command	Description
VIDPic:AUTOContrast	Sets (or queries) the video picture automatic contrast state.
VIDPic:AUTOContrast:UPDATERate	Sets (or queries) the number of frames between automatic contrast updates
VIDPic:BRIGHTNess	Sets (or queries) the video picture brightness level as an integer percentage.
VIDPic:CONTRast	Sets (or queries) the video picture contrast level as an integer percentage.
VIDPic:DISplay	Sets (or queries) the video picture display state.
VIDPic:FRAMETYPe	Sets (or queries) the video picture frame type (ODD, EVEN or INTERLAced).
VIDPic:LOCation:HEIght	Sets (or queries) the video picture height, in rows.
VIDPic:LOCation:OFFSet	Sets (or queries) the video picture line-to-line offset. This is the amount of additional delay time to add between lines of the video picture.
VIDPic:LOCation:STARt:LINE	Sets (or queries) the video picture starting line number.
VIDPic:LOCation:STARt:PIXel	Sets (or queries) the video picture starting pixel in each line
VIDPic:LOCation:WIDth	Sets (or queries) the video picture width, in columns.
VIDPic:LOCation:X	Sets (or queries) the video picture X origin location, in columns.
VIDPic:LOCation:Y	Sets (or queries) the video picture Y origin location, in rows.
VIDPic:SOUrce	Sets (or queries) the channel to use for the video picture source waveform.
VIDPic:STANdard	Sets (or queries) which video picture standard to use (either NTSC or PAL).

Waveform Transfer Command Group

(See Table 2-47.)

The `CURVe` and other commands and queries in the Waveform Transfer Command Group are used to transfer waveform data points to and from the oscilloscope. The waveform data points are a collection of values that represent the amplitude of the waveform samples. One data value usually represents one data point in the waveform record. Only one waveform can be transferred at a time.

Each waveform you transfer has an associated waveform preamble, which contains information such as data format, horizontal scale, vertical scale, and the other settings in effect when the waveform was created. When you transfer a waveform, you need to specify at least some of the general and preamble settings (using the `DATa, WFMInpre` or `WFMOutpre` commands) before you specify the raw data point information (using the `CURVe` command or query.)

Waveform data can be transferred to or from the oscilloscope using the Ethernet or USBTMC interfaces in binary or ASCII format. Binary data transfer is considerably more efficient than ASCII data transfer. Binary data is transferred to

and from the oscilloscope using the IEEE488.2 arbitrary block format (7.7.6 of the IEEE488.2 spec) which we refer to in this document as “binary block format”. A binary block is represented as:

#N<N-Digits><binary data>

Where:

The “#” is the arbitrary block token.

N is a single hexadecimal digit specifying how many decimal digits immediately follow.

<N-Digits> is a decimal number N digits long, that specifies the number of binary data bytes to follow.

<binary data> is the binary data which should be exactly N-Digits bytes in length.

NOTE. *If you would like to save or recall a waveform to or from a file, use the SAVe:WAVEform and RECAll:WAVEform commands.*

Transferring a Waveform from an Oscilloscope to a Computer

Use the `DATa` commands and `WFMOutpre` commands to specify the attributes of the waveform being transferred from the oscilloscope. You must, at a minimum, specify the waveform source (using the `DATa:SOUrce` command) and data format (using the `DATa:ENCdg` and `DATa:WIDth` commands).

Then, use the `WFMOutpre?` query, which provides the context needed to interpret the waveform data points. Finally, use the `CURVE?` query to transfer the waveform data points. (You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.)

NOTE. *In order to guarantee that the waveform data returned from `CURVE?` queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using ACQuire:STOPAfter `SEQuence`.*

NOTE. *The `WFMOutpre:BYT_Nr` and `WFMOutpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMOutpre:BYT_Nr 2` causes `WFMOutpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMOutpre:BIT_Nr` to 16 causes `WFMOutpre:BYT_Nr` to be set to 2.*

Following is an example command sequence that illustrates how to transfer waveform data from the oscilloscope to the computer.

In this case, let's say you'd like to transfer 10,000 points from channel 1, in ASCii format with 1 byte per point, to your computer program.

Table 2-43: Example Command Sequence for Transferring Waveform Data from Oscilloscope to Computer

Item	Description
:DATa:SOUrce CH1	Sets the source waveform to be transferred to Channel 1.
:DATa:STARt 1	This, along with DATa:STOP, specifies the portion of the waveform record that will be transferred .
:DATa:STOP 10000	
:DATa:ENCdg ASCIi	Sets the data format to ASCII. (This command replaces WFMOutpre:ENCdg, WFMOutpre:BN_Fmt and WFMOutpre:BYT_Or with a single command.)
:DATa:WIDth 1	Sets 1 byte per point (same as WFMOutpre:BYT_Nr).
:HEADer 1	Turning on HEADer and VERBose will allow you to view the WFMOutpre? parameters in context.
:VERBose	1
:WFMOutpre?	The WFMOutpre? query provides the information needed to interpret the waveform data point information that will be returned from the CURVe query.
:HEADer 0	You may want to turn the header off before doing the CURVe query, because with the header on, a CURVe query will return the CURVe command header followed by a space and the ASCII waveform data.
:CURVe?	Transfers the data points.

NOTE. *Command sequence examples as well as several comprehensive examples of what the WFMOutpre? query might return using different data sources are included as an appendix. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

Example 7: RF Frequency Domain Waveform

NOTE. *When you do a WFMOutpre? query in an interactive session during program development, it's a good idea to first turn on the header and verbose features (using the HEADer and VERBose commands) in order to see the returned values in context.*

Waveform Sources. Valid waveform sources that can be transferred from the oscilloscope (using the DATa:SOUrce command) include:

CH1 – CH4 - Analog channels. When DATa:SOUrce is set to one of these sources, the data points represent digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. These data points can be transferred in signed or unsigned integer formats.

D0 – D15 - The digital input channels (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed). When DATa:SOUrce is set to one of these, the data points are binary states (0 or 1). These data points can be transferred in widths of 1 or 2 bytes, as signed or unsigned integers.

DIGital - The Digital Collection. These data points are binary states (0 or 1) that can be transferred in widths of 4 or 8 bytes, as signed or unsigned integers. For ASCII encoding, the data is transferred as hexadecimal values with leading zeroes suppressed. When DATa:SOUrce is set to DIGital, this represents a collection of information that differs depending on the data width (set using either the DATa:WIDth or WFMOutpre:BYT_Nr command.)

- When the data width is set to 4 bytes, the Digital Collection is the states of digital channels D0 – D15, plus the digital representations of analog channels 1 – 4, plus the trigger state.
- When the data width is set to 8 bytes, the Digital Collection is the transition state information for digital channels D0 – D15, plus the digital representations of analog channels 1 – 4. For more information, see the section below "Further Explanation of Digital Collection Data". (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_NORMal, RF_AVErage, RF_MAXHold, RF_MINHold - these are the RF frequency domain traces (MDO4000/B and MDO3000 models only). When DATa:SOUrce is set to one of these traces, the data points represent the amplitude of the trace in watts, and are floating point values. The frequency domain trace data is returned as 4-byte floating point values. (Note that CURVe? always returns linear watts, not the display units.)

RF_AMPlitude, RF_FREQuency, RF_PHASe – these are the RF time domain traces (MDO4000/B series models only.) When DATa:SOUrce is set to one of these traces, the data points are the Amplitude vs. Time, Frequency vs. Time, or Phase vs. Time representations of the RF input signal.

The RF time domain traces are returned as 1-byte or 2-byte integers, depending on the DATa:WIDth setting. The default is 1 byte per point.

- **RF_FREQuency** – frequency in Hz.
- **RF_PHASe** – phase in degrees.
- **RF_AMPlitude** – amplitude in Volts.

MATH — The format of MATH data is dependent upon the sources for the math waveform. For analog channel sources, the format is that for the analog channels described above. For spectrum math, the format is the same as for RF frequency domain traces, which is 4-byte floating point data.

REF1-REF4 — The format of REF data is dependent upon the sources from which the reference waveform was created. For analog channel sources, the format is that for the analog channels described above. For RF frequency domain sources, the format is that for the RF frequency domain traces, which is 4-byte floating point data.

NOTE. *When you change the* `DATa:SOUrce` *setting, all of the associated settings for the waveform preamble (*`WFMOutpre` *commands) are automatically adjusted for the specified source waveform. The specified source waveform must be turned on.*

Data Encoding and Widths. Data transferred from the oscilloscope using the `CURVe` query can be sent in either ASCII or binary formats. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header, immediately followed by the binary data.

You can specify the format for waveform transfers from the oscilloscope using the combination of `WFMOutpre:ENCdg`, `WFMOutpre:BN_Fmt` and `WFMOutpre:BYT_Or` commands. Or else you can simply use the `DATa:ENCdg` command, which combines all three.

ASCII data is represented by signed integer values for analog and digital channels and by 4-byte floating point values for the RF frequency domain traces (RF_NORMal, RF_AVErage, RF_MAXHold, RF_MINHold). The range of the values depends on the data width (specified using the `WFMOutpre:BYT-Nr` or `DATa:WIDth` command). One byte wide data ranges from -128 to 127. Two byte wide data ranges from -32768 to 32767. For digital channels D0 through D15, the values returned are 0 or 1. For the Digital Collection, ASCII data is returned in hexadecimal format with any leading zeroes omitted.

Transferring a Waveform from a Computer to an Oscilloscope's Internal Reference Memory

Waveforms sent from a computer program TO the oscilloscope are always stored in one of the internal reference memory locations (REF1-4). Use `DATa:DESTination` to specify the reference memory location, as well other `DATa` commands to specify record start and stop points. Next, use the `WFMInpre` commands to specify the waveform's data format, scale, domain and other attributes that will be used to convert raw data points into the scope's internal waveform points. Then, use `WFMInpre?` to verify your settings. Finally, use the `CURVe` command to transfer the raw data points.

Following is an example command sequence that illustrates how to transfer waveform data to the oscilloscope's internal reference memory.

In this case, let's say you have created a waveform on your computer and would like to transfer 10,000 data points of it, in ASCii format with 1 byte per point, to your oscilloscope's internal reference memory location REF2.

NOTE. *The* `WFMInpre:BYT_Nr` *and* `WFMInpre:BIT_Nr` *settings are directly related; setting one causes the other to be set accordingly. For example,* `WFMInpre:BYT_Nr 2` *causes* `WFMInpre_BIT_Nr` *to be set to 16 (2 * 8 bits/byte). Similarly, setting* `WFMInpre:BIT_Nr` *to 16 causes* `WFMInpre:BYT_Nr` *to be set to 2.*

Table 2-44: Example Command Sequence for Transferring Waveform Data from Computer to Oscilloscope

Item	Description
:DATa:DESTination REF2	Selects REF 2 as the internal reference memory location that the incoming waveform will be transferred to.
:DATa:STARt 1	This, along with DATa:STOP, specifies the starting and ending points of the waveform record that will be transferred to REF2.
:DATa:STOP	10000
:WFMInpre:DOMain TIMe	Specifies that the data to be transferred is a time domain waveform, and therefore should be treated as integers (as opposed to a frequency domain waveform, which uses floating point).
:WFMInpre:BYT_Nr 1	Sets the number of bytes per data point in the waveform data to be sent to REF2 to 1.
:WFMInpre:BIT_Nr 8	Sets the number of bits per binary data point to 8.
:WFMInpre:ENCdg ASCII	Specifies that the incoming waveform uses the ASCII format.
:WFMInpre:NR_Pt 10000	Sets the number of data points that are being sent to REF2 to 10000.
:WFMInpre:PT_Fmt Y	Specifies that the incoming waveform is a normal one, where one ASCII or binary data point is transmitted for each point in the waveform record (as opposed to envelope).
:WFMInpre:XUNit "S"	Sets the horizontal units of the x-axis of the data points to seconds.
:WFMInpre:XINcr 4.0000E-9	Sets the horizontal interval between the incoming waveform points, using the units specified above.
:WFMInpre:XZERo -20.0000E-6	Sets the position value of the first data point in the incoming waveform record.
:WFMInpre:YUNit "V"	Specifies that Volts are the vertical units of the data points being sent.
:WFMInpre:YMUlt 4.0000E-3	Specifies the vertical scale multiplying factor used to convert the incoming data points from digitizing levels into the units specified above.
:WFMInpre:YOFf 0.0E+0	Specifies that the vertical position in digitizing levels of the incoming reference waveform is 0.
:WFMInpre:YZEro 0.0E+0	Specifies that the vertical offset of the incoming waveform is 0.
:HEADer 1	Turning on `HEADer` and `VERBose` will allow the `WFMInpre?` parameters to be viewed in context.
:VERBose 1	

Table 2-44: Example Command Sequence for Transferring Waveform Data from Computer to Oscilloscope (cont.)

Item	Description
:WFMInpre?	Do this query to verify your settings.
:CURVe <10,000 ASCIi data points, each separated by a comma>	Sends the data points to REF2.

Scaling Waveform Data

Once you transfer waveform data from an oscilloscope to a computer, you can convert the data points (which are digitizing levels) into engineering units such as Volts or Amps for analysis using information from the waveform preamble.

The following is an example for converting transferred data into the appropriate engineering units. The transfer data is from an analog waveform in YT (single point) format. (See WFMInpre:PT_Fmt for the definition of the point formats.) The data points returned from the CURVE? query for analog channel data are in digitizing levels. The YMULT value is in vertical units (e.g. volts) per digitizing level.

Formula for computing horizontal (time) point value:

$X_i = XZEro + XINcr * (i - 1)$

Formula for computing vertical (amplitude) point value:

$Y_i = YZEro + (YMUlt * DataPoint_i)$

where:

i is the index of a curve data point (1–based: first data point is point number 1)

X_i is the ith horizontal value in XUNits

Y_i is the ith vertical value in YUNits

$DataPoint_i$ is the waveform data point value, in digitizing levels.

Commands used:

```
:DATa:SOUrce CH1
:DATa:START 1
:DATa:STOP 1000
:WFMOutpre:NR_pt?  1000
:WFMOutpre:XUNit?  “s”
:WFMOutpre:XZEro?  -500.000E-3
:WFMOutpre:XINcr?  1.0000E-3
:WFMOutpre:YUNit?  “V”
:WFMOutpre:YZEro?  0.0E+0
```

```
:WFMOutpre:YMUlt?  4.0000E-3
:WFMOutpre:BYT_nr?  1
```

Horizontal (time) values:

X_i = XZEro + XINcr * (i - 1)

= -500ms + 1ms * (i – 1)

X_1 = -500ms + 1ms * (1 - 1)

= -500ms

X_2 = -500ms + 1ms * (2 - 1)

= -499ms

. . .

X_{1000} = -500ms + 1ms * (1000 - 1) = 499ms

Vertical (amplitude) values:

Y_i = YZEro + (YMUlt * $DataPoint_i$)

= 0.0V + (0.004 * $DataPoint_i$)

YZERO is in vertical units; in this example, 0.0 Volts.

YMULT is in vertical units per digitizing level (DL), in this example, 0.004 Volts per digitizing level.

From `CURVe` query:

$DataPoint_1$ = -10

$DataPoint_2$ = -11

$DataPoint_{1000}$ = 23

Y_1 = 0.0V + (0.004V/DL * -10DL) = –0.040V

Y_2 = 0.0V + (0.004V/DL * -11DL) = –0.044V

Y_{1000} = 0.0V + (0.004V/DL * 23DL) = 0.092V

Further Explanation of the Digital Collection

When the waveform source is set to DIGital using the `DATa:SOUrce` command, a `WFMOutpre?` and `CURVe?` query (or a `WAVFRM?` query) will return the Digital Collection data. The format and content of this data will depend upon the width that has been specified using the `DATa:WIDth` command, which can be either 4 or 8 bytes per point.

NOTE. *Applies to MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.*

4 Byte Data. When the data width is set to 4 bytes (using either DATa:WIDth or WFMOutpre:BYT_Nr, the Digital Collection represents

- the states of digital channels D0 – D15,
- the digital representations of analog Channels 1 – 4, and
- the trigger state.

In this case, the Digital Collection data returned will be 32-bit packed integers, where each point is represented as follows. Note that the trigger state bit described below is only available when ACQuire:MAGnivu is 1 (on).

Table 2-45: Digital Collection: 4 Byte Data

Bit number	Description
31– 22	not used
21	trigger state
20	not used (always 1)
19	CH4 digital state
18	CH3 digital state
17	CH2 digital state
16	CH1 digital state
15	D15 state
...	
1	D1 state
0	D0 state

8 Byte Data. When the data width is set to 8 bytes, the Digital Collection represents

- the transition state information for digital channels D0 – D15 and
- the digital representations of analog Channels 1 – 4.

The "transition state" refers to MSB and LSB bits which together represent the state of the digital channel during the sampling period, as follows:

MSB	LSB	Transition/State
0	0	Low
0	1	High
1	0	Single transition
1	1	Multiple transitions

If the width specified using the DATa:WIDth command is 8 bytes, the Digital Collection data returned will be 64-bit packed integers, where each point is represented as follows:

Table 2-46: Digital Collection: 8 Byte Data

Bit Number	Description
63 — 52	not used
51	CH4 transition state MSB
50	CH3 transition state MSB
49	CH2 transition state MSB
48	CH1 transition state MSB
47	D15 transition state MSB
...	
33	D1 transition state MSB
32	D0 transition state MSB
31 — 20	not used
19	CH4 transition state LSB
18	CH3 transition state LSB
17	CH2 transition state LSB
16	CH1 transition state LSB
15	D15 transition state LSB
...	
1	D1 transition state LSB
0	D0 transition state LSB

For example, to find the transition state of the digital channel D0, set DATa:SOUrce to `DIGITAL` and DATa:WIDth to 8. Look at bits 0 and 32 in the data returned by the `CURVe?` or `WAVFrm?` queries, where bit 0 is the transition state LSB and bit 32 is the transition state MSB for D0.

Table 2-47: Waveform Transfer Commands

Command	Description
CURVe	The CURVe command transfers the waveform data points TO the oscilloscope's internal reference memory location (REF1–4), which is specified by the DATa:DESTination command. The CURVe? query transfers data FROM the oscilloscope; the source waveform is specified by the DATa:SOUrce command. The first and last data points are specified by the DATa:STARt and DATa:STOP commands. Associated with each waveform transferred using the CURVe command or query is a waveform preamble that provides the data format, scale and associated information needed to interpret the waveform data points. The preamble information for waveforms sent TO the oscilloscope is specified using the WFMInpre commands. The preamble information for waveforms transferred FROM the oscilloscope is specified or queried using the WFMOutpre commands. If the waveform is not displayed, the query form generates an error. The CURVe command and CURVe? query transfer waveform data in ASCII or binary format. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header immediately followed by the binary data.
DATa	These commands specify the format and location of waveform data that is transferred using the CURVe command, or return the format and location of the waveform data that is transferred with the CURVe? query. You can use the INIT argument to reset all of the DATa parameters to default values. (Note that the *RST and FACtory commands do not reset the DATa parameters.) You can use the SNap argument to automatically set the DATa:STARt and DATa:STOP values to the starting and stopping point of the waveform cursors (if on). Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.
DATa:DESTination	This command specifies the reference memory location (REF1–4) for storing waveform data transferred into the oscilloscope using the CURVe command.
DATa:ENCdg	This command specifies the encoding format for outgoing waveform data. This command is equivalent to setting WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or. Setting the DATa:ENGdg value causes the corresponding WFMOutpre values to be updated.
DATa:SOUrce	This command specifies the source waveform to be transferred from the oscilloscope using the CURVe? query. The valid waveform sources are CH1-CH4, MATH, REF1-REF4, D0-D15, DIGital, RF_AMPlitude, RF_FREQuency, RF_PHASe, RF_NORMal, RF_AVErage, RF_MAXHold, and RF_MINHold. Setting DATa:SOUrce automatically constrains the following to valid values for the specified source waveform: WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr and WFMOutpre:BN_Fmt. ***NOTE.*** *The RF time domain traces, RF_AMPlitude, RF_FREQuency and RF_PHASe, are only available on the MDO4000/B series models.*
DATa:STARt	This command specifies the starting data point for incoming or outgoing waveform transfer using the CURVe command or query. (Use DATa:STOP to specify the ending data point.) You can set the DATa:STARt and DATa:STOP values automatically to the starting and stopping points of the waveform cursors, if on, using DATa SNap. Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.
DATa:STOP	This command specifies the final data point that will be transferred when using the CURVe command or query for incoming or outgoing waveform transfer. (UseDATa:STARt to specify the starting data point.)

Table 2-47: Waveform Transfer Commands (cont.)

Command	Description
DATa:WIDth	This command specifies the width, in bytes per point, for waveform data transferred from the scope via the CURVe? query. (This command is synonymous with WFMOutpre:BYT_Nr .) When the source isCH1-CH4, REF1-REF4, MATH, D0-D15, RF_AMPlitude, RF_FREQuency and RF_PHASe, the default width is 1 byte. When the source is RF_NORMal, RF_AVERage, RF_MAXHold, or RF_MINHold, the default width is 4 bytes. ***NOTE.*** *The RF time domain traces, RF_AMPlitude, RF_FREQuency and RF_PHASe, are only available on the MDO4000/B series models.*
WAVFrm?	This query returns the waveform preamble and the waveform data for the source waveform specified by the DATa:SOUrce command. This command is equivalent to sending both WFMOutpre? and CURVe?, with the additional provision that the response to WAVFrm? is guaranteed to provide a synchronized preamble and curve.
WFMInpre?	Returns the waveform formatting and scaling specifications to be applied to the next incoming CURVe command data.
WFMInpre:BIT_Nr	This command specifies the number of bits per data point in the waveform data to be sent to the oscilloscope using the CURVe command. Changing this value also changes the value of WFMInpre:BYT_Nr.
WFMInpre:BN_Fmt	This command specifies the format of the data for outgoing waveforms when WFMInpre:ENCdg is set to BINary. The format can either be RI (signed integer), RP (positive integer) or FP (floating point).
WFMInpre:BYT_Nr	This command specifies the number of bytes per data point in the waveform data to be sent to the oscilloscope using the CURVe command. Changing this value also changes the value of WFMInpre:BIT_Nr.
WFMInpre:BYT_Or	This command specifies which byte of incoming binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMInpre:ENCdg is set to BINary and WFMInpre:BYT_Nr is 2.
WFMInpre:CENTERFREQuency	This command specifies the center frequency of the incoming RF trace (waveform), in hertz. The center frequency is a precise frequency at the center of the frequency domain display. In many applications, it is a carrier frequency.
WFMInpre:DOMain	This command specifies whether the information being sent to a reference location should be treated as integer (time domain) information, or floating point (frequency domain) information, for the purposes of storing the data internally. The default is TIMe. This parameter should be set before using the CURVe command to transfer a waveform from a PC to an internal reference location.
WFMInpre:ENCdg	This command specifies the type of encoding of the incoming waveform data to be sent to the oscilloscope using the CURVe command. Supported types are BINary and ASCii.
WFMInpre:NR_Pt	This command specifies the number of data points that are in the incoming waveform record to be sent to the oscilloscope using the CURVe command.
WFMInpre:PT_Fmt	This command specifies the format of the data points to be sent to the oscilloscope using the CURVE command. This can be Y for YT format, or ENV for envelope format (min/max pairs). Regardless of the argument used, the scale, offset, and so on are interpreted similarly. When ENV is used, waveform data is interpreted as min-max pairs (the minimum value precedes the maximum for each pair); when Y is used, it is interpreted over a single point.

Table 2-47: Waveform Transfer Commands (cont.)

Command	Description
WFMInpre:PT_Off	The set form of this command is ignored. The query form always returns a 0.
WFMInpre:REFLevel	This command specifies the Reference Level of the incoming waveform. This command applies only to frequency domain waveforms. The Reference Level is adjustable from 10 pico Watts (–140dBm) to 1 Watt (+30dBm).
WFMInpre:SPAN	This command specifies the frequency span of the incoming RF trace. The span is the range of frequencies that can be observed around the center frequency. It can range from 1 KHz to 6 GHz.
WFMInpre:WFMTYPe	This command specifies the type of waveform that is being transferred to the oscilloscope for storage in one of the REF1 — REF4 memory locations. The waveform type possibilities are the ANALOG, the RF time domain waveforms (RF_TD), or the RF frequency domain waveforms (RF_FD). The default is ANALOG. This parameter should be set before using the CURVe command to transfer a waveform from a PC to an internal reference location. The type of waveform that is being transferred in turn determines which window will display it on the instrument screen: the time domain window or frequency domain window. Both the analog and RF-TD arguments specify the time domain window; the RF_FD argument specifies the frequency domain window.
WFMInpre:XINcr	This command specifies the horizontal interval between incoming waveform points sent to the oscilloscope using the CURVE command. The units can be time, in seconds, or frequency, in hertz, and can be specified or queried using the WFMInpre:XUNit command.
WFMInpre:XUNit	This command specifies the horizontal units of the x-axis of the data points being sent to the oscilloscope using the CURVE command. This value can be in “s” or “Hz”.
WFMInpre:XZEro	This command specifies the position value of the first data point in the incoming waveform record being sent to the oscilloscope using the CURVE command. The units are determined or queried using the WFMInpre:XUNit command and are typically time, in seconds, or frequency, in hertz. This time or frequency is relative to the time or frequency of the trigger, which is always 0. Thus, the XZEro value can be negative.
WFMInpre:YMUlt	This command specifies the vertical scale multiplying factor to be used to convert the incoming data point values being sent to the oscilloscope, from digitizing levels into the units specified by the WFMInpre:YUNit command. For one byte waveform data, there are 256 digitizing levels. For two byte waveform data there are 65,536 digitizing levels.
WFMInpre:YOFf	This command specifies the vertical position of the destination reference waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. Variations in this number are analogous to changing the vertical position of the waveform.
WFMInpre:YUNit	This command specifies the vertical units of data points in the incoming waveform record sent to the oscilloscope using the CURVE command. This can be any of several string values, depending upon the vertical units of the waveform being sent.
WFMInpre:YZEro	This command specifies the vertical offset of the destination reference waveform in units specified by the WFMInpre:YUNit command. Variations in this number are analogous to changing the vertical offset of the waveform. The WFMInpre:YMUlt, WFMInpre:YOFf, and WFMInpre:YZEro commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units).

Table 2-47: Waveform Transfer Commands (cont.)

Command	Description
WFMOutpre?	This query returns the information needed to interpret the waveform data points returned by the CURVe? query. It returns the waveform transmission and formatting parameters for the waveform specified by the DATa:SOUrce command.
WFMOutpre:BIT_Nr	This command specifies the number of bits per data point in the outgoing waveform being transferred using the CURVe? query. Changing the value of WFMOutpre:BIT_Nr also changes the values of WFMOutpre:BYT_Or and DATa:WIDth.
WFMOutpre:BN_Fmt	This command specifies the format of the binary data for outgoing waveforms when WFMOutpre:ENCdg is set to BINary. The format can be RI (signed integer) or RP (positive integer) for analog channels, and FP for RF frequency domain traces. Changing the value of WFMOutpre:BN_Fmt also changes the value of DATa:ENCdg. The waveform is specified by the DATa:SOUrce command.
WFMOutpre:BYT_Nr	This command specifies the data width for the outgoing waveform specified by the DATa:SOUrce command. (This command is synonymous withDATa:WIDTH.) Note that changing WFMOutpre:BYT_Nr also changes WFMOutpre:BIT_Nr and DATa:WIDth.
WFMOutpre:BYT_Or	This command specifies which byte of outgoing binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMOutpre:ENCdg is set to BINary and WFMOutpre:BYT_Nr is 2.
WFMOutpre:CENTERFREQuency?	This query returns the center frequency of the incoming waveform. For non-MDO models, this query always returns 0.
WFMOutpre:DOMain?	This query returns the domain of the outgoing waveform — either TIMe or FREQuency. If the domain is TIMe, it indicates that the data is to be treated as integer information. If the domain is FREQuency, it indicates that the data is to be treated as floating point information.
WFMOutpre:ENCdg	This command specifies the type of encoding (BINary or ASCii) of the outgoing waveform data queried using the CURVe? query. (This can also be set using the DATa:ENCdg command, which provides the ability to set WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or using a single command.)
WFMOutpre:NR_Pt?	This query returns the number of data points in the waveform record that will be transmitted in response to a CURVe? query. This value is the adjusted range specified by DATA:START and DATA:STOP commands. Note that the oscilloscope automatically adjusts the DATA:START and DATA:STOP values when the DATA:STOP value is less than the DATA:START value, and when the DATA:START and/or DATA:STOP value is greater than the record length of the source waveform. The adjusted DATA:START and DATA:STOP values determine WFMOUTPRE:NR_PT. (You can use DATa:STARt and DATa:STOP to transfer partial waveforms.) If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.
WFMOutpre:PT_Fmt?	This query returns the point format of the data points in the outgoing waveform record transferred using the CURVe? query. The returned values can be Y, which indicates normal waveform points for YT format, or ENV, which indicates envelope mode format in which the data is returned as a series of min/max pairs. The minimum value precedes the maximum. The outgoing waveform is specified by the DATa:SOUrce command. The query command will time out and an error will be generated if the waveform specified by DATa:SOUrce is not turned on.
WFMOutpre:PT_Off?	This query always returns 0 if the outgoing waveform specified by DATA:SOUrce is on or displayed.

Table 2-47: Waveform Transfer Commands (cont.)

Command	Description
WFMOutpre:PT_ORder?	This query returns the point ordering, which is always linear.
WFMOutpre:REFLEvel?	This query returns the Reference Level of the outgoing waveform. It applies only to the four frequency domain waveforms (RF Normal, RF Average, RF Max Hold, and RF Min Hold).
WFMOutpre:SPAN?	This query returns the frequency span of the outgoing waveform. For non-MDO models, this query always returns 0.0. The span is the range of frequencies you can observe around the center frequency.
WFMOutpre:WFId?	This query returns a string that describes several aspects of the acquisition parameters for the source waveform, including Source, Coupling, Vertical Scale, Horizontal Scale, Record Length and Acquisition Mode. If the waveform specified by DATa:SOUrce command is not turned on, an error will be generated.
WFMOutpre:WFMTYPe?	This query returns the type of the outgoing waveform. RF_FD indicates an RF frequency domain waveform; RF_TD indicates an RF time domain waveform; ANALOG indicates Channel 1–4 or the Math waveform. The default is analog. For non-MDO models, this query always returns ANALOG. The type of waveform that is being transferred in turn determines which window will display it on the instrument screen: (the time domain window or frequency domain window).
WFMOutpre:XINcr?	This query returns the horizontal point spacing in units of time (seconds), or frequency (hertz) between data points in the waveform record transferred using the `CURVe?` query. This value corresponds to the sampling interval.
WFMOutpre:XUNit?	This query indicates the horizontal units of the x-axis of the waveform record transferred using the `CURVe?` query. Typically, this value is "s" when the waveform source is displayed in the time domain, and "Hz" when the waveform source is displayed in the frequency domain. When the waveform source is Math or a reference waveform, the value can be "s" or "Hz".
WFMOutpre:XZEro?	This query returns the time coordinate, in seconds, or frequency, in hertz, of the first data point in the outgoing waveform record transferred using the `CURVe?` query. This time or frequency is relative to the time of the trigger, which is always 0. Thus, the XZEro time or frequency can be negative.
WFMOutpre:YMUlt?	This query returns the vertical scale multiplying factor used to convert the waveform data point values in the outgoing waveform record from digitizing levels to the YUNit units. You can determine the units by using the `WFMOutpre:YUNit` query. See the description of the WFMInpre:YMUlt command to see how this scale factor is used to convert waveform sample values to volts.
WFMOutpre:YOFf?	This query returns the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. See the description of WFMInpre:YOFf to see how this position is used to convert waveform sample values to volts.
WFMOutpre:YUNit?	This query returns the units of data points in the outgoing waveform record transferred using the `CURVe?` query. This can be any of several string values, depending upon the vertical units of the source waveform (specified by the DATa:SOUrce command). Typically, this is “V” for volts.
WFMOutpre:YZEro?	This query returns the vertical offset of the source waveform. You can determine the units using the WFMOutpre:YUNit? query. See the description of WFMInpre:YZEro to see how this offset is used to convert waveform sample values to volts.

Zoom Command Group

Use the commands in the Zoom Command Group to expand and position the waveform display horizontally, without changing the time base settings.

Table 2-48: Zoom Commands

Command	Description
ZOOm?	Returns the horizontal positioning and scaling of the zoom display
ZOOm{:MODe|:STATE}	This command specifies the zoom mode
ZOOm:ZOOM<x>?	Returns the current horizontal positioning and scaling of the zoom display
ZOOm:ZOOM<x>:FACtor?	Returns the zoom factor of the zoom window. <x> can only be 1
ZOOm:ZOOM<x>:POSition	This command specifies the horizontal position of the zoom window in terms of 0 to 100% of the overview window. <x> can only be 1
ZOOm:ZOOM<x>:SCAle	This command specifies the horizontal zoom scale of the zoom window. <x> can only be 1
ZOOm:ZOOM<x>:STATE	Specifies or returns a trace as zoomed, on or off. <x> can only be 1
ZOOm:ZOOM<x>:TRIGPOS?	This query returns the time relative to trigger of the center of the zoom box, for the currently selected waveform.

Commands Listed in Alphabetical Order

ACQuire? (Query Only)

Returns the following current acquisition parameters:

- Stop after
- Acquisition state
- Mode
- Number of averages
- Sampling mode

Group Acquisition

Syntax `ACQuire?`

Related Commands ACQuire:MODe,

ACQuire:NUMACq?,

ACQuire:NUMAVg,

ACQuire:STOPAfter

ACQuire:FASTAcq

Sets or queries the FastAcq feature. This feature provides a high-speed waveform capture rate to help capture signal anomalies.

Conditions MDO models only.

Group Acquisition

Syntax `ACQuire:FASTAcq`

Examples `:ACQUIRE:FASTACQ?` might return: :ACQUIRE:FASTACQ:STATE 0;PALETTE TEMPERATURE

ACQuire:FASTAcq:PALEtte

Sets (or queries) which palette to use for fast acquisition mode.

Group Acquisition

Syntax

```
ACQuire:FASTAcq:PALEtte
{NORMal|TEMPErature|SPECTral|INVERTed}
ACQuire:FASTAcq:PALEtte?
```

Arguments

NORMal – Normal displays hues and lightness levels for best overall viewing. The color of each channel waveform matches the color of the corresponding front-panel vertical knob.

TEMPErature - Temperature Grading displays areas of the waveform with the highest sample density in red shades. The areas of lowest sample density appear in blue shades.

SPECTra – Spectral Grading displays areas of the waveform with the highest sample density in blue shades. The areas of lowest sample density appear in red shades.

INVERTed – Inverts the normal display hues and lightness levels based on sample intensity. The areas of lowest sample density appear the brightest, while the areas with the highest sample density appear the darkest.

Examples `ACQ:FASTA:PALETTE SPECT` sets the palette for fast acquisition mode to Spectral.

ACQuire:FASTAcq:STATE

Turns fast acquisition mode on or off, or queries the state of the mode.

NOTE. *When fast acquisition mode is on, waveforms cannot be queried, saved or recalled, and reference waveforms cannot be turned on. Attempting any of these results in a settings conflict error event.*

Group Acquisition

Syntax

```
ACQuire:FASTAcq:STATE {0|1|OFF|ON}
ACQuire:FASTAcq:STATE?
```

Arguments 1 or ON turns on fast acquisition mode.

0 or OFF turns it off.

Examples ACQ:FASTA:STATE ON turns on fast acquisition mode.

ACQuire:MAGnivu

Turns on the MagniVu feature, which provides up to 32 times signal detail for fast viewing of short events. This feature is not recommended for slow data formats such as RS-232.

NOTE. *MagniVu channel sampling is available on MSO/MDO4000/B oscilloscopes only as well as MDO3000 models with option MDO3MSO installed.*

Group Acquisition

Syntax
```
ACQuire:MAGnivu {<NR1>|OFF|ON}
ACQuire:MAGnivu?
```

Arguments <NR1> = 0 disables the MagniVu feature; any other value turns this feature on.

ON enables the MagniVu feature.

OFF disables the MagniVu feature.

ACQuire:MAXSamplerate? (Query Only)

Returns the maximum real-time sample rate, which varies from model to model.

Group Acquisition

Syntax
```
ACQuire:MAXSamplerate?
```

Examples ACQUIRE:MAXSAMPLERATE? might return 2.5000E+9 indicating the maximum real-time sample rate is 2.5GS/s.

ACQuire:MODe

Specifies the acquisition mode of the oscilloscope for all analog channel waveforms. The acquisition mode determines how the final value of the acquisition interval is generated from the many data samples.

Waveforms are the displayed data point values taken from acquisition intervals. Each acquisition interval represents a time duration set by the horizontal scale (time per division). The oscilloscope sampling system always samples at the maximum rate, so the acquisition interval may include more than one sample.

Group Acquisition

Syntax

```
ACQuire:MODe {SAMple|PEAKdetect|HIRes|AVErage|ENVelope}
ACQuire:MODe?
```

Related Commands ACQuire:NUMAVg, ACQuire:NUMEnv

CURVe

Arguments

`SAMple` specifies that the displayed data point value is the first sampled value that is taken during the acquisition interval. In sample mode, all waveform data has 8 bits of precision. You can request 16 bit data with a CURVe query but the lower-order 8 bits of data will be zero. SAMple is the default mode.

`PEAKdetect` specifies the display of high-low range of the samples taken from a single waveform acquisition. The high-low range is displayed as a vertical column that extends from the highest to the lowest value sampled during the acquisition interval. PEAKdetect mode can reveal the presence of aliasing or narrow spikes.

`HIRes` specifies Hi Res mode where the displayed data point value is the average of all the samples taken during the acquisition interval. This is a form of averaging, where the average comes from a single waveform acquisition. The number of samples taken during the acquisition interval determines the number of data values that compose the average.

`AVErage` specifies averaging mode, in which the resulting waveform shows an average of SAMple data points from several separate waveform acquisitions. The oscilloscope processes the number of waveforms you specify into the acquired waveform, creating a running exponential average of the input signal. The number of waveform acquisitions that go into making up the average waveform is set or queried using the `ACQuire:NUMAVg` command.

`ENVelope` specifies envelope mode, where the resulting waveform shows the PEAKdetect range of data points from every waveform acquisition.

Examples

`ACQUIRE:MODE ENVELOPE` sets the acquisition mode to display a waveform that is an envelope of many individual waveform acquisitions.

`ACQUIRE:MODE?` might return `:ACQuire:MODe AVERAGE` indicating that the displayed waveform is the average of the specified number of waveform acquisitions.

ACQuire:NUMACq? (Query Only)

Returns the number of waveform acquisitions that have occurred since starting acquisition with the ACQuire:STATE RUN command. This value is reset to zero when any acquisition, horizontal, or vertical arguments that affect the waveform are changed. The maximum number of acquisitions that can be counted is 2^{32} 1.

Group

Acquisition

Syntax

```
ACQuire:NUMACq?
```

Related Commands

ACQuire:STATE

Returns

`ACQuire:NUMACq?` might return `:ACQUIRE:NUMACQ 350` indicating that 350 acquisitions have occurred since executing an ACQuire:STATE RUN command.

ACQuire:NUMAVg

Specifies the number of waveform acquisitions that should make up an averaged waveform. Use the ACQuire:MODe command to enable the Average mode. Sending this command is equivalent to turning a multipurpose knob to enter the number of waveform acquisitions to average.

Group

Acquisition

Syntax

```
ACQuire:NUMAVg <NR1>
ACQuire:NUMAVg?
```

Related Commands

ACQuire:MODe, ACQuire:STATE

Arguments

`<NR1>` is the number of waveform acquisitions to average. The range of values is from 2 to 512 in powers of two.

Examples

`ACQUIRE:NUMAVG 16` specifies that 16 waveform averages will be performed before exponential averaging starts.

`ACQUIRE:NUMAVG?` might return `:ACQUIRE:NUMAVG 64` indicating that there are 64 acquisitions specified for averaging.

ACQuire:NUMEnv

This command controls the number of envelopes (when acquisition mode has been set to ENVelope using ACQuire:MODe). The number of envelopes can be set from 1 to 2000 in increments of 1, or to INFInite. Setting the value to a number greater than 2000 sets the number of envelopes to INFInite.

Group

Acquisition

Syntax

```
ACQuire:NUMEnv {<NR1>|INFInite}
ACQuire:NUMEnv?
```

Related Commands

ACQuire:MODe, ACQuire:STATE

Arguments

`<NR1>` is an integer that specifies the number of envelopes to use when the acquisition mode has been set to ENVelope.

`INFInite` specifies to use an infinite number of envelopes.

Examples

`ACQuire:NUMEnv 22` sets the number of envelopes to 22.

`ACQuire:NUMEnv?` returns the number of envelopes that has been specified, either an integer or INFINITE.

ACQuire:STATE

Starts or stops acquisitions. When state is set to ON or RUN, a new acquisition will be started. If the last acquisition was a single acquisition sequence, a new single sequence acquisition will be started. If the last acquisition was continuous, a new continuous acquisition will be started.

If RUN is issued in the process of completing a single sequence acquisition (for example, averaging or enveloping), the acquisition sequence is restarted, and any accumulated data is discarded. Also, the oscilloscope resets the number of acquisitions. If the RUN argument is issued while in continuous mode, acquisition continues.

Group Acquisition

Syntax
```
ACQuire:STATE {OFF|ON|RUN|STOP|<NR1>}
ACQuire:STATE?
```

Related Commands ACQuire:STOPAfter

Arguments

`OFF` stops acquisitions.

`STOP` stops acquisitions.

`ON` starts acquisitions.

`RUN` starts acquisitions.

`<NR1>` = 0 stops acquisitions; any other value starts acquisitions.

Examples

`ACQUIRE:STATE RUN` starts the acquisition of waveform data and resets the count of the number of acquisitions.

`ACQUIRE:STATE?` might return `:ACQUIRE:STATE 0` indicating that the acquisition is stopped.

ACQuire:STOPAfter

Specifies whether the oscilloscope should continually acquire acquisitions or acquire only a single sequence.

Group Acquisition

Syntax
```
ACQuire:STOPAfter {RUNSTop|SEQuence}
ACQuire:STOPAfter?
```

Related Commands ACQuire:STATE

Arguments

`RUNSTop` specifies that the oscilloscope will continually acquire data, if ACQuire:STATE is turned on.

`SEQuence` specifies that the next acquisition will be a single-sequence acquisition.

Examples `ACQUIRE:STOPAFTER RUnsTOP` sets the oscilloscope to continually acquire data.

`ACQUIRE:STOPAFTER?` might return `:ACQUIRE:STOPAFTER SEQUENCE` indicating that the next acquisition the oscilloscope makes will be of the single-sequence type.

ACTONEVent:ACTION:AUXOUT:STATE

Sends a pulse to the Auxiliary Out port when a specified event occurs, or queries the state of the "pulse to aux out" action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:AUXOUT:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:AUXOUT:STATE?
```

Arguments `1, ON` sends a pulse to the Auxiliary Out port when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:AUXOUT:STATE ON` specifies to send a pulse to the Auxiliary Out port when the specified event occurs.

ACTONEVent:ACTION:EMAIL:SETUp:TOADDRess

Sets (or queries) the email address for the recipient when the ACTONEVent:ACTION:EMAIL:STATE command is used.

To set up the email address for the sender, use EMAIL:SETUp:FROMADDRess.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:EMAIL:SETUp:TOADDRess <QString>
ACTONEVent:ACTION:EMAIL:SETUp:TOADDRess?
```

Arguments Quoted string that represents the recipient's email address. The maximum number of characters allowed is 128.

Examples `ACTONEVENT:ACTION:EMAIL:SETUP:TOADDRESS "george.wilcox@tektronix.com"` sets the recipient's email address to george.wilcox@tektronix.com.

ACTONEVent:ACTION:EMAIL:STATE

Sends an email when a specified event occurs, or queries the state of the "send email" action. The default state is 0 (off).

To specify an email address for the recipient, use the command ACTONEVent:ACTION:EMAIL:SETUp:TOADDRess

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:EMAIL:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:EMAIL:STATE?
```

Arguments

`1, ON` sends an email when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:EMAIL:STATE ON` specifies to send an email when the specified event occurs.

ACTONEVent:ACTION:PRINT:STATE

Sends a screen image to a printer when a specified event occurs, or queries the state of the "send screen image" action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:PRINT:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:PRINT:STATE?
```

Arguments

`1, ON` sends a screen image to the printer when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:PRINT:STATE ON` specifies to send a screen image to the printer when the specified event occurs.

ACTONEVent:ACTION:SAVEIMAGE:STATE

Saves a screen image to file when a specified event occurs, or queries the state of the "save screen image to a file" action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:SAVEIMAGE:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:SAVEIMAGE:STATE?
```

Arguments `1, ON` saves a screen image to a file when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:SAVEIMAGE:STATE ON` specifies to save a screen image to a file when the specified event occurs.

ACTONEVent:ACTION:SAVEWFM:STATE

Saves the currently selected waveform data to a file when a specified event occurs, or queries the state of the "save waveform to file" action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:ACTION:SAVEWFM:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:SAVEWFM:STATE?
```

Arguments `1, ON` saves the waveform to a file when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:SAVEWFM:STATE ON` specifies to save a waveform to a file when the specified event occurs.

ACTONEVent:ACTION:SRQ:STATE

Sets or returns the enabled state of the generate service request (SRQ) action when a specified event occurs. The default state is 0.

When this control is set, the instrument will set the OPC bit (bit 0) in the SESR (Standard Events Status Register) when the specified event occurs. In order to generate a service request interrupt (SRQ), the SRER (Service Request Enable Register), DESER (Device Event Status Enable Register), and the ESER (Event Status Enable Register) must be set appropriately as described in the programmer manual Synchronization Methods section. Upon completion of the mask test, event code 2600 ("Mask testing complete") is queued to the event queue.

NOTE. *With this setting enabled, a *OPC? query will not return until the specified event occurs. Users should be aware of this when using synchronization methods such as *OPC? and *WAI for other operations.*

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax

```
ACTONEVent:ACTION:SRQ:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:SRQ:STATE?
```

Arguments

`1, ON` generates an SRQ when the specified event occurs.

`0, OFF` turns off this action.

Examples `ACTONEVENT:ACTION:SRQ:STATE ON` specifies to generate an SRQ when the specified event occurs.

ACTONEVent:ACTION:STOPACQ:STATE

Stops acquisitions when a specified event occurs, or queries the state of the “stop acquisition” action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax

```
ACTONEVent:ACTION:STOPACQ:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:STOPACQ:STATE?
```

Arguments

`1, ON` stops acquisitions when the specified event occurs.

`0, OFF` turns off this action.

Examples

`ACTONEVENT:ACTION:STOPACQ:STATE ON` specifies to stop acquisitions when the specified event occurs.

ACTONEVent:ACTION:VISUAL:STATE

Displays a visual notification when a specified event occurs, or queries the state of the "display a visual notification" action. The default state is 0 (off).

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group

Act on Event

Syntax

```
ACTONEVent:ACTION:VISUAL:STATE <0|1|OFF|ON>
ACTONEVent:ACTION:VISUAL:STATE?
```

Arguments

`1, ON` displays a visual notification when the specified event occurs.

`0, OFF` turns off this action.

Examples

`ACTONEVENT:ACTION:VISUAL:STATE ON` specifies to display a visual notification when the specified event occurs.

ACTONEVent:EVENTTYPe

Specifies (or queries) which event to act on (TRIGger, ACQCOMPLete, or NONe) when using an Act on Event command. The default is `NONe`.

To specify the action to take, use the `ACTONEVent:ACTION` commands.

Group

Act on Event

Syntax

```
ACTONEVent:EVENTTYPe <NONe|TRIGger|ACQCOMPLete>
ACTONEVent:EVENTTYPe?
```

Arguments

`NONe` no event (this is the default).

`TRIGger` specifies to act when a trigger occurs.

ACQCOMPLete specifies to act when acquisition completes.

Examples ACTONEVENT:EVENTTYPE ACQCOMPLETE specifies to take action when acquisition completes.

ACTONEVent:NUMACQs

Sets (or queries) the number of acquisitions to complete for the event type ACQCOMPLete. The default is 1 acquisition.

To set the event type to ACQCOMPLete, use the ACTONEVent:EVENTTYPe command.

Group Act on Event

Syntax
```
ACTONEVent:NUMACQs <NR1>
ACTONEVent:NUMACQs?
```

Arguments Integer which can be set as follows:

Table 2-49:

From	To	Resolution
1	100	1
100	1000	10
1000	10,000	100
10,000	1,000,000	1000

Examples ACTONEVENT:NUMACQS 350 specifies to take the specified action when 350 acquisitions have been completed.

ACTONEVent:REPEATCount

Sets or returns the number of events to run.

To specify an event, use the command ACTONEVent:EVENTTYPe.

Group Act on Event

Syntax
```
ACTONEVent:REPEATCount <NR1>
ACTONEVent:REPEATCount?
```

Arguments

NR1 is an integer that specifies the number of events to run. The default is 1 event and the maximum is 1000000 events. A repeat count greater than 1000000 specifies to run forever. In this case, the action on event can be terminated by setting the state for all actions to OFF. When the repeat count is set to infinite, the query returns 9.9E+37 (IEEE positive infinity).

AFG:AMPLitude

Sets (or queries) the AFG amplitude in volts, peak to peak. The minimum and maximum allowable settings are dependent upon the output load impedance setting (AFG:OUTPut:LOAd:IMPEDance) and the selected function (AFG:FUNCtion).

NOTE. *The AFG:OUTPut:LOAd:IMPEDance command must be used before using any of the amplitude/offset/highLevel/lowLevel/Preset commands, so that saved setups are recalled with the proper load factor applied.*

The following values can be set for AFG:AMPLitude:

Function	AFG AMPLitude Setting Value					
	Load Impedance FIFTY Ohm			Load Impedance HIGHZ		
	Min	Max	Resolution	Min	Max	Resolution
SINE SQUare PULSe RAMP NOISe DC [1] HAVERSINe CARDIac ARBitrary	10.0mV	2.5V	500uV	20.0mV	5.0V	1mV
SINC	10.0mV	1.5V	500uV	20.0mV	3.0V	1mV
LORENtz	10.0mV	1.2V	500uV	20.0mV	2.4V	1mV
GAUSsian ERISe EDECAy	10.0mV	1.25V	500uV	20.0mV	2.5V	1mV

[1] The DC function does not use the amplitude setting. The DC level is set using :AFG:OFFSet. Ampltude settings that are set when the :AFG:FUNCtion is DC are remembered and applied when the function is changed to other than DC.

Conditions

MDO3000 series only. Requires the MDO3AFG option installed.

Group AFG

Syntax
```
AFG:AMPLitude <NR3>
AFG:AMPLitude?
```

Arguments Floating point number that represents the AFG amplitude, peak to peak, in volts.

Examples `AFG:AMPLITUDE 1.0` sets the AFG amplitude to 1.0 volts, peak to peak.

AFG:ARBitrary:ARB<x>:DATE? (Query Only)

Returns the date that the data in the specified arbitrary waveform slot 1-4 was saved.

Conditions MDO3000 only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax
```
AFG:ARBitrary:ARB<x>:DATE?
```

Examples `AFG:ARB:ARB3:DATE?` might return 11-11-13, which represents the date that the data in slot 3 was saved.

AFG:ARBitrary:ARB<x>:LABel

Sets (or queries) the waveform label for arbitrary waveform slots 1- 4.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax
```
AFG:ARBitrary:ARB<x>:LABel <QString>
AFG:ARBitrary:ARB<x>:LABel?
```

Arguments Quoted string that represents the waveform label for one of the arbitrary waveform slots 1-4.

Examples `AFG:ARBITRARY:ARB4` “Foo” sets the waveform label for arbitrary waveform slot 4 to “Foo.”

AFG:ARBitrary:ARB<x>:TIMe? (Query Only)

Returns the time that the data in the specified arbitrary waveform slot was saved.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax `AFG:ARBitrary:ARB<x>:TIMe?`

Examples `AFG:ARB:ARB3:TIME?` might return `"14:43:29"`, which represents the time that the data in the slot 3 was saved.

AFG:ARBitrary:EMEM:FUNCtion? (Query Only)

Returns the currently selected arbitrary waveform pre-defined function. The pre-defined ARB function is selected using the command AFG:ARBitrary:EMEM:GENerate.

This query may also return `USER`, which indicates that the arbitrary waveform in edit memory has been altered from one of the predefined functions.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax `AFG:ARBitrary:EMEM:FUNCtion?`

Examples `AFG:ARB:EMEM:FUNC?` might return `SINE,` indicating that the currently selected arbitrary waveform function is Sine.

AFG:ARBitrary:EMEM:GENerate (No Query Form)

This command generates the arbitrary waveform function specified by the enumeration argument.

The NR1 argument is optional; it can be used to specify the number of points; if it is used, it also sets the value that will be used by AFG:ARBitrary:EMEM:NUMPoints? until the instrument is reset via TEKSecure.

In the absence of the NR1 argument, the number of points used with the function is that number returned by the AFG:ARBitrary:EMEM:NUMPoints? query.

To query the arbitrary waveform function set by this command, use AFG:ARBitrary:EMEM:FUNCtion?

(This value is not reset by default setup or by power cycle).

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax

```
AFG:ARBitrary:EMEM:GENerate
{SINE|SQUare|PULSe|RAMP|NOISe[,NR1]}
AFG:ARBitrary:EMEM:GENerate?
```

Arguments <NR1> (Optional) Specifies the number of points for the arbitrary waveform function. The number of points, if specified, must be >= 2 and <= 131072. The default number of points is 100.

SINE generates the Sine AFG function.

SQUare generates the Square AFG function.

PULSe generates the Pulse AFG function.

RAMP generates the Ramp AFG function.

NOISe generates the Noise AFG function.

Examples AFG:ARB:EMEM:GEN SQU will generate a 100 point square wave if the previous setting of AFG:ARB:EMEM:NUMP is 100.

AFG:ARB:EMEM:GEN SQU 1000 will generate a 1000 point square wave.

AFG:ARBitrary:EMEM:NUMPoints? (Query Only)

Returns the number of points in the AFB arbitrary waveform edit memory.

This value will be used with the AFG:ARBitrary:EMEM:GENerate command in the event that the number of points is not specified. See the AFG:ARBitrary:EMEM:GENerate command description for more information.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax `AFG:ARBitrary:EMEM:NUMPoints?`

Examples `AFG:ARB:EMEM:NUMP?` might return `100`, indicating that there are 100 points in the AFB arbitrary waveform edit memory being used to generate the function.

AFG:ARBitrary:EMEM:POINTS

Specifies which points to load into the AFG arbitrary waveform edit memory. The point data to be loaded may be specified as an IEEE488.2 binary block with 4-byte floating point data values, or as a comma-separated list of NR2 or NR3 data values. The data values must be in the range of -1.0 to 1.0. The minimum number of points is 2 and maximum is 131072.

Upon successful transfer of the data points, the AFG:ARBitrary:EMEM:NUMPoints? query will return the number of points loaded into arbitrary waveform edit memory and the AFG:ARBitrary:EMEM:FUNCtion? query will return `USER`. Note that the output, if turned on, will not change unless or until the AFG function is set to `ARBitrary` using the AFG:FUNCtion command.

Point values may be coerced to the nearest valid step size.

Refer to the AFG:ARBitrary:EMEM:POINTS:ENCdg command description for more information.

NOTE. *If a waveform does not specify points that extend to values of -1.0 and 1.0, then the waveform will not utilize the full available amplitude range. The resulting amplitude will be the fraction of the range specified by the points. For example, "AFG:ARBitrary:EMEM:POINTS 0.5,-0.5" with 1.0Vpp amplitude will result in a 500mVpp Square waveform.*

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group ARB

Syntax
```
AFG:ARBitrary:EMEM:POINTS <BlockWfmInDTO> |<NrfWfmInDTO>
AFG:ARBitrary:EMEM:POINTS?
```

Arguments

`BlockWfmInDTO` – an IEEE488.2 binary block with 4-byte floating point data values

`NrfWfmInDTO` – a comma-separated list of NR2 or NR3 data values

Returns

The query form returns the points data that is stored in the AFG arbitrary waveform edit memory in the format specified by the AFG:ARBitrary:EMEM:POINTS:ENCdg command (either ASCII or binary).

Examples

`AFG:ARB:EMEM:POINTS -0.2,-0.1,0.0,0.1,0.2,0.3,0.2,0.1,0.0,-0.1` specifies 10 data point values to be loaded into edit memory.

AFG:ARBitrary:EMEM:POINTS:ENCdg

This command specifies the data encoding format for the AFG:ARBitrary:EMEM:POINTS query (either ASCII or binary).

The default format is ASCii. Note that this setting is volatile: it defaults to ASCii upon power-up.

Refer to the AFG:ARBitrary:EMEM:POINTS command description for more information.

Conditions

MDO3000 series only. Requires the MDO3AFG option to be installed.

Group

ARB

Syntax

```
AFG:ARBitrary:EMEM:POINTS:ENCdg {ASCii|BINary}
AFG:ARBitrary:EMEM:POINTS:ENCdg?
```

Arguments

`ASCii` – ASCII NR3 format

`BINary` – IEEE488.2 binary block in 4-byte floating point format.

Examples

`AFG:ARB:EMEM:POINTS:ENC ASC` sets the data encoding format for the `:AFG:ARBitrary:EMEM:POINTS?` query to ASCII.

AFG:FREQuency

Sets (or queries) the AFG frequency, in Hz. The following frequency values can be set for each AFG function (use the command AFG:FUNCtion to select a function):

	Frequency		
Function	Min	Max	Resolution
SINE	0.1Hz	50MHz	0.1Hz
SQUare PULSe ARBitrary	0.1Hz	25MHz	0.1Hz
LORENtz GAUSsian ERISe EDECAy NOISe [1] DC [1] HAVERSINe	0.1Hz	5MHz	0.1Hz
SINC (Sin(x)/x)	0.1Hz	2MHz	0.1Hz
CARDIac RAMP	0.1Hz	500kHz	0.1Hz

[1] DC and NOISe waveforms do not use the frequency setting. Frequency settings that are set when the AFG:FUNCtion is DC or NOISe are remembered and applied when the function is changed to other than DC or NOISe.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:FREQuency <NR3>
AFG:FREQuency?
```

Arguments Floating point number that represents the AFG frequency, in Hz.

Returns Query response is returned in high precision NR3 format (up to 12 digits with more than 4 trailing 0 digits after the decimal point is omitted).

Examples `AFG:FREQUENCY 100.0E3` sets the AFG frequency to 100 kHz.

AFG:FUNCtion

Sets (or queries) which AFG function to execute.

NOTE. *The DC level is controlled by AFG:OFFSet.*

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:FUNCtion
{SINE|SQUare|PULSe|RAMP|NOISe|DC|SINC|GAUSsian|LORENtz
|ERISe|EDECAy|HAVERSINe|CARDIac|ARBitrary}
AFG:FUNCtion?
```

Arguments

SINE
SQUare
PULSe
RAMP
NOISe
DC – The DC level is controlled by AFG:OFFSet.
SINC (Sin(x)/x)
GAUSsian
LORENtz
ERISe
EDECAy
HAVERSINe
CARDIac
ARBitrary

Examples `AFG:FUNC LOREN` specifies to generate the Lorentz function.

AFG:HIGHLevel

This command sets (or queries) the high level value of the output waveform, in volts, when using the arbitrary function generator feature. The high level value

is constrained by the requirements for amplitude and offset; updating this value changes the amplitude and offset values.

To set or query the amplitude or offset values, use the commands AFG:AMPLitude and AFG:OFFSet.

NOTE. *The AFG:OUTPut:LOAd:IMPEDance command must be used before using any of the amplitude/offset/highLevel/lowLevel/Preset commands, so that saved setups are recalled with the proper load factor applied.*

The following values can be set for high level:

	AFG:HIGHLevel Setting Value					
	Load Impedance FIFTY Ohm			Load Impedance HIGHZ		
	Min	Max	Resolution	Min	Max	Resolution
SINE SQUare PULSe RAMP NOISe DC [1] HAVERSINe CARDIac ARBitrary	-1.245V	2.5V	1mV	-2.49V	5.0V	2mV
SINC (Sin(x)/x)	-1.241V	2.5V	1mV	-2.482V	5.0V	2mV
LORENtz	-1.239V	2.5V	1mV	-2.478V	5.0V	2mV
GAUSsian ERISe EDECAy	-1.24V	2.5V	1mV	-2.48V	5.0V	2mV

1 When the :AFG:FUNCtion is specified as DC, a change to the AFG:HIGHLevel value results in a corresponding change to :AFG:OFFset. A corresponding change to :AFG:AMPLitude is remembered but is not applied until the :AFG:FUNCtion is changed to a function other than DC.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:HIGHLevel <NR3>
AFG:HIGHLevel?
```

Arguments Floating point number that represents the AFG high level value, in volts.

Examples `AFG:HIGHLEVEL 1.0` sets the AFG high level value to 1.0 volts.

AFG:LEVELPreset

Sets (or queries) the AFG preset levels to values that correspond to the logic standard specified by the argument. The presets set the following vertical controls:

AMPLitude

OFFSet

HIGHLevel

LOWLevel

Note that once any of these vertical settings are changed from the preset values, or the output load impedance is changed, the query form returns `USER`.

NOTE. *Specifying a level preset attempts to set the High and Low level values to valid levels for the selected logic standard. Because some waveforms (e.g., LORENtz, SINC, etc.) have limited amplitude/offset ranges, these values may not be achievable. In such cases they are limited to by the maximum levels specified by the commands AFG:HIGHLevel and AFG:LOWLevel.*

NOTE. *The AFG:OUTPut:LOAd:IMPEDance command must be used before using any of the amplitude/offset/highLevel/lowLevel/Preset commands, so that saved setups are recalled with the proper load factor applied.*

The `AFG:LEVELPreset` command sets the high level and low level values as follows:

	AFG:HIGHLevel and AFG:LOWLevel Setting Values			
	Load Impedance FIFTY Ohm		Load Impedance HIGHZ	
LEVEL Preset	High	Low	High	Low
TTL	N/A	N/A	5.0V	0V
CMOS_5_0V	N/A	N/A	5.0V	0V
CMOS_3_3V	2.5V	0V	3.3V	0V
CMOS_2_5V	2.5V	0V	2.5V	0V
ECL	-0.85V	-1.65V	-0.9V	-1.7V

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:LEVELPreset {CMOS_5_0V|CMOS_3_3V|CMOS_2_5V|ECL|TTL|USER}
AFG:LEVELPreset?
```

Arguments

CMOS_5_0V – standard 5-volt CMOS levels. Not available when the load impedance is 50 Ohm.

CMOS_3_3V – standard 3.3-volt CMOS levels

CMOS_2_5V – standard 2.5-volt CMOS levels

USER– user-defined.

ECL – -1.7 to -0.9 volts (note the full range is not available in 50 Ohm – actual is -1.65 to -0.85. See table below.

TTL – 5.0 volts. Not available when the load impedance is 50 Ohm.

Note: The TTL standard power supply is 5V. Since the Typical standard is >2.6V for high, this is unachievable in 50 Ohm mode. See table below.

Returns Once any of the vertical settings are changed from the preset values, or the output load impedance is changed, the query form returns USER.

Examples AFG:LEVELPRESET CMOS_3_3V sets the AFG preset levels to standard 3.3 volt CMOS levels for the AMPLitude, OFFSet, HIGHLevel and LOWLevel settings.

AFG:LOWLevel

This command sets (or queries) the low level value of the output waveform, in volts, when using the arbitrary function generator feature. The low level value is constrained by the requirements for amplitude and offset; updating this value changes the amplitude and offset values.

To set or query the amplitude or offset values, use the commands AFG:AMPLitude and AFG:OFFSet.

NOTE. *The AFG:OUTPut:LOAd:IMPEDance command must be used before using any of the amplitude/offset/highLevel/lowLevel/Preset commands, so that saved setups are recalled with the proper load factor applied.*

The following values can be set for low level:

	AFG:LOWLevel Setting Value					
	Load Impedance FIFTY Ohm			Load Impedance HIGHZ		
	Min	Max	Resolution	Min	Max	Resolution
SINE SQUare PULSe RAMP NOISe DC [1] HAVERSINe CARDIac ARBitrary	-2.5V	1.24V	1mV	-5.0V	2.49V	2mV
SINC (Sin(x)/x)	-1.518V	1.248V	1mV	-3.036V	2.496V	2mV
LORENtz	-1.233V	1.266V	1mV	-2.466V	2.532V	2mV
GAUSsian ERISe EDECAy	-1.25V	1.24V	1mV	-2.5V	2.5V	2mV

1 When the :AFG:FUNCtion is specified as DC, a change to the AFG:LOWLevel value results in a corresponding change to :AFG:OFFset. A corresponding change to :AFG:AMPLitude is remembered but is not applied until the :AFG:FUNCtion is changed to a function other than DC.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax
```
AFG:LOWLevel <NR3>
AFG:LOWLevel?
```

Arguments Floating point number that represents the AFG low level value, in volts.

Examples `AFG:LOWLEVEL 1.0` sets the AFG low level value to 1.00 volts.

AFG:NOISEAdd:PERCent

Sets (or queries) the AFG additive noise level as a percentage. Minimum is 0.0%, maximum is 100.0% and increment is 1.0%.

The maximum noise percent is limited when AFG:AMPLitude is greater than 50% of its maximum setting value for the current function, in accordance with the following formula:

*Noise Percent Max = 100.0 * (Amplitudemax/Amplitude – 1.0)*

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:NOISEAdd:PERCent <NR3>
AFG:NOISEAdd:PERCent?
```

Arguments Floating point number that represents the AFG additive noise level, as a percentage.

Examples `AFG:NOISEADD:PERCENT 50` sets the AFG additive noise level to 50 percent.

AFG:NOISEAdd:STATE

Sets (or queries) the AFG additive noise state.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:NOISEAdd:STATE {0|1|OFF|ON}
AFG:NOISEAdd:STATE?
```

Arguments `1` or`ON` turns on the AFG additive noise state.

`0` or `OFF` turns it off.

Examples `AFG:NOISEADD:STATE ON` turns on the additive noise state.

AFG:OFFSet

Sets (or queries) the AFG offset value, in volts. The offset values that can be specified for each function and load impedance are in the table below. (To

specify the function and load impedance, use the commands AFG:FUNCtion and AFG:OUTPut:LOAd:IMPEDance.)

NOTE. *The AFG:OUTPut:LOAd:IMPEDance command must be used before using any of the amplitude/offset/highLevel/lowLevel/Preset commands, so that saved setups are recalled with the proper load factor applied.*

	AFG:OFFSet Setting Value					
	Load Impedance FIFTY Ohm			Load Impedance HIGHZ		
	Min	Max	Resolution	Min	Max	Resolution
SINE SQUare PULSe RAMP NOISe DC SINC (Sin(x)/x) GAUSsian LORENtz ERISe EDECAy HAVERSINe CARDIac ARBitrary	-1.25V	1.25V	500uV	-2.5V	2.5V	1mV

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:OFFSet <NR3>
AFG:OFFSet?
```

Arguments Floating point number that represents the AFG offset, in volts.

Examples `AFG:OFFSET 1.0` sets the AFG offset to 1.0 volts.

AFG:OUTPut:LOAd:IMPEDance

Sets (or queries) the AFG output load impedance.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:OUTPut:LOAd:IMPEDance {FIFty|HIGHZ}
AFG:OUTPut:LOAd:IMPEDance?
```

Arguments `FIFty` sets the output load impedance to 50 Ohms.

`HIGHZ` sets the output load impedance to the high-impedance state.

Examples `AFG:OUTP:LOA:IMPED FIF` sets the AFG output load impedance to 50 Ohms.

AFG:OUTPut:STATE

Sets (or queries) the AFG output state.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:OUTPut:STATE {0|1|OFF|ON}
AFG:OUTPut:STATE?
```

Arguments `1` or`ON` turns on the AFG output state.

`0` or `OFF` turns it off.

Examples `AFG:OUTPUT:STATE ON` turns on the AFG output state.

AFG:PERIod

Sets (or queries) the period of the AFG waveform, in seconds. (Period = 1.0/Frequency).

The period value is constrained by the frequency max/min/resolution (see AFG:FREQuency). For example, frequency resolution steps from 0.1Hz to 1Hz, result in the following valid settings for period: 10, 5, 3.33…, 2.5, 2, 1.66…, 1.428571…, 1.25, 1.11…, 1.0.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax
```
AFG:PERIod <NR3>
AFG:PERIod?
```

Arguments Floating point number that represents the AFG period value, in seconds.

Returns The query response is returned in high precision NR3 format (up to 12 digits with more than 4 trailing 0 digits after the decimal point is omitted).

Examples `AFG:PERIOD 1` sets the AFG period value to 1 second.

AFG:PHASe

Sets (or queries) the AFG phase. The AFG phase setting controls the phase difference between the trigger signal output and the AFG waveform output. Phase is expressed in degrees and ranges from -180.0 to 180.0 in increments of 0.1 degrees.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax
```
AFG:PHASe <NR3>
AFG:PHASe?
```

Arguments Floating point number that represents the AFG phase, in degrees.

Examples `AFG:PHASE -145.0` sets the phase of the AFG to -145.0 degrees.

AFG:PULse:WIDth

Sets (or queries) the AFG pulse width, in seconds.

Pulse width has an absolute minimum of 10ns and has a relative range of 10% - 90% of the current period setting. Resolution is 0.1ns.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:PULse:WIDth <NR3>
AFG:PULse:WIDth?
```

Arguments Floating point number that represents the pulse width, in seconds.

Examples `AFG:PULSE:WIDTH 100.0E-6` sets the AFG pulse width to 100 microseconds.

AFG:RAMP:SYMmetry

Sets (or queries) the AFG ramp symmetry as a percentage. Minimum is 0.0%, maximum is 100.0% and increment is 0.10%.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax

```
AFG:RAMP:SYMmetry <NR3>
AFG:RAMP:SYMmetry?
```

Arguments Floating point number that represents the AFG ramp symmetry, as a percentage.

Examples `AFG:RAMP:SYMMETRY 50.0` sets the AFG ramp symmetry to 50 percent.

AFG:SQUare:DUty

Sets (or queries) the AFG duty cycle, as a percentage. The minimum is 10.0%, maximum is 90.0% and increment is 0.10%.

Conditions MDO3000 series only. Requires the MDO3AFG option to be installed.

Group AFG

Syntax
```
AFG:SQUare:DUty <NR3>
AFG:SQUare:DUty?
```

Arguments Floating point number that represents the AFG duty cycle, as a percentage.

Examples `AFG:SQUARE:DUTY 50.0` sets the AFG duty cycle to 50 percent.

ALIas:CATalog? (Query Only)

Returns a list of the currently defined alias labels, separated by commas. If no aliases are defined, the query returns the string "".

Group Alias

Syntax
```
ALIas:CATalog?
```

Examples `ALIAS:CATALOG?` might return the string `:ALIAS:CATALOG "SETUP1","TESTMENU1","DEFAULT"` showing that there are three aliases named SETUP1, TESTMENU1, and DEFAULT.

ALIas:DEFine

Assigns a sequence of program messages to an alias label. These messages are then substituted for the alias whenever it is received as a command or query, provided that ALIas:STATE has been turned on. The query form of this command returns the definitions of a selected alias.

NOTE. *Attempting to give two aliases the same name causes an error. To give a new alias the name of an existing alias, the existing alias must first be deleted.*

Group Alias

Syntax
```
ALIas:DEFine <QString><,>{<QString>|<Block>}
ALIas:DEFine?  <QString>
```

Related Commands ALIas[:STATE]

Arguments The first <QString> is the alias label.

This label cannot be a command name. Labels must start with a letter and can contain only letters, numbers, and underscores; other characters are not allowed. The label must be less than or equal to 12 characters.

The second<QString> or <Block> is a complete sequence of program messages.

The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 256 characters.

Examples `ALIAS:DEFINE "ST1",":RECALL:SETUP 5;:AUTOSET EXECUTE;:SELECT:CH1 ON"` defines an alias named "ST1" that sets up the oscilloscope.

`ALIAS:DEFINE? "ST1"` returns `:ALIAS:DEFINE "ST1",#246 :RECALL:SETUP 5;:AUTOSET EXECUTE;:SELECT:CH1 ON`

ALIas:DELEte:ALL (No Query Form)

Deletes all existing aliases.

Group Alias

Syntax `ALIas:DELEte:ALL`

Related Commands ALIas:DELEte[:NAMe]

Examples `ALIAS:DELETE:ALL` deletes all existing aliases.

ALIas:DELEte[:NAMe] (No Query Form)

Removes a specified alias.

Group Alias

Syntax `ALIas:DELEte[:NAMe] <QString>`

Arguments <QString> is the name of the alias to remove. Using ALIas:DELEte[:NAMe] without specifying an alias causes an execution error. <QString> must be an existing alias.

Examples ALIAS:DELETE[:NAME] "STARTUP" deletes the alias named STARTUP.

ALIas[:STATE]

Turns aliases on or off. (See page 2-13, *Alias Command Group*.)

Group Alias

Syntax
```
ALIas[:STATE] {<NR1>|OFF|ON}
ALIas[:STATE]?
```

Arguments OFF or <NR1> = 0 turns alias expansion off. If a defined alias is sent when ALIas:STATE is OFF, a command error (102) is generated.

ON or <NR1>0 turns alias expansion on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.

Examples ALIAS[:STATE] OFF turns the command alias feature off.

ALIAS[:STATE]? returns 0 when the alias feature is off.

ALLEv? (Query Only)

Prompts the oscilloscope to return all events and their messages (delimited by commas), and removes the returned events from the Event Queue. Use the *ESR? query to enable the events to be returned. This command is similar to repeatedly sending *EVMsg? queries to the oscilloscope.

Group Status and Error

Syntax ALLEv?

Related Commands *ESR?, EVMsg?

Examples ALLEV? might return :ALLEV 2225,"Measurement error, No waveform to measure; "420,"Query UNTERMINATED;"

APPLication:LICENSE:SLOT<x>:LOCation? (Query Only)

This query returns the license location. < x> can be slot number 1-4 (1-2 for MDO3000 models).

NOTE. *In order to use many of the advanced oscilloscope features, you must purchase an application module that contains a license. A license turns on a feature that is already present in the firmware. The module can be inserted into any of the four application module slots in the oscilloscope (two for the MDO3000 series). While only four of the more than twelve physical application modules available can be supported at one time (or two for the MDO3000 series), more than this number of applications can be used simultaneously: a license can be transferred from the physical application module to an internal location within the oscilloscope. Once a license has been transferred to an internal location, the application that it enables can be used without the physical application module being present; the physical application module can be removed, thus freeing up a slot. However, the license then needs to be transferred back to the physical application module in order to use the license with another instrument.*

Group Miscellaneous

Syntax `APPLication:LICENSE:SLOT<x>:LOCation?`

Related Commands APPLication:LICENSE:SLOT<x>:TRANSFER,

APPLication:LICENSE:SLOT<x>:TYPe?

Returns `SCOPE` - The license has been transferred to the oscilloscope and is active internally.

`MODULE` - The license is in the application module and has not been transferred to the scope.

`BOTH` - The license is in the application module and the license from another application module of the same type has already been transferred to the scope.

`NEITHER` - The license is neither in the application module nor in the scope's internal memory. (In this situation, the license must have been transferred to a different oscilloscope.)

`NONE` - There is no application module in the slot.

Examples `APPLication:LICENSE:SLOT1:LOCation?` might return SCOPE, indicating that the license is active internally.

APPLication:LICENSE:SLOT<x>:TRANSFER (No Query Form)

You can use this command to transfer a license from a physical application module to an internal memory location within the oscilloscope, and to transfer it back. Once a license has been transferred to an internal location, the application that it enables can be used without the physical application module being present; the physical application module can be removed, thus freeing up a slot. However, the license then needs to be transferred back to the physical application module in order to use the license with another instrument.

After licenses have been transferred, the oscilloscope power must be cycled in order to enable/disable the features affected by the module. Applications modules must only be installed and removed when the oscilloscope power is off.

CAUTION. *Applications modules must only be installed and removed when the oscilloscope power is off.*

< x> can be slot number 1-4 (1-2 for MDO3000 models).

NOTE. *In order to use many of the advanced oscilloscope features, you must purchase an application module that contains a license. A license turns on a feature that is already present in the firmware. The module can be inserted into any of the four application module slots in the oscilloscope (two for the MDO3000 series). While only four of the more than twelve physical application modules available can be supported at one time (or two for the MDO3000 series), more than this number of applications can be used simultaneously: a license can be transferred from the physical application module to an internal location within the oscilloscope.*

Conditions

If the license currently resides in the physical application module and the license does not also reside in the scope, it is transferred to the scope and the license is no longer in the module.

If the license currently resides in the scope and the license does not also reside in the module, the license is transferred from the scope to the module.

If the application module slot is empty, an error event is posted to the event queue so indicating and no operation is performed.

If the license resides in both the scope and the module, an error event is posted to the event queue so indicating and no operation is performed.

If the license resides in neither the scope nor the module, an error event is posted to the event queue so indicating and no operation is performed.

Group

Miscellaneous

Syntax `APPLication:LICENSE:SLOT<x>:TRANSFER EXECute`

Related Commands APPLication:LICENSE:SLOT<x>:LOCation?,

APPLication:LICENSE:SLOT<x>:TYPe?

APPLication:LICENSE:SLOT<x>:TYPe? (Query Only)

This query returns the application license type of the module that is currently inserted in the specified application module slot. If there is no application module in the slot, `NONE` is returned. < x> can be slot number 1-4 (1-2 for MDO3000 models).

NOTE. *In order to use many of the advanced oscilloscope features, you must purchase an application module that contains a license. A license turns on a feature that is already present in the firmware. The module can be inserted into any of the four application module slots in the oscilloscope (two for the MDO3000 series). While only four of the more than twelve physical application modules available can be supported at one time (or two for the MDO3000 series), more than this number of applications can be used simultaneously: a license can be transferred from the physical application module to an internal location within the oscilloscope. Once a license has been transferred to an internal location, the application that it enables can be used without the physical application module being present; the physical application module can be removed, thus freeing up a slot. However, the license then needs to be transferred back to the physical application module in order to use the license with another instrument.*

Group Miscellaneous

Syntax `APPLication:LICENSE:SLOT<x>:TYPe?`

Related Commands APPLication:LICENSE:SLOT<x>:TRANSFER,

APPLication:LICENSE:SLOT<x>:LOCation?

Examples `APPLication:MODule:SLOT1:TYPe?` might return `DPO4AUTO`, indicating that the DPO4AUTO license is installed in slot 1.

APPLication:TYPe

This command sets or returns the application type. These are the applications available when the front panel "Test" button is pressed. The query form will return NONe if none of the supported test application modules are installed.

Attempting to set the application type to a type with no application module installed will result in a settings conflict error event.

NOTE. *The Video Picture features are standard on MDO3000 series models. They require the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.*

NOTE. *The Act on Event features are standard on all models. The Limit/Mask and Power features are optional for all models.*

Conditions

Video Picture commands are available for MDO3000 series models. They require the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models

The Limit/Mask and Power features require the MDO3LMT or MDO3PWR application modules for the MDO3000 series models, or the DPO4LMT or DPO4PWR application modules for the MDO4000/B series.

Group

Miscellaneous

Syntax

```
APPLication:TYPe {POWer|LIMITMask|VIDPic|ACTONEVent|NONe}
APPLication:TYPe?
```

Related Commands

All of the commands associated with the specified application type.

Arguments

POWer sets the application type to power analysis.

LIMITMask sets the application type to limit mask test.

VIDPic sets the application type to video picture.

ACTONEVent sets the application type to act on event.

NONe

Returns

The query form will return NONe if none of the supported application modules are installed.

Examples `APPL:TYP?` might return `LIMITMASK`, indicating that the DPO4LMT application module is currently being used.

AUTOSet (No Query Form)

Sets the vertical, horizontal, and trigger controls of the oscilloscope to automatically acquire and display the selected waveform.

Group Miscellaneous

Syntax
```
AUTOSet {EXECute|UNDo}
```

Arguments `EXECute` autosets the displayed waveform.

`UNDo` restores the oscilloscope settings to those present prior to the autoset execution.

Examples `AUTOSET EXECUTE` vertical, horizontal, and trigger controls of the oscilloscope to automatically acquire and display all waveforms which are turned on.

AUTOSet:ENAble

Enables or disables the autoset feature. This is useful for classroom purposes where the instructor wants the students to achieve the desired instrument settings without the benefit of the autoset feature. This setting is not saved in setup files or SET? or *LRN? queries. The default state is 1 (autoset enabled).

Group Miscellaneous

Syntax
```
AUTOSet:ENAble {OFF|ON|0|1}
AUTOSet:ENAble?
```

Arguments `OFF or 0` disables autoset.

`ON or 1` enables autoset.

Examples `AUTOSET:ENABLE 1` enables the front-panel **Autoset** button.

`AUTOSET:ENABLE?` might return `AUTOSET:ENABLE 0` indicating that the autoset feature is disabled.

AUXin? (Query Only)

Returns all Aux Input connector parameters.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin?`

AUXin:PRObe

Returns all information concerning the probe attached to Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax
```
AUXin:PRObe
AUXin:PRObe?
```

Examples `AUXIN:PROBE?` might return `AUXIN:PROBE:ID:TYPE "No Probe Detected";SERNUMBER "";:AUXIN:PROBE:UNITS "";RESISTANCE 1.0000E+6` giving information about the probe attached to the Aux Input connector.

AUXin:PRObe:AUTOZero (No Query Form)

This command executes the attached probe's Auto Zero function, for probes that support this feature. See your probe documentation for more details.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:AUTOZero EXECute`

Arguments `EXECute` sets the probe to autozero.

Examples `AUXin:PRObe:AUTOZero EXECute` performs the AutoZero function in the probe.

AUXin:PRObe:CALibrate:CALIBRATABLe? (Query Only)

This query indicates whether the attached probe is calibratable. It returns a boolean value.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:CALibrate:CALIBRATABLe?`

Examples `AUXin:PRObe:CALibrate:CALIBRATABLe?` might return 0, indicating that the probe attached to the Aux Input connector is not calibratable.

AUXin:PRObe:COMMAND (No Query Form)

Sets the state of the probe control specified with the first argument to the state specified with the second argument. The commands and states are unique to the attached probe type. Only certain VPI probes support this command. See the probe documentation for how to set these string arguments.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:COMMAND <QString>, <QString>`

Arguments `<QString>` are quoted strings specifying the probe command and value to set in the probe attached to the Aux Input connector.

Examples AUXIN:PROBE:COMMAND "OUTPUT", "ON" turns the output of a Tektronix VPI-DPG probe on.

AUXIN:PROBE:COMMAND "MODE", "4-4V1MHz" sets a Tektronix VPI-DPG probe to the 4-4V1MHz mode.

AUXIN:PROBE:COMMAND? might return AUXIN:PROBE:COMMAND "MODE","4-4V1MHZ".

AUXin:PRObe:DEGAUss (No Query Form)

Starts a degauss/autozero cycle on a TekVPI current probe attached to the Aux Input connector. If you send this command to a probe that does not support this function, it is ignored.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax AUXin:PRObe:DEGAUss {EXECute}

Arguments EXECute starts a probe degauss cycle.

Examples AUXin:PROBE:DEGAUSS EXECUTE degausses the probe attached to the Aux Input connector.

AUXin:PRObe:DEGAUss:STATE? (Query Only)

Returns the state of the probe degauss (NEEDED, RECOMMENDED, PASSED, FAILED, RUNNING). The command will return PASSED for probes that do not support degauss operations.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax AUXin:PRObe:DEGAUss:STATE?

Examples `AUXin:PROBE:DEGAUSS:STATE?` might return:
`AUXin:PROBE:DEGAUSS:STATE PASSED` indicating that the probe has been degaussed.

AUXin:PRObe:FORCEDRange

Changes or returns the range on a TekVPI probe attached to the Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax
```
AUXin:PRObe:FORCEDRange <NR3>
AUXin:PRObe:FORCEDRange?
```

Arguments `<NR3>` is a floating point number that specifies the probe range, which is probe dependent.

AUXin:PRObe:GAIN

Specifies the gain factor of a probe that is attached to the Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax
```
AUXin:PRObe:GAIN <NR3>
AUXin:PRObe:GAIN?
```

Arguments `<NR3>` is a floating point number that specifies the probe gain, which is probe dependent.

Examples `AUXin:PROBE:GAIN?` might return `100.0000E-3` indicating that the attached 10x probe delivers 0.1 V to the Aux In BNC for every 1.0 V applied to the probe input.

AUXin:PRObe:ID:SERnumber? (Query Only)

Returns the serial number of the probe that is attached to the Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:ID:SERnumber?`

AUXin:PRObe:ID:TYPe? (Query Only)

Returns the type of probe that is attached to the Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:ID:TYPe?`

AUXin:PRObe:RESistance? (Query Only)

Returns the resistance of the probe attached to the front panel Aux In connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax `AUXin:PRObe:RESistance?`

Examples `AUXin:PRObe:RESistance?` might return `:AUXin:PROBE:RESISTANCE 1.0000E+6` indicating that the input resistance of the probe attached to the front panel Aux In connector is 1 MΩ.

NOTE. *This query will return 0.0 if no probe is attached or the attached probe does not report the input resistance.*

AUXin:PRObe:SIGnal

This command changes the input bypass setting on VPI probes that support input bypass, for example the TCP0001. If sent to a probe that does not support input bypass, it is ignored.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax

```
AUXin:PRObe:SIGnal {BYPass|PASS}
AUXin:PRObe:SIGnal?
```

Arguments `ByPass` sets the probe to Bypass mode.

`PASS` sets the probe to Pass mode.

AUXin:PRObe:UNIts? (Query Only)

Returns a string describing the units of measure of the probe attached to the Aux Input connector.

Conditions Available for MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Vertical

Syntax

```
AUXin:PRObe:UNIts?
```

Examples `AUXin:PROBE:UNITS?` might return: `:AUXin:PROBE:UNITS "V"` indicating that the units of measure for the attached probe are volts.

AUXOut:SOUrce

This command sets (or queries) the source for the Auxiliary Output port.

Group Miscellaneous

Syntax
```
AUXOut:SOUrce {ATRIGger|MAIn|REFOut|EVENT|AFG}
AUXOut:SOUrce?
```

Arguments `ATRIGger` is the default signal output of the auxiliary out port. `MAIn` is synonymous with `ATRIGger`.

`REFOut` specifies the reference oscillator output as the source for the auxiliary output. (Not supported on MDO3000 models.)

`EVENT` refers to an internally generated oscilloscope event. The Mask and Act on Event commands can cause an event output, such as a mask test completion notification event.

`AFG` specifies the AFG sync out pulse. (Only available for MDO3000 models with the AFG option installed.)

Examples `AUXOut:SOUrce REFOut` sets the instrument to use the reference oscillator output as the source for the auxiliary output.

`AUXOut:SOUrce?` might return ATRIGGER, indicating the source for the auxilliary out port is the A Trigger.

BUS? (Query Only)

Returns the parameters for each serial (if installed) and parallel bus.

Group Bus

Syntax `BUS?`

BUS:B<x>:AUDio:BITDelay

Specifies the number of delay bits for the AUDIO bus.

NOTE. *This command is applicable only for TDM audio bus type (`BUS:B<x>AUDio:TYPe TDM`)*

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:BITDelay <NR1>
BUS:B<x>:AUDio:BITDelay?
```

Arguments <NR1> specifies the number of delay bits.

Examples BUS:B1:AUDIO:BITDELAY 2 sets the bit delay to 2.

BUS:B1:AUDIO:BITDELAY? might return :BUS:B1:AUDIO:BITDELAY 1 indicating that the number of delay bits is 1.

BUS:B<x>:AUDio:BITOrder

Specifies the bit order for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:BITOrder {MSB|LSB}
BUS:B<x>:AUDio:BITOrder?
```

Arguments MSB specifies that the most significant bit will be expected first in the order.

LSB specifies that the least significant bit will be expected first in the order.

Examples BUS:B1:AUDIO:BITORDER LSB sets the bit order to LSB.

BUS:B1:AUDIO:BITORDER? might return :BUS:B1:AUDIO:BITORDER MSB indicating that the MSB is first in the bit order.

BUS:B<x>:AUDio:CHANnel:SIZe

Specifies the number of bits per channel for the AUDIO bus. (To specify the number of bits per word, use BUS:B<x>:AUDio:DATa:SIZe).

NOTE. *This command is applicable only for TDM audio bus type (BUS:B<x>AUDio:TYPe TDM)*

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:CHANnel:SIZe <NR1>
BUS:B<x>:AUDio:CHANnel:SIZe?
```

Arguments <NR1> specifies the number of bits per channel.

Examples `BUS:B1:AUDIO:CHANNEL:SIZE 8` sets the number of bits per channel to 8.

`BUS:B1:AUDIO:CHANNEL:SIZE?` might return `:BUS:B1:AUDIO:CHANNEL:SIZe 24` indicating that the number of bits per channel is 24.

BUS:B<x>:AUDio:CLOCk:POLarity

Specifies the clock polarity for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:CLOCk:POLarity {FALL|RISe}
BUS:B<x>:AUDio:CLOCk:POLarity?
```

Arguments `FALL` sets falling edge as the clock polarity.

`RISe` sets rising edge as the clock polarity.

Examples `BUS:B1:AUDIO:CLOCK:POLARITY Fall` sets the clock polarity to Fall.

`BUS:B1:AUDIO:CLOCK:POLARITY?` might return `:BUS:B1:AUDIO:CLOCK:POLARITY RISe` indicating that the clock polarity is set to Rise.

BUS:B<x>:AUDio:CLOCk:SOUrce

Specifies the clock source waveform for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax

```
BUS:B<x>:AUDio:CLOCk:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:AUDio:CLOCk:SOUrce?
```

Arguments `CH1–CH4` specifies an analog channel as the clock source waveform for the audio bus.

`D0-D15` specifies a digital channel as the clock source waveform for the audio bus. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples `BUS:B1:AUDIO:CLOCK:SOURCE D1` sets D1 as the clock source for the audio bus.

`BUS:B1:AUDIO:CLOCK:SOURCE?` might return `:BUS:B1:AUDIO:CLOCK:SOURCE CH1` indicating that the clock source is set to CH1.

BUS:B<x>:AUDio:DATa:POLarity

Specifies the data polarity for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax

```
BUS:B<x>:AUDio:DATa:POLarity {NORMal|INVERTed}
BUS:B<x>:AUDio:DATa:POLarity?
```

Arguments `NORMal` specifies positive data polarity for the audio bus.

`INVERTed` specifies negative data polarity for the audio bus.

Examples `BUS:B1:AUDIO:DATA:POLARITY INVERTed` sets the data polarity to Inverted.

`BUS:B1:AUDIO:DATA:POLARITY?` might return `:BUS:B1:AUDIO:DATA:POLARITY NORMAL` indicating that the data polarity is set to Normal.

BUS:B<x>:AUDio:DATa:SIZe

Specifies the number of bits per word for the AUDIO bus.

NOTE. *The number of bits specified for this command must be always less than or equal to the number of bits per channel (set using BUS:B<x>:AUDio:CHANnel:SIZe).*

Conditions This command requires DPO4AUDIO application module for the MDO4000/B series, and MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:DATa:SIZe <NR1>
BUS:B<x>:AUDio:DATa:SIZe?
```

Arguments `NR1` specifies the number of bits per word.

Examples `BUS:B1:AUDIO:DATA:SIZE 8` sets the number of bits per word to 8.

`BUS:B1:AUDIO:DATA:SIZE?` might return `:BUS:B1:AUDIO:DATA:SIZE 24` indicating that the number of bits per word is set to 24.

BUS:B<x>:AUDio:DATa:SOUrce

Specifies the data source waveform for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax

```
BUS:B<x>:AUDio:DATa:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:AUDio:DATa:SOUrce?
```

Arguments `CH1–CH4` specifies an analog channel as the data source waveform for the audio bus.

`D0-D15` specifies a digital channel as the data source waveform for the audio bus. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples `BUS:B1:AUDIO:DATA:SOURCE D1` sets the data source to D1.

`BUS:B1:AUDIO:DATA:SOURCE?` might return `:BUS:B1:AUDIO:DATA:SOURCE CH3` indicating that the data source is set to CH3.

BUS:B<x>:AUDio:DISplay:FORMat

Specifies the display format for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax

```
BUS:B<x>:AUDio:DISplay:FORMat
{BINary|HEXadecimal|SIGNEDDECimal}
BUS:B<x>:AUDio:DISplay:FORMat?
```

Arguments `BINary` specifies a binary data display.

`HEXadecimal` specifies a hexadecimal data display.

`SIGNEDDECimal` specifies a signed decimal data display.

Examples `BUS:B1:AUDIO:DISPLAY:FORMat BINARY` sets the display format to Binary.

`BUS:B1:AUDIO:DISPLAY:FORMat?` might return `:BUS:B1:AUDIO:DISPLAY:FORMAT SIGNEDDECIMAL` indicating that the display format is set to signed decimal.

BUS:B<x>:AUDio:FRAME:SIZe

Specifies the number of channels in each frame for the AUDIO bus.

NOTE. This command is applicable only for TDM audio bus type (BUS:B<x>AUDio:TYPe TDM)

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:FRAME:SIZe <NR1>
BUS:B<x>:AUDio:FRAME:SIZe?
```

Arguments <NR1> specifies the number of channels in each frame.

Examples BUS:B1:AUDIO:FRAME:SIZE 2 sets the frame size to 2.

BUS:B1:AUDIO:FRAME:SIZE? might return :BUS:B1:AUDIO:FRAME:SIZE 8 indicating that the number of channels in each frame is set to 8.

BUS:B<x>:AUDio:FRAMESync:POLarity

Specifies the frame sync polarity for the AUDIO bus - falling or rising edge.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax
```
BUS:B<x>:AUDio:FRAMESync:POLarity {FALL|RISe}
BUS:B<x>:AUDio:FRAMESync:POLarity?
```

Arguments FALL specifies the falling edge as the frame sync polarity.

RISe specifies the rising edge as the frame sync polarity.

Examples

`BUS:B1:AUDIO:FRAMESYNC:POLARITY FALL` sets the falling edge for frame sync polarity.

`BUS:B1:AUDIO:FRAMESYNC:POLARITY?` might return `:BUS:B1:AUDIO:FRAMESYNC:POLARITY RISe` indicating that the polarity is set to Rise.

BUS:B<x>:AUDio:FRAMESync:SOUrce

Specifies the frame sync source waveform for the AUDIO bus.

Conditions

This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:FRAMESync:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:AUDio:FRAMESync:SOUrce?
```

Arguments

`CH1-CH4` specifies an analog channel as the frame sync source waveform.

`D0-D15` specifies a digital channel as the frame sync source waveform. (MSO /MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples

`BUS:B1:AUDIO:FRAMESYNC:SOURCE CH1` sets CH1 as the frame sync source.

`BUS:B1:AUDIO:FRAMESYNC:SOURCE?` might return `:BUS:B1:AUDIO:FRAMESYNC:SOURCE CH2` indicating that the source is set to Ch2.

BUS:B<x>:AUDio:TYPe

Specifies the audio format (type) for the AUDIO bus.

Conditions

This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:TYPe {I2S|LJ|RJ|TDM}
BUS:B<x>:AUDio:TYPe?
```

Arguments

`I2S` specifies the I²S audio format.

`LJ` specifies the left-justified audio format.

`RJ` specifies the right justified audio format.

`TDM` specifies the time-division multiplexing audio format.

Examples

`BUS:B1:AUDIO:TYPE RJ` sets right-justified as the audio format.

`BUS:B1:AUDIO:TYPE?` might return `:BUS:B1:AUDIO:TYPE I2S` indicating that the audio format is set to I²S.

BUS:B<x>:AUDio:WORDSel:POLarity

Specifies the word select polarity for the AUDIO bus.

Conditions

This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:WORDSel:POLarity {NORMal|INVERTed}
BUS:B<x>:AUDio:WORDSel:POLarity?
```

Arguments

`NORMal` specifies positive WORDSel polarity.

`INVERTed` specifies negative WORDSel polarity.

Examples

`BUS:B1:AUDIO:WORDSEL:POLARITY NORMal` sets normal as the word select polarity.

`BUS:B1:AUDIO:WORDSEl:POLARITY?` might return `:BUS:B1:AUDIO:WORDSEL:POLARITY NORMAL` indicating that the word select polarity is set to normal.

BUS:B<x>:AUDio:WORDSel:SOUrce

Specifies the word select source waveform for the AUDIO bus.

Conditions This command requires the DPO4AUDIO application module for the MDO4000/B series, or the MDO3AUDIO for MDO3000 series.

Group Bus

Syntax

```
BUS:B<x>:AUDio:WORDSel:SOUrce {CH1|CH2|CH3|CH4
|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:AUDio:WORDSel:SOUrce?
```

Arguments `CH1–CH4` specifies an analog channel as the word select source waveform .

`D0-D15` specifies a digital channel as the word select source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples `BUS:B1:AUDIO:WORDSEL:SOURCE CH1` sets CH1 as the word select source.

`BUS:B1:AUDIO:WORDSEL:SOURCE?` might return `:BUS:B1:AUDIO:WORDSEL:SOURCE CH2` indicating that the word select source is set to CH2.

BUS:B<x>:CAN:BITRate

Specifies the bit rate for the CAN bus.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, or the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:CAN:BITRate <NR1>
BUS:B<x>:CAN:BITRate?
```

Arguments `<NR1>` is the bit rate. The instrument supports bit rates at 10 bps intervals. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

Returns The query always returns the numerical bit rate value.

Examples `bus:b1:can:bitrate 50000` sets the CAN bit rate to 50000.

`bus:b1:can:bitrate?` might return `:BUS:B1:CAN:BITRATE 50000` indicating the bit rate is set to 50K.

BUS:B<x>:CAN:PRObe

Specifies the probing method for the CAN bus.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, or the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:CAN:PRObe {CANH|CANL|RX|TX|DIFFerential}
BUS:B<x>:CAN:PRObe?
```

Arguments `CANH` specifies the single-ended CANH signal, as specified by the CAN standard.

`CANL` specifies the single-ended CANL signal, as specified by the CAN standard.

`RX` specifies the receive signal on the bus side of the CAN transceiver.

`TX` specifies the transmit signal.

`DIFFerential` specifies the differential CAN signal.

BUS:B<x>:CAN:SAMPLEpoint

Specifies the sampling point, as a percent, to sample during each bit period for the CAN bus.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:CAN:SAMPLEpoint <NR1>
BUS:B<x>:CAN:SAMPLEpoint?
```

Arguments <NR1> is the sample point in percent. Values are limited to 25, 30, ... 70, 75.

BUS:B<x>:CAN:SOUrce

Specifies the CAN bus data source.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:CAN:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:CAN:SOUrce?
```

Arguments CH1–CH4 specifies an analog channel as the data source waveform.

D0–D15 specifies a digital channel as the data source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:DISplay:FORMat

Specifies the display format for the numerical information in the bus waveform. The display formats supported depend on the BUS:B<x>:TYPe.

Table 2-50: Supported display formats

Bus type	Display format
Audio	BINary | HEXadecimal | ASCII | SIGNEDDECimal [1]
CAN	BINary | HEXadecimal
Ethernet	BINary | HEXadecimal | ASCII|MIXed
FlexRay	BINary | HEXadecimal | MIXed
I^2C	BINary | HEXadecimal
LIN	BINary | HEXadecimal | MiXed
MIL-STD-1553	BINary | HEXadecimal | ASCII|MIXed|BLOCKHEX
Parallel	BINary | HEXadecimal
RS232C	BINary | HEXadecimal | ASCII

Table 2-50: Supported display formats (cont.)

Bus type	Display format
SPI	BINary | HEXadecimal
USB	BINary | HEXadecimal | MIXed | MIXED2

1 SIGNEDDECimal is set using the audio application BUS:B<x>:AUDio:DISplay:FORMat command.

Group Bus

Syntax

```
BUS:B<x>:DISplay:FORMat
{BINary|HEXadecimal|ASCII|MIXed|MIXED2|BLOCKHEX}

BUS:B<x>:DISplay:FORMat?
```

Related Commands BUS:B<x>:TYPe

Arguments

`BINary` – All values are displayed in binary.

`HEXadecimal` – All values are displayed in hexadecimal.

`ASCII` – All values are displayed in an ASCII format, for RS-232 only.

`MIXed` – Values are displayed in a mixture of hexadecimal, binary, and decimal, depending on the field.

`MIXED2` – Values are displayed in a mixture of hexadecimal, binary, decimal and ASCII, depending on the field.

`BLOCKHEX` – Displays the 16-bits of each payload as a block of 4 hexadecimal digits.

BUS:B<x>:DISplay:TYPe

Specifies the display type for bus. You can set up the bus to display the protocol information, the logic waveforms that comprise the bus, or both.

Group Bus

Syntax

```
BUS:B<x>:DISplay:TYPe {BUS|BOTh}
BUS:B<x>:DISplay:TYPe?
```

Arguments

`BUS` displays the bus waveforms only.

`BOTh` displays both the bus and logic waveforms.

BUS:B<x>:ETHERnet:PRObe

This command specifies the Ethernet probe type: differential or single-ended. The default is DIFFerential.B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Bus

Syntax

```
BUS:B<x>:ETHERnet:PRObe {DIFFerential|SINGleended}
BUS:B<x>:ETHERnet:PRObe?
```

Related Commands BUS:B<x>:ETHERnet:SOUrce:DIFFerential

BUS:B<x>:ETHERnet:SOUrce:DMINus

BUS:B<x>:ETHERnet:SOUrce:DPLUs

Arguments `DIFFerential`

`SINGleended`

Examples `BUS:B1:ETHERnet:PRObe DIFFerential` specifies that a differential probe is connected to the input channels specified by `BUS:B<x>:ETHERnet:SOUrce:DPLUs` and `BUS:B<x>:ETHERnet:SOUrce:DMINus.`

`BUS:B1:ETHERnet:PRObe?` might return `SINGLEENDED`, indicating that the probe type has been set to single-ended.

BUS:B<x>:ETHERnet:PROTOcol

Use this command to set the Ethernet protocol type to TCP/IPv4, or to OTHER. The default is IPV4.

NOTE. *The commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition DATa and SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition DATa are impacted by the setting of this command.*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Bus

Syntax
```
BUS:B<x>:ETHERnet:PROTOcol {IPv4|OTHER}
BUS:B<x>:ETHERnet:PROTOcol?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments `IPv4` sets the Ethernet protocol type to Internet Protocol version 4.

`OTHER` sets the Ethernet protocol type to other than IPv4.

Examples `BUS:B1:ETHERnet:PROTOcol IPv4` specifies IPv4 as the Ethernet protocol.

`BUS:B1:ETHERnet:PROTOcol?` might return OTHER.

BUS:B<x>:ETHERnet:SOUrce:DIFFerential

This command specifies the Ethernet data source for differential input. The supported source waveforms are channels 1–4, math waveform, and reference waveforms 1–4. The default is channel 1.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Bus

Syntax
```
BUS:B<x>:ETHERnet:SOUrce:DIFFerential {CH1|CH2|CH3|CH4|MATH
|REF1|REF2|REF3|REF4}

BUS:B<x>:ETHERnet:SOUrce:DIFFerential?
```

Related Commands BUS:B<x>:ETHERnet:PRObe

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments `CH1–4` specifies to use one of the channels 1–4 as the Ethernet data source for differential input.

MATH specifies to use the math waveform as the source for Ethernet data differential input

REF1–4 specifies to use one of the reference waveforms 1–4 as the source for Ethernet data differential input.

Examples

BUS:B1:ETHERnet:SOUrce:DIFFerential ref4 specifies to use reference waveform 4 as the source for the Ethernet data differential input.

BUS:B1:ETHERnet:SOUrce:DIFFerential? might return CH2, indicating that channel 2 is the currently specified source for Ethernet data differential input.

BUS:B<x>:ETHERnet:SOUrce:DMINus

This command specifies the Ethernet data source for D- input for single-ended probing. The default is Channel 2.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Bus

Syntax

```
BUS:B<x>:ETHERnet:SOUrce:DMINus {CH1|CH2|CH3|CH4|D0|D1|D2|D3
|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:ETHERnet:SOUrce:DMINus?
```

Related Commands

BUS:B<x>:ETHERnet:PRObe

BUS:B<x>:ETHERnet:SOUrce:DPLUs

Arguments

CH1–4 specifies to use one of the analog channels as the Ethernet data source for the D- input.

D0–D15 specifies to use one of the digital channels D0 – D15 as the Ethernet data source for the D- input. (MSO/MDO4000/B models only.)

Examples

BUS:B1:ETHERnet:SOUrce:DMINus D5 specifies the Ethernet data source for the D- input as D5.

BUS:B1:ETHERnet:SOUrce:DMINus? might return CH3, indicating that channel 3 is the Ethernet data source for the D- input.

BUS:B<x>:ETHERnet:SOUrce:DPLUs

This command specifies the Ethernet data source for the D+ input for single-ended probing. The default is channel 1.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Bus

Syntax

```
BUS:B<x>:ETHERnet:SOUrce:DPLUs {CH1|CH2|CH3|CH4|D0|D1|D2|D3|
D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:ETHERnet:SOUrce:DPLUs?
```

Related Commands BUS:B<x>:ETHERnet:PRObe

BUS:B<x>:ETHERnet:SOUrce:DMINus

Arguments `CH1–4` specifies to use one of the analog channels 1–4 as the Ethernet data source for the D+ input.

`D0–D15` specifies to use one of the digital channels D0 — D15 as the Ethernet data source for the D+ input. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples `BUS:B1:ETHERnet:SOUrce:DPLUs D5` specifies the Ethernet data source for the D+ input as D5.

`BUS:B1:ETHERnet:SOUrce:DPLUs?` might return CH3, indicating that channel 3 is the Ethernet data source for the D+ input.

BUS:B<x>:ETHERnet:TYPe

This command specifies the Ethernet standard type: 10Base-T or 100Base-T. The default is ENET 100 BASETX.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Bus

Syntax

```
BUS:B<x>:ETHERnet:TYPe {ENET10BASET|ENET100BASETX}
BUS:B<x>:ETHERnet:TYPe?
```

Related Commands

BUS:B<x>:ETHERnet:PRObe

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments

`ENET10BASET` specifies the Ethernet type as 10Base-T standard. This standard supports data transfer rates up to 10 Mbps (also called Twisted Pair Ethernet).

`ENET100BASETX` specifies the Ethernet type as 100Base-T standard. This standard supports data transfer rates up to 100 Mbps (also called Fast Ethernet).

Examples

`BUS:B1:ETHERnet:TYPe ENET100BASETX` specifies the Ethernet type as 100Base-T.

`BUS:B1:ETHERnet:TYPe?` might return ENET10BASET, indicating that the Ethernet type has been set to 10Base-T.

BUS:B<x>:FLEXray:BITRate

Specifies the bit rate for the FlexRay bus signal. The maximum bitrate is 100 Mbps.

Conditions

This command requires a DPO4AUTOMAX application module for 4000 series models, and MDO3FLEX application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:FLEXray:BITRate <NR1>
BUS:B<x>:FLEXray:BITRate?
```

Arguments

`<NR1>` specifies the FlexRay bus bit rate. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

Examples

`BUS:B1:FLEXRAY:BITRATE 9600` sets the FlexRay bus bit rate to 9600 bits per second.

`BUS:B1:FLEXRAY:BITRATE?` might return `BUS:B1:FLEXRAY:BITRATE 10000000` indicating the FlexRay bit rate is 10,000,000 bits per second.

BUS:B<x>:FLEXray:CHannel

Specifies the FlexRay bus ID format.

Conditions This command requires a DPO4AUTOMAX application module for 4000 series models, and MDO3FLEX application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:CHannel {A|B}
BUS:B<x>:FLEXray:CHannel?
```

Arguments `A` sets the FlexRay ID format to channel A.

`B` sets the FlexRay ID format to channel B.

Examples `BUS:B1:FLEXRAY:CHANNEL B` sets the ID format to channel B.

`BUS:B1:FLEXRAY:CHANNEL?` might return `BUS:B1:FLEXRAY:CHANNEL A` indicating that the ID format is channel A.

BUS:B<x>:FLEXray:SIGnal

Specifies the FlexRay bus standard.

Conditions This command requires a DPO4AUTOMAX application module for 4000 series models, and MDO3FLEX application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:SIGnal {BDIFFBP|BM|TXRX}
BUS:B<x>:FLEXray:SIGnal?
```

Arguments `BDIFFBP` sets the FlexRay standard to BDIFFBP.

`BM` sets the FlexRay standard to BM.

`TXRX` sets the FlexRay standard to TXRX.

Examples `BUS:B1:FLEXRAY:SIGNAL BM` sets the FlexRay bus standard to BM.

`BUS:B1:FLEXRAY:SIGNAL?` might return `BUS:B1:FLEXRAY:SIGNAL BDIFFBP` indicating the FlexRay standard is BDIFFBP.

BUS:B<x>:FLEXray:SOUrce

Specifies the FlexRay bus source waveform.

Conditions This command requires a DPO4AUTOMAX application module for 4000 series models, and MDO3FLEX application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:FLEXray:SOUrce?
```

Arguments `CH1–CH4` specifies an analog channel as the source waveform.

`D0–D15` specifies a digital channel as the source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples `BUS:B1:FLEXRAY:SOURCE CH4` sets the source waveform to channel 4.

`BUS:B1:FLEXRAY:SOURCE?` might return `BUS:B1:FLEXRAY:SOURCE CH1` indicating the source waveform is channel 1.

BUS:B<x>:I2C:ADDRess:RWINClude

Sets and returns whether the read/write bit is included in the address.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:I2C:ADDRess:RWINClude {<NR1>|OFF|ON}
BUS:B<x>:I2C:ADDRess:RWINClude?
```

Arguments

<NR1> = 0 does not include the read/write bit in the addess; any other value includes the read/write bit in the address.

OFF does not include the read/write bit in the address.

ON includes the read/write bit in the address.

Examples

BUS:B1:I2C:ADDRESS:RWINCLUDE ON includes the read/write bit in the address.

BUS:B1:I2C:ADDRESS:RWINCLUDE? might return BUS:B1:I2C:ADDRESS:RWINCLUDE 0 indicating the read/write bit is not included in the address.

BUS:B<x>:I2C{:CLOCk|:SCLk}:SOUrce

This command specifies the SCLK source for the I2C bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:I2C{:CLOCk|:SCLk}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:I2C{:CLOCk|:SCLk}:SOUrce?
```

Arguments

CH1–CH4 specifies an analog channel as the SCLK source waveform.

D0–D15 specifies a digital channel as the SCLK source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:I2C{:DATa|:SDAta}:SOUrce

Specifies the SDATA source for the I2C bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:I2C{:DATa|:SDAta}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:I2C{:DATa|:SDAta}:SOUrce?
```

Arguments CH1–CH4 specifies an analog channel as the I2C SDATA source waveform.

D0–D15 specifies a digital channel as the I2C SDATA source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:LABel

Specifies the waveform label for the bus.

Group Bus

Syntax
```
BUS:B<x>:LABel <Qstring>
BUS:B<x>:LABel?
```

Arguments <Qstring> is an alphanumeric string of text, enclosed in quotes, that contains the text label information for bus <x>. The text string is limited to 30 characters.

BUS:B<x>:LIN:BITRate

Specifies the bit rate for the LIN bus.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:LIN:BITRate <NR1>
BUS:B<x>:LIN:BITRate?
```

Arguments <NR1> is the LIN bus bit rate. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

Examples BUS:B1:LIN:BITRATE 9600 sets the bit rate 9600.

BUS:B1:LIN:BITRATE? might return BUS:B1:LIN:BITRATE 2400 indicating the bit rate is set to 2400.

BUS:B<x>:LIN:IDFORmat

Specifies the LIN bus ID format.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:LIN:IDFORmat {NOPARity|PARity}
BUS:B<x>:LIN:IDFORmat?
```

Arguments NOPARity sets the LIN bus ID format to no parity.

PARity sets the LIN bus ID format to parity.

Examples BUS:B1:LIN:IDFORMAT PARITY sets the LIN bus ID format to parity.

BUS:B1:LIN:IDFORMAT? might return BUS:B1:LIN:IDFORMAT NOPARITY indicating the LIN bus ID format is no parity.

BUS:B<x>:LIN:POLarity

Specifies the LIN bus polarity.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:LIN:POLarity {NORMal|INVerted}
BUS:B<x>:LIN:POLarity?
```

Arguments

`NORMal` specifies normal polarity.

`INVerted` specifies inverted polarity.

Examples

`BUS:B1:LIN:POLARITY INVERTED` sets the polarity to INVERTED.

`BUS:B1:LIN:POLARITY?` might return `BUS:B1:LIN:POLARITY NORMAL` indicating the polarity is normal.

BUS:B<x>:LIN:SAMPLEpoint

Specifies the point to sample during each bit period, as a percent, for the LIN bus.

Conditions

This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:LIN:SAMPLEpoint <NR1>
BUS:B<x>:LIN:SAMPLEpoint?
```

Arguments

`<NR1>` is a percentage that represents the point at which to sample during each bit period.

Examples

`BUS:B1:LIN:SAMPLEPOINT 10` sets the sample point to 10% of the bit period

`BUS:B1:LIN:SAMPLEPOINT?` might return `BUS:B1:LIN:SAMPLEPOINT 50` indicating that the sample point is set to 50% of the bit period

BUS:B<x>:LIN:SOUrce

Specifies the source waveform for the LIN bus.

Conditions

This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:LIN:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11
|D12|D13|D14|D15}

BUS:B<x>:LIN:SOUrce?
```

Arguments CH1–CH4 specifies an analog channel as the source waveform.

D0–D15 specifies a digital channel as the source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples BUS:B1:LIN:SOURCE CH4 sets the source waveform to channel 4.

BUS:B1:LIN:SOURCE? might return BUS:B1:LIN:SOURCE CH1 indicating the source waveform is channel 1.

BUS:B<x>:LIN:STANDard

Specifies the LIN bus standard to use.

Conditions This command requires a DPO4AUTO or DPO4AUTOMAX application module for all 4000 series models, and the MDO3AUTO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:LIN:STANDard {V1X|V2X|MIXed}
BUS:B<x>:LIN:STANDard?
```

Arguments V1X sets the LIN bus standard to V1X.

V2X sets the LIN bus standard to V2X

MIXed sets the LIN bus standard to MIXED.

Examples BUS:B1:LIN:STANDARD V1X sets the LIN bus standard is V1X.

BUS:B1:LIN:STANDARD? might return BUS:B1:LIN:STANDARD V2X indicating the LIN bus standard is V2X.

BUS:B<x>:MIL1553B:POLarity

This command sets the polarity of the MIL-STD-1553 bus (normal or inverted).

Conditions This command requires a DPO4AERO application module for 4000 series models, and an MDO3AERO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:MIL1553B:POLarity {NORMal|INVERTed}
BUS:B<x>:MIL1553B:POLarity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

BUS:B<x>:MIL1553B:SOUrce

Arguments `NORMal` - A high-low transition represents a 1 on the Data+ line.

`INVERTed` - A high-low transition represents a 0 on the Data+ line.

Examples `BUS:B1:MIL1553B:POLarity INVERTED` sets the polarity so that a high-low transition represents a 0 on the Data+ line.

`BUS:B1:MIL1553B:POLarity?` might return `NORMAL`.

BUS:B<x>:MIL1553B:RESPonsetime:MAXimum

This command specifies the maximum response time to a valid command issued for the MIL-STD-1553 bus.

NOTE. *The MIL-STD-1553 bus specification requires devices to respond to a valid command within 4 to 12 microseconds.*

Conditions This command requires a DPO4AERO application module for 4000 series models, and an MDO3AERO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:MIL1553B:RESPonsetime:MAXimum <NR3>
BUS:B<x>:MIL1553B:RESPonsetime:MAXimum?
```

Related Commands

BUS:B<x>:MIL1553B:RESPonsetime:MINimum

Arguments

<NR3> is a floating point number that specifies the maximum response time, in seconds.

Examples

BUS:B1:MIL1553B:RESPonsetime:MAXimum 12.0E-6 specifies the maximum response time to a valid command received to be 12.0000E-6 microseconds.

BUS:B1:MIL1553B:RESPonsetime:MAXimum? might return 12.0000E-6.

BUS:B<x>:MIL1553B:RESPonsetime:MINimum

This command specifies the minimum response time to a valid command issued for the MIL-STD-1553 bus.

NOTE. *The MIL-STD-1553 bus specification requires devices to respond to a valid command within 4 to 12 microseconds.*

Conditions

This command requires a DPO4AERO application module for 4000 series models, and an MDO3AERO application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:MIL1553B:RESPonsetime:MINimum <NR3>
BUS:B<x>:MIL1553B:RESPonsetime:MINimum?
```

Related Commands

BUS:B<x>:MIL1553B:RESPonsetime:MAXimum

Arguments

<NR3> is a floating point number that specifies the minimum response time in seconds.

Examples

BUS:B1:MIL1553B:RESPonsetime:MINimum 4.0E-6 specifies the minimum response time to a valid command received to 4.0E-6 microseconds.

BUS:B1:MIL1553B:RESPonsetime:MINimum? might return 4.0000E-6.

BUS:B<x>:MIL1553B:SOUrce

This command specifies the source for differential input for the MIL-STD-1553 bus. The supported source waveforms are channels 1–4, math waveform, and reference waveforms 1–4. The default is channel 1.

Conditions This command requires a DPO4AERO application module for 4000 series models, and an MDO3AERO application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:MIL1553B:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4}
BUS:B<x>:MIL1553B:SOUrce?
```

Related Commands BUS:B<x>:ETHERnet:PRObe

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments `CH1–4` specifies an analog channel as the source for differential input.

`MATH` specifies the math waveform as the MIL-STD-1553 bus source for differential input

`REF1–4` specifies a reference waveform as the source for differential input.

Examples `BUS:B1:MIL1553B:SOUrce ref4` specifies to use reference waveform 4 as the source.

`BUS:B1:MIL1553B:SOUrce?` might return `CH2,` indicating that channel 2 is the currently specified source.

BUS:B<x>:PARallel:BIT<x>:SOUrce

Specifies the bit source waveform for the parallel bus.

Conditions Requires an MSO/MDO model, with the MDO3MSO option installed for the MDO3000 series. The MSO4000B and MDO4000/B models can trigger on parallel buses without an application module.

Group Bus

Syntax

```
BUS:B<x>:PARallel:BIT<x>:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:PARallel:BIT<x>:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the bit source waveform.

`D0–D15` specifies a digital channel as the bit source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:PARallel:CLOCk:EDGE

Specifies the clock edge for the parallel bus.

Conditions Requires an MSO/MDO model, with the MDO3MSO option installed for the MDO3000 series. The MSO4000B and MDO4000/B models can trigger on parallel buses without an application module.

Group Bus

Syntax

```
BUS:B<x>:PARallel:CLOCk:EDGE {EITher|RISing|FALling}
BUS:B<x>:PARallel:CLOCk:EDGE?
```

Arguments

`EIther` specifies either edge as the clock edge.

`RISing` specifies the rising edge as the clock edge.

`FALling` specifies the falling edge as the clock edge.

BUS:B<x>:PARallel:CLOCk:ISCLOCKed

Specifies the state of the clock function for the parallel bus.

Conditions Requires an MSO/MDO model, with the MDO3MSO option installed for the MDO3000 series. The MSO4000B and MDO4000/B models can trigger on parallel buses without an application module.

Group Bus

Syntax

```
BUS:B<x>:PARallel:CLOCk:ISCLOCKed {YES|NO}
BUS:B<x>:PARallel:CLOCk:ISCLOCKed?
```

Arguments

YES specifes that the parallel bus is clocked.

NO specifes that the parallel bus is not clocked.

BUS:B<x>:PARallel:CLOCk:SOUrce

Specifies the clock source waveform for the parallel bus.

Conditions

Requires an MSO/MDO model, with the MDO3MSO option installed for the MDO3000 series. The MSO4000B and MDO4000/B models can trigger on parallel buses without an application module.

Group

Bus

Syntax

```
BUS:B<x>:PARallel:CLOCk:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:PARallel:CLOCk:SOUrce?
```

Arguments

CH1–CH4 specifies an analog channel to use the clock source waveform.

D0-D15 specifies a digital channelas the clock source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:PARallel:WIDth

This command specifies the number of bits to use for the width of the parallel bus.

Conditions

Requires an MSO/MDO model, with the MDO3MSO option installed for the MDO3000 series. The MSO4000B and MDO4000/B models can trigger on parallel buses without an application module.

Group

Bus

Syntax

```
BUS:B<x>:PARallel:WIDth <NR1>
BUS:B<x>:PARallel:WIDth?
```

Arguments <NR1> is the number of bits.

BUS:B<x>:POSition

This command specifies the position of the bus waveform on the display.

Group Bus

Syntax
```
BUS:B<X>:POSition <NR3>
BUS:B<X>:POSition?
```

Arguments <NR3> is a floating point number that specifies the position of the bus <x> waveform on the display.

BUS:B<x>:RS232C:BITRate

This command specifies the bit rate for the RS-232 bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<X>:RS232C:BITRate <NR1>
BUS:B<X>:RS232C:BITRate?
```

Arguments <NR1> is the bit rate in bits-per-second. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

BUS:B<x>:RS232C:DATABits

This command specifies the number of bits in the data frame for the RS-232 bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:RS232C:DATABits {7|8|9}
BUS:B<x>:RS232C:DATABits?
```

Arguments

7 specifies seven bits in the RS-232 data frame.

8 specifies eight bits in the RS-232 data frame.

BUS:B<x>:RS232C:DELIMiter

This command specifies the delimiting value for a packet on the RS-232 bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:RS232C:DELIMiter {NULl|LF|CR|SPace|XFF}
BUS:B<x>:RS232C:DELIMiter?
```

Arguments

NULl specifies 0x00.

LF specifies 0x0A.

CR specifies 0x0D.

XFF specifies 0xFF.

BUS:B<x>:RS232C:DISplaymode

This command specifies the display mode for the RS-232 bus (frame or packet).

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:RS232C:DISplaymode {FRAme|PACKET}
BUS:B<x>:RS232C:DISplaymode?
```

Arguments FRAme displays each frame as a single entity.

PACKET displays a group of frames terminated with a single frame defined by the BUS:B<x>:RS232C:DELImiter command or the front panel.

BUS:B<x>:RS232C:PARity

This command specifies the parity for the RS-232C bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:RS232C:PARity {NONe|EVEN|ODD}
BUS:B<x>:RS232C:PARity?
```

Arguments NONe specifies no parity.

EVEN specifies even parity.

ODD specifies odd parity.

BUS:B<x>:RS232C:POLarity

This command specifies the polarity for the RS-232C bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:RS232C:POLarity {NORMal|INVERTed}
BUS:B<x>:RS232C:POLarity?
```

Arguments NORMal sets the polarity to positive.

INVERTed sets the polarity to negative.

BUS:B<x>:RS232C:RX:SOUrce

This command specifies the RX source waveform for the RS-232 bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:RS232C:RX:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|Off}
```

```
BUS:B<x>:RS232C:RX:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the RX source waveform.

`D0–D15` specifies a digital channel as the RX source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

`Off` sets the specified bus input to off.

BUS:B<x>:RS232C:TX:SOUrce

This command specifies the TX source waveform for the RS-232 bus.

Conditions This command requires a DPO4COMP application module for 4000 series models, and an MDO3COMP application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:RS232C:TX:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|Off}
```

```
BUS:B<x>:RS232C:TX:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the TX source waveform.

`D0–D15` specifies a digital channel as the TX source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

`Off` sets the specified bus input to off.

BUS:B<x>:SPI:BITOrder

This command specifies the bit order for the SPI bus. LSB is least significant bit first; MSB is most significant bit first.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI:BITOrder {LSB|MSB}
BUS:B<x>:SPI:BITOrder?
```

Arguments `LSB` sets the bit order to least significant bit first.

`MSB` sets the bit order to most significant bit first.

Examples `BUS:B1:SPI:BITORDER LSB` sets the bit order to least significant bit first.

`BUS:B1:SPI:BITORDER?` might return `BUS:B1:SPI:BITORDER MSB` indicating the bit order is set to most significant bit first.

BUS:B<x>:SPI{:CLOCk|:SCLk}:POLarity

This command specifies the SCLK polarity for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI{:CLOCk|:SCLk}:POLarity {FALL|RISe}
BUS:B<x>:SPI{:CLOCk|:SCLk}:POLarity?
```

Arguments `FALL` specifies the SCLK polarity as falling edge.

`RISe` specifies the SCLK polarity as rising edge.

BUS:B<x>:SPI{:CLOCk|:SCLk}:SOUrce

This command specifies the SCLK source waveform for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI{:CLOCk|:SCLk}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:SPI{:CLOCk|:SCLk}:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the SCLK source waveform.

`D0–D15` specifies a digital channel as the SCLK source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:SPI:DATa{:IN|:MISO}:POLarity

This command specifies the MISO polarity for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATa{:IN|:MISO}:POLarity {LOW|HIGH}
BUS:B<x>:SPI:DATa{:IN|:MISO}:POLarity?
```

Arguments

`LOW` specifies an active low polarity.

`HIGH` specifies an active high polarity.

BUS:B<x>:SPI:DATa{:IN|:MISO}:SOUrce

This command specifies the MISO source waveform for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATa{:IN|:MISO}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:SPI:DATa{:IN|:MISO}:SOUrce?
```

Arguments `CH1–CH4` specifies an analog channel as the MISO source waveform.

`D0–D15` specifies a digital channel as the MISO source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:SPI:DATa{:OUT|:MOSI}:POLarity

This command specifies the MOSI polarity for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATa{:OUT|:MOSI}:POLarity {LOW|HIGH}
BUS:B<x>:SPI:DATa{:OUT|:MOSI}:POLarity?
```

Arguments `LOW` specifies the active low polarity.

`HIGH` specifies the active high polarity.

BUS:B<x>:SPI:DATa{:OUT|:MOSI}:SOUrce

This command specifies the MOSI source for the SPI bus.

Conditions This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATa{:OUT|:MOSI}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:SPI:DATa{:OUT|:MOSI}:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the MOSI source waveform.

`D0–D15` specifies a digital channel as the SPI MOSI source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:SPI:DATa:SIZe

This command specifies the number of bits per word (data size) for the specified SPI bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:SPI:DATa:SIZe <NR1>
BUS:B<x>:SPI:DATa:SIZe?
```

Arguments

`NR1` is the data size of the specified bus.

Examples

`BUS:B1:SPI:DATA:SIZE 8` sets the data size to 8 bits per word.

`BUS:B1:SPI:DATA:SIZE?` might return `BUS:B1:SPI:DATA:SIZE 8` indicating the data size is 8 bits per word.

BUS:B<x>:SPI:FRAMING

This command specifies the type of framing to use for the SPI bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:SPI:FRAMING {SS|IDLEtime}
BUS:B<x>:SPI:FRAMING?
```

Arguments

SS specifies to use the SS (non 2-wire) framing type.

IDLEtime specifies to use the Idle Time (2-wire) framing type.

Examples

`BUS:B1:SPI:FRAMING SS` sets the framing type to SS.

`BUS:B1:SPI:FRAMING IDELTIME` might return `BUS:B1:SPI:FRAMING IDELTIME` indicating the framing type is set to IDLETIME.

BUS:B<x>:SPI:IDLETime

This command specifies the idle time, in seconds, for the SPI bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:SPI:IDLETime <NR3>
BUS:B<x>:SPI:IDLETime?
```

Arguments

`NR3` is the idle time, in seconds, for the SPI bus.

Examples

`BUS:B1:SPI:IDLETIME 100.0000E-9` sets the idle time to 100 ns.

`BUS:B1:SPI:IDLETIME?` might return `BUS:B1:SPI:IDLETIME 100.0000E-9` indicating the idle time is set to 100 ns.

BUS:B<x>:SPI{:SELect|:SS}:POLarity

This command specifies the polarity for the SPI bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:SPI{:SELect|:SS}:POLarity {LOW|HIGH}
BUS:B<x>:SPI{:SELect|:SS}:POLarity?
```

Arguments

`LOW` specifies an active low polarity.

`HIGH` specifies an active high polarity.

BUS:B<x>:SPI{:SELect|:SS}:SOUrce

This command specifies the source waveform for the SPI bus.

Conditions

This command requires a DPO4EMBD application module for 4000 series models, and an MDO3EMBD application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:SPI{:SELect|:SS}:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:SPI{:SELect|:SS}:SOUrce?
```

Arguments

`CH1–CH4` specifies an analog channel as the source waveform.

`D0-D15` specifies a digital channel as the source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

BUS:B<x>:STATE

This command specifies the on/off state of the bus.

Group

Bus

Syntax

```
BUS:B<x>:STATE {<NR1>|OFF|ON}
BUS:B<x>:STATE?
```

Related Commands

SELect:{BUS<x>|B<x>}

Arguments

`ON` or `<NR1>` ≠ 0 turns on the bus.

`OFF` or `<NR1>` = 0 turns off the bus.

BUS:B<x>:TYPe

This command specifies (or queries) the bus type. The supported bus types are dependent on the oscilloscope model and the installed application models. With the exception of the parallel bus, all bus types require installation of an application module. (See page 2-15, *Bus Command Group*.)

NOTE. *The PARallel bus is available on MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.*

Group Bus

Syntax

```
BUS:B<x>:TYPe
{I2C|SPI|CAN|RS232C|PARallel|USB|LIN|FLEXRay|AUDio|ETHERnet|
MIL1553B}
BUS:B<x>:TYPe?
```

Arguments

`I2C` specifies the Inter-IC bus.

`SPI` specifies the Serial Peripheral Interface bus (not available on two-channel models).

`CAN` specifies the Controller Area Network bus.

`RS232C` specifies the RS-232C bus.

`PARallel` specifies the Parallel bus.

`USB` specifies the USB bus.

`LIN` specifies the LIN bus.

`FLEXRay` specifies the FLexRay bus.

`AUDio` specifies the audio bus.

`ETHERnet` specifies the Ethernet bus.

`MIL1553B` specifies the MIL-STD-1553 bus.

BUS:B<x>:USB:BITRate

This command specifies the bit rate for the USB bus.

Conditions This command requires a DPO4USB application module for 4000 series models, and an MDO3USB application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:USB:BITRate {LOW|FULL|HIGH}
BUS:B<x>:USB:BITRate?
```

Arguments `LOW` indicates the bit rate is 1.5 Mbps.

`FULL` indicates the bit rate is 12 Mbps.

`HIGH` indicates the bit rate is 480 Mbps.

Examples `BUS:B1:USB:BITRATE FULL` sets the bit rate to 12 Mbps.

`BUS:B1:USB:BITRATE?` might return `:BUS:B1:USB:BITRATE LOW`, which indicates that the bit rate is 1.5 Mbps.

BUS:B<x>:USB:PRObe

This command specifies the type of probe connected to the USB bus.

Conditions This command requires a DPO4USB application module for 4000 series models, and an MDO3USB application module for MDO3000 series models.

Group Bus

Syntax
```
BUS:B<x>:USB:PRObe {DIFFerential|SINGleended}
BUS:B<x>:USB:PRObe?
```

Arguments `DIFFerential` indicates the bus probe is a differential probe.

`SINGleended` indicates the bus probe is not a differential probe.

Examples `BUS:B1:USB:PROBE DIFFERENTIAL` sets the bus probe to differential.

`BUS:B1:USB:PROBE?` might return `:BUS:B1:USB:PROBE SINGLEENDED`, which indicates that the bus probe is not a differential probe.

BUS:B<x>:USB:SOUrce:DIFFerential

This command specifies the source waveform for the USB bus when using a differential probe.

Conditions This command requires a DPO4USB application module for 4000 series models, and an MDO3USB application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:USB:SOUrce:DIFFerential
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4}

BUS:B<x>:USB:SOUrce:DIFFerential?
```

Arguments `CH1–4` specifies an analog waveform as the source. This channel should have an attached differential probe.

`MATH` specifies the math waveform as the source.

`REF1–4` specifies a reference waveform as the source.

Examples `BUS:B1:USB:SOURCE:DIFFERENTIAL CH2` sets the source to channel 2. You should have a differential probe attached to channel 2 and connect it to the USB data signal.

`BUS:B1:USB:SOURCE:DIFFERENTIAL?` might return `:BUS:B1:USB:SOURCE:DIFFERENTIAL CH4` indicating that channel 4 is the source.

BUS:B<x>:USB:SOUrce:DMINus

This command specifies the source for the USB bus D- input. If you are using single-ended probes, you need to set the sources for both the D+ and D- inputs.

Conditions This command requires a DPO4USB application module for 4000 series models, and an MDO3USB application module for MDO3000 series models.

Group Bus

Syntax

```
BUS:B<x>:USB:SOUrce:DMINus
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8
|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:USB:SOUrce:DMINus?
```

Arguments

CH1–CH4 specifies an analog channel as the source waveform for the D- input.

D0–D15 specifies a digital channel as the source waveform for the D- input. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples

BUS:B1:USB:SOURCE:DMINUS CH2 sets the source to channel 2.

BUS:B1:USB:SOURCE:DMINUS? might return :BUS:B1:USB:SOURCE:DMINUS CH4 indicating that channel 4 is the source.

BUS:B<x>:USB:SOUrce:DPLUs

This command specifies the source for the USB D+ input. If you are using single-ended probes, you need to set the sources for both the D+ and D- inputs.

Conditions

This command requires a DPO4USB application module for 4000 series models, and an MDO3USB application module for MDO3000 series models.

Group

Bus

Syntax

```
BUS:B<x>:USB:SOUrce:DPLUs
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8
|D9|D10|D11|D12|D13|D14|D15}
```

```
BUS:B<x>:USB:SOUrce:DPLUs?
```

Arguments

CH1–CH4 specifies an analog channel as the source waveform for D+ input.

D0–D15 specifies a digital channel as the source waveform for D+ input. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

Examples

BUS:B1:USB:SOURCE:DPLUS CH1 sets the D+ source to channel 1.

BUS:B1:USB:SOURCE:DPLUS? might return :BUS:B1:USB:SOURCE:DPLUS CH3 indicating that channel 3 is the source.

BUS:LOWerthreshold:CH<x>

This command sets the lower threshold for each channel. This applies to all search and trigger types that use the channel.

Group Bus

Syntax
```
BUS:LOWerthreshold:CH<x> {<NR3>|ECL|TTL}
BUS:LOWerthreshold:CH<x>?
```

Arguments <NR3> is a floating point number that specifies the threshold, in volts.

ECL specifies a preset ECL high level of -1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples BUS:LOWERTHRESHOLD:CH1 TTL sets the CH1 lower threshold to 800mV.

BUS:LOWERTHRESHOLD:CH1? might return :BUS:LOWERTHRESHOLD:CH1 -800.0000E-3 indicating the CH1 lower threshold is -800 mV.

BUS:LOWerthreshold{:MATH|:MATH1}

This command specifies the lower threshold for the math waveform. This will apply to all search and trigger types that use the math waveform.

Group Bus

Syntax
```
BUS:LOWerthreshold{:MATH|:MATH1} {<NR3>|ECL|TTL}
BUS:LOWerthreshold{:MATH|:MATH1}?
```

Related Commands BUS:UPPerthreshold{:MATH|:MATH1}

Arguments <NR3> is a floating point number that specifies the lower threshold for the reference waveform, in volts.

ECL – ECL (-1.3 volts). Note that this setting is constrained, depending upon the vertical scale of the specified math waveform.

TTL – TTL (1.4 volts). Note that this setting is constrained, depending upon the vertical scale of the specified math waveform.

Examples BUS:LOWerthreshold:MATH TTL sets the lower threshold for the math waveform to 1.4 volts.

BUS:LOWerthreshold:MATH? might return 0.0E+0, which is the default.

BUS:LOWerthreshold:REF<x>

This command sets the lower threshold for each reference waveform. This applies to all search and trigger types that use that reference waveform.

Group Bus

Syntax

```
BUS:LOWerthreshold:REF<x> {<NR3>|ECL|TTL}
BUS:LOWerthreshold:REF<x>?
```

Related Commands BUS:UPPerthreshold:REF<x>

Arguments

<NR3> is a floating point number that specifies the lower threshold for the reference waveform, in volts

ECL – ECL (-1.3 volts). Note that this setting is constrained, depending upon the vertical scale for the specified reference waveform.

TTL – TTL (1.4 volts). Note that this setting is constrained, depending upon the vertical scale for the specified reference waveform.

Examples

BUS:LOWerthreshold:REF2 TTL sets the lower threshold for reference waveform 2 to 1.4 volts. Note that this setting is constrained, depending upon the vertical scale for the specified reference waveform.

BUS:LOWerthreshold:REF3? might return 0.0E+0, which is the default.

BUS:THReshold:CH<x>

This command specifies the threshold for analog channel <x>, where x is the channel number (1–4). This setting applies to all trigger types that use the channel.

Conditions This command requires a serial bus analysis module on DPO models.

Group Bus

Syntax

```
BUS:THReshold:CH<x> {ECL|TTL|<NR3>}
BUS:THReshold:CH<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a TTL preset high level of 1.4V.

<NR3> is a floating point number that specifies the threshold level, in volts.

BUS:THReshold:D<x>

This command specifies the threshold for digital channel <x>, where x is the digital channel number (0–15). This will apply to all Search and Trigger Types that use the channel.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group Bus

Syntax

```
BUS:THReshold:D<x> {<NR3>|ECL|TTL}
BUS:THReshold:D<x>?
```

Arguments

ECL specifies a preset ECL high level of -1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the threshold level, in volts.

BUS:UPPerthreshold:CH<x>

Sets the upper threshold for each analog channel (1–4). This applies to all search and trigger types that use the channel.

Group Bus

Syntax

```
BUS:UPPerthreshold:CH<x> {<NR3>|ECL|TTL}
BUS:UPPerthreshold:CH<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold, in volts.

ECL specifies a preset ECL high level of -1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

BUS:UPPERTHRESHOLD:CH1 800.0000E-3 sets the CH1 upper threshold to 800 mV.

BUS:UPPERTHRESHOLD:CH1? might return :BUS:UPPERTHRESHOLD:CH1 -800.0000E-3 indicating that the CH1 upper threshold is set to -800 mV.

BUS:UPPerthreshold{:MATH|:MATH1}

This command specifies the upper threshold of the math waveform. This will apply to all search and trigger types that use the math waveform.

Group Bus

Syntax

```
BUS:UPPerthreshold{:MATH|:MATH1} {<NR3>|ECL|TTL}
BUS:UPPerthreshold{:MATH|:MATH1}?
```

Related Commands BUS:LOWerthreshold{:MATH|:MATH1}

Arguments

<NR3> is a floating point number that specifies the upper threshold of the math waveform, in volts.

ECL – ECL (-1.3 volts). Note that this setting is constrained, depending upon the vertical scale for the specified math waveform.

TTL – TTL (1.4 volts). Note that this setting is constrained, depending upon the vertical scale for the specified math waveform.

Examples

BUS:UPPerhreshold:MATH TTL sets the upper threshold for the math waveform to 1.4000 volts.

BUS:UPPerhreshold:MATH? might return 0.0E+0, which is the default.

BUS:UPPerthreshold:REF<x>

This command sets the upper threshold for each reference waveform. This applies to all search and trigger types that use that reference waveform.

Group Bus

Syntax

```
BUS:UPPerthreshold:REF<x> {<NR3>|ECL|TTL}
BUS:UPPerthreshold:REF<x>?
```

Related Commands BUS:LOWerthreshold:REF<x>

Arguments

<NR3> is a floating point number that specifies the upper threshold for the reference waveform, in volts.

ECL — ECL (-1.3 volts). Note that this setting is constrained, depending upon the vertical scale for the specified reference waveform.

TTL — TTL (1.4 volts). Note that this setting is constrained, depending upon the vertical scale for the specified reference waveform.

Examples

BUS:UPPerthreshold:REF2 TTL sets the upper threshold for reference waveform 2 to 1.4000.

BUS:UPPerthreshold:REF3? might return 0.0E+0, which is the default.

BUSY? (Query Only)

Returns the status of the oscilloscope. This command allows you to synchronize the operation of the oscilloscope with your application program. (See page 3-7, *Synchronization Methods*.)

Certain oscilloscope operations can affect the BUSY? response. (See Table 3-3 on page 3-8.)

Group

Status and Error

Syntax

BUSY?

Related Commands

*OPT?, *WAI

Returns

<NR1> = 0 means the oscilloscope is not busy processing a command whose execution time is extensive.

<NR1> = 1 means the oscilloscope is busy processing a command whose execution time is extensive. (See Table 3-3 on page 3-8.)

Examples

BUSY? might return :BUSY 1 indicating that the oscilloscope is currently busy.

*CAL? (Query Only)

Performs an internal self-calibration and returns the oscilloscope calibration status.

NOTE. Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.

Group Calibration and Diagnostic

Syntax *CAL?

Returns <NR1> = 1 indicates the calibration did not complete successfully.

<NR1> = 0 indicates the calibration completed without errors.

Examples *CAL? starts the internal signal path calibration and might return 0 to indicate that the calibration was successful.

CALibrate:FACtory:STATus? (Query Only)

Returns the factory calibration status value saved in nonvolatile memory.

Group Calibration and Diagnostic

Syntax CALibrate:FACtory:STATus?

Examples CAL:FAC:STAT? might return CALIBRATE:FACTORY:STATUS PASS indicating that factory calibration passed.

CALibrate:FACtory:STATus:AFG? (Query Only)

This query returns the factory calibration status for the Arbitrary Function Generator portion of the instrument, if present.

This query is synonymous with CALibrate:RESults:FACtory:AFG?

Group Calibration and Diagnostic

Syntax CALibrate:FACtory:STATus:AFG?

Related Commands CALibrate:FACtory:STATus:SCOPE?, CALibrate:FACtory:STATus:RF?

Returns PASS - factory calibration has passed

INIT - factory calibration is unadjusted

RUNNING - factory calibration is running

Examples CALIBRATE:FACTORY:STATUS:AFG? might return RUNNING, indicating that the factory calibration for the AFG portion of the instrument is in progress.

CALibrate:FACtory:STATus:RF? (Query Only)

Returns the factory calibration status value saved in nonvolatile memory for the RF portion of the oscilloscope.

This query is synonymous with CALibrate:RESults:FACtory:RF?.

Conditions MDO models only

Group Calibration and Diagnostic

Syntax CALibrate:FACtory:STATus:RF?

Returns PASS: shows the RF portion of the factory calibration has succeeded.

INIT: shows the RF portion of the factory calibration has not been adjusted.

RUNNING: shows the RF portion of the factory calibration is in progress.

Examples CAL:FAC:STAT:RF? might return RUNNING, indicating that the factory calibration for the RF portion of the instrument is in progress.

CALibrate:FACtory:STATus:SCOPE? (Query Only)

Returns the factory calibration status value saved in nonvolatile memory for the non-RF portion of the oscilloscope. It is synonymous with the :CALibrate:RESults:FACtory:SCOPE? query.

Conditions MDO models only

Group Calibration and Diagnostic

Syntax `CALibrate:FACtory:STATus:SCOPE?`

Returns PASS: shows the non-RF portion of the factory calibration has succeeded.

INIT: shows the non-RF portion of the factory calibration has not been adjusted.

RUNNING: shows the non-RF portion of the factory calibration is in progress.

FAIL: show the non-RF portion of the factory calibration has failed.

Examples `CAL:FAC:STAT:SCOPE?` might return `CALIBRATE:FACTORY:STATUS:SCOPE PASS` indicating that factory calibration passed.

CALibrate:INTERNal (No Query Form)

This command starts a signal path compensation.

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal`

Arguments None

Examples `CALIBRATE:INTERNAL` starts a serial path compensation cycle.

CALibrate:INTERNal:STARt (No Query Form)

This command starts the internal signal path calibration (SPC) of the oscilloscope – exactly the same as `:CALibrate:INTERNal`. First, disconnect all probes and cables from all channels. You can use the CALibrate:INTERNal:STATus? query to return the current status of the internal signal path calibration of the oscilloscope. This query can only be sent when internal calibration (SPC) is not running.

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STARt`

Related Commands CALibrate:RESults:SPC?

Examples `CALIBRATE:INTERNAL:START` initiates the internal signal path calibration of the oscilloscope.

CALibrate:INTERNal:STATus? (Query Only)

Returns the current status of the oscilloscope internal signal path calibration for the last SPC operation.

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STATus?`

Related Commands *CAL?

Returns This query will return one of the following:

- `INIT` indicates the oscilloscope has not had internal signal path calibration run.
- `PASS` indicates the signal path calibration completed successfully.
- `FAIL` indicates the signal path calibration did not complete successfully.
- `RUNNING` indicates the signal path calibration is currently running.

Examples `CAL:INTERN:STAT?` might return `:CALIBRATE:INTERNAL:STATus INIT` indicating that the current status of the internal signal path calibration is that it has not been run.

CALibrate:INTERNal:STATus:RF? (Query Only)

This query returns the status of the last SPC run for the RF portion of the instrument: (doesn't include the analog channels). This query is synonymous with `CALibrate:RESults:SPC:RF?`

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STATus:RF?`

Returns This query will return one of the following:

`INIT` indicates the RF portion of the instrument has not been calibrated.

`PASS` indicates the RF internal calibration completed successfully.

`RUNNING` indicates the oscilloscope internal calibration is currently running.

`FAIL` indicates the RF internal calibration did not complete successfully.

Examples `CAL:INTERN:STAT:RF?` might return `INIT` indicating that the RF portion of the instrument has not been internally calibrated.

CALibrate:INTERNal:STATus:SCOPE? (Query Only)

This query returns the status of the last SPC run for the oscilloscope portion of the instrument (doesn't include the RF portion). To query the status of the RF portions, use CALibrate:INTERNal:STATus:RF?

This query is synonymous to CALibrate:RESults:SPC:SCOPE?

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STATus:SCOPE?`

Returns This query will return one of the following:

`INIT` indicates the oscilloscope portion of the instrument has not been calibrated.

`PASS` indicates the oscilloscope internal calibration completed successfully.

`RUNNING` indicates the oscilloscope internal calibration is currently running.

`FAIL` indicates the oscilloscope internal calibration did not complete successfully.

Examples `CAL:INTERN:STAT:SCOPE?` might return `INIT` indicating that the oscilloscope portion of the instrument has not been calibrated.

CALibrate:RESults? (Query Only)

Returns the status of internal and factory calibrations, without performing any calibration operations. The results returned do not include the calibration status of attached probes. The `CALibrate:RESults?` query is intended to support GO/NoGO testing of the oscilloscope calibration readiness: all returned results should indicate PASS status if the oscilloscope is "fit for duty". It is quite common, however, to use uncalibrated probes (particularly when the oscilloscope inputs are connected into a test system with coaxial cables).

Group Calibration and Diagnostic

Syntax `CALibrate:RESults?`

Related Commands *CAL?

CALibrate:RESults:FACtory? (Query Only)

Returns the status of internal and factory calibration, without performing any calibration operations.

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:FACtory?`

CALibrate:RESults:FACtory:AFG? (Query Only)

This query returns the factory calibration status for the Arbitrary Function Generator portion of the instrument, if present.

This query is synonymous with `CALibrate:FACtory:STATus:AFG?`

Conditions Available for MDO3000 series only.

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:FACtory:AFG?`

Returns `PASS` - factory calibration has passed

`INIT` - factory calibration is unadjusted

`RUNNING` - factory calibration is running

Examples `CALIBRATE:RESULTS:FACTORY:AFG?` might return `RUNNING`, indicating that the factory calibration for the AFG portion of the instrument is in progress.

CALibrate:RESults:FACtory:RF? (Query Only)

This query returns the factory calibration status for the RF portion of the instrument, if present.

This query is synonymous with `CALibrate:FACtory:STATus:RF?`

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:FACtory:RF?`

Returns `PASS` - factory calibration has passed

`INIT` - factory calibration is unadjusted

`RUNNING` - factory calibration is in progress

Examples `CALIBRATE:RESULTS:FACTORY:RF?` might return `RUNNING`, indicating that the factory calibration for the RF portion of the instrument is in progress.

CALibrate:RESults:FACtory:SCOPE? (Query Only)

This query returns the factory calibration status for the oscilloscope (doesn't include RF or AFG) of the instrument.

This query is synonymous with the following query:

`:CALibrateFACtory:STATus:SCOPE?`

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:FACtory:SCOPE?`

Returns This query will return one of the following:

`INIT` indicates the oscilloscope portion of the instrument has not been calibrated.

`PASS` indicates the oscilloscope internal calibration completed successfully.

`RUNNING` indicates the oscilloscope internal calibration is currently running.

Examples `CAL:RESULTS:SPC:SCOPE?` might return `INIT` indicating that the oscilloscope portion of the instrument has not been calibrated.

CALibrate:RESults:SPC? (Query Only)

Returns the status of the SPC operation. This query does not initiate a SPC.

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:SPC?`

Related Commands *CAL?

Returns `INIT` indicates that SPC has never successfully completed.

`PASS` indicates that the last SPC operation passed.

`FAIL` indicates that the last SPC operation failed.

`RUNNING` indicates that the SPC operation is running.

Examples `CALIBRATE:RESULTS:SPC?` might return `FAIL`, indicating that the last SPC operation failed.

CALibrate:RESults:SPC:RF? (Query Only)

This query returns the status of the last SPC run for the RF portion of the instrument (doesn't include analog channels) . This query is synonymous with `CALibrate:INTERNal:STATus:RF?`

Group Calibration and Diagnostic

Syntax CALibrate:RESults:SPC:RF?

Returns This query will return one of the following:

INIT indicates the RF portion of the instrument has not been calibrated.

PASS indicates the RF internal calibration completed successfully.

RUNNING indicates the oscilloscope internal calibration is currently running.

FAIL indicates the RF internal calibration did not complete successfully.

Examples CAL:RESULS:SPC:RF? might return INIT indicating that the RF portion of the instrument has not been internally calibrated.

CALibrate:RESults:SPC:SCOPE? (Query Only)

This query returns the status of the last SPC run for the oscilloscope portion of the instrument (doesn't include the RF portion). This query is synonymous to CALibrate:INTERNal:STATus:SCOPE?

Group Calibration and Diagnostic

Syntax CALibrate:RESults:SPC:SCOPE?

Returns This query will return one of the following:

INIT indicates the oscilloscope portion of the instrument has not been calibrated.

PASS indicates the oscilloscope internal calibration completed successfully.

FAIL indicates the oscilloscope internal calibration did not complete successfully.

RUNNING indicates the oscilloscope internal calibration is currently running.

Examples CAL:RESULTS:SPC:SCOPE? might return INIT indicating that the oscilloscope portion of the instrument has not been calibrated.

CALibrate:RF (No Query Form)

This command begins the RF calibration process. You should first disconnect all cables and probes from the RF input before using this command. The calibration process takes approximately 3 minutes. This command is identical to CALibrate:RF:STARt.

NOTE. *If you run the signal path calibration (SPC) commands, you don't need to run this command as well.*

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

Conditions MDO models only.

Group Calibration and Diagnostic

Syntax `CALibrate:RF`

Related Commands *CAL?, CALibrate:RESults:SPC?, CALibrate:INTERNal:STARt, CALibrate:RF:STATus?

CALibrate:RF:STARt (No Query Form)

This command is identical to `CALIBRATE:RF`.

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

Conditions MDO models only.

Group Calibration and Diagnostic

Syntax `CALibrate:RF:STARt`

CALibrate:RF:STATus? (Query Only)

This query returns the status of the last RF calibration.

Conditions MDO models only.

Group Calibration and Diagnostic

Syntax `CALibrate:RF:STATus?`

Related Commands CALibrate:RF:STARt

Examples `CAL:RF:STAT?` might return PASS.

CH<x>? (Query Only)

Returns the vertical parameters for channel <x>, where x is the channel number (1–4).

Group Vertical

Syntax `CH<x>?`

CH<x>:AMPSVIAVOLTs:ENAble

This command specifies the state of the amps via volts feature for the specified channel. This feature supports measuring current via the voltage drop across a resistor (1–4).

Group Vertical

Syntax
```
CH<x>:AMPSVIAVOLTs:ENAble {<NR1>|OFF|ON}
CH<x>:AMPSVIAVOLTs:ENAble?
```

Arguments `OFF` sets the amps via volts function for channel <x> to off.

`ON` sets the amps via volts function for channel <x> to on.

`<NR1>` = 0 sets the amps via volts function to off. Any other value sets the function to on.

Examples `CH1:AMSVIAVOLTS:ENABLE ON` turns on the amps via volts feature for channel 1.

CH<x>:AMPSVIAVOLTs:FACtor

This command specifies the amps via volts factor for the specified channel (1–4).

Group Vertical

Syntax
```
CH<x>:AMPSVIAVOLTs:FACtor <NR3>
CH<x>:AMPSVIAVOLTs:FACtor?
```

Arguments <NR3> is a double-precision ASCII string that represents the amps via volts factor.

Examples CH1:AMPSVIAVOLTS:FACTOR 15.5 sets the amps via volts factor for channel 1 to 15.5.

CH<x>:BANdwidth

This command specifies the selectable low-pass bandwidth limit filter for channel <x>, where x is the channel number (1–4).

Available bandwidth limits vary by model, and are also influenced by attached probes. Furthermore, some oscilloscope models support options to increase the analog bandwidth. The presence of those options also affects the available bandwidth limits.

To see what the available bandwidth limits are, on the UI, push the relevant channel's front panel button and the push the Bandwidth lower menu button, and see what bandwidths are listed in the side menu.

Group Vertical

Syntax
```
CH<x>:BANdwidth {FULl|<NR3>}
CH<x>:BANdwidth?
```

Arguments FULl disables any optional bandwidth limiting. The specified channel operates at its maximum attainable bandwidth.

<NR3> is a double-precision ASCII string. The oscilloscope rounds this value to an available bandwidth using geometric rounding, and then uses this value to set the upper bandwidth limit.

Examples CH1:BANDWIDTH 20E6 sets the bandwidth of channel 1 to 20 MHz.

CH<x>:COUPling

This command specifies the input attenuator coupling setting for channel <x>, where x is the channel number (1–4).

Group Vertical

Syntax

```
CH<x>:COUPling {AC|DC|DCREJect}
CH<x>:COUPling?
```

Arguments

AC sets channel <x> to AC coupling.

DC sets channel <x> to DC coupling.

DCREJect sets channel <x> to DC Reject coupling when a probe that supports DC Reject coupling is attached. Attempting to set the coupling to DCREJect for a channel that has no probe attached or a probe that does not support DCREJect coupling attached results in a settings conflict error event and the coupling remains unchanged.

Examples

CH2:COUPLING AC sets channel 2 to AC coupling.

CH3:COUPling? might return :CH3:COUPling DC indicating that channel 3 is set to DC coupling.

CH<x>:DESKew

This command specifies the deskew time for channel <x>, where x is the channel number (1–4). You can adjust the deskew time to add an independent, channel-based delay time to the delay (set by the horizontal position control and common to all channels) from the common trigger point to first sample taken for each channel. This lets you compensate individual channels for different delays introduced by their individual input hook ups.

Group Vertical

Syntax

```
CH<x>:DESKew <NR3>
CH<x>:DESKew?
```

Arguments

<NR3> is a floating point number that specifies the deskew time for channel <x>, ranging from -100 ns to +100 ns with a resolution of 1 ps.

Examples

CH4:DESKew 5.0E-9 sets the deskew time for channel 4 to 5 ns.

CH2:DESKew? might return :CH2:DESKEW 2.0000E-09 indicating that the deskew time for channel 2 is set to 2 ns.

CH<x>:INVert

This command specifies the invert function for channel <x>, where is the channel number (1–4) . When on, the invert function inverts the waveform for the specified channel.

NOTE. *This command inverts the waveform for display purposes only. The oscilloscope does not use an inverted waveform for triggers or trigger logic inputs.*

Group Vertical

Syntax

```
CH<x>:INVert {ON|OFF}
CH<x>:INVert?
```

Arguments

`OFF` sets the invert function for channel <x> to off.

`ON` sets the invert function for channel <x> to on.

Examples

`CH4:INVert ON` inverts the waveform on channel 4.

`CH2:INVert?` might return `:CH2:INVERT 0` indicating that channel 2 is not inverted.

CH<x>:LABel

This command specifies the waveform label for channel <x>, where x is the channel number (1–4).

Group Vertical

Syntax

```
CH<x>:LABel <Qstring>
CH<x>:LABel?
```

Arguments

`<Qstring>` is an alphanumeric string of text, enclosed in quotes, that contains the text label information for the channel <x> waveform. The text string is limited to 30 characters.

CH<x>:OFFSet

This command specifies the vertical offset for channel <x>, where x is the channel number (1–4).

This command offsets the vertical acquisition window (moves the level at the vertical center of the acquisition window) for the specified channel. Visualize offset as scrolling the acquisition window towards the top of a large signal for increased offset values, and scrolling towards the bottom for decreased offset values. The resolution of the vertical window sets the offset increment for this control.

Offset adjusts only the vertical center of the acquisition window for channel waveforms to help determine what data is acquired. The oscilloscope always displays the input signal minus the offset value.

The channel offset range depends on the vertical scale factor.

Table 2-51: Channel Offset Range

	Offset range	
V/Div Setting	**1 MΩ Input**	**50 Ω Input**
1 mV/div — 50 mV/div	±1 V	±1 V
50.5 mV/div — 99.5 mV/div	±0.5 V	±0.5 V
100 mV/div — 500 mV/div	±10 V	±5 V
505 mV/div — 995 mV/div	±5 V	±5 V
1 V/div — 5 V/div [1]	±100 V	±5 V
5.05 V/div — 10 V/div [1]	±50 V	N/A

[1] For 50 Ω input, 1 V/div is the maximum setting.

NOTE. *The above table describes oscilloscope behavior only when no probe is attached, and when the external attenuation factor is 1.0.*

Group Vertical

Syntax

```
CH<x>:OFFSet <NR3>
CH<x>:OFFSet?
```

Related Commands CH<x>:POSition

Arguments <NR3> is a floating point number that specifies the offset value for the specified channel <x>.

Examples `CH3:OFFSet 2.0E-3` sets the offset for channel 3 to 2 mV.

`CH4:OFFSet?` might return `:CH4:OFFSET 1.0000E-03` indicating that the offset for channel 4 is set to 1 mV.

CH<x>:POSition

This command specifies the vertical position of channel <x>, where x is the channel number (1–4). The position value is applied to the signal before it is digitized.

Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The position value determines the vertical graticule coordinate at which input signal values, minus the present offset setting for that channel, are displayed. For example, if the position for Channel 3 is set to 2.0 and the offset is set to 3.0, then input signals equal to 3.0 units are displayed 2.0 divisions above the center of the screen (at 1 V/div).

Group Vertical

Syntax

```
CH<x>:POSition <NR3>
CH<x>:POSition?
```

Related Commands CH<x>:OFFSet, REF<x>:VERTical:POSition, MATH[1]:VERTical:POSition

Arguments `<NR3>` is a floating point number that specifies the position value for channel <x>, in divisions, from the center graticule. The range is 8 to -8 divisions.

Examples `CH2:POSition 1.3` positions the Channel 2 input signal 1.3 divisions above the center graticule.

`CH1:POSition?` might return `:CH1:POSITION -1.3000` indicating that the current position of Channel 1 is 1.3 divisions below the center graticule.

CH<x>:PRObe? (Query Only)

Returns all information concerning the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PRObe?`

CH<x>:PRObe:AUTOZero (No Query Form)

This command executes the attached probe's Auto Zero function, for probes that support this feature. See your probe documentation for more details.

Group Vertical

Syntax `CH<x>:PRObe:AUTOZero EXECute`

Examples `EXECute` performs the AutoZero function in the probe.

CH<x>:PRObe:CALibrate (No Query Form)

This command executes a calibration or initialization for the probe attached to channel 1–4, if the probe is calibratable. To determine whether the probe is calibratable, use CH<x>:PRObe:CALibrate:CALIBRATABLe?. The channel is specified by x, which can range from 1 through 4.

Group Vertical

Syntax `CH<x>:PRObe:CALibrate {EXECute|INITialize}`

Related Commands CH<x>:PRObe:CALibrate:CALIBRATABLe?

CH<x>:PRObe:CALibrate:STATE?

Arguments `EXECute` — executes a calibration for the attached probe.

`INITialize` — initializes the attached probe.

Examples `CH2:PRObe:CALibrate execute` executes a calibration for the attached probe.

0

CH<x>:PRObe:CALibrate:CALIBRATABLe? (Query Only)

This query returns the state of the probe attached to channel 1–4, either 0 if the probe is not calibratable, or 1 if the probe is calibratable. The channel is specified by x, which can range from 1 through 4.

Group Vertical

Syntax `CH<x>:PRObe:CALibrate:CALIBRATABLe?`

Related Commands CH<x>:PRObe:CALibrate

CH<x>:PRObe:CALibrate:STATE?

Examples `CH2:PRObe:CALibrate:CALIBRATABLe?` might return 0, indicating that the probe attached to channel 2 is not calibratable.

CH<x>:PRObe:CALibrate:STATE? (Query Only)

This query returns the calibration state of the probe connected to the specified channel. If the probe is calibratable, the state could be either DEFAULT (not calibrated), COMPensated, or RUNNING (calibration is proceeding). If the probe is not calibratable, DEFAULT will be returned. The channel is specified by x, which can range from 1 through 4.

Group Vertical

Syntax `CH<x>:PRObe:CALibrate:STATE?`

Related Commands CH<x>:PRObe:CALibrate

CH<x>:PRObe:CALibrate:CALIBRATABLe?

Returns `DEFAULT` — not calibrated.

`COMPensated` — last calibration passed.

`RUNNING` — probe calibration is in progress.

Examples `CH2:PRObe:CALibrate:STATE?` might return DEFAULT, indicating that the probe is not calibrated.

CH<x>:PRObe:COMMAND (No Query Form)

Sets the state of the probe control specified with the first argument to the state specified with the second argument. The commands and states are unique to the attached probe. Only certain VPI probes support this command. See the specific probe documentation for how to set these string arguments.

The command form takes 2 string arguments: the first is the probe command enumeration and the second is the data value.

The query form requires a single quoted string argument to specify the probe command enumeration for which the response data is requested.

Group Vertical

Syntax `CH<x>:PRObe:COMMAND <QString>, <QString>`

Arguments `<QString>` are quoted strings specifying the probe command and value to set in the probe attached to the specified channel.

Examples `CH1:PROBE:COMMAND "MODE", "4-4V1MHz"` sets a Tektronix VPI-DPG probe to the 4-4V1MHz mode.

`CH1:PROBE:COMMAND "OUTPUT", "ON"` turns the output of a Tektronix VPI-DPG probe on.

`CH1:PROBE:COMMAND?"MODE"` might return `CH1:PROBE:COMMAND "MODE","4-4V1MHZ"`.

CH<x>:PRObe:DEGAUss (No Query Form)

This command starts a degauss auto-zero cycle on a TekVPI current probe attached to the input channel specified by <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PRObe:DEGAUss EXECute`

Arguments `EXECute` initiates the degauss operation.

CH<x>:PRObe:DEGAUss:STATE? (Query Only)

This command returns the state of the probe degauss for the channel specified by <x>, where is x is the channel number.

NOTE. *This command will return* `PASSED` *for probes that do not support degauss operations.*

Group Vertical

Syntax

```
CH<x>:PRObe:DEGAUss:STATE?
```

Returns

`NEEDED` indicates the probe should be degaussed before taking measurements.

`RECOMMENDED` indicates the measurement accuracy might be improved by degaussing the probe.

`PASSED` indicates the probe is degaussed.

`FAILED` indicates the degauss operation failed.

`RUNNING` indicates the probe degauss operation is currently in progress.

CH<x>:PRObe:FORCEDRange

This command specifies the range of a TekVPI probe attached to the channel specified by <x>, where x is the channel number.

NOTE. *This command will return* `PASSED` *for probes that do not support degauss operations.*

Group Vertical

Syntax

```
CH<x>:PRObe:FORCEDRange <NR3>
CH<x>:PRObe:FORCEDRange?
```

Arguments `<NR3>` is a floating point number that specifies the range, which is probe specific.

Returns The query form of this command returns `0.0` for probes that do not support forced ranges.

CH<x>:PRObe:GAIN

This command specifies the gain factor for the probe attached to the channel specified by <x>, where x is the channel number. The "gain" of a probe is the output divided by the input transfer ratio. For example, a common 10x probe has a gain of 1V.

Group Vertical

Syntax
```
CH<x>:PRObe:GAIN <NR3>
CH<x>:PRObe:GAIN?
```

Related Commands CH<x>:SCAle

Arguments <NR3> is a floating point number that specifies the probe gain. Allowed values depend on the specific probe.

Examples CH2:PROBE:GAIN? might return :CH2:PROBE:GAIN 0.1000E+00 indicating that the attached 10x probe delivers 1 V to the channel 2 BNC for every 10 V applied to the probe input.

CH<x>:PRObe:ID? (Query Only)

Returns the type and serial number of the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax CH<x>:PRObe:ID?

Examples CH2:PROBE:ID? might return :CH2:PROBE:ID:TYPE "10X";SERNUMBER "N/A" indicating that a passive 10x probe of unknown serial number is attached to channel 2.

CH<x>:PRObe:ID:SERnumber? (Query Only)

Returns the serial number of the probe attached to channel <x>, where x is the channel number.

NOTE. *For Level 0 and 1 probes, the serial number will be "".*

Group Vertical

Syntax `CH<x>:PRObe:ID:SERnumber?`

Examples `CH1:PROBE:ID:SERNUMBER?` might return `:CH1:PROBE:ID:SERNUMBER "B010289"` indicating that the serial number of the probe attached to channel 1 is B010289.

CH<x>:PRObe:ID:TYPe? (Query Only)

Returns the type of probe attached to the channel specified by <x>, where x is the channel number. Level 2 (or higher) probes supply their exact product nomenclature; for Level 0 or 1 probes, a generic *"No Probe Detected* message is returned.

NOTE. *Use the command CH<x>:YUNits to query the probe type – either "Voltage" or "Current".*

Group Vertical

Syntax `CH<x>:PRObe:ID:TYPe?`

Examples `CH1:PROBE:ID:TYPE?` might return `:CH1:PROBE:ID:TYPE "P6203"` indicating that P6203-type probe is attached to channel 1.

CH<x>:PRObe:MODel

This command specifies the probe model for the specified channel. If a coded probe is attached or the specified model is not recognized, an error event is set. The argument must be a supported probe.

To find the list of supported probes, push the front-panel channel **1**, **2**, **3**, or **4** button, then push the lower-menu **More** item as many times as needed to select **Deskew**. Push **Probe Model** on the side menu and turn knob **a** to help you read from the resulting list. Alternatively, you can push **Test** > **Analysis** > **Deskew** > **Configure** > **Probe Model** and read from the resulting list.

Group Vertical

Syntax
```
CH<x>:PRObe:MODel <String>
CH<x>:PRObe:MODel?
```

CH<x>:PRObe:PROPDELay

This command specifies the propagation delay for the probe connected to the specified channel.

Group Vertical

Syntax
```
CH<x>:PRObe:PROPDELay <NR3>
CH<x>:PRObe:PROPDELay?
```

Arguments <NR3> is a floating point number that specifies the propagation time delay for the connected probe.

Examples CH1:PROBE:PROPDELAY 100E-12 sets the CH1 propagation delay to 100 ps.

CH1:PROBE:PROPDELAY? might return :CH1:PROBE:PROPDELAY 1.1E-9 indicating that the CH1 propagation delay is set to 1.1 ns.

CH<x>:PRObe:RECDESkew? (Query Only)

Returns the recommended deskew for the probe connected to the specified channel.

Group Vertical

Syntax
```
CH<x>:PRObe:RECDESkew?
```

CH<x>:PRObe:RESistance? (Query Only)

Returns the resistance factor of the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PRObe:RESistance?`

Examples `CH2:PRObe:RESistance?` might return `:CH2:PROBE:RESISTANCE 1.0000E+6` indicating that the input resistance of the probe attached to Channel 2 is 1 MΩ.

NOTE. *This query will return 0.0 if no probe is attached or the attached probe does not report the input resistance.*

CH<x>:PRObe:SIGnal

This command specifies the input bypass setting of a TekVPI probe attached to channel <x>, where x is the channel number. The probe must support input bypass, for example TCP0001. This command is ignored if sent to an unsupported probe.

Group Vertical

Syntax
```
CH<x>:PRObe:SIGnal {BYPass|PASS}
CH<x>:PRObe:SIGnal?
```

Arguments `BYPass` sets the probe to Bypass mode.

`PASS` sets the probe to Pass mode.

CH<x>:PRObe:UNIts? (Query Only)

Returns a string describing the units of measure for the probe attached to channel <x>, where x is the channel number.

NOTE. *Use the command CH<x>:YUNits to set the probe type to "Voltage" or "Current".*

Group Vertical

Syntax `CH<x>:PRObe:UNIts?`

Examples `CH4:PROBE:UNITS?` might return `:CH4:PROBE:UNITS "V"` indicating that the units of measure for the probe attached to channel 4 are volts.

CH<x>:SCAle

This command specifies the vertical scale for the channel specified by <x>, where x is the channel number. This setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.

For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Group Vertical

Syntax

```
CH<x>:SCAle <NR3>
CH<x>:SCAle?
```

Related Commands CH<x>:OFFSet, CH<x>:POSition, REF<x>:VERTical:SCAle, MATH[1]:VERTical:SCAle

Arguments <NR3> is a floating point number that specifies the vertical channel scale in units-per-division. The value entered here is truncated to three significant digits.

Examples CH4:SCALE 100E-03 sets the channel 4 scale to 100 mV per division.

CH2:SCALE? might return :CH2:SCALE 1.0000 indicating that the current scale setting of channel 2 is 1 V per division.

CH<x>:TERmination

Sets the connected-disconnected status of a 50 Ω resistor (or 75 Ω with MDO3000 models) which may be connected between the specified channel's coupled input and oscilloscope ground. The channel is specified by <x>. There is also a corresponding query that requests the termination parameter and translates this enumeration into one of the two float values.

NOTE. *75 Ω termination is not available on the MDO3104 or MDO3102 models.*

Group Vertical

Syntax

```
CH<x>:TERmination {FIFty|MEG|<NR3>}
CH<x>:TERmination?
```

Arguments

FIFty sets the channel <x> input resistance to 50 Ω.

MEG sets the channel <x> input resistance to 1 MΩ.

<NR3> is a floating point number that specifies the channel <x> input resistance numerically.

Examples

CH4:TERMINATION 50.0E+0 establishes 50 Ω impedance on channel 1.

CH2:TERMINATION? might return :CH2:TERMINATION 50.0E+0 indicating that channel 2 is set to 50 Ω impedance.

CH<x>:YUNits

This command specifies the vertical units for the channel specified by <x>, where x is the channel number. String arguments are case insensitive and any unsupported units will generate an error.

Supported units are:
%, /Hz, A, A/A, A/V, A/W, A/dB, A/s, AA, AW, AdB, As, B, Hz, IRE, S/s, V, V/A, V/V, V/W, V/dB, V/s, VV, VW, VdB, volts, Vs, W, W/A, W/V, W/W, W/dB, W/s, WA, WV, WW, WdB, Ws, dB, dB/A, dB/V, dB/W, dB/dB, dBA, dBV, dBW, dBdB, day, degrees, div, hr, min, ohms, percent, s

The vertical units affect the "Probe Type" that is shown in the "Probe Setup" menu:

- Setting CH<x>:YUNits to "V" causes the probe type to be displayed as "Voltage".
- When CH1:AMSVIAVOLTs:ENAble is set to OFF, setting CH<x>:YUNits to "A" causes the probe type to be displayed as "Current".
- Setting CH<x>:YUNits to anything else causes the probe type not to be displayed (neither "Voltage" nor "Current" are highlighted).

Group

Vertical

Syntax

```
CH<x>:YUNits <QString>
CH<x>:YUNits?
```

Arguments

QString is a string of text surrounded by quotes, specifying the supported units.

Examples

CH4:YUN "V" causes the probe type to be displayed as "Voltage".

CLEARMenu (No Query Form)

Clears the current menu from the display. This command is equivalent to pressing the front panel Menu off.

Group Miscellaneous

Syntax `CLEARMenu`

*CLS (No Query Form)

Clears the following:

- Event Queue
- Standard Event Status Register
- Status Byte Register (except the MAV bit)

If the *CLS command immediately follows an <EOI>, the Output Queue and MAV bit (Status Byte Register bit 4) are also cleared. The MAV bit indicates that information is in the output queue. The device clear (DCL) control message will clear the output queue and thus MAV. *CLS does not clear the output queue or MAV.

*CLS can suppress a Service Request that is to be generated by an *OPC. This will happen if a single sequence acquisition operation is still being processed when the *CLS command is executed.

Group Status and Error

Syntax `*CLS`

Related Commands DESE, *ESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Examples `*CLS` clears the oscilloscope status data structures.

CONFIGuration:ADVMATH? (Query Only)

This query returns a boolean value to indicate whether the advanced math feature is present.

Group Configuration

Syntax `CONFIGuration:ADVMATH?`

Related Commands MATH[1]:TYPe `ADVanced`

Returns `<NR1>` = 1 if the advanced math feature is present.

`<NR1>` = 0 if the advanced math feature is not present.

CONFIGuration:AFG? (Query Only)

Indicates whether or not the arbitrary function generator hardware is present, and the arbitrary function generation feature is enabled.

Conditions Available for MDO3000 series models only.

Group Configuration

Syntax `CONFIGuration:AFG?`

Returns `1` indicates that the arbitrary function generator hardware is present and the AFG feature is enabled.

`0` indicates that either the arbitrary function generator hardware is not present, or the feature is not enabled.

Examples `CONFIG:AFG?` might return 1, indicating that the hardware is present and the feature is enabled.

CONFIGuration:ANALOg:BANDWidth? (Query Only)

This query returns the bandwidth, in Hz, for the analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:BANDWidth?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns <NR3>, which is a floating point number that represents the bandwidth, in hertz, for the analog channels.

CONFIGuration:ANALOg:GNDCPLG? (Query Only)

This query returns a boolean value to indicate whether the ground coupling feature for analog channels is present. As this feature is not supported on MSO/DPO4000B, MDO4000/B or MDO3000 models, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:ANALOg:GNDCPLG?`

Related Commands (See page 2-90, *Vertical Command Group*.)

Returns 0

CONFIGuration:ANALOg:MAXBANDWidth? (Query Only)

This query returns the maximum bandwidth for analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:MAXBANDWidth?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns <NR3>, which is a floating point number that represents the maximum bandwidth, in hertz, for the analog channels.

CONFIGuration:ANALOg:MAXSAMPLERate? (Query Only)

This query returns the maximum sample rate for analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:MAXSAMPLERate?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns `<NR3>`, which is a floating point number that represents the maximum sample rate, in samples per second, for the analog channels.

CONFIGuration:ANALOg:NUMCHANnels? (Query Only)

This query returns the number of analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:NUMCHANnels?`

Returns `<NR1>`

CONFIGuration:ANALOg:RECLENS? (Query Only)

This query returns a comma-separated list of supported record lengths for the analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:RECLENS?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns List of `<NR1>` values.

CONFIGuration:ANALOg:VERTINVert? (Query Only)

This query returns a boolean value to indicate whether the vertical invert feature for analog channels is present.

Group Configuration

Syntax `CONFIGuration:ANALOg:VERTINVert?`

Related Commands (See page 2-90, *Vertical Command Group*.)

Returns <NR1> = 1 if the vertical invert feature is present.

<NR1> = 0 if the vertical invert feature is not present.

CONFIGuration:APPLications:CUSTOMMask? (Query Only)

Indicates whether the Custom Mask test feature is present and enabled.

Conditions Requires installation of a DPO4LMT application module, or an MDO3LMT for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:APPLications:CUSTOMMask?`

Returns 1 indicates that the Custom Mask test feature is present and enabled.

0 indicates that either the Custom Mask test feature is not present, or it is not enabled.

Examples `CONFIG:APPL:CUSTOMM?` might return 1, indicating that the feature is present and enabled.

CONFIGuration:APPLications:LIMITMask? (Query Only)

This query returns a boolean value to indicate whether the optional mask/limit test feature is present.

Conditions Requires installation of a DPO4LMT application module, or MDO3LMT for MDO3000 models)

Group Configuration

Syntax `CONFIGuration:APPLications:LIMITMask?`

Related Commands (See page 2-31, *Mask Command Group*.)

Returns 1 indicates the mask/limit test feature is present.

0 indicates the mask/limit test feature is not present.

CONFIGuration:APPLications:POWer? (Query Only)

This query returns a boolean value to indicate whether the optional power application feature is present.

Conditions This feature requires installation of a DPO4PWR application module, or MDO3PWR for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:APPLications:POWer?`

Related Commands (See page 2-41, *Power Command Group*.)

Returns 1 indicates the power application feature is present.

0 indicates the power application feature is not present.

CONFIGuration:APPLications:STANDARDMask? (Query Only)

Indicates whether the Standard Mask test feature is present and enabled.

Conditions Available for DPO/MSO4000B and MDO4000/B series models only when the DPO4LMT option is present. Not available for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:APPLications:STANDARDMask?`

Returns 1 indicates that the Standard Mask test feature is present and enabled.

0 indicates that either the Standard Mask test feature is not present, or it is not enabled.

Examples `CONFIG:APPL:STANDARDM?` might return 1, indicating that the hardware is present and the feature is enabled.

CONFIGuration:APPLications:VIDPIC? (Query Only)

Indicates whether the Video Picture feature is present and enabled.

Conditions Available for MDO3000 series models. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Configuration

Syntax `CONFIGuration:APPLications:VIDPIC?`

Returns `1` indicates that the Video Picture feature is present and is enabled.

`0` indicates either the Video Picture feature is not present or the feature is not enabled.

Examples `CONFIG:APPL:VIDPIC?` might return 1, indicating that the hardware is present and the feature is enabled.

CONFIGuration:ARB? (Query Only)

Indicates whether or not the arbitrary function generator hardware is present, and the user-defined arbitrary waveform generation feature is enabled. Note that this is different than the `CONFIGuration:AFG?` query. The ability to generate arbitrary waveforms is an extension of the standard AFG features.

Conditions Available for MDO3000 series models only.

Group Configuration

Syntax `CONFIGuration:ARB?`

Returns `1` indicates that the arbitrary function generator hardware is present and the arbitrary function generation feature is enabled.

0 indicates that either the arbitrary function generator hardware is not present, or the user-defined arbitrary waveform generation feature is not enabled.

Examples CONFIG:ARB? might return 1, indicating that the hardware is present and the feature is enabled.

CONFIGuration:AUXIN? (Query Only)

This query returns a boolean value to indicate whether the instrument has an Aux Input connector.

NOTE. *The MSO/DPO4000B series and 2-channel MDO3000 series models contain an Aux Input connector.*

Group Configuration

Syntax CONFIGuration:AUXIN?

Related Commands (See page 2-90, *Vertical Command Group*.)

Returns <NR1> = 1 if the instrument has an Aux Input connector.

<NR1> = 0 if the instrument does not have an Aux Input connector.

CONFIGuration:BUSWAVEFORMS:AUDIO? (Query Only)

This query returns a boolean value to indicate whether the optional audio bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4AUDIO application module, or MDO3AUDIO for MDO3000 models.

Group Configuration

Syntax CONFIGuration:BUSWAVEFORMS:AUDIO?

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the audio bus feature is present.

<NR1> = 0 if the audio bus feature is not present.

CONFIGuration:BUSWAVEFORMS:CAN? (Query Only)

This query returns a boolean value to indicate whether the optional CAN bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4AUTO application module, or MDO3AUTO for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:CAN?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the CAN bus feature is present.

<NR1> = 0 if the CAN bus feature is not present.

CONFIGuration:BUSWAVEFORMS:ETHERNET? (Query Only)

This query returns a boolean value to indicate whether the optional Ethernet triggering and analysis feature is present. (Enabling this feature on MDO4000/B and MSO/DPO4000B requires installation of a DPO4ENET application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:ETHERNET?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the Ethernet feature is present.

<NR1> = 0 if the Ethernet feature is not present.

CONFIGuration:BUSWAVEFORMS:FLEXRAY? (Query Only)

This query returns a boolean value to indicate whether the optional FlexRay bus triggering and analysis feature is present.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or an MDO3FLEX application module for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:FLEXRAY?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the FlexRay bus feature is present.

<NR1> = 0 if the FlexRay bus feature is not present.

CONFIGuration:BUSWAVEFORMS:I2C? (Query Only)

This query returns a boolean value to indicate whether the optional I²C bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4EMBD application module, or MDO3EMBD for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:I2C?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the I²C bus feature is present.

<NR1> = 0 if the I²C bus feature is not present.

CONFIGuration:BUSWAVEFORMS:LIN? (Query Only)

This query returns a boolean value to indicate whether the optional LIN bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4AUTO application module, or MDO3AUTO for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:LIN?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the LIN bus feature is present.

<NR1> = 0 if the LIN bus feature is not present.

CONFIGuration:BUSWAVEFORMS:MIL1553B? (Query Only)

This query returns a boolean value to indicate whether the optional MIL-STD-1553 bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4AERO application module, or MDO3AERO for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:MIL1553B?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the MIL-STD-1553 bus feature is present.

<NR1> = 0 if the MIL-STD-1553 bus feature is not present.

CONFIGuration:BUSWAVEFORMS:NUMBUS? (Query Only)

This query returns the number of bus waveforms.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:NUMBUS?`

Returns <NR1>

CONFIGuration:BUSWAVEFORMS:PARallel? (Query Only)

This query returns a boolean value to indicate whether the parallel bus triggering and analysis feature is present.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:PARallel?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the parallel bus feature is present.

<NR1> = 0 if the parallel bus feature is not present.

CONFIGuration:BUSWAVEFORMS:RS232C? (Query Only)

This query returns a boolean value to indicate whether the optional RS232 bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4COMP application module, or MDO3COMP for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:RS232C?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the RS232 bus feature is present.

<NR1> = 0 if the RS232 bus feature is not present.

CONFIGuration:BUSWAVEFORMS:SPI? (Query Only)

This query returns a boolean value to indicate whether the optional SPI bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4EMBD application module, or MDO3EMBD for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:SPI?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the SPI bus feature is present.

<NR1> = 0 if the SPI bus feature is not present.

CONFIGuration:BUSWAVEFORMS:USB? (Query Only)

This query returns a boolean value to indicate whether the USB bus triggering and analysis feature is present.

Conditions This feature requires installation of a DPO4USB application module, or MDO3USB for MDO3000 models.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:USB?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the USB bus feature is present.

<NR1> = 0 if the USB bus feature is not present.

CONFIGuration:BUSWAVEFORMS:USB:HS? (Query Only)

This query returns a boolean value to indicate whether the high-speed USB bus triggering and analysis feature is present.

Depending upon the bandwidth of the instrument, USB bus triggering and analysis features may be limited to USB low-speed or full-speed. If the instrument bandwidth is sufficient, USB high-speed (HS) triggering and analysis is supported as long as the DPO4USB or MDO3USB application module is installed.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:USB:HS?`

Related Commands (See page 2-15, *Bus Command Group*.)

(See page 2-75, *Trigger Command Group*.)

(See page 2-61, *Search Command Group*.)

Returns <NR1> = 1 if the high-speed USB bus feature is present.

<NR1> = 0 if the high-speed USB bus feature is not present.

CONFIGuration:DIGITAl:MAGnivu? (Query Only)

This query returns a boolean value to indicate whether the instrument supports the MagniVu feature for digital channels. If there are no digital channels, the value returned is 0.

Group Configuration

Syntax `CONFIGuration:DIGITAl:MAGnivu?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns <NR1> = 1 if MagniVu is present.

<NR1> = 0 if MagniVu is not present.

CONFIGuration:DIGITAl:MAXSAMPLERate? (Query Only)

This query returns the maximum sample rate for digital channels, in samples per second. If there are no digital channels, the value returned is 0.

Group Configuration

Syntax `CONFIGuration:DIGITAl:MAXSAMPLERate?`

Related Commands (See page 2-29, *Horizontal Command Group*.)

Returns <NR3>, which is a floating point number.

CONFIGuration:DIGITAl:NUMCHANnels? (Query Only)

This query returns the number of digital channels.

Group Configuration

Syntax `CONFIGuration:DIGITAl:NUMCHANnels?`

Returns `<NR1>`

CONFIGuration:DVM? (Query Only)

Indicates whether the Digital Voltmeter hardware is present. and the DVM feature is enabled.

Conditions Available for MDO3000 series models only.

Group Configuration

Syntax `CONFIGuration:DVM?`

Returns `1` indicates that the Digital Voltmeter hardware is present and the DMV feature is enabled.

`0` indicates that either the digital volt meter hardware is not present, or the feature is not enabled.

Examples `CONFIG:DVM?` might return 1, indicating that the hardware is present and the feature is enabled.

CONFIGuration:EXTVIDEO? (Query Only)

This query returns a boolean value to indicate whether the extended video trigger features are present.

Conditions This feature requires installation of a DPO4VID application module for all except the MDO3000 series.

Group Configuration

Syntax `CONFIGuration:EXTVIDEO?`

Related Commands (See page 2-75, *Trigger Command Group*.)

Returns <NR1> = 1 if the extended video trigger features are present.

<NR1> = 0 if the extended video trigger features are not present.

CONFIGuration:HISTOGRAM? (Query Only)

This query returns a boolean value to indicate whether the waveform histogram feature is present.

Group Configuration

Syntax `CONFIGuration:HISTOGRAM?`

Related Commands (See page 2-29, *Histogram Command Group*.)

Returns <NR1> = 1 if the histogram feature is present.

<NR1> = 0 if the histogram feature is not present.

CONFIGuration:NETWORKDRIVES? (Query Only)

This query returns a boolean value to indicate whether network drives are supported.

Group Configuration

Syntax `CONFIGuration:NETWORKDRIVES?`

Related Commands (See page 2-27, *File System Command Group*.)

Returns <NR1> = 1 if network drives are supported.

<NR1> = 0 if network drives are not supported.

CONFIGuration:NUMMEAS? (Query Only)

This query returns the maximum number of periodic measurements.

Group Configuration

Syntax `CONFIGuration:NUMMEAS?`

Related Commands (See page 2-36, *Measurement Command Group*.)

Returns `<NR1>`

CONFIGuration:REFS:NUMREFS? (Query Only)

This query returns the number of reference waveforms.

Group Configuration

Syntax `CONFIGuration:REFS:NUMREFS?`

Related Commands (See page 2-90, *Vertical Command Group*.)

Returns `<NR1>`

CONFIGuration:RF:ADVTRIG? (Query Only)

This query returns a boolean value to indicate whether the advanced RF trigger and analysis feature is present. (Enabling this feature requires an MDO4000/B Series oscilloscope and installation of a MDO4TRIG application module.)

Group Configuration

Syntax `CONFIGuration:RF:ADVTRIG?`

Related Commands (See page 2-47, *RF Command Group* .)

Returns `<NR1>` = 1 if the advanced RF feature is present.

`<NR1>` = 0 if the advanced RF feature is not present.

CONFIGuration:RF:BANDWidth? (Query Only)

This query returns the bandwidth, in Hz, for the RF channel(s). If there are no RF channels, the value returned is 0.

Group Configuration

Syntax `CONFIGuration:RF:BANDWidth?`

Returns Floating point number that represents the bandwidth, in Hz, for the RF channel.

CONFIGuration:RF:MAXBANDWidth? (Query Only)

This query returns the maximum bandwidth, in hertz, for RF channels. If no RF channels are present, the query returns 0. Enabling this feature requires an MDO4000/B Series oscilloscope and installation of a MDO4TRIG application module.

Group Configuration

Syntax `CONFIGuration:RF:MAXBANDWidth?`

Related Commands (See page 2-47, *RF Command Group* .)

Returns `<NR3>`, which is a floating point number that represents the maximum RF bandwidth, in hertz.

CONFIGuration:RF:NUMCHANnels? (Query Only)

This query returns the number of RF channels present. If no RF channels are present, the query returns 0.)

Group Configuration

Syntax `CONFIGuration:RF:NUMCHANnels?`

Related Commands (See page 2-47, *RF Command Group* .)

Returns <NR1>

CONFIGuration:ROSC? (Query Only)

This query returns a boolean value to indicate whether the instrument has an external reference oscillator (ROSC) input.

Group Configuration

Syntax CONFIGuration:ROSC?

Returns <NR1> = 1 if a ROSC input is present.

<NR1> = 0 if a ROSC input is not present.

CURSor?

Returns all of the current cursor settings.

Group Cursor

Syntax CURSor?

Examples CURSOR? might return the following as the current cursor settings:

```
:CURSOR:FUNCTION SCREEN;HBARS:POSITION1 0.0000;POSITION2
0.0000;UNITS BASE;:CURSOR:MODE INDEPENDENT;VBARS:POSITION1
-19.0006E-6;POSITION2 -18.9994E-6;UNITS SECONDS
```

CURSor:DDT? (Query Only)

Returns the cursor deltaY/deltaT (dY/dT) readout.

Conditions This command requires a DPO4PWR application module.

Group Cursor

Syntax CURSor:DDT?

Examples `CURSOR:DDT?` might return `:CURSOR:DDT -166.6670` indicating that the cursor dV/dt read out is -166.6670

CURSor:FUNCtion

This command selects the cursor mode. In Waveform mode, the cursors are attached to the selected waveform; in Screen mode, cursors are attached to the display area .

Group Cursor

Syntax
```
CURSor:FUNCtion {SCREEN|WAVEform|OFF}
CURSor:FUNCtion?
```

Related Commands CURSor:SOUrce,

CURSor:MODe

Arguments `SCREEN` specifies to display both horizontal and vertical bar cursors, which measure the selected waveform in horizontal and vertical units. Use these cursors to measure anywhere in the waveform display area.

`WAVEform` specifies to display the paired cursors in YT display format for measuring waveform amplitude and time. In XY and XYZ format, these cursors indicate the amplitude positions of an XY pair (Ch1 vs Ch2 voltage, where Ch1 is the X axis and Ch2 is the Y axis) relative to the trigger.

`OFF` removes the cursors from the display.

Examples `CURSOR:FUNCTION WAVEFORM` selects the paired cursors for measuring waveform amplitude and time.

`CURSOR:FUNCTION?` might return `:CURSor:FUNCtion SCREEN` indicating that the screen cursors are currently selected.

CURSor:HBArs? (Query Only)

Returns the current settings for the horizontal bar cursors.

Group Cursor

Syntax `CURSor:HBArs?`

Examples `CURSOR:HBARS?` might return the horizontal bar setting as `:CURSOR:HBARS:POSITION1 320.0000E-03;POSITION2-320.0000E-03;UNITS BASE`

CURSor:HBArs:DELTa? (Query Only)

Returns the vertical difference between the two horizontal bar cursors.

Group Cursor

Syntax `CURSor:HBArs:DELTa?`

Related Commands CURSor:HBArs:UNIts

Returns A floating point value with an exponent.

Examples `CURSOR:HBARS:DELTA?` might return `:CURSOR:HBARS:DELTA 5.0800E+00` indicating that the difference between the two cursors is 5.08.

CURSor:HBArs:POSITION<x>

This command specifies the horizontal bar cursor position relative to ground, which is expressed in vertical units (usually volts). The cursor is specified by x, which can be 1 or 2.

Group Cursor

Syntax
```
CURSor:HBArs:POSITION<x> <NR3>
CURSor:HBArs:POSITION<x>?
```

Related Commands CURSor:FUNCtion

Arguments `<NR3>` is a floating point number that specifies the cursor position relative to ground.

Examples `CURSOR:HBARS:POSITION1 25.0E-3` positions Cursor 1 of the horizontal cursors at 25 mV.

CURSOR:HBARS:POSITION2? might return :CURSOR:HBARS:POSITION2 -64.0000E-03 indicating that Cursor 2 of the horizontal bar cursors is at -64 mV.

CURSor:HBArs:UNIts

This command specifies the units for the horizontal bar cursors.

Group Cursor

Syntax
```
CURSor:HBArs:UNIts {BASE|PERcent}
CURSor:HBArs:UNIts?
```

Arguments BASE selects the vertical units for the selected waveform.

PERcent selects ratio cursors.

Examples CURSOR:HBARS:UNITS might return :CURSOR:HBARS:UNITS BASE indicating that the units for the horizontal bar cursors are base.

CURSor:HBArs:USE (No Query Form)

This command specifies the horizontal bar cursor measurement scale. This command is only applicable when the ratio cursors are turned on.

Group Cursor

Syntax
```
CURSor:HBArs:USE {CURrent|HALFgrat}
```

Related Commands CURSor:HBArs:UNIts

Arguments CURrent sets the H Bar measurement scale so that 0% is the current position of the lowest H Bar cursor and 100% is the current position of the highest H Bar cursor.

HALFgrat sets H Bar measurement scale so that half the screen major divisions (five on the MSO/DPO4000B and MDO4000/B, four on the MDO3000) is 100%, where 0% is -2.5 divisions and 100% is +2.5 divisions from the center horizontal graticule.

Examples CURSOR:HBARS:USE HALFGRAT sets the H Bar measurement scale so that five screen major divisions equals 100%.

CURSor:MODe

This command specifies whether the two cursors move linked together in unison or separately. This command is equivalent to setting Linked to On or Off in the Cursor menu.

Group Cursor

Syntax

```
CURSor:MODe {TRACk|INDependent}
CURSor:MODe?
```

Arguments

`TRACk` ties the navigational functionality of the two cursors together. For cursor 1 adjustments, this ties the movement of the two cursors together; however, cursor 2 continues to move independently of cursor 1. This mode only applies when the DISplay:XY:WITHYT is set to `OFF`.

`INDependent` allows independent adjustment of the two cursors.

Examples

`CURSOR:MODE TRACK` specifies that the cursor positions move in unison.

`CURSOR:MODE?` might return `:CURSOR:MODE TRACK` indicating that the two cursors move in unison.

CURSor:SOUrce

This command specifies the cursor source waveform, which can be one of channels 1-4, reference waveforms 1-4, math waveform, bus 1-4, digital channels 0-15 (MSO /MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed), the RF time domain traces (MDO4000/B models), or AUTO. When the cursor source is set to AUTO, cursor readouts apply to the currently selected waveform.

Group Cursor

Syntax

```
CURSor:SOUrce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4|MATH
|BUS1|BUS2|BUS3|BUS4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15|RF_AMPlitude|RF_FREQuency|RF_PHASe|AUTO}

CURSor:SOUrce?
```

Related Commands SELect:CONTROl,

CURSor:MODe,

CURSor:FUNCtion

Arguments

CH1-4 – specifies one of the analog waveforms as the cursor source.

REF1-4 – specifies one of the reference waveforms as the cursor source.

MATH – specifies the cursor source as the math waveform.

BUS1-4 – specifies the cursor source as one of the bus waveforms.

D0-D15 – specifies the cursor source as one of the digital waveforms. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_AMPlitude|RF_FREQuency|RF_PHASe – specifies the cursor source as one of the RF time domain traces (Amplitude vs. Time, Frequency vs. Time or Phase vs. Time). (MDO4000/B series models only.)

AUTO – specifies the currently selected waveform. The selected waveform can be determined by querying SELect:CONTROl

Examples

CURSor:SOUrce CH3 sets the cursor source to Channel 3.

CURSor:SOUrce? might return AUTO, indicating that the cursor source has been set to the currently selected waveform.

CURSor:VBArs? (Query Only)

Returns the current settings for the vertical bar cursors.

Group

Cursor

Syntax

CURSor:VBArs?

Examples

CURSOR:VBARS? might return the following vertical bar settings :CURSOR:VBARS:UNITS SECONDS;POSITION1 1.0000E-06;POSITION2 9.0000E-06

CURSor:VBArs:ALTERNATE<x>? (Query Only)

Returns the alternate readout for the waveform (Vbar) cursors specified by <x>. This alternate readout is in effect when the selected waveform is a bus or digital channel.

Group Cursor

Syntax `CURSor:VBArs:ALTERNATE<x>?`

Arguments `x = 1` specifies vertical bar cursor1.

`x = 2` specifies vertical bar cursor2.

CURSor:VBArs:DELTa? (Query Only)

Returns the horizontal difference between the two vertical bar cursors. The units are specified by the `CURSor:VBArs:UNIts` command.

Group Cursor

Syntax `CURSor:VBArs:DELTa?`

Related Commands CURSor:VBArs:UNIts

Returns `<NR3>`

Examples `CURSOR:VBARS:DELTA?` might return `:CURSOR:VBARS:DELTa 1.0640E+00` indicating that the time between the vertical bar cursors is 1.064 s.

CURSor:VBArs:HPOS<x>? (Query Only)

Returns the vertical value of the specified vertical bar ticks for cursor <x>.

Group Cursor

Syntax `CURSor:VBArs:HPOS<x>?`

Related Commands CURSor:VBArs:UNIts

Arguments <x> specifies the cursor. Valid values are 1 and 2.

Returns <NR3> is a floating point number that indicates the value of one of the ticks. The units are the same as the selected waveform.

Examples CURSor:VBArs:HPOS2? might return CURSOR:VBARS:HPOS2 100E-3, indicating the waveform value where the cursor intersects it is 0.100.

CURSor:VBArs:POSITION<x>

This command specifies the horizontal position for the specified vertical bar cursor. The cursor is specified by <x>, which can be 1 or 2. Values are with respect to trigger position or the zero reference point for the designated waveform (if horizontal units are not set to time). Use the CURSor:VBArs:UNIts command to specify units.

Group Cursor

Syntax
```
CURSor:VBArs:POSITION<x> <NR3>
CURSor:VBArs:POSITION<x>?
```

Related Commands CURSor:VBArs:UNIts

Arguments <NR3> is a floating point number that specifies the cursor position.

Returns A floating point value with an exponent.

Examples CURSor:VBArs:POSITION2 9.00E-6 positions the cursor2 vertical bar cursor at 9 ms.

CURSor:VBArs:POSITION1? this command might return :CURSOR:VBARS:POSITION1 1.0000E-06 indicating that the cursor1 vertical bar is positioned at 1 µs.

CURSor:VBArs:UNIts

This command specifies the units for the vertical bar cursors.

Group Cursor

Syntax

```
CURSor:VBArs:UNIts {SEConds|HERtz|DEGrees|PERcent}
CURSor:VBArs:UNIts?
```

Arguments

`SEConds` sets the units of the vertical bar cursors for the time domain (seconds).

`HERtz` sets the units of the vertical bar cursors for the frequency domain (hertz).

`DEGrees` sets the units to degrees for measuring phase.

`PERcent` sets the units to percent for use with ratio cursors.

Returns

`SECONDS`, `HERTZ`, `DEGREES`, or `PERCENT`, depending on the current vertical bar cursor units.

Examples

`CURSOR:VBARS:UNITS HERtz` sets the units of the VBArs cursors to 1/seconds.

`CURSOR:VBARS:UNITS?` might return `:CURSOR:VBARS:UNITS SECONDS` indicating that the units for the vertical bar cursor are currently set to seconds.

CURSor:VBArs:USE (No Query Form)

Sets the vertical bar cursor measurement scale.

Conditions

This command is only applicable when ratio cursors are on.

Group

Cursor

Syntax

```
CURSor:VBArs:USE {CURrent|HALFgrat|FIVEdivs}
```

Related Commands

CURSor:VBArs:UNIts

Arguments

`CURrent` sets the V Bar measurement scale so that 0% is the current position of the left-most V Bar cursor and 100% is the current position of the right-most V Bar cursor.

`HALFgrat` resets the ratio range to the default positions on the screen, half of the number of horizontal divisions (five on the MSO/DPO4000B and MDO4000/B), from 25% to 75% of the screen.

`FIVEdivs` sets V Bar measurement scale so that 5 screen major divisions is 100%, where 0% is -2.5 divisions and 100% is +2.5 divisions from the center vertical graticule.

Examples `CURSOR:VBARS:USE CURRENT` sets the V Bar measurement scale to use the current cursor positions as 0% and 100% of scale if units are set to %.

CURSor:VBArs:VDELTa? (Query Only)

Returns the vertical difference between the two vertical bar cursor ticks.

Group Cursor

Syntax `CURSor:VBArs:VDELTa?`

Related Commands CURSor:HBArs:UNIts

Returns <NR3> indicates the vertical difference between the two vertical bar cursors' ticks.

Examples `CURSOR:VBARS:VDELTA?` might return CURSOR:VBARS:VDELTA 1.064E+0, indicating that the vertical difference between the vertical bar cursors ticks is 1.064 units.

CURSor:XY:POLar:RADIUS:DELta? (Query Only)

Returns the difference between the cursors X radius and the cursor Y radius (ΔY¸ ΔX). The ratio is calculated as (cursor 2 Y - cursor 1 Y) ÷ (cursor 2 X - cursor 1 X).

Group Cursor

Syntax `CURSor:XY:POLar:RADIUS:DELta?`

CURSor:XY:POLar:RADIUS:POSITION<x>? (Query Only)

Returns the polar radius for the specified cursor, where x can be either 1 or 2.

Group Cursor

Syntax `CURSor:XY:POLar:RADIUS:POSITION<x>?`

CURSor:XY:POLar:RADIUS:UNIts? (Query Only)

Returns the polar radius units.

Group Cursor

Syntax `CURSor:XY:POLar:RADIUS:UNIts?`

CURSor:XY:POLar:THETA:DELta? (Query Only)

Returns the XY cursor polar angle delta.

Group Cursor

Syntax `CURSor:XY:POLar:THETA:DELta?`

CURSor:XY:POLar:THETA:POSITION<x>? (Query Only)

Returns the cursor X or cursor Y polar coordinate, where x is either 1 or 2.

Group Cursor

Syntax `CURSor:XY:POLar:THETA:POSITION<x>?`

CURSor:XY:POLar:THETA:UNIts? (Query Only)

Returns the cursor coordinate units.

Group Cursor

Syntax `CURSor:XY:POLar:THETA:UNIts?`

CURSor:XY:PRODUCT:DELta? (Query Only)

Returns the difference between the cursors X position and cursor Y position. The ΔX × ΔY value is calculated as (X2 - X1) × (Y2 - Y1).

Group Cursor

Syntax `CURSor:XY:PRODUCT:DELta?`

CURSor:XY:PRODUCT:POSITION<x>? (Query Only)

Returns the position of the X or Y cursor used to calculate the X × Y cursor measurement, Position 1 = (X1 × Y1); Position 2 = (X2 × Y2). The cursor is specified by x, which can be 1 or 2.

Group Cursor

Syntax `CURSor:XY:PRODUCT:POSITION<x>?`

CURSor:XY:PRODUCT:UNIts? (Query Only)

Returns the XY cursor product units.

Group Cursor

Syntax `CURSor:XY:PRODUCT:UNIts?`

CURSor:XY:RATIO:DELta? (Query Only)

Returns the ratio of the difference between the cursors X position and cursor Y position (ΔY¸ ΔX). The ratio is calculated as (Y2 - Y1) / (X2 - X1).

Group Cursor

Syntax `CURSor:XY:RATIO:DELta?`

CURSor:XY:RATIO:POSITION<x>? (Query Only)

Returns the X (horizontal) or Y (vertical) position for the specified cursor, which can be 1 (X) or 2 (Y). The ratio is calculated as Position 1 = (Y1/X1); Position 2 = (Y2/X2).

Group Cursor

Syntax `CURSor:XY:RATIO:POSITION<x>?`

CURSor:XY:RATIO:UNIts? (Query Only)

Returns the cursor X and cursor Y units for the ratio measurement.

Group Cursor

Syntax `CURSor:XY:RATIO:UNIts?`

CURSor:XY:READOUT

This command specifies the XY cursor readout selection.

Group Cursor

Syntax
```
CURSor:XY:READOUT {RECTangular|POLARCord|PRODuct|RATio}
CURSor:XY:READOUT?
```

Arguments

`RECTangular` specifies the XY readout as rectangular coordinates.

`POLARCord` specifies the XY readout as polar coordinates.

`PRODuct` specifies the XY readout in X*Y format.

`RATio` specifies the XY readout in X:Y format.

CURSor:XY:RECTangular:X:DELta? (Query Only)

Returns the cursor X delta value in rectangular coordinates.

Group Cursor

Syntax `CURSor:XY:RECTangular:X:DELta?`

CURSor:XY:RECTangular:X:POSITION<x>

This command specifies the X rectangular coordinate for cursor 1 or cursor 2. The cursor is specified by x and can be either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:X:POSITION<x> <NR3>
CURSor:XY:RECTangular:X:POSITION<x>?
```

Arguments <NR3> is a floating point number that specifies the coordinate in volts.

CURSor:XY:RECTangular:X:UNIts? (Query Only)

Returns the cursor X rectangular units.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:X:UNIts?
```

CURSor:XY:RECTangular:Y:DELta? (Query Only)

Returns The cursor Y delta value in rectangular coordinates.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:Y:DELta?
```

CURSor:XY:RECTangular:Y:POSITION<x>

This command specifies the Y rectangular coordinate for cursor 1 or cursor 2. The cursor is specified by x and can be either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:Y:POSITION<x> <NR3>
CURSor:XY:RECTangular:Y:POSITION<x>?
```

Arguments <NR3> is a floating point number that specifies the coordinate in volts.

CURSor:XY:RECTangular:Y:UNIts? (Query Only)

Returns the cursor Y rectangular units.

Group Cursor

Syntax CURSor:XY:RECTangular:Y:UNIts?

CURVe

The CURVe command transfers the waveform data points ***to*** the oscilloscope's internal reference memory location (REF1–4), which is specified by the DATa:DESTination command. The CURVe? query transfers data ***from*** the oscilloscope; the source waveform is specified by the DATa:SOUrce command. The first and last data points are specified by the DATa:STARt and DATa:STOP commands.

Associated with each waveform transferred using the CURVe command or query is a waveform preamble that provides the data format, scale and associated information needed to interpret the waveform data points. The preamble information for waveforms sent ***to*** the oscilloscope is specified using the WFMInpre commands. The preamble information for waveforms transferred ***from*** the oscilloscope is specified or queried using the WFMOutpre commands. If the waveform is not displayed, the query form generates an error.

The CURVe command and CURVe? query transfer waveform data in ASCII or binary format. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header immediately followed by the binary data. The IEEE488.2 binary block header is defined as follows:

#N<N-digits>

where: N is a single decimal or hexadecimal digit indicating the number of digits to follow. <N-digits> are the decimal digits representing the number of bytes in the data that immediately follows this binary block header.

The Waveform Transfer command group text contains more comprehensive information. (See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *In order to guarantee that the waveform data returned from* `CURVE?` *queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using* *ACQuire:STOPAfter* `SEQuence`.

NOTE. *A series of examples of waveform transfer command sequences is included as an appendix. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

Example 7: RF Frequency Domain Waveform

Group Waveform Transfer

Syntax

```
CURVe {<Block>|<asc curve>}
CURVe?
```

Related Commands DATa:DESTination

DATa:ENCdg

DATa:SOUrce

DATa:STARt

DATa:STOP

WFMInpre?

WFMOutpre?

ACQuire:MODe

Arguments `<Block>` is the waveform data in binary format. The waveform is formatted as follows:

<IEEE488.2 binary block header><data><newline>

<IEEE488.2 binary block> is the header, which is defined as #N<N-digits>

N is a single decimal or hexadecimal digit indicating the number of digits to follow.

<N-digits> are the decimal digits representing the number of bytes in the data that immediately follows this binary block header. (Use the WFMInpre:BYT_Nr command to set the width for waveforms transferred into the oscilloscope. Use WFMOutpre:BYT_Nr to set the width for waveforms transferred out from the oscilloscope.)

<data> is the curve data.

<newline> is a single byte new line character at the end of the data.

<asc curve> is the waveform data in ASCII format. The format for ASCII data is <NR1>[,<NR1>..], where each <NR1> represents a data point. For RF frequency domain waveforms, the data is transmitted as 4-byte floating point values (NR2 or NR3).

Examples

CURVe 0,1,4,32,-120 … — This command sends ASCII data values to the specified destination reference waveform (DATa:DESTination).

CURVe #510000<10000 binary bytes> — This command sends 10,000 binary data bytes to the specified destination reference waveform (DATa:DESTination).

CURVE? with ASCII encoding, START and STOP of 1 and 10 respectively, and a width set to 1 might return :CURVe 61,62,61,60,60,-59,-59,-58,-58,-59

CURVe? with ASCII encoding, START and STOP of 1 and 5 respectively, and DATa:SOUrce set to RF_NORMal might return :CURVE 1.20635E-11,6.30522E-12,1.46334E-11,8.97143E-12,4.87173E-12.

CURVe? with ASCII encoding, START and STOP of 1 and 5 respectively, and DATa:SOUrce set to RF_NORMal might return :CURVE 1.20635E-11,6.30522E-12,1.46334E-11,8.97143E-12,4.87173E-12.

NOTE. *Curve data is transferred from the oscilloscope asynchronously, depending on the length of the curve record. Such transfers may require several seconds to complete. During this period, the oscilloscope will not respond to the user controls. You can interrupt these asynchronous data transfers by sending a device clear message to the oscilloscope or by interrupting the query with another command or query. In order to verify that curve data has been completely transferred, it is recommended that you follow such queries with an *ESR? query to verify there are no error bits set. You can also check the event queue to determine the cause of the error, if any. If the error was caused by an interrupted query, then the asynchronous data transfer was not complete when the *ESR? query was sent. In such cases, it may be necessary to increase the program's time-out value to ensure that all data is transferred and read.*

DATa

These commands specify the format and location of waveform data that is transferred using the CURVe command, or return the format and location of the waveform data that is transferred with the CURVe? query. You can use the INIT argument to reset all of the DATa parameters to default values. (Note that the *RST and FACtory commands do not reset the DATa parameters.) You can use the SNap argument to automatically set the DATa:STARt and DATa:STOP values to the starting and stopping point of the waveform cursors (if on). Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
DATa {INIT|SNAp}
DATa?
```

Related Commands CURVe,

DATa:STARt,

DATa:STOP,

DATa:ENCdg,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments INIT initializes the waveform data parameters to their factory defaults except for DATa:STOP, which is set to the current acquisition record length. The data waveform preamble parameters are initialized to the following values:

:DATa:SOUrce CH1

:DATa:DESTination REF1

:WFMInpre:BYT_NR 1

:WFMInpre:BIT_NR 8

:WFMInpre:ENCDG BINARY

:WFMInpre:BN_FMT RI

:WFMInpre:BYT_OR MSB

:WFMInpre:PT_FMT Y

:WFMOutpre:BYT_NR 1

:WFMOutpre:BIT_NR 8

:WFMOutpre:ENCDG BINARY

:WFMOutpre:BN_FMT RI

:WFMOutpre:BYT_OR MSB

:WFMOutpre:NR_PT <current acquisition record length>

:WFMOutpre:PT_FMT Y

SNAp sets DATa:STARt and DATa:STOP to match the current waveform cursor positions.

Examples

DATA? might return :DATA:DESTINATION REF1:ENCDG RIBINARY;SOURCE CH1;START 1;STOP 500;WIDTH 1

DATA INIT initializes the waveform data parameters to their factory defaults.

DATa:DESTination

This command specifies the reference memory location (REF1–4) for storing waveform data transferred into the oscilloscope using the CURVe command.

(See page 2-93, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:DESTination REF<x>
DATa:DESTination?
```

Related Commands

CURVe

Arguments

REF<x> is the reference location where the waveform will be stored.

Examples

DATA:DESTINATION? might return :DATA:DESTINATION REF3 indicating that reference 3 is the currently selected reference memory location for incoming waveform data. DATA:DESTINATION REF1 indicates that incoming waveform data be stored in reference 1.

DATa:ENCdg

This command specifies the encoding format for outgoing waveform data. This command is equivalent to setting WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or. Setting the `DATa:ENGdg` value causes the corresponding `WFMOutpre` values to be updated.

NOTE. *This command and query does not apply to incoming waveform data.*

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group

Waveform Transfer

Syntax

```
DATa:ENCdg
{ASCIi|FAStest|RIBinary|RPBinary|SRIbinary|SRPbinary|FPbinary|
SFPbinary}
```

```
DATa:ENCdg?
```

Related Commands

WFMOutpre:ENCdg,

WFMOutpre:BN_Fmt,

WFMOutpre:BYT_Or

Arguments

`ASCIi` specifies to use ASCII encoding for the waveform data queried using the `CURVe?` query. Data values are returned as signed decimal integers for analog channel and RF time domain data, 4-byte floating point values for RF frequency domain data, or hexadecimal values for Digital Collection data with 4 or 8 bytes per point. The maximum number of ASCII data points that can be queried using the `CURVe?` query is 1 million points. If more than 1 million points are desired, you must use one of the binary encodings. If ASCII is the value, then `BN_Fmt` and `BYT_Or` are ignored.

`FAStest` specifies the encoding which results in the fastest waveform data transfer rate. This sets the following: `WFMOutpre:ENCdg BINary`, `WFMOutpre:BIN_Fmt RI` and `WFMOutpre:BYT_Or MSB`.

`RIBinary` specifies the signed integer data point format, with the most significant byte transferred first.

When `DATa:WIDTH` is set to 1, the range is from -128 through 127. When `DATa:WIDTH` is 2, the range is from -32,768 through 32,768. Center screen is 0 (zero). The upper limit is the top of the screen and the lower limit is

the bottom of the screen. The default encoding is RIBINARY. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BN_Fmt RI and WFMOutpre:BYT_Or MSB.

RPBinary specifies the positive integer data-point representation, with the most significant byte transferred first.

When BYT_Nr is 1, the range of data values is 0 through 255. When BYT_Nr is 2, the range of data values is 0 to 65,535. The center of the screen is 127 for 1-byte data and is 32768 for 2-byte data. The upper limit is the top of the screen and the lower limit is the bottom of the screen. This sets the following: :WFMOutpre:ENCdg BINary,:WFMOutpre:BN_Fmt RP and WFMOutpre:BYT_Or MSB.

SRIbinary specifies the signed integer format. It is the same as RIBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BIN_Fmt RI and WFMOutpre:BYT_Or LSB.

SRPbinary specifies the positive integer format. It is the same as RPBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BN_Fmt RP and WFMOutpre:BYT_Or LSB.

FPbinary specifies floating point binary. It automatically forces DATa:WIDTH to 4 and BYT_OR to MSB (most significant byte transmitted first). This argument only applies to the frequency domain waveforms (MDO4000/B models only).

SFPbinary specifies floating point binary. It automatically forces DATa:WIDTH to 4 and BYT_OR to LSB (least significant byte transmitted first). This argument only applies to the frequency domain waveforms (MDO4000/B models only).

Table 2-52: DATa and WFMOutpre Parameter Settings

DATa:ENCdg Setting	WFMOutpre Settings			
	:ENCdg	:BN_Fmt	:BYT_Or	:BYT_NR
ASCii	ASC	N/A	N/A	1,2,4,8
FAStest	BIN	RI	MSB	1,2
RIBinary	BIN	RI	MSB	1,2
RPBinary	BIN	RP	MSB	1,2
SRIbinary	BIN	RI	LSB	1,2
SRPbinary	BIN	RP	LSB	1,2
FPbinary	BIN	FP	MSB	4
SFPbinary	BIN	FP	LSB	4

Examples

DATA:ENCDG? might return :DATa:ENCDG SRPBINARY for the format of the outgoing waveform data.

DATA:ENCDG RPBinary sets the data encoding format to be a positive integer where the most significant byte is transferred first.

DATa:SOUrce

This command specifies the source waveform to be transferred from the oscilloscope using the CURVe? query. The valid waveform sources are CH1-CH4, MATH, REF1-REF4, D0-D15, DIGital, RF_AMPlitude, RF_FREQuency, RF_PHASe, RF_NORMal, RF_AVErage, RF_MAXHold, and RF_MINHold. Setting DATa:SOUrce automatically constrains the following to valid values for the specified source waveform: WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr and WFMOutpre:BN_Fmt.

(See page 2-93, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|D0|D1|D2|D3
|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|DIGital
|RF_AMPlitude|RF_FREQuency|RF_PHASe|RF_NORMal|RF_AVErage|
RF_MAXHold|RF_MINHold}

DATa:SOUrce?
```

Related Commands

CURVe

Arguments

CH1–CH4 specifies which analog channel waveform data will be transferred from the oscilloscope to the controller, channels 1 through 4.

MATH specifies that the Math waveform data will be transferred from the oscilloscope to the controller.

REF1–REF4 specifies which Reference waveform data will be transferred from the oscilloscope to the controller.

D0–D15 specifies which digital channel waveform data will be transferred from the oscilloscope to the controller. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

DIGital specifies that the Digital Collection waveform data will be transferred from the oscilloscope to the controller. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_AMPlitude|RF_FREQuency|RF_PHASe (MDO4000/B models only)

and RF_NORMal|RF_AVErage| RF_MAXHold|RF_MINHold specify that the RF data will be transferred from the oscilloscope to the controller (MDO models only).

Examples

DATA:SOURCE? might return :DATA:SOURCE REF3 indicating that Reference location 3 is the source for the waveform data that is transferred using a CURVe? query.

DATA:SOURCE CH1 specifies that the CH1 waveform will be transferred in the next CURVe? query.

DATa:STARt

This command specifies the starting data point for incoming or outgoing waveform transfer using the CURVe command or query. (Use DATa:STOP to specify the ending data point.) You can set the DATa:STARt and DATa:STOP values automatically to the starting and stopping points of the waveform cursors, if on, using DATa SNap. Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.

(See page 2-93, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:STARt <NR1>
DATa:STARt?
```

Related Commands

CURVe,

DATa,

DATa:STOP,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments

<NR1> is the first data point that will be transferred, which ranges from 1 to the record length. Data will be transferred from <NR1> to DATa:STOP or the record length, whichever is less. If <NR1> is greater than the record length, the last data point in the record is transferred.

DATa:STARt and DATa:STOP are order independent. When DATa:STOP is greater than DATa:STARt, the values will be swapped internally for the CURVe? query.

Examples

DATA:START? might return :DATA:START 214 indicating that data point 214 is the first waveform data point that will be transferred.

DATA:START 10 specifies that the waveform transfer will begin with data point 10.

DATa:STOP

This command specifies the final data point that will be transferred when using the CURVe command or query for incoming or outgoing waveform transfer. (UseDATa:STARt to specify the starting data point.)

NOTE. *The oscilloscope automatically adjusts the DATa:START and DATa:STOP values for CURVe queries when the DATa:STOP value is less than the DATa:START value, and also when the DATa:START and/or DATa:STOP values are greater than the record length of the source waveform. The adjusted DATa:START and DATa:STOP values determine WFMOutpre:NR_Pt.*

You can set the DATa:STARt and DATa:STOP values to automatically to the starting and stopping points of the waveform cursors, if on, using the DATa command with the SNap argument. Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.

Changes to the record length value are not automatically reflected in the DATa:STOP value. As record length is varied, the DATa:STOP value must be explicitly changed to ensure the entire record is transmitted. In other words, curve results will not automatically and correctly reflect increases in record length if the difference of DATa:STARt and DATa:STOP remains smaller than the increased record length. Note that DATa:STOP can be larger than the record length. (Use WFMOutpre:NR_Pt? to find how many samples are available.)

(See page 2-93, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:STOP <NR1>
DATa:STOP?
```

Related Commands

CURVe,

DATa,

DATa:STARt,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments

<NR1> is the last data point that will be transferred, which ranges from 1 to the record length. If<NR1> is greater than the record length, then data will be transferred up to the record length. If both DATa:STARt and DATa:STOP are greater than the record length, the last data point in the record is returned.

DATa:STARt and DATa:STOP are order independent. When DATa:STOP is less than DATa:STARt, the values will be swapped internally for the CURVe? query.

If you always want to transfer complete waveforms, set DATa:STARt to 1 and DATa:STOP to the record length of the source waveform, or larger.

Examples

DATA:STOP? might return DATA:STOP 14900 indicating that 14900 is the last waveform data point that will be transferred.

DATA:STOP 15000 specifies that the waveform transfer will stop at data point 15000.

DATa:WIDth

This command specifies the width, in bytes per point, for waveform data transferred from the scope via the CURVe? query. (This command is synonymous with WFMOutpre:BYT_Nr .) When the source is CH1-CH4, REF1-REF4, MATH, D0-D15, RF_AMPlitude, RF_FREQuency and RF_PHASe, the default width is 1 byte. When the source is RF_NORMal, RF_AVERage, RF_MAXHold, RF_MINHold or DIGital, the default width is 4 bytes.

NOTE. *The RF time domain traces, RF_AMPlitude, RF_FREQuency and RF_PHASe, are only available on the MDO4000/B series models.*

NOTE. *This command is equivalent to the* ***WFMOutpre:BYT_Nr*** *command.*

(See page 2-93, Waveform Transfer Command Group.)

Group

Waveform Transfer

Syntax

```
DATa:WIDth <NR1>
DATa:WIDth?
```

Related Commands

CURVe?,

DATa:SOUrce,

DATa:DESTination,

WFMOutpre:BYT_Nr

Arguments <NR1> is an integer that indicates the number of bytes per point for the outgoing waveform data when queried using the CURVe? command. For analog channel and RF_FREQuency, RF_PHASe and RF_AMPlitude traces (MDO4000/B only), the values can be 1 or 2. For digital channels (D0 through D15), the values can be 1 or 2. For the digital collection (DATa:SOUrce DIGital), the values can be 4 or 8. For RF_NORMal, RF_AVERage, RF_MAXHold, or RF_MINHold, the value can only be 4 as this is 32-bit floating point data.

Examples DATa:WIDth 2 sets the width of waveform data to be read from the scope to 2 bytes.

DATa:WIDth? might return 1, indicating that a width of 1 byte has been set.

DATE

This command specifies the date the oscilloscope displays.

Group Miscellaneous

Syntax
```
DATE <QString>
DATE?
```

Related Commands TIMe

Arguments <QString> is a date in the form "yyyy-mm-dd" where yyyy refers to a four-digit year number, mm refers to a two-digit month number from 01 to 12, and dd refers to a two-digit day number in the month.

Examples DATE "2006-01-24" specifies that the date is set to January 24, 2006.

DATE? might return :DATE 2006-01-24 indicating the current date is set to January 24, 2014.

*DDT

Allows you to specify a command or a list of commands that execute when the oscilloscope receives a *TRG command or the GET IEEE488.2 interface message. Define Device Trigger (*DDT) is a special alias that the *TRG command uses.

Group Miscellaneous

Syntax

```
*DDT {<Block>|<QString>}
*DDT?
```

Related Commands

*TRG

Arguments

<Block> is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters. The format of this argument is always returned as a query.

<QString> is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters.

Examples

`*DDT #OACQUIRE:STATE RUN` specifies that the acquisition system will be started each time a *TRG command is sent.

DESE

This command specifies the bits in the Device Event Status Enable Register (DESER). The DESER is the mask that determines whether events are reported to the Standard Event Status Register (SESR), and entered into the Event Queue. For a detailed discussion of the use of these registers, see Registers. (See page 3-1, *Registers*.)

Group

Status and Error

Syntax

```
DESE <NR1>
DESE?
```

Related Commands

*CLS, *ESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Arguments

<NR1> sets the binary bits of the DESER according to this value, which ranges from 1 through 255. For example, DESE 209 sets the DESER to the binary value 11010001 (that is, the most significant bit in the register is set to 1, the next most significant bit to 1, the next bit to 0, etc.).

The power-on default for DESER is all bits set if *PSC is 1. If *PSC is 0, the DESER maintains the previous power cycle value through the current power cycle.

NOTE. *Setting the DESER and ESER to the same value allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the *ESE command to set the ESER.*

Examples `DESE 209` sets the DESER to binary 11010001, which enables the PON, URQ, EXE and OPC bits.

`DESE?` might return `:DESE 186`, showing that the DESER contains the binary value 10111010.

DESkew (No Query Form)

Causes the deskew values for all channels to be set to the recommended values. Equivalent to pressing the "Set all deskews to recommended values" button in the application UI.

NOTE. *The actual deskew values for each channel can be set or queried using the CH<x>:DESKew command.*

Group Vertical

Syntax
```
DESkew {SETALLtorec}
```

Arguments `<SETALLtorec>` sets the deskew for all channels to the recommended values.

DESkew:DISPlay

This command specifies the state of the deskew table display.

Group Vertical

Syntax
```
DESkew:DISPlay {OFF|ON|0|1}
DESkew:DISPlay?
```

Arguments `OFF` or 0 turns off the deskew table display.

`ON` or 1 turns on the deskew table display.

DIAg:LOOP:OPTion

Sets the self-test loop option.

Group Calibration and Diagnostic

Syntax

```
DIAg:LOOP:OPTion {ALWAYS|FAIL|ONFAIL|ONCE|NTIMES}
```

Arguments

`ALWAYS` continues looping until the self tests (diagnostics) are stopped via the front panel or by an oscilloscope command.

`FAIL` causes looping until the first self test (diagnostic) failure or until self tests (diagnostics) are stopped.

`ONFAIL` causes looping on a specific test group as long as a FAIL status is returned from the test.

`ONCE` executes self test (diagnostics test) sequence once.

`NTIMES` runs "n" number of loops.

Examples `DIAG:LOOP:OPTION ONCE` runs one loop of self tests.

DIAg:LOOP:OPTion:NTIMes

Sets the self-test loop option to run N times.

Group Calibration and Diagnostic

Syntax

```
DIAg:LOOP:OPTion:NTIMes <NR1>
DIAg:LOOP:OPTion:NTIMes?
```

Arguments `<NR1>` is the number of self-test loops.

Examples `DIAG:LOOP:OPTION:NTIMES 3` sets the self-test loop to run three times.

`DIAG:LOOP:OPTION:NTIMES?` might return `:DIAG:LOOP:OPTION:NTIMES 5`, indicating the self-test loop is set to run five times.

DIAg:LOOP:STOP (No Query Form)

Stops the self-test at the end of the current loop.

Group Calibration and Diagnostic

Syntax `DIAg:LOOP:STOP`

Examples `DIAG:LOOP:STOP` stops the self test at the end of the current loop.

DIAg:RESUlt:FLAg? (Query Only)

Returns the pass/fail status from the last self-test sequence execution. Use this query to determine which test(s) has failed.

Group Calibration and Diagnostic

Syntax `DIAg:RESUlt:FLAg?`

Related Commands DIAg:RESUlt:LOG?

Returns `PASS` indicates that all of the selected self (diagnostic) tests have passed.

`FAIL` indicates that at least one of the selected self (diagnostic) tests has failed.

`IN PROGRESS` indicates that at least one of the selected self (diagnostic) tests is ongoing.

`NOT RUN` indicates that the selected diagnostic test suite has not been run since the instrument was powered on.

Examples `DIAG:RESULT:FLAG?` might return `DIAG:RESULT:FLAG PASS`.

DIAg:RESUlt:LOG? (Query Only)

Returns the internal results log from the last self-test sequence execution. The list contains all modules and module interfaces that were tested along with the pass/fail status of each.

Group Calibration and Diagnostic

Syntax `DIAg:RESUlt:LOG?`

Related Commands DIAg:RESUlt:FLAg?

Returns <QString> in the following format:

<Status>--<Module name>[,<Status>--<Module name>..]

Examples DIAG:RESULT:LOG? might return :DIAG:RESULT:LOG "NOT RUN--CPU,PASS--DISPLAY,NOT RUN--FPANEL,NOT RUN--IO,NOT RUN--ACQ,NOT RUN--RO M,NOT RUN--APPKEY"

DIAg:SELect (No Query Form)

This command specifies which of the diagnostic groups will be tested when the DIAg:STATE EXECute command is run.

Group Calibration and Diagnostic

Syntax

```
DIAg:SELect
{ALL|APPKey|CPU|DISplay|FPAnel|IO|ROM|ACQ|RF|AFG}
```

Arguments

ALL runs all diagnostic groups.

APPKey runs just the application key diagnostic group.

CPU runs just the CPU diagnostic group.

DISplay runs just the display circuit diagnostic group.

FPAnel runs just the front panel diagnostic group.

IO runs just the IO board diagnostic group.

ROM runs just the ROM board diagnostic group.

ACQ runs just the acquisition system diagnostic group.

RF runs just the RF system diagnostic group (MDO models only).

AFG runs just the AFG system diagnostic group (models with AFG hardware).

DIAg:SELect:<function> (No Query Form)

This command specifies which of the subsystems will be tested when the DIAg:STATE EXECute command is run.

Group Calibration and Diagnostic

Syntax `DIAg:SELect:<function>`

Related Commands DIAg:STATE EXECute

Arguments `<function>` specifies a single oscilloscope subsystem on which to run self tests (diagnostics). Valid values are:

`ACQ` tests the acquisition system.

`APPKey` tests the application keys.

`CPU` tests the CPU.

`DISplay` tests the display.

`FPAnel` tests the front panel controls.

`IO` tests the IO ports.

`ROM` tests the system read only memory.

Examples `DIAG:SELECT:CPU` specifies that the oscilloscope will test the CPU when the diagnostic test is run.

`DIAG:STATE EXECute` will actually run the test.

DIAg:STATE (No Query Form)

This command starts or stops the oscilloscope diagnostic self-tests. Which self-test is run is specified by the `DIAg:SELect:` or`DIAg:SELect:<function>` commands.

Group Calibration and Diagnostic

Syntax `DIAg:STATE {EXECute|ABORt}`

Arguments `EXECute` starts diagnostics.

`ABORt` stops diagnostics at the end of the current loop.

Examples `DIAG:STATE EXECute` starts diagnostics.

DISplay? (Query Only)

Returns the current display settings.

Group Display

Syntax `DISplay?`

DISplay:CLOCk

This command specifies whether the oscilloscope displays the date and time. The query form of this command returns an ON (1) or an OFF (0).

Group Display

Syntax
```
DISplay:CLOCk {ON|OFF|<NR1>}
DISplay:CLOCk?
```

Related Commands DATE,

TIMe

Arguments `ON` enables the display of date and time.

`OFF` disables the display of date and time.

`<NR1>` = 0 disables the display of date and time; any other value enables the display of date and time.

Examples `DISPLAY:CLOCK ON` enables display of date and time.

`DISPLAY:CLOCK?` might return `:DISPLAY:CLOCK 1` indicating that the display of date and time is currently enabled.

DISplay:DIGital:ACTIVity

Sets or returns the state of the digital channel monitor display. When enabled, the digital channel monitor is displayed when one or more of D0-D15 are turned on.

The data that is summarized in that display can be obtained by querying CURVe with the DATa:SOUrce set to `DIGital` and one or more digital channels D0-D15 turned on.

For more information, refer to the description of DIGital in the section entitled "Transferring a Waveform From an Oscilloscope to a Computer". (See page 2-94, *Transferring a Waveform from an Oscilloscope to a Computer*.)

Conditions Available only for MSO/MDO4000/B models and MDO3000 models with option MDO3MSO enabled.

Group Display

Syntax
```
DISplay:DIGital:ACTIVity {0|1|OFF|ON}
DISplay:DIGital:ACTIVity?
```

Arguments `1` or `ON` turns on the digital channel activity monitor display.

`0` or `OFF` turns it off.

Examples `DIS:DIG:ACTIV ON` turns on the digital channel activity monitor.

DISplay:DIGital:HEIght

This command specifies the number of available digital waveform position slots.

NOTE. *If the number of live digital channels exceeds the number of slots, their height is reduced to a smaller size, allowing all digital channels to be displayed.*

Group Display

Syntax
```
DISplay:DIGital:HEIght {SMAll|MEDium|LARge}
DISplay:DIGital:HEIght?
```

Arguments `SMAll` sets the height to display 4 digital waveforms per division.

`MEDium` sets the height to display 2 digital waveforms per division.

`LARge` sets the height to display 1 digital waveform per division.

DISplay:GRAticule

This command specifies the type of graticule the oscilloscope displays.

Group Display

Syntax
```
DISplay:GRAticule {CROSSHair|FRAme|FULl|GRId|SOLid}
DISplay:GRAticule?
```

Arguments

`CROSSHair` specifies a frame and cross hairs.

`FRAme` specifies a frame only.

`FULl` specifies a frame, a grid and cross hairs.

`GRId` specifies a frame and grid only.

`SOLid` specifies a solid graticule.

Examples

`DISPLAY:GRATICULE FRAme` sets the graticule type to display the frame only.

`DISPLAY:GRATICULE?` might return `:DISPLAY:GRATICULE FULL` indicating that all graticule elements are selected.

DISplay:INTENSITy? (Query Only)

Returns the display intensity settings.

Group Display

Syntax
```
DISplay:INTENSITy?
```

Examples

`DISPLAY:INTENSITY?` might return: `:DISPLAY:INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT HIGH`

DISplay:INTENSITy:BACKLight

Sets and returns the waveform backlight intensity settings.

Group Display

Syntax
```
DISplay:INTENSITy:BACKLight {LOW|MEDium|HIGH}
DISplay:INTENSITy:BACKLight?
```

Examples `DISPLAY:INTENSITY:BACKLIGHT?` might return
`DISPLAY:INTEnsITY:BACKLIGHT HIGH`

DISplay:INTENSITy:BACKLight:AUTODim:ENAble

Sets or returns the state of the display auto-dim feature. The default is enabled.

Once the backlight has dimmed, any button push or knob turn returns the backlight value to the value set by DISplay:INTENSITy:BACKLight.

Group Display

Syntax
```
DISplay:INTENSITy:BACKLight:AUTODim:ENAble {OFF|ON|0|1}
DISplay:INTENSITy:BACKLight:AUTODim:ENAble?
```

Arguments `OFF` or 0 turns off the display auto-dim feature.

`ON` or 1 turns it on.

DISplay:INTENSITy:BACKLight:AUTODim:TIMe

Sets or returns the amount of time, in minutes, to wait for no UI activity before automatically dimming the display. The time can range from a minimum of 10 minutes to a maximum of 1440 minutes (24 hours). The default is 60 minutes.

Group Display

Syntax
```
DISplay:INTENSITy:BACKLight:AUTODim:TIMe <NR1>
DISplay:INTENSITy:BACKLight:AUTODim:TIMe?
```

Arguments An integer that represents the amount of time, in minutes, to wait for no UI activity before automatically dimming the display.

DISplay:INTENSITy:GRAticule

Sets and returns the display graticule intensity settings.

Group Display

Syntax

```
DISplay:INTENSITy:GRAticule <NR1>
DISplay:INTENSITy:GRAticule?
```

Arguments

<NR1> is the graticule intensity and ranges from 0 to 100 percent.

Examples

DISPLAY:INTENSITY:GRATICULE? might return

```
DISPLAY:INTEnsITY:GRATICULE 30
```

DISplay:INTENSITy:WAVEform

Sets and returns the display waveform intensity settings.

Group

Display

Syntax

```
DISplay:INTENSITy:WAVEform <NR1>
DISplay:INTENSITy:WAVEform?
```

Arguments

<NR1> is the waveform intensity and ranges from 1 to 100 percent.

Examples

DISPLAY:INTENSITY:WAVEFORM? might return

```
DISPLAY:INTEnsITY:WAVEFORM 60
```

as the intensity of the waveforms.

DISplay:PERSistence

This command specifies the display persistence for analog waveforms. This affects the display only.

Group

Display

Syntax

```
DISplay:PERSistence {<NR3>|CLEAR|AUTO|INFInite|OFF}
DISplay:PERSistence?
```

Arguments

<NR3> is a floating point number that specifies the time of the persistence.

CLEAR resets the persist time count down and clears the display of acquired points.

INFInite displays waveform points until a control change resets the acquisition system.

NOTE. *When persistence is set to infinite, it does not mean that the brightness of any pixel should never decrease. The brightness of a pixel is proportionally dependent on the ratio between its intensity, which does NOT decrease at infinite persistence, and the maximum value of intensity of any pixel on the screen. Thus, if a particular pixel gets hit less often than others, its brightness will decrease over time. It will become less bright relative to the pixels that get hit more often.*

AUTO specifies that the oscilloscope automatically determines the best waveform persistence based on the value of waveform intensity (DISplay:INTENSITy:WAVEform)

OFF turns off DPO mode (0 seconds of persistence).

Examples DISPLAY:PERSISTENCE 3 specifies that the waveform points are displayed fading for 3 seconds before they completely disappear.

DISplay:STYle:DOTsonly

This command turns on or off the dots-only mode for the waveforms displayed in the time domain.

Group Display

Syntax
```
DISplay:STYle:DOTsonly {ON|OFF|<NR1>}
DISplay:STYle:DOTsonly?
```

Arguments ON or <NR1> ≠ 0 turns on the dots-only display.

OFF or <NR1> = 0 turns off the dots-only display.

DISplay:TRIGFrequency

This command switches the trigger frequency readout on or off.

Group Display

Syntax
```
DISplay:TRIGFrequency {OFF|ON|0|1}
DISplay:TRIGFrequency?
```

Related Commands TRIGger:FREQuency?

Examples

`DISplay:TRIGFrequency ON` turns the trigger frequency read out on.

`DISplay:TRIGFrequency?` might return 0, indicating that the trigger frequency readout is turned off.

DISplay:XY

This command turns on or off the XY display mode.

Group

Display

Syntax

```
DISplay:XY {OFF|TRIGgered}
DISplay:XY?
```

Related Commands

All `CURSOR:XY` commands.

Arguments

`OFF` – The channels are displayed individually as a function of time.

`TRIGgered` – The channels are displayed in "X-Y" pairs with CH1 being displayed as a function of CH2, and so on.

Examples

`DISplay:XY TRIG` specifies to use the XY display mode.

`DISPLAY:XY?` might return OFF, indicating that the XY display mode is not currently on.

DISplay:XY:WITHYT

Sets or returns the state of simultaneous display of the XY and YT waveforms when in TRIGgered XY display mode. (To set the mode to TRIGgered XY display, first use the command `:DISplay:XY TRIGgered.`)

When both the XY and YT waveforms are displayed, the YT waveform is displayed in the upper graticule, and the XY waveform is displayed in the lower graticule.

This command applies to the MDO3000 series only. For this platform, the default state is 0 (XY display only).

For the DPO/MSO4000B and MDO4000/B platforms, this command is ignored and the state is always 1 (to display both the XY and YT waveforms when in XY display mode).

NOTE. *For models with the DVM feature, such as the MDO3000, this command does not take effect if the :DVM:DISPLAYSTYle is set to FULl, but will take effect once the :DVM:DISPLAYSTYle is set to MINimum or if the DVM is turned off.*

Group Display

Syntax
```
DISplay:XY:WITHYT {0|1|OFF|ON}
DISplay:XY:WITHYT?
```

Related Commands All `CURSOR:XY` commands.

DVM:DISPLAYSTYle

Arguments `1` or `ON` turns on simultaneous display of the XY and YT waveforms when in TRIGgered XY display mode.

`0` or `OFF` turns simultaneous display off.

Examples `DISplay:XY:WITHYT` turns simultaneous display of the XY and YT waveforms when in TRIGgered XY display mode

DVM (No Query Form)

Resets the Digital Voltmeter measurements and history.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM {RESET}`

Arguments None

Examples `DVM:RESET` resets the DVM measurement and history.

DVM:AUTORange

Sets (or queries) the auto range state for the Digital Voltmeter.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax
```
DVM:AUTORange {0|1|OFF|ON}
DVM:AUTORange?
```

Arguments 1 or ON turns on the auto range state for the Digital Voltmeter.

0 or OFF turns it off.

Examples DVM:AUTOR ON turns on the auto range state for the Digital Voltmeter.

DVM:DISPLAYSTYle

Sets (or queries) the display style for the Digital Voltmeter.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax
```
DVM:DISPLAYSTYle {FULl|MINimum}
DVM:DISPLAYSTYle?
```

Arguments FULl sets the display style for the DVM to Full.

MINimum sets the display style for the DVM to Minimum.

Examples DVM:DISPLAYSTYLE MIN sets the display style for the DVM to Minimum.

DVM:MEASUrement:FREQuency? (Query Only)

Returns the current frequency value for the Digital Voltmeter.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:FREQuency?`

Examples `DVM:MEASU:FREQ?` might return `100.0000E+3,` which represents 100 KHz as the current frequency value for the DVM.

DVM:MEASUrement:HIStory:AVErage? (Query Only)

Returns the average readout value for the Digital Voltmeter function over the history period.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:HIStory:AVErage?`

Examples `DVM:MEASU:HIS:AVE?` might return `100.0000E+3,` which represents the average DVM readout value over the history period.

DVM:MEASUrement:HIStory:MAXimum? (Query Only)

Returns the maximum readout value for the DVM function over the history period.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:HIStory:MAXimum?`

Examples `DVM:MEASU:HIS:MAX?` might return `100.0000E+3`, which represents the maximum readout value for the DVM function over the history period.

DVM:MEASUrement:HIStory:MINImum? (Query Only)

Returns the minimum readout value for the DVM function over the history period.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:HIStory:MINImum?`

Examples `DVM:MEASU:HIS:MINI?` might return 100.0000E+3, which represents the minimum readout value for the DVM function over the history period.

DVM:MEASUrement:INFMAXimum? (Query Only)

Returns the maximum DVM readout value over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or `DVM RESET`.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:INFMAXimum?`

Examples `DVM:MEASU:INFMAX?` might return `100.0000E+3`, which represents the maximum readout value of the DVM function over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or `DVM RESET`.

DVM:MEASUrement:INFMINimum? (Query Only)

Returns the minimum readout value of the DVM function over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or `DVM RESET`.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:INFMINimum?`

Examples `DVM:MEASU:INMIN?` might return `100.0000E+3,` which represents the minimum readout value of the DVM function over the entire time that the DVM has been on since the last change using the DVM:MODe or DVM:SOUrce commands or `DVM RESET`.

DVM:MEASUrement:VALue? (Query Only)

Returns the Digital Voltmeter value.

Any qualifier, such as "Measurement warning, Clipping positive", is automatically set as an error event.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax `DVM:MEASUrement:VALue?`

Examples `DVM:MEASU:VAL?` might return 100.0000E+3, which represents the DVM value.

DVM:MODe

Specifies (or queries) the mode to use for the Digital Voltmeter (ACRMS, ACDCRMS, DC, Frequency, or OFF).

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax
```
DVM:MODe {ACRMS|ACDCRMS|DC|FREQuency|OFF}
DVM:MODe?
```

Arguments ACRMS – displays the root-mean-square value of the acquired data, with the DC component removed.

ACDCRMS – displays the RMS value of the acquired data.

DC – displays the DC value of the acquired data.

FREQuency – displays the frequency counter measurement.

OFF

Examples DVM:MODE DC sets the mode for the DVM to DC, which displays the DC value of the acquired data.

DVM:MOD? might return ACRMS, which indicates the mode is currently set to ACRMS.

DVM:SOUrce

Sets (or queries) the source for the Digital Voltmeter: Channel 1 - 4.

Conditions MDO3000 only; requires DVM option key to be installed.

Group DVM

Syntax
```
DVM:SOUrce {CH1|CH2|CH3|CH4}
DVM:SOUrce?
```

Arguments CH1|CH2|CH3|CH4 specify which channel to use as the source for the DVM.

Examples DVM:SOURCE CH4 sets the DVM source to Channel 4.

D<x>

This command specifies parameters for digital channel <x>, where x is the channel number.

Conditions Requires an MSO or MDO4000/B model, or MDO3000 with option MDO3MSO installed.

Group Vertical

Syntax

```
D<x>
```

D<x>:LABel

This command specifies the waveform label for digital channel <x>, where x is the channel number.

Conditions Requires an MSO or MDO4000/B model, or MDO3000 with option MDO3MSO installed.

Group Vertical

Syntax

```
D<x>:LABel <Qstring>
D<x>:LABel?
```

Arguments <Qstring> is an alphanumeric string of text, enclosed in quotes, that contains the text label information for the digital channel <x> waveform. The text string is limited to 30 characters.

Examples D4:LABEL? might return :D4:LABEL “Clk Wfm 4”.

D<x>:POSition

This command specifies the vertical position for digital channel <x>, where x is the channel number.

NOTE. Unlike analog channels, which use the center baseline as the zero point, digital channels use the bottom logic level as the zero point. Because of the slot model used to describe digital channel position, the oscilloscope rounds off divisions to the nearest slot.

Conditions Requires an MSO or MDO4000/B model, or MDO3000 with option MDO3MSO installed.

Group Vertical

Syntax

```
D<x>:POSition <NR3>
D<x>:POSition?
```

Arguments <NR3> is a floating point number that specifies the position of the digital channel, in slot units. Use the oscilloscope front-panel controls to place the channel; then query the channel to obtain an exact value for the position.

D<x>:THReshold

This command specifies the logical threshold for the digital channel <x>, where x is the digital channel number D0 – D15.

NOTE. MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Changing one digital channel's threshold level changes all of the channels' levels in the same set.

Conditions Requires an MSO or MDO4000/B model, or MDO3000 with option MDO3MSO installed.

Group Vertical

Syntax

```
D<x>:THReshold {ECL|TTL|<NR3>}
D<x>:THReshold?
```

Arguments ECL sets the digital threshold for channel <x> to a preset ECL high level of -1.3V.

TTL sets the digital threshold for channel <x> to a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the digital threshold for channel <x>, in volts.

Examples

`D5:THRESHOLD ECL` sets the threshold for D5 digital channel to ECL levels.

`D14:threshold?` might return :D14:THRESHOLD 1.2500 indicating that the threshold level for the D14 digital channel is 1.25 volts.

*ESE

Sets and queries the bits in the Event Status Enable Register (ESER). The ESER prevents events from being reported to the Status Byte Register (STB). For a detailed discussion on how to use registers, see Registers. (See page 3-1, *Registers*.)

Group

Status and Error

Syntax

```
*ESE <NR1>
*ESE?
```

Related Commands

*CLS, DESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Arguments

`<NR1>` specifies the binary bits of the ESER according to this value, which ranges from 0 through 255.

The power-on default for the ESER is 0 if *PSC is 1. If *PSC is 0, the ESER maintains the previous power cycle value through the current power cycle.

NOTE. *Setting the DESER and the ESER to the same values allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the DESE command to set the DESER.*

Examples

`*ESE 209` sets the ESER to binary 11010001, which enables the PON, URQ, EXE, and OPC bits.

`*ESE?` might return 186, showing that the ESER contains the binary value 10111010.

*ESR? (Query Only)

Returns the contents of the Standard Event Status Register (SESR). *ESR? also clears the SESR (reading the SESR clears it). For a detailed discussion on how to use registers, see Registers. (See page 3-1, *Registers*.)

Group

Status and Error

Syntax `*ESR?`

Related Commands ALLEv?, *CLS, DESE, *ESE, EVENT?, EVMsg?, *SRE, *STB?

Examples `*ESR?` might return 213, showing that the SESR contains the binary value 11010101.

EMAIL:SETUp:FROMADDRess

Sets (or queries) the sender's email address for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.

Note: to set the email recipient address for Act on Event commands, use ACTONEVent:ACTION:EMAIL:SETUp:TOADDRess.

Group Email

Syntax
```
EMAIL:SETUp:FROMADDRess <QString>
EMAIL:SETUp:FROMADDRess?
```

Arguments Quoted string that represents the sender's email address. The maximum number of characters allowed is 128.

Examples `EMAIL:SETUP:FROMADDRESS "george.wilcox@tektronix.com"` sets the sender's email address to george.wilcox@tektronix.com.

EMAIL:SETUp:HOSTALIASNAMe

Sets (or queries) the email host alias name for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands. If this is an empty string, the DNS name of the instrument is used. This string is included in the email message.

Group Email

Syntax
```
EMAIL:SETUp:HOSTALIASNAMe <QString>
EMAIL:SETUp:HOSTALIASNAMe?
```

Arguments Quoted string that represents the email host alias name. The maximum number of characters allowed is 128.

Examples `EMAIL:SETUP:HOSTALIASNAME "pop2.mail.com"` sets the email host alias name to pop2.mail.com.

EMAIL:SETUp:SMTPLOGIn

Sets or returns the email SMTP server login ID for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.

Group Email

Syntax
```
EMAIL:SETUp:SMTPLOGIn <QString>
EMAIL:SETUp:SMTPLOGIn?
```

Arguments Quoted string that represents the email SMTP server login ID. The maximum number of characters allowed is 128.

Examples `EMAIL:SETUP:SMTPLOGIN "johnnysmith"` sets the email SMTP server login ID to johnnysmith.

EMAIL:SETUp:SMTPPASSWord (No Query Form)

Sets the email SMTP server login password for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands. For security reasons, no query form is provided.

Group Email

Syntax `EMAIL:SETUp:SMTPPASSWord <QString>`

Arguments Quoted string that represents the email SMTP server login password. The maximum number of characters allowed is 128.

Examples `EMAIL:SETUP:SMTPPASSWORD "foo7acme"` sets the email SMTP server login ID to foo7acme.

EMAIL:SETUp:SMTPPort

Sets or returns the email SMTP server port number for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands. The default port number is 25.

Group Email

Syntax
```
EMAIL:SETUp:SMTPPort <NR1>
EMAIL:SETUp:SMTPPort?
```

Arguments Integer that represents the email SMTP server port number.

Examples `EMAIL:SETUP:SMTPPORT 19` sets the email SMTP server port number to 19.

EMAIL:SETUp:SMTPServer

Sets or returns the email SMTP server DNS name for the common server setup information that is shared between the Act on Event commands and the Hardcopy Email commands.

Group Email

Syntax
```
EMAIL:SETUp:SMTPServer <QString>
EMAIL:SETUp:SMTPServer?
```

Arguments Integer that represents the email SMTP server DNS name.

Examples `EMAIL:SETUP:SMTPSERVER"SMTP1.mail.com"` sets the email SMTP server to SMTP1.mail.com.

ETHERnet:DHCPbootp

This command specifies the network initialization search for a DHCP/BOOTP server.

Group Ethernet

Syntax

```
ETHERnet:DHCPbootp {ON|OFF}
ETHERnet:DHCPbootp?
```

Arguments

`ON` enables the oscilloscope to search the network for a DHCP or BOOTP server in order to automatically assign a dynamic IP address to the oscilloscope.

NOTE. *Do not use DHCP/BOOTP searching if your oscilloscope has been assigned a static address on a network. If you set this command to ON, the DHCP/BOOTP search will delete or change your static IP address information.*

`OFF` disables the oscilloscope to search the network for a DHCP or BOOTP server.

Examples

`ETHERNET:DHCPBOOTP ON` sets the oscilloscope to search for a DHCP or BOOTP server and assign a dynamic IP address to the oscilloscope.

ETHERnet:DNS:IPADDress

This command specifies the network Domain Name Server (Dns) IP address.

Group Ethernet

Syntax

```
ETHERnet:DNS:IPADDress <QString>
ETHERnet:DNS:IPADDress?
```

Arguments

`<QString>` is a standard IP address value, enclosed in quotes.

Examples

`ETHERNET:DNS:IPADDRESS "128.196.13.352"` sets the Dns IP address that the oscilloscope uses to communicate with the network.

ETHERnet:DOMAINname

This command specifies the network domain name.

Group Ethernet

Syntax

```
ETHERnet:DOMAINname <Qstring>
ETHERnet:DOMAINname?
```

Arguments <QString> is the network domain name, enclosed in quotes.

Examples ETHERNET:DOMAINNAME "Alpha1.Mycorp.com" sets the domain name that the oscilloscope uses to communicate with the network.

ETHERnet:ENET:ADDress? (Query Only)

Returns the Ethernet address value assigned to the oscilloscope. This is assigned at the factory and can not be changed.

Group Ethernet

Syntax ETHERnet:ENET:ADDress?

Examples ETHERNET:ENET:ADDRESS? returns an Ethernet address such as 08:00:11:01:02:03

ETHERnet:GATEWay:IPADDress

This command specifies the remote interface gateway IP address.

Group Ethernet

Syntax
```
ETHERnet:GATEWay:IPADDress <QString>
ETHERnet:GATEWay:IPADDress?
```

Related Commands ETHERnet:NETWORKCONFig, ETHERnet:IPADDress, ETHERnet:SUBNETMask

Arguments <QString> is a standard IP address value, enclosed in quotes.

Examples ETHERNET:GATEWAY:IPADDRESS "128.143.16.1" sets the gateway IP address.

ETHERnet:HTTPPort

This command specifies the remote interface HTTP port value.

Group Ethernet

Syntax
```
ETHERnet:HTTPPort <QString>
ETHERnet:HTTPPort?
```

Arguments <QString> is an integer port number, enclosed in quotes.

NOTE. *Consider the following if you are using the e*Scope™ control software. If you don't enter a port address in the URL, then the* ETHERnet:HTTPPort *value must be set to "80", which is the default port for HTTP protocol. If you use a URL with a port address (for example: http://DPO4104B-04WKL4:1234), the port number is specified by the number after the colon. Set the* ETHERnet:HTTPPort *value to this same number.*

Examples ETHERNET:HTTPPORT "80" sets the HTTP port value to 80.

ETHERnet:IPADDress

This command specifies the IP address assigned to the oscilloscope.

Group Ethernet

Syntax
```
ETHERnet:IPADDress <QString>
ETHERnet:IPADDress?
```

Related Commands ETHERnet:NETWORKCONFig,

ETHERnet:SUBNETMask,

ETHERnet:GATEWay:IPADDress

Arguments <QString> is a standard IP address value, enclosed in quotes.

Examples ETHERNET:IPADDRESS "123.121.13.214" sets the oscilloscope's IP address.

ETHERnet:LXI:LAN:PASSWord:ENABle

This command controls whether LXI (LAN eXtensions for Instrumentation) is password protected.

Group Miscellaneous

Syntax
```
ETHERnet:LXI:LAN:PASSWord:ENABle {0|1|ON|OFF}
ETHERnet:LXI:LAN:PASSWord:ENABle?
```

Related Commands ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle, ETHERnet:PASSWord

Arguments

`0, OFF` — turns off the LXI password feature. This is the default.

`1, ON` — turns on the LXI password feature.

Examples

`ETHERnet:LXI:LAN:PASSWord:ENABle ON` turns on the LXI password feature.

`ETHERnet:LXI:LAN:PASSWord:ENABle?` might return 1, indicating that this feature is turned on.

ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle

This command controls whether to use the LXI password for e*Scope (effectively equal to enabling password protection for e*Scope). With e*Scope, you can access any Internet-connected MDO4000/B, MSO/DPO4000B or MDO3000 Series Oscilloscope from a web browser.

Group Miscellaneous

Syntax
```
ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle {0|1|ON|OFF}
ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle?
```

Related Commands ETHERnet:PASSWord,

ETHERnet:LXI:LAN:PASSWord:ENABle

Arguments

`0, OFF` turns off the LXI password feature for e*Scope. This is the default.

`1, ON` turns on the LXI password feature for e*Scope.

Examples

`ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle ON` turns on the LXI password feature for e*Scope.

`ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle?` might return 1, indicating that this feature is turned on.

ETHERnet:LXI:LAN:RESET (No Query Form)

This command resets the LXI local area network. The items which this command reset include: DHCP/BOOTP, mDNS and DNS-SD, e*Scope password protection, LXI password protection, and e*Scope and LXI password.

Group Miscellaneous

Syntax

```
ETHERnet:LXI:LAN:RESET
```

Examples `ETHERnet:LXI:LAN:RESET` resets the LXI local area network.

ETHERnet:LXI:LAN:SERVICENAMe

This command specifies the mDNS service name used for the LXI interface.

Group Miscellaneous

Syntax

```
ETHERnet:LXI:LAN:SERVICENAMe QString
ETHERnet:LXI:LAN:SERVICENAMe?
```

Arguments QString is a quoted string of up to 64 characters that specifies the mDNS service name used for the LXI interface.

Examples `ETHERnet:LXI:LAN:SERVICENAMe?` might return "Tektronix Oscilloscope MSO4104B 053CVV"

ETHERnet:LXI:LAN:STATus? (Query Only)

This query returns the LXI network status.

Group Miscellaneous

Syntax

```
ETHERnet:LXI:LAN:STATus?
```

Related Commands ETHERnet:PING,

ETHERnet:PING:STATus?

Returns OK — indicates the network is running and the oscilloscope can "see" the network.

FAULT — indicates the network is not visible, or the network settings are incorrect.

IDENTIFY indicates that a message is being displayed on the oscilloscope's front panel indicating which scope the user is currently accessing.

Examples ETHER:LXI:LAN:STAT? might return FAULT, indicating the network is not visible, or the network settings are incorrect.

ETHERnet:NAME

This command specifies the network name assigned to the oscilloscope.

Group Ethernet

Syntax
```
ETHERnet:NAME <QString>
ETHERnet:NAME?
```

Arguments <QString> is the network name assigned to the oscilloscope, enclosed in quotes.

Examples ETHERNET:NAME "labscope1" sets the oscilloscope's network name.

ETHERnet:NETWORKCONFig

This command specifies the Ethernet network configuration setting. The default is automatic.

Group Miscellaneous

Syntax
```
ETHERnet:NETWORKCONFig {AUTOmatic|MANual}
ETHERnet:NETWORKCONFig?
```

Related Commands ETHERnet:NAME,

ETHERnet:IPADDress,

ETHERnet:SUBNETMask,

ETHERnet:GATEWay:IPADDress,

ETHERnet:DHCPbootp

Arguments

AUTOmatic specifies that the oscilloscope's IP address, subnet mask and gateway settings will be received from a DHCP server on the local network.

MANual specifies that the Ethernet settings will be configured manually, using ETHERnet:IPADDress, ETHERnet:SUBNETMask, and ETHERnet:GATEWay:IPADDress.

Examples

ETHERnet:NETWORKCONFig MANual specifies to configure the Ethernet settings manually.

ETHERnet:NETWORKCONFig? might return AUTOMATIC, indicating the settings are being configured automatically.

ETHERnet:PASSWord

This command specifies the HTTP Ethernet access password. If a password is set, the user must enter the password before the user's Web browser can access the oscilloscope.

Group

Ethernet

Syntax

```
ETHERnet:PASSWord <new>
ETHERnet:PASSWord?
```

Related Commands

ETHERnet:LXI:LAN:PASSWord:ENABle,

ETHERnet:LXI:LAN:PASSWord:ESCOPEENABle

Arguments

<new> is a new password, enclosed in quotes.

Examples

ETHERNET:PASSWORD "ZEN53" replaces the current Ethernet password with the new password ZEN53.

ETHERNET:PASSWORD? might return :ETHERNET:PASSWORD "ZEN53".

ETHERnet:PING (No Query Form)

Causes the oscilloscope to ping the gateway IP address.

Group

Ethernet

Syntax `ETHERnet:PING EXECute`

Examples `ETHERNET:PING EXECUTE` causes the oscilloscope to ping the gateway IP address.

ETHERnet:PING:STATus? (Query Only)

Returns the results from sending the ETHERnet:PING command to ping the gateway IP address.

Group Ethernet

Syntax `ETHERnet:PING:STATus?`

Returns `OK` is returned if the computer at the gateway IP address answers.

`NORESPOnsE` is returned if the computer at the gateway IP address does not answer.

`INPROGRESS` is returned if the ping operation is still executing.

`NEVER` is returned if `ETHERnet:PING EXECute` has not been previously sent, indicating that no ping response has ever been received in response to an `ETHERnet:PING EXECute` command since the instrument was powered on.

ETHERnet:SUBNETMask

This command specifies the remote interface subnet mask value.

Group Ethernet

Syntax
```
ETHERnet:SUBNETMask <QString>
ETHERnet:SUBNETMask?
```

Related Commands ETHERnet:NETWORKCONFig,

ETHERnet:IPADDress,

ETHERnet:GATEWay:IPADDress

Arguments `<QString>` is the subnet mask value, enclosed in quotes.

Examples ETHERNET:SUBNETMASK "255.255.255.0" sets the subnet mask value using standard IP address notation format.

EVENT? (Query Only)

Returns an event code from the Event Queue that provides information about the results of the last *ESR? read. EVENT? also removes the returned value from the Event Queue.

Group Status and Error

Syntax EVENT?

Related Commands ALLEv?, *CLS, DESE, *ESE, *ESR?, EVMsg?, *SRE, *STB?

Examples EVENT? might return :EVENT 110, showing that there was an error in a command header. (See page 3-13, *Messages*.)

EVMsg? (Query Only)

Removes a single event code from the Event Queue that is associated with the results of the last *ESR? read and returns the event code along with an explanatory message. For information, see Event Handling.

Group Status and Error

Syntax EVMsg?

Related Commands ALLEv?

*CLS, DESE, *ESE, *ESR?, EVENT?, *SRE, *STB?

Returns The event code and message in the following format:

<Event Code><Comma><QString>[<Event Code><Comma><QString>..]<QString>::= <Message>;[<Command>] where <Command> is the command that caused the error and may be returned when a command error is detected by the oscilloscope. As much of the command will be returned as possible without exceeding the 60 character limit of the <Message> and <Command> string combined. The command string is right-justified.

Examples `EVMSG?` might return `:EVMSG 110,"Command header error".`

EVQty? (Query Only)

Returns the number of event codes in the Event Queue. This is useful when using the ALLEv? query, which returns the exact number of events.

Group Status and Error

Syntax `EVQty?`

Related Commands ALLEv?, EVENT?, EVMsg?

Examples `EVQTY?` might return `:EVQTY 3`, indicating the number of event codes in the Event Queue.

FACtory (No Query Form)

Resets the oscilloscope to its factory default settings.

This command does the following:

- Clears the Event Status Enable Register
- Clears the Service Request Enable Register
- Sets the Device Event Status Enable Register to 255
- Purges all defined aliases
- Enables all Command Headers
- Sets the macro defined by *DDT to a "zero-length field"
- Clears the pending operation flag and associated operations

This command does not reset the following:

- Communication settings
- Selected GPIB address.
- Sate of the VXI-11 (Ethernet IEEE Std 488.2) interface.
- Calibration data that affects device specifications
- Protected user data
- Stored settings
- Power On Status Clear Flag
- Oscilloscope password

Group Save and Recall

Syntax `FACtory`

Related Commands *PSC, *RCL, RECAll:SETUp, *RST, *SAV, SAVe:SETUp

Arguments None

Examples `FACTORY` resets the oscilloscope to its factory default settings.

FILESystem? (Query Only)

Returns the directory listing of the current working directory and the number of bytes of free space available. This query is the same as the FILESystem:DIR? query and the FILESystem:FREESpace? query.

Group File System

Syntax `FILESystem?`

Related Commands FILESystem:CWD,

FILESystem:DELETe,

FILESystem:DIR?,

FILESystem:REName

Arguments None.

Examples FILESYSTEM? might return

```
:FILESYSTEM:DIR
"tek00000.bmp","elusiveGlitch1.png","TEMP.TMP",
"file1.wfm","file2.wfm", "MATH1.wfm","
REF1.wfm","REF2.wfm";FREESPACE 30212096
```

FILESystem:COPy (No Query Form)

This command copies a named file to a new file. The new file may be in a totally separate directory than the old file. You can only copy one file at a time using this command. Wild card characters are not allowed.

Group File System

Syntax `FILESystem:COPy {<source QString>,<destination QString>}`

Related Commands FILESystem:CWD,

FILESystem:DELEte

Arguments `QString` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Examples `FILESYSTEM:COPY “E:/myTestData/tek00001.isf”,”I:/archive/tek00001.isf”` copies the file named TEK00001.SET, located in the /myTestData/ directory on the E: drive to a file named TEK00001.SET in the /archive/ directory on the I: drive. Note that I: is a mounted drive.

FILESystem:CWD

This command specifies the current working directory (CWD) for FILESystem commands. The default working directory is "E:/". Anytime you use this command to change the directory, the directory that you specify is retained as the current working directory until you either change the directory or you delete the directory. If you delete the current working directory, the oscilloscope resets current working directory to the default directory the next time the oscilloscope is powered on or the next time you execute a file system command.

This command supports the permutations of file and directory names supported by Microsoft Windows:

- Relative path names; for example, "./Temp"
- Absolute path names; for example, "E:/MyWaveform"
- Implied relative path names; for example "newfile.txt" becomes "E:/TekScope/newfile.txt" if the current working directory is "E:/TekScope"

Group File System

Syntax `FILESystem:CWD {<new working directory path>}`

Arguments `<new working directory path>` is a quoted string that defines the current working; a directory name can be up to 128 characters.

Examples `FILESYSTEM:CWD "E:/TekScope/images"` sets the current working directory to images.

`FILESYSTEM:CWD?` might return

`:FILESYSTEM:CWD "E:/TekScope/Waveforms"` indicating that the current working directory is set to Waveforms.

FILESystem:DELETe (No Query Form)

This command deletes a named file. If you specify a directory name, it will delete the directory and all of its contents, the same as the RMDir command. You can also specify the filename as *.* to delete all of the files in the current or specified directory.

Group File System

Syntax `FILESystem:DELETe <file path>`

Related Commands FILESystem:CWD

FILESystem:RMDir

Arguments `<file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

The argument `*.*` will delete all files and subdirectories within the current working directory.

Examples `FILESYSTEM:DELETE "NOT_MINE.SET"` deletes the file named NOT_MINE.SET from the current working directory.

FILESystem:DIR? (Query Only)

Returns a list of quoted strings. Each string contains the name of a file or directory in the current working directory.

Group File System

Syntax `FILESystem:DIR?`

Related Commands FILESystem:CWD,

FILESystem:MKDir

Arguments None

Returns `FILESystem:DIR?` returns a list of files and directories in the current working directory.

Examples `FILESYSTEM:DIR?` might return

```
:FILESYSTEM:DIR
"tek00000.png","my_CAN_setup.set","savedWfm1.isf","myImages"
```

FILESystem:FORMat (No Query Form)

Formats a mass storage device. This command should be used with extreme caution as it causes all data on the specified mass storage device to be lost. Drive letters (e.g., E:) are case sensitive and must be upper case. For all other FILESYSTEM commands, drives letters are not case sensitive. Example: FILES:FORMAT "E:/" Formats the USB flash drive installed in the oscilloscope's front panel USB port.

Group File System

Syntax `FILESystem:FORMat`

Arguments <drive name> is a quoted string that defines the disk drive to format.

Examples `FILESYSTEM:FORMAT "E:/"` formats the USB flash drive installed in the oscilloscope's front panel USB port.

FILESystem:FREESpace? (Query Only)

Returns the number of bytes of free space on the current drive.

Group File System

Syntax `FILESystem:FREESpace?`

Related Commands FILESystem:FREESpace?,

FILESystem:CWD

FILESystem:LDIR? (Query Only)

Returns a semicolon separated list of every file and directory in the folder referred to by the FILESystem:CWD command. This is different than the FILESystem:DIR? query in that it provides a long output format with the file size, type, and modification date/time. Each entry is a semicolon separated list:

<file name>;<type DIR or FILE>;<size in bytes>;<date>;<time>

Group File System

Syntax `FILESystem:LDIR?`

Related Commands FILESystem:CWD,

FILESystem:DIR?

Returns A string of the form: <file name>;<type DIR or FILE>;<size in bytes>;<date>;<time>

Examples `FILESYSTEM:LDIR?` might return `:FILESYSTEM:LDIR ".;DIR;4096;2007-06-22;14:13:43";"tek0000CH1.isf;FILE; 20342;2009-05-21;13:58:24";"TEMP;DIR;4096;2009-09-15;06:20:44"`

FILESystem:MKDir (No Query Form)

Creates a new folder.

Group File System

Syntax `FILESystem:MKDir <directory path>`

Related Commands FILESystem:CWD, FILESystem:DIR?, FILESystem:MOUNT:DRIve

Arguments `<directory path>` is a quoted string that specifies the directory to create

Examples `FILESYSTEM:MKDIR "E:/NewDirectory"` creates the directory named *NewDirectory* at the root of the D drive.

These two commands create the directory MyNewSubDirectory within the existing directory MyDirectory at the root of the D drive:

```
FILESYSTEM:CWD "E:/MyDirectory"; FILESYSTEM:MKDIR
"MyNewSubDirectory"
```

This, of course, assumes that *E:/MyDirectory* already existed and was not a read-only directory.

FILESystem:MOUNT:AVAILable? (Query Only)

This query returns a comma-separated list of available drive letters that can be used for mounting network drives.

Group File System

Syntax `FILESystem:MOUNT:AVAILable?`

Related Commands FILESystem:CWD,

FILESystem:MOUNT:DRIve

Examples `FILESystem:MOUNT:AVAILable?` might return I:,J:,K:,L:,M:,N:,O:,P:,Q:,R:,S:,T:,U:,V:,W:,X:,Y:,Z: specifying all available drive letters that can be used for mounting network drives.

FILESystem:MOUNT:DRIve

This command attempts to mount the network drive specified by the quoted string argument. The query form takes a quoted string argument specifying the drive letter, and returns a Boolean to indicate whether the specified drive letter is mounted. 1 = mounted; 0 = not mounted. You can get the details of the mounted drives by querying FILESystem:MOUNT:LIST?

Group File System

Syntax `FILESystem:MOUNT:DRIve <Qstring>`

Related Commands FILESystem:MOUNT:LIST?,

FILESystem:UNMOUNT:DRIve

Arguments Qstring is a semicolon separated list of fields described as follows:

Drive Name: The drive name to use, which should be a case insensitive single letter followed by a colon. The drive name must be a letter between 'I' and 'Z', inclusive. Drives A: through D: are not used and drives E: through H: are reserved for the USB host ports.

Server Identity: One of:

- DNS name of the server.

- IP address of the server.

Path: The path to be mounted; e.g. /this/that/mydir

User Name: The user name.

User Password: The user password.

NOTE. *"User Name" and "User Password" are optional and are only used for mounts on Microsoft Windows networks.*

Examples `FILESystem:MOUNT:DRIve "I:;192.168.1.10;C$;mywindowsusername;mywindowspassword"` would mount the shared C: drive on the Windows server at IP address

192.168.1.10, using the Windows login name mywindowsusername and the Windows password mywindowspassword.

FILESystem:MOUNT:LIST? (Query Only)

This query returns a comma-separated list of the mounted network drives, including the drive letter, server identity (DNS name or IP address), mount path and type. If no network drives are mounted, an empty string is returned. Mount types are either NFS or CIFS (for Microsoft Windows networks).

NOTE. *There are no new lines or white spaces in the returned string.*

Group File System

Syntax `FILESystem:MOUNT:LIST?`

Related Commands FILESystem:UNMOUNT:DRIve,

FILESystem:MOUNT:DRIve

Examples `FILESystem:MOUNT:LIST?` might return "X:;network.xyz.com;/net/users/mike/home;NFS,:;winnet.xyz.com;\net \users\fred\home;CIFS"

FILESystem:READFile (No Query Form)

Writes the contents of the specified file to the specified interface. If the specified file does not exist or is not readable, an appropriate error event is posted.

Group File System

Syntax `FILESystem:READFile <QString>`

Related Commands FILESystem:CWD

Arguments `<QString>` is a quoted string that defines the file name and path. If the file path is within the current working directory, specify only the file name.

Examples `FILESYSTEM:READFILE "E:/test_data/tek00016CH1.csv"` reads the content of the specified file, if the file exists and is readable, and sends the content of the file to the current interface.

FILESystem:REName (No Query Form)

Assigns a new name to an existing file.

Group File System

Syntax `FILESystem:REName <old file path>,<new file path>`

Related Commands FILESystem:CWD

Arguments `<old file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

`<new file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Examples `FILESYSTEM:RENAME "E:/TEK00000.SET","E:/MYSETTING.SET"` gives the file named TEK00000.SET the new name of MYSETTING.SET. The file remains in the root directory on the D drive.

FILESystem:RMDir (No Query Form)

Deletes a named directory. This command deletes the specified directory and all of its contents. The directory must not be a read-only directory.

Group File System

Syntax `FILESystem:RMDir <directory path>`

Related Commands FILESystem:CWD

Arguments `<directory path>` is a quoted string that defines the directory name and path. If the file path is within the current working directory, you need only specify the file name.

Examples `FILESYSTEM:RMDIR"E:/OldDirectory"` removes the directory named OldDirectory from the root of the D drive.

FILESystem:UNMOUNT:DRIve (No Query Form)

This command attempts to un-mount the network drive specified by the quoted string argument.

Group File System

Syntax `FILESystem:UNMOUNT:DRIve QString`

Related Commands FILESystem:MOUNT:DRIve, FILESystem:MOUNT:LIST?

Arguments QString is a quoted string that specifies which network drive to un-mount.

Examples `FILES:UNMOUNT:DRIVE "I:"` specifies to un-mount network drive I:.

FILESystem:WRITEFile (No Query Form)

Writes the specified block data to a file in the oscilloscope current working directory. If the specified file does not exist or is not readable, an appropriate error event is posted.

Group File System

Syntax `FILESystem:WRITEFile <file path>, <data>`

Related Commands FILESystem:CWD

Arguments `<file path>` is the quoted string that defines the file name and path. If the path is within the current working directory, specify the file name only.

`<data>` can be either DEFINITE LENGTH encoding or INDEFINITE LENGTH ARBITRARY BLOCK PROGRAM DATA encoding as described in IEEE488.2.

FPAnel:HOLD (No Query Form)

This command is used to emulate the button push-and-hold feature. Presently, only the Cursors button is supported by this command, even though any of the button enumerations described for FPAnel:PREss are accepted. (When the Cursors button on the front panel is held, the cursor menu is displayed on screen.)

This command contains two arguments: a button, and an optional hold time.

Group Miscellaneous

Syntax FPAnel:HOLD CURsor [,<NR1>]

Related Commands FPAnel:PRESS, FPAnel:TURN

Arguments CURsor — currently this is the only button supported by this command. If the hold time is not specified, it defaults to 1200 milliseconds. The range is 0 to 10,000 milliseconds. The system expects a minimum of 1 second to recognize a hold.

<NR1> (optional), an integer, is the hold time — ie. the time to emulate holding the button down before releasing it, in milliseconds. If the hold time is not specified, it defaults to 1200 milliseconds.

Examples FPAnel:HOLD CURsor — This simulates pressing and holding the CURSOR button for 1200 milliseconds.

FPAnel:PRESS (No Query Form)

Simulates the action of pressing a specified front-panel button.

When the front panel is locked, the front-panel button and multipurpose knob operations are suspended. The FPAnel:PRESS and the FPAnel:TURN commands will also not work. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands.

Group Miscellaneous

Syntax FPAnel:PRESS <button>

Arguments

<button> is the name of a front-panel button. Most of the argument names associate directly with their front panel buttons. For example, AUTOSet is for the Autoset button.

Table 2-53: FPAnel:PRESS arguments

Argument	Description
ACQuire	**Acquire** button
AFG	**Arbitrary Function Generator** button
AUTOset	**Autoset** button
BMENU<x>	Screen bottom menu buttons, where <x>=1 for the left-most bottom menu button and <x>=7 for the right-most bottom menu button
B<x>	Bus select buttons, where <x> = 1–4 or 1–2 depending on the model
CH<x>	Channel select button, where <x>=1 for channel 1, <x>=2 for channel 2, and so on
CURsor	**Cursors** button
D15D0	**D15–D0** button
DEFaultsetup	**Default Setup** button
FINe	**Fine** button
FORCetrig	**Force Trig** button
HARDcopy	**Print** button
HORZPos	Push to center (MDO3000 only)
INTensity	**Intensity** button
MAGnify	Magnify (zoom) button (not the zoom/pan knob)
MARk	Mark**Set/Clear** button
MATh	**M** button
MENUOff	**Menu Off** button
MEASurement	**Measure** button
NEXt	Right arrow button
PAUse	Play/pause button
PREv	Left arrow button
REF	**R** button
RMENU<x>	Screen side menu buttons, where <x>=1 for top-most side menu button and <x>=5 for the bottom-most side menu button
RUnstop	**Run/Stop** button
SAVEBUtton	**Save** button
SAVERecall	Save/Recall **Menu** button
SEArch	**Search** button

Table 2-53: FPAnel:PRESS arguments (cont.)

Argument	Description
SELect	**Select** button
SINGleseq	**Single** button
TESt	**Test** button
TRIGger	Trigger **Menu** button
TRIGLevel	Trigger Level knob – sets the trigger level to the midpoint of the waveform.
VERTPOS1–4	Vertical position knob — push to center (MDO3000 only)
VERTSCALE1–4	Vertical scale knob — push for Fine (MDO3000 only)
UTILity	**Utility** button

Examples `FPANEL:PRESS AUTOSET` executes the oscilloscope Autoset function.

FPAnel:TURN (No Query Form)

Simulates the action of turning a specified front-panel control knob.

When the front panel is locked, the front-panel button and multipurpose knob operations are suspended. The FPAnel:PRESS and `FPAnel:TURN` commands will also not work, and, they will not generate an error. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands. For example, to set the trigger level to 50%, you could use TRIGger:A SETLevel. To force a trigger, you could use TRIGger FORCe.

Group Miscellaneous

Syntax `FPAnel:TURN <knob>,<n>`

Arguments <knob> is the name of a rotating control.

A comma (,) separates the control knob argument from the numeric rotation value argument. You do not need a white space between the arguments and the comma.

<n> represents the rotation direction and magnitude of rotation. Negative values represent a counterclockwise knob rotation, and positive values represent a clockwise rotation. The magnitude of <n> specifies the amount of the turn, where <n> = 1 represents turning the knob one unit, <n> = 2 represents turning the knob two units, <n> = 4 represents turning the knob four units, and so on. The range of units depends on which front panel knob is specified.

Table 2-54: FPAnel:TURN arguments

Argument	Description
GPKNOB1	**Multipurpose a** knob
GPKNOB2	**Multipurpose b** knob
HORZPOS	Horizontal **Position** knob
HORZScale	Horizontal **Scale** knob
PANKNOB1	Outer pan knob
TRIGLevel	Trigger **Level** knob
VERTPOS<n>	Vertical **Position** knob
VERTSCALE<n>	Vertical **Scale** knob
ZOOM	Inner zoom knob

Examples `FPANEL:TURN TRIGLEVEL,10` duplicates turning the front-panel Trigger Level knob clockwise by 10 units.

GPIBUsb:ADDress? (Query Only)

Returns the current GPIB address setting for a connected TEK-USB-488 adaptor module.

Group Miscellaneous

Syntax `GPIBUsb:ADDress?`

GPIBUsb:ID? (Query Only)

Returns the identification string of the connected TEK-USB-488 adaptor module and firmware version. If a TEK-USB-488.2 module is not connected, the system returns “Not detected”.

Group Miscellaneous

Syntax `GPIBUsb:ID?`

HARDCopy (No Query Form)

Sends a hard copy of the screen display to the currently active printer using the current palette and layout settings.

Group Hard Copy

Syntax
```
HARDCopy {STARt}
```

Related Commands *WAI, *CLS

Arguments STARt sends a block of data representing the current screen image to the requested port. The data sent is in the image format specified by the SAVe:IMAGe:FILEFormat command and the compression level is controlled by the selected format (BMP and TIFF are uncompressed whereas PNG is compressed). The HARDCopy:INKSaver determines whether the data sent is in InkSaver mode.

NOTE. *The Hardcopy command with no arguments is equivalent to pressing the "HardCopy" button on the front panel, when the data is sent to the printer. As there is no front panel equivalent of the HARDCOPY START, you can choose to save the images to a different location using the "SAVE" button.*

Examples HARDCOPY initiates a screen copy to the active printer.

HARDCopy:ACTIVeprinter

This command specifies the currently active printer. When a hard copy operation is performed, the output will be sent to this printer. One of two methods of specifying the printer can be used: specifying an index value obtained from looking at the list of attached printers or by specifying the printer name.

Group Hard Copy

Syntax
```
HARDCopy:ACTIVeprinter {<NR1>|<name>}
HARDCopy:ACTIVeprinter?
```

Arguments <NR1> is the index of the desired printer as returned from HARDCopy:PRINTer:LIST?

<name> is the name of the printer as specified in the printer list. This name is case sensitive and must be entered exactly as shown in the list.

HARDCopy:INKSaver

Changes hard copy output to print traces and graticule on a white background while retaining waveform color information (except for channel 1, which prints as dark blue because yellow does not show up well and is difficult to see on a white background). This option can significantly reduce print time and quantities of ink required compared with WYSIWYG dark background images.

Group Hard Copy

Syntax

```
HARDCopy:INKSaver?
```

Arguments

ON or <NR1> ≠ 0 sets the ink saver mode on.

OFF or <NR1> = 0 sets the ink saver mode off.

Examples

HARDCOPY:INKSAVER ON will cause subsequent hard copy output to display the screen on a white background.

HARDCopy:LAYout

This command specifies the page orientation for hard copy. If you set the layout to LANdscape, the printer will print hard copies in landscape mode where the long edge of the screen will print to the long edge of the sheet of paper. If you set the layout to PORTRait, the printer will print hard copies in portrait mode.

This command is not applicable for PictBridge hardcopies.

Group Hard Copy

Syntax

```
HARDCopy:LAYout {PORTRait|LANdscape}
HARDCopy:LAYout?
```

Arguments

PORTRait orients the screen image vertically on the printed page.

LANdscape orients the screen image horizontally on the printed page.

Examples

HARDCOPY:LAYOUT LANDSCAPE sets the hard copy page orientation to Landscape.

HARDCOPY:LAYOUT? might return :HARDCOPY:LAYOUT PORTRAIT indicating that the hard copy page orientation is set to portrait.

HARDCopy:PREVIEW (No Query Form)

Displays a preview of the current screen contents with the InkSaver palette applied.

Group Hard Copy

Syntax `HARDCopy:PREVIEW {ON|OFF|<NR1>}`

Arguments `ON` or `<NR1>` ≠ 0 turns preview mode on.

`OFF` or `<NR1>` = 0 turns preview mode off.

HARDCopy:PRINTer:ADD (No Query Form)

This command is used to add a network or email printer to the list of available printers. Adding a network printer requires 3 arguments, but only one of server name or server IP address should be specified. An empty string can be used for blank arguments. Adding an email printer requires only one argument.

Group Hard Copy

Syntax
```
HARDCopy:PRINTer:ADD
<name>,<server>,<address>|<emailaddress>
```

Arguments **Network printers:**

`<name>` is the name of the network printer queue.

`<server>` is the host name of the print (LPR) server.

`<address>` is the IP address of the print server.

Specifying the printer name and server name or server address adds a network printer to the list of available printers. All three arguments must be present, but only one of server name or server IP address should be specified. An empty string should be used for the second or third argument (server name or server address) which is not specified. If both are specified and neither is an empty string, then the server name takes precedence.

Email printers:

`<emailaddress>` is the internet email address of the printer. Must contain an @ character.

Specifying only a single argument, the printer email address adds an email printer to the list of available printers, as does specifying 2 or more arguments where the first argument contains an @ character. When the first argument contains an @ symbol, the command is interpreted as a request to add an email printer and, therefore, any additional arguments are ignored.

Examples

Network printer:

To add a networked printer called 'labprn1', hosted from a compatible print server called 'printhost.example.com':

```
HARDCopy:PRINTer:ADD "labprn1", "printhost.example.com",
""
```

To add a networked printer called 'labprn2', hosted from a print server at IP address '192.168.0.20':

```
HARDCopy:PRINTer:ADD "labprn2", "", "192.168.0.20"
```

Email printer:

To add an email printer at labprn3@example.com:

```
HARDCopy:PRINTer:ADD "labprn3@example.com"
```

HARDCopy:PRINTer:DELete (No Query Form)

Removes a network printer from the list of available printers. The printer name is case sensitive.

Group Hard Copy

Syntax `HARDCopy:PRINTer:DELete <name>`

Arguments `<name>` is the name of the printer to be deleted.

HARDCopy:PRINTer:LIST? (Query Only)

Displays the list of currently defined printers.

The fields for each entry represent the printer number, whether the printer is currently active (Y=active, N=inactive), the printer name, the printer type (USB, Net or Email), print server name or IP address.

Group Hard Copy

Syntax `HARDCopy:PRINTer:LIST?`

Examples With a single printer configured, the `HARDCopy:PRINTer:LIST?` query might return a result similar to the following:

`"1:Y:labprn1:Net:printhost.example.com:;"`

HARDCopy:PRINTer:REName (No Query Form)

Renames a network or email printer on the list of available printers, replacing the currently stored settings with the settings specified in the command. The first argument can be either the printer name, or the index from querying HARDCopy:PRINTer:LIST?

Group Hard Copy

Syntax
```
HARDCopy:PRINTer:REName
<name>,<new_name>,<new_server>,<new_address>
```

Arguments

Network printer:

`<index> | <name>` is the name of the printer to be renamed (deleted).

`<new_printer_name>` is the new name for this printer.

`<new_server_name>` is the new print server for this printer.

`<new_server_address>` is the new IP address for the server.

All four arguments must be present when renaming a network printer to another network printer. Either the server name or the server IP address should be specified, but not both. An empty string or server address should be used for the third or fourth argument (server name or server address) which is not specified. If both are specified, and neither is an empty string, then the server name takes precedence. which is not specified.

If the second argument contains an @ symbol, the command is interpreted as a request to rename an existing printer to an email printer and, therefore, any additional arguments are ignored.

Email printer:

`<index> | <name>` is the index or name of the printer to be renamed.

`<new printer email address>` is the new email address for this printer.

If the second argument contains an @ symbol, the command is interpreted as a request to replace the printer entry with an email printer and, therefore, any additional arguments are ignored.

Examples

Network printer:

If the first entry on the printer list is for a network printer called 'labprn1', either of the following commands could be used to change the print server for the printer to 'newserver.example.com':

```
HARDCopy:PRINTer:REName "labprn1", "labprn1",
"newserver.example.com", ""
```

```
HARDCopy:PRINTer:REName 1, "labprn1",
"newserver.example.com", ""
```

Using the same example printer list entry, the name of the network printer could be changed to 'labprn2' with either of the following commands:

```
HARDCopy:PRINTer:REName "labprn1", "labprn2",
"newserver.example.com", ""
```

```
HARDCopy:PRINTer:REName 1, "labprn2",
"newserver.example.com", ""
```

Email printer:

If the first entry on the printer list is for a network printer called 'labprn1', either of the following commands could be used to replace this printer with an email printer 'emailPrinter@example.com':

```
HARDCopy:PRINTer:REName "labprn1", "labprn3@example.com"
```

```
HARDCopy:PRINTer:REName 1, "labprn3@example.com"
```

If the first entry on the printer list is for an email printer whose email address is 'oldEmail@example.com', either of the following commands could be used to replace this printer with an email printer 'newEmail@example.com':

```
HARDCopy:PRINTer:REName "oldEmail@example.com",
"newEmail@example.com"
```

```
HARDCopy:PRINTer:REName 1, "newEmail@example.com"
```

HEADer|:HDR

This command specifies the Response Header Enable State that causes the oscilloscope to either include or omit headers on query responses.

NOTE. *This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk); these commands never return headers. This command does affect the Response Header Enable State of both the USBTMC and VXI-11 interfaces. Refer to the Introduction for additional information.*

NOTE. *Refer to the Waveform Transfer Command Group text for more comprehensive information.*

Group Miscellaneous

Syntax

```
HEADer|:HDR {OFF|ON|<NR1>}
HEADer|:HDR?
```

Related Commands VERBose

Arguments

`OFF` sets the Response Header Enable State to false. This causes the oscilloscope to omit headers on query responses, so that only the argument is returned.

`ON` sets the Response Header Enable State to true. This causes the oscilloscope to include headers on applicable query responses. You can then use the query response as a command.

`<NR1>` = 0 sets the Response Header Enable State to false; any other value sets this state to true.

Examples

`HEADER|:HDR OFF` specifies that the oscilloscope omits headers on query responses, so that only the argument is returned.

`HEADER|:HDR?` might return `:HEADER 1` indicating that the oscilloscope is including headers on applicable query responses.

HIStogram? (Query Only)

This query-only query returns all histogram parameters; it queries the state of all histogram parameters that the user can set. This command is equivalent to selecting Waveform Histograms from the Measure menu.

Group Histogram

Syntax

```
HIStogram?
```

Related Commands MEASUrement:METHod

Examples HISTOGRAM? might return the histogram parameters as :HISTOGRAM:BOXPCNT 30.0000,25.1000,70.0000,75.2000;DISPLAY LINEAR;STATE 1;FUNCTION VERTICAL;SIZE 2.0000;SOURCE CH1.

HIStogram:BOX

This command specifies the histogram box coordinates in terms of source waveform vertical and horizontal units.

Group Histogram

Syntax
```
HIStogram:BOX <NR3>, <NR3>, <NR3>, <NR3>
HIStogram:BOX?
```

Related Commands HIStogram:BOXPcnt

Arguments <NR3> is a floating point number that specifies the left position of the histogram box in source waveform horizontal units.

<NR3> specifies the top position of the histogram box in source waveform vertical units.

<NR3> specifies the right position of the histogram box in source waveform horizontal units.

<NR3> specifies the bottom position of the histogram box in source waveform vertical units.

Examples HISTOGRAM:BOX 1E-9, 0.250, 2E-9, 0.500 defines the coordinates of the histogram box in source waveform coordinates.

HISTOGRAM:BOX? might return :HISTOGRAM:BOX 1.0000E-09, 0.2500, 2.0000E-09, 0.5000, which identifies the coordinates of the histogram box in source waveform coordinates.

HIStogram:BOXPcnt

This command specifies the histogram box coordinates in terms of percentages of the full screen extents of the source waveform. The arguments refer to the left (percent of the horizontal screen extent), top (percent of the vertical screen

extent), right (percent of the horizontal screen extent), bottom (percent of the vertical screen extent). The valid range for these values is 0.0 to 100.0.

Group Histogram

Syntax
```
HIStogram:BOXPcnt <NR2>, <NR2>, <NR2>, <NR2>
HIStogram:BOXPcnt?
```

Related Commands HIStogram:BOX

Arguments <NR3> is a floating point number that specifies the left position of the histogram box in percentage coordinates. The default value is 20%

<NR3> specifies the top position of the histogram box in percentage coordinates. The default value is 80%

<NR3> specifies the right position of the histogram box in percentage coordinates. The default value is 80%

<NR3> specifies the bottom position of the histogram box in percentage coordinates. The default value is 20%

Examples `HISTOGRAM:BOXPCNT 30.0,25.0,70.0,75.0` sets the left boundary of the histogram box to 30% of the graticule (3 divisions from the left edge); the top boundary to 25% of the graticule (0.25 × 10 = 2.5 divisions from the top edge); the right boundary to 70% of the graticule (7 divisions from the left edge); and the bottom boundary to 75% of the graticule (0.75 × 10 = 7.5 divisions from the top edge).

`HISTOGRAM:BOXPCNT?` might return `:HISTOGRAM:BOXPCNT 30.0000,25.1000,70.0000,75.2000`.

HIStogram:COUNt (No Query Form)

This command (no query form) clears the count and statistics for the histogram and the histogram source data. If the histogram is on, then counting restarts.

Group Histogram

Syntax
```
HIStogram:COUNt RESET
```

Related Commands HIStogram:BOX

HIStogram:BOXPcnt

Arguments `RESET`

Examples `HISTOGRAM:COUNT RESET` clears the count and statistics for the histogram and the histogram source data.

HIStogram:DATa? (Query Only)

This query returns the histogram data when `HIStogram:MODe` is `HORizontal` or `VERTical`. If the mode is `OFF`, then no data is returned and an error event is set.

The data values returned for this query represent the number of times the histogram source waveform samples were coincident with a particular histogram bin.

For vertical histograms, this query returns 256 values, representing the number of times the histogram source waveform samples were coincident with each of the 256 digitizing levels. Of these 256 values, the first 2 and last 3 are always 0, as they represent digitizing levels that fall above and beneath the waveform graticule, respectively.

For horizontal histograms, this query returns 1000 values, representing the number of times the histogram source waveform samples were coincident with each horizontal pixel column. The time of occurrence for each of the horizontal bins can be derived using the HIStogram:STARt? and HIStogram:END? queries.

Group Histogram

Syntax `HIStogram:DATa?`

Related Commands HIStogram:BOX

HIStogram:BOXPcnt

HIStogram:COUNt

HIStogram:DISplay

HIStogram:MODe

HIStogram:SOUrce

Examples `HISTOGRAM:DATA?` might return `:HISTOGRAM:DATA 0,0,0,

```
0,0,0,0,0,0,1245,933,903,1003,838,782,764,697,
687,620,582,566,530,595,557,552,518,524,606,
503,526,470,498,554,534,487,546,548,504,554,
513,566,639,508,643,704,662,769,785,806,922,
960,1153,1336,1478,1960,4515,17598,52184,
67040,50417,12885,4104,2382,1866,1699,1428,
1288,1271,1140,975,1024,894,841,841,678,841,
804,685,713,746,729,644,640,787,768,668,671,
661,745,755,692,882,772,802,862,770,854,799,
969,1102,1080,1040,1272,1329,1394,1760,1428,
2418,3313,4475,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0.
```

HIStogram:DISplay

This command sets the scaling of the histogram data display to be the count of each histogram bin or the log of that count. The default scaling is linear.

Group Histogram

Syntax

```
HIStogram:DISplay {OFF|LOG|LINEAr}
HIStogram:DISplay?
```

Related Commands HIStogram:MODe

Arguments <LOG> sets the histogram display to logarithmic scaling

<LINEAr> sets the histogram display to linear scaling. This is the default setting.

Examples HISTOGRAM:DISPLAYLOG sets the histogram scaling to be the log count of each histogram bin.

HISTOGRAM:DISPLAY? might return :HISTOGRAM:DISPLAY LOG indicating that the current histogram display scaling is the log count of each histogram bin.

HIStogram:END? (Query Only)

Returns the time (horizontal) or vertical units value (vertical) of the last bin where the histogram data ends. The HIStogram:MODe must be either HORizontal or VERTical for a value to be returned. If the mode is OFF, an error event is set and nothing is returned.

If the HIStogram:MODe is HORizontal, the value returned is the time of the right bin. If the HIStogram:MODe is VERTical the value returned is the vertical units value of the bottom bin. The returned value is an <NR3>.

Group Histogram

Syntax
```
HIStogram:END?
```

Related Commands HIStogram:MODe

HIStogram:STARt?

Returns <NR3>

Examples HISTOGRAM:END? might return :HISTOGRAM:END 1.6000E-05 indicating that the last bin is at 16 µs.

HIStogram:MODe

This command selects the type of histogram to create or disables the histogram display. The query form either returns the current histogram type or that the histogram display is disabled.

Group Histogram

Syntax
```
HIStogram:MODe {HORizontal|VERTical|OFF}
HIStogram:MODe?
```

Related Commands HIStogram:DISplay

Arguments HORizontal enables a horizontally positioned histogram that shows time distribution.

VERTical enables a vertically positioned histogram that shows a voltage distribution, or another distribution such as amperes.

OFF disables the collection of the histogram measurement.

Examples HISTOGRAM:MODE HORIZONTAL sets the type of histogram created to horizontal, which displays a horizontally positioned histogram that shows time distribution.

HISTOGRAM:MODE? might return :HISTOGRAM:MODE OFF, indicating that the histogram display is disabled.

HIStogram:SOUrce

This command sets or queries which source will be compared against the histogram box when the histogram testing is enabled.

Group Histogram

Syntax

```
HIStogram:SOUrce {CH1|CH2|CH3|CH4|MATH|REF1|CH2|CH3|CH4}
HIStogram:SOUrce?
```

Related Commands HIStogram:DISplay

Arguments

CH1–4> selects the analog channel waveform to use as the source for the histogram. The x variable can be expressed as an integer ranging from 1 through 4.

MATH selects the math waveform as the source for the histogram.

REF<1–4> selects a reference waveform as the source for the histogram. The x variable can be expressed as an integer ranging from 1 through 4.

Examples

HISTOGRAM:SOURCE CH1 enables the Channel 1 waveform to be compared against the histogram box.

HISTOGRAM:SOURCE? might return :HISTOGRAM:SOURCE CH1, indicating that the waveform for Channel 1 is the source for the histogram.

HIStogram:STARt? (Query Only)

Returns the time (horizontal) or vertical units value (vertical) of the first bin where the histogram data starts. The HIStogram:MODe must be either HORizontal or VERTical for a value to be returned. If the mode is OFF, an error event is set and nothing is returned.

If the HIStogram:MODe is HORizontal, the value returned is the time of the left bin. If the HIStogram:MODe is VERTical the value returned is the vertical units value of the top bin. The returned value is an <NR3>.

Group Histogram

Syntax `HIStogram:STARt?`

Related Commands HIStogram:END?

HIStogram:MODe

Returns <NR3> showing the returned value.

Examples `HISTOGRAM:START?` might return `:HISTOGRAM:START 2.0000E-06` indicating that the first bin is at 2 µs.

HORizontal? (Query Only)

Returns all settings for the horizontal commands.

Group Horizontal

Syntax `HORizontal?`

Examples `HORIZONTAL?` might return the following horizontal settings
`:HORIZONTAL:DELAY:MODE 1;TIME 0.0000;:HORIZONTAL:MAIN:SCALE 20.0000E-9;SAMPLERATE 5.0000E+9;UNITS "s";UNITS:STRING "s";:HORIZONTAL:SAMPLERATE 5.0000E+9;RECORDLENGTH 1000000`

HORizontal:DELay:MODe

This command specifies the horizontal delay mode.

Group Horizontal

Syntax
`HORizontal:DELay:MODe {OFF|ON|<NR1>}`
`HORizontal:DELay:MODe?`

Related Commands HORizontal:POSition

Arguments `OFF` sets the Horizontal Delay Mode to off. This causes the HORizontal:POSition command to operate like the HORIZONTAL POSITION knob on the front panel.

ON sets the Horizontal Delay Mode to on. This causes the HORizontal:DELay:TIMe command to operate like the HORIZONTAL POSITION knob on the front panel.

<NR1> = 0 sets the Horizontal Delay Mode to off; any other value sets this mode to on.

Examples

HORIZONTAL:DELAY:MODE OFF sets the Horizontal Delay Mode to off, allowing the horizontal position command to operate like the HORIZONTAL POSITION knob on the front panel.

HORIZONTAL:DELAY:MODE? might return HORIZONTAL:DELAY:MODE OFF indicating that the Horizontal Delay Mode is off and that the horizontal position command operates like the HORIZONTAL POSITION knob on the front panel.

HORizontal:DELay:TIMe

This command specifies the horizontal delay time (position) that is used when delay is on (the default mode).

Group

Horizontal

Syntax

```
HORizontal:DELay:TIMe <NR3>
HORizontal:DELay:TIMe?
```

Related Commands

HORizontal:POSition

Arguments

NR3 is the delay in seconds.

Examples

HORizontal:DELay:TIME 0.3 sets the delay of acquisition data so that the resulting waveform is centered 300 ms after the trigger occurs.

HORizontal:DIGital:RECOrdlength:MAGnivu? (Query Only)

Returns the record length of the MagniVu digital acquisition.

Group

Horizontal

Syntax

```
HORizontal:DIGital:RECOrdlength:MAGnivu?
```

HORizontal:DIGital:RECOrdlength:MAIn? (Query Only)

Returns the record length of the main digital acquisition.

Group Horizontal

Syntax
```
HORizontal:DIGital:RECOrdlength:MAIn?
```

HORizontal:DIGital:SAMPLERate:MAGnivu? (Query Only)

Returns the sample rate of the MagniVu digital acquisition.

Group Horizontal

Syntax
```
HORizontal:DIGital:SAMPLERate:MAGnivu?
```

HORizontal:DIGital:SAMPLERate:MAIn? (Query Only)

Returns the sample rate of the main digital acquisition.

Group Horizontal

Syntax
```
HORizontal:DIGital:SAMPLERate:MAIn?
```

HORizontal:POSition

This command specifies the horizontal position, in percent, that is used when delay if off. If Horizontal Delay Mode is turned off, this command is equivalent to adjusting the HORIZONTAL POSITION knob on the front panel. When Horizontal Delay Mode is on, this command stores a new horizontal position that is used when Horizontal Delay Mode is turned off.

Group Horizontal

Syntax
```
HORizontal:POSition <NR3>
HORizontal:POSition?
```

Related Commands HORizontal:DELay:TIMe

Arguments <NR3> is a floating point number that specifies the horizontal position expressed as the percentage of the waveform acquired before the trigger.

Examples HORIZONTAL:POSITION 50 sets the horizontal position to 50%.

HORIZONTAL:POSITION? might return :HORIZONTAL:POSITION 100 indicating that the horizontal position is set to 100%.

HORizontal:PREViewstate? (Query Only)

Returns a boolean value to indicate whether the display system is in the preview state.

Group Horizontal

Syntax
```
HORizontal:PREViewstate?
```

Returns <NR1> = 1 if the display system is in the preview state.

<NR1> = 0 if the display system is not in the preview state.

HORizontal:RECOrdlength

Sets the horizontal record length. The query form of this command returns the current horizontal record length.

Group Horizontal

Syntax
```
HORizontal:RECOrdlength <NR1>
HORizontal:RECOrdlength?
```

Arguments <NR1> represents the horizontal record length value.

NOTE. *The supported horizontal record length values for models MSO4104B–L, MSO4102B-L, DPO4104B-L, and DPO4102B-L are 1,000, 10,000, 100,000, 1M and 5M. The supported record length values for all other models are 1,000, 10,000, 100,000, 1M, 5M, 10M and 20M, with the exception of MDO3000, which does not support 20M record length.*

Examples

HORIZONTAL:RECORDLENGTH 10000 specifies that 10000 data points will be acquired for each record.

HORIZONTAL:RECORDLENGTH? might return :HORIZONTAL:RECOrdlength 1000 indicating that the horizontal record length is equal to 1000 data points.

HORizontal:SCAle

This command specifies the time base horizontal scale.

Group

Horizontal

Syntax

```
HORizontal:SCAle <NR3>
HORizontal:SCAle?
```

Arguments

<NR3> is a floating point number that specifies the range from 400 ps to 1000 s, depending on the record length.

Examples

HORIZONTAL:SCALE 2E-6 sets the main scale to 2µs per division.

HORIZONTAL:SCALE? might return :HORIZONTAL:MAIN:SCALE 2.0000E-06 indicating that the main scale is currently set to 2 µs per division.

ID? (Query Only)

Returns the instrument identification data. This is similar to the data returned by the *IDN? IEEE488.2 common query, but also includes any enabled application modules and enabled options. However, it does not include the instrument serial number.

The format of the returned string is an extension of that specified in Tektronix Codes and Formats with the addition of the application information (and is not dependent upon :HEADer or :VERBose settings):

ID TEK/<model>,CF:91.1CT FV:v<firmware version> <app module info>

where:

<firmware version> is comprised of 2 numerical values separated by a decimal

point representing the major and minor version numbers, respectively.

<app module info> is a list of application modules separated by a space of the form:

<App ID> such as DPO4EMBD:V1.00, MDO3AUTO:V1.00, etc.

Group Miscellaneous

Syntax `ID?`

Related Commands *IDN?

Examples `ID?` might return `ID TEK/MDO4104-3,CF:91.1CT FV:v2.95144 DPO4EMBD:V1.00 DPO4USB:V1.00 DPO4ENET:V1.00`. This indicates the oscilloscope model number, configured format, firmware version number and enabled application modules.

*IDN? (Query Only)

Returns the oscilloscope identification code.

Group Miscellaneous

Syntax `*IDN?`

Related Commands ID?

Examples `*IDN?` might return `:TEKTRONIX,DPO4034B,SN123456789,CF:91.1CT FV:v1.00000` indicating the oscilloscope model number, serial number, configured number, and firmware version number.

LANGuage

This command specifies the user interface display language. This command only affects the oscilloscope displayed language. Remote commands and their responses are always in English.

Group Miscellaneous

Syntax

```
LANGuage
{ENGLish|FRENch|GERMan|ITALian|SPANish|PORTUguese|JAPANese|
KOREan|RUSSian|SIMPlifiedchinese|TRADitionalchinese}

LANGuage?
```

Examples LANGUAGE? might return :LANGUAGE ENGLISH.

LOCk

Enables or disables all front-panel buttons and knobs. There is no front panel equivalent.

When the front panel is locked, neither the FPAnel:PRESS nor the FPAnel:TURN commands will work. They will not generate an error event either. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands. For example, to set the trigger level to 50%, you could use TRIGger:A SETLevel. To force a trigger, you could use TRIGger FORCe.

Group Miscellaneous

Syntax
```
LOCk {ALL|NONe}
LOCk?
```

Related Commands UNLock

Arguments ALL disables all front-panel controls.

NONe enables all front-panel controls. This is equivalent to the UNLock ALL command.

Examples LOCK ALL locks the front-panel controls.

LOCK? might return :LOCK NONE indicating that the front-panel controls are enabled by this command.

*LRN? (Query Only)

Returns the commands that list the oscilloscope settings except for configuration information for the calibration values, the WFMInpre? query, and the WFMOutpre? query. This query allows you to record or "learn" the current oscilloscope settings. You can use these commands to return the oscilloscope to the state it was in when you made the *LRN? query. This command is identical to the SET? Command.

Group Miscellaneous

Syntax *LRN?

Related Commands SET?

Examples *LRN? might return a long response, part of which could be as follows:

```
:ACQUIRE:STOPAFTER RUnsTOP;STATE 1;MODE SAMPLE;NUMENV
INFINITE;NUMAVG 16;SAMPLINGMODE RT;:HEADER 1;:LOCK
NONE;:LANGUAGE ENGLISH;:VERBOSE 1;:ALIAS:STATE
0;:DISPLAY:COLOR:PALETTE NORMAL;:DISPLAY:STYLE:DOTSONLY
0;:DISPLAY:PERSISTENCE 0.0000;CLOCK 1;GRATICULE
FULL;INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT
HIGH;:HARDCOPY :INKSAVER OFF;LAYOUT LANDSCAPE;PREVIEW
0;:SAVE:IMAGE:FILEFORMAT BMP;:SAVE:WAVEFORM:FILEFORMAT
INTERNAL;:SAVE:ASSIGN:TYPE SETUP;:TRIGGER:A:MODE
AUTO;TYPE EDGE;LE VEL 20.0000E-3;LEVEL:CH1
20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:
UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3
800.0000E-3;CH4 800.0000E-3;:TRIGG ER:A:LOWERTHRESHOLD:CH1
20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:H
OLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE
CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS
SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2
0.0000;CH3 0.0 000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1
X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE; EDGE
RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2
X;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN
TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT
4.0000E-9;:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE
RISE;THRESHOLD 20.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE
CH2;THRESHOLD 0.0000;:TRIGGER:A:SETHOLD:HOLDTIME
4.0000E-9;SETTIME 4.0000E-9; :TRIGGER:A:PULSE:CLASS
TRANSITION;:TRIGGER:A:PULSEWIDTH:SOURCE
CH1;POLARITY POSITIVE;WHEN LESSTHAN;WIDTH
4.0000E-9;:TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE; WHEN
OCCURS;WIDTH 4.0000E-9;:TRIGGER:A:TRANSITION:SOURCE CH1

..
```

MARK

Moves to the next or previous reference mark on the waveform. Returns the current mark position.

Group Mark

Syntax

```
MARK {NEXT|PREVious}
MARK?
```

Arguments NEXT moves to the next reference mark on the right.

PREVious moves to the next reference mark on the left.

MARK:CREATE (No Query Form)

Creates a mark on a specified waveform or all waveforms in a column.

Group Mark

Syntax

```
MARK:CREATE {CH1|CH2|CH3|CH4|MATH|REF1
|REF2|REF3|REF4|B1|B2|B3|B4|REF1|REF2|REF3|REF4|DIGital|
COLUMN|RF_AMPlitude|RF_FREQuency|RF_PHASe}
```

Arguments CH<x> creates the mark on a channel waveform, where <x> is the channel number.

MATH creates the mark on the math waveform.

B<x> creates the mark on a bus waveform, where <x> is the bus number (1-4), except for MDO3000, which has only two buses.

REF<x> creates the mark on a reference waveform, where <x> is the reference waveform number.

DIGital creates the mark on a digital waveform. (An error will result if no digital channel is turned on.) (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

COLUMN creates marks on all waveforms in the current zoom pixel column.

RF_AMPlitude|RF_FREQuency|RF_PHASe creates the mark on an RF time domain trace. (MDO4000/B models only.)

MARK:DELETe (No Query Form)

This command deletes a mark on a particular waveform, all waveforms in a column, the selected mark, or all marks.

Group Mark

Syntax

```
MARK:DELETe
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|B1|B2|B3|B4|REF1|REF2|
REF3|REF4|DIGital|COLUMN|SELECTED|ALL||RF_AMPlitude|RF_FREQuency|
RF_PHASe}
```

Arguments

CH<x> deletes the mark on a channel waveform, where <x> is the channel number.

MATH deletes the mark on the math waveform.

B<x> deletes the mark on a bus waveform, where <x> is the bus number (1-4), except for MDO3000, which has only two buses.

REF<x> deletes the mark on a reference waveform, where <x> is the reference waveform number.

DIGital deletes all marks on all digital channels. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_AMPlitude|RF_FREQuency|RF_PHASe deletes the mark on an RF time domain trace. (MDO4000/B models only.)

COLUMN deletes marks on all waveforms in the current zoom pixel column.

MARK:FREE? (Query Only)

Returns how many marks are available for use. There can be a total of 1,024 marks returned.

Group Mark

Syntax

```
MARK:FREE?
```

MARK:SAVEALL (No Query Form)

This command saves all current marks on waveforms in the time domain to the user search mark list in internal memory. (This is equivalent to pressing the “Save All Marks" button in the Search button menu on the front panel.) In order to retrieve the information, use the query form of MARK:USERLIST.

Group Mark

Syntax

```
MARK:SAVEALL TOUSER
```

Related Commands MARK:USERLIST, SEARCH:SEARCH<x>:LIST?

MARK:SELected:END? (Query Only)

Returns the end of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:END?`

MARK:SELected:FOCUS? (Query Only)

Returns the focus of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:FOCUS?`

MARK:SELected:MARKSINCOLumn? (Query Only)

Returns the number of marks in the current zoom pixel column.

Group Mark

Syntax `MARK:SELected:MARKSINCOLumn?`

MARK:SELected:OWNer? (Query Only)

Returns the owner of the selected mark.

Group Mark

Syntax `MARK:SELected:OWNer?`

Returns `<QString>` is the owner of the mark.

Examples `MARK:SELECTED:OWNER?` might return: `USER, SEARCH1`

MARK:SELected:SOURCe? (Query Only)

Returns the source waveform for the selected mark.

Group Mark

Syntax `MARK:SELected:SOURCe?`

MARK:SELected:STARt? (Query Only)

Returns the starting point of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:STARt?`

MARK:SELected:STATE? (Query Only)

Returns the on or off state of the selected mark. The selected mark is at or near the center of the screen. If you press the front-panel Set/Clear button, this mark will disappear.

Group Mark

Syntax `MARK:SELected:STATE?`

MARK:SELected:ZOOm:POSition? (Query Only)

Returns the position of the selected mark, 0 to 100% of the zoom overview window.

Group Mark

Syntax `MARK:SELected:ZOOm:POSition?`

MARK:TOTal? (Query Only)

Returns how many marks are currently in use. There can be a total of 1,024 marks returned.

Group Mark

Syntax `MARK:TOTal?`

MARK:USERLIST

The command creates a single user mark on a waveform in the time domain. The arguments consist of an enumeration specifying the source waveform, followed by 7 time mark parameters. You can create up to 1,024 marks. To save all the marks to memory, use the command `MARK:SAVEALL TOUSER`.

The query form retrieves a list of all user marks, separated by a semicolon. To retrieve the list of all system generated marks, use the command SEARCH:SEARCH<x>:LIST?

A "Settings conflict" error event is set for the command form if any of the following conditions are true:

- The source waveform is not turned on.
- The position of the mark is not on the waveform.
- The maximum number of marks would be exceeded.

NOTE. *The search marks returned from the `MARK:USERLIST?` query are those marks saved to the internal user list of marks. The search marks returned by the `SEARCH:SEARCH:LIST?` query are the automatically generated system marks.*

Group Mark

Syntax

```
MARK:USERLIST
<Enum>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>
MARK:USERLIST?
```

Related Commands MARK:SAVEALL, SEARCH:SEARCH<x>:LIST?

Arguments The first argument <Enum> can be any one of the following source waveforms:

`CH<x>` – analog channels 1–4

`B<x>` – serial (if installed) or parallel bus 1–4

`MATH` – math waveform

`REF<x>` – reference waveforms 1–4

`D0 – D15` – digital channels 0 — 15 (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_AMPlitude|RF_FREQuency|RF_PHASe – RF time domain traces (MDO4000/B models only.)

The next 7 <NR3> arguments are time mark parameters as follows:

Start – start value in percentage of record

End – end value in percentage of record

Focus – focus value in percentage of record

X value – horizontal value of the focus point in the mark's waveform units (This is ignored in the command form – use any value.)

Y value – vertical value of the focus point in the mark's waveform units (This is ignored in the command form – use any value.)

Delta X value – always 0, since there is no time-domain reference mark. (This is ignored in the command form – use any value.)

Delta Y value – always 0, since there is no time-domain reference mark. (This is ignored in the command form – use any value.)

Returns If no user time marks have been set, the query returns NONe,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0.

Examples MARK:USERLIST CH1,62.5000,62.5000,62.5000,0E+0,0E+0,0.0E+0,0.0E+0;USERLIST CH1,79.5000,79.5000,79.5000,0E+0,0E+0,0.0E+0,0.0E+0 sets two marks on the Channel 1 waveform.

MARK:USERLIST? might return CH1,62.5000,62.5000,62.5000,5.0000E-6,infE-315,0.0E+0,0.0E+0;USERLIST CH1,79.5000,79.5000,79.5000,11.8000E-6,infE-315,0.0E+0,0.0E+0, indicating that two marks were set on the Channel 1 waveform.

MARKER:MANual

This command switches on or off the manual markers **a** and **b** that are available for frequency domain traces.

Two manual markers are available for measuring non-peak areas of interest. The absolute measurements are in dBm; the relative measurements (relative to the Reference Marker) are in dBc (dB relative to the carrier).

When the manual markers are turned off, and the peak markers are turned on, the Reference Marker is placed on the highest amplitude peak. With manual markers on, the Reference Marker is placed at the **a** manual marker. The manual markers use the units specified with the command RF:UNIts.

Conditions MDO models only.

Group RF

Syntax
```
MARKER:MANual {OFF|ON|0|1}
MARKER:MANual?
```

Related Commands MARKER:M<x>:AMPLitude:ABSolute?, MARKER:M<x>:AMPLitude:DELTa?, MARKER:M<x>:FREQuency:DELTa?, MARKER:M<x>:FREQuency:ABSolute

Arguments `OFF` or 0 turns the manual markers off.

`ON` or 1 turns the manual markers on.

Examples `MARKER:MANual 1` turns on the manual markers.

`MARKER:MANual?` might return 0, indicating that the manual markers are turned off.

MARKER:M<x>:AMPLitude:ABSolute? (Query Only)

This query returns the actual amplitude (vertical) value of either of the two manual markers that are available for frequency domain traces, in user-set units. M<x> can be either M1, which specifies manual marker **a**, or M2, which specifies manual marker **b**. (Use RF:UNIts to specify the units.)

Conditions MDO models only.

Group RF

Syntax
```
MARKER:M<x>:AMPLitude:ABSolute?
```

Related Commands MARKER:MANual, MARKER:M<x>:AMPLitude:DELTa?, MARKER:M<x>:FREQuency:DELTa?, MARKER:M<x>:FREQuency:ABSolute

Examples `MARKER:M2:AMPLitude:ABSolute?` might return -1.0E+01, indicating a marker amplitude of -10 dBm.

MARKER:M<x>:AMPLitude:DELTa? (Query Only)

This query returns the delta amplitude (vertical) value of either of the two manual markers that are available for frequency domain traces, in relation to the Reference Marker. M<x> can be either M1, which specifies manual marker **a**, or M2, which specifies manual marker **b**.

NOTE. *Querying the delta of M1 will always return 0, because M1 is always the Reference Marker when manual markers are turned on.*

Conditions MDO models only.

Group RF

Syntax `MARKER:M<x>:AMPLitude:DELTa?`

Related Commands MARKER:MANual, MARKER:M<x>:AMPLitude:ABSolute?, MARKER:M<x>:FREQuency:DELTa?, MARKER:M<x>:FREQuency:ABSolute

Examples `MARKER:M2:AMPLitude:DELTa?` might return –5.0E+00, indicating that marker **b** is –5 dBc below marker **a**, which is also the Reference Marker.

MARKER:M<x>:FREQuency:ABSolute

This command specifies the actual frequency (horizontal) value of either of the two manual markers that are available for frequency domain traces. M<x> can be either M1, which specifies manual marker **a**, or M2, which specifies manual marker **b**.

NOTE. *Markers cannot be placed outside the frequency range defined by RF:STARt and RF:STOP.*

Conditions MDO models only.

Group RF

Syntax
```
MARKER:M<x>:FREQuency:ABSolute <NR3>
MARKER:M<x>:FREQuency:ABSolute?
```

Related Commands MARKER:MANual, MARKER:M<x>:AMPLitude:ABSolute?, MARKER:M<x>:AMPLitude:DELTa?, MARKER:M<x>:FREQuency:DELTa?

Arguments <NR3> is a floating point value that indicates the actual frequency of either of the two manual markers.

Examples `MARKER:M1:FREQuency:ABSolute 1.50E+9` sets the absolute frequency value of manual marker **a** to 1.5 GHz.

`MARKER:M2:FREQuency:ABSolute?` might return 1.50E+9, indicating that the absolute frequency value of manual marker **b** has been set to 1.5 GHz.

MARKER:M<x>:FREQuency:DELTa? (Query Only)

This query returns the delta frequency (horizontal) value of either of the two manual markers that are available for frequency domain traces, in relation to the Reference Marker. M<x> can be either M1, which specifies manual marker **a**, or M2, which specifies manual marker **b**.

The manual marker readouts use the units specified with the command RF:UNIts.

NOTE. *Querying the delta of M1 will always return 0, because M1 is always the Reference Marker when manual markers are turned on.*

Conditions MDO models only.

Group RF

Syntax `MARKER:M<x>:FREQuency:DELTa?`

Related Commands MARKER:MANual, MARKER:M<x>:AMPLitude:ABSolute?, MARKER:M<x>:AMPLitude:DELTa?, MARKER:M<x>:FREQuency:ABSolute

Examples `MARKER:M2:FREQuency:DELTa?` might return 1.00E+08, indicating that marker **b** is 100 MHz to the right of the Reference Marker.

MARKER:M<x>:NOISEDensity? (Query Only)

This command returns the noise density of the RF_NORMal trace at the specified marker position in <RF Units>/Hz units, where <RF Units> are the units specified by the command RF:UNIts.

Conditions MDO models only.

Group RF

Syntax `MARKER:M<x>:NOISEDensity?`

Related Commands MARKER:MANual, MARKER:M<x>:PHASENoise?

Returns floating point number

Examples `MARKER:M2:NOISEDensity?` might return –133.2350, indicating noise density of –133.2350 dBm/Hz at the marker position.

MARKER:M<x>:PHASENoise? (Query Only)

This command returns the phase noise of the RF_NORMal trace at the specified marker position in dBc/Hz units.

Conditions MDO models only.

Group RF

Syntax `MARKER:M<x>:PHASENoise?`

Related Commands MARKER:MANual, MARKER:M<x>:NOISEDensity?

Returns floating point number

Examples `MARKER:M2:PHASENoise?` might return –60.1289, indicating phase noise of –60.1289 dBc/Hz at the marker position.

MARKER:PEAK:EXCURsion

This command specifies the peak excursion value, in dB, for the frequency domain trace automatic peak markers.

Peak excursion refers to how far an RF signal needs to fall in amplitude between marked peaks, in order to be considered another valid peak. If the peak excursion value is low, more peaks will tend to qualify as valid peaks and have associated markers. If the peak excursion value is high, fewer peaks will tend to qualify as valid peaks and have associated markers.

Conditions MDO models only.

Group RF

Syntax

```
MARKER:PEAK:EXCURsion <NR3>
MARKER:PEAK:EXCURsion?
```

Related Commands MARKER:PEAK:THReshold, MARKER:TYPe, MARKER:PEAK:STATE MARKER:PEAK:MAXimum

Arguments <NR3> is a floating point number that specifies the automatic marker excursion value.

Examples `MARKER:PEAK:EXCURsion 30` sets the peak excursion value to 30 dB.

`MARKER:PEAK:EXCURsion?` might return 30.0000, indicating a peak excursion value of 30 dB.

MARKER:PEAK:MAXimum

This command specifies the maximum number of frequency domain trace peaks that could have automatic markers placed on them. This can be a number between 1 and 11. The default is 5. To turn on the automatic peak markers, use the command MARKER:PEAK:STATE. To list all of the peak markers, use the command SEARCH:SPECTral:LIST?

The actual number of automatic markers may be less than the maximum, depending on the threshold and excursion values and the spectral content of the RF signal.

If more peaks than the maximum are detected that meet the threshold and excursion criteria, only the highest amplitude peaks will have automatic markers placed on them.

Group RF

Syntax
```
MARKER:PEAK:MAXimum <NR1>
MARKER:PEAK:MAXimum?
```

Related Commands MARKER:PEAK:STATE, MARKER:PEAK:EXCURsion, MARKER:PEAK:THReshold, MARKER:TYPe,

Arguments <NR1> is an integer that represents the maximum number of peaks that could have automatic markers.

Examples MARKER:PEAK:MAXimum 3 sets the maximum number of peaks that could have automatic markers to 3.

MARKER:PEAK:MAXimum? might return 11, indicating that the maximum number of peaks that should have automatic markers has been set to 11.

MARKER:PEAK:STATE

This command switches on or off the automatic peak markers that are available for frequency domain traces. There are up to 11 automatic markers. The maximum number of markers can be set using the command MARKER:PEAK:MAXimum.

The automatic peak markers find amplitude peaks based upon user threshold and excursion settings (set with the MARKER:PEAK:EXCURsion and MARKER:PEAK:THReshold commands.)

Each automatic marker has a readout associated with it. These can be absolute or delta readouts (set with the MARKER:TYPe command.) To list all of the peak markers, use the command SEARCH:SPECTral:LIST?

Group RF

Syntax
```
MARKER:PEAK:STATE {OFF|ON|0|1}
MARKER:PEAK:STATE?
```

Related Commands MARKER:PEAK:MAXimum, MARKER:PEAK:EXCURsion, MARKER:PEAK:THReshold, MARKER:TYPe

Arguments OFF or 0 turns the automatic peak markers off.

ON or 1 turns the automatic peak markers on.

Examples

`MARKER:PEAK:STATE 1` turns the automatic peak markers on.

`MARKER:PEAK:STATE?` might return 0, indicating that automatic peak markers are turned off.

MARKER:PEAK:THReshold

This command specifies the threshold value of the automatic peak markers available for frequency domain traces. (Use the RF:UNIts command to specify the units.) Only peaks with an amplitude greater than the threshold value will qualify for automatic peak marker placement.

To set the excursion value for the automatic markers, use the command MARKER:PEAK:EXCURsion. To switch the automatic marker readout between absolute and delta, use the command MARKER:TYPe. To turn on and set the number of automatic markers, use the commands MARKER:PEAK:STATE and MARKER:PEAK:MAXimum. To list all of the peak markers, use the command SEARCH:SPECTral:LIST?

Conditions

MDO models only.

Group

RF

Syntax

```
MARKER:PEAK:THReshold <NR3>
MARKER:PEAK:THReshold?
```

Related Commands

MARKER:PEAK:EXCURsion, MARKER:TYPe, MARKER:PEAK:STATE, MARKER:PEAK:MAXimum

Arguments

`<NR3>` is a floating point number that indicates the automatic marker threshold value.

Examples

`MARKER:PEAK:THReshold -50` sets the automatic marker threshold to –50 dBm.

`MARKER:PEAK:THReshold?` might return –50.000, indicating that only peaks with an amplitude greater than –50 dBm will qualify for automatic peak marker placement.

MARKER:REFERence (No Query Form)

This command changes the Center Frequency to the frequency indicated by the Reference Marker, in effect moving the Reference Marker to the center

of the screen. This applies when markers are turned on (using the command MARKER:PEAK:STATE or MARKER:MANual). This is equivalent to the **'R' to Center** side menu button in the front panel Markers menu.

Conditions MDO models only.

Group RF

Syntax `MARKER:REFERence CENTER`

Examples `MARKER:REFERence CENTER` moves the Reference Marker location to the center of the screen.

MARKER:REFERence:AMPlitude? (Query Only)

This query returns the actual amplitude (vertical) value of the Reference Marker in user-set units. This value indicates the absolute amplitude of the Reference Marker, regardless of whether the other markers are manual or automatic.

This data is equivalent to the number that appears on the display next to the red R inside a triangle when markers are turned on. If all markers are turned off, the value returned will be the last value displayed.

Conditions MDO models only.

Group RF

Syntax `MARKER:REFERence:AMPlitude?`

Related Commands RF:UNIts

Examples `MARKER:REFER:AMP?` might return -65.6218, indicating an amplitude value of -65.6218 dBm.

MARKER:REFERence:FREQuency? (Query Only)

This query returns the frequency of the Reference Marker, in Hz, when the frequency domain trace markers are on (using either the command MARKER:PEAK:STATE or MARKER:MANual). This data is equivalent to the

number that appears on the display next to the red R inside a triangle when markers areon. If all markers are off, the value returned will be the last value displayed.

Conditions MDO models only.

Group RF

Syntax `MARKER:REFERence:FREQuency?`

Examples `MARKER:REFERence:FREQuency?` might return 1.6830E+9.

MARKER:TYPe

This command specifies the marker type (either DELTa or ABSolute). An absolute marker shows the frequency and amplitude at the location of the marker. A delta marker shows the frequency and amplitude of the marker relative to the Reference Marker. The Reference Marker shows the absolute frequency and amplitude, regardless of this command. The marker amplitude measurements are in dBm for absolute, or in dBc (dB below carrier amplitude) for delta.

Conditions MDO models only.

Group RF

Syntax
```
MARKER:TYPe {DELTa|ABSolute}
MARKER:TYPe?
```

Related Commands MARKER:PEAK:STATE, MARKER:PEAK:MAXimum, RF:UNIts

Arguments `DELTa` specifies to display the frequency and amplitude of the markers relative to the Reference Marker. The relative amplitude is in dBc (dB below carrier amplitude); the relative frequency is in Hz.

`ABSolute` specifies to display the actual frequency and amplitude of each marker. The absolute amplitude is in user-set units; the absolute frequency is in Hz.

Examples `MARKER:TYPe DELTa` changes the marker type to delta.

`MARKER:TYPe?` might return `ABSOLUTE.`

MASK:COPy:SOUrce

This command specifies the mask that is to be copied to a user-defined custom mask. The specified mask is not copied until after the MASK:COPy:USER command is executed. Note that in addition to a standard mask, LIMit, USER and NONe can also be specified.

NOTE. *The only argument enumerations available for the MDO3000 series models are CUSTom / LIMit / NONe / USER.*

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:COPy:SOUrce
{DS1|DS1A|DS1C|DS2|DS3|DS4NA|DS4XNA|STS1Pulse|STS1Eye|STS3
|STSX3|CLOCKCoax|CLOCKSymmetrical|DSOContra|DSODouble
|DSOSingle|DSOTiming|G703DS1|DS1Rate|DS2RATECoax
|DS2RATESymmetrical|G703DS3|DS3Rate|E1Coax
|E1Symmetrical|E2|E3|HST1|HST2|HST3|HST4|HST5|HST6|NONe|USER
|LIMit}

MASK:COPy:SOUrce?
```

Related Commands

MASK:CUSTom

MASK:COPy:USER

Arguments

ANSI T1.102:

DS1 – DS1 1.544 Mb/s

DS1A – DS1A 2.048 Mb/s

DS1C – DS1C 3.152 Mb/s

DS2 – DS2 6.312 Mb/s

DS3 – DS3 44.736 Mb/s

DS4NA – DS4NA 139.26 Mb/s

DS4XNA – DS4NA Max Output 138.26 Mb/s

STS1Pulse – STS–1 Pulse 51.84 Mb/s

STS1Eye – STS–1 Eye 51.84 Mb/s

STS3 – STS–3 155.52 Mb/s

STSX3 – STS–3 Max Output 155.52 Mb/s

ITU-T:

CLOCKCoax – Clock Interface Coaxial Pair 2.048 Mb/s

CLOCKSymmetrical – Clock Interface Symmetrical Pair 2.048 Mb/s

DSOContra – DSO Data Contradirectional 64 kb/s

DSODouble – DSO Double 64 kb/s

DSOSingle – DSO Single 64 kb/s

DSOTiming – DSO Timing 64 kb/s

G703DS1 – DS1 G.7031.544 Mb/s

DS1Rate – DS1 Old Rate 1.544 Mb/s

DS2RATECoax – DS2 Rate Coaxial Pair 6.312 Mb/s

DS2RATESymmetrical – DS2 Rate Symmetrical Pair 6.312 Mb/s

G703DS3 – DS3 G.703 44.736 Mb/s

DS3Rate – DS3 Old Rate 44.736 Mb/s

E1Coax – E1 Coaxial Pair 2.048 Mb/s

E1Symmetrical – E1 Symmetric Pair 2.048 Mb/s

E2 – E2 8.448 Mb/s

E3 – E3 34.368 Mb/s

USB:

HST1 – HS:T1 480 Mb/s

HST2 – HS:T1 480 Mb/s

HST3 – HS:T1 480 Mb/s

HST4 – HS:T1 480 Mb/s

HST5 – HS:T1 480 Mb/s

HST6 – HS:T1 480 Mb/s

In addition to the standard masks, `LIMit, USER,` and `NONe` can be input as well.

Examples

`MASK:COPy:SOUrce` E1Coax specifies that the source for a user-defined custom mask (to be created with the command `MASK:COPy:USER`) is to be a standard ITU-T E1 Coaxial Pair mask.

`MASK:COPy:SOUrce?` might return NONE, indicating that no source has been specified.

MASK:COPy:USER (No Query Form)

This creates a user-defined custom mask by making a copy of the source mask that was specified prior with the command .MASK:COPy:SOUrce The source mask could be a standard, limit or another custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

`MASK:COPy:USER`

Related Commands

MASK:CUSTom

MASK:COPy:SOUrce

Examples

`MASK:COPy:USER` creates a user-defined custom mask from a copy of the source mask.

MASK:COUNt (No Query Form)

This command resets to zero the number of hits and failures for all mask segments.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt RESET`

Related Commands MASK:COUNt:HITS?

MASK:COUNt:SEG<x>:HITS?

MASK:COUNt:FAILURES?

Examples `MASK:COUNt RESET` resets to zero the number of hits and failures for all mask segments.

MASK:COUNt:FAILURES? (Query Only)

This query returns the number of pass/fail mask tests that have failed.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:FAILURES?`

Related Commands MASK:COUNt:HITS?

MASK:COUNt:SEG<x>:HITS?

Returns Integer which represents the number of pass/fail mask tests that have failed.

Examples `MASK:COUNT:FAILURES?` might return `:MASK:COUNT:FAILURES 3`, showing that three tests have failed.

MASK:COUNt:HITS? (Query Only)

This query returns the sum of all hits in all mask segments.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:HITS?`

Related Commands MASK:COUNt

MASK:COUNt:SEG<x>:HITS?

Returns `<NR1>`

Examples `MASK:COUNT:TOTAL?` might return `:MASK:COUNT:TOTAL 150`, showing 150 hits have occurred.

MASK:COUNt:SEG<x>:HITS? (Query Only)

This query returns the number of hits for the specified mask segment. There are up to 8 segments.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:SEG<x>:HITS?`

Related Commands MASK:COUNt:HITS?

MASK:COUNt

Returns Integer, representing the number of hits in the mask segment.

Examples `MASK:COUNT:SEG1:HITS?` might return `MASK:COUNT:SEG1:HITS 0`, showing that there have been no hits to mask segment 1.

MASK:COUNt:TESTS? (Query Only)

This query returns the number of pass/fail mask tests that have occurred.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:TESTS?`

Related Commands MASK:COUNt:HITS?

MASK:COUNt

Returns Integer that represents how many mask tests have occurred.

Examples `MASK:COUNT:TESTS?` might return 50, showing that 50 mask tests have occurred.

MASK:COUNt:VIOLATIONS? (Query Only)

This query returns the number of test violations that have occurred in the current mask pass/fail test. A test violation occurs when any part of a waveform falls within any mask segment. The default is 0.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:VIOLATIONS?`

Related Commands MASK:COUNt:TESTS?, MASK:COUNt:WAVEFORMS?

Returns `<NR1>`

Examples `MASK:COUNT:VIOLATIONS?` might return: 250 showing that 250 test violations have occurred.

MASK:COUNt:WAVEFORMS? (Query Only)

This query returns the number of waveforms that have been acquired and processed during pass/fail mask testing.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:COUNt:WAVEFORMS?`

Related Commands MASK:COUNt:TESTS?,

MASK:COUNt

Returns Integer

Examples `MASK:COUNT:WAVEFORMS?` might return: 1,000, showing that 1,000 waveforms have been acquired and processed.

MASK:CUSTom (No Query Form)

This command initializes a custom mask using a default triangle segment 1 mask (`:MASK:CUSTOM INIT`), or copies the currently active mask to the user-defined custom mask (`:MASK:CUSTOM COPYActive`).

NOTE. *When you create a custom mask, the horizontal position setting is converted from percent to time, and sets the trigtosamp value. If you change trigtosamp value after the mask has been displayed, the mask will be horizontally offset, and the segment x values recalculated. Note that the segment x values are the relative time between the trigger position and the mask point's x value.*

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:CUSTom {INIT|COPYACTive}`

Related Commands MASK:USER:AMPLitude,

MASK:USER:WIDth,

MASK:MARgin:PERCent

Arguments `INIT` sets the user-defined custom mask to its initialized state.

`COPYACTive` copies the currently active mask to the user-defined custom mask.

Examples `MASK:CUSTom INIT` creates an initialized user-defined custom mask.

MASK:DISplay

This command controls whether a mask is displayed on the screen. This is useful for temporarily turning off masks without deleting them. This is equivalent to pushing the bottom bezel "Setup Mask" button, and then pushing the side bezel "Display Mask" button.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:DISplay {ON|OFF|1|0}
MASK:DISplay?
```

Related Commands MASK:TEMPLate:CREATEmask

Arguments `ON` shows the mask on the display. This is the default value.

`OFF` removes the mask from the display.

`0` removes the mask from the display;

`1` shows the mask on the display.

Examples `MASK:DISplay ON` shows the mask on the display.

`MASK:DISplay?` might return 0, indicating that the mask is not being shown on the display.

MASK:LOCk

This command locks the mask to the source waveform so that any changes made to the horizontal and/or vertical scale settings of the waveform will redraw the mask segments in proportion. This feature is useful for expanding the horizontal and/or vertical settings in order to zoom in on waveforms and masks, and visually examine violation areas in more detail.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:LOCk {ON|OFF|<NR1>}
MASK:LOCk?
```

Related Commands

MASK:SOUrce

Arguments

`ON` turns on this feature, so that the mask is locked to the waveform.

`OFF` turns off this feature.

`<NR1> = 0` turns off this feature. Any other value turns it on.

Examples

`MASK:LOCK?` might return `:MASK:LOCK 1`, indicating that the mask lock to waveform mode is enabled.

MASK:MARgin:PERCent

Sets or returns the tolerance for the mask test. A positive value expands the mask and a negative margin shrinks the mask by the specified percentage.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:MARgin:PERCent <NR3>
MASK:MARgin:PERCent?
```

Related Commands

MASK:CUSTom

MASK:USER:WIDth

Arguments

`<NR3>` is a floating point value that ranges from -50.0 to +50.0. The default is 5.

Examples

`MASK:MARGIN:PERCENT 25` sets the mask margin percentage to 25.

`MASK:MARGIN:PERCENT?` might return `:MASK:MARGIN:PERCENT 1.00000000000E+001`, indicating that the mask margin is set to 10%.

MASK:SOUrce

This command specifies the mask source waveform to be used during pass/fail mask testing. Must be one of CH1 through CH4.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:SOUrce {CH1|CH2|CH3|CH4}
MASK:SOUrce?
```

Related Commands MASK:LOCk

Examples `MASK:SOUrce CH2` sets the source waveform for the mask to channel 2.

MASK:STANdard

This command replaces the existing mask, if any, with a specified standard mask. There are three categories of standard masks: ANSI T1.102, ITU-T, and USB.

To ensure that Mask commands are enabled, use the command APPLication:TYPe `LIMITMask`.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

NOTE. *The only argument enumerations available for the MDO3000 series models are* `CUSTom` / `LIMit` / `NONe` / `USER`.

Conditions This command requires a DPO4LMT application module for 4000 series models, or an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:STANdard
{DS1|DS1A|DS1C|DS2|DS3|DS4NA|DS4XNA|STS1Pulse|STS1Eye|STS3
|STSX3|CLOCKCoax|CLOCKSymmetrical|DSOContra|DSODouble
|DSOSingle|DSOTiming|G703DS1|DS1Rate|DS2RATECoax
|DS2RATESymmetrical|G703DS3|DS3Rate|E1Coax|E1Symmetrical
|E2|E3|HST1|HST2|HST3|HST4|HST5 |HST6|NONe |USER|LIMit}

MASK:STANdard?
```

Arguments

ANSI T1.102:

DS1 – DS1 1.544 Mb/s

DS1A – DS1A 2.048 Mb/s

DS1C – DS1C 3.152 Mb/s

DS2 – DS2 6.312 Mb/s

DS3 – DS3 44.736 Mb/s

DS4NA – DS4NA 139.26 Mb/s

DS4XNA – DS4NA Max Output 138.26 Mb/s

STS1Pulse – STS–1 Pulse 51.84 Mb/s

STS1Eye – STS–1 Eye 51.84 Mb/s

STS3 – STS–3 155.52 Mb/s

STSX3 – STS–3 Max Output 155.52 Mb/s

ITU-T:

CLOCKCoax – Clock Interface Coaxial Pair 2.048 Mb/s

CLOCKSymmetrical – Clock Interface Symmetrical Pair 2.048 Mb/s

DSOContra – DSO Data Contradirectional 64 kb/s

DSODouble – DSO Double 64 kb/s

DSOSingle – DSO Single 64 kb/s

DSOTiming – DSO Timing 64 kb/s

G703DS1 – DS1 G.7031.544 Mb/s

DS1Rate – DS1 Old Rate 1.544 Mb/s

DS2RATECoax – DS2 Rate Coaxial Pair 6.312 Mb/s

DS2RATESymmetrical – DS2 Rate Symmetrical Pair 6.312 Mb/s

G703DS3 – DS3 G.703 44.736 Mb/s

DS3Rate – DS3 Old Rate 44.736 Mb/s

E1Coax – E1 Coaxial Pair 2.048 Mb/s

E1Symmetrical – E1 Symmetric Pair 2.048 Mb/s

E2 – E2 8.448 Mb/s

E3 – E3 34.368 Mb/s

USB:

HST1 – HS:T1 480 Mb/s

HST2 – HS:T1 480 Mb/s

HST3 – HS:T1 480 Mb/s

HST4 – HS:T1 480 Mb/s

HST5 – HS:T1 480 Mb/s

HST6 – HS:T1 480 Mb/s

In addition to the standard masks, LIMit, USER, and NONe can be input as well.

Returns MASK:STANdard? returns one of the following:

NONE indicates that the mask application is not active.

USER indicates one of the following:

- the current mask has been recalled from a file or
- the current mask has been created from scratch using the MASK commands or
- the current mask has been created by modifying one of the built-in standard telecommunications masks.

LIMIT indicates that the mask is a limit test (template) mask.

DS1, etc. indicates that the current mask is one of the built-in standard masks.

Examples MASK:STANdard DSO Double replaces the existing mask, if any, with a standard ITU-T DSO Double mask.

MASK:STANdard? might return NONE, indicating that the mask application is not currently active.

MASK:STOPOnviolation

This command stops the waveform acquisitions upon the first occurrence of a waveform violation. You can also specify an action to be performed when acquisitions are stopped by using the commands such as MASK:TESt:

SAVEWFM, MASK:TESt:SAVEIMAGE, MASK:TESt:AUXout:FAILure, MASK:TESt:HARDCopy, or MASK:TESt:SRQ:FAILure.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:STOPOnviolation {ON|OFF|<NR1>}
MASK:STOPOnviolation?
```

Related Commands MASK:TESt:SAVEWFM,

MASK:TESt:SAVEIMAGE,

MASK:TESt:AUXout:FAILure,

MASK:TESt:HARDCopy,

MASK:TESt:SRQ:FAILure

Arguments `ON` stops waveform acquisition on the first occurrence of a mask violation.

`OFF` turns this feature off.

`<NR1>=0` turns this feature off ; any other value turns it on.

Examples `MASK:STOPONVIOLATION ON` sets the instrument to stop waveform acquisition on the first occurrence of a waveform violation.

`MASK:STOPONVIOLATION?` might return `:MASK:STOPONVIOLATION ON`, indicating that the waveform acquisitions will be stopped upon the first occurrence of a waveform violation.

MASK:TEMPLate:CREATEmask (No Query Form)

This command, used for limit mask testing, causes a template mask to be created based on the settings of the MASK:TEMPLate:SOUrce, MASK:TEMPLate:TOLerance:HORizontal, and MASK:TEMPLate:TOLerance:VERTical commands. If you do not specify horizontal or vertical tolerances, the default tolerance of one minor division will be used.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

NOTE. *To ensure that Mask commands are enabled, use the command APPLication:TYPe LIMITMask.*

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax `MASK:TEMPLate:CREATEmask`

Related Commands MASK:TEMPLate:SOUrce,

MASK:TEMPLate:TOLerance:HORizontal,

MASK:TEMPLate:TOLerance:VERTical,

SAVe:MASK

MASK:TEMPLate:SOUrce

This command, typically used for limit mask testing, specifies the source waveform to be used to create a template mask. The source can be either one of four channels, or one of four saved reference waveforms. See the SAVe:WAVEform commands for more information on creating reference waveforms.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

NOTE. *To ensure that Mask commands are enabled, use the command APPLication:TYPe LIMITMask.*

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TEMPLate:SOUrce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4}
MASK:TEMPLate:SOUrce?
```

Related Commands

MASK:TEMPLate:CREATEmask,

MASK:TEMPLate:TOLerance:HORizontal,

MASK:TEMPLate:TOLerance:VERTical,

SAVe:MASK

MASK:TEMPLate:TOLerance:HORizontal

This command specifies the horizontal limit (tolerance) for a template mask to be used for limit testing. This indicates how far horizontally from the template source to create the mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:TEMPLate:TOLerance:HORizontal <NR3>
MASK:TEMPLate:TOLerance:HORizontal?
```

Related Commands

MASK:TEMPLate:CREATEmask,

MASK:TEMPLate:TOLerance:VERTical,

SAVe:MASK

Arguments

<NR3> is a floating point value that specifies the horizontal limit (tolerence) in milli-divisions. Range: 0 to 500 mDiv, resolution: 1mDiv, default: 40mDiv. This value cannot be negative.

Examples

If you create a limit mask after a default setup, then query:

```
:MASK:TEMPLate:TOLerance:HORizontal?
```

you get the response: 200.000E-3

Now send the commands:

```
:MASK:TEMPLate:TOLerance:HORizontal 0.4
:MASK:TEMPLate:CREATEmask
```

Notice that the horizontal gap in the mask is twice as tall.

MASK:TEMPLate:TOLerance:VERTical

This command specifies the vertical limit (tolerance) for a template mask to be used for limit testing. This indicates how far vertically from the template source to create the mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TEMPLate:TOLerance:VERTical <NR3>
MASK:TEMPLate:TOLerance:VERTical?
```

Related Commands MASK:TEMPLate:CREATEmask, MASK:TEMPLate:TOLerance:HORizontal, SAVe:MASK

Arguments <NR3> is a floating point value that specifies the vertical limit (tolerence) in milli-divisions. Range: 0 to 1000 mDiv, resolution: 1 mDiv, default: 40mDiv. This value cannot be negative.

Examples If you create a limit mask after a default setup, then query:

```
:MASK:TEMPLate:TOLerance:VERTical?
```

you get the response: 200.000E-3

Now send the commands:

```
:MASK:TEMPLate:TOLerance:VERTical 0.4
:MASK:TEMPLate:CREATEmask
```

Notice that the vertical gap in the mask is twice as tall.

MASK:TESt:AUXout:COMPLetion

This command will cause the instrument to send a TTL signal to the AUX:out port whenever a pass/fail mask test completes.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TESt:AUXout:COMPLetion {ON|OFF|<NR1>}
MASK:TESt:AUXout:COMPLetion?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion,

MASK:TESt:AUXout:FAILure

Arguments `ON` turns on this feature, so that a signal is sent to the AUX:out port whenever a mask test status changes to 'Complete'.

`OFF` turns off this feature.

`<NR1>=0` turns off this feature; any other value turns it on.

Examples `MASK:TESt:AUXout:COMPLetion ON` will send a TTL signal to the AUX:out port upon test completion.

`MASK:TESt:AUXout:COMPLetion?` might return 0, indicating that the instrument has not been set to send a TTL signal upon completion.

MASK:TESt:AUXout:FAILure

This command causes the instrument to send a TTL signal to the AUX:out port whenever a pass/fail mask test fails.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:AUXout:FAILure {ON|OFF|<NR1>}
MASK:TESt:AUXout:FAILure?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion,

MASK:TESt:AUXout:COMPLetion

Arguments `ON` turns on this feature, so that a signal is sent to the AUX:out port whenever a mask test status changes to 'failing'.

`OFF` turns off this feature.

`<NR1>= 0` turns off this feature; any other value turns it on.

Examples `MASK:TESt:AUXout:FAILure ON` will send a TTL signal to the AUX:out port upon test failure.

`MASK:TESt:AUXout:FAILure?` might return 0, indicating that the instrument has not been set to send a TTL signal upon failure.

MASK:TESt:COMPLetion:CRITerion

This command specifies the criterion to be used (either by waveform or by time) for test completion during pass/fail mask testing.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:COMPLetion:CRITerion {WAVEform|TIMe}
MASK:TESt:COMPLetion:CRITerion?
```

Related Commands

MASK:TESt:STATE,

MASK:TESt:WAVEform,

MASK:TESt:TIME,

MASK:TESt:THReshold

Arguments

`WAVEform` specifies that the test is to be considered complete when a specified number of waveforms has been tested. (The number of waveforms is specified using `MASK:TEST:WAVEform (<NR1>|INFInite))` .

`TIMe` specifies that the test is to be considered complete when a specified amount of time has elapsed. (The amount of time is specified using `MASK:TEST:TIME (<NR1>|INFInite))`.

Examples

Create a limit mask. The display should be a waveform inside a mask with no mask hits accumulating.

Now send the following commands:

```
MASK:TESt:COMPLetion:CRITerion WAVEform
MASK:TESt:WAVEform 10
MASK:TESt:STATE ON
```

Fairly quickly, the RunTest button should say OFF and the Show Results button should say Passed.

If you push the Show Results button, it should say Total Waveforms 10.

If instead you send:

```
mask:test:completion:criterion time
mask:test:time 10
mask:test:state on
```

The Run Test button should display ON for ten seconds, then display OFF. If you push the Show Results button, Elapsed time should display 10 S.

MASK:TESt:DELay

This command specifies the amount of time, in seconds, the instrument should wait after the start of pass/fail mask testing before it evaluates the waveforms. This command is useful if the test system requires some ‘settling’ time.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:DELay <NR3>
MASK:TESt:DELay?
```

Related Commands MASK:TESt:STATE, MASK:TESt:TIME

Arguments <NR3> is a floating point number that specifies the amount of time in seconds, to delay the start of the mask pass/fail test.

Examples MASK:TEST:DELAY 2.5 delays waveform evaluation by 2.5 seconds after the start of pass/fail testing.

MASK:TEST:DELAY? might return 5, indicating that the instrument has been set to wait 5 seconds after the start of a mask test before it evaluates the waveforms.

MASK:TESt:HARDCopy

This command will cause the instrument to generate a screen shot to the default printer as soon as a pass/fail mask test fails, using the current instrument hard copy settings. See HARDCopy:ACTIVeprinter and other Hardcopy commands for more information on accessing printer settings.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:HARDCopy {ON|OFF|<NR1>}
MASK:TESt:HARDCopy?
```

Related Commands MASK:TESt:STATE,

HARDCopy:ACTIVeprinter

Arguments

ON turns on this feature, so that the instrument will generate a screen hard copy to the default printer upon failure.

OFF turns off this feature.

<NR1> = 0 turns off this feature; any other value turns it on.

Examples

MASK:TESt:HARDCopy ON generates a screen shot to the default printer upon test failure.

MASK:TESt:HARDCopy? might return 0, indicating that the instrument is not set to generate a screen shot upon failure.

MASK:TESt:REPeat

This command causes the mask test cycle to continuously repeat upon the completion of the previous test cycle.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:TESt:REPeat {ON|OFF|<NR1>}
MASK:TESt:REPeat?
```

Related Commands

MASK:TESt:STATE,

Arguments

ON turns on this feature, so that the mask test cycle repeats continuously upon the completion of the previous test cycle.

OFF turns off this feature.

<NR1> is an integer. 0 turns off this feature; any other integer turns it on.

Examples

MASK:TESt:REPeat ON causes the mask test cycle to continuously repeat.

MASK:TESt:REPeat? might return 0, indicating that the mask test cycle is not set to continuously repeat.

MASK:TESt:SAVEIMAGE

This command causes the instrument to copy the screen image to a file on a USB mass storage device or a mounted network drive if a pass/fail mask test fails. See the command FILESystem:MKDir and other File System commands for more information on saving to a file.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TESt:SAVEIMAGE {ON|OFF|<NR1>}
MASK:TESt:SAVEIMAGE?
```

Related Commands MASK:TESt:STATE,

FILESystem:MKDir

Arguments `ON` turns on this feature, so that the screen image is copied to a specified file upon test failure.

`OFF` turns off this feature.

`<NR1>` is an integer. 0 turns off this feature; any other integer turns it on.

Examples `MASK:TESt:SAVEIMAGE On` copies a screen image to a file upon test failure.

`MASK:TESt:SAVEIMAGE?` might return 0, indicating that the instrument is not set to copy a screen image to a file upon failure.

MASK:TESt:SAVEWFM

This command copies the waveform data from all active channels to a file on a flash memory device such as a USB stick or a network drive. See the command FILESystem:MKDir and other File System commands for more information on saving to a file.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:SAVEWFM {ON|OFF|<NR1>}
MASK:TESt:SAVEWFM?
```

Related Commands MASK:TESt:STATE,

FILESystem:MKDir

Arguments ON turns on this feature, so that waveform data from all active channels is copied to files upon test failure.

OFF turns off this feature.

<NR1> is an integer. 0 turns off this feature; any other value turns it on.

Examples MASK:TEST:SAVEWFM ON sets the instrument to save the failing waveform data to a file.

MASK:TESt:SRQ:COMPLetion

This command causes the instrument to send an SRQ command when a pass/fail mask test completes. Use the command MASK:TESt:COMPLetion:CRITerion to specify criterion.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

NOTE. *NOTE: SRQ generation requires that the SRER ESB bit is 1 (*SRE 32) and the ESER OPC bit is 1 (*ESE 1).*

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:SRQ:COMPLetion {ON|OFF|<NR1>}
MASK:TESt:SRQ:COMPLetion?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion

Arguments ON turns on this feature, so that upon the completion of a mask test, the instrument will send an SRQ command (if registers are set to send SRQ when OPC is asserted. (See page 3-1, *Registers*.))

OFF turns off this feature.

<NR1> is an integer. 0 turns off this feature; any other integer turns it on.

Examples MASK:TESt:SRQ:COMPLetion ON sends an SRQ command upon test completion.

MASK:TESt:SRQ:COMPLetion? might return 0, indicating the instrument is not set to send an SRQ command upon test completion.

MASK:TESt:SRQ:FAILure

This command causes the instrument to send an SRQ command when a pass/fail mask test fails.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TESt:SRQ:FAILure {ON|OFF|<NR1>}
MASK:TESt:SRQ:FAILure?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion

Arguments ON turns on this feature, so that when a mask test fails, the instrument will send an SRQ command (if registers are set to send SRQ when OPC is asserted. (See page 3-1, *Registers*.)).

OFF turns off this feature.

<NR1> is an integer. 0 turns off this feature; any other integer turns it on.

Examples MASK:TEST:SRQ:FAILURE? might return :MASK:TEST:SRQ:FAILURE 1, indicating that the pass/fail SRQ on failure is turned on.

MASK:TESt:STATE

This command turns the pass/fail mask test on or off. Most of the other MASK:TEST commands need to be executed before this command.

NOTE. *To ensure that Mask commands are enabled, use the command APPLication:TYPe LIMITMask.*

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:STATE {ON|OFF|<NR1>}
MASK:TESt:STATE?
```

Related Commands MASK:TESt:WAVEform

Arguments ON turns the mask test on.

OFF turns the mask test off.

<NR1> is an integer. 0 turns the mask test off; any other integer turns it on.

Examples MASK:TESt:STATE ON starts the mask test.

MASK:TESt:STATus? (Query Only)

This command indicates the result of a pass/fail mask test.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:STATus?
```

Related Commands MASK:TESt:STATE,

Returns This query returns one of: `OFF, DELAY, PASSING, FAILING, PASSED, or FAILED,` When the violation count exceeds the violation threshold during the test, the status changes from `PASSING` to `FAILING`. When the test is complete, it changes from `FAILING` to `FAILED`.

Examples `MASK:TESt:STAT?` might return PASSED indicating the test passed and is complete.

MASK:TESt:STOP:FAILure

This command causes the instrument to stop acquiring data when a pass/fail mask test fails.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:TESt:STOP:FAILure {|ON|OFF|<NR1>}
MASK:TESt:STOP:FAILure?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion

Arguments

ON turns on this features, so that the instrument stops acquiring data upon failure.

OFF turns off this feature.

<NR1> is an integer. 0 turns off this feature; any other value turns it on.

Examples

MASK:TESt:STOP:FAILure 1 stops data acquisition upon test failure.

MASK:TESt:STOP:FAILure? might return 0, indicating the instrument is not set to stop acquiring data upon test failure.

MASK:TESt:THReshold

This command specifies the number of failed tested waveforms needed in a pass/fail mask test to cause the test status to change to 'Failing'.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:TESt:THReshold {<NR1>|INFInite}
MASK:TESt:THReshold?
```

Related Commands

MASK:TESt:STATE,

MASK:TESt:COMPLetion:CRITerion

Arguments

<NR1> is an integer that specifies the number of tested waveform violations occurring in each mask test that will change the test status to 'Failing'. The maximum number of failed tested waveforms that can be specified is 1,000,000. The default is 1.

INFInite indicates that there is no limit to the number of failed tested waveforms that will change a test status to 'Failing'.

Examples

`MASK:TESt:STOP:FAILure 50000` sets the instrument to change the test status to "failing" after 50,000 failed waveforms.

`MASK:TESt:STOP:FAILure?` might return INFINITE which indicates the instrument has been set so that there is no limit to tested waveform violations per test.

MASK:TESt:TIME

This command specifies the duration, in seconds, the instrument should run a pass/fail mask test. The default is INFINITE.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:TESt:TIME {<NR1>|INFInite}
MASK:TESt:TIME?
```

Related Commands

MASK:TESt:STATE,

MASK:TESt:DELay

Arguments

`<NR1>` is an integer that represents the number of seconds to test. The maximum number of seconds that can be specified is 172,800.

`INFInite` indicates that there is no time limit on the test run.

Examples

`MASK:TESt:TIME 2` specifies to run a mask test for 2 seconds.

`MASK:TESt:TIME?` might return INFINITE, indicating there is currently no specified time limit. This is the default.

MASK:TESt:WAVEform

This command specifies the number of waveforms the instrument should test during a pass/fail mask test.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:TESt:WAVEform {<NR1>|INFInite}
MASK:TESt:WAVEform?
```

Related Commands MASK:TESt:STATE,

MASK:TESt:TIME,

MASK:TESt:THReshold

Arguments `<NR1>` is an integer that specifies the number of waveforms to test. The maximum waveform count that can be specified is 1,000,000.

`INFInite` indicates that there is no limit on the waveform count.

Examples `MASK:TESt:WAVEform 100000` specifies to test 100,000 waveforms.

`MASK:TESt:TIME?` might return INFINITE, indicating there is currently no specified waveform limit.

MASK:USER:AMPLitude

This command specifies the nominal pulse amplitude, in volts, to be used for a user-defined custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

NOTE. *To ensure that Mask commands are enabled, use the command APPLication:TYPe LIMITMask.*

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:USER:AMPLitude <NR3>
MASK:USER:AMPLitude?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point number that determines the nominal pulse amplitude, in volts, of a user-defined custom mask.

Examples `MASK:USER:AMPLITUDE 2.4` sets the nominal pulse amplitude of a user-defined custom mask to 2.4 volts.

`MASK:USER:AMPLITUDE?` might return

`:MASK:USER:AMPLITUDE 100.0000E-3`, indicating that the user mask nominal pulse amplitude is set to 0.1 volts.

MASK:USER:HSCAle

This command specifies the nominal timing resolution, in time/division, to be used to draw a user-defined custom mask pulse shape.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:USER:HSCAle <NR3>
MASK:USER:HSCAle?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point value that specifies the timing resolution used to a draw a user-defined custom mask pulse shape.

Examples MASK:USER:HSCALE 200E-9 sets the nominal timing resolution used to draw the mask pulse shape to 200 nanoseconds per division.

MASK:USER:HSCALE? might return :MASK:USER:HSCALE 40.0000E-9, indicating that the nominal timing resolution used to draw the mask pulse shape is set to 40 nanoseconds per division.

MASK:USER:HTRIGPOS

This command specifies the nominal trigger position (pulse leading edge), to be used to draw a user-defined custom mask, as a fraction of the display width.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:USER:HTRIGPOS <NR3>
MASK:USER:HTRIGPOS?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point number in the range of 0.0 to 1.0 that sets the trigger points as a fraction of the display width, referenced from the left edge of the graticule.

0.0 represents the left edge.

Examples MASK:USER:HTRIGPOS 0.6 sets the nominal trigger position of the mask to 0.6.

MASK:USER:HTRIGPOS? might return :MASK:USER:HTRIGPOS 500.0000E-3, indicating that the nominal trigger position of the mask is set to 0.5.

MASK:USER:LABel

This command specifies a user-defined label for a custom mask.

Conditions This command requires a DPO4LMT application module.

Group Mask

Syntax

```
MASK:USER:LABel <QString>
MASK:USER:LABel?
```

Related Commands MASK:CUSTom, MASK:USER:AMPLitude

Arguments <QString> is a quoted string of up to 32 characters.

MASK:USER:RECOrdlength

This command specifies the nominal record length to be used for pulse mask testing with a user-defined custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:USER:RECOrdlength <NR1>
MASK:USER:RECOrdlength?
```

Related Commands MASK:CUSTom,

SAVe:MASK,

MASK:USER:TRIGTOSAMP

Arguments <NR1> is an integer that sets the record length value to be used for pulse mask testing of a user-defined custom mask.

Examples

`MASK:USER:RECOrdlength 5000` sets the record length for pulse mask testing with a user-defined mask to 5,000.

`MASK:USER:RECOrdlength?` might return 5000, indicating that a record length of 5,000 has been set.

MASK:USER{:SEG<x>|:MASK<x>} (No Query Form)

This command deletes the specified mask segment from the current mask segment. There can be up to 8 segments.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

`MASK:USER{:SEG<x>|:MASK<x>} DELEte`

Related Commands

MASK:CUSTom,

SAVe:MASK

Examples

`MASK:USER:SEG3 DELEte` deletes segment 3 from the current mask segment.

MASK:USER{:SEG<x>|:MASK<x>}:NR_Pt? (Query Only)

This query returns the number of points that make up the specified mask segment of a user-defined custom mask. There can be up to 8 segments.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax `MASK:USER{:SEG<x>|:MASK<x>}:NR_Pt?`

Related Commands MASK:CUSTom,

SAVe:MASK

Returns Integer

Examples `MASK:USER:SEG3:NR_Pt?` might return 0, indicating that there is no segment 3 in the current mask.

MASK:USER{:SEG<x>|:MASK<x>}:POINTS

This command specifies the x and y coordinates of the points that make up the segment 1–8. The units are normal waveform units. The x-coordinate is specified relative to the trigger. The points are specified as a sequence of (x,y) points which traverse the boundary of the segment in a counter-clockwise direction.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:USER{:SEG<x>|:MASK<x>}:POINTS <NR3>
MASK:USER{:SEG<x>|:MASK<x>}:POINTS?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments `<NR3>` is a floating- point number.

Examples :MASK:USER:SEG1:POINTS -20e-6,.1,20e-6,.1,20e-6,.2,-20e-6,.2

:MASK:USER:SEG2:POINTS -20e-6,-.2,20e-6,-.2,20e-6,-.1,-20e-6,-.1

MASK:USER:TRIGTOSAMP

This command specifies the nominal time, in seconds, from the (leading edge) trigger position to the pulse bit sampling position, to be used for testing with a user-defined custom mask.

NOTE. *When you create a custom mask, the horizontal position setting is converted from percent to time, and sets the trigtosamp value. If you change trigtosamp value after the mask has been displayed, the mask will be horizontally offset, and the segment x values recalculated. Note that the segment x values are the relative time between the trigger position and the mask point's x value.*

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:USER:TRIGTOSAMP <NR3>
MASK:USER:TRIGTOSAMP?
```

Related Commands

MASK:CUSTom,

SAVe:MASK,

MASK:USER:RECOrdlength

Arguments

<NR3> is a floating point number that sets the time to the pulse bit sampling position.

Examples

`MASK:USER:TRIGTOSAMP 50.0000E-6` sets the time from the trigger position to the pulse bit sampling position to 50 µS.

`MASK:USER:TRIGTOSAMP?` might return 100.0000E-6, indicating that a time of 100 µS has been specified.

MASK:USER:VOFFSet

This command specifies the nominal value, in volts, to be used to vertically offset the input channels for a user-defined custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax

```
MASK:USER:VOFFSet <NR3>
MASK:USER:VOFFSet?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point number that sets the nominal vertical offset value, in volts.

Examples MASK:USER:VOFFSET 0.0 sets the user mask nominal vertical offset value to 0.0 volts.

MASK:USER:VOFFSET? might return :MASK:USER:VOFFSET 0.0000, indicating that the nominal vertical offset value of the displayed mask is set to 0 volts.

MASK:USER:VPOS

This command specifies the nominal value, in divisions, to be used to vertically position the input channels for a user-defined custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:USER:VPOS <NR3>
MASK:USER:VPOS?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point number that sets the nominal vertical position value in divisions.

Examples `MASK:USER:VPOS -0.8` sets the user mask nominal vertical position value to -0.8 divisions.

`MASK:USER:VPOS?` might return `:MASK:USER:VPOS 0.0000`, indicating that the nominal vertical position value of the displayed mask is set to 0 divisions.

MASK:USER:VSCAle

This command specifies the nominal value, in volts per division, to be used to vertically scale the input channels for a user-defined custom mask.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group Mask

Syntax
```
MASK:USER:VSCAle <NR3>
MASK:USER:VSCAle?
```

Related Commands MASK:CUSTom,

SAVe:MASK

Arguments <NR3> is a floating point number that sets the nominal vertical scale value for the input channels for a user-defined custom mask.

Examples

`MASK:USER:VSCALE200E-3` sets the user mask nominal vertical scale to 200 millivolts per division.

`MASK:USER:VSCALE?` might return `:MASK:USER:VSCALE 1.0000E-3`, indicating that the nominal vertical scale of the displayed mask is set to 1 millivolt per division.

MASK:USER:WIDth

This command specifies the nominal bit width value, in seconds, to be used for a user-defined custom mask. This is the time of one bit of data where bit width = 1 / (data rate of the signal).

NOTE. *Width is set to the scope's horizontal time per div setting at the time the mask is created. If you create a mask, extract the definition, modify width, then recall the modified mask definition, you will get the same mask you originally did. If you change the width after the mask has been recalled, you will modify the mask ratio metrically; i.e., if you increase it by a factor of two, the mask display becomes twice as wide, and the mask segment points are recalculated.*

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions

This command requires a DPO4LMT application module for 4000 series models, and an MDO3LMT application module for MDO3000 series models.

Group

Mask

Syntax

```
MASK:USER:WIDth <NR3>
MASK:USER:WIDth?
```

Related Commands

MASK:CUSTom,

SAVe:MASK

Arguments

`<NR3>` is a floating point number that indicates the nominal bit width value in seconds.

Examples

`MASK:USER:WIDTH 648E-9` sets the nominal bit width value of the user mask to 648 nanoseconds (1.544 Mbits/second).

MASK:USER:WIDTH? might return 0.0E+0, which is the default.

MATH[1]? (Query Only)

Returns the definition of the math waveform. The returned data depends on the setting of the MATH[1]:TYPe command.

Group Math

Syntax

```
MATH[1]?
```

Related Commands MATH[1]:TYPe

Examples

MATH? or MATH1? might return

```
:MATH:TYPE DUAL;DEFINE "CH1+CH2";VERTICAL:SCALE 100.0000E-3;POSITION 0.0000;UNITS "V";:MATH:HORIZONTAL:SCALE 4.0000E-6;POSITION 50.0000;UNITS "s";:MATH:SPECTRAL:MAG DB;WINDOW HANNING
```

MATH[1]:AUTOSCale

Sets (or queries) the state of automatic vertical scaling of the math waveform. The default state is ON (1).

Group Math

Syntax

```
MATH[1]:AUTOSCale?
MATH[1]:AUTOSCale {0|1|OFF|ON}
```

Arguments

1 or ON enables automatic vertical scaling of the math waveform when the RF reference level falls below -25.0 dBm. Reference levels greater than or equal to -25.0 dBm cause the probe to go into BYPass mode. The reference level is set/queried using the command RF:REFLevel.

0 or OFF disables math autoscaling.

Examples

MATH[1]:AUTOSC ON enables automatic vertical scaling of the math waveform.

MATHAUTOSCALE? might return 1 indicating that auto-scaling is enabled for the math waveform.

MATH[1]:DEFine

This command specifies the current math function as a text string. You must also specify the type (dual waveform, FFT, advanced math, or spectrum math) using MATH[1]:TYPe

Dual math expressions are strings of the form `<wfm> <operation> <wfm>`, where the <wfm>s are any combination of live analog or reference waveforms in the time domain display, the <operation> is any of +, -, * or /, and the type has been set to `DUAL`.

FFT math expressions are strings of the form `FFT(<wfm>)`, where <wfm> is any live analog or reference waveforms in the time domain display, and the type has been set to `FFT`.

NOTE. *You can also use FFT as part of a math expression by setting the type to* `ADVanced` *using MATH[1]:TYPe. See examples of advanced type math expressions below.*

Advanced math expressions extend beyond dual math expressions, incorporating combinations of advanced math functions, measurements, and operators.

Spectrum math (MDO models) expressions are strings of the form <wfm><operation><wfm>, where the waveforms are any combination of live RF or reference traces in the frequency domain display, the <operation> is either + or –, and type has been set to `SPECTRUM`.

Group Math

Syntax

```
MATH[1]:DEFine <QString>
MATH[1]:DEFine?
```

Related Commands MATHVAR:VAR<x>,

MATH[1]:TYPe

Arguments `<QString>` quoted string argument is the mathematical expression that defines the waveform.

Table 2-55: Math expression elements

Element	Description	Example
CH1-CH4 REF1-REF4	Specifies an analog channel or reference waveform as the data source. Referenced as <wfm> in the math operators descriptions.	:MATH:DEFINE "FFT(CH1)"
Automatic measurements of waveforms See also MEASUrement:IMMed:TYPe and MEASUrement:MEAS<x>:TYPe .		
AMPlitude(<wfm>)	The high value less the low value measured over the entire waveform or gated region.	:MATH:DEFINE "AMPlitude(CH1)"
AREa(<wfm>)	Area measurement is a voltage over time measurement. It returns the area over the entire waveform or gated region in volt-seconds. Area measured above ground is positive; area measured below ground is negative.	:MATH:DEFINE "AREA(CH1)"
BURst(<wfm>)	Burst width: the duration of a burst (a series of transient events) and is measured over the entire waveform or gated region.	:MATH:DEFINE "BURST(CH1)"
CAREa(<wfm>)	Cycle area: a voltage over time measurement. The measurement is the area over the first cycle in the waveform or the first cycle in the gated region expressed in volt-seconds. The area above the common reference point is positive, and the area below the common reference point is negative.	:MATH:DEFINE "CAREA(CH1)"
CMEan(<wfm>)	Cycle mean: the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region.	:MATH:DEFINE "CMEAN(CH1)"
CRMs(<wfm>)	Cycle RMS: the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region.	:MATH:DEFINE "CRMS(CH1)"
DELay(<wfm>,<wfm>)	The time between the mid reference (default 50%) amplitude point of two different waveforms. See also Phase.	:MATH:DEFINE "DELAY(CH1,CH2)"
FALL(<wfm>)	The time required for the falling edge of the first pulse in the waveform or gated region to fall from the high reference value (default = 90%) to the low reference value (default = 10%) of the final value.	:MATH:DEFINE "FALL(CH1)"

Table 2-55: Math expression elements (cont.)

Element	Description	Example
FREQuency(<wfm>)	The first cycle in a waveform or gated region. Frequency is the reciprocal of the period; it is measured in hertz (Hz) where one Hz is one cycle per second.	:MATH:DEFINE "FREQUENCY(CH1)"
HIGH(<wfm>)	This value is used as 100% whenever high reference, mid reference, or low reference values are needed, such as in fall time or rise time measurements. Calculate using either the min/max or histogram method. The min/max method uses the maximum value found. The histogram method uses the most common value found above the midpoint. This value is measured over the entire waveform or gated region.	:MATH:DEFINE "HIGH(CH1)*CH2"
LOW(<wfm>)	This value is used as 0% whenever high reference, mid reference, or low reference values are needed, such as in fall time or rise time measurements. Calculate using either the min/max or histogram method. The min/max method uses the minimum value found. The histogram method uses the most common value found below the midpoint. This value is measured over the entire waveform or gated region.	:MATH:DEFINE "LOW(CH1)"
MAXimum(<wfm>)	The most positive peak voltage. Max is measured over the entire waveform or gated region.	:MATH:DEFINE "MAXIMUM(CH1)"
MEAN(<wfm>)	The arithmetic mean over the entire waveform or gated region.	:MATH:DEFINE "MEAN(CH1)"
MINImum(<wfm>)	The most negative peak voltage. Min is measured over the entire waveform or gated region.	:MATH:DEFINE "MINIMUM(CH1)"
NDUty(<wfm>)	Negative duty cycle: the ratio of the negative pulse width to the signal period expressed as a percentage. The duty cycle is measured on the first cycle in the waveform or gated region.	:MATH:DEFINE "NDUTY(CH1)"
NOVershoot(<wfm>)	Negative overshoot: this is measured over the entire waveform or gated region and is expressed as: Negative Overshoot = (Low – Minimum) / Amplitude x 100%.	:MATH:DEFINE "NOVERSHOOT(CH1)"

Table 2-55: Math expression elements (cont.)

Element	Description	Example
NWIdth(<wfm>)	Negative pulse width: the distance (time) between the mid reference (default 50%) amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform or gated region.	`:MATH:DEFINE "NWIDTH(CH1)"`
PDUTy(<wfm>)	Positive duty cycle: the ratio of the positive pulse width to the signal period expressed as a percentage. duty cycle is measured on the first cycle in the waveform or gated region.	`:MATH:DEFINE "PDUTY(CH1)"`
PERIod(<wfm>)	The time required to complete the first cycle in a waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.	`:MATH:DEFINE "PERIOD(CH1)"`
PHAse(<wfm>)	The amount of time that one waveform leads or lags another waveform, expressed in degrees where 360° makes up one waveform cycle. See also Delay.	`:MATH:DEFINE "PHASE(CH1,CH2)"`
PK2pk(<wfm>)	Peak to peak: the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region.	`:MATH:DEFINE "PK2PK(CH1)"`
POVershoot(<wfm>)	Positive overshoot: this is measured over the entire waveform or gated region and is expressed as: Positive Overshoot = (Maximum – High) / Amplitude x 100%.	`:MATH:DEFINE "POVERSHOOT(CH1)"`
PWIdth(<wfm>)	Positive pulse width: the distance (time) between the mid reference (default 50%) amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform or gated region.	`:MATH:DEFINE "PWIDTH(CH1)"`
RISe(<wfm>)	The time required for the leading edge of the first pulse in the waveform or gated region to rise from the low reference value (default = 10%) to the high reference value (default = 90%) of the final value.	`:MATH:DEFINE "RISE(CH1)"`
RMS(<wfm>)	The true Root Mean Square voltage over the entire waveform or gated region.	`:MATH:DEFINE "RMS(CH1)"`
SINe<wfm>	Sine measurement of <wfm>	`:MATH:DEFINE "SINE(CH1)"`

Table 2-55: Math expression elements (cont.)

Element	Description	Example
TOVershoot<wfm>	Total overshoot is the summation of positive overshoot and the absolute value of negative overshoot.	
Trigonometric operations on expressions		
ABS(<expr>)	Absolute value of (<expr>)	`:MATH:DEFINE "ABS(CH2-CH1)"`
COSINE(<expr>)	Absolute value of (<expr>)	`:MATH:DEFINE "COSine(CH1)"`
DEG(<expr>)	Converts (<expr>) from radians to degrees	`:MATH:DEFINE "CH1 * DEG(VAR1)"`
DIFF(<expr>)	Differential of (<expr>) Executes a differentiation operation on the expression that follows. Measures the slope of a curve at each point on the input waveform.	`:MATH:DEFINE "DIFF(CH1)"` `:MATH:DEFINE "DIFF(ABS(CH1))"`
EXP(<expr>)	Base of natural logarithm constant "e" raised to the power of (<expr>)	`:MATH:DEFINE "EXP(DIFF(CH1))"`

FFT(<expr>)	Executes a Fast Fourier Transform operation on the expression that follows. Calculates the set of frequencies that are present in the input waveform.
	NOTE. *If the FFT operator is used, it needs to be the outer-most operator.*
		`:MATH:DEFINE "FFT(CH1)"`
		`:MATH:DEFINE "FFT(CH1+CH2)"`
		`:MATH:DEFINE "FFT(CH1+INT(CH2))"`
		Not acceptable:: `:MATH:DEFINE "CH1 + FFT(CH2)"`

INTG(<expr>)	Integral of (<expr>) Executes an integration operation on the expression that follows. Measures the accumulated area under the input waveform.	`:MATH:DEFINE "INTG(CH1)"` `:MATH:DEFINE "INTG(CH1+CH2)"`
LOG(<expr>)	Base 10 logarithm of (<expr>)	`:MATH:DEFINE "LOG(CH1)"`
RAD(<expr>)	Converts (<expr>) from degrees to radians	`:MATH:DEFINE "RAD(PHASE(CH1,CH2))"`
SQRT(<expr>)	Square root of (<expr>)	`:MATH:DEFINE "SQRT(SINE(CH1))"`
SINe<expr>)	Sine of (<expr>)	`:MATH:DEFINE "SINE(CH1+CH2)"`
TAN(<expr>)	Tangent of (<expr>)	`:MATH:DEFINE "TAN(CH1)"`
TRE(<expr>)	Trend plot of <expr>	`:MATH:DEFINE "TRE(PERIOD(CH1))"`
User-defined variables		
VAR1, VAR2	Specify the variables using the MATHVAR:VAR<x> command.	`:MATH:DEFINE "VAR1+CH1"`
Relational and logical operators		

Table 2-55: Math expression elements (cont.)

Element	Description	Example
+ , - , * , /	Addition, subtraction, multiplication, and division operators	
<	"Less than" operator	:MATH:DEFINE "(CH1 < CH2)"
>	"Greater than" operator	:MATH:DEFINE "(CH1 > CH2)"
<=	"Less than or equal to" operator	:MATH:DEFINE "(CH1 <= CH2)"
>=	"Greater than or equal to" operator	:MATH:DEFINE "(CH1 >= CH2)"
!=	"Not equal to" operator	:MATH:DEFINE "(CH1 != CH2)"
==	"Equal to" operator	:MATH:DEFINE "CH1==CH2"
||	Logical "OR" operator	:MATH:DEFINE "(CH1 != CH2) || (CH3 == CH4)"
&&	Logical "AND" of expressions	:MATH:DEFINE "(CH1 != CH2) && (CH3 == CH4)"
!(	"NOT" function, which changes non-zero values to zero, and zero values to 1.	:MATH:DEFINE "(CH2-CH1) * !(CH1 >= CH2)"
+-, 0-9, ., 0-9, E, +-, 0-9	Specifies a numeric value in (optional) scientific notation (for example: 2.34E-9).	:MATH:DEFINE "1E2"

Examples

Some examples of DUAL math expressions are as follows:

MATH1:DEFINE "CH1+CH2" adds the Ch 1 waveform and Ch 2 waveform, storing the results in Math 1.

MATH:DEFINE? might return :MATH1:DEFINE "CH2*REF2" as the expression that defines Math 1.

Some examples of FFT math expressions are as follows:

```
MATH:DEFINE "FFT(CH1)"
```

```
MATH:DEFINE "FFT(REF1)"
```

```
MATH:DEFINE "FFT(RF_NORMAL)"
```

Some examples of ADVanced math expressions are as follows:

```
MATH:DEFINE "AMPLITUDE(CH1) * (VAR1 + CH2) - CH3"
```

```
MATH:DEFINE "SINE(CH1)*(VAR1+CH2)*CH3 - CAREA(CH4)"
```

```
MATH:DEFINE "INTG(1+CH1) + SINE(CH1)*(VAR1+CH2)*CH3 -
CAREA(CH4)"
```

Some examples of SPECTRUM math expressions are as follows:

```
MATH:DEFINE "RF_NORMAL - RF_AVERAGE"
```

```
MATH:DEFINE "RF_NORMAL * RF_AVERAGE"
```

MATH[1]:HORizontal:POSition

This command specifies the math horizontal display position for FFT or (non-live) math reference waveforms.

Group Math

Syntax

```
MATH[1]:HORizontal:POSition <NR3>
MATH[1]:HORizontal:POSition?
```

Arguments <NR3> is a floating point number that specifies the % of the math waveform that precedes center screen. It can vary from 0.0 to 100.0.

Examples MATH:HORIZONTAL:POSITION 10 sets the horizontal position to 10% pretrigger

MATH[1]:HORizontal:SCAle

This command specifies the math horizontal display scale for FFT or for dual math waveforms that have source waveforms that are reference waveforms. The horizontal scale of a dual math waveform with a channel source waveform is set through the HORizontal:SCAle command.

Group Math

Syntax

```
MATH[1]:HORizontal:SCAle <NR3>
MATH[1]:HORizontal:SCAle?
```

Arguments <NR3> is a floating point number that specifies the math horizontal scale, in seconds.

Examples `MATH:HORIZONTAL:SCALE?` might return `MATH:HORIZONTAL:SCALE 2.0E-4` indicating that the math horizontal scale is 200 µ

MATH[1]:HORizontal:UNIts

Returns the math waveform horizontal measurement unit value.

Group Math

Syntax `MATH[1]:HORizontal:UNIts?`

Examples `MATH:HORIZONTAL:UNITS?` might return `MATH:HORIZONTAL:UNITS "?"`

indicating that the math horizontal unit label for unknown values is the default question mark unit.

MATH[1]:LABel

Sets or queries the waveform label for the math waveform.

Group Math

Syntax
```
MATH[1]:LABel <QString>
MATH[1]:LABel?
```

Arguments `<QString>` is the quoted string used as the label for the math waveform.

Examples `MATH:LABEL “Output”` sets the label for the math waveform to Output.

`MATH:LABEL?` might return `MATH:LABEL "Sum of channel 1 and channel 2"` indicating the current label for the math waveform.

MATH[1]:SPECTral:MAG

This command specifies the units of the Spectral Magnification function in the math string.

Group Math

Syntax

```
MATH[1]:SPECTral:MAG {LINEAr|DB}
MATH[1]:SPECTral:MAG?
```

Arguments

`LINEAR` sets the SpectralMag units to linear.

`DB` sets the SpectralMag units to decibels.

Examples

`MATH1:SPECTRAL:MAG DB` sets the SpectralMag units for Math1 to decibels.

`MATH1:SPECTRAL:MAG?` might return `:MATH1:SPECTRAL:MAG DB` indicating that the SpectralMag units for Math1 are set to decibels.

MATH[1]:SPECTral:WINdow

This command specifies the window function for the spectral analyzer input data for the specified math waveform. A spectral window determines what the filter shape of the spectral analyzer will be in the frequency domain. It can be described by a mathematical function that is multiplied point-by-point times the input data to the spectral analyzer.

Group

Math

Syntax

```
MATH[1]:SPECTral:WINdow
{RECTangular|HAMming|HANning|BLAckmanharris}
MATH[1]:SPECTral:WINdow?
```

Arguments

`RECTangular` window function is equivalent to multiplying all gate data by one.

`HAMming` window function is based on a cosine series.

`HANning` window function is based on a cosine series.

`BLAckmanharris` window function is based on a cosine series.

Examples

`MATH1:SPECTRAL:WINDOW HANNING` applies a Hanning window to the spectral analyzer input data.

`MATH1:SPECTRAL:WINDOW?` might return `:MATH1:SPECTRAL:WINDOW HAMMING` indicating that the window function used to multiply the spectral analyzer input data is the Hamming window.

MATH[1]:TYPe

This command specifies the math type (DUAL, FFT, ADVanced or SPECTRUM). This command is used along with MATH[1]:DEFine, which specifies the current mathematical expression as a text string which defines the waveform. You must specify the math type before defining the math expression. For a list of math expressions, see MATH[1]:DEFine.

Group Math

Syntax

```
MATH[1]:TYPe {DUAL|FFT|ADVanced|SPECTRUM}
MATH[1]:TYPe?
```

Arguments

DUAL sets the type to dual waveform math, which can use any combination of live analog or reference waveforms in the time domain display.

FFT sets the type to FFT math, which can use any live analog or reference waveform in the time domain.

NOTE. *You can also use FFT as part of a math expression by declaring the type* `ADVanced`*. See examples for the command MATH[1]:DEFine.*

ADVanced sets the type to advanced math.

SPECTRUM sets the type to spectrum, which can use any combination of live RF or reference traces in the frequency domain. (MDO models only.)

Examples

MATH:TYPE FFT sets the math type to FFT.

MATH:TYPE FFT;:MATH:DEFINE “FFT(CH1)”;:SELECT:MATH1 sets the math type to FFT and displays an FFT waveform of the channel 1 waveform, using the current FFT scale and window settings.

MATH:TYPE ADVANCED;:MATH:DEFINE “INTG(REF1*CH3)+DELAY(CH1,CH2)”;:SELECT:MATH1 sets the math type to ADVanced and displays an advanced math waveform that is the INTEGRAL of the product of REF1 and CH3 plus the result of the delay measurement between channel 1 and 2.

MATH[1]:VERTical:POSition

This command specifies the vertical position of the currently selected math type.

Group Math

Syntax
```
MATH[1]:VERTical:POSition <NR3>
MATH[1]:VERTical:POSition?
```

Related Commands CH<x>:POSition, REF<x>:VERTical:POSition

Arguments <NR3> is a floating point number that specifies the desired position in divisions from the center graticule.

Examples MATH1:VERTICAL:POSITION 1.3E+00 positions the Math 1 input signal 1.3 divisions higher than a position of 0.

MATH1:VERTICAL:POSITION? might return :MATH1:VERTICAL:POSITION -1.3000E+00 indicating that the current position of Math 1 is 1.3 divisions below the center graticule.

MATH[1]:VERTical:SCAle

This command specifies the vertical scale of the currently selected math type. This setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Group Math

Syntax
```
MATH[1]:VERTical:SCAle <NR3>
MATH[1]:VERTical:SCAle?
```

Related Commands CH<x>:SCAle,

REF<x>:VERTical:SCAle

Arguments <NR3> is a floating point number that specifies the scale-per-division in the current math vertical units. The range is from 1.0E-12 through 500.0E+12.

Examples MATH1:VERTICAL:SCALE 100E-03 sets the Math scale to 100 mV per division.

MATH:VERTICAL:SCALE? might return :MATH:VERTICAL:SCALE 1.0000E+00 indicating that the current scale setting of Math is 1 V per division.

MATH[1]:VERTical:UNIts

Returns the math waveform vertical measurement unit value.

Group Math

Syntax `MATH[1]:VERTical:UNIts?`

Examples `MATH:VERTICAL:UNITS?` might return `MATH:VERTICAL:UNITS "joules"` indicating that the math vertical unit label for unknown values is joules.

MATHVAR? (Query Only)

Queries both numerical values you can use within math expressions.

Group Math

Syntax `MATHVAR?`

Related Commands MATHVAR:VAR<x>, MATH[1]:DEFine

Returns `<NR3>` are the stored numerical values.

Examples `MATHVAR?` returns the values of all variables stored in locations 1 through 2.

MATHVAR:VAR<x>

This command specifies one of two different numerical values you can use within math expressions. These values can range from -10.0e-18 to 1.0e+15; the default values are 0.0. <x> specifies the location, 1 or 2, in which you can store values. Stored math variables can be referenced within math expressions as VAR1 and VAR2.

For example, the following command defines MATH1 as the product of Channel 1 and math variable 1: MATH1:DEFINE "CH1 * VAR1".

Group Math

Syntax

```
MATHVAR:VAR<x> <NR3>
MATHVAR:VAR<x>?
```

Related Commands

MATHVAR:VAR<x>,

MATH[1]:DEFine

Arguments

<NR3> is a floating point number that specifies the numerical value to be stored in location x <1 through 2>.

Examples

MATHVAR:VAR2 -2.43E-5 stores the value -2.43e-5 in the second math variable location.

MATHVAR:VAR2? might return:MATHVAR:VAR2 24.3000E-6 for the expression stored in location 2.

MEASUrement? (Query Only)

Returns all measurement parameters.

Group

Measurement

Syntax

```
MEASUrement?
```

Examples

MEASUREMENT? might return :MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:IMMED:TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;:MEASUREMENT:MEAS1:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS1:STATE 1;TYPE FREQUENCY;UNITS "Hz";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0 000;STDDEV 0.0000;:MEASUREMENT:MEAS2:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS2:STATE 1;TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:MEAS3: DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS3:STATE 1;TYPE PK2PK;UNITS "V";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:MEAS4:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS4:STATE 0;TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:METHOD AUTO;REFLEVEL:METHOD

```
PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1
0.0000;MID2 0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH
90.0000;LOW 10.0000;MID1 50.0000;MID2
50.0000;:MEASUREMENT:INDICATORS:STATE
OFF;NUMHORZ 0;NUMVERT 0;HORZ1 99.0000E +36;HORZ2
99.0000E+36;HORZ3 99.0000E+36;HORZ4 99.0000E+36;VERT1
99.0000E+36;VERT2 99.0000E+36;VERT3 99.0000E+36;VERT4
99.0000E+36;:MEASUREMENT:STATISTICS:MODE OFF;WEIGHTING
32;:MEASUREMENT:GATING SCREEN.
```

MEASUrement:CLEARSNapshot (No Query Form)

Removes the measurement snapshot display.

Group Measurement

Syntax

```
MEASUrement:CLEARSNapshot
```

Related Commands CLEARMenu

MEASUrement:GATing

Specifies or returns the measurement gating setting.

Group Measurement

Syntax

```
MEASUrement:GATing {OFF|SCREen|CURSor}
MEASUrement:GATing?
```

Arguments

`OFF` turns off measurement gating (full record).

`SCREen` turns on gating, using the left and right edges of the screen.

`CURSor` limits measurements to the portion of the waveform between the vertical bar cursors, even if they are off screen.

Examples `MEASUREMENT:GATING CURSOR` turns on measurement gating using the cursors as limits.

MEASUREMENT:GATING? might return :MEASUREMENT:GATING CURSOR indicating that measurements are limited to the portion of the waveform between the vertical bar cursors.

MEASUrement:IMMed? (Query Only)

Returns all immediate measurement setup parameters.

Group Measurement

Syntax MEASUrement:IMMed?

Examples MEASUREMENT:IMMED? might return
:MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:IMMED:TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2

MEASUrement:IMMed:DELay? (Query Only)

Returns information about the immediate delay measurement. This command is equivalent to viewing the delay measurement settings on the measurement readout.

Group Measurement

Syntax MEASUrement:IMMed:DELay?

Examples MEASUREMENT:IMMED:DELAY? might return
:MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS; EDGE1 RISE;EDGE2 RISE

MEASUrement:IMMed:DELay:DIRection

This command specifies the starting point and direction that determines the delay "to" edge when taking an immediate delay measurement.

NOTE. *Use the MEASUrement:IMMed:SOUrce<x> command to specify the delay "to" waveform.*

Group Measurement

Syntax
```
MEASUrement:IMMed:DELay:DIRection {BACKWards|FORWards}
MEASUrement:IMMed:DELay:DIRection?
```

Related Commands MEASUrement:IMMed:SOUrce<x>

Arguments `BACKWards` starts the search at the end of the waveform and looks for the last rising or falling edge in the waveform.

`FORWards` starts the search at the beginning of the waveform and looks for the first rising or falling edge in the waveform.

Examples `MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS` starts searching from the beginning of the waveform record and looks for the first rising or falling edge.

`MEASUREMENT:IMMED:DELAY:DIRECTION?` might return `:MEASUREMENT:IMMED:DELAY:DIRECTION BACKWARDS` indicating that searching begins at the end of the waveform record and looks for the last rising or falling edge.

MEASUrement:IMMed:DELay:EDGE<x>

This command specifies the slope of the edge the oscilloscope uses for the delay "from" or "to" waveform when taking an immediate delay measurement.

Group Measurement

Syntax
```
MEASUrement:IMMed:DELay:EDGE<x> {FALL|RISe}
MEASUrement:IMMed:DELay:EDGE<x>?
```

Related Commands MEASUrement:IMMed:SOUrce<x>

Arguments <x> specifies which waveform to use, where <x> = 1 is the "from" waveform, and <x> = 2 is the "to" waveform.

`FALL` specifies the falling edge.

`RISe` specifies the rising edge.

Examples `MEASUREMENT:IMMED:DELAY:EDGE1 RISE` specifies that the "from" waveform rising edge be used for the immediate delay measurement.

`MEASUREMENT:IMMED:DELAY:EDGE1?` returns either RISE or FALL.

MEASUrement:IMMed:SOUrce<x>

For SOURce1: This command specifies the source for all single channel measurements. For delay or phase measurements, this command specifies the waveform to measure "from". This is equivalent to setting the "From:" waveform in the "Measure Delay" side menu or the "Measure Phase" side menu. SOUrce is equivalent to SOURCE1.

For SOUrce2: This command specifies the waveform to measure "to" when taking a delay measurement or phase measurement. This is equivalent to setting the "To:" waveform in the "Measure Delay" side menu or the "Measure Phase" side menu.

NOTE. *If you do not specify a numerical suffix, the source is assumed to be SOUrce1.*

Group Measurement

Syntax

```
MEASUrement:IMMed:SOUrce<x>
{CH1|CH2|CH3|CH4|MATH|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15|HIStogram|RF_AMPlitude|RF_FREQuency|RF_PHASe}

MEASUrement:IMMed:SOUrce<x>?
```

Arguments `CH1–CH4` is the analog channel to use as the source waveform.

`MATH` is the math waveform.

`D0 – D15` is the digital waveform to use as the source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

`HIStogram` indicates the histogram as the object to be measured. HIStogram only applies to SOUrce1; it is not available for SOUrce2.

`RF_AMPlitude|RF_FREQuency|RF_PHASe` are the RF time domain traces. (MDO4000/B only.)

MEASUrement:IMMed:TYPe

This command specifies the immediate measurement type.

Digital channel measurements do not have a user-settable midRef threshold. If you specify a digital channel measurement that is not available on MSO/MDO4000/B models (or MDO3000 models with the MDO3MSO option installed), measurement error 2200: measurement system error occurs and 9.91e37 (not a number) is returned.

Conditions

The TOVershoot (total overshoot) measurement is supported on MDO models only.

Group

Measurement

Syntax

```
MEASUrement:IMMed:TYPe
{AMPlitude|AREa|BURst|CAREa|CMEan|CRMs|DELay|FALL|FREQuency
|HIGH|HITS|LOW|MAXimum|MEAN|MEDian|MINImum|NDUty|NEDGECount
|NOVershoot|NPULSECount|NWIdth|PEAKHits|PEDGECount|PDUty
|PERIod|PHAse|PK2Pk|POVershoot|PPULSECount|PWIdth|RISe|RMS
|SIGMA1|SIGMA2|SIGMA3|STDdev|TOVershoot|WAVEFORMS}

MEASUrement:IMMed:TYPe?
```

Arguments

`AMPlitude` measures the amplitude of the selected waveform. In other words, it measures the high value less the low value measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Amplitude = High - Low

`AREa` measures the voltage over time. The area is over the entire waveform or gated region and is measured in volt-seconds. The area measured above the ground is positive, while the area below ground is negative. This measurement is applicable only to the analog channels.

`BURst` measures the duration of a burst. The measurement is made over the entire waveform or gated region.

`CAREa` (cycle area) measures the voltage over time. In other words, it measures, in volt-seconds, the area over the first cycle in the waveform or the first cycle in the gated region. The area measured above the common reference point is positive, while the area below the common reference point is negative. This measurement is applicable only to the analog channels.

`CMEan` (cycle mean) measures the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region. This measurement is applicable only to the analog channels.

`CRMs` (cycle rms) measures the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region. This measurement is applicable only to the analog channels.

DELay measures the time between the middle reference (default = 50%) amplitude point of the source waveform and the destination waveform.

FALL measures the time taken for the falling edge of the first pulse in the waveform or gated region to fall from a high reference value (default is 90%) to a low reference value (default is 10%). This measurement is applicable only to the analog channels.

FREQuency measures the first cycle in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

HIGH measures the High reference (100% level, sometimes called Topline) of a waveform. This measurement is applicable only to the analog channels.

HITS (histogram hits) measures the number of points in or on the histogram box.

LOW measures the Low reference (0% level, sometimes called Baseline) of a waveform. This measurement is applicable only to the analog channels.

MAXimum finds the maximum amplitude. This value is the most positive peak voltage found. It is measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

MEAN amplitude measurement finds the arithmetic mean over the entire waveform or gated region. This measurement is applicable only to the analog channels.

MEDian (histogram measurement) measures the middle point of the histogram box. Half of all acquired points within or on the histogram box are less than this value and half are greater than this value.

MINImum finds the minimum amplitude. This value is typically the most negative peak voltage. It is measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

NDUty (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on the first cycle in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

NEDGECount is the count of falling edges.

NOVershoot (negative overshoot) finds the negative overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Negative Overshoot = ((Low - Minimum) / Amplitude) × 100%)

NPULSECount is the count of negative pulses.

NWIdth (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform or gated region.

PEAKHits measures the number of points in the largest bin of the histogram.

PDUty (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on the first cycle in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

PEDGECount is the count of rising edges.

PERIod is the time required to complete the first cycle in a waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.

PHAse measures the phase difference (amount of time a waveform leads or lags the reference waveform) between two waveforms. The measurement is made between the middle reference points of the two waveforms and is expressed in degrees, where 360° represents one waveform cycle.

PK2Pk (peak-to-peak) finds the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region. This measurement is applicable only to the analog channels.

POVershoot is the positive overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Positive Overshoot = ((Maximum - High) / Amplitude) ×100%

PPULSECount is the count of positive pulses.

PWIdth (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform or gated region.

RISe timing measurement finds the rise time of the waveform. The rise time is the time it takes for the leading edge of the first pulse encountered to rise from a low reference value (default is 10%) to a high reference value (default is 90%). This measurement is applicable only to the analog channels.

RMS amplitude measurement finds the true Root Mean Square voltage in the entire waveform or gated region. This measurement is applicable only to the analog channels.

SIGMA1 (histogram measurement) measures the percentage of points in the histogram that are within one standard deviation of the histogram mean.

SIGMA2 (histogram measurement) measures the percentage of points in the histogram that are within two standard deviations of the histogram mean.

SIGMA3 (histogram measurement) measures the percentage of points in the histogram that are within three standard deviations of the histogram mean.

STDdev measures the standard deviation (Root Mean Square (RMS) deviation) of all acquired points within or on the histogram box.

TOVershoot (total overshoot) (MDO models only) measures the sum of the positive and negative overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

WAVEFORMS (waveform count) measures the number of waveforms used to calculate the histogram.

Examples

MEASUREMENT:IMMED:TYPE FREQUENCY defines the immediate measurement to be a frequency measurement.

MEASUREMENT:IMMED:TYPE? might return :MEASUREMENT:IMMED:TYPe RMS indicating that the immediate measurement is the true Root Mean Square voltage.

MEASUrement:IMMed:UNIts? (Query Only)

Returns a string containing the units of the immediate measurement.

Group

Measurement

Syntax

MEASUrement:IMMed:UNIts?

Returns

This query returns one of the following strings.

Unit string	Description
"%"	percent
"/Hz"	inverse hertz
"?"	indeterminate
"A"	amperes
"A/A"	amperes per ampere
"A/V"	amperes per volt
"A/W"	ampere per watt
"A/dB"	amperes per decibel
"A/s"	amperes per second
"AA"	amperes squared
"AW"	ampere-watts
"AdB"	ampere-decibels
"As"	ampere-seconds
"B"	bytes
"Hz"	hertz
"IRE"	Institute of Radio Engineers units
"S/s"	samples per second

Unit string	Description
"V"	volts
"V/A"	volts per ampere
"V/V"	volts per volt
"V/W"	volts per watt
"V/dB"	volts per decibel
"V/s"	volts per second
"VA"	volt-amperes
"VAR"	volt-amperes resistive
"VV"	volts squared
"VW"	volt-watts
"VdB"	volts-decibels
"Vs"	volt-seconds
"W"	watts
"W/A"	watts per ampere
"W/V"	watts per volt
"W/W"	watts per watt
"W/dB"	watt per decibel
"W/s"	watts per second
"WA"	watt-amperes
"WV"	watt-volts
"WW"	watts squared
"WdB"	watt-decibels
"Wfms"	waveforms
"Ws"	watt-seconds
"dB"	decibels
"dB/A"	decibels per ampere
"dB/V"	decibels per volt
"dB/W"	decibels per watt
"dB/dB"	decibels per decibel
"dBA"	decibel-amperes
"dBV"	decibel-volts
"dBW"	decibel-watts
"dBdB"	decibels squared
"day"	days
"degrees"	degrees
"div"	divisions
"edges"	edges
"hits"	hits

Unit string	Description
"hr"	hours
"joules"	joules
"min"	minutes
"ohms"	ohms
"percent"	percent
"pulses"	pulses
"s"	seconds
"unk"	unknown

Examples `MEASUREMENT:IMMED:UNITS?` might return

`:MEASUREMENT:IMMED:UNIts "s"`

indicating that units for the immediate measurement are in seconds.

MEASUrement:IMMed:VALue? (Query Only)

Returns the value of the measurement specified by the MEASUrement:IMMed:TYPe command. The measurement is immediately taken on the source(s) specified by a MEASUrement:IMMed:SOUrce<x> command.

NOTE. *A change to HORizontal:MAIn:SCALe or CH<x>:SCALe will not necessarily have taken affect if immediately followed by this command.*

NOTE. *Before using this query, you should make sure the prerequisites are completed. (See page 3-7, Synchronization Methods.)*

Group Measurement

Syntax `MEASUrement:IMMed:VALue?`

Related Commands MEASUrement:IMMed:TYPe,

MEASUrement:IMMed:SOUrce<x>,

*ESR?,

ALLEv?

Examples `MEASUREMENT:IMMED:VALUE?` might return `:MEASUREMENT:IMMED:VALUE 9.9000E+37.` If the measurement has an error or warning associated with it, then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEv? commands.

MEASUrement:INDICators? (Query Only)

Returns all measurement indicator parameters.

Group Measurement

Syntax `MEASUrement:INDICators?`

Examples `MEASUREMENT:INDICATORS?` might return `MEASUREMENT:INDICATORS:STATE MEAS1;NUMHORZ 0;NUMVERT 4;HORZ1 7.5E0;HORZ2 -3.400000095367E0;HORZ3 0.0E0;HORZ4 0.0E0;VERT1 -6.351123E-6;VERT2 -3.179753E-6;VERT3 -6.40943E-6;VERT4 -6.403E-6`

MEASUrement:INDICators:HORZ<x>? (Query Only)

Returns the position of the specified horizontal measurement indicator <x>, where <x> can be 1, 2, 3, or 4.

Group Measurement

Syntax `MEASUrement:INDICators:HORZ<x>?`

Examples `MEASUREMENT:INDICATORS:HORZ1?` might return `MEASUREMENT:INDICATORS:HORZ1 -2.0E-3` indicating that horizontal indicator1 has a value of -2mV.

MEASUrement:INDICators:NUMHORZ? (Query Only)

Returns the number of horizontal measurement indicators currently being displayed.

Group Measurement

Syntax `MEASUrement:INDICators:NUMHORZ?`

Examples `MEASUREMENT:INDICATORS:NUMHORZ?` might return `MEASUREMENT:INDICATORS:NUMHORZ 2` indicating there are currently 2 horizontal lines drawn on the graticule. The indicators show where the measurement specified by MEASUrement:INDICators:STATE is being performed.

MEASUrement:INDICators:NUMVERT? (Query Only)

Returns the number of vertical measurement indicators currently being displayed.

Group Measurement

Syntax `MEASUrement:INDICators:NUMVERT?`

Examples `MEASUREMENT:INDICATORS:NUMVERT?` might return `MEASUREMENT:INDICATORS:NUMVERT 2` indicating there are currently 2 vertical lines drawn on the graticule. The indicators show where the measurement specified by MEASUrement:INDICators:STATE is being performed.

MEASUrement:INDICators:STATE

This command specifies the state of visible measurement indicators.

Group Measurement

Syntax
```
MEASUrement:INDICators:STATE {OFF|MEAS<x>}
MEASUrement:INDICators:STATE?
```

Arguments `OFF` turns the visible measurement indicators off.

`MEAS<x>` displays the visible measurement indicators for measurement <x>, where <x> can be 1 through 8.

NOTE. *There must be an active measurement before you can activate an indicator for a specified measurement.*

Examples `MEASUREMENT:INDICATORS:STATE MEAS2` turns on the display of visible measurement indicators for measurement 2.

`MEASUREMENT:INDICATORS:STATE?` might return `MEASUREMENT:INDICATORS:STATE OFF` indicating that no measurement indicators are active.

MEASUrement:INDICators:VERT<x>? (Query Only)

Returns the value of the specified vertical measurement indicator <x> from the trigger point, where <x> can be 1 through 8. A negative value means that the indicator is positioned earlier in the waveform record than the trigger point.

Group Measurement

Syntax `MEASUrement:INDICators:VERT<x>?`

Examples `MEASUREMENT:INDICATORS:VERT2?` might return `MEASUREMENT:INDICATORS:VERT2 -3.724507E-6` indicating that the second measurement indicator is positioned 3.72 µs before the trigger point.

MEASUrement:MEAS<x>? (Query Only)

Returns all measurement parameters for the specified active measurement <x>.

Group Measurement

Syntax `MEASUrement:MEAS<x>?`

MEASUrement:MEAS<x>:COUNt? (Query Only)

Returns the number of values accumulated for this measurement since the last statistical reset. Values may be ignored if they generated an error. Measurements are specified by x, which ranges from 1 through 8.

Group Measurement

Syntax `MEASUrement:MEAS<x>:COUNt?`

Examples `MEASUREMENT:MEAS3:COUNT?` might return `:MEASUREMENT:MEAS3:COUNT 3247.`

MEASUrement:MEAS<x>:DELay? (Query Only)

Returns the delay measurement parameters for the measurement specified by <x>, which ranges from 1 through 8.

Group Measurement

Syntax `MEASUrement:MEAS<x>:DELay?`

Examples `MEASUREMENT:MEAS1?` might return `:MEASUREMENT:MEAS1:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE.`

MEASUrement:MEAS<x>:DELay:DIRection

This command specifies the starting point and direction that determines the delay "to" edge when taking a delay measurement. Use the MEASUrement:MEAS<x>:SOUrce<x> command to specify the waveform.

Group Measurement

Syntax
```
MEASUrement:MEAS<x>:DELay:DIRection {BACKWards|FORWards}
MEASUrement:MEAS<x>:DELay:DIRection?
```

Related Commands MEASUrement:MEAS<x>:SOUrce<x>

Arguments `BACKWards` means the search starts at the end of the waveform and looks for the last rising or falling edge in the waveform. Use the MEASUrement:MEAS<x>:DELay:EDGE<x> command to specify the slope of the edge.

`FORWards` means the search starts at the beginning of the waveform and looks for the first rising or falling edge in the waveform. Use the MEASUrement:MEAS<x>:DELay:EDGE<x> command to specify the slope of the edge.

Examples `MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS` starts searching from the end of the waveform record.

`MEASUREMENT:MEAS3:DELAY:DIRECTION?` might return `:MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS` indicating that the current search direction is backwards.

MEASUrement:MEAS<x>:DELay:EDGE<x>

This command specifies the slope of the edge used for the delay "from" or "to" waveform when taking an immediate delay measurement. The waveform is specified by MEASUrement:MEAS<x>:SOUrce<x>.

Group Measurement

Syntax
```
MEASUrement:MEAS<x>:DELay:EDGE<x> {FALL|RISe}
MEASUrement:MEAS<x>:DELay:EDGE<x>?
```

Arguments <x> specifies which waveform to use, where <x> = 1 is the "from" waveform, and <x> = 2 is the "to" waveform.

`FALL` specifies the falling edge.

`RISe` specifies the rising edge.

Examples `MEASUREMENT:MEAS1:DELAY:EDGE1 RISE` specifies that the "from" waveform rising edge be used for the immediate delay measurement.

`MEASUREMENT:MEAS1:DELAY:EDGE1?` returns either RISE or FALL.

MEASUrement:MEAS<x>:MAXimum? (Query Only)

Returns the maximum value found for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group Measurement

Syntax
```
MEASUrement:MEAS<x>:MAXimum?
```

Examples `MEASUREMENT:MEAS3:MAXIMUM?` might return `:MEASUREMENT:MEAS3:MAXIMUM 4.18E-9.`

MEASUrement:MEAS<x>:MEAN? (Query Only)

Returns the mean value accumulated for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group Measurement

Syntax `MEASUrement:MEAS<x>:MEAN?`

Examples `MEASUREMENT:MEAS1:MEAN?` might return `:MEASUREMENT:MEAS1:MEAN 514.71E-09.`

MEASUrement:MEAS<x>:MINImum? (Query Only)

Returns the minimum value for this measurement since the last statistical reset. Measurements are specified by <x>, which ranges from 1 through 8.

Group Measurement

Syntax `MEASUrement:MEAS<x>:MINImum?`

Examples `MEASUREMENT:MEAS1:MINIMUM?` might return `:MEASUREMENT:MEAS1:MINIMUM 1.75E-09.`

MEASUrement:MEAS<x>:SOUrce<x>

For SOURce1: This command specifies the source for all single channel measurements. For delay or phase measurements, This command specifies the waveform to measure "from". This is equivalent to setting the "From:" waveform in the "Measure Delay" side menu or the "Measure Phase" side menu. SOUrce is equivalent to SOURCE1.

For SOUrce2: This command specifies the waveform to measure "to" when taking a delay measurement or phase measurement. This is equivalent to setting the "To:" waveform in the "Measure Delay" side menu or the "Measure Phase" side menu.

Measurements are specified by <x>, which ranges from 1 to 8.

NOTE. *If you do not specify a numeric suffix, the source is assumed to be SOUrce1.*

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:SOUrce<x>
{CH1|CH2|CH3|CH4|MATH|R1|R2|R3|R4|D0|D1|D2|D3|D4|D5|D6|D7
|D8|D9|D10|D11|D12|D13|D14|D15|HIStogram|RF_AMPlitude|
RF_FREQuency|RF_PHASe}
MEASUrement:MEAS<x>:SOUrce<x>?
```

Related Commands MEASUrement:MEAS<x>:TYPe

Arguments

`CH1-4` is an analog channel to use as the source waveform.

`MATH` is the math waveform.

`REF1-4` is a reference waveform to use as the source waveform.

`D0-D15` is a digital channel to use as the source waveform. (MSO /MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.).

`HIStogram` indicates the histogram is the object to be measured. HIStogram only applies to SOUrce1; it is not allowed on SOUrce2.

`RF_AMPlitude|RF_FREQuency|RF_PHASe` are the RF time domain traces. (MDO4000/B models only.)

Examples

`MEASUREMENT:MEAS4:SOURCE2 CH1` specifies CH1 as the delay "to" source when making delay measurement.

`MEASUREMENT:MEAS2:SOURCE2?` might return `:MEASUREMENT:MEAS2:SOURCE2 MATH1` indicating that Math 1 is the measurement 2 source.

MEASUrement:MEAS<x>:STATE

This command specifies whether the specified measurement slot is computed and displayed. The measurement slot is specified by <x>, which ranges from 1 through 8.

For a measurement to display, you must have selected a source waveform and defined the measurement you want to take and display. You select the measurement using the MEASUrement:MEAS<x>:SOUrce<x> command. You define the measurement type using the MEASUrement:MEAS<x>:TYPe command.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:STATE {OFF|ON|<NR1>}
MEASUrement:MEAS<x>:STATE?
```

Related Commands

MEASUrement:MEAS<x>:SOUrce<x>,

MEASUrement:MEAS<x>:TYPe

Arguments

OFF disables calculation and display of the specified measurement slot.

ON enables calculation and display of the specified measurement slot.

<NR1> = 0 disables calculation and display of the specified measurement slot; any other value enables calculation and display of the specified measurement slot.

Examples

MEASUREMENT:MEAS2:STATE ON computes and displays the measurement defined as measurement 2.

MEASUREMENT:MEAS1:STATE? might return :MEASUREMENT:MEAS1:STATE 0 indicating that measurement defined for measurement slot 1 is disabled.

MEASUrement:MEAS<x>:STDdev? (Query Only)

Returns the standard deviation of values accumulated for this measurement since the last statistical reset. Measurements are specified by <x>, the measurement slots, from 1 through 8.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:STDdev?
```

Examples

MEASUREMENT:MEAS1:STDDEV? might return :MEASUREMENT:MEAS1:STDDEV 21.0E-12.

MEASUrement:MEAS<x>:TYPe

This command specifies the measurement type defined for the specified measurement slot. The measurement slot is specified by <x>, which ranges from 1 through 8 in all models except MDO3000, which only support 4 simultaneous measurements.

Digital channel measurements do not have a user-settable midRef threshold. If you specify a digital channel measurement that is not available, measurement error 2200: measurement system error occurs and 9.9e37 is returned.

Conditions The TOVershoot (total overshoot) measurement is supported on MDO models only.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:TYPe
{AMPlitude|AREa|BURst|CAREa|CMEan|CRMs|DELay|FALL|FREQuency
|HIGH|HITS|LOW|MAXimum|MEAN|MEDian|MINImum|NDUty|NEDGECount
|NOVershoot|NPULSECount|NWIdth|PEAKHits|PDUty|PEDGECount|PERIod
|PHAse|PK2Pk|POVershoot|PPULSECount|PWIdth|RISe|RMS|SIGMA1|SIGMA2
|SIGMA3|STDdev|TOVershoot|WAVEFORMS}

MEASUrement:MEAS<x>:TYPe?
```

Arguments

`AMPlitude` measures the amplitude of the selected waveform. In other words, it measures the high value less the low value measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Amplitude = High - Low

`AREa` measures the voltage over time. The area is over the entire waveform or gated region and is measured in volt-seconds. The area measured above the ground is positive, while the area below ground is negative. This measurement is applicable only to the analog channels.

`BURst` measures the duration of a burst. The measurement is made over the entire waveform or gated region.

`CAREa` (cycle area) measures the voltage over time. In other words, it measures, in volt-seconds, the area over the first cycle in the waveform or the first cycle in the gated region. The area measured above the common reference point is positive, while the area below the common reference point is negative. This measurement is applicable only to the analog channels.

`CMEan` (cycle mean) measures the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region. This measurement is applicable only to the analog channels.

`CRMs` (cycle rms) measures the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region. This measurement is applicable only to the analog channels.

`DELay` measures the time between the middle reference (default = 50%) amplitude point of the source waveform and the destination waveform. This measurement is applicable only to the analog channels.

`FALL` measures the time taken for the falling edge of the first pulse in the waveform or gated region to fall from a high reference value (default is 90%) to

a low reference value (default is 10%). This measurement is applicable only to the analog channels.

FREQuency measures the first cycle in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

HIGH measures the High reference (100% level, sometimes called Topline) of a waveform. This measurement is applicable only to the analog channels.

HITS (histogram hits) measures the number of points in or on the histogram box.

LOW measures the Low reference (0% level, sometimes called Baseline) of a waveform. This measurement is applicable only to the analog channels.

MAXimum finds the maximum amplitude. This value is the most positive peak voltage found. It is measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

MEAN amplitude measurement finds the arithmetic mean over the entire waveform or gated region. This measurement is applicable only to the analog channels.

MEDian (histogram measurement) measures the middle point of the histogram box. Half of all acquired points within or on the histogram box are less than this value and half are greater than this value.

MINImum finds the minimum amplitude. This value is typically the most negative peak voltage. It is measured over the entire waveform or gated region. This measurement is applicable only to the analog channels.

NDUty (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on the first cycle in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

NEDGECount is the count of negative edges.

NOVershoot (negative overshoot) finds the negative overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Negative Overshoot = ((Low - Minimum) / Amplitude) × 100%)

NPULSECount is the count of negative pulses.

NWIdth (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform or gated region.

PEAKHits measures the number of points in the largest bin of the histogram.

PDUty (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on the first cycle in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

PEDGECount is the count of positive edges.

PERIod is the time required to complete the first cycle in a waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.

PHASe measures the phase difference (amount of time a waveform leads or lags the reference waveform) between two waveforms. The measurement is made between the middle reference points of the two waveforms and is expressed in degrees, where 360° represents one waveform cycle.

PK2Pk (peak-to-peak) finds the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region. This measurement is applicable only to the analog channels.

POVershoot is the positive overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

Positive Overshoot = ((Maximum - High) / Amplitude) ×100%

PPULSECount is the count of positive pulses.

PWIdth (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform or gated region.

RISe timing measurement finds the rise time of the waveform. The rise time is the time it takes for the leading edge of the first pulse encountered to rise from a low reference value (default is 10%) to a high reference value (default is 90%). This measurement is applicable only to the analog channels.

RMS amplitude measurement finds the true Root Mean Square voltage in the entire waveform or gated region. This measurement is applicable only to the analog channels.

SIGMA1 (histogram measurement) measures the percentage of points in the histogram that are within one standard deviation of the histogram mean.

SIGMA2 (histogram measurement) measures the percentage of points in the histogram that are within two standard deviations of the histogram mean.

SIGMA3 (histogram measurement) measures the percentage of points in the histogram that are within three standard deviations of the histogram mean.

STDdev measures the standard deviation (Root Mean Square (RMS) deviation) of all acquired points within or on the histogram box.

TOVershoot (total overshoot) (MDO only) measures the sum of the positive and negative overshoot value over the entire waveform or gated region. This measurement is applicable only to the analog channels.

WAVEFORMS (waveform count) measures the number of waveforms used to calculate the histogram.

Examples

`MEASUREMENT:MEAS2:TYPE FREQUENCY` defines measurement 2 as a measurement of the frequency of a waveform.

`MEASUREMENT:MEAS1:TYPE?` might return `:MEASUREMENT:MEAS1:TYPE RMS` indicating that measurement 1 is defined to measure the RMS value of a waveform.

MEASUrement:MEAS<x>:UNIts? (Query Only)

Returns the units associated with the specified measurement. The measurement slots are specified by <x>, which ranges from 1 through 8 (only 4 in MDO3000 models).

Group

Measurement

Syntax

`MEASUrement:MEAS<x>:UNIts?`

Related Commands

MEASUrement:MEAS<x>:TYPe

Returns

This query returns one of the following strings.

Unit string	Description
"%"	percent
"/Hz"	inverse hertz
"?"	indeterminate
"A"	amperes
"A/A"	amperes per ampere
"A/V"	amperes per volt
"A/W"	ampere per watt
"A/dB"	amperes per decibel
"A/s"	amperes per second
"AA"	amperes squared
"AW"	ampere-watts
"AdB"	ampere-decibels
"As"	ampere-seconds
"B"	bytes
"Hz"	hertz
"IRE"	Institute of Radio Engineers units
"S/s"	samples per second
"V"	volts
"V/A"	volts per ampere

Unit string	Description
"V/V"	volts per volt
"V/W"	volts per watt
"V/dB"	volts per decibel
"V/s"	volts per second
"VA"	volt-amperes
"VAR"	volt-amperes resistive
"VV"	volts squared
"VW"	volt-watts
"VdB"	volts-decibels
"Vs"	volt-seconds
"W"	watts
"W/A"	watts per ampere
"W/V"	watts per volt
"W/W"	watts per watt
"W/dB"	watt per decibel
"W/s"	watts per second
"WA"	watt-amperes
"WV"	watt-volts
"WW"	watts squared
"WdB"	watt-decibels
"Wfms"	waveforms
"Ws"	watt-seconds
"dB"	decibels
"dB/A"	decibels per ampere
"dB/V"	decibels per volt
"dB/W"	decibels per watt
"dB/dB"	decibels per decibel
"dBA"	decibel-amperes
"dBV"	decibel-volts
"dBW"	decibel-watts
"dBdB"	decibels squared
"day"	days
"degrees"	degrees
"div"	divisions
"edges"	edges
"hits"	hits
"hr"	hours
"joules"	joules

Unit string	Description
"min"	minutes
"ohms"	ohms
"percent"	percent
"pulses"	pulses
"s"	seconds
"unk"	unknown

Examples `MEASUREMENT:MEAS1:UNITS?` might return `:MEASUREMENT:MEAS1:UNIts %` indicating units for measurement 1 are set to percent.

MEASUrement:MEAS<x>:VALue? (Query Only)

Returns a calculate value for the measurement specified by <x>, which ranges from 1 through 8 (only 4 in MDO3000 models).

NOTE. *This is the same value as displayed on-screen. If measurement statistics are enabled, a new value is calculated with every waveform. In addition, this value is updated approximately every 1/3 second. If you are acquiring a long acquisition record, the oscilloscope may take longer to update.*

Group Measurement

Syntax `MEASUrement:MEAS<x>:VALue?`

Related Commands MEASUrement:MEAS<x>:UNIts?,

*ESR?,

ALLEv?

Examples `MEASUREMENT:MEAS1:VALUE?` might return `:MEASUREMENT:MEAS1:VALue 2.8740E-06`. If the measurement has an error or warning associated with it, then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEv? commands.

MEASUrement:METHod

This command specifies the method used to calculate the 0% and 100% reference level.

Group Measurement

Syntax
```
MEASUrement:METHod {Auto|HIStogram|MINMax}
MEASUrement:METHod?
```

Related Commands MEASUrement:REFLevel:PERCent:HIGH,

MEASUrement:REFLevel:PERCent:LOW,

MEASUrement:REFLevel:PERCent:MID<x>,

Arguments `Auto` selects the best method for each data set.

`HIStogram` sets the high and low waveform levels statistically using a histogram algorithm.

`MINMax` uses the highest and lowest values of the waveform record. This selection is best for examining waveforms with no large, flat portions of a common value, such as sine waves and triangle waves.

Examples `MEASUREMENT:METHOD?` might return `:MEASUREMENT:METHOD MINMAX` indicating that the reference levels are set to MIN and MAX.

MEASUrement:REFLevel? (Query Only)

Returns the current reference level parameters.

Group Measurement

Syntax
```
MEASUrement:REFLevel?
```

Examples `MEASUREMENT:REFLEVEL?` might return these reference level settings `:MEASUREMENT:REFLEVEL:METHOD PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1 0.0000 ;MID2 0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90.0000;LOW 10.0000;MID1 50.0000 ;MID2 50.0000`

MEASUrement:REFLevel:ABSolute:HIGH

This command specifies the high reference level, and is the upper reference level when MEASUrement:REFLevel:METHod is set to Absolute. This command affects the results of rise and fall measurements.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:ABSolute:HIGH <NR3>
MEASUrement:REFLevel:ABSolute:HIGH?
```

Related Commands MEASUrement:REFLevel:METHod,

MEASUrement:IMMed:TYPe,

MEASUrement:MEAS<x>:TYPe

Arguments <NR3> is a floating point number that specifies the high reference level, in volts. The default is 0.0 V.

Examples MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH 1.71 sets the high reference level to 1.71 V.

MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH? might return :MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH 1.7100E+00 indicating that the absolute high reference level is set to 1.71 V.

MEASUrement:REFLevel:ABSolute:LOW

This command specifies the low reference level, and is the lower reference level when MEASUrement:REFLevel:METHod is set to Absolute.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:ABSolute:LOW <NR3>
MEASUrement:REFLevel:ABSolute:LOW?
```

Related Commands MEASUrement:REFLevel:METHod,

MEASUrement:IMMed:TYPe,

MEASUrement:MEAS<x>:TYPe

Arguments <NR3> is a floating point number that specifies the low reference level, in volts. The default is 0.0 V.

Examples MEASUREMENT:REFLEVEL:ABSOLUTE:LOW 0.0 sets the low reference level to 0.0 V.

MEASUREMENT:REFLEVEL:ABSOLUTE:LOW? might return :MEASUREMENT:REFLEVEL:ABSOLUTE:LOW 0.0000E+00 indicating that the absolute low reference level is set to 0.0 V.

MEASUrement:REFLevel:ABSolute:MID<x>

This command specifies an absolute mid reference level (the 50% reference level) for the "to" waveform when taking a delay measurement, in volts. There are two absolute mid reference levels; thus MID<x> can either be MID1 or MID2. This command applies when MEASUrement:REFLevel:METHod has been set to Absolute. This command is equivalent to setting the Reference Levels in the MEASURE menu on the oscilloscope front panel.

NOTE. *This command affects the results of period, frequency, delay, and all cyclic measurements. This command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:ABSolute:MID<x> <NR3>
MEASUrement:REFLevel:ABSolute:MID<x>?
```

Related Commands MEASUrement:REFLevel:METHod

Arguments <NR3> is a floating point number that specifies the mid reference level in volts.

Examples MEASUrement:REFLevel:ABSolute:MID 0.5 sets the absolute MID1 reference level for the delay waveform to 0.5 V.

MEASUrement:REFLevel:ABSolute:MID? might return :MEASUREMENT:REFLEVEL:ABSOLUTE:MID2 0.5000E+00 indicating that the absolute MID2 reference level is set to 0.5 V.

MEASUrement:REFLevel:METHod

Specifies or returns the reference level units used for measurement calculations.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the eight periodic measurements (4 in MDO3000). To change the parameter for individual measurements, use the MEASUrement:MEAS<x>:REFLevel commands.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:METHod {ABSolute|PERCent}
MEASUrement:REFLevel:METHod?
```

Arguments

`ABSolute` specifies that the reference levels are set explicitly using the MEASUrement:REFLevel:ABSolute commands. This method is useful when precise values are required (for example, when designing to published interface specifications, such as RS-232-C).

`PERCent` specifies that the reference levels are calculated as a percent relative to HIGH and LOW. The percentages are defined using the MEASUrement:REFLevel:PERCent commands.

Examples

`MEASUREMENT:REFLEVEL:METHODABSOLUTE` specifies that explicit user-defined values are used for the reference levels.

`MEASUREMENT:REFLEVEL:METHOD?` might return `:MEASUREMENT:REFLEVEL:METHOD PERCENT` indicating that the reference level units used are calculated as a percent relative to HIGH and LOW.

MEASUrement:REFLevel:PERCent:HIGH

This command specifies the percent (where 100% is equal to HIGH) used to calculate the high reference level when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of rise and fall measurements.

NOTE. *This command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:HIGH <NR3>
MEASUrement:REFLevel:PERCent:HIGH?
```

Related Commands

MEASUrement:REFLevel:METHod,

MEASUrement:IMMed:TYPe,

MEASUrement:MEAS<x>:TYPe

Arguments

<NR3> is a floating point number that specifies the high reference level, ranging from 0 to 100%. The default high reference level is 90%.

Examples

MEASUREMENT:REFLEVEL:PERCENT:HIGH95 sets the high reference level to 95% of HIGH.

MEASUREMENT:REFLEVEL:PERCENT:HIGH? might return :MEASUREMENT:REFLEVEL:PERCENT:HIGH 90 indicating that the percentage high reference level is set to 90% of HIGH.

MEASUrement:REFLevel:PERCent:LOW

This command specifies the percent (where 100% is equal to HIGH) used to calculate the low reference level when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of rise and fall measurements.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the periodic measurements.*

Group

Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:LOW <NR3>
MEASUrement:REFLevel:PERCent:LOW?
```

Related Commands

MEASUrement:REFLevel:METHod,

MEASUrement:IMMed:TYPe,

MEASUrement:MEAS<x>:TYPe

Arguments

<NR3> is a floating point number that specifies the low reference level, ranging from 0 to 100%. The default low reference level is 10%.

Examples

`MEASUREMENT:REFLEVEL:PERCENT:LOW 15` sets the high reference level to 15% of HIGH.

`MEASUREMENT:REFLEVEL:PERCENT:LOW?` might return `:MEASUREMENT:REFLEVEL:PERCENT:LOW 10` indicating that the percentage high reference level is set to 10% of HIGH.

MEASUrement:REFLevel:PERCent:MID<x>

This command specifies the percent (where 100% is equal to HIGH) that is used to calculate a mid reference level. There are two mid reference levels; thus, MID<x> can be either MID1 or MID2. This command applies when the command MEASUrement:REFLevel:METHod has been set to Percent. This command is equivalent to setting the Reference Levels in the MEASURE menu on the oscilloscope front panel.

NOTE. *This command affects the results of period, frequency, delay, and all cyclic measurements. This command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:MID<x> <NR3>
MEASUrement:REFLevel:PERCent:MID<x>?
```

Related Commands MEASUrement:REFLevel:METHod

Arguments `<NR3>` is a floating point number that specifies the mid reference level, ranging from 0 to 100%. The default mid reference level is 50%.

Examples

`MEASUrement:REFLevel:PERCent:MID 60` sets the MID1 reference level to 60% of HIGH.

`MEASUrement:REFLevel:PERCent:MID?` might return `:MEASUREMENT:REFLEVEL:PERCENT:MID2 65` indicating that the MID2 reference level has been set to 65% of HIGH.

MEASUrement:STATIstics (No Query Form)

Clears all of the statistics accumulated for all periodic measurements (MEAS1 through MEAS4).

The query form returns statistic settings.

Group Measurement

Syntax
```
MEASUrement:STATIstics RESET
MEASUrement:STATIstics?
```

Arguments `RESET` clears the measurements.

MEASUrement:STATIstics:MODe

Controls the operation and display of management statistics.

Group Measurement

Syntax
```
MEASUrement:STATIstics:MODe {OFF|ALL}
MEASUrement:STATIstics:MODe?
```

Related Commands MEASUrement:STATIstics

Arguments `OFF` turns all measurements off. This is the default value.

`AL` turns on statistics and displays all statistics for each measurement.

Examples `MEASUREMENT:STATISTICS:MODE OFF` turns statistic measurements off.

`MEASUREMENT:STATISTICS:MODE?` might return `:MEASUREMENT:STATISTICS:MODE ON` indicating that measurement statistics are turned on and all statistics are being displayed for each measurement.

MEASUrement:STATIstics:WEIghting

This command specifies the time constant for mean and standard deviation statistical accumulations.

Group Measurement

Syntax
```
MEASUrement:STATIstics:WEIghting <NR1>
MEASUrement:STATIstics:WEIghting?
```

Related Commands MEASUrement:STATIstics:MODe

Arguments <NR1> is the number of samples used for the mean and standard deviation statistical accumulations.

Examples MEASUREMENT:STATISTICS:WEIGHTING 4 sets statistical weighting to four samples.

MEASUREMENT:STATISTICS:WEIGHTING? might return :MEASUREMENT:STATISTICS:WEIGHTING 4 indicating that measurement statistics weighting is currently set to 4 samples.

MESSage

This command sets or queries message box (screen annotation) parameters.

Group Display

Syntax
```
MESSage
MESSage?
```

Examples MESSAGE? might return MESSAGE:SHOW "TP401";BOX 271,82,292,114;STATE 0 indicating the message parameters.

MESSage:BOX

This command specifies the co-ordinates of the message box. This command does not display the message unless MESSage:STATE is on.

X1 and Y1 are the screen coordinates of the top left corner of the message box. X2 and Y2 are the screen coordinates of the bottom right corner of the message box. All four coordinates are returned by the query.

Changing the text in the message box, using the MESSAGE:SHOW command, automatically resizes the message box. If you want a custom message box size, send the MESSAGE:BOX command after changing the text using the MESSAGE:SHOW command.

Message box settings and data are saved and restored in saved setups.

Group Display

Syntax

```
MESSage:BOX <X1>,<Y1>[,<X2>,<Y2>]
MESSage:BOX?
```

Related Commands

MESSage:STATE,

MESSage:SHOW,

MESSage:CLEAR

Arguments

<X1> and <X2> = 0 to 1023, and are pixel positions along the horizontal axis. <X1> defines the left and <X2> defines the right side of the window.

<Y1> and <Y2> = 0 to 767, and are pixel positions along the vertical axis. <Y1> defines the top and <Y2> defines the bottom of the window. The reserved height of all characters is 16 pixels so the window must be at least that high to fully display characters. <X2> and <Y2> are optional because the MESSAGE:SHOW command automatically sizes the box to fit the message. All four values are returned in a query.

MESSage:CLEAR (No Query Form)

Clears the contents of the message box.

Group Display

Syntax

```
MESSage:CLEAR
```

Related Commands MESSage:BOX, MESSage:SHOW, MESSage:STATE

Examples

MESSage:CLEAR
removes the message from the message window.

MESSage:SHOW

This command specifies the contents of the message box. MESSage:SHOW <Qstring> defines the content of the message box. Change in string length causes automatic resize of the message box to fit the text. The box may be resized using the MESSage:BOX command. The MESSage:STATE command is used to turn on and off the message box display.

Group Display

Syntax

```
MESSage:SHOW <QString>
MESSage:SHOW?
```

Related Commands

MESSage:BOX

MESSage:CLEAR

MESSage:STATE

Arguments

<QString> is the message and can include any of the characters shown in the Character Set. (See page A-1, *Character Set*.)The maximum length of the message is 1000 characters; the instrument ignores longer strings.

The message box size is set to fit the message. You can also set the message area height and width using the MESSage:BOX command. The length of the message that fits in the message area depends on the contents of the message because the width of characters varies.

If the message exceeds the limits of the message box, either horizontally or vertically, the portion of the message that exceeds the limits will not be displayed. The message string itself is not altered. The entire message can be returned as a query response regardless of what is displayed in the message box.

The message is left-justified, and is displayed on a single line starting with the top most line in the window. A new line character can be embedded in the string to position the message on multiple lines. You can also use white space and tab characters to position the message within a line. Text which does not fit within the message box is truncated. Defining a message box text string erases any previously displayed text within the message box.

You can send a tab by transmitting a tab character (\t or \x09) followed characters representing the most significant eight bits followed by significant eight bits of a 16-bit number. The number specifies the position relative to the left margin of the message area. For example, to tab send TAB (\t or \x09), NUL (decimal 0), and CR (decimal 13).

For example, using hexadecimal escape sequences, MESSAGE:SHOW '\x09\x01\x17Hello' when sent as a command would cause the 'Hello' to be displayed starting at pixel position 279 relative to the left margin set by the MESSAGE:BOX command. If you want to display characters starting at position 279, then 279 = 0x0117; split the hexadecimal number into two characters 0x01 and 0x17 and send \x09\x01\x17.

Special characters which control decoration are two character sequences where the first character is an escape (0x1b) and the second character is as described below.

Bit 7	0	
Bit 6	If set, inverse video is toggled from current state and the following text is displayed in the new inverse state until the state is toggled again. Remaining bits are ignored	
Bit 5	If set, the color index in the four LSB's (bits 0 through 3) is applied to the foreground or background color depending on the fg/bg bit (bit 4).	
Bit 4	If set, color change is applied to the background, otherwise applies to the foreground.	
Bit 0 – 3	Specifies the color index (0 through 15) to change color as specified below:	
	Index 0	Black (transparent)
	Index 1	Yellow (Ch 1)
	Index 2	Cyan (Ch 2)
	Index 3	Magenta (Ch 3)
	Index 4	Green (Ch 4)
	Index 5	Red (math)
	Index 6	White (reference)
	Index 7	Orange
	Index 8	Black
	Index 9	Black
	Index 10	Blue
	Index 11	Dark Green
	Index 12	Tan
	Index 13	Black
	Index 14	White (text color)
	Index 15	Dark gray
Bit 4	If set, the foreground color is set to the default foreground color.	
Bit 3	If set, the background color is set to the default background color.	
Bit 2	Undefined	
Bit 1	Undefined	
Bit 0	Undefined	

The ESC (escape) character followed by the @ character turns inverse video on or off and can be embedded in the message string. Example: "abcESC@defESC@ ghi" specifies the string "abcdefghi" where the "def" portion is displayed in inverse video.

Example: "abcESC#defESC)ESC@ghi" specifies the string "abcdefghi" where the "def" portion appears in the channel 3 color (magenta) and the "ghi" portion appears in the normal text color except it's in inverse video.

An alternate way to enter characters is octal escape sequences. This consists of a backslash followed by numerals in the standard C language printf fashion.

Another way to enter characters is \xnn where the nn is the hexadecimal value of the character to display.

An advantage of these methods is that any controller program can be used. Another advantage is it's easy to access characters with the high bit set, that is, those characters with a decimal value greater than 127.

An alternate way to enter certain characters is with a backslash followed by a single character (following "standard" Unix) as described in the table below.

n	Newline (carriage return and line feed)
\	Backslash (\\ is required to get a backslash character)
t	Horizontal tab; the next 2 characters specify the pixel column to tab to as explained earlier

If a backslash is followed by an undefined special character, the backslash is ignored and the character following it is accepted as is.

NOTE. *The use of any escape codes other than those described above may produce unpredictable results.*

Examples

MESSage:SHOW "Hello World"
displays "Hello world" in the upper left corner of the box (you can define the box size with the MESSAGE BOX command).

MESSage:SHOW "←@Hello World←@ .. hello"
displays "Hello world .. hello" in the upper left corner of the box and the word "world" is displayed in inverse video. In this example, ← stands for the escape character. The escape character may appear differently for you depending on your controller program.

MESSage:STATE

Controls the display of the message box.

Group

Display

Syntax

```
MESSage:STATE {OFF|ON|<NR1>}
MESSage:STATE?
```

Related Commands

MESSage:BOX

MESSage:SHOW, MESSage:CLEAR

Arguments

`OFF or <NR1> = 0` removes the message window from the screen.

`ON or <NR1> ≠ 0` displays the message window and its contents on the screen.

NEWpass (No Query Form)

This command changes the password that enables access to password protected data. The PASSWord command must be successfully executed before using this command or an execution error will be generated.

Group

Miscellaneous

Syntax

`NEWpass <QString>`

Related Commands

*PUD

PASSWord

Arguments

`<QString>` is the new password, which can contain up to 16 characters.

Examples

`NEWPASS "mypassword"` creates a new password (mypassword) for accessing your protected data.

*OPC

Generates the Operation Complete message in the Standard Event Status Register (SESR) when all pending commands that generate an OPC message are complete.

The *OPC command allows you to synchronize the operation of the oscilloscope with your application program. Examples of this commands usage are available(See page 3-7, *Synchronization Methods*.) The *OPC? query places the ASCII character "1" into the output queue when all such OPC commands are complete.

The *OPC? response is not available to read until all pending operations finish. (See page 3-948, *Status and Events*.)

Certain oscilloscope operations can affect the `*OPC` response. (See Table 3-3 on page 3-8.)

Group

Status and Error

Syntax

```
*OPC
*OPC?
```

Related Commands

BUSY?, *WAI

Examples

*OPC generates the operation complete message in the SESR at the completion of all pending OPC operations.

*OPC? might return 1 to indicate that all pending OPC operations are finished.

*OPT? (Query Only)

Returns a comma-separated list of installed options (not to be confused with application modules) as an arbitrary ASCII string (no quotes) of the form:

<optionCode>:<optionDescription>,<optionCode>:<optionDescription>..

If no options are found, NONE is returned.

To obtain a list of installed application modules, use the ID? query instead.

Conditions

Available for MDO3000 series models only.

Group

Status and Error

Syntax

```
*OPT?
```

Examples

*OPT? might return ”DVM:Digital Voltmeter,AFG:Arbitrary Function Generator,MSO:Mixed Signal Oscilloscope,SA:Spectrum analyzer maximum input frequency,MDO3SEC:Security lockout”

PASSWord(No Query Form)

Enables the *PUD and NEWpass set commands. Sending PASSWord without any arguments disables these same commands. Once the password is successfully entered, the *PUD and NEWpass commands are enabled until the oscilloscope is powered off, or until the FACtory command or the PASSWord command with no arguments is issued.

To change the password, you must first enter the valid password with the PASSWord command and then change to your new password with the NEWpass command. Remember that the password is case sensitive.

Group Miscellaneous

Syntax `PASSWord <QString>`

Related Commands NEWpass, *PUD

Arguments `<QString>` is the password and can include up to 10 characters. The factory default password is "XYZZY" and is always valid.

Examples `PASSWORD"XYZZY"` enables the *PUD and NEWpass set commands.

`PASSWORD` disables the *PUB and NEWpass set commands. You can still use the query version of *PUD.

PAUSe (No Query Form)

This command causes the interface to pause the specified number of seconds before processing any other commands.

Group Miscellaneous

Syntax `PAUSe <NR3>`

Arguments <NR3> is a floating-point number that represents the number of seconds the interface should pause before processing any other commands. It must be greater than 0.0 and less than or equal to 1800.0.

Examples `PAUSE 2.0` causes the interface to pause for 2 seconds before processing any other commands.

PICTBridge:DATEPrint

Enables or disables printing the date on the print output

Group PictBridge

Syntax
```
PICTBridge:DATEPrint {DEFLT|OFF|ON}
PICTBridge:DATEPrint?
```

Arguments

DEFLT is the default setting of the printer.

ON enables the date print on the print output.

OFF disables the date print on the print output.

Examples

PICTBRIDGE:DATEPRINT ON enables the date print on the print output.

PICTBRIDGE:DATEPRINT? might return PICTBRIDGE:DATEPRINT DEFLT indicating the default setting of the printer.

PICTBridge:DEFault (No Query Form)

Sets the arguments for all PictBridge commands to their default values. The default values are same as printer default settings.

Group

PictBridge

Syntax

```
PICTBridge:DEFault
```

Examples

PICTBRIDGE:DEFAULT sets all PICTBridge commands to their default values.

PICTBridge:IDPrint

Enables or disables printing the oscilloscope model and serial number on the print output.

Group

PictBridge

Syntax

```
PICTBridge:IDPrint {DEFLT|OFF|ON}
PICTBridge:IDPrint?
```

Arguments

DEFLT is the default setting of the printer.

ON enables the oscilloscope model and serial number print on the print output.

OFF disables the oscilloscope model and serial number print on the print output.

Examples

PICTBRIDGE:IDPRINT ON enables the printing of oscilloscope model and serial number on the print output.

PICTBRIDGE:IDPRINT? might return PICTBRIDGE:IDPRINT OFF indicating that the ID print is disabled on the print output.

PICTBridge:IMAGESize

This command specifies the image print size.

Group PictBridge

Syntax

```
PICTBridge:IMAGESize
{DEFLT|IN2P5BY3P25|L|IN4BY6|L2|IN8BY10|L4|E|CARD|HAGAKIPcard
|CM6BY8|CM7BY10|CM9BY13|CM10BY15|CM13BY18|CM15BY21|CM18BY24|
A4|LETTER}

PICTBridge:IMAGESize?
```

Arguments

DEFLT for a default image print size.

IN2P5BY3P25 for a 2_5*3_25 image print size.

L for a 3_5*5 image print size.

IN4BY6 for a 4*6 image print size.

L2 for a 5*7 image print size.

IN8BY10 for a 8*10 image print size.

L4 for a 254 MM*178 MM image print size.

E for a 110 MM*74 MM image print size.

CARD for a 89 MM*55 MM image print size.

HAGAKIPcard for a 100 MM*148 MM image print size.

CM6BY8 for a 6 CM*8 CM image print size.

CM7BY10 for a 7 CM*10 CM image print size.

CM9BY13 for a 9 CM*13 CM image print size.

CM10BY15 for a 10 CM*15 CM image print size.

CM13BY18 or a 13 CM*18 CM image print size.

CM15BY21 for a 15 CM*21 CM image print size.

CM18BY24 for a 18 CM*24 CM image print size.

A4 for a A4 image print size.

LETTER for a Letter image print size.

Examples

`PICTBRIDGE:IMAGESIZE CARD` sets the image print size to 89 MM* 55 MM.

`PICTBRIDGE:IMAGESIZE?` might return `PICTBRIDGE:IMAGESIZE DEFLT` indicating the default image print size.

PICTBridge:PAPERSize

Sets the output print paper size.

Group

PictBridge

Syntax

```
PICTBridge:PAPERSize
DEFLT|L|L2|HAGAKIPCARD|MM54BY86|MM100BY150|IN4BY6|IN8BY10
|LETTER|IN11BY17|A0|A1|A2|A3|A4|A5|A6|A7|A8
|A9|B0|B1|B2|B3|B4|B5|B6|B7|B8|B9|ROLL89MM|ROLL127MM|ROLL100MM
|ROLL210MM}

PICTBridge:PAPERSize?
```

Arguments

`DEFLT` for a default paper size.

`L` for a paper size L

`L2` for a paper size 2L.

`HAGAKIPCARD` for a paper size Hagaki.

`MM54BY86` for a card paper size.

`MM100BY150` for paper size of 100*150 MM.

`IN4BY6` for a paper size of 4*6.

`IN8BY10` for a paper size of 8*10.

`LETTER` for a letter paper size.

`IN11BY17` for a paper size of 11*17.

`A0` for a A0 paper size.

`A1` for a A1 paper size.

`A2` for a A2 paper size.

`A3` for a A3 paper size.

`A4` for a A4 paper size.

`A5` for a A5 paper size.

`A6` for a A6 paper size.

A7 for a A7 paper size.

A8 for a A8 paper size.

A9 for a A9 paper size.

B0 for a B0 paper size.

B1 for a B1 paper size.

B2 for a B2 paper size.

B3 for a B3 paper size.

B4 for a B4 paper size.

B5 for a B5 paper size.

B6 for a B6 paper size.

B7 for a B7 paper size.

B8 for a B8 paper size.

B9 for a B9 paper size.

ROLL89MM for a 89 MM Roll paper size.

ROLL127MM for a 127 MM Roll paper size.

ROLL100MM for a 100 MM Roll paper size.

ROLL210MM for a 210 MM Roll paper size.

Examples

PICTBRIDGE:PAPERSIZEL sets the paper size to L.

PICTBRIDGE:PAPERSIZE? might return PICTBRIDGE:PAPERSIZE DEFLT indicating the paper size is set to Default.

PICTBridge:PAPERType

This command specifies the paper type.

Group

PictBridge

Syntax

```
PICTBridge:PAPERType {DEFLT|PLAIN|PHOTO|FASTPHOTO}
PICTBridge:PAPERType?
```

Arguments

DEFLT for a default print paper type.

PLAIN for a plain print paper type.

PHOTO for a photo print paper type.

FASTPHOTO for a fastphoto print paper type.

Examples PICTBRIDGE:PAPERTYPE PLAIN sets the paper type to Plain.

PICTBRIDGE:PAPERTYPE? might return PICTBRIDGE:PAPERTYPE DEFLT indicating the default paper type.

PICTBridge:PRINTQual

This command specifies the output print quality.

Group PictBridge

Syntax
```
PICTBridge:PRINTQual {DEFLT|NRMAL|FINE|DRAFT}
PICTBridge:PRINTQual?
```

Arguments DEFLT for the default quality print.

NRMAL for a normal quality print.

FINE for a fine quality print.

DRAFT for a draft quality print.

Examples PICTBRIDGE:PRINTQUAL FINE sets the print quality to Fine.

PICTBRIDGE:PRINTQUAL? might return PICTBRIDGE:PRINTQUAL DEFLT indicating the default quality print.

POWer:CURRENTSOurce

This command specifies the current source for the power application.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:CURRENTSOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4}
POWer:CURRENTSOurce?
```

Arguments `CH1–CH4` sets an analog channel as the current source.

`REF1–REF4` sets a reference waveform as the current source.

Examples `POWER:CURRENTSOURCE CH1` sets the current source as CH1.

`POWER:CURRENTSOURCE?` might return `POWER:CURRENTSOURCE CH2` indicating that CH2 is the current source.

POWer:DISplay

This command controls whether or not to display the power test results. This is the equivalent to pressing the **Test** button and then selecting the power application. The same control is provided for each application.

Conditions This command requires a DPO4PWR or a MDO3PWR application module.

Group Power

Syntax

```
POWer:DISplay {OFF|ON|0|1}
POWer:DISplay?
```

Arguments `OFF` or 0 turns off the display settings.

`ON` or 1 turns on the display settings.

Examples `POWER:DISPLAY 1` turns on the display.

`POWER:DISPLAY?` might return `:POWER:DISPLAY 0` indicating that the display is off.

POWer:GATESOurce

This command specifies the gate source for the power application.

NOTE. *This command is not applicable to 2-channel models. Any attempt to set the* `:GATESOurce` *to other than* `NONe` *will not take effect.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:GATESOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4|NONe}
POWer:GATESOurce?
```

Arguments `CH1–CH4` sets an analog channel as the gate source.

`REF1–REF4` sets a reference waveform as the gate source.

`NONe` is set when the gate source is not used in the application.

Examples `POWER:GATESOURCE CH1` sets the gated source as CH1.

`POWER:GATESOURCE?` might return `POWER:GATESOURCE CH2` indicating that CH2 is the gated source.

POWer:GATing

This command specifies the power application gating.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:GATing {OFF|SCREen|CURSor}
POWer:GATing?
```

Arguments `OFF` turns off measurement gating (full record).

`SCREen` turns on gating, using the left and right edges of the screen.

`CURSor` limits measurements to the portion of the waveform between the vertical bar cursors, even if they are off screen.

Examples `POWER:GATING CURSOr` sets cursor gating on the oscilloscope.

`POWER:GATING?` might return `POWER:GATING OFF` indicating that gating is turned off on the oscilloscope.

POWer:HARMonics:DISplay:SELect

This command specifies the harmonics to be displayed when the harmonics standard is NONe.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:DISplay:SELect {ODD|EVEN|ALL}
POWer:HARMonics:DISplay:SELect?
```

Arguments `ODD` to display only odd harmonics.

`EVEN` to display only even harmonics.

`ALL` to display both odd and even harmonics.

Examples `POWER:HARMONICS:DISPLAY:SELECT EVEN` displays only even harmonics.

`POWER:HARMONICS:DISPLAY:SELECT?` might return `:POWER:HARMONICS:DISPLAY:SELECT ALL` indicating that both odd and even harmonics are displayed.

POWer:HARMonics:DISplay:TYPe

This command specifies the display type for harmonics tests.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:DISplay:TYPe {GRAph|TABle}
POWer:HARMonics:DISplay:TYPe?
```

Arguments `GRAph` displays harmonic tests results in graphical format.

`TABle` displays harmonic tests results in tabular format.

Examples

`POWER:HARMONICS:DISPLAY:TYPE GRAph` sets the display type to graphical.

`POWER:HARMONICS:DISPLAY:TYPE?` might return `:POWER:HARMONICS:DISPLAY:TYPE TAB` indicating that the display type is set to tabular.

POWer:HARMonics:FREQRef

This command specifies the frequency reference used when the harmonic standard is None.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:HARMonics:FREQRef
{VOLTage|CURRent|HARMSOURce|FIXEDFREQuency}
POWer:HARMonics:FREQRef?
```

Arguments

`VOLTage` to use a voltage waveform as the frequency reference.

`CURRent` to use a current waveform as the frequency reference.

`HARMSOURce` to use a harmonic source waveform as the frequency reference.

`FIXEDFREQuency` to use a fixed frequency value instead of a waveform for the frequency reference.

Examples

`POWER:HARMONICS:FREQREF VOLTage` sets voltage source as the frequency reference.

`POWER:HARMONICS:FREQREF?` might return `:POWER:HARMONICS:FREQREF FIXEDFREQ` indicating that the frequency reference is a fixed value.

POWer:HARMonics:FREQRef:FIXEDFREQValue

This command specifies the frequency value when the :FREQRef selection is `FIXEDFREQuency`.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:FREQRef:FIXEDFREQValue <NR3>
POWer:HARMonics:FREQRef:FIXEDFREQValue?
```

Arguments <NR3> is a floating point number that specifies the fixed frequency value.

Examples POWER:HARMONICS:FREQREF:FIXEDFREQVALUE 100 sets the frequency to 100 Hz.

POWER:HARMONICS:FREQREF:FIXEDFREQVALUE? might return :POWer:HARMonics:FREQREF:FIXEDFREQVALUE 60 indicating that the fixed frequency value is set to 60 Hz.

POWer:HARMonics:IEC:CLAss

This command specifies the equipment class for IEC harmonics.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:IEC:CLAss {A|B|C1|C2|C3|D}
POWer:HARMonics:IEC:CLAss?
```

Arguments

A specifies Class A Equipment.

B specifies Class B Equipment.

C1 specifies Class C Equipment that use Table 1 limits of the IEC standard.

C2 specifies Class C Equipment that use Table 2 limits of the IEC standard.

C3 specifies Class C Equipment that use Table 3 limits of the IEC standard.

D specifies Class D Equipment.

Examples POWER:HARMONICS:IEC:CLASSB sets Equipment Class B for IEC harmonics.

POWER:HARMONICS:IEC:CLASS? might return :POWER:HARMONICS:IEC:CLASS A indicating that the Equipment Class is A for IEC harmonics.

POWer:HARMonics:IEC:FILter

This command specifies the enabled state for filtering of IEC harmonics.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:IEC:FILter {OFF|ON|0|1}
POWer:HARMonics:IEC:FILter?
```

Arguments `ON` or 1 enables filtering of IEC harmonics.

`OFF` or 0 disables filtering of IEC harmonics.

Examples `POWER:HARMONICS:IEC:FILTER OFF` disables filtering of IEC harmonics.

`POWER:HARMONICS:IEC:FILTER?` might return `:POWER:HARMONICS:IEC:FILTER 1` indicating that the IEC harmonics are filtered.

POWer:HARMonics:IEC:FUNDamental

This command specifies the rated fundamental current for IEC harmonics. Valid values ranges from 0 to 16 in increments of 0.1. The unit is ampere.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:IEC:FUNDamental <NR3>
POWer:HARMonics:IEC:FUNDamental?
```

Arguments `<NR3>` is a floating point number that specifies the fundamental current in amperes.

Examples `POWER:HARMONICS:IEC:FUNDAMENTAL 1` sets the fundamental current to 1.0000 A.

POWER:HARMONICS:IEC:FUNDAMENTAL? might return :POWER:HARMONICS:IEC:FUNDAMENTAL 16 indicating that the fundamental current for IEC harmonics is set to 16.0000 A.

POWer:HARMonics:IEC:GROUPing

This command specifies the enabled state for grouping of IEC harmonics.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:IEC:GROUPing {OFF|ON|1|0}
POWer:HARMonics:IEC:GROUPing?
```

Arguments ON or 1 enables grouping of IEC harmonics.

OFF or 0 disables grouping of IEC harmonics.

Examples POWER:HARMONICS:IEC:GROUPING OFF disables grouping of IEC harmonics.

POWER:HARMONICS:IEC:GROUPING? might return :POWER:HARMONICS:IEC:GROUPING 1 indicating that the grouping is enabled for IEC harmonics.

POWer:HARMonics:IEC:INPUTPOWer

This command specifies the class D rated input power for IEC harmonics.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:IEC:INPUTPOWer <NR3>
POWer:HARMonics:IEC:INPUTPOWer?
```

Arguments <NR3> is a floating point number that specifies the class D input power. Valid values ranges from 0 to 600 in increments of 10. The unit of measure is watt.

Examples

`POWER:HARMONICS:IEC:INPUTPOWER 600` sets the class D input power to 600 W.

`POWER:HARMONICS:IEC:INPUTPOWER?` might return `:POWER:HARMONICS:IEC:INPUTPOWER 100` indicating that the class D input power is set to 100 W.

POWer:HARMonics:IEC:LINEFREQuency

This command specifies the line frequency for the IEC standard.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:HARMonics:IEC:LINEFREQuency <NR1>
POWer:HARMonics:IEC:LINEFREQuency?
```

Arguments

`<NR1>` is an unsigned integer that specifies the line frequency. The valid values are 50 and 60.

Examples

`POWER:HARMONICS:IEC:LINEFREQUENCY 50` sets the line frequency to 50 Hz.

`POWER:HARMONICS:IEC:LINEFREQUENCY?` might return `:POWER:HARMONICS:IEC:LINEFREQUENCY 60` indicating that the line frequency value is set to 60 Hz.

POWer:HARMonics:IEC:OBSPERiod

This command specifies the IEC observation period.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:HARMonics:IEC:OBSPERiod <NR3>
POWer:HARMonics:IEC:OBSPERiod?
```

Arguments <NR3> is a floating point number that specifies the IEC observation period. Valid values ranges from 0.2 to 10 s.

Examples POWER:HARMONICS:IEC:OBSPERIOD 3 sets the IEC observation period to 3.0000 s.

POWER:HARMONICS:IEC:OBSPERIOD? might return :POWER:HARMONICS:IEC:OBSPERIOD 10 indicating that the IEC observation period is set to 10 s.

POWer:HARMonics:IEC:POWERFACtor

This command specifies the rated power factor for IEC harmonics.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:IEC:POWERFACtor <NR3>
POWer:HARMonics:IEC:POWERFACtor?
```

Arguments <NR3> is a floating point number that specifies the power factor. Valid values ranges from 0 to 1 in increments of 0.1.

Examples POWER:HARMONICS:IEC:POWERFACTOR 1 sets the power factor to 1.0000.

POWER:HARMONICS:IEC:POWERFACTOR? might return :POWER:HARMONICS:IEC:POWERFACTOR 900.0000E-03 indicating that the power factor is set to 0.9.

POWer:HARMonics:MIL:FUNDamental:CALCmethod

This command specifies the measurement method for the MIL harmonics fundamental current for use in calculating limits.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:MIL:FUNDamental:CALCmethod {MEAS|USER}
POWer:HARMonics:MIL:FUNDamental:CALCmethod?
```

Arguments

MEAS specifies that the value of the fundamental current used in calculating limits is measured.

USER specifies that the value of the fundamental current used in calculated limits is user defined.

Examples

POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD USER sets the measurement method to User.

POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD? might return :POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD MEAS indicating that the measurement method is set to Meas.

POWer:HARMonics:MIL:FUNDamental:USER:CURrent

This command specifies RMS amperes for USER CALCmethod.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:HARMonics:MIL:FUNDamental:USER:CURrent <NR3>
POWer:HARMonics:MIL:FUNDamental:USER:CURrent?
```

Arguments

<NR3> is a floating point number that specifies the current in amperes for USER CALCmethod.

Examples

POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT 2 sets the RMS fundamental current to 2 A in calculating limits.

POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT? might return :POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT 1.0000 indicating that the RMS fundamental current for use in calculating limits is 1.0000 A.

POWer:HARMonics:MIL:LINEFREQuency

This command specifies the line frequency for MIL-STD-1399 Section 300A harmonics tests. Valid values are 60 or 400 Hz.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:MIL:LINEFREQuency <NR1>
POWer:HARMonics:MIL:LINEFREQuency?
```

Arguments <NR1> is an unsigned integer that specifies the line frequency for the MIL standard.

Examples POWER:HARMONICS:MIL:LINEFREQUENCY 60 sets the MIL line frequency to 60 Hz.

POWER:HARMONICS:MIL:LINEFREQUENCY? might return :POWER:HARMONICS:MIL:LINEFREQUENCY 400 indicating that the MIL line frequency is set to 400 Hz.

POWer:HARMonics:MIL:POWERLEVel

This command specifies the power level for calculating limits for MIL-STD-1399 Section 300A harmonics tests.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:MIL:POWERLEVel {LOW|HIGH}
POWer:HARMonics:MIL:POWERLEVel?
```

Arguments LOW specifies low power level for MIL-STD-1399 harmonics tests.

HIGH specifies high power level for MIL-STD-1399 harmonics tests.

Examples POWER:HARMONICS:MIL:POWERLEVEL HIGH sets the MIL power level to High.

POWER:HARMONICS:MIL:POWERLEVEL? might return :POWER:HARMONICS:MIL:POWERLEVEL LOW indicating that the MIL power level is set to Low.

POWer:HARMonics:NR_HARMonics

This command specifies the number of harmonics (value ranging from 20 to 400) when the harmonics standard is NONe.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:NR_HARMonics <NR3>
POWer:HARMonics:NR_HARMonics?
```

Arguments <NR3> is a floating point number that specifies the number of harmonics.

Examples POWER:HARMONICS:NR_HARMONICS 100 sets the number of harmonics to 100.

POWER:HARMONICS:NR_HARMONICS? might return :POWer:HARMonics:NR_HARMONICS 40 indicating that the number of harmonics is set to 40.

POWer:HARMonics:RESults:HAR<1-400>:FREQuency? (Query Only)

Returns the frequency of the harmonic.

NOTE. *The query returns NA, if the current harmonic standard is set to a new standard other than the returned query.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:HARMonics:RESults:HAR<1-400>:FREQuency?
```

Examples POWER:HARMONICS:RESULTS:HAR400:FREQUENCY? might return :POWER:HARMONICS:RESULTS:HAR400:FREQUENCY 24000 indicating that the harmonic frequency is set to 24000.

POWer:HARMonics:RESults:HAR<1-400>:IECMAX? (Query Only)

The IEC Standard specifies harmonics measurements to be computed in time windows, with each time window being nominally 200 ms. This returns the maximum of the RMS magnitude of the harmonic, computed across successive 200 ms time windows within an observation period entered by the user.

NOTE. *The query returns NA, if the current harmonic standard is set to a new standard other than the returned query.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:IECMAX?`

Examples `POWER:HARMONICS:RESULTS:HAR400:IECMAX?` might return `:POWER:HARMONICS:RESULTS:HAR400:IECMAX 1.0` indicating that the maximum value is 1.0 A for the 400th harmonic.

POWer:HARMonics:RESults:HAR<1-400>:LIMit? (Query Only)

The IEC and MIL standards specify a limit for each harmonic magnitude. Returns the limit in absolute units, or as a percentage of the fundamental as specified by the standard. IEC Class C (Table 2) and MIL standards specify the limit as a percentage of the fundamental.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:LIMit?`

Examples `POWER:HARMONICS:RESULTS:HAR3:LIMIT?` might return `:POWER:HARMONICS:RESULTS:HAR3:LIMIT 2.30` indicating that the harmonic magnitude limit for IEC standard for the 3rd harmonic is set to 2.30 A.

POWer:HARMonics:RESults:HAR<1-400>:PHASe? (Query Only)

Returns the phase of the harmonic in degrees. The phase is measured relative to the zero-crossing of the reference waveform. When there is no reference waveform, the phase is relative to the fundamental component.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:PHASe?`

Examples `POWER:HARMONICS:RESULTS:HAR400:PHASE?` might return `:POWER:HARMONICS:RESULTS:HAR400:PHASE 0` indicating that the harmonic phase is set to 0 in degrees.

POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute? (Query Only)

Returns the RMS magnitude of the harmonic in absolute units.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute?`

Examples `POWER:HARMONICS:RESULTS:HAR400:RMS:ABSOLUTE?` might return `:POWER:HARMONICS:RESULTS:HAR400:RMS:ABSOLUTE 1.0` indicating that the RMS magnitude of the harmonic is set to 1.0 A.

POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent? (Query Only)

Returns the RMS magnitude of the harmonic expressed as a percentage of the fundamental.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent?`

Examples `POWER:HARMONICS:RESULTS:HAR400:RMS:PERCENT?` might return `:POWER:HARMONICS:RESULTS:HAR400:RMS:PERCENT 33` indicating that the RMS magnitude of the harmonic is set to 33%.

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit? (Query Only)

Specifies if the IEC Class A higher harmonic limit (and conditions) are met.

NOTE. *The query returns NA if the standard does not specify a limit or the equipment is not class A.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit?`

Returns `PASS`, `FAIL`, or `NA`.

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL? (Query Only)

Specifies if the Normal IEC harmonic limits are met.

NOTE. *The query returns NA if the standard does not specify a limit.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL?`

Returns PASS, FAIL, or NA.

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit? (Query Only)

Specifies if the higher harmonic limit (and conditions) for the 21st and higher order odd harmonics are met.

NOTE. *The query returns NA if the limit does not apply for a specific harmonic.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit?

Returns PASS, FAIL, or NA.

POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL? (Query Only)

Returns the test result for the specified harmonic for the MIL-STD-1399 Section 300A testing standard.

This query is analogous to that for the IEC 61000-3-2 standard POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL? command.

NOTE. *The query returns NA if the standard does not specify a limit for the specific harmonic.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL?

Returns PASS, FAIL, or NA.

POWer:HARMonics:RESults:IEC:FUNDamental? (Query Only)

Returns the IEC fundamental current used in calculating limits.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:FUNDamental?`

Examples `POWER:HARMONICS:RESULTS:IEC:FUNDAMENTAL?` might return `:POWER:HARMONICS:RESULTS:IEC:FUNDAMENTAL 1.0` indicating that the IEC fundamental frequency is set to 1.0 A.

POWer:HARMonics:RESults:IEC:HARM3ALTernate? (Query Only)

Returns the IEC harmonics test result for the 3rd harmonic.

NOTE. *The query returns NA if the limit does not apply.*

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:HARM3ALTernate?`

Returns `PASS`, `FAIL`, or `NA`.

Examples `POWER:HARMONICS:RESULTS:IEC:HARM3ALTERNATE?` might return `POWER:HARMONICS:RESULTS:IEC:HARM3ALTERNATE PASS` indicating the test result.

POWer:HARMonics:RESults:IEC:HARM5ALTernate? (Query Only)

Returns the overall harmonics test result for the 5th harmonic.

NOTE. The query returns NA the harmonic limit does not apply.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:HARM5ALTernate?`

Returns `PASS`, `FAIL`, or `NA`.

Examples `POWER:HARMONICS:RESULTS:IEC:HARM5ALTERNATE?` might return `POWER:HARMONICS:RESULTS:IEC:HARM5ALTERNATE PASS` indicating the test result.

POWer:HARMonics:RESults:IEC:POHC? (Query Only)

Returns the IEC POHC measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POHC?`

Examples `POWER:HARMONICS:RESULTS:IEC:POHC?` might return `:POWER:HARMONICS:RESULTS:IEC:POHC 0.5` indicating that the IEC POHC is set to 0.5 A.

POWer:HARMonics:RESults:IEC:POHL? (Query Only)

Returns the IEC POHL measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POHL?`

Examples `POWER:HARMONICS:RESULTS:IEC:POHL?` might return `:POWER:HARMONICS:RESULTS:IEC:POHL 0.5` indicating that the IEC POHL is set to 0.5 A.

POWer:HARMonics:RESults:IEC:POWer? (Query Only)

Returns the IEC input power that is used to calculate limits.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POWer?`

Examples `POWER:HARMONICS:RESULTS:IEC:POWER?` might return `:POWER:HARMONICS:RESULTS:IEC:POWER 5` indicating that the IEC power is set to 5 W.

POWer:HARMonics:RESults:IEC:POWERFactor? (Query Only)

Returns the IEC power factor measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POWERFactor?`

Examples `POWER:HARMONICS:RESULTS:IEC:POWERFACTOR?` might return `:POWER:HARMONICS:RESULTS:IEC:POWERFACTOR 9.1900E+37` indicating that the IEC power factor is set to 9.1900E+37.

POWer:HARMonics:RESults:PASSFail? (Query Only)

Returns the overall harmonics test result: PASS, FAIL or NA.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:PASSFail?`

Examples `POWER:HARMONICS:RESULTS:PASSFAIL?` might return `:POWER:HARMONICS:RESULTS:PASSFAIL PASS` indicating that the harmonics test passed.

POWer:HARMonics:RESults:RMS? (Query Only)

Returns the root mean square value of the harmonics source waveform.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:RMS?`

Examples `POWER:HARMONICS:RESULTS:RMS?` might return `:POWER:HARMONICS:RESULTS:RMS 1.0` indicating that the harmonics source waveform RMS is set to 1.0.

POWer:HARMonics:RESults:SAVe (No Query Form)

Saves the harmonic results to the specified file in CSV format.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:SAVe <String>`

POWer:HARMonics:RESults:THDF? (Query Only)

Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the fundamental component of the source waveform.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:THDF?`

Examples `POWER:HARMONICS:RESULTS:THDF?` might return `:POWER:HARMONICS:RESULTS:THDF 40` indicating that the THDF is set to 40.

POWer:HARMonics:RESults:THDR? (Query Only)

Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the source waveform.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:HARMonics:RESults:THDR?`

Examples `POWER:HARMONICS:RESULTS:THDR?` might return `:POWER:HARMONICS:RESULTS:THDR 40` indicating that the THDR is set to 40.

POWer:HARMonics:SOURce

This command specifies the source waveform for harmonics tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:SOURce {VOLTage|CURRent}
POWer:HARMonics:SOURce?
```

Arguments `VOLTage` specifies voltage source waveform for harmonic tests.

`CURRent` specifies current source waveform for harmonic tests.

Examples `POWER:HARMONICS:SOURCE VOLTage` sets voltage source for harmonic tests.

`POWER:HARMONICS:SOURCE?` might return `:POWer:HARMonics:SOURCE CURRENT` indicating that the harmonic source is set to current.

POWer:HARMonics:STANDard

This command specifies the standard for harmonics tests.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:HARMonics:STANDard {NONe|IEC|MIL}
POWer:HARMonics:STANDard?
```

Arguments `NONe` sets no standard for harmonic tests.

`IEC` sets IEC 610003-2 standard for harmonic tests.

`MIL` sets MIL1399 standard for harmonic tests.

Examples `POWER:HARMONICS:STANDARD IEC` sets IEC standard for harmonic tests.

`POWER:HARMONICS:STANDARD?` might return `:POWer:HARMonics:STANDard NONe` indicating that no standard is set.

POWer:INDICators

This command specifies the state of the measurement indicators for the power application.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:INDICators {OFF|ON|0|1}
POWer:INDICators?
```

Arguments `OFF` or 0 turns off the measurement indicators.

`ON` or 1 turns on the measurement indicators.

Examples `POWER:INDICATORS 1` turns on the indicator.

`POWER:INDICATORS?` might return `:POWER:INDICators 0` indicating that the indicator is off.

POWer:MODulation:SOUrce

This command specifies the source waveform for modulation tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:MODulation:SOUrce {VOLTage|CURRent}
POWer:MODulation:SOUrce?
```

Arguments `VOLTage` specifies voltage source waveform for modulation tests.

`CURRent` specifies current source waveform for modulation tests.

Examples

`POWER:MODULATION:SOURCE CURRent` sets the modulation source to Current.

`POWER:MODULATION:SOURCE?` might return `:POWER:MODULATION:SOURCE VOLT` indicating that the modulation source is set to Voltage.

POWer:MODulation:TYPe

This command specifies the modulation type.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:MODulation:TYPe
{PWIdth|NWIdth|PERIod|PDUty|NDUty|FREQuency}

POWer:MODulation:TYPe?
```

Arguments

`PWIdth` (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on all the cycles in the waveform or gated region.

`NWIdth` (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on all the cycles in the waveform or gated region.

`PERIod` is the time required to complete the first cycle in a waveform or the gated region. The time is measured between the mid reference (default being 50%) amplitude points of the waveform.

`PDUty` (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on all the cycles in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

`NDUty` (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on all the cycles in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

`FREQuency` measures all the cycles in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

Frequency = 1 / Period

Examples `POWER:MODULATION:TYPE NWIDTH` sets the modulation type to Negative Width.

`POWER:MODULATION:TYPE?` might return `:POWER:MODULATION:TYPE PWI` indicating that the modulation type is set to Positive Width.

POWer:QUALity:APPpwr? (Query Only)

Returns the apparent power measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:APPpwr?`

Examples `POWER:QUALITY:APPPWR?` might return `:POWER:QUALITY:APPpwr 100` indicating that the apparent power value is set to 100 VA.

POWer:QUALity:DISplay:APPpwr

This command specifies the display state for the apparent power readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:QUALity:DISplay:APPpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:APPpwr?
```

Arguments `OFF` or 0 turns off the apparent power display.

`ON` or 1 turns on the apparent power display.

Examples `POWER:QUALITY:DISPLAY:APPPWR 1` turns on the apparent power display.

`POWER:QUALITY:DISPLAY:APPPWR?` might return `:POWER:QUALITY:DISPLAY:APPPWR 0` indicating that the apparent power display is off.

POWer:QUALity:DISplay:FREQuency

This command specifies the display state for the frequency readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:QUALity:DISplay:FREQuency {OFF|ON|0|1}
POWer:QUALity:DISplay:FREQuency?
```

Arguments `OFF` or 0 turns off the frequency display.

`ON` or 1 turns on the frequency display.

Examples `POWER:QUALITY:DISPLAY:FREQUENCY 1` turns on the frequency readout display.

`POWER:QUALITY:DISPLAY:FREQUENCY?` might return `:POWER:QUALITY:DISPLAY:FREQUENCY 0` indicating that the frequency readout display is off.

POWer:QUALity:DISplay:ICRESTfactor

This command specifies the display state for the current crest factor readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:QUALity:DISplay:ICRESTfactor {OFF|ON|0|1}
POWer:QUALity:DISplay:ICRESTfactor?
```

Arguments `OFF` or 0 turns off the current crest factor display.

`ON` or 1 turns on the current crest factor display.

Examples `POWER:QUALITY:DISPLAY:ICRESTFACTOR 1` turns on the current crest factor display.

POWER:QUALITY:DISPLAY:ICRESTFACTOR? might return :POWER:QUALITY:DISPLAY:ICRESTFACTOR 0 indicating that the current crest factor display is off.

POWer:QUALity:DISplay:IRMS

This command specifies the display state for the rms current readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:QUALity:DISplay:IRMS {OFF|ON|0|1}
POWer:QUALity:DISplay:IRMS?
```

Arguments OFF or 0 turns off the rms current display.

ON or 1 turns on the rms current display.

Examples POWER:QUALITY:DISPLAY:IRMS 1 turns on the rms current display.

POWER:QUALITY:DISPLAY:IRMS? might return :POWER:QUALITY:DISPLAY:IRMS 0 indicating that the rms current display is off.

POWer:QUALity:DISplay:PHASEangle

This command specifies the display state for the phase angle readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:QUALity:DISplay:PHASEangle {OFF|ON|0|1}
POWer:QUALity:DISplay:PHASEangle?
```

Arguments

`OFF` or 0 turns off the phase angle display.

`ON` or 1 turns on the phase angle display.

Examples

`POWER:QUALITY:DISPLAY:PHASEANGLE 1` turns on the phase angle display.

`POWER:QUALITY:DISPLAY:PHASEANGLE?` might return `:POWER:QUALITY:DISPLAY:PHASEANGLE 0` indicating that the phase angle display is off.

POWer:QUALity:DISplay:POWERFACtor

This command specifies the display state for the power factor readout.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:QUALity:DISplay:POWERFACtor {OFF|ON|0|1}
POWer:QUALity:DISplay:POWERFACtor?
```

Arguments

`OFF` or 0 turns off the power factor display.

`ON` or 1 turns on the power factor display.

Examples

`POWER:QUALITY:DISPLAY:POWERFACTOR 1` turns on the power factor display.

`POWER:QUALITY:DISPLAY:POWERFACTOR?` might return `:POWER:QUALITY:DISPLAY:POWERFACTOR 0` indicating that the power factor display is off.

POWer:QUALity:DISplay:REACTpwr

This command specifies the display state for the reactor power readout.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:QUALity:DISplay:REACTpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:REACTpwr?
```

Arguments

OFF or 0 turns off the reactor power display.

ON or 1 turns on the reactor power display.

Examples

POWER:QUALITY:DISPLAY:REACTPWR 1 turns on the reactor power display.

POWER:QUALITY:DISPLAY:REACTPWR? might return :POWER:QUALITY:DISPLAY:REACTPWR 0 indicating that the reactor power display is off.

POWer:QUALity:DISplay:TRUEpwr

This command specifies the display state for the true power readout.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:QUALity:DISplay:TRUEpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:TRUEpwr?
```

Arguments

OFF or 0 turns off the true power display.

ON or 1 turns on the true power display.

Examples

POWER:QUALITY:DISPLAY:TRUEPWR 1 turns on the true power display.

POWER:QUALITY:DISPLAY:TRUEPWR? might return :POWER:QUALITY:DISPLAY:TRUEPWR 0 indicating that the true power display is off.

POWer:QUALity:DISplay:VCRESTfactor

This command specifies the display state for the voltage crest factor readout.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:QUALity:DISplay:VCRESTfactor {OFF|ON|0|1}
POWer:QUALity:DISplay:VCRESTfactor?
```

Arguments `OFF` or 0 turns off the voltage crest factor display.

`ON` or 1 turns on the voltage crest factor display.

Examples `POWER:QUALITY:DISPLAY:VCRESTFACTOR 1` turns on the voltage crest factor display.

`POWER:QUALITY:DISPLAY:VCRESTFACTOR?` might return `:POWER:QUALITY:DISPLAY:VCRESTFACTOR 0` indicating that the voltage crest factor display is off.

POWer:QUALity:DISplay:VRMS

This command specifies the display state for the rms voltage readout.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:QUALity:DISplay:VRMS {OFF|ON|0|1}
POWer:QUALity:DISplay:VRMS?
```

Arguments `OFF` or 0 turns off the rms voltage display.

`ON` or 1 turns on the rms voltage display.

Examples `POWER:QUALITY:DISPLAY:VRMS0` turns off the rms voltage display.

`POWER:QUALITY:DISPLAY:VRMS?` might return `:POWER:QUALITY:DISPLAY:VRMS 1` indicating that the rms voltage display is on.

POWer:QUALity:FREQREFerence

This command specifies the power quality frequency reference.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:QUALity:FREQREFerence {VOLTage|CURRent}
POWer:QUALity:FREQREFerence?
```

Arguments `VOLTage` sets voltage as the power quality frequency reference source.

`CURRent` sets current as the power quality frequency reference source.

Examples `POWER:QUALITY:FREQREFERENCE CURRent` sets current as the power quality frequency reference source.

`POWER:QUALITY:FREQREFERENCE?` might return `:POWER:QUALITY:FREQREFERENCE VOLTAGE` indicating that the power quality frequency reference source is set to Voltage.

POWer:QUALity:FREQuency? (Query Only)

Returns the frequency measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:QUALity:FREQuency?
```

Examples `POWER:QUALITY:FREQUENCY?` might return `:POWER:QUALITY:FREQUENCY 60` indicating that the frequency is set to 60 Hz.

POWer:QUALity:ICRESTfactor? (Query Only)

Returns the current crest factor measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:ICRESTfactor?`

Examples `POWER:QUALITY:ICRESTFACTOR?` might return `:POWER:QUALITY:ICRESTfactor 1.4` indicating that the current crest factor value is set to 1.4.

POWer:QUALity:IRMS? (Query Only)

Returns the RMS current measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:IRMS?`

Examples `POWER:QUALITY:IRMS?` might return `:POWER:QUALITY:IRMS 1.00` indicating that the RMS current value is set to 1.00 A.

POWer:QUALity:PHASEangle? (Query Only)

Returns the phase angle measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:PHASEangle?`

Examples `POWER:QUALITY:PHASEANGLE?` might return `:POWER:QUALITY:PHASEANGLE 0` indicating that the phase angle is set to 0.

POWer:QUALity:POWERFACtor? (Query Only)

Returns the power factor measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:POWERFACtor?`

Examples `POWER:QUALITY:POWERFACTOR?` might return `:POWER:QUALITY:POWERFACTOR 1.0` indicating that the power factor is set to 1.0.

POWer:QUALity:REACTpwr? (Query Only)

Returns the reactive power measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:REACTpwr?`

Examples `POWER:QUALITY:REACTPWR?` might return `:POWER:QUALITY:REACTpwr 100` indicating that the reactor power value is set to 100 VAR.

POWer:QUALity:TRUEpwr? (Query Only)

Returns the true power measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:TRUEpwr?`

Examples `POWER:QUALITY:TRUEPWR?` might return `:POWER:QUALITY:TRUEpwr 1000 W` indicating that the true power value is set to 1000 W.

POWer:QUALity:VCRESTfactor? (Query Only)

This query returns the measurement for the voltage crest factor.

Conditions This command requires the optional power analysis application module DPO4PWR

Group Power

Syntax `POWer:QUALity:VCRESTfactor?`

Related Commands POWer:QUALity:DISplay:ICRESTfactor,

APPLication:TYPe

POWer:TYPe

Returns Floating point number.

Examples `POWer:QUALity:VCRESTfactor?` might return 1.4, indicating that the crest factor is 1.4.

`POWer:QUALity:VCRESTfactor?` might return 9.9100E+37, indicating that the voltage crest factor measurement has not been computed.

POWer:QUALity:VRMS? (Query Only)

Returns the RMS voltage measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:QUALity:VRMS?`

Examples `POWER:QUALITY:VRMS?` might return `:POWER:QUALITY:VRMS 115` indicating that the rms voltage value is set to 115 V.

POWer:REFLevel:ABSolute (No Query Form)

This command sets the reference levels to be used for power measurements their default unit values.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:REFLevel:ABSolute {SETTODEFaults}`

Arguments `SETTODEFaults` sets the reference levels to their default values.

POWer:REFLevel:ABSolute:HIGH

This command specifies the top reference level to be used for power measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:REFLevel:ABSolute:HIGH <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:HIGH?
```

Arguments `<NR3>` is a floating point number that specifies the absolute high value in volts. Default value is 0.0E+0

Examples

`POWER:REFLEVEL:ABSOLUTE:HIGH 2` sets the absolute high value to 2.000.

`POWER:REFLEVEL:ABSOLUTE:HIGH?` might return `POWER:REFLEVEL:ABSOLUTE:HIGH 2` indicating that the absolute high value is set to 2 V.

POWer:REFLevel:ABSolute:LOW

This command specifies the low reference level to be used for power measurements.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:REFLevel:ABSolute:LOW <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:LOW?
```

Arguments

`<NR3>` is a floating point number that specifies the absolute low value in volts. Default value is 0.0E+0.

Examples

`POWER:REFLEVEL:ABSOLUTE:LOW 1.0` sets the absolute high value to 1.0000.

`POWER:REFLEVEL:ABSOLUTE:LOW?` might return `POWER:REFLEVEL:ABSOLUTE:LOW 1.0000` indicating that the absolute low value is set to 1 V.

POWer:REFLevel:ABSolute:MID<x>

This command specifies the mid reference level to be used for power measurements. MID1 is used on the user's voltage waveform. MID2 is used on the user's current waveform. MID3 is used on the user's gate waveform. (MID3 is specific to the power application.)

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:REFLevel:ABSolute:MID<x> <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:MID<x>?
```

Arguments

<NR3> is a floating point number that specifies the absolute mid reference value.

Examples

POWER:REFLEVEL:ABSOLUTE:MID1 1 sets the mid reference voltage to 1V.

POWER:REFLEVEL:ABSOLUTE:MID1? might return POWER:REFLEVEL:ABSOLUTE:MID1 0.0E+0 indicating that the absolute reference voltage level is set to 0.0E+0 V.

POWer:REFLevel:HYSTeresis

This command specifies the reference level hysteresis value to be used for power measurements.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:REFLevel:HYSTeresis <NR3>
POWer:REFLevel:HYSTeresis?
```

Arguments

<NR3> is a floating point number that specifies the hysteresis value.

Examples

POWER:REFLEVEL:HYSTERESIS 30 sets the hysteresis value to 30.

POWER:REFLEVEL:HYSTERESIS? might return POWER:REFLEVEL:HYSTERESIS 10 indicating that the hysteresis value is set to 10.

POWer:REFLevel:METHod

This command specifies the method used to calculate the 0% and 100% reference level to be used for power measurements.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:REFLevel:METHod {ABSolute|PERCent}
POWer:REFLevel:METHod?
```

Arguments `ABSolute` specifies that the reference levels are set explicitly using the `MEASUrement:REFLevel:ABSolute` commands. This method is useful when precise values are required.

`PERCent` specifies that the reference levels are calculated as a percent of the signal amplitude. The percentages are defined using the `MEASUrement:REFLevel:PERCent` commands.

Examples `POWER:REFLEVEL:METHOD ABSOLUTE` specifies that explicit user-defined values are used for the reference levels.

`POWER:REFLEVEL:METHOD?` might return `POWER:REFLEVEL:METHOD PERCENT` indicating that the reference level units used are calculated as a percent relative to HIGH and LOW.

POWer:REFLevel:PERCent (No Query Form)

This command sets the reference levels to be used for power measurements to the default percentage values.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:REFLevel:PERCent <SETTODEFaults>
```

Arguments `SETTODEFaults` sets the reference levels to their default percentage values.

POWer:REFLevel:PERCent:HIGH

This command specifies the top reference percent level to be used for power measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:REFLevel:PERCent:HIGH <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:HIGH?
```

Arguments <NR3> is a floating point number that specifies the high value in percent.

Examples POWER:REFLEVEL:PERCENT:HIGH 95 sets the high reference level to 95% of the signal amplitude.

POWER:REFLEVEL:PERCENT:HIGH? might return :POWER:REFLEVEL:PERCENT:HIGH 90 indicating that the percentage high reference level is set to 90% of the signal amplitude.

POWer:REFLevel:PERCent:LOW

This command specifies the low reference percent level to be used for power measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:REFLevel:PERCent:LOW <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:LOW?
```

Arguments <NR3> is a floating point number that specifies the low value in percentage.

Examples POWER:REFLEVEL:PERCENT:LOW 15 sets the low reference level to 15% of the signal amplitude.

POWER:REFLEVEL:PERCENT:LOW? might return :POWER:REFLEVEL:PERCENT:LOW 10 indicating that the percentage low reference level is set to 90% of the signal amplitude.

POWer:REFLevel:PERCent:MID<x>

This command specifies one of 3 mid reference percentage levels to be used for power measurements. MID1 is used on the user's voltage waveform. MID2 is used on the user's current waveform. MID3 is used on the user's gate waveform. (MID3 is specific to power applications.)

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:REFLevel:PERCent:MID<x> <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:MID<x>?
```

Arguments <NR3> is a floating point number that specifies the mid value in percentage.

Examples POWER:REFLEVEL:PERCENT:MID1 25 sets the mid reference voltage to 25%.

POWER:REFLEVEL:PERCENT:MID1? might return POWER:REFLEVEL:PERCENT:MID1 50.0000 indicating that the mid reference voltage level is set to 50%.

POWer:RIPPle (No Query Form)

This command performs a vertical autoset for ripple measurements or sets the vertical offset to 0.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:RIPPle {VERTAUTOset|VERTDEFault}
```

Arguments VERTAUTOset automatically scales the source waveform to optimize ripple measurements.

VERTDEFault sets the vertical offset of the source waveform to 0 volts (for voltage source) or 0 amperes (for current source).

POWer:RIPPle:RESults:AMPLitude? (Query Only)

Returns the peak-to-peak ripple measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:RIPPle:RESults:AMPLitude?`

Examples `POWER:RIPPLE:RESULTS:AMPLITUDE?` might return `:POWER:RIPPLE:RESULTS:AMPLITUDE 1` indicating that the peak-to-peak amplitude is set to 1 V.

POWer:RIPPle:RESults:MAX? (Query Only)

Returns the maximum of the peak-to-peak ripple measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:RIPPle:RESults:MAX?`

Examples `POWER:RIPPLE:RESULTS:MAX?` might return `:POWER:RIPPLE:RESULTS:MAX 1.1` indicating that the maximum peak-to-peak amplitude is set to 1.1 V.

POWer:RIPPle:RESults:MEAN? (Query Only)

Returns the mean of the peak-to-peak ripple measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:RIPPle:RESults:MEAN?`

Examples `POWER:RIPPLE:RESULTS:MEAN?` might return `:POWER:RIPPLE:RESULTS:MEAN 1.0` indicating that the mean peak-to-peak amplitude is set to 1.0 V.

POWer:RIPPle:RESults:MIN? (Query Only)

Returns the minimum of the peak-to-peak ripple measurement.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:RIPPle:RESults:MIN?`

Examples `POWER:RIPPLE:RESULTS:MIN?` might return `:POWER:RIPPLE:RESULTS:MIN 0.9` indicating that the minimum peak-to-peak amplitude is set to 0.9 V.

POWer:RIPPle:RESults:STDdev? (Query Only)

Returns the standard deviation of the peak-to-peak ripple measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:RIPPle:RESults:STDdev?`

Examples `POWER:RIPPLE:RESULTS:STDDEV?` might return `:POWER:RIPPLE:RESULTS:STDDEV 0.14` indicating that the standard deviation of the peak-to-peak amplitude is set to 0.14.

POWer:RIPPle:SOUrce

This command specifies the source waveform for ripple tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:RIPPle:SOUrce {VOLTage|CURRent}
```

Arguments `VOLTage` specifies voltage source waveform for ripple tests.

`CURRent` specifies current source waveform for ripple tests.

Examples `POWER:RIPPLE:SOURCE CURRent` sets the ripple source to Current.

`POWER:RIPPLE:SOURCE?` might return `:POWER:RIPPLE:SOURCE VOLT` indicating that the ripple source is set to Voltage.

POWer:SOA:LINear:XMAX

This command specifies the user XMAX value for use in linear SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:LINear:XMAX <NR3>
POWer:SOA:LINear:XMAX?
```

Arguments `<NR3>` is a floating point number that specifies the XMAX value used for linear SOA calculations.

Examples

`POWER:SOA:LINEAR:XMAX 700` sets the XMAX value to 700.0000.

`POWER:SOA:LINEAR:XMAX ?` might return `:POWER:SOA:LINear:XMAX 500.0000` indicating that the XMAX value for linear plot type is set to 500.0000.

POWer:SOA:LINear:XMIN

This command specifies the user XMIN value for use in linear SOA calculations.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:LINear:XMIN <NR3>
POWer:SOA:LINear:XMIN?
```

Arguments

`<NR3>` is a floating point number that specifies the XMIN value used for linear SOA calculations.

Examples

`POWER:SOA:LINEAR:XMIN 2` sets the XMIN value to 2.0000.

`POWER:SOA:LINEAR:XMIN ?` might return `:POWER:SOA:LINear:XMIN 0.0E+0` indicating that the XMIN value for linear plot type is set to 0.0E+0.

POWer:SOA:LINear:YMAX

This command specifies the user YMAX value for use in linear SOA calculations.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:LINear:YMAX <NR3>
POWer:SOA:LINear:YMAX?
```

Arguments

`<NR3>` is a floating point number that specifies the YMAX value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:YMAX 700` sets the YMAX value to 700.0000.

`POWER:SOA:LINEAR:YMAX ?` might return `:POWER:SOA:LINear:YMAX 50.0000` indicating that the YMAX value for linear plot type is set to 50.0000.

POWer:SOA:LINear:YMIN

This command specifies the user YMIN value for use in linear SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:LINear:YMIN <NR3>
POWer:SOA:LINear:YMIN?
```

Arguments `<NR3>` is a floating point number that specifies the YMIN value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:YMIN 2` sets the YMIN value to 2.0000.

`POWER:SOA:LINEAR:YMIN ?` might return `:POWER:SOA:LINear:YMIN 0.0E+0` indicating that the YMIN value for linear plot type is set to 0.0E+0.

POWer:SOA:LOG:XMAX

This command specifies the user XMAX value for use in Log SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:LOG:XMAX <NR3>
POWer:SOA:LOG:XMAX?
```

Arguments `<NR3>` is a floating point number that specifies the XMAX value used for log SOA calculations.

Examples `POWER:SOA:LOG:XMAX 1` sets the XMAX value to 1.0000.

`POWER:SOA:LOG:XMAX ?` might return `:POWER:SOA:LOG:XMAX 1.0000E+3` indicating that the XMAX value for log plot type is set to 1.0000E+3.

POWer:SOA:LOG:XMIN

This command specifies the user XMIN value for use in Log SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:LOG:XMIN <NR3>
POWer:SOA:LOG:XMIN?
```

Arguments `<NR3>` is a floating point number that specifies the XMIN value used for log SOA calculations.

Examples `POWER:SOA:LOG:XMIN 2` sets the XMIN value to 2.0000.

`POWER:SOA:LOG:XMIN ?` might return `:POWER:SOA:LOG:XMIN 100.0000E-3` indicating that the XMIN value for log plot type is set to 100.0000E-3.

POWer:SOA:LOG:YMAX

This command specifies the user YMAX value for use in Log SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:LOG:YMAX <NR3>
POWer:SOA:LOG:YMAX?
```

Arguments `<NR3>` is a floating point number that specifies the YMAX value used for log SOA calculations.

Examples

`POWER:SOA:LOG:YMAX 10` sets the YMAX value to 10.0000.

`POWER:SOA:LOG:YMAX ?` might return `:POWER:SOA:LOG:YMAX 100.0000` indicating that the YMAX value for log plot type is set to 100.0000.

POWer:SOA:LOG:YMIN

This command specifies the user YMIN value for use in Log SOA calculations.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:LOG:YMIN <NR3>
POWer:SOA:LOG:YMIN?
```

Arguments

`<NR3>` is a floating point number that specifies the YMIN value used for log SOA calculations.

Examples

`POWER:SOA:LOG:YMIN 1` sets the YMIN value to 1.0000.

`POWER:SOA:LOG:YMIN ?` might return `:POWER:SOA:LOG:YMIN 100.0000E-3` indicating that the YMIN value for log plot type is set to 100.0000E-3.

POWer:SOA:MASK:DEFine

This command specifies the X (volts) and Y (Amps) coordinates of the current SOA mask. You can specify the number of points from 2 to 10, minimum being 2. Successive X values must be ≥ the preceding X values. The number of XY points sent determines the value of NR_PT.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:MASK:DEFine <NR3>
POWer:SOA:MASK:DEFine?
```

Arguments <NR3> is a floating point number that represents the SOA mask coordinates.

Examples POWER:SOA:MASK:DEFINE 10 specifies the SOA mask coordinates as 0.0E+0,0.0E+0,0.0E+0,0.0E+0,0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000, 300.0000,2.4000,300.0000,2.2000,300.0000,1.9000,300.0000,1.3000, 300.0000,0.0E+0.

POWER:SOA:MASK:DEFINE ? might return :POWER:SOA:MASK:DEFINE 0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000,300.0000,0.0E+0 indicating that the SOA mask coordinates are set to 0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000,300.0000,0.0E+0.

POWer:SOA:MASK:MAXAmps

This command specifies the maximum current applied to SOA mask testing.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SOA:MASK:MAXAmps <NR3>
POWer:SOA:MASK:MAXAmps?
```

Arguments <NR3> is a floating point number that specifies the maximum current applied to SOA mask testing.

Examples POWER:SOA:MASK:MAXAMPS 40 sets the SOA mask testing current to 40 A.

POWER:SOA:MASK:MAXAMPS ? might return :POWER:SOA:MASK:MAXAMPS 30.0000 indicating that the SOA mask testing maximum current is set to 30 A.

POWer:SOA:MASK:MAXVolts

This command specifies the maximum voltage applied to SOA mask testing.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:MASK:MAXVolts <NR3>
POWer:SOA:MASK:MAXVolts?
```

Arguments

<NR3> is a floating point number that specifies the maximum voltage applied to SOA mask testing.

Examples

POWER:SOA:MASK:MAXVOLTS 200 sets the SOA mask testing voltage to 200 V.

POWER:SOA:MASK:MAXVOLTS ? might return :POWER:SOA:MASK:MAXVOLTS 300.0000 indicating that the SOA mask testing maximum voltage is set to 300 V.

POWer:SOA:MASK:MAXWatts

This command specifies the maximum power applied to SOA mask testing.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:MASK:MAXWatts <NR3>
POWer:SOA:MASK:MAXWatts?
```

Arguments

<NR3> is a floating point number that specifies the maximum power applied to SOA mask testing.

Examples

POWER:SOA:MASK:MAXWATTS 1000 sets the SOA mask testing power to 1.0000E+3 W.

POWER:SOA:MASK:MAXWATTS ? might return :POWER:SOA:MASK:MAXWATTS 750.0000 indicating that the SOA mask testing maximum power is set to 750 W.

POWer:SOA:MASK:NR_Pt? (Query Only)

Returns the number of mask points defined.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax `POWer:SOA:MASK:NR_Pt?`

Examples `POWER:SOA:MASK:NR_PT?` might return `:POWER:SOA:MASK:NR_PT 4` indicating that the number of mask points defined is 4.

POWer:SOA:MASK:STATE

This command specifies the state of the mask for SOA calculations.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SOA:MASK:STATE {OFF|LIMITS|POINTS}
POWer:SOA:MASK:STATE?
```

Arguments `OFF` disables mask testing.

`LIMITS` enables mask testing based on limits specified using POWer:SOA:MASK:MAXAmps, POWer:SOA:MASK:MAXVolts, and POWer:SOA:MASK:MAXWatts commands

`POINTS` enables mask testing based on masks points defined.

Examples `POWER:SOA:MASK:STATEPOINTS` enables mask testing power based on points defined.

`POWER:SOA:MASK:STATE?` might return `:POWER:SOA:MASK:STATE LIMITS` indicating that the mask testing is enabled based on limits.

POWer:SOA:MASK:STOPOnviol

This command specifies the enabled state of the mask stop on violation condition.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SOA:MASK:STOPOnviol {OFF|ON|0|1}
POWer:SOA:MASK:STOPOnviol?
```

Arguments

OFF or 0 enables mask stop on violations.

ON or 1 disables mask stop on violations.

Examples

POWER:SOA:MASK:STOPONVIOL 1 disables the state of the mask stop on violation condition.

POWER:SOA:MASK:STOPONVIOL ? might return :POWER:SOA:MASK:STOPONVIOL 0 indicating that the mask stop is enabled.

POWer:SOA:PLOTTYPe

This command specifies the Safe Operating Area (SOA) plot type.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SOA:PLOTTYPe {LOG|LINear}
POWer:SOA:PLOTTYPe?
```

Arguments

LOG for logarithmic SOA plot type.

LINear for linear SOA plot type.

Examples

POWER:SOA:PLOTTYPE LINear sets the SOA plot type to Linear.

POWER:SOA:PLOTTYPE ? might return :POWER:SOA:PLOTTYPE LOG indicating that the SOA plot type is set to Log.

POWer:SOA:RESult:FAILures:QTY? (Query Only)

Returns the number of failures in the test.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SOA:RESult:FAILures:QTY?`

Examples `POWER:SOA:RESULT:FAILURES:QTY?` might return `:POWER:SOA:RESULT:FAILURES 0` indicating that the number of failures is 0.

POWer:SOA:RESult:NUMACq? (Query Only)

Returns the number of acquisitions in the test.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SOA:RESult:NUMACq?`

Examples `POWER:SOA:RESULT:NUMACQ?` might return `:POWER:SOA:RESULT:NUMACQ 10` indicating that the number of acquisitions is 10.

POWer:SOA:RESult:STATE? (Query Only)

Returns the pass/fail state of the SOA test.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SOA:RESult:STATE?`

Returns `PASS` or `FAIL`.

Examples `POWER:SOA:RESULT:STATE?` might return `:POWER:SOA:MASK:STATE PASS` indicating that the SOA test state is PASS.

POWer:STATIstics (No Query Form)

Clears all the accumulated statistics of all measurements. Performs the same function as the MEASUrement:STATIstics command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:STATIstics {RESET}
```

Arguments RESET clears the measurement statistics.

POWer:STATIstics:MODe

Enables or disables the display of the measurement statistics. Performs the same function as the MEASUrement:STATIstics:MODe command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:STATIstics:MODe {OFF|ALL}
POWer:STATIstics:MODe?
```

Arguments ALL turns on measurement statistics display.

OFF turns all measurements statistics off.

Examples POWER:STATISTICS:MODE OFF turns measurements statistics display off.

POWER:STATISTICS:MODE? might return :MEASUREMENT:STATISTICS:MODE ALL indicating that measurement statistics are turned on and all statistics are being displayed for each measurement.

POWer:STATIstics:WEIghting

Sets the number of samples which are included for the statistics computations for mean and the standard deviation. Performs the same function as the MEASUrement:STATIstics:WEIghting command.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:STATIstics:WEIghting <NR1>;Ranges {L,2,1000}
POWer:STATIstics:WEIghting?
```

Arguments <NR1> is the number of samples used for the mean and standard deviation statistical accumulations

Examples POWER:STATISTICS:WEIGHTING 4 sets statistical weighting to four samples.

POWER:STATISTICS:WEIGHTING ? might return :POWER:STATISTICS:WEIGHTING 4 indicating that statistics weighting is currently set to 4 samples.

POWer:SWLoss:CONDCALCmethod

This command specifies the power application switching loss conduction calculation method.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SWLoss:CONDCALCmethod {VOLTage|RDSon|VCEsat}
POWer:SWLoss:CONDCALCmethod?
```

Arguments VOLTage sets voltage as the conduction calculation method.

RDSon sets RDSon as the conduction calculation method.

VCEsat sets VCEsat as the conduction calculation method.

Examples

`POWER:SWLOSS:CONDCALCMETHOD RDSon` sets the conduction calculation method to RDSon.

`POWER:SWLOSS:CONDCALCMETHOD ?` might return `:POWER:SWLOSS:CONDCALCMETHOD VOLT` indicating that the conduction calculation method is set to Voltage.

POWer:SWLoss:CONDuction:ENERGY:MAX? (Query Only)

Returns the maximum conduction energy for switching loss calculation.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

`POWer:SWLoss:CONDuction:ENERGY:MAX?`

Examples

`POWER:SWLOSS:CONDUCTION:ENERGY:MAX?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MAX 1` indicating that the maximum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:ENERGY:MEAN? (Query Only)

Returns the mean conduction energy in the conduction period for the switching loss calculation.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

`POWer:SWLoss:CONDuction:ENERGY:MEAN?`

Examples

`POWER:SWLOSS:CONDUCTION:ENERGY:MEAN?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MEAN 1` indicating that the mean conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:ENERGY:MIN? (Query Only)

Returns the minimum conduction energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:CONDuction:ENERGY:MIN?`

Examples `POWER:SWLOSS:CONDUCTION:ENERGY:MIN?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MIN 1` indicating that the minimum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:POWer:MAX? (Query Only)

Returns the maximum conduction power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWer:MAX?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MAX?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MAX 1` indicating that the maximum conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:CONDuction:POWer:MEAN? (Query Only)

Returns the mean conduction power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWer:MEAN?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MEAN?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MEAN 1` indicating that the mean conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:CONDuction:POWer:MIN? (Query Only)

Returns the minimum conduction power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWer:MIN?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MIN?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MIN 1` indicating that the minimum conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:DISplay

This command specifies the display selection for switching loss results: All measurements, energy loss measurements or power loss measurements.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SWLoss:DISplay {ALL|ENERGYLoss|POWERLoss}
POWer:SWLoss:DISplay?
```

Arguments `ALL` displays both energy and power loss measurements in the results.

`ENERGYLoss` displays only energy loss measurements in the results.

`POWERLoss` displays only power loss measurements in the results.

Examples

`POWER:SWLOSS:DISPLAY ENERGYLoss` displays only energy loss measurements in the results.

`POWER:SWLOSS:DISPLAY ?` might return `:POWER:SWLOSS:DISPLAY ALL` indicating that the results displays both energy and power loss measurements.

POWer:SWLoss:GATe:POLarity

This command specifies the switching loss gate polarity.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SWLoss:GATe:POLarity {FALL|RISe}
POWer:SWLoss:GATe:POLarity?
```

Arguments

`FALL` sets falling edge as the switching loss gate polarity.

`RISe` sets rising edge as the switching loss gate polarity.

Examples

`POWER:SWLOSS:GATE:POLARITY FALL` sets the gate polarity to Fall.

`POWER:SWLOSS:GATE:POLARITY ?` might return `:POWER:SWLOSS:GATE:POLARITY RISE` indicating that the gate polarity is set to Rise.

POWer:SWLoss:GATe:TURNON

This command specifies the gate turn on level for switching loss power measurements.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SWLoss:GATe:TURNON <NR3>
POWer:SWLoss:GATe:TURNON?
```

Examples

`POWER:SWLOSS:GATE:TURNON 3.5` sets the gate turn on level to 3.5000.

`POWER:SWLOSS:GATE:TURNON ?` might return `:POWER:SWLOSS:GATE:TURNON 1.5` indicating that the gating turn on level is set to 1.5.

POWer:SWLoss:NUMCYCles? (Query Only)

Returns the number of cycles counted for the switching loss calculation.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

`POWer:SWLoss:NUMCYCles? <NR3>`

Examples

`POWER:SWLOSS:NUMCYCLES?` might return the number of cycles for switching loss calculation, if the POWer:TYPe is set to Switching Loss (`POWer:TYPe:SWITCHingLoss`). If the query times out with the Switching Loss power enabled, it indicates the possibility of incorrect settings and might return the following:

*ESR?
20
ALLEV?
2202,"Measurement error, No period found;
:power:swloss:numcycles?",410,"Query INTERRUPTED"

POWer:SWLoss:RDSon

This command specifies the user RDSON value for use in switching loss calculations when the conduction calculation method is RDSON.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

`POWer:SWLoss:RDSon <NR3>`
`POWer:SWLoss:RDSon?`

Arguments <NR3> is a floating point number that specifies the RDSON switching loss calculation.

Examples POWER:SWLOSS:RDSON 30 sets the RDSon value to 30.0000.

POWER:SWLOSS:RDSON ? might return :POWER:SWLOSS:RDSon 20.0000E-3 indicating that the RDSon value is set to 20.0000E-3.

POWer:SWLoss:REFLevel:ABSolute:GATEMid

This command specifies the mid voltage reference level used in switching loss power measurements in volts.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SWLoss:REFLevel:ABSolute:GATEMid <NR3>
POWer:SWLoss:REFLevel:ABSolute:GATEMid?
```

Arguments <NR3> is a floating point number that specifies the mid voltage reference level in volts.

Examples POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID 100 sets the absolute gate mid reference voltage to 100.0000 V.

POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID ? might return :POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID 50.0000 indicating that the gate mid reference voltage is set to 50.0000 V.

POWer:SWLoss:REFLevel:ABSolute:LOWCurrent

This command specifies the low current reference level used in switching loss power measurements in amperes.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent <NR3>
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent?
```

Arguments

<NR3> is a floating point number that specifies the low voltage current level in amperes.

Examples

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT 2.8 sets the absolute reference low current to 2.8000 A.

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT ? might return :POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT 5.0000 indicating that the absolute reference low current is set to 5.0000 A.

POWer:SWLoss:REFLevel:ABSolute:LOWVoltage

This command specifies the low voltage reference level used in switching loss power measurements in volts.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage <NR3>
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage?
```

Arguments

<NR3> is a floating point number that specifies the low voltage reference level in volts.

Examples

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE 2.5 sets the absolute reference low voltage to 2.5000 V.

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE ? might return :POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE 5.0000 indicating that the absolute reference low voltage is set to 5.0000 V.

POWer:SWLoss:REFLevel:PERCent:GATEMid

This command specifies the mid voltage reference level used in switching loss power measurements in percent.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SWLoss:REFLevel:PERCent:GATEMid <NR3>
POWer:SWLoss:REFLevel:PERCent:GATEMid?
```

Arguments <NR3> is a floating point number that specifies the mid voltage reference level in volts.

Examples `POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID 30` sets the gate mid reference voltage to 30%.

`POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID ?` might return `:POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID 50.0000` indicating that the gate mid reference voltage is set to 50%.

POWer:SWLoss:REFLevel:PERCent:LOWCurrent

This command specifies the low current reference level used in switching loss power measurements in percent.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SWLoss:REFLevel:PERCent:LOWCurrent <NR3>
POWer:SWLoss:REFLevel:PERCent:LOWCurrent?
```

Arguments <NR3> is a floating point number that specifies the low voltage reference level percent.

Examples `POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT 15` sets the reference low current to 15%.

`POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT ?` might return `:POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT 5.0000` indicating that the reference low current is set to 5%.

POWer:SWLoss:REFLevel:PERCent:LOWVoltage

This command specifies the low voltage reference level used in switching loss power measurements in percent.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SWLoss:REFLevel:PERCent:LOWVoltage <NR3>
POWer:SWLoss:REFLevel:PERCent:LOWVoltage?
```

Arguments <NR3> is a floating point number that specifies the low voltage reference level in percent.

Examples POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE 10 sets the reference low voltage to 10%.

POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE ? might return :POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE 5.0000 indicating that the reference low voltage is set to 5%.

POWer:SWLoss:TOFF:ENERGY:MAX? (Query Only)

Returns the maximum Toff energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax

```
POWer:SWLoss:TOFF:ENERGY:MAX?
```

Examples POWER:SWLOSS:TOFF:ENERGY:MAX? might return :POWER:SWLOSS:TON:ENERGY:MAX 1 indicating that the maximum Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:ENERGY:MEAN? (Query Only)

Returns the mean Toff energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOFF:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TOFF:ENERGY:MEAN?` might return `:POWER:SWLOSS:TON:ENERGY:MEAN 1` indicating that the mean Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:ENERGY:MIN? (Query Only)

Returns the minimum Toff energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOFF:ENERGY:MIN?`

Examples `POWER:SWLOSS:TOFF:ENERGY:MIN?` might return `:POWER:SWLOSS:TON:ENERGY:MIN 1` indicating that the minimum Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:POWer:MAX? (Query Only)

Returns the maximum Toff power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOFF:POWer:MAX?`

Examples `POWER:SWLOSS:TOFF:POWER:MAX?` might return `:POWER:SWLOSS:TON:POWER:MAX 1` indicating that the maximum Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TOFF:POWer:MEAN? (Query Only)

Returns the mean Toff power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOFF:POWer:MEAN?`

Examples `POWER:SWLOSS:TOFF:POWER:MEAN?` might return `:POWER:SWLOSS:TON:POWER:MEAN 1` indicating that the mean Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TOFF:POWer:MIN? (Query Only)

Returns the minimum Toff power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOFF:POWer:MIN?`

Examples `POWER:SWLOSS:TOFF:POWER:MIN?` might return `:POWER:SWLOSS:TON:POWER:MIN 1` indicating that the minimum Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:ENERGY:MAX? (Query Only)

Returns the maximum Ton energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MAX?`

Examples `POWER:SWLOSS:TON:ENERGY:MAX?` might return `:POWER:SWLOSS:TON:ENERGY:MAX 1` indicating that the maximum Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:ENERGY:MEAN? (Query Only)

Returns the mean Ton energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TON:ENERGY:MEAN?` might return `:POWER:SWLOSS:TON:ENERGY:MEAN 1` indicating that the mean Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:ENERGY:MIN? (Query Only)

Returns the minimum Ton energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MIN?`

Examples `POWER:SWLOSS:TON:ENERGY:MIN?` might return `:POWER:SWLOSS:TON:ENERGY:MIN 1` indicating that the minimum Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:POWer:MAX? (Query Only)

Returns the maximum Ton power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:POWer:MAX?`

Examples `POWER:SWLOSS:TON:POWER:MAX?` might return `:POWER:SWLOSS:TON:POWER:MAX 1` indicating that the maximum Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:POWer:MEAN? (Query Only)

Returns the mean Ton power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:POWer:MEAN?`

Examples `POWER:SWLOSS:TON:POWER:MEAN?` might return `:POWER:SWLOSS:TON:POWER:MEAN 1` indicating that the mean Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:POWer:MIN? (Query Only)

Returns the minimum Ton power for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TON:POWer:MIN?`

Examples `POWER:SWLOSS:TON:POWER:MIN?` might return `:POWER:SWLOSS:TON:POWER:MIN 1` indicating that the minimum Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:ENERGY:MAX? (Query Only)

Returns the maximum total energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MAX?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MAX?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MAX 1` indicating that the maximum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:ENERGY:MEAN? (Query Only)

Returns the mean total energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MEAN?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MEAN 1` indicating that the mean conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:ENERGY:MIN? (Query Only)

Returns the minimum total energy for the switching loss calculation.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MIN?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MIN?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MIN 1` indicating that the minimum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:POWer:MAX? (Query Only)

Returns the maximum total power loss.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:POWer:MAX?`

Examples `POWER:SWLOSS:TOTAL:POWER:MAX?` might return `:POWER:SWLOSS:TOTAL:POWER:MAX 1` indicating that the maximum total power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:POWer:MEAN? (Query Only)

Returns the mean total power loss.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:POWer:MEAN?`

Examples `POWER:SWLOSS:TOTAL:POWER:MEAN?` might return `:POWER:SWLOSS:TOTAL:POWER:MEAN 1` indicating that the mean total power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:POWer:MIN? (Query Only)

Returns the minimum total power loss.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax `POWer:SWLoss:TOTal:POWer:MIN?`

Examples `POWER:SWLOSS:TOTAL:POWER:MIN?` might return `:POWER:SWLOSS:TOTAL:POWER:MIN 1` indicating that the minimum total power switching loss calculation is set to 1 W.

POWer:SWLoss:VCEsat

This command specifies VCESAT value for use in switching loss calculations when the conduction calculation method is VCESAT.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:SWLoss:VCEsat <NR3>
POWer:SWLoss:VCEsat?
```

Arguments <NR3> is a floating point number that specifies the VCEsat switching loss calculation.

Examples POWER:SWLOSS:VCESAT 5 sets the VCEsat value to 5.0000.

POWER:SWLOSS:VCESAT ? might return :POWER:SWLOSS:VCEsat 2.0000 indicating that the VCEsat value is set to 2.0000.

POWer:TYPe

This command specifies the power application measurement type.

Conditions This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group Power

Syntax
```
POWer:TYPe {NONe|QUALity|SWITCHingloss|SOA
|HARMonics|RIPPle|MODULationanalysis|DESKew}

POWer:TYPe?
```

Arguments NONe Use to set the measurement type to None.

QUALity Use the power quality functions to obtain measurements and statistics about the general power quality in your test circuit

SWITCHingloss Use the switching loss functions to obtain the power loss and energy loss across the acquired waveform, including turn-on loss, turn-off loss, conduction loss, and total loss. Typically, use these functions to characterize losses in power supply switching devices, as they switch on and off.

SOA Use the safe operating functions to obtain an X-Y display of the switching device-under-test's voltage and current. Also use them to perform a mask test of the X-Y signal relative to the graphical X-Y description of the device specification table. The safe operating area is typically the voltage and current values that a semiconductor can operate without damaging itself.

HARMonics Use the harmonics functions to obtain the frequency spectrum of the source waveform and associated measurement values. Harmonic measurements can help one perform in-depth troubleshooting of power quality problems.

RIPPle Use the ripple functions to obtain measurements and statistics for the AC components of the acquired waveform. Ripples are often found on top of a large DC signal.

MODULationanalysis Use the modulation functions to obtain a trend plot of a measurement value across the acquired waveform. This is useful for showing the variations in the modulated switching signal.

DESKew Run the deskew procedure to match the delays through the probes. Different probes introduce different delays between the probe tip and the oscilloscope. Many oscilloscope users do not have to worry about this because they use the same type of probe on all channels. Power measurement users, however, frequently use both a voltage probe and a current probe. A current probe typically has a larger delay than a voltage probe, so setting deskew values becomes important.

Examples

POWER:TYPE HARMonics sets the measurement type to Harmonics.

POWER:TYPE? might return POWER:TYPE NON indicating that no measurement type is set.

POWer:VOLTAGESOurce

This command specifies the voltage source for the power application.

Conditions

This command requires a DPO4PWR application module for 4000 series models, or an MDO3PWR application module for MDO3000 series models.

Group

Power

Syntax

```
POWer:VOLTAGESOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4}
POWer:VOLTAGESOurce?
```

Arguments

CH1–CH4 or REF1–REF4 sets the analog channel 1–4 or reference waveform 1–4 as the voltage source.

Examples

POWER:VOLTAGESOURCE CH1 sets the voltage source as CH1.

POWER:VOLTAGESOURCE? might return POWER:VOLTAGESOURCE CH1 indicating that the voltage source is set to CH1.

*PSC

This command specifies the power-on status flag that controls the automatic power-on handling of the DESER, SRER, and ESER registers. When *PSC is true, the DESER register is set to 255 and the SRER and ESER registers are set to 0 at power-on. When *PSC is false, the current values in the DESER, SRER, and ESER registers are preserved in nonvolatile memory when power is shut off and are restored at power-on.

Group Status and Error

Syntax

```
*PSC {OFF|ON|NR1>}
*PSC?
```

Related Commands DESE, *ESE, FACtory, *RST, *SRE

Arguments

`OFF` sets the power-on status clear flag to false.

`ON` sets the power-on status clear flag to true.

`<NR1>` = 0 sets the power-on status clear flag to false. This disables the power-on clear allowing the oscilloscope to possibly assert SRQ after power-on; any other value sets the power-on status clear flag to true, enabling the power-on status clear preventing any SRQ assertion after power on.

Examples

`*PSC 0` sets the power-on status clear flag to false.

`*PSC?` might return 1 to indicate that the power-on status clear flag is set to true.

*PUD

This command specifies a string of Protected User Data. This data is protected by the PASSWord command. You can modify it only by first entering the correct password. This password is not necessary to query the data.

Group Status and Error

Syntax

```
*PUD {<Block>|<QString>}
*PUD?
```

Related Commands PASSWord

Arguments <Block> is a block containing up to 300 ASCII characters.

<QString> is a string containing up to 300 ASCII characters.

Examples *PUD #229This oscilloscope belongs to me stores the string "This oscilloscope belongs to me" in the user protected data area.

*PUD? might return #221PROPERTY OF COMPANY X

*RCL (No Query Form)

This command restores the state of the oscilloscope from a copy of the settings stored in memory (The settings are stored using the *SAV command).

Group Save and Recall

Syntax *RCL <NR1>

Related Commands FACtory, *LRN?, RECAll:SETUp, *RST, *SAV, SAVe:SETUp

Arguments <NR1> is a value in the range from 1 to 10, which specifies a saved setup storage location.

Examples *RCL 3 restores the oscilloscope from a copy of the settings stored in memory location 3.

RECAll:MASK (No Query Form)

This command recalls the mask from a specified file that was saved to the current working directory using the SAVe:MASK command.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module.

Group Mask

Syntax RECAll:MASK <QString>

Related Commands SAVe:MASK

Arguments QString is a quoted string that is the name of the mask definition being recalled from the current working directory.

Examples :RECall:MASK "FOO.MSK" will recall a copy of the mask "FOO" from the current working directory.

RECAll:SETUp (No Query Form)

Restores the state of the oscilloscope from a copy of the settings stored in memory. The settings are stored using the *SAV command.

Group Save and Recall

Syntax RECAll:SETUp {FACtory|<NR1>|<file path>}

Related Commands FACtory, *RCL, *RST, *SAV, SAVe:SETUp, FILESystem:CWD

Arguments FACtory restores the factory setup.

<NR1> is a value in the range from 1 to 10, which specifies a saved setup storage location.

<file path> specifies a location for an oscilloscope setup file. <file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>:/<dir>/<filename>.<extension> and one or <dir>s are optional. If you do not specify them, the oscilloscope will read the file from the default directory (see FILESystem:CWD). <filename> stands for a filename; the use of wildcard characters in filenames is not supported. Filename extensions are not required, but highly recommended.

Examples RECALL:SETUP FACTORY recalls (and makes current) the oscilloscope setup to its factory defaults.

RECALL:SETUP 2 recalls the oscilloscope setup from setup storage location 2.

RECALL:SETUP "TEK00000.SET" recalls the setup from the file TEK00000.SET in the current working directory.

RECAll:SETUp:DEMO<x> (No Query Form)

This command recalls one of up to 22 built-in demonstration setups of oscilloscope functionality. <x> varies by model.

Conditions MDO only.

Group Save and Recall

Syntax `RECAll:SETUp:DEMO<x>`

Examples `RECAll:SETUp:DEMO4` recalls the Demonstration #4 setup.

RECAll:WAVEform (No Query Form)

This command (no query form) recalls a stored waveform to a reference memory location, and, for instruments with the arbitrary waveform feature, to arbitrary waveform edit memory (EMEM). Only the first waveform in a .CSV file is recalled for multiple waveform .CSV files. Recall of digital waveforms (D0 through D15) is not supported.

NOTE. *For MDO3000 series models, a saved ARB waveform cannot be recalled to a reference location. It can only be recalled to an EMEM location. However, an AFG waveform can be recalled into either a reference or EMEM location.*

Group Save and Recall

Syntax `RECAll:WAVEform <Source>, <Destination>`

Related Commands SAVe:WAVEform, FILESystem:CWD, FILESystem?

Arguments <Source> is one of:

`<file path>`

Specifies an ISF (internal save format) or CSV (comma separated values) file. For CSV files containing multiple waveforms (created using :SAVe:WAVEform ALL), only the first waveform column is recalled. Recalling digital waveforms to reference memory is not supported and attempting to recall a CSV file with only digital waveforms to REF1-4 results in an error event.

The instrument with the arbitrary waveform feature, supports recalling CSV or ISF files from time domain waveforms to EMEM. The list of supported time domain waveforms include CH1-4, D0-D15, Math and REF and ARB. Recalling CSV files which contain data from an RF frequency domain is not supported and results in an error event. Similarly, recalling ISF files with RF frequency domain waveforms to EMEM is not supported.

ARB1-ARB4 -

For instruments with the arbitrary waveform feature, the internal arbitrary waveform memory locations ARB1-ARB4 can be recalled to edit memory (EMEM). These sources cannot be recalled to reference memory locations.

<QString> is a quoted string that specifies a location for an oscilloscope file. The file name and path should be input using the form <drive>:/<dir>/<filename>.<extension>.

<Destination> is one of:

REF1-REF4 - Specifies a reference memory location to receive the saved ISF or CSV data. ARB1-ARB4 cannot be recalled to reference memory locations and attempting to do so on an instrument with the arbitrary waveform feature results in an error event.

EMEM - For instruments with the arbitrary waveform feature, specifies arbitrary waveform edit memory (EMEM). If the source is a file, the file can be either an ISF or CSV file with the following restrictions:

The source waveform must be a time domain waveform. MATH FFT and REF waveforms saved from RF frequency domain sources are not supported and will result in an error event.

Waveform files containing more that 131072 points are decimated in order to fit into the 131072 point edit memory.

Examples RECALL:WAVEFORM "TEK00000.ISF",REF1 recalls the waveform stored in the file named TEK00000.ISF from the current directory to the reference location 1.

REF<x>? (Query Only)

This query returns data for the reference waveform specified by <x>.

Group Vertical

Syntax REF<x>?

REF<x>:DATE? (Query Only)

Returns the date that reference waveform data for reference waveform <x> was copied into the internal reference memory.

Group Vertical

Syntax
```
REF<x>:DATE?
```

REF<x>:HORizontal:DELay:TIMe

This command specifies the horizontal delay time for reference waveform <x>. The delay time is expressed in seconds and is limited to ±5 times the reference horizontal scale.

Group Vertical

Syntax
```
REF<x>:HORizontal:DELay:TIMe <NR3>
REF<x>:HORizontal:DELay:TIMe?
```

Arguments <NR3> is a floating point number that specifies the delay time, in seconds.

Examples `REF2:HORIZONTAL:DELAY:TIME 4.0E-6` sets the horizontal delay time for the REF2 waveform to 4 µs.

REF<x>:HORizontal:SCAle

This command specifies the horizontal scale for the reference waveform specified by <x>.

Group Vertical

Syntax
```
REF<x>:HORizontal:SCAle <NR3>
REF<x>:HORizontal:SCAle?
```

Arguments <NR3> is a floating point number that specifies the horizontal scale in seconds.

Examples `REF1:HORIZONTAL:SCALE?` might return `REF1:HORIZONTAL:SCALE 4.0E-4`.

REF<x>:LABel

This command specifies the label for the reference waveform specified by <x>.

Group Vertical

Syntax
```
REF<x>:LABel <Qstring>
REF<x>:LABel?
```

Arguments <Qstring> is an alphanumeric string of text, enclosed in quotes, that contains the label text for the reference channel <x> waveform. The text string is limited to 30 characters.

Examples REF4:LABEL? might return :REF4:LABEL "Clk Wfm 2".

REF<x>:TIMe? (Query Only)

Returns the time that reference waveform data was copied into the internal reference memory for reference waveform <x>.

Group Vertical

Syntax
```
REF<x>:TIMe?
```

Examples REF4:TIME? might return "16:54:05".

REF<x>:VERTical:POSition

This command specifies the vertical position of the reference waveform specified by <x>.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform. The position value determines the vertical graticule coordinate at which signal values are displayed. For example, if the position for Reference 3 is set to 2.0, the signal represented by that reference will be displayed at 2.0 divisions above the center of the screen.

Group Vertical

Syntax

```
REF<x>:VERTical:POSition <NR3>
REF<x>:VERTical:POSition?
```

Related Commands

CH<x>:POSition,

MATH[1]:VERTical:POSition

Arguments

<NR3> is a floating point number that specifies the desired position, in divisions from the center horizontal graticule. The range is from -5.0 to 5.0 divisions.

Examples

REF2:VERTICAL:POSITION 1.3E+00 positions the Reference 2 input signal 1.3 divisions above the center horizontal graticule.

REF1:VERTICAL:POSITION? might return :REF1:VERTICAL:POSITION -1.3000E+00 indicating that the current position of Reference 1 is 1.3 divisions below the center horizontal graticule.

REF<x>:VERTical:SCAle

This command specifies the vertical scale for the reference waveform specified by <x>. This setting controls the display only. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Group

Vertical

Syntax

```
REF<x>:VERTical:SCAle <NR3>
REF<x>:VERTical:SCAle?
```

Related Commands

CH<x>:SCAle,

MATH[1]:VERTical:SCAle

Arguments

<NR3> is a floating point number that specifies the gain in user units-per-division.

Examples

REF4:VERTICAL:SCALE 100E-03 sets the Reference 4 scale to 100 mV per division.

REF4:VERTICAL:SCALE? might return :REF2:VERTICAL:SCALE 1.0000e+00 indicating that the current vertical scale setting for Reference 2 is 1 V per division.

REM (No Query Form)

Embeds a comment within programs as a means of internally documenting the programs. The oscilloscope ignores these embedded comment lines.

Group Miscellaneous

Syntax `REM <QString>`

Arguments `<QString>` is a string that can contain a maximum of 80 characters.

Examples `REM "This is a comment"` is a comment string that the oscilloscope will ignore.

RF:CLIPPing? (Query Only)

Returns a boolean indicating whether the RF input is "clipping" due to input over/under-range detection.

Group RF

Syntax `RF:CLIPPing?`

Returns 1 or ON indicates that the RF input is clipping.

0 or OFF indicates that the RF input is not clipping.

Examples `RF:CLIPPING?` might return 0, indicating that the RF input is not clipping.

RF:DETECTionmethod:MODe

This command specifies whether the RF detection within the oscilloscope occurs automatically or manually. If you set the detection method mode to MANual, you are able to use the related `RF:DETECTionmethod` commands to specify detection method options for the frequency domain traces (the options are `MINUSpeak`, `SAMple`, `PLUSpeak` and `AVErage`).

The detection method is the internal calculation that decimates (reduces) a long frequency domain waveform down to display resolution, by dividing the

waveform into intervals and choosing a single value to represent each interval on screen.

Conditions MDO models only.

Group RF

Syntax

```
RF:DETECTionmethod:MODe {AUTO|MANual}
RF:DETECTionmethod:MODe?
```

Related Commands RF:DETECTionmethod:RF_AVErage, RF:DETECTionmethod:RF_MAXHold, RF:DETECTionmethod:RF_MINHold, RF:DETECTionmethod:RF_NORMal

Examples `RF:DETECTionmethod:MODe MANual` sets the detection mode to manual.

`RF:DETECTionmethod:MODe?` might return `AUTO`, indicating that the RF detection mode has been set to automatic.

RF:DETECTionmethod:RF_AVErage

This command specifies the detection method the oscilloscope should use when acquiring an RF Average frequency domain trace.

In order to change the detection method, you must first change the detection method mode to `MANUAL` using the command RF:DETECTionmethod:MODe.

The detection method is the internal calculation that decimates (reduces) a long frequency domain waveform down to display resolution, by dividing the waveform into intervals and choosing a single value to represent each interval on screen.

Conditions MDO models only.

Group RF

Syntax

```
RF:DETECTionmethod:RF_AVErage
{PLUSpeak|MINUSpeak|SAMple|AVErage}

RF:DETECTionmethod:RF_AVErage?
```

Related Commands RF:DETECTionmethod:MODe, RF:DETECTionmethod:RF_MAXHold, RF:DETECTionmethod:RF_MINHold, RF:DETECTionmethod:RF_NORMal

Arguments PLUSpeak — Detection method that selects the largest value in each interval.

MINUSpeak — Detection method that selects the smallest value in each interval.

SAMple — Detection method that selects the first point in each interval.

AVErage — Detection method that selects the mean value within an interval.

Examples RF:DETECTionmethod:RF_AVErage SAM sets the detection method to sample.

RF:DETECTionmethod:RF_AVE? might return MINUSPEAK, indicating the detection method has been set to select the smallest value in each waveform interval.

RF:DETECTionmethod:RF_MAXHold

This command specifies the detection method the oscilloscope should use when acquiring an RF Max Hold frequency domain trace. The Max Hold trace displays the largest value in all acquisition history at each trace point.

In order to change the detection method, you must first change the detection method mode to MANUAL using the command RF:DETECTionmethod:MODe.

The detection method is the internal calculation that decimates (reduces) a long frequency domain waveform down to display resolution, by dividing the waveform into intervals and choosing a single value to represent each interval on screen.

Conditions MDO models only.

Group RF

Syntax

```
RF:DETECTionmethod:RF_MAXHold
{PLUSpeak|MINUSpeak|SAMple|AVErage}
RF:DETECTionmethod:RF_MAXHold?
```

Related Commands RF:DETECTionmethod:MODe, RF:DETECTionmethod:RF_AVErage, RF:DETECTionmethod:RF_MINHold, RF:DETECTionmethod:RF_NORMal

Arguments

PLUSpeak — Detection method that selects the largest value in each interval.

MINUSpeak — Detection method that selects the smallest value in each interval.

SAMple — Detection method that selects the first point in each interval.

AVErage — Detection method that selects the mean value within an interval.

Examples

RF:DETECTionmethod:RF_MAXHold SAM sets the detection method to sample.

RF:DETECTionmethod:RF_MAXHold? might return AVERAGE, indicating the detection method has been set to select the mean value within a waveform interval.

RF:DETECTionmethod:RF_MINHold

This command specifies the detection method the oscilloscope should use when acquiring an RF Min Hold frequency domain trace. The Min Hold trace displays the smallest value throughout the acquisition history at each trace point.

In order to change the detection method, you must first change the detection method mode to MANUAL using the command RF:DETECTionmethod:MODe.

The detection method is the internal calculation that decimates (reduces) a long frequency domain waveform down to display resolution, by dividing the waveform into intervals and choosing a single value to represent each interval on screen.

Conditions

MDO models only.

Group

RF

Syntax

```
RF:DETECTionmethod:RF_MINHold
{PLUSpeak|MINUSpeak|SAMple|AVErage}
RF:DETECTionmethod:RF_MINHold?
```

Related Commands

RF:DETECTionmethod:MODe, RF:DETECTionmethod:RF_AVErage, RF:DETECTionmethod:RF_MAXHold, RF:DETECTionmethod:RF_NORMal

Arguments

PLUSpeak — Detection method that selects the largest value in each interval.

MINUSpeak — Detection method that selects the smallest value in each interval.

SAMple — Detection method that selects the first point in each interval.

AVErage — Detection method that selects the mean value within an interval.

Examples

`RF:DETECTionmethod:RF_MINHold SAM` changes the detection method to sample.

`RF:DETECTionmethod:RF_MINHold?` might return `AVERAGE,` indicating the detection method has been set to select the mean value within a waveform interval.

RF:DETECTionmethod:RF_NORMal

This command specifies the detection method the oscilloscope should use when acquiring an RF Normal frequency domain trace. The Normal trace displays the most recently acquired sample at each trace point. .

In order to change the detection method, you must first change the detection method mode to `MANUAL` using the command RF:DETECTionmethod:MODe.

The detection method is the internal calculation that decimates (reduces) a long frequency domain waveform down to display resolution, by dividing the waveform into intervals and choosing a single value to represent each interval on screen.

Conditions

MDO models only.

Group

RF

Syntax

```
RF:DETECTionmethod:RF_NORMal
{PLUSpeak|MINUSpeak|SAMple|AVErage}
RF:DETECTionmethod:RF_NORMal?
```

Related Commands

RF:DETECTionmethod:MODe, RF:DETECTionmethod:RF_AVErage, RF:DETECTionmethod:RF_MAXHold, RF:DETECTionmethod:RF_MINHold

Arguments

`PLUSpeak` — Detection method that selects the largest value in each interval.

`MINUSpeak` — Detection method that selects the smallest value in each interval.

`SAMple` — Detection method that selects the first point in each interval.

`AVErage` — Detection method that selects the mean value within an interval.

Examples

`RF:DETECTionmethod:RF_NORMal SAM` sets the detection method to sample.

`RF:DETECTionmethod:RF_NORMal?` might return `AVERAGE,` indicating the detection method has been set to select the mean value within a waveform interval.

RF:FREQuency

This command specifies the center frequency of the RF acquisition system.

NOTE. *For the parameters RF:STARt, RF:STOP, RF:FREQuency and RF:SPAN, when any one of the parameters is changed, the following relationship is enforced:*

START = FREQ — SPAN/2

STOP = FREQ + SPAN/2

FREQ = (START + STOP)/2

SPAN = STOP — START

Conditions MDO models only.

Group RF

Syntax

```
RF:FREQuency <NR3>
RF:FREQuency?
```

Related Commands RF:POSition, RF:REFLevel

Arguments <NR3> is a floating point value.

Returns Query response is returned in high precision NR3 format (up to 12 digits with more than 4 trailing 0 digits after the decimal point omitted).

Examples `RF:FREQuency 3.0E+06` sets the center frequency to 3 MHz.

`RF:FREQuency?` might return 3.0E+06, indicating that the center frequency has been set to 3 MHz.

RF:LABel

This command specifies (or queries) a label for the RF frequency domain waveform.

Conditions MDO models only.

Group RF

Syntax

```
RF:LABel <QString>
RF:LABel?
```

Related Commands RF:RF_AMPlitude:LABel, RF:RF_FREQuency:LABel, RF:RF_PHASe:LABel

Arguments <QString> is a quoted string of up to 32 characters.

RF:MEASUre:ACPR:ADJACENTPAIRs

When the RF measurement type has been set to ACPR, the frequency domain displays a Main channel in the center (Ch:Main), and a side channel group on either side of the Main Channel. There can be either 1, 2 or 3 channels within each side group; this command specifies that number. (Lower Area 1, 2 and 3 would be on the left side of the Main channel; Upper Area 1, 2 and 3 would be on the right side).

To set the measurement type to ACPR, use the command `RFMEASUre:TYPe ACPR`.

The Adjacent Channel Power Ratio (ACPR) is the ratio of channel power between two user-selected channels (a side channel and a main channel).

NOTE. *The oscilloscope will maintain the span to fit all the channels on-screen, plus a margin of 10% (5% on either side.)*

Conditions MDO models only.

Group RF

Syntax

```
RF:MEASUre:ACPR:ADJACENTPAIRs[1|2|3]
RF:MEASUre:ACPR:ADJACENTPAIRs?
```

Related Commands RF:MEASUre:TYPe, RF:MEASUre:ACPR:CHANBW,RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples `RF:MEASUre:ACPR:ADJACENTPAIRs 2` sets the number of adjacent pairs to use to 2.

RF:MEASUre:ACPR:ADJACENTPAIRs? might return 3, indicating the number of adjacent pairs has been set to 3.

RF:MEASUre:ACPR:CHANBW

This command configures the measurement bandwidth to use for the Main channel, as well as the adjacent side channels, when performing ACPR measurements using a frequency domain trace. The RF measurement type must first be set to ACPR using the command RFMEASUre:TYPe ACPR.

Note that adjusting the channel bandwidth automatically adjusts the channel spacing. If the bandwidth is adjusted to be wider than the channel spacing, the oscilloscope will automatically increase the channel spacing and the span.

NOTE. *The oscilloscope will maintain the span to fit all the channels on-screen, plus a margin of 10% (5% on either side.)*

Conditions MDO models only.

Group RF

Syntax

```
RF:MEASUre:ACPR:CHANBW <NR3>
RF:MEASUre:ACPR:CHANBW?
```

Related Commands RF:MEASUre:TYPe, RF:MEASUre:ACPR:ADJACENTPAIRs,RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Arguments <NR3> is a floating point number.

Examples RF:MEASUre:ACPR:CHANBW 1.5E+6 sets the width to use for Main and side channels to 1.5 MHz.

RF:MEASUre:ACPR:CHANBW? might return 4.0000E+6, indicating the ACPR Main and side channel width is set to 4 MHz.

RF:MEASUre:ACPR:CHANSPACing

This command specifies the center-to-center spacing between the Main channel and adjacent channels when performing ACPR measurements using a frequency domain trace. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.) Note that if the channel spacing is adjusted to be more narrow than the channel bandwidth, then the oscilloscope will automatically decrease the channel bandwidth.

NOTE. *The oscilloscope will maintain the span to fit all the channels on-screen, plus a margin of 10% (5% on either side.)*

Conditions MDO models only.

Group RF

Syntax

```
RF:MEASUre:ACPR:CHANSPACing <NR3>
RF:MEASUre:ACPR:CHANSPACing?
```

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Arguments <NR3> is a floating point number.

Examples `RF:MEASUre:ACPR:CHANSPACing 5.0000E+6` sets the ACPR channel center-to-center spacing between the Main channel and the side channels to 5.0000E+6 MHz.

`RF:MEASUre:ACPR:CHANSPACing?` might return 5.0000E+6, indicating the ACPR channel spacing has been set to 5 MHz.

RF:MEASUre:ACPR:LA1DB? (Query Only)

This query measures a ratio between the first lower adjacent side channel and the Main channel when performing ACPR measurements. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:LA1DB?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW,RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples `RF:MEASUre:ACPR:LA1DB` might return –30.000, indicating that the Lower Area 1 side channel (left side of Main channel) has 1/1000 the power of the Main channel.

If the main channel power is –41.0dBm and `:RF:MEASUre:ACPR:LA1DB` returns –12.0 dB, then the actual power in the adjacent channel is –41.0dBm + –12.0 dB or –53.0dBm.

RF:MEASUre:ACPR:LA2DB? (Query Only)

This query measures a ratio between the second lower side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:LA2DB?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples

`RF:MEASUre:ACPR:LA2DB` might return –30.000, indicating that the Lower Area 2 side channel (left side of Main channel) has 1/1000 the power of the Main channel.

If the main channel power is –41.0dBm and `RF:MEASUre:ACPR:LA2DB` returns –12.0 dB, then the actual power in the adjacent channel is –41.0dBm + –12.0 dB or –53.0dBm.

RF:MEASUre:ACPR:LA3DB? (Query Only)

This query measures a ratio between the third lower side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions

MDO models only.

Group

RF

Syntax

`RF:MEASUre:ACPR:LA3DB?`

Related Commands

RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples

`RF:MEASUre:ACPR:LA3DB` might return –30.000, indicating that the Lower Area 3 side channel (left side of Main channel) has 1/1000 the power of the Main channel.

If the main channel power is –41.0dBm and `RF:MEASUre:ACPR:LA3DB` returns –12.0 dB, then the actual power in the adjacent channel is –41.0dBm + –12.0 dB or –53.0dBm.

RF:MEASUre:ACPR:POWer? (Query Only)

This query returns the measure of the total RF power in the Main channel within the channel bandwidth when performing ACPR measurements using a frequency domain trace. It uses the units that have been selected with the command RF:UNIts. The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:POWer?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples `RF:MEASUre:ACPR:POWer?` might return –20.0000, in whatever units have been selected using RF:UNIts.

RF:MEASUre:ACPR:UA1DB? (Query Only)

This query measures a ratio between the first upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:UA1DB?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA2DB?, RF:MEASUre:ACPR:UA3DB?

Examples `RF:MEASUre:ACPR:UA1DB` might return –30.000, indicating that the Upper Area 1 side channel (right side of Main channel) has 1/1000 the power of the Main channel.

RF:MEASUre:ACPR:UA2DB? (Query Only)

This query measures a ratio between the second upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:UA2DB?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?, RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA3DB?

Examples `RF:MEASUre:ACPR:UA2DB` might return –30.000, indicating that the Upper Area 2 side channel (right side of the Main channel) has 1/1000 the power of the Main channel.

RF:MEASUre:ACPR:UA3DB? (Query Only)

This query measures a ratio between the third upper side channel and the Main channel when performing ACPR measurements using a frequency domain trace. The power in the adjacent channel is equivalent to the power in the main channel (dBm) added to the power ratio (dB) of the adjacent channel. (The RF measurement type must be set to ACPR using the command RF:MEASUre:TYPe.)

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:ACPR:UA3DB?`

Related Commands RF:MEASUre:ACPR:ADJACENTPAIRs, RF:MEASUre:ACPR:CHANBW, RF:MEASUre:ACPR:CHANSPACing, RF:MEASUre:ACPR:POWer?,

RF:MEASUre:ACPR:LA1DB?, RF:MEASUre:ACPR:LA2DB?, RF:MEASUre:ACPR:LA3DB?, RF:MEASUre:ACPR:UA1DB?, RF:MEASUre:ACPR:UA2DB?

Examples `RF:MEASUre:ACPR:UA3DB` might return –30.000, indicating that the Upper Area 3 side channel (on the right side of the Main channel) has 1/1000 the power of the Main channel.

RF:MEASUre:CP:CHANBW

This command specifies the channel bandwidth to use when the RF measurement type has been set to Channel Power (CP) using the command RF:MEASUre:TYPe. The channel bandwidth is centered about the CF (center frequency).

Note that the span is automatically controlled to be 10% wider than the channel width. The span maximum varies according to the oscilloscope model; either 3GHz or 6GHz.

Conditions MDO models only.

Group RF

Syntax
```
RF:MEASUre:CP:CHANBW <NR3>
RF:MEASUre:CP:CHANBW?
```

Related Commands RF:MEASUre:CP:POWer?

Arguments `<NR3>` is a floating point number.

Examples `RF:MEASUre:CP:CHANBW` 5.0000E+6 sets the channel width to 5 MHz.

RF:MEASUre:CP:POWer? (Query Only)

This query returns the total channel power within the displayed channel bandwidth, when the RF measurement type has been set to CP (using the command RF:MEASUre:TYPe).

Group RF

Syntax `RF:MEASUre:CP:POWer?`

Related Commands RF:MEASUre:CP:CHANBW

Examples `RF:MEASure:CP:POWer?` might return 5.23 in whatever units have been selected using `RF:UNIts`.

RF:MEASUre:OBW:CHANBW

This command specifies the Analysis Bandwidth to use, when the RF measurement type has been set to OBW (using the command RF:MEASUre:TYPe). Note that the span automatically increases or decreases to be 10% more than the Analysis Bandwidth (providing some room around the signal of interest).

Conditions MDO models only.

Group RF

Syntax
```
RF:MEASUre:OBW:CHANBW <NR3>
RF:MEASUre:OBW:CHANBW?
```

Related Commands RF:MEASUre:OBW:POWer?, RF:MEASUre:OBW:PERCENTdown, RF:MEASUre:OBW:LOWERFreq?, RF:MEASUre:OBW:UPPERFreq?

RF:MEASUre:OBW:LOWERFreq? (Query Only)

This query returns the lower frequency threshold (on the display, the white line to the left bracketing OBW power). The RF measurement type must be set to OBW using the command RF:MEASUre:TYPe.

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:OBW:LOWERFreq?`

Related Commands RF:MEASUre:OBW:CHANBW, RF:MEASUre:OBW:POWer?, RF:MEASUre:OBW:PERCENTdown, RF:MEASUre:OBW:UPPERFreq?

Examples `RF:MEASUre:OBW:LOWERFreq?` might return 2.6000E+9, indicating that the lower frequency threshold is 2.6000E+9 Hz. If `OBW:PERCENTdown` is 80%, then (100%-80%)/2 or 10% of the total power will be above 2.6000E+9 Hz.

RF:MEASUre:OBW:PERCENTdown

This command specifies the percentage of total power within the Analysis Bandwidth (the OBW power) such that half of the remaining power will be below the OBW:LOWERFreq level and the other half of the remaining power will be above the OBW:UPPERFreq level.

The value can be set from 99.9 down to 60.0 in 0.1 increments. The RF measurement type must be set to OBW using the command RF:MEASUre:TYPe.

Conditions MDO models only.

Group RF

Syntax

```
RF:MEASUre:OBW:PERCENTdown <NR3>
RF:MEASUre:OBW:PERCENTdown?
```

Related Commands RF:MEASUre:OBW:CHANBW, RF:MEASUre:OBW:POWer?, RF:MEASUre:OBW:LOWERFreq?, RF:MEASUre:OBW:UPPERFreq?

Arguments `<NR3>` is a floating point number.

Examples `RF:MEASUre:OBW:PERCENTdown` 80 sets the OBW upper and lower frequencies such that 80% of the total power is contained within these two frequencies, with 20% remaining (10% on either side of these bounding frequencies).

`RF:MEASUre:OBW:PERCENTdown?` might return 85.0000, indicating that 85% of the total power has been set to fit within the occupied bandwidth.

RF:MEASUre:OBW:POWer? (Query Only)

This query returns the total channel power within the occupied bandwidth, when the RF measurement type has been set to OBW (using the command RF:MEASUre:TYPe). The units are user-set (with the command RF:UNIts).

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:OBW:POWer?`

Related Commands RF:MEASUre:OBW:CHANBW, RF:MEASUre:OBW:PERCENTdown, RF:MEASUre:OBW:LOWERFreq?, RF:MEASUre:OBW:UPPERFreq?

Examples `RF:MEASUre:OBW:POWer?` might return –26.1607, indicating that the total channel power within the occupied bandwidth is 26.1607 user-set units.

RF:MEASUre:OBW:UPPERFreq? (Query Only)

This query returns the upper frequency threshold (on the display, the white line to the right bracketing OBW power). The RF measurement type must be set to OBW using the command RF:MEASUre:TYPe. This frequency will locate the position where (100% — OBW:PERCENTdown)/2 power is above this frequency.

Conditions MDO models only.

Group RF

Syntax `RF:MEASUre:OBW:UPPERFreq?`

Related Commands RF:MEASUre:OBW:CHANBW, RF:MEASUre:OBW:POWer?, RF:MEASUre:OBW:PERCENTdown, RF:MEASUre:OBW:LOWERFreq?

Examples `RF:MEASUre:OBW:UPPERFreq?` might return 2.4000E+9, indicating that the upper frequency threshold is 2.4000E+9 Hz. If `OBW:PERCENTdown` is 80%, then (100%-80%)/2 or 10% of the total power will be above 2.4000E+9 Hz.

RF:MEASUre:TYPe

This command specifies the RF measurement type: Channel Power, Adjacent Channel Power Ratio, Occupied Bandwidth, or none.

Conditions MDO models only.

Group RF

Syntax

```
RF:MEASUre:TYPe {NONe|CP|ACPR|OBW}
RF:MEASUre:TYPe?
```

Arguments

CP — Channel Power is the total power within the bandwidth defined by the channel width. When this measurement is active, the span is automatically set 10% wider than the channel width, and the auto detection method is set to Average. To configure the channel width, use the command RF:MEASUre:CP:CHANBW. To query the total power within the channel bandwidth, use the command RF:MEASUre:CP:POWer?

ACPR — The Adjacent Channel Power Ratio returns the power in the main channel and the ratio of channel power to main power for the upper and lower halves of each adjacent channel. When this measurement is active, the span is automatically set 10% larger than required to capture all channels, and the auto detection method is set to Average. To configure the number of adjacent channels, use the command RF:MEASUre:ACPR:ADJACENTPAIRs. To configure the channel width, use the command RF:MEASUre:ACPR:CHANBW. To configure the channel spacing, use the command RF:MEASUre:ACPR:CHANSPACing

OBW — Occupied Bandwidth (OBW) is the bandwidth that contains the specified % of power within the Analysis Bandwidth. The OBW is the difference between the Upper Frequency and the Lower Frequency. When this measurement is active, the span is automatically set 10% larger than required to capture all channels, and the auto detection method is set to Average. To specify the Analysis Bandwidth, use the command RF:MEASUre:OBW:CHANBW. To specify the % of power, use the command RF:MEASUre:OBW:PERCENTdown.

NONe

Examples

`RF:MEASUre:TYPe ACPR` sets the RF measurement type to ACPR.

`RF:MEASUre:TYPe?` might return NONE, the default.

RF:POSition

This command specifies the vertical position for the frequency domain traces. The vertical position is the location of the Reference Level with respect to the top of the graticule, in divisions. The lower limit is –10 divisions. The upper limit is +10 divisions.

Conditions

MDO models only.

Group

RF

Syntax

```
RF:POSition <NR3>
RF:POSition?
```

Related Commands RF:UNIts

Arguments <NR3> is a floating point number.

Examples RF:POSITION –3 moves the frequency domain baseline indicator down3 graticule divisions from its default position.

RF:POSITION? might return 3.0000, indicating the baseline indicator has been set 3 divisions up from its default position.

RF:PRObe:AUTOZero (No Query Form)

This command executes the attached probe's AutoZero function, for probes that support this feature. See your probe documentation for more details.

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:AUTOZero EXECute
```

Examples RF:PROBE:AUTOZERO EXECute performs the AutoZero function in the probe.

RF:PRObe:CALibrate (No Query Form)

This command executes a calibration or initialization for a probe attached to the RF input, if the probe is calibratable. To determine whether the probe is calibratable, use RF:PRObe:CALibrate:CALIBRATABLe?.

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:CALibrate {EXECute|INITialize}
```

Related Commands RF:PRObe:CALibrate:STATE?, RF:PRObe:CALibrate:CALIBRATABLe?

Arguments EXECute — executes a calibration for the attached probe.

INITialize — initializes the attached probe.

Examples RF:PROBE:CALIBRATE INIT initializes the probe attached to the RF input.

RF:PRObe:CALibrate:CALIBRATABLe? (Query Only)

This query returns a boolean value that indicates whether the attached probe is calibratable.

Conditions MDO models only.

Group RF

Syntax RF:PRObe:CALibrate:CALIBRATABLe?

Examples RF:PRObe:CALibrate:CALIBRATABLe? might return 0, indicating that the probe attached to the RF input is not calibratable.

RF:PRObe:CALibrate:STATE? (Query Only)

This command returns the calibration state of the probe connected to the RF input.

Conditions MDO models only.

Group RF

Syntax RF:PRObe:CALibrate:STATE?

Returns DEFAULT — Not calibrated

COMPensated — Last calibration passed

RUNNING — Probe calibration is in progress.

Examples RF:PRObe:CALibrate:STATE? might return DEFAULT, indicating that the probe is not calibrated.

RF:PRObe:COMMAND

This command sets the state of the probe control specified with the first argument to the state specified with the second argument. The commands and states are unique to the attached probe type. See the probe documentation for how to set these string arguments.

The command form takes 2 string arguments: the first is the probe command enumeration and the second is the data value.

The query form requires a single quoted string argument to specify the probe command enumeration for which the response data is requested.

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:COMMAND <QString>, <QString>
RF:PRObe:COMMAND? <QString>
```

Arguments <QString> are quoted strings specifying the probe command and value to set in the probe attached to the specified channel.

Examples RF:PROBE:COMMAND "MODE", "4-4V1MHz" sets a Tektronix VPI-DPG probe to the 4-4V1MHz mode.

RF:PROBE:COMMAND "OUTPUT", "ON" turns the output of a Tektronix VPI-DPG probe on.

RF:PROBE:COMMAND?"MODE" might return RF:PROBE:COMMAND "MODE","4-4V1MHZ".

RF:PRObe:DEGAUss (No Query Form)

This command starts a degauss/AutoZero cycle on a TekVPI current probe attached to the RF input.

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:DEGAUss EXECute`

Examples `RF:PROBE:DEGAUSS EXECute` begins the degauss/AutoZero operation.

RF:PRObe:DEGAUss:STATE? (Query Only)

This command returns the state of the probe degauss for the RF input.

NOTE. *This command will return* `PASSED` *for probes that do not support degauss operations.*

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:DEGAUss:STATE?`

Returns `NEEDED` indicates the probe should be degaussed before taking measurements.

`RECOMMENDED` indicates the measurement accuracy might be improved by degaussing the probe.

`PASSED` indicates the probe is degaussed.

`FAILED` indicates the degauss operation failed.

`RUNNING` indicates the probe degauss operation is currently in progress.

Examples `RF:PROBE:DEGAUSS:STATE?` might return FAILED, indicating the degauss operation failed.

RF:PRObe:FORCEDRange

This command specifies the range of a TekVPI probe attached to the RF input.

Conditions MDO models only.

Group RF

Syntax
```
RF:PRObe:FORCEDRange <NR3>
RF:PRObe:FORCEDRange?
```

Arguments <NR3> is a floating point number that specifies the range, which is probe specific.

Returns The query form of this command returns 0.0 for probes that do not support forced ranges.

RF:PRObe:GAIN

This command specifies the scale factor for the probe attached to the RF input.

Conditions MDO models only.

Group RF

Syntax
```
RF:PRObe:GAIN <NR3>
RF:PRObe:GAIN?
```

Arguments <NR3> is a floating point number that specifies the probe scale factor. Allowed values depend on the specific probe.

Examples RF:PROBE:GAIN? might return RF:PROBE:GAIN 0.1000E+00 indicating that the attached 10x probe delivers 1 V to the RF input for every 10 V applied to the probe input.

RF:PRObe:ID:SERnumber? (Query Only)

This query returns the serial number of the probe attached to the RF input.

NOTE. *For Level 0 and 1 probes, the serial number will be "".*

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:ID:SERnumber?`

Related Commands RF:PRObe:ID:TYPe?

Examples `RF:PROBE:ID:SERNUMBER?` might return `:RF:PROBE:ID:SERNUMBER "B010289"` indicating that the serial number of the probe attached to the RF input is B010289.

RF:PRObe:ID:TYPe? (Query Only)

This query returns the type of probe attached to the RF input. Level 2 (or higher) probes supply their exact product nomenclature; for Level 0 or 1 probes, a generic *"No Probe Detected" message is returned.

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:ID:TYPe?`

Related Commands RF:PRObe:ID:SERnumber?

Examples `RF:PROBE:ID:TYPE?` might return `:RF:PROBE:ID:TYPE "P6203"` indicating that P6203-type probe is attached to the RF input.

RF:PRObe:PREAmp:MODe

Sets or returns the user-selected mode for an RF pre-amp connected to the RF input - either `BYPass` or `AUTO`.

Note that the actual *status* of the pre-amp (either `NONE`, `ON` or `BYPass`) is determined by the selected mode along with the RF reference level. You can query the status of the pre-amp using the command RF:PRObe:PREAmp:STATus?

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:PREAmp:MODe <BYPass|AUTO>
RF:PRObe:PREAmp:MODe?
```

Related Commands

RF:PRObe:PREAmp:STATus?

Arguments

BYPass means the pre-amp will not amplify the signal. When the mode is set to BYPass, the pre-amp amplification is always off, regardless of the RF reference level.

AUTO means the pre-amp will turn its amplification on or off based on the RF reference level. When the MODe is set to AUTO and the RF reference level is below the RF reference level threshold, then the pre-amp amplification is automatically turned on, and the STATus is set to ON. When the RF reference level is at or above the RF reference level threshold, then the pre-amp amplification is automatically turned off, and the STATus is set to BYPass.

NOTE. *The RF reference level threshold for the TPA-N-PRE model pre-amp is -25 dBm on MDO4000/B models, and -15 dBm on MDO3000 models.*

Examples

RF:PRObe:PREAmp:MODe BYP sets the preamp so that it will not amplify the signal.

RF:PRObe:PREAmp:MODe? might return AUTO, indicating that the pre-amp amplification has been set to turn on or off depending on whether the RF reference level is above or below the RF reference level threshold.

RF:PRObe:PREAmp:STATus? (Query Only)

Returns the actual status of the RF pre-amp connected to the RF input. The returned status enumerations are:

NONe – no pre-amp is connected.

ON – the pre-amp is connected and is in the amplification (non-bypassed) state.

BYPass – the pre-amp is connected but is in the bypassed state because the mode is set to BYPass, or the mode is set to AUTO and the RF reference level is at or above the RF reference level threshold.

You can set the mode for the pre-amp (either BYPass or AUTO) using the command RF:PRObe:PREAmp:MODe.

NOTE. *The RF reference level threshold for the TPA-N-PRE model pre-amp is -25 dBm, and -15 dBm on MDO3000 models..*

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:PREAmp:STATus?`

Related Commands RF:PRObe:PREAmp:MODe

Examples `RF:PRObe:PREAmp:STATus?` might return `ON`, indicating that the pre-amp connected to the RF input is in the amplification (non-bypassed) state.

RF:PRObe:RESistance? (Query Only)

This query returns the input resistance of the probe attached to the RF input, if the probe supports it (otherwise, it returns 0.0). The RF input is 50 Ω impedance.

Conditions MDO models only.

Group RF

Syntax `RF:PRObe:RESistance?`

Examples `RF:PRObe:RESistance?` might return `:RF:PROBE:RESISTANCE 1.0000E+6` indicating that the input resistance of the probe attached to the RF input is 1 MΩ.

NOTE. *This query will return 0.0 if no probe is attached or if the attached probe does not report the input resistance.*

RF:PRObe:SIGnal

This command specifies the input bypass setting of a TekVPI probe attached to the RF input. The probe must support input bypass (for example, TCP0001).

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:SIGnal {BYPass|PASS}
RF:PRObe:SIGnal?
```

Arguments

`BYPass` sets the probe to Bypass mode.

`PASS` sets the probe to Pass mode.

RF:PRObe:UNIts? (Query Only)

This query returns a quoted string that describes the units of measure for the probe attached to the RF input.

Conditions MDO models only.

Group RF

Syntax

```
RF:PRObe:UNIts?
```

Examples `RF:PROBE:UNITS?` might return `:RF:PROBE:UNITS "A"` indicating that the probe attached to the RF input is a current probe.

RF:RBW

This command specifies the resolution bandwidth (RBW) when the RBW mode has been set to MANUAL (using the command RF:RBW:MODe). The resolution bandwidth is the width of the narrowest measurable band of frequencies in a frequency domain trace. The RBW is adjustable down to 20Hz. By default, the RBW tracks the span value in a 1000:1 ratio.

The RBW determines the level to which the oscilloscope can resolve individual frequencies in the frequency domain. For example, if the input signal contains two carriers separated by 1 kHz, you will not be able to discriminate between them unless the RBW is less than 1 kHz.

Conditions MDO models only.

Group RF

Syntax

```
RF:RBW <NR3>
RF:RBW?
```

Arguments <NR3> is a floating point number that represents the width of the narrowest measurable band of frequencies in a frequency domain trace.

Examples RF:RBW 2.0E+04 sets the RBW to 20 kHz.

RF:RBW? might return 3.0000E+6, indicating that the RBW has been set to 3 MHz.

RF:RBW:MODe

This command specifies the resolution bandwidth (RBW) mode, either automatic or manual.

Conditions MDO models only.

Group RF

Syntax
```
RF:RBW:MODe {AUTO|MANual}
RF:RBW:MODe?
```

Arguments AUTO sets the resolution bandwidth automatically as the span is changed. The default behavior is 1000:1, but you can set it to other values in a 1–2–5 sequence (e.g. 10000, 20000, 50000). To specify the RBW ratio that will be used when the mode is set to automatic, use the command RF:SPANRbwratio.

MANual allows you to set the resolution bandwidth, independently from the span, using the command RF:RBW.

Examples RF:RBW:MODe MANual sets the mode to manual.

RF:RBW:MODe? might return AUTO, the default.

RF:REFLevel

This command sets the Reference Level of the RF input. The Reference Level can either be specified as a numeric floating point value, or set automatically.

Conditions MDO models only.

Group RF

Syntax

```
RF:REFLevel {<NR3>|AUTO}
RF:REFLevel?
```

Arguments

<NR3> is a floating point number.

AUTO directs the oscilloscope to automatically calculate and set the Reference Level. This is a one-time calculation based on the content of the RF input signal. It is not a "mode".

Examples

RF:REFLevel –10 sets the Reference Level to –10 dBm.

RF:REFLevel? might return 0.0E+0, indicating a Reference Level of 0 dBm.

RF:RF_AMPlitude:LABel

This command specifies the label for the RF Amplitude vs. Time trace.

Conditions

MDO4000/B models only.

Group

RF

Syntax

```
RF:RF_AMPlitude:LABel <QString>
RF:RF_AMPlitude:LABel?
```

Related Commands

RF:RF_FREQuency:LABel, RF:RF_PHASe:LABel, RF:LABel

Arguments

<QString> is a quoted string of up to 32 characters.

RF:RF_AMPlitude:VERTical:POSition

This command specifies the vertical position of the RF Amplitude vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.

Conditions

MDO4000/B models only.

Group

RF

Syntax

```
RF:RF_AMPlitude:VERTical:POSition <NR3>
RF:RF_AMPlitude:VERTical:POSition?
```

Arguments

<NR3> is a floating point number.

Examples

RF:RF_AMPlitude:VERTical:POSition −1 sets the vertical position of the RF Amplitude vs. Time trace to -1 division.

RF:RF_AMPlitude:VERTical:POSition? might return 0.0E+0, indicating a vertical position of 0.

RF:RF_AMPlitude:VERTical:SCAle

This command specifies the vertical scale for the RF Amplitude vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Conditions

MDO4000/B models only.

Group

RF

Syntax

```
RF:RF_AMPlitude:VERTical:SCAle <NR3>
RF:RF_AMPlitude:VERTical:SCAle?
```

Arguments

<NR3> is a floating point number that specifies the vertical scale.

Examples

RF:RF_AMPlitude:VERTical:SCAle 50E-3 sets the vertical scale to 50mV/division.

RF:RF_AMPlitude:VERTical:SCAle? might return 10.0000E-3, indicating that the vertical scale has been set to 10mV/division.

RF:RF_AVErage:COUNt? (Query Only)

This query returns the number of RF traces that have been accumulated to create the RF Average frequency domain trace.

Conditions

MDO models only.

Group RF

Syntax `RF:RF_AVErage:COUNt?`

Returns This command returns an integer that ranges from 0 to the number of acquisitions specified in the command RF:RF_AVErage:NUMAVg.

Examples `RF:RF_AVErage:COUNt?` might return 15, indicating that 15 traces have been accumulated to create the RF Average trace.

RF:RF_AVErage:NUMAVg

This command specifies the number of acquisitions to be used when creating the RF Average frequency domain trace, which displays the average of values from multiple acquisitions at each trace point. The range is 2 – 512, in exponential increments.

Conditions MDO models only.

Group RF

Syntax
```
RF:RF_AVErage:NUMAVg <NR1>
RF:RF_AVErage:NUMAVg?
```

Related Commands RF:RF_AVErage:COUNt?

Arguments `<NR1>` is an integer.

Examples `RF:RF_AVErage:NUMAVg 100` sets the number of acquisitions to be used for the RF average trace to 128 (the closest power of 2 increment).

`RF:RF_AVErage:NUMAVg?` might return 16, indicating that the number of averages for the RF average trace has been set to 16.

RF:RF_FREQuency:LABel

This command specifies the label for the RF Frequency vs. Time trace.

Conditions MDO4000/B models only.

Group RF

Syntax
```
RF:RF_FREQuency:LABel <QString>
RF:RF_FREQuency:LABel?
```

Related Commands RF:RF_AMPlitude:LABel, RF:RF_PHASe:LABel, RF:LABel

Arguments <QString> is a quoted string of up to 32 characters.

RF:RF_FREQuency:VERTical:POSition

This command specifies the vertical position for the RF Frequency vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.

Conditions MDO4000/B models only.

Group RF

Syntax
```
RF:RF_FREQuency:VERTical:POSition <NR3>
RF:RF_FREQuency:VERTical:POSition?
```

Related Commands RF:RF_FREQuency:VERTical:SCAle

Arguments <NR3> is a floating point number.

Examples `RF:RF_FREQuency:VERTical:POSition –1` sets the vertical position of the RF Frequency vs. Time trace to –1 division.

`RF:RF_FREQuency:VERTical:POSition?` might return 0.0E+0, indicating a vertical position of 0.

RF:RF_FREQuency:VERTical:SCAle

This command specifies the vertical scale for the RF Frequency vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Conditions MDO4000/B models only.

Group RF

Syntax

```
RF:RF_FREQuency:VERTical:SCAle <NR3>
RF:RF_FREQuency:VERTical:SCAle?
```

Related Commands RF:RF_FREQuency:VERTical:POSition

Arguments <NR3> is a floating point number that specifies the vertical scale.

Examples `RF:RF_FREQuency:VERTical:SCAle 1.0000E+6` sets the vertical scale to 1 MHz/division.

`RF:RF_FREQuency:VERTical:SCAle?` might return 1.0000E+6, indicating that the vertical scale has been set to 1 MHz/division.

RF:RF_PHASe:LABel

This command specifies the label for the RF Phase vs. Time trace.

Conditions MDO4000/B models only.

Group RF

Syntax

```
RF:RF_PHASe:LABel <QString>
RF:RF_PHASe:LABel?
```

Related Commands RF:RF_AMPlitude:LABel, RF:RF_FREQuency:LABel, RF:LABel

Arguments <QString> is a quoted string of up to 32 characters.

RF:RF_PHASe:REFERence:DEGrees

This command sets or returns the phase, in degrees, at the trigger point for the RF_PHASe time domain trace. The value can range from –180 to +180 degrees. The default is 0.0 degrees and the resolution is 1.0 degrees.

Conditions MDO models only.

Group RF

Syntax

```
RF:RF_PHASe:REFERence:DEGrees?
RF:RF_PHASe:REFERence:DEGrees <NR3>
```

RF:RF_PHASe:VERTical:POSition

This command specifies the vertical position for RF Phase vs. Time trace. The position value determines the vertical graticule location at which the trace is displayed. Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The minimum is -50 divisions and the maximum is 50 divisions with a resolution of 0.02 divisions.

Conditions MDO4000/B models only.

Group RF

Syntax

```
RF:RF_PHASe:VERTical:POSition <NR3>
RF:RF_PHASe:VERTical:POSition?
```

Related Commands RF:RF_PHASe:VERTical:SCAle

Arguments <NR3> is a floating point number that specifies the vertical position.

Examples `RF:RF_PHASe:VERTical:POSition –1` sets the vertical position of the RF Phase vs. Time trace to –1 division.

`RF:RF_PHASe:VERTical:POSition?` might return 0.0E+0, indicating a vertical position of 0.

RF:RF_PHASe:VERTical:SCAle

This command specifies the vertical scale for RF Phase vs. Time trace. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Conditions MDO4000/B models only.

Group RF

Syntax

```
RF:RF_PHASe:VERTical:SCAle <NR3>
RF:RF_PHASe:VERTical:SCAle?
```

Related Commands RF:RF_PHASe:VERTical:POSition

Arguments <NR3> is a floating point number that specifies the vertical scale.

Examples `RF:RF_PHASe:VERTical:SCAle 50` sets the vertical scale to 50 degrees/division.

`RF:RF_PHASe:VERTical:SCAle?` might return 50.0000, indicating that the vertical scale has been set to 50 degrees/division.

RF:RF_PHASe:WRAP:DEGrees

Sets or returns the number of degrees to wrap the RF_PHASe time domain trace. The value can range from –180.0 to 54,000.0 degrees. The default is 360.0 degrees and the resolution is 180.0 degrees.

Conditions MDO models only

Group RF

Syntax

```
RF:RF_PHASe:WRAP:DEGrees?
RF:RF_PHASe:WRAP:DEGrees <NR3>
```

RF:RF_PHASe:WRAP:STATE

Sets or returns the state of the phase wrap control for the RF_PHASE time domain trace. The default is 1, meaning that wrapping the RF_PHASe time domain trace is enabled.

Conditions MDO models only

Group RF

Syntax
```
RF:RF_PHASe:WRAP:STATE?
RF:RF_PHASe:WRAP:STATE <Boolean>
```

RF:RF_V_TIMe:BANDWidth

Sets or returns the RF versus time bandwidth as an NR3 value in Hz. This is the same as the "RF v T BW" readout, which is displayed when at least one of the RF Versus Time traces is on.

Conditions MDO4000/B only

Group RF

Syntax
```
RF:RF_V_TIMe:BANDWidth?
RF:RF_V_TIMe:BANDWidth
```

RF:SCAle

This command specifies the overall vertical scale setting of the frequency domain window. The lower limit is 0.1 dB/division. The upper limit is 100dB/division. The vertical scale is adjustable in a 1–2–5 sequence.

Conditions MDO models only.

Group RF

Syntax
```
RF:SCAle <NR3>
RF:SCAle?
```

Arguments <NR3> is a floating point number.

Examples RF:SCAle 10 sets the vertical scale to 10 dB/division.

RF:SCAle? might return 10.000, indicating that the vertical scale has been set to 10 dB/division.

RF:SPAN

This command specifies the span setting. The span is the range of frequencies that can be observed around the center frequency. This is the width of the frequency domain trace, which is equal to the stop frequency minus the start frequency.

The maximum span varies according to the oscilloscope model. For the 4000 series models, the maximum span is either 3 GHz or 6 GHz. For the MDO3000 series models, the maximum span matches the analog bandwidth rating; however, if the MDO3SA option is installed, then the maximum span is 3 GHz.

NOTE. *For the parameters RF:STARt, RF:STOP, RF:FREQuency and RF:SPAN, when any one of the parameters is changed, the following relationship is enforced:*

START = FREQ – SPAN/2

STOP = FREQ + SPAN/2

FREQ = (START + STOP)/2

SPAN = STOP – START

Conditions MDO models only.

Group RF

Syntax
```
RF:SPAN <NR3>
RF:SPAN?
```

Related Commands RF:FREQuency, RF:STARt, RF:STOP

Arguments <NR3> is a floating point number.

Examples RF:SPAN 2E9 sets the span to 2 GHz.

RF:SPAN? might return 10.0000E+6, indicating the span is 10MHz.

RF:SPANRbwratio

This command specifies the ratio of the span to the resolution bandwidth (RBW) that will be used when the RBW Mode is set to AUTO. (In order to set the RBW Mode to AUTO, use the command RF:RBW:MODe.)

The span is the width of the frequency domain trace in Hz, which is equal to the stop frequency minus the start frequency. The RBW is the width of the narrowest measurable band of frequencies in a frequency domain trace. The default RBW ratio is a factor of 1000.

Conditions MDO models only.

Group RF

Syntax

```
RF:SPANRbwratio <NR3>
RF:SPANRbwratio?
```

Arguments <NR3> is a floating point number.

Examples RF:SPANRbwratio 1000 would force the scope to adjust the RBW to one one-thousandth of the span.

RF:SPANRbwratio? might return 1.0000E+3, which means the RBW has been set to one one-thousandth of the span.

RF:SPECTRogram (No Query Form)

Clears the spectrogram.

Conditions Available for MDO4000/B and MDO3000 series models only.

Group RF commands

Syntax RF:SPECTRogram {CLEAR}

Arguments CLEAR clears the spectrogram.

Examples RF:SPECTR CLEAR clears the spectrogram.

RF:SPECTRogram:NUMSLICEs? (Query Only)

This query returns the number of spectrogram slices that are currently being rendered. A spectrogram slice is a section of the spectrogram representing one interval, or slice, of time in the spectrogram record.

Conditions MDO models only.

Group RF

Syntax `RF:SPECTRogram:NUMSLICEs?`

Related Commands RF:SPECTRogram:STATE,RF:SPECTRogram:NUMSLICEs?,

Examples `RF:SPECTRogram:NUMSLICEs?` might return 85, indicating that the spectrogram is made up of 85 individual time slices.

RF:SPECTRogram:SLICESELect

This command specifies the spectrogram slice number that is to be displayed.

The slice can only be selected or changed when acquisitions have been stopped. As soon as acquisitions start again, the slice number is reset to 0 (the latest slice). Attempts to select a slice number outside of range, or when acquisitions are running, are ignored. The query form returns the currently selected spectrogram slice.

To use this command, first turn on the spectrogram (RF:SPECTRogram:STATE). Then query the number of slices (RF:SPECTRogram:NUMSLICEs?). Stop the acquisition when you've reached the number of desired slices. Then select the slice to display (RF:SPECTRogram:SLICESELect).

Each slice of the spectrogram corresponds to a single RF acquisition. The FFT samples the entire spectrum for the incoming signal (at the rate with which new spectrums are acquired). The newest spectrum is on the bottom edge of the spectrogram, and the oldest is on the top edge. When the oscilloscope is stopped, you can scroll "back in time" through the spectrogram using the spectrum slice control. When you select a spectrogram slice, it is displayed in the bottom window as the RF Normal trace.

NOTE. *When acquisitions are stopped and the spectrogram is displayed, the spectrogram slice trace is displayed as the RF Normal frequency domain trace.*

Conditions MDO models only.

Group RF

Syntax
```
RF:SPECTRogram:SLICESELect <NR1>
RF:SPECTRogram:SLICESELect?
```

Related Commands RF:SPECTRogram:STATE, RF:SPECTRogram:NUMSLICEs?,

Arguments <NR1> is an integer that specifies the spectrogram slice number that is to be displayed.

For the MDO4000/B models, allowable slice numbers range from 0 to –327 in full-screen mode, and 0 to –147 in split-screen mode. For MDO3000 models, there is no split-screen mode – the slice numbers always range from 0 to –197. (The range is negative because the numbering starts with the latest slice (0) and proceeds backwards in time.)

Examples `RF:SPECTRogram:SLICESELect -5` would select the slice that is five acquisitions before the most recent one.

`RF:SPECTRogram:SLICESELect?` might return 0, indicating that the latest spectrogram slice is being displayed.

RF:SPECTRogram:SLICETIMe? (Query Only)

Returns the time stamp of the selected spectrogram slice (specified using `:RF:SPECTRogram:SLICESELect)`.

The value represents the number of seconds since spectrogram acquisitions were started after the instrument was powered up, or since the spectrogram was cleared (see RF:SPECTRogram).

Group RF commands

Syntax
```
RF:SPECTRogram:SLICETIMe?
```

Examples `RF:SPECTR:SLICETIME?` returns 0.0E+0.

RF:SPECTRogram:STATE

This command switches the frequency domain spectrogram display on or off.

The spectrogram illustrates how frequency and amplitude change over time. It is useful for monitoring slowly-changing RF events, and for identifying low amplitude signals too subtle for the eye to catch in a regular frequency domain display. The x-axis shows frequency, and the y-axis shows time. Amplitude is represented by the color of the trace. Cold colors (blue, green) indicate low amplitude, and hot colors (red, yellow) indicate high amplitude. When acquisitions are stopped, you can navigate back through each spectrum slice in the spectrogram by using the RF:SPECTRogram:NUMSLICEs? and RF:SPECTRogram:SLICESELect commands.

Conditions MDO models only.

Group RF

Syntax

```
RF:SPECTRogram:STATE {OFF|ON|0|1}
RF:SPECTRogram:STATE?
```

Related Commands RF:SPECTRogram:NUMSLICEs?, RF:SPECTRogram:SLICESELect

Examples `RF:SPECTRogram:STATE ON` or `1` turns the frequency domain spectrogram display on.

`RF:SPECTRogram:STATE?` might return 0, indicating that the spectrogram function is off.

RF:SPECTRogram:TIMe? (Query Only)

Queries the number of seconds in the spectrogram since continuous acquisition started. The value returned is always <= 0.

Group RF commands

Syntax

```
RF:SPECTRogram:TIMe?
```

Examples `RF:SPECTR:TIME?` might return -66.8174, indicating that there were 66.8174 seconds in the spectrogram since continuous acquisition started.

RF:SPECTRUMMode

When only the frequency domain waveforms are displayed (no time domain waveforms), you can choose whether the MDO4000/B should use Triggered mode or Free Run mode. (MDO3000 series models only use Free Run mode.) When Triggered mode is selected, you can control all trigger settings, including Normal and Auto triggering. When Free Run mode is selected, the oscilloscope generates RF acquisitions as fast as possible. The default is `FREErun.` (On an MDO4000/B series model, in order to display only the frequency domain waveforms, you need turn off all time domain waveforms, including channels 1- 4, digital channels 0 - 15, buses, time domain math waveforms, time domain reference waveforms, and any RF vs. Time traces.)

When the MDO4000/B oscilloscope displays both time and frequency domain waveforms, then the instrument's trigger system is in control of the Triggered mode and the RF acquisitions.

NOTE. *Note: the Free Run spectrum mode is only possible when all analog and digital channels are turned off.*

Conditions MDO4000/B models only.

Group RF

Syntax

```
RF:SPECTRUMMode {TRIGgered|FREErun}
RF:SPECTRUMMode?
```

Arguments

`TRIGgered` ties RF acquisitions to the scope's unified triggering system for all channels.

`FREErun` acquires RF data as often as processing allows, without waiting for trigger events.

Examples

`RF:SPECTRUMMode TRIG` sets the RF spectrum mode to TRIGgered.

`RF:SPECTRUMMode?` might return FREERUN, indicating the spectrum mode is free run, the default.

RF:SPECTRUMTrace (No Query Form)

Resets the spectrum traces, `RF_MINHold, RF_MAXHold and RF_AVErage.`

Group RF commands

Syntax `RF:SPECTRUMTrace {RESET}`

Examples `RF:SPECTRUMTRACE RESET` resets the spectrum traces: `RF_MINHold`, `RF_MAXHold` and `RF_AVErage`.

RF:SQUELCH:STATE

This command turns the squelch control on or off for the RF Frequency vs. Time and RF Phase vs. Time traces. When squelch is on, only the portions of these traces where the amplitude exceeds the squelch threshold are displayed. This prevents the display of Phase and/or Frequency for signals that are at or near noise levels. The RF amplitude can be observed in the RF Amplitude vs. Time trace.

Conditions MDO4000/B models only.

Group RF

Syntax
```
RF:SQUELCH:STATE {OFF|ON|0|1}
RF:SQUELCH:STATE?
```

Related Commands RF:SQUELCH:THReshold

Examples `RF:SQUELCH:STATE ON` turns the squelch control on.

`RF:SQUELCH:STATE?` might return 0, indicating that squelch has been turned off.

RF:SQUELCH:THReshold

This command specifies the squelch threshold level, in volts, for the RF Frequency vs. Time and RF Phase vs. Time traces.

Conditions MDO4000/B models only.

Group RF

Syntax
```
RF:SQUELCH:THReshold <NR3>
RF:SQUELCH:THReshold?
```

Related Commands RF:SQUELCH:STATE

Arguments <NR3> is a floating point number.

Examples RF:SQUELCH:THReshold 200.0000E-6 sets the squelch threshold level to 200 µV.

RF:SQUELCH:THReshold? might return 22.0000E-6, indicating the squelch threshold level is 22 µV.

RF:STARt

This command specifies to exclude frequencies below a certain level from use.

NOTE. *For the parameters RF:STARt, RF:STOP, RF:FREQuency and RF:SPAN, when any one of the parameters is changed, the following relationship is enforced:*

START = FREQ — SPAN/2

STOP = FREQ + SPAN/2

FREQ = (START + STOP)/2

SPAN = STOP — START

Conditions MDO models only.

Group RF

Syntax
```
RF:STARt <NR3>
RF:STARt?
```

Arguments <NR3> is a floating point value that represents the Start frequency.

Examples RF:STARt 0 specifies to exclude frequencies below 0 Hz from use.

RF:STARt? might return 0.0E+0, indicating that the Start frequency is 0 Hz.

RF:STOP

This command specifies to exclude frequencies above a certain level from use.

NOTE. *For the parameters RF:STARt, RF:STOP, RF:FREQuency and RF:SPAN, when any one of the parameters is changed, the following relationship is enforced:*

START = FREQ — SPAN/2

STOP = FREQ + SPAN/2

FREQ = (START + STOP)/2

SPAN = STOP — START

Conditions MDO models only.

Group RF

Syntax
```
RF:STOP <NR3>
RF:STOP?
```

Arguments <NR3> is a floating point value.

Examples RF:STOP 3.0000E+9 specifies to exclude frequencies above 3 GHz from use.

RF:STOP? might return 3.0000E+9, the default.

RF:UNIts

This command specifies the vertical units to be used in all RF-related absolute logarithmic amplitudes.

Conditions MDO models only.

Group RF

Syntax
```
RF:UNIts {DBM|DBUW|DBMV|DBUV|DBMA|DBUA}
RF:UNIts?
```

Arguments DBM — Decibel milliwatts.

DBUW — Decibel microwatts.

DBMV — Decibel millivolts.

DBUV — Decibel microvolts.

DBMA — Decibel milliamperes.

DBUA — Decibel microamperes.

Examples

RF:UNIts DBUV sets the units to be used in marker and measurement commands to decibel microvolts.

RF:UNIts? might return DBM, indicating that the current units are in decibel milliwatts.

RF:WINdow

This command specifies which window will be used for the windowing function, which is only used for the three time domain RF traces (RF Amplitude vs. Time, RF Frequency vs. Time and RF Phase vs. Time). The windowing function is a Fast Fourier Transform (FFT) technique used to minimize the discontinuities between successive frames of an RF time domain signal. The MDO4000/B Series Oscilloscope includes a set of standard window functions. The default window is Kaiser.

Conditions

MDO models only.

Group

RF

Syntax

```
RF:WINdow
{RECTangular|HAMming|HANning|BLAckmanharris|KAIser|FLATtop}
RF:WINdow?
```

Arguments

RECTangular — window function equivalent to multiplying all gate data by one (sometimes known as a Dirichlet window).

HAMming — a high or moderate resolution window based on a cosine series.

HANning — a high or moderate resolution window based on a cosine series.

BLAckmanharris — a low-resolution (high dynamic range) window based on a cosine series.

KAIser — a high or moderate resolution window.

FLATtop — a low-resolution (high dynamic range) window.

Examples

RF:WINdow BLA sets the window to BLAckmanharris.

RF:WINDOW? KAISER indicates that the window function is set to the default, Kaiser.

ROSc:SOUrce

This command specifies the source for the time base reference oscillator. The reference oscillator locks to this source. Depending on the command argument that you specify, you can use an external reference or use the internal crystal oscillator as the time base reference.

This command is also useful for synchronizing multiple instruments.

NOTE. *If using an external oscillator, its input frequency variation tolerance needs to be 10MHz +- 1% (ie. 9.9 MHz to 10.1MHz) and 7Vp-p maximum voltage.*

Conditions Available for 4000 series models only. For MDO3000, this query always returns `UNLOCKED`.

Group Miscellaneous

Syntax

```
ROSc:SOUrce {INTERnal|EXTernal}
ROSc:SOUrce?
```

Related Commands ROSc:STATE?

Arguments `INTERnal` specifies to use the internal 10 MHz crystal oscillator as the time base reference.

`EXTernal` specifies to use a user-supplied external signal as the time base reference.

Examples `ROSC:SOURCE?` might return `INTERNAL`, indicating that the 10 MHz crystal oscillator is being used as the time base reference.

ROSc:STATE? (Query Only)

This query returns an enumeration value that indicates the lock state of the reference oscillator specified by the `ROSc:SOUrce` command. The values returned are `LOCKED` or `UNLOCKED`.

Group Miscellaneous

Syntax

```
ROSc:STATE?
```

Related Commands ROSc:SOUrce

Examples `ROSC:STATE?` might return `LOCKED`, indicating that the time base reference is locked.

*RST (No Query Form)

Resets the oscilloscope to the factory default settings. The *RST command does not alter the following:

- Calibration data that affect device specifications
- The Output Queue
- The Service Request Enable Register setting
- The Power-on status clear flag setting
- Alias definitions
- Stored settings
- The *PUD? Response
- Any of the values associated with the DATA command.
- Oscilloscope password

Group Status and Error

Syntax `*RST`

Related Commands FACtory,

RECAll:SETUp,

SAVe:SETUp,

*PSC,

*RCL,

*SAV

Arguments None

Examples `*RST` resets the oscilloscope settings to factory defaults.

*SAV (No Query Form)

Stores the state of the oscilloscope to a specified memory location. You can use the *RCL command to restore the oscilloscope to this saved state at a later time.

Group Save and Recall

Syntax `*SAV <NR1>`

Related Commands *RCL, RECAll:SETUp,

SAVe:SETUp

Arguments `<NR1>` specifies a location in which to save the state of the oscilloscope. Location values range from 1 through 10. Using an out-of-range location value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Examples `*SAV 2` saves the current oscilloscope state in memory location 2.

SAVe:ASSIgn:TYPe

This command specifies the assignment of the data to be saved when the front-panel Save button is pressed.

Group Save and Recall

Syntax
```
SAVe:ASSIgn:TYPe {IMAGe|WAVEform|SETUp}
SAVe:ASSIgn:TYPe?
```

Arguments `IMAGe` assigns the Save button to save screen images.

`WAVEform` assigns the Save button to save waveforms.

`SETUp` assigns the Save button to save setups.

SAVe:EVENTtable:{BUS<x>|B<x>} (No Query Form)

Saves the data from bus<x> to a specified file and location; where x is the bus number (1-4), except MDO3000, which has two buses B1–B2.

NOTE. *External file structure is as follows:*

E: is the USB memory device plugged into the first USB port on the front of the oscilloscope.

F: is the USB memory device plugged into the second USB port on the front of the oscilloscope.

G: and H: are the USB memory device plugged into the USB ports on the rear of the oscilloscope.

I: is the network storage.

However, the MDO3000 only has two ports. E: is on the front and F: is on the rear.

Group Save and Recall

Syntax `SAVe:EVENTtable:{BUS<x>|B<x>} <file path>`

Arguments `<file path>` is a quoted string that defines the file name and path location where the event table will be stored.

NOTE. *<filename> stands for a filename of up to 125 characters, followed by a period (".") and the three-character extension. Waveform files should have a .csv extension for comma-separated spreadsheet format files.*

SAVe:IMAGe (No Query Form)

Saves a capture of the screen image to the specified file. Supported image formats are PNG, Windows Bitmap, and TIFF. The file format is specified by the SAVe:IMAGe:FILEFormat command. The SAVe:IMAGe:INKSaver command determines whether the data is saved in InkSaver mode.

NOTE. *The external file structure is as follows:*

E: is the USB memory device plugged into the first USB port on the front of the oscilloscope.

F: is the USB memory device plugged into the second USB port on the front of the oscilloscope. .(Not available for MDO3000.)

G: and H: are the USB memory device plugged into the USB ports on the rear of the oscilloscope. (Not available for MDO3000 models.)

I: is the network storage.

Group Save and Recall

Syntax `SAVe:IMAGe <file path>`

Related Commands SAVe:ASSIgn:TYPe

Arguments `<file path>` is a filename, including path, where the image will be saved. If you do not specify a directory, the oscilloscope will store the file in the current working directory. File name extensions are not required but are highly recommended.

SAVe:IMAGe:FILEFormat

This command specifies the file format to use for saving screen images.

NOTE. *The file format is not automatically determined by the file name extension. You need to choose a file format with an extension which is consistent with the selected file format.*

Group Save and Recall

Syntax
```
SAVe:IMAGe:FILEFormat {PNG|BMP|TIFf}
SAVe:IMAGe:FILEFormat?
```

Related Commands SAVe:IMAGe

Arguments `PNG` saves the file in Portable Network Graphics format.

`BMP` saves the file in Microsoft Windows bitmap format.

`TIFf` saves the file in Tagged Image File Format.

SAVe:IMAGe:INKSaver

This command specifies the current ink saver setting for the SAVe:IMAGe command. If set to "ON" or "1", images will be generated using the ink saver palette. If set to "OFF" or "0", images will be generated using the standard palette.

Group Save and Recall

Syntax

```
SAVe:IMAGe:INKSaver {OFF|ON|0|1}
SAVe:IMAGe:INKSaver?
```

Related Commands SAVe:IMAGe

Arguments

`OFF` or 0 generates images from the Inksaver palette.

`ON` or 1 generates images using the Standard palette.

SAVe:IMAGe:LAYout

This command specifies the layout to use for saved screen images.

Group Save and Recall

Syntax

```
SAVe:IMAGe:LAYout {LANdscape|PORTRait}
SAVe:IMAGe:LAYout?
```

Arguments

`LANdscape` specifies that screen images are saved in landscape format.

`PORTRait` specifies that screen images are saved in portrait format.

SAVe:MASK (No Query Form)

This command saves the current mask definition to the file specified with a quoted string, into the current working directory. You can recall the mask from the file by using the command RECAll:MASK

NOTE. *If you would like to save the mask definition plus the rest of the scope settings to the current working directory, use the command* `SAVE:SETUP`.

A series of examples showing how to use mask commands for typical tasks is included in an appendix. (See page E-1, *Mask/Limit Command Sequence Examples*.)

Conditions This command requires a DPO4LMT application module.

Group Mask

Syntax `SAVe:MASK <QString>`

Related Commands RECAll:MASK

Arguments `QString` is a quoted string that is the name of the mask definition being saved to the current working directory.

Examples `:SAVE:MASK "FOO.MSK"` will save a copy of the mask "FOO" to the current working directory.

SAVe:SETUp (No Query Form)

Stores the state of the oscilloscope to a specified memory location. You can later use the *RCL command to restore the oscilloscope to this saved state.

NOTE. *External file structure is as follows:*

E: is the USB memory device plugged into the first USB port on the front of the oscilloscope.

F: is the USB memory device plugged into the second USB port on the front of the oscilloscope. (Not available for MDO3000.)

G: and H: are the USB memory device plugged into the USB ports on the rear of the oscilloscope. (Not available for MDO3000 models.)

I: – Z are the network storage.

Group Save and Recall

Syntax `SAVe:SETUp {<file path>|<NR1>}`

Related Commands *RCL, RECAll:SETUp,

*SAV

Arguments `<file path>` is the target location for storing the setup file. <file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>:<dir>/<filename>. <extension> and one or <dir>s are optional. If you do not specify them, the oscilloscope will store the file in the current working directory. <filename> stands for a filename. (Use of wildcard characters

in filenames is not supported.) Filename extensions are not required but are highly recommended. For setups, use the extension ".SET".

<NR1> specifies a location for saving the current front-panel setup. The front-panel setup value ranges from 1 to 10. Using an out-of-range value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Examples

SAVE:SETUP 5 saves the current oscilloscope setup in memory location 5.

SAVE:SETUP "TEK00000.SET" saves the current oscilloscope setup in the file TEK00000.SET in the current working directory.

SAVe:WAVEform (No Query Form)

This command saves the specified waveform to the specified destination reference memory slot, or saves the specified waveform(s) to the specified destination file. The same function can be accomplished from the front panel Menu->save waveform menu. The type of file saved is dependent upon the SAVe:WAVEform:FILEFormat command.

For instruments with the arbitrary waveform feature, the source can be arbitrary waveform edit memory (EMEM) or one of the internal arbitrary waveform locations (ARB1 - ARB4).

Specifying ALL saves all displayed waveforms, depending upon the specified SAVe:WAVEform:FILEFormat, to the specified destination path. ALL can only be used to save all waveforms to a single CSV file (SAVe:WAVEform:FILEFormat SPREADSheet) or to individual ISF files with the path and file name prefix specified by <file path> (SAVe:WAVEform:FILEFormat INTERNal). It cannot be used to save to a reference memory slot.

With the INTERNal format, all displayed waveforms, excluding digital waveforms (D0-15) are saved to files in the specified destination path named as <file path>_<wfm>.isf.

Arbitrary waveforms EMEM, ARB1 - ARB4 are not saved with the :SAVe:WAVEform ALL, <file> command.

For example: With CH1,CH2 and MATH only displayed, the command

:SAVE:WAVEFORM ALL,"E:/MyWaveforms/Test1"

saves

CH1 to E:/MyWaveforms/Test1_CH1.isf

CH2 to E:/MyWaveforms/Test1_CH2.isf

MATH to E:/MyWaveforms/Test1_MATH.isf

For SPREADSheet format, the displayed waveforms are saved to a single CSV file.

Attempting to save a waveform to itself, such as: :

SAVe:WAVEform REF1,REF1

:SAVe:WAVEform ARB1,ARB1

results in an error event: 100,"Command error; Source and destination are the same; ..

The MATLAB Level 5 file format description is as follows:

The RF_BB_IQ data can be exported to a file in a format that is readable by MATLAB when RF_BB_IQ is saved with the MATLAB file format, which is specified using :SAVe:WAVEform:FILEFormat:RF_BB_IQ MATLAB. The MATLAB file format is the Level 5 format described in the "MAT-File Format R2013a" document available from the MathWorks web site at http://www.mathworks.com/help/pdf_doc/matlab/matfile_format.pdf. This section describes our use of the Level 5 format for the export of RF_BB_IQ data from the instrument. Please reference the MAT-File Format document for detailed information about the file header and data elements.

The 128-byte header is comprised of the following fields:

Descriptive Text (116 bytes):

MATLAB 5.0 MAT-file, Platform: <ID>, Created on: <date>

where:

<ID> is the instrument ID string of the form:

TEK/MSO4104B/SN C001023/FV v2.97061

<date> is the date/time of the form:

Tue Aug 6 18:30:28 2013

This 116-byte field is padded at the end with spaces.

Subsystem Data Offset (8 bytes):

This is always written as 8 ASCII spaces (0x20).

Version (2 bytes):

This is the MATLAB file format version number and is always written as 0x0100.

How this is read is determined by the next field.

Endian Indicator (2 bytes):

This is written as a 16-bit value of ('M' << 8) | 'I' and is used by the reader to

determine whether byte swapping is needed. If it reads as MI, then no byte swapping is needed.

The pertinent instrument settings, comprised of center frequency, span and sample rate are written as miMATRIX elements. Each of these elements have an ASCII name and the values are miDOUBLE:

CenterFreq is the center frequency in hertz.

Span is the frequency span in hertz.

SampleRate is the sampling rate in samples per second.

Each of these is written as an miMATRIX element, a complex record of the following format:

Array Type (4 bytes) = miMATRIX (14)

Array Size (4 bytes) = 56 + nameLen + padding

nameLen is the string length of the name

padding = (8 - (nameLen % 8)) % 8

Type of Array Flags (4 bytes) = miUINT32 (6)

Size of Array Flags (4 bytes) = 8

Array Flags (8 bytes) = 0 0 0 mxDOUBLE_CLASS=6 0 0 0 0

Dimensions Array Type (4 bytes) = miINT32 (5)

Dimensions Array Length (4 bytes) = 8

X Dimension (4 bytes) = 1

Y Dimension (4 bytes) = 1

Array Name Type (4 bytes) = miINT8 (1)

Array Name Length (string length of name - e.g. 10 for CenterFreq)

Array Name (including pad bytes which are 0's) (see Array Size above)

Array Data Element Type (4 bytes) = miDOUBLE (9)

Size of Array (4 bytes) = 8

The Instrument Setting Value (8 bytes)

Pad Bytes: 0 or more 0 bytes to end the record on an 8-byte boundary

The actual IQ data record with values written as single precision floating point values (miSINGLE):

The I data array is written first:

Array Type (4 bytes) = miSINGLE (7)

Array Size (4 bytes) = 56 + nameLen + padding

nameLen is the string length of the name

padding = (8 - (nameLen % 8)) % 8

Type of Array Flags (4 bytes) = miUINT32 (6)

Size of Array Flags (4 bytes) = 8

Array Flags (8 bytes) = 0 0 miFLAGS_COMPLEX=8 mxSINGLE_CLASS=7 0 0 0 0

Dimensions Array Type (4 bytes) = miINT32 (5)

Dimensions Array Length (4 bytes) = 8

X Dimension (4 bytes) = number of IQ samples (IQ record length)

Y Dimension (4 bytes) = 1

Array Name Type (4 bytes) = miINT8 (1)

Array Name Length (string length of name - e.g. 6 for IQData)

Array Name (including pad bytes which are 0's) (see Array Size above)

Array Data Element Type (4 bytes) = miSINGLE (7)

Size of Array (4 bytes) = (IQ record length) * 4

The I data values as 4-byte floating point values

Pad Bytes: 0 or more 0 bytes to end the record on an 8-byte boundary

The Q data is written next:

Data Type (4 bytes) = miSINGLE (7)

Size of Array (4 bytes) = (IQ record length) * 4

The Q data values as 4-byte floating point values

Pad Bytes: 0 or more 0 bytes to end the record on an 8-byte boundary

NOTE. *The external file structure is as follows:*

E: is the USB memory device plugged into the first (left) USB port on the front of the oscilloscope.

F: is the USB memory device plugged into the second (right) USB port on the front of the oscilloscope. (Not available for MDO3000).

G: and H: are the USB memory device plugged into the USB ports on the rear of the oscilloscope. (Not available for MDO3000 models.)

I: – Z: are for network storage.

Group Save and Recall

Syntax `SAVe:WAVEform <Source>,<Destination>`

Related Commands RECAll:WAVEform,

SAVe:WAVEform:FILEFormat

Arguments <source> can be one of:

`CH1-4, MATH, REF1-4` -

These sources can be saved to REF1-4, an ISF or CSV file. For instruments with the arbitrary waveform feature, these sources can be saved to EMEM (edit memory) with the restriction that MATH and REF1-4 sources must be time domain waveforms. Waveform sources with record lengths greater than 131072 points saved to EMEM are decimated to fit in the 131072 point edit memory.

`D0-D15` -

These digital waveform sources can only be saved to CSV files and, for instruments with the arbitrary waveform feature, to EMEM.

`EMEM` (instruments with the arbitrary waveform feature) - EMEM is the arbitrary waveform edit memory. EMEM can be saved to a CSV file or to one of the 4 internal arbitrary waveform storage locations (ARB1-4).

`ARB1-4` is one of the internal arbitrary waveform storage locations. These sources can only be saved to ARB1-4 or to a CSV file. ARB1-4 can be copied to another of the internal arbitrary waveform storage locations: e.g. :SAVe:WAVEform ARB1,ARB2. To recall from an arbitrary storage location to EMEM, use the :RECAll:WAVEform command.

`RF_NORMal, RF_AVErage, RF_MAXHold, RF_MINHold` - These sources can be saved to REF1-4, an ISF or CSV file

RF_BB_IQ – specifies to save baseband I & Q data. This file format is automatically saved using a .TIQ file extension. You can import .TIQ files into Tektronix SignalVu-PC software (PC based), SignalVu software (oscilloscope based), RSAVu software (PC based) or into a Tektronix real-time spectrum analyzer for pulse analysis and demodulation analysis.

ALL - Specifies all displayed waveforms subject to the restrictions indicated in the note below for saving ALL waveforms.

<destination> can be one of:

REF1-4 - For saving a single scope waveform to one of the 4 internal reference waveform memory storage locations (see descriptions for source waveforms above for which waveforms can be saved to REF1-4).

EMEM - For instruments with the arbitrary waveform feature, scope waveforms (CH1-4, MATH, REF1-4, D0-D15) can be saved to arbitrary waveform edit memory. MATH and REF1-4 waveforms can only be time domain.

ARB1-ARB4 - For instruments with the arbitrary waveform feature, EMEM can be saved to one of the 4 internal arbitrary waveform memorylocations. Additionally, ARB1-4 can be copied to another of the internal arbitrary waveform memory locations: e.g. :SAVe:WAVEform ARB1,ARB2

<file path> - Specifies the destination file path to save the specified waveform(s). The file path is a quoted string that specifies the file name and path. Specify the file path using the form <drive>:<dir>/<filename>. <drive> and one or more <dir>s are optional. If you do not specify them, the instrument will write the waveform to the current working directory. <filename> stands for a filename of up to 125 characters, followed by a period (".") and the three-character extension. Waveform files should have a .isf extension for internal save format files or a .csv extension for comma-separated value format files. The fileformat is specified using the SAVe:WAVEform:FILEFormat:RF_BB_IQ command.

Examples

SAVE:WAVEFORM CH1,REF1 saves the CH1 waveform to reference memory location 1.

SAVE:WAVEFORM ALL,"E:/test_folder/test1_all.csv" saves all displayed waveforms (excluding serial bus waveforms) to E:/test_folder/test1_all.csv when the file format is set to SPREADSHEET.

SAVe:WAVEform ALL,"E:/test_folder/test1" saves all displayed waveforms (excluding serial bus waveforms and digital channels for MSO/MDO models) to individual files named E:/test_folder/test1_<wfm>.isf (for example test1_CH1.isf) when the file format is set to INTERNAL.

SAVe:WAVEform:FILEFormat

This command specifies the file format to be used when saving waveforms – either an internal format, .ISF, or an external comma-delimited spreadsheet format, .CSV, that includes waveform header and timing information.

NOTE. *If the waveform source is RF_BB_IQ (baseband I&Q), then the* `SAVe:WAVEform:FILEFormat` *is not applicable. Use the command* `SAVe:WAVEform:FILEFormat:RF_BB_IQ` *instead.*

Group Save and Recall

Syntax

```
SAVe:WAVEform:FILEFormat {INTERNal|SPREADSheet}
SAVe:WAVEform:FILEFormat?
```

Related Commands CURVe,

DATa,

DATa:STARt,

DATa:STOP,

SAVe:WAVEform,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments `INTERNal` specifies to save waveforms using an internal format. The file name should be specified with .ISF filename extension. These files can be recalled as reference waveforms.

`SPREADSheet` specifies that waveform data is saved in a format that contains comma delimited values. These waveform data files should be named using the .CSV filename extension. Saving waveforms in .CSV format enables spreadsheet programs to import the data.

Examples `SAVE:WAVEFORM:FILEFORMAT INTERNAL` specifies that the internal .ISV file format is the format specified for saved waveforms.

`SAVE:WAVEFORM:FILEFORMAT?` might return `:SAVE:WAVEFORM:FILEFORMAT SPREADSHEET` indicating that waveforms are saved using the comma-delimited .CSV format, enabling them to be imported by spreadsheet programs.

SAVe:WAVEform:FILEFormat:RF_BB_IQ

This command specifies the file format for saving the RF baseband I & Q data. The default format is TIQ. See the description of the SAVe:WAVEform command for detailed information about these formats.

Group Save and Recall

Syntax

```
SAVe:WAVEform:FILEFormat:RF_BB_IQ {TIQ|MATLAB}
SAVe:WAVEform:FILEFormat:RF_BB_IQ?
```

Arguments

`TIQ` specifies to use the TIQ file format for saving the RF baseband I & Q data.

`MATLAB` specifies to use the MATLAB file format for saving the RF baseband I & Q data.

Examples

`SAVE:WAVEFORM:FILEFORMAT:RF_BB_IQ TIQ` specifies the the TIQ file format for saving the RF baseband I & Q data.

`SAVE:WAVEFORM:FILEFORMAT:RF_BB_IQ?` might return `:SAVE:WAVEFORM:FILEFORMAT MATLAB` indicating that `MATLAB` is the currently selected file format for saving the RF baseband I & Q data.

SAVe:WAVEform:GATIng

Specifies whether save waveform operations should save the entire waveform (NONe) or a specified portion of the waveform.

Group Save and Recall

Syntax

```
SAVe:WAVEform:GATIng {NONe|CURSors|SCREEN}
SAVe:WAVEform:GATIng?
```

Arguments

`CURSors` turns on cursors and the gates are the waveform record points at the cursor positions.

`NONe` saves the entire waveform.

`SCREEN`, if zoom is on, the gates are the start and end waveform record points of the zoom (upper) graticule, otherwise the gates are the start and end waveform record points of the main graticule.

Examples SAVE:WAVEFORM:GATING CURSors specifies that, when the waveform gating is set to cursors, save waveform operations should save the waveform points between the cursors. If cursors are turned off, waveform gating automatically reverts to NONE.

SEARCH? (Query Only)

Returns all search-related settings.

Group Search

Syntax SEARCH?

Examples SEARCH? might return:

```
:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI:COND SS;DAT:MOSI:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI: DAT:MISO:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI:DAT:SIZ
1;:SEARCH:SEARCH1:TRIG:A:BUS:B1:I2C:COND
STAR;DAT:VAL "XXXXXXXX";SIZ 1;DIR
NOCARE;:SEARCH:SEARCH1:TRIG:A:BUS:B1:I2C:ADDR:MOD ADDR7;TYP
USER;VAL "XXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:CAN:COND
SOF;FRAME DATA;DAT:VAL "XXXXXXXX";SIZ 1;D IR
NOCARE;QUAL EQU;:SEARCH:SEARCH1:TRIG:A:BUS:B1:CAN:ID:MOD
ST;VAL "XXXXXXXXXXX";:SEARCH:SEARCH1:TRI
G:A:BUS:B2:SPI:COND SS;DAT:MOSI:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B2:SPI:DAT:MISO:VAL
"XXXXX XXX";:SEARCH:SEARCH1:TRIG:A:BUS:B2:SPI:DAT:SIZ
1;:SEARCH:SEARCH1:TRIG:A:BUS:B2:I2C:COND
STAR;DAT:VAL "XXXXXXXX";SIZ 1;DIR
NOCARE;:SEARCH:SEARCH1:TRIG:A:BUS:B2:I2C:ADDR:MOD ADDR7;TYP
USER;VAL "XXXXXXX" ;:SEARCH:SEARCH1:TRIG:A:BUS:B2:CAN:COND
SOF;FRAME DATA;DAT:VAL "XXXXXXXX";SIZ 1;DIR NOCARE;QUAL
EQU; :SEARCH:SEARCH1:TRIG:A:BUS:B2:CAN:ID:MOD ST;VAL
"XXXXXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:SOU B1;:SEA
RCH:SEARCH1:TRIG:A:TYP EDG;LEV 0.0000;LEV:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH
0.0000;RE F1 0.0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:UPP:CH1 800.0000E-3;CH2
800.000 0E-3;CH3 800.0000E-3;CH4 800.0000E-3;MATH
800.0000E-3;REF1 800.0000E-3;REF2 800.0000E-3;REF3 800.000
0E-3;REF4 800.0000E-3;:SEARCH:SEARCH1:TRIG:A:LOW:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH 0.
0000;REF1 0.0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:EDGE:SOU CH1;SLO
```

```
RIS;:SE ARCH:SEARCH1:TRIG:A:LOGI:FUNC AND;THR:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH
0.0000;REF1 0 .0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:LOGI:INP:CH1 X;CH2 X;CH3
X;CH4 X;MA TH X;REF1 X;REF2 X;REF3 X;REF4 X;CLOC:SOU
NONE;EDGE RIS;:SEARCH:SEARCH1:TRIG:A:LOGI:PAT:INP:CH1
X;CH 2 X;CH3 X;CH4 X;MATH X;REF1 X;REF2 X;REF3 X;REF4
X;:SEARCH:SEARCH1:TRIG:A:LOGI:PAT:WHE TRU;WHE:LESSL
8.0000E-9;L 8.0000E-9;:SEARCH:SEARCH1:TRIG:A:PULSEW:SOU
CH1;POL POS;WHE LESS;WID 8.0000E-9;:SEA
RCH:SEARCH1:TRIG:A:RUNT:SOU CH1;POL POS;WHE OCCURS;WID
8.0000E-9;:SEARCH:SEARCH1:TRIG:A:TRAN:SOU CH1 ;POL POS;WHE
SLOW;DELT 8.0000E-9;:SEARCH:SEARCH1:TRIG:A:SETH:CLOC:SOU
CH1;EDGE RIS;THR 0.0000;:SEARC H:SEARCH1:TRIG:A:SETH:DAT:SOU
CH2;THR 0.0000;:SEARCH:SEARCH1:TRIG:A:SETH:HOLDT
8.0000E-9;SETT 8.0000 E-9;:SEARCH:SEARCH1:STATE 0
```

SEARCH:SEARCH<x>:COPy (No Query Form)

Copies the search criteria to the trigger, or the trigger criteria to a search. <x> is the search number, which is always 1.

Group Search

Syntax `SEARCH:SEARCH<x>:COPy {SEARCHtotrigger|TRIGgertosearch}`

Arguments `SEARCHtotrigger` copies the search criteria to the trigger

`TRIGgertosearch` copies the trigger criteria to the search

SEARCH:SEARCH<x>:LIST? (Query Only)

This query returns a list of all automatically created search marks on waveforms in the time domain (leaving out any manually created marks). These automatic marks are created using a search command. The entries returned are in the form of an enumeration representing the source waveform, followed by 7 time mark parameters. `SEARCH<x>` is the search number, which is always 1. To return a list of manual marks, use the query form of MARK:USERLIST.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.)*

Group Search

Syntax `SEARCH:SEARCH<x>:LIST?`

Related Commands MARK:USERLIST, MARK:SAVEALL

Returns The query is returned in the form: (<Enum>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>) ..

<Enum> is the source waveform.

The 7 NR3 time mark parameters returned are as follows:

Start — start value in percent of record

End — end value in percent of record

Focus — focus value in percent of record

X value — horizontal value of the focus point in the mark's waveform units

Y value — vertical value of the focus point in the mark's waveform units

Delta X value — always 0, since there is no time-domain reference mark.

Delta Y value — always 0, since there is no time-domain reference mark.

Examples `SEARCH:SEARCH1:LIST?` might return CH1,23.6824,23.6824,23.6824,-1.0527E-3,-26.7798,0.0E+0,0.0E+0;CH1,50.0050, 50.0050,50.0050,200.0200E-9,-25.4704,0.0E+0,0.0E+0;CH1, 76.3376,76.3376,76.3376,1.0535E-3,0.0E+0,0.0E+0,0.0E+0 which indicates three search marks on Channel 1.

SEARCH:SEARCH<x>:STATE

Sets the search state to on or off. <x> is the search number, which is always 1. The query form returns the search state.

A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, *Search and Trigger Command Sequence Examples*.)

Group Search

Syntax
```
SEARCH:SEARCH<x>:STATE {<NR1>|OFF|ON}
SEARCH:SEARCH<x>:STATE?
```

Arguments

OFF or <NR1> = 0 sets the search state to off.

ON or <NR1> ≠ 0 sets the search state to on.

SEARCH:SEARCH<x>:TOTal? (Query Only)

Returns the total number of matches for the search. The total number of matches may be than the number of marks placed. <x> is the search number, which is always 1.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.)*

Group

Search

Syntax

SEARCH:SEARCH<x>:TOTal?

Returns

<NR1> is the total number of matches.

SEARCH:SEARCH<x>:TRIGger:A:BUS? (Query Only)

Queries the SEARCH:SEARCH<x>:TRIGger:A:BUS settings. <x> is the search number, which is always 1. There are four buses, B1 through B4, except for MDO3000, which only has two buses, B1–B2.

To set the search type to bus, use SEARCH:SEARCH<x>:TRIGger:A:TYPe BUS.

NOTE. *Parallel bus commands work with MSO4000B Series, MDO4000/B Series, and MDO3000 Series oscilloscopes only.*

Conditions

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3COMP.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals on the MDO4000/B and MSO4000B and DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

A table is available listing the commands enabled by each application module. (See page G-1, *Application Module-enabled Commands*.)

Group Search

Syntax `SEARCH:SEARCH<x>:TRIGger:A:BUS?`

Returns `I2C` specifies the Inter-IC bus.

`SPI` specifies the Serial Peripheral Interface bus (not available on two-channel models).

`CAN` specifies the Controller Area Network bus.

`RS232C` specifies the RS-232C bus.

`PARallel` specifies the Parallel bus.

`USB` specifies the USB bus.

`LIN` specifies the LIN bus.

`FLEXRay` specifies the FlexRay bus.

`AUDio` specifies the audio bus.

ETHERnet specifies the Ethernet bus.

MIL1553B specifies the MIL-STD-1553 bus.

Examples

```
SEARCH:SEARCH1:TRIGGER:A:BUS? might return
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:CONDITION
SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:CONDITION
SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B3:SPI:CONDITION
SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B4:SPI:CONDITION
SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:DATA:MOSI:VALUE "XX".
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition

This command sets the condition (start of frame or matching data) to be used to search on audio bus data. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000 models, which only have two buses, B1–B2.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition
{SOF|DATA}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition?
```

Arguments

SOF specifies to search on the start of frame.

DATA specifies to search on matching data.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue

This command sets the upper word value to be used to search on audio bus data. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue to search on the lower word value.) The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue <String>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue?
```

Arguments `<String>` specifies the upper word value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet

This commands sets the data offset value to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet?
```

Arguments `<NR1>` is the data offset value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier

This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier?
```

Arguments `LESSthan` sets the qualifier to less than.

`MOREthan` sets the qualifier to greater than.

`EQual` sets the qualifier to equal.

`UNEQual` sets the qualifier to not equal.

`LESSEQual` sets the qualifier to less than or equal.

`MOREEQual` sets the qualifier to greater than or equal.

`INrange` sets the qualifier to in range.

`OUTrange` sets the qualifier to out of range.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue

This command sets the lower word value to be used to search on audio bus data. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue to set the upper word value.) The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue
<String>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue?
```

Arguments <String> is the lower word value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD

This command sets the alignment of the data (left, right or either) to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD
{EITher|LEFt|RIGht}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD?
```

Arguments EITher aligns the data to either left or right.

LEFt aligns the data to the left.

RIGht aligns the data to the right.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition

This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used to search on CAN bus data. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition
{SOF|FRAMEtype|IDentifier|DATA|IDANDDATA|EOF|ACKMISS:ERROR}
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition?

Arguments

SOF specifies a search based on the start of frame.

FRAMEtype specifies a search based on the frame type.

IDentifier specifies a search based on the frame identifier.

DATA specifies a search based on the frame data.

IDANDDATA specifies a search based on the frame identifier and data.

EOF specifies a search based on the end of frame.

ACKMISS specifies a search based on the missing ACK field.

ERROR specifies a search based on a bit stuffing error.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection

This command sets the data direction (read, write or nocare) to be used to search on CAN bus data. This only applies if the search condition has been set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection {READ|WRITE|NOCARE}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition

Arguments

READ specifies the read direction.

WRITE specifies the write direction.

NOCARE specifies either a read or write direction.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

This command sets the qualifier (<, >, =, not =, <=) to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|EQual}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue

Arguments

LESSthan searches for bus data less than the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

MOREthan searches for bus data greater than the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

EQual searches for bus data equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

UNEQual searches for bus data not equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

LESSEQual searches for bus data less equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

EQual searches for bus data equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe

This command sets the length of the data string, in bytes, to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe?
```

Arguments <NR1> is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue

This command sets the binary data value to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

Arguments <bin> is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype

This command sets the frame type (data, remote, error or overload) to be used to search on CAN bus data. This only applies if the search condition has been set to FRAMEtype (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype
{DATA|REMote|ERRor|OVERLoad}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype?
```

Arguments

DATA specifies a data frame.

REMote specifies a remote frame.

ERRor specifies an error frame.

OVERLoad specifies an overload frame.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe

This command sets the addressing mode (standard or extended format) to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:MODe {STandard|EXTended}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:MODe?
```

Arguments

`STandard` specifies an 11-bit identifier field.

`EXTended` specifies a 29-bit identifier field.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue

This command sets the binary address value to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:VALue?
```

Arguments `<bin>` is the address in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

When searching through Ethernet data, this command specifies the field or condition to search for. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1–B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:
ETHERnet:CONDition {SFD|MACADDRess|MACLENgth|
IPHeader|TCPHeader|DATa|EOP|IDLe|FCSError|QTAG}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition?
```

Related Commands

Most of the other `SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet` commands are impacted by the setting of this command.

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

BUS:B<x>:ETHERnet:PROTOcol

Arguments

`SFD` — Start of frame delimiter field.

`MACADDRess` — MAC addresses field.

`MACLENgth` — MAC length/type field.

`IPHeader` — IP header field. This argument is only available when PROTOCOL is set to IPv4 (using the command BUS:B<x>:ETHERnet:PROTOcol).

`TCPHeader` — TCP header field. This argument is only available when PROTOCOL is set to IPv4 (using the command BUS:B<x>:ETHERnet:PROTOcol).

`DATa` — TCP/IPv4 or MAC protocol client data field. Use the command BUS:B<x>:ETHERnet:PROTOcol to specify either TCP/IPv4 or OTHER protocol. If the protocol is set to OTHER, DATa refers to the MAC client data.

`EOP` — End of Packet field.

`IDLe` — Idle field.

`FCSError` — Frame Check Sequence Error (CRC) field.

`QTAG` — IEEE 802.1Q (VLAN) control information field. In order to use QTAG as a search condition, the frame type must be set to QTAG (using TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe).

Examples

```
SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:CONDition
MACADDRess
```

sets the condition to search for to `MACADDRESS`.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

When the search condition is set to `DATa`, and the qualifier is set to either `INRange` or `OUTRange`, this command specifies the upper data value of the range. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue to specify the lower data value of the range.) The default is all X's

(don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number B1–B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

Arguments QString is a quoted string whose length varies depending on the size setting, up to 32 bits. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe to specify size.) The allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:HIVALue "XXXXXXXXXXXXXXXXXXXXXXXX00001000" sets the upper limit of the range to XXXXXXXXXXXXXXXXXXXXXXXX00001000.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:HIVALue? might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet

When the search condition is set to DATa, this command specifies where in the data field to look for the data search value. In other words, it specifies the offset into the data field, in bytes, where the value will be matched. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet
<NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

Arguments NR1 is an integer. The minimum and default values are -1 (don't care) and the maximum is 1,499.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:OFFSet 36 sets the data offset to 36 bytes.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:OFFSet? might return –1, indicating that the data offset value is the default value, –1, meaning “don’t care”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

When the search condition is set to DATa, this command specifies the number of contiguous TCP/IPv4/MAC client data bytes to search for. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

Arguments NR1 is an integer. The minimum and default values are 1 and maximum is 16, except when the qualifier is set to either INrange or OUTrange. In these cases, the maximum size is 4.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:SIZe "4" sets the oscilloscope to search for 4 contiguous data bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

When the search condition is set to DATa, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value to search for. When the search condition is set to DATa, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the range. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue to specify the upper limit of the range.) The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

Arguments QString is a quoted string where the allowable characters are 0, 1, and X. The allowable number of characters depends on the setting for size. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe to specify size.) The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:VALue "00001000"` sets the binary data to search on to 00001000, assuming the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, and `DATa:SIZe` is set to 1 byte

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:DATa:VALue "00001000"` sets the lower limit of the range to 00001000, assuming the qualifier is set to `INrange` or `OUTrange`, and `DATa:SIZe` is set to 1 byte.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe

This command specifies which Ethernet frame type to search for: either Basic or QTAG (IEEE 802.1Q, or VLAN tagging). The default is Basic.`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number 1-4.

NOTE. *Once this command is used to specify QTAG, then the command TRIGger:A:BUS:B<x>:ETHERnet:CONDition can be used to specify QTAG as the condition to search on.*

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe
{BASic|QTAG}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments

`BASic` is the standard Ethernet frame.

`QTAG` is the Q-Tag Ethernet frame (also called VLAN tagging.)

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:FRAMETYPe QTAG` sets the frame type to QTag (VLAN tagging).

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:FRAMETYPe?` might return BASIC, indicating the frame type is a standard Ethernet frame.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

When the Ethernet search condition is set to `IPHeader`, this command specifies the value of the 8–bit protocol field that is to be used in the search (along with the source and destination addresses). The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number 1-4.

NOTE. *Commonly used protocol values are 1 (ICMP), 2 (IGMP), 6 (TCP) and 17 (UDP).*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
PROTOcol:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
PROTOcol:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

Arguments `QString` is a quoted string of up to 8 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:ETHERNET:IPHEADER:PROTOCOL:VALUE` "01010010" would set the value to be used in the search to 01010010.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:IPHeader:PROTOcol:VALue?` might return "XXXXXXXX".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

When the Ethernet search condition is set to `IPHeader`, this command specifies the value of the 32–bit source address that will be used in the search (along with

the protocol and destination address). The IP source address is a standard IP address such as 192.168.0.1. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
SOUrceaddr:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
SOUrceaddr:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples TRIGger:A:BUS:B1:ETHERnet:IPHeader:SOUrceaddr:VALue "00011001001000010110100000000001" sets the IP source address to search for to 192.168.0.1.

TRIGger:A:BUS:B1:ETHERnet:IPHeader:SOUrceaddr:VALue might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX01".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

When the Ethernet search condition is set to IPHeader, this command specifies the value of the 32–bit destination address that is to be used in the search (along with the protocol and source address). The IP destination address is a standard IP address such as 192.168.0.1. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
DESTinationaddr:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:
DESTinationaddr:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

Arguments `QString` is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:IPHeader:DESTinationaddr:VALue` “00011001001000010110100000000001” sets the IP destination address to search for to 192.168.0.1.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:IPHeader:DESTinationaddr:VALue` might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX01".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue

When the Ethernet search condition is set to `MACADDress`, this command specifies the 48–bit MAC source address value that is to be used in the search (along with the destination address value). The default is all X’s (don’t care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number 1-4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:
SOUrce:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:
SOUrce:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue

Arguments `QString` is a quoted string of up to 48 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

```
SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:
SOUrce:VALue
```
”XXXXXXXXXX01010111111100000001111010101010101000” would set the MAC destination address to search for to XX:35:FC:07:AA:C8 hex.

```
SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:
SOUrce:VALue?
```
might return ”XXXXXXXXXX01010111111100000001111010101010101000”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue

When the Ethernet search condition is set to `MACADDress`, this command specifies the 48-bit MAC destination address value that is to be used in the search (along with the source address value). The default is all X’s (don’t care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

NOTE. *MAC Addresses are 48–bit values such as 08:00:11:1E:C9:AE hex. Use the command BUS:B<x>:DISplay:FORMat to change the display format to hex.*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:
DESTination:VALue <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:
DESTination:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue

Arguments

`QString` is a quoted string of up to 48 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:DESTination:VALue` ”XXXXXXXXXX01010111111100000001111010101010101000” would set the MAC destination address to search for to XX:35:FC:07:AA:C8 hex.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:DESTination:VALue?` might return ”XXXXXXXXXX010101111111000 0000111101010101010101000”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue

When the Ethernet search condition is set to `MACLENgth`, and the qualifier is set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`, this command specifies the 16–bit value to search for. When the qualifier is set to `INrange` or `OUTrange`, this command specifies the lower limit of the range. (Use the command `SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue` to set the upper limit of the range.) The default is all X’s (don’t care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

Arguments

`QString` is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth|:TYPe}:VALue "XXXXXXXX00001000"` sets the MAC length/type value to search on to the hexadecimal value XX08, assuming the qualifier is set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth|:TYPe}:VALue "XXXXXXXX00001000"` sets the lower limit of the range to the hexadecimal value XX08, assuming the qualifier is set to `INrange` or `OUTrange`.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

When the Ethernet search condition is set to `MACLENgth`, and the qualifier is set to either `INrange` or `OUTrange`, this command specifies the upper data value of this range. (Use the command `SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue` to set the lower limit of the range.) The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue <QString>
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

Arguments

QString is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth| :TYPe}:HIVALue "XXXXXXXX00001000" sets the upper limit of the range to the hexadecimal value XX08 (when the search condition is set to MACLENgth, and the qualifier is set to INrange or OUTrange).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:ETHERNET:MAC{:LENGTH|:TYPE}:HIVALUE? might return "XXXXXXXX00001000".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue

When the Ethernet search condition is set to QTAG, this command specifies the 32–bit QTAG value to search for. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments

QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:ETHERNET:QTAG:VALUE "XXXXXXXXXXXXXXXXXXXX010010001010" would specify to search for the Q-Tag value of hexadecimal XXXXX48A.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:ETHERNET:QTAG:VALUE? might return "XXXXXXXXXXXXXXXXXXXX010010001010".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

This command specifies the qualifier to be used when the Ethernet search condition is set to MACLENgth or DATa. Normally, the Ethernet qualifier is set to "Equal to". SEARCH<x> is the search number, which is always 1, and B<x> is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:QUALifier LESSthan sets the MACLENgth or DATa qualifier to less than.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

When the Ethernet search condition is set to TCPHeader, this command specifies the 32–bit acknowledgement value that is to be used in the search (along with the destination and source port addresses and the sequence number). The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
ACKnum:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
ACKnum:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

Arguments `QString` is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:ACKnum:VALue "XXXXXXXXXXXXXXXXXXXX00001000"` sets the acknowledgement number to be used in the search to hexadecimal XXXXXX08.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

When the Ethernet search condition is set to `TCPHEADER`, this command specifies the 32–bit sequence number that is to be used in the search (along with the destination and source port addresses and the acknowledgement value). The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
SEQnum:VALue <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
SEQnum:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

Arguments

`QString` is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SEQnum:VALue "XXXXXXXXXXXXXXXXXXXX000100010001"` would set the sequence number that is to be used in the search to hexadecimal XXXXX111.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SEQnum:VALue?` might return "XXXXXXXXXXXXXXXXXXXXXXX0010010100" .

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

When the Ethernet search condition is set to `TCPHeader`, this command specifies the 16–bit destination port address that is to be used in the search (along with the acknowledgement value, source port address and the sequence number). The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
DESTinationport:VALue <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
DESTinationport:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

Arguments

`QString` is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:DESTinationport:VALue "XXXXXXXX00100010"` would set the destination port address value that is to be used in the search to hexadecimal XX22.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:DESTinationport:VALue?` might return "XXXXXXXXXXXXXXXX".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

When the Ethernet search condition is set to `TCPHEADER`, this command specifies the 16–bit source port address that is to be used in the search (along with the destination port address, the sequence number and the acknowledgement number). The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
SOUrceport:VALue <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:
SOUrceport:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

Arguments

`QString` is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SOUrceport:VALue` "XXXX000010100110" would set the source port address that is to be used in the search to hexadecimal X0A6.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SOUrceport:VALue?` might return "XXXXX01001010110".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

This command specifies the condition to use when searching on FlexRay bus data (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number B1–B4, except for MDO3000, which has two buses B1–B2.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition
{SOF|FRAMETypeid|CYCLEcount|HEADer|DATA|IDANDDATA|EOF|ERROR}
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition?

Arguments

SOF sets the search condition to start of frame.

FRAMETypeid sets the search condition to a frame type id.

CYCLECount sets the search condition to cycle count.

HEADer sets the search condition to header.

DATA sets the search condition to data.

IDANDDATA sets the search condition to ID and data.

EOF sets the search condition to EOF.

ERROR sets the search condition to an error.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION ERROR sets the FlexRay condition to ERROR

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION SOF indicating the FlexRay condition is start of frame.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue

This command specifies the upper data value of the range to be used when searching on the FlexRay bus cycle count field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue to set the low value.) The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue?

Arguments <QString> is a quoted string that is the cycle count high value.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "110010" sets the cycle count high value to 110010.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE? might return
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "XXXXXX" indicating the cycle count high value is set to don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus cycle count field. The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:
B<x>:FLEXray:CYCLEcount:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:
QUALifier?
```

Arguments LESSthan sets the cycle count qualifier to less than.

MOREthan sets the cycle count qualifier to greater than.

EQual sets the cycle count qualifier to equal.

UNEQual sets the cycle count qualifier to not equal.

LESSEQual sets the cycle count qualifier to less than or equal.

MOREEQual sets the cycle count qualifier to greater than or equal.

INrange sets the cycle count qualifier to in range.

OUTrange sets the cycle count qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER LESSthan` sets the cycle count qualifier to less than.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER EQUAL` indicating the cycle count qualifier is set to =.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue

This command specifies the low data value to be used when searching on the FlexRay bus cycle count field. The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue?
```

Arguments

`<QString>` is a quoted string that is the cycle count binary value.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE "110010"` sets the cycle count value to 110010.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE "XXXXXX"` indicating the cycle count value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue

This command specifies the high value to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition).SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

Arguments <QString> is a quoted string that is the data field high binary value.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "11001010" sets the high value 11001010.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "XXXXXXXX" indicating the high value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet

This command specifies the offset of the data string in bytes to be used when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition).SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet
<NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet?
```

Arguments <NR1> is the data offset in bytes. A byte offset of -1 signifies don't care, and no byte offset is used. The instrument will search or match any byte value that fits.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 10 sets the FLEXRAY data offset to 10 bytes.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 0 indicating the offset is set to 0 bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier?
```

Arguments LESSthan sets the data qualifier to less than.

MOREthan sets the data qualifier to greater than.

EQual sets the data qualifier to equal.

UNEQual sets the data qualifier to not equal.

LESSEQual sets the data qualifier to less than or equal.

MOREEQual sets the data qualifier to greater than or equal.

INrange sets the data qualifier to in range.

OUTrange sets the data qualifier to out of range.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER LESSTHAN sets the data qualifier to less than.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER EQUAL indicating the data qualifier is =.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe

This command specifies the length of the data string, in bytes, to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe?
```

Arguments

<NR1> is the length of the data string in bytes. Length range is 1 to 8.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 8 sets the data size to 8 bytes.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 1 indicating the data size is 1 byte.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue

This command specifies the low value to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

Arguments <QString> is a quoted string that is the low binary data string to be used for a FlexRay search if the search condition is set to IDANDDATA.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE "11001010" sets the binary data string to 11001010.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE "XXXXXXXX" indicates the binary data string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE

This command specifies which end of file type to use (static, dynamic or any) when searching on the FlexRay bus EOF field. The search condition needs to be set to EOF (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE
{STATic|DYNAMic|ANY}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE?
```

Arguments `STATic` sets the FlexRay end of frame type to STATIC.

`DYNAMic` sets the FlexRay end of frame type to DYNAMIC.

`ANY` sets the FlexRay end of frame type to ANY type.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE ANY` sets the FlexRay end of frame type to any type.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE STATIC` indicating the FlexRay end of frame type is static.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE

This command specifies the error type to use when searching on the FlexRay bus signal. The search condition needs to be set to ERROR (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE
{CRCHeader|CRCTrailer|SYNCFrame|STARTupnosync|NULLFRStatic|
NULLFRDynamic}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE?
```

Arguments `CRCHeader` sets the error type to CRC header.

`CRCTrailer` sets the error type to CRC trailer.

`SYNCFrame` sets the error type to sync frame.

`STARTupnosync` sets the error type to start up with no sync.

NULLFRStatic sets the error type to null frame static.

NULLFRDynamic sets the error type to null frame dynamic.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE SYNCFRAME sets the error type to sync frame

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE CRCHEADER indicating the FlexRay error type is CRCHEADER

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue

This command specifies the high value to use when searching on the FlexRay bus frame ID field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue to set the low value.) The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue?
```

Arguments

<QString> is a quoted string representing the binary data string used for FlexRay frame ID high value.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE "00101100101" sets the frame id high value to 00101100101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE "XXXXXXXXXXX" indicating the frame id high value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier

This command specifies the qualifier to use when searching on the FlexRay bus frame ID field. The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:
B<x>:FLEXray:FRAMEID:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:
QUALifier?
```

Arguments

LESSthan sets the frame ID qualifier to less than.

MOREthan sets the frame ID qualifier to more than.

EQual sets the frame ID qualifier to equal.

UNEQual sets the frame ID qualifier to unequal

LESSEQual sets the frame ID qualifier to less than or equal.

MOREEQual sets the frame ID qualifier to greater than or equal.

INrange sets the frame ID qualifier to in range.

OUTrange sets the frame ID qualifier to outside of range.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER OUTRANGE sets the frame ID qualifier to out of range.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER EQUAL indicating the frame ID qualifier is EQUAL.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue

This command specifies the low value to use when searching on the FlexRay bus frame ID field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue to set the high value.) The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue?
```

Arguments <QString> is a quoted string representing the binary data string used for FlexRay frame ID low value.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "11001101010" sets the value of the frame ID is 11001101010.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "10110010101" indicating the value of the frame ID is 10110010101.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType

This command specifies the frame type (normal, payload, null, sync or startup) to use when searching on FlexRay bus data. The search condition needs to be set to FRAMEType (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType
{NORMal|PAYLoad|NULL|SYNC|STARTup}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType?
```

Arguments

NORMal sets the frame type to normal.

PAYLoad sets the frame type to payload.

NULL sets the frame type to NULL.

SYNC sets the frame type to sync.

STARTup sets the frame type to start up.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE STARTUP sets the FlexRay frame type to startup.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE NORMAL indicating the FlexRay frame type is normal.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC

This command specifies the CRC portion of the binary header string to be used when searching on FlexRay bus data. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC?
```

Arguments

<QString> is a quoted string representing the CRC portion of the binary header string used for FlexRay search.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC "00110010101" sets the CRC protion of the binary header string 00110010101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC "XXXXXXXXXXX" indicating the CRC protion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount

This command specifies to use the cycle count portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
CYCLEcount <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
CYCLEcount?
```

Arguments

<QString> is a quoted string representing the cycle count portion of the binary header string used for FlexRay search.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "001101" sets the cycle count to 001101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "XXXXXX" indicating the cycle count is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID

This command specifies to use the frame ID portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:

CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses. .

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID?
```

Arguments <QString> is a quoted string representing the frame ID portion of the binary header string used for a FlexRay search.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "10110010101" sets the frame ID portion of the binary header string to 10110010101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "XXXXXXXXXXX" indicating the frame ID portion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits

This command specifies to use the indicator bits portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits <QString>
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits?

Arguments <QString> is a quoted string representing the indicator bits portion of the binary header string used in a FlexRay search.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "10100" sets the indicator bits of the header to 10100.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "XXXXX" indicating the indicator bits of the header are don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength

This command specifies to use the payload length portion of the binary header string when searching on the FlexRay bus header. This command specifies the payload length to be used in a FlexRay search. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
PAYLength?
```

Arguments <QString> is a quoted string representing the payload length portion of the binary header string used for a FlexRay search.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH "1001101" sets the payload length portion of the binary header string to 1001101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH? might return
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH

"XXXXXXX" indicating the payload length portion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe

This command specifies the I2C address mode to be used in an I2C search: either 7 or 10-Bit. SEARCH<x> is the search number and B<x> is the bus number (1-4), except for MDO3000, which has only two buses. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe
{ADDR7|ADDR10}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe?
```

Arguments ADDR7 specifies 7-bit addresses.

ADDR10 specifies 10-bit addresses.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe

This command specifies the I2C address type to be used in an I2C search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
{GENeralcall|STARtbyte|HSmode|EEPROM|USER}
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe?

Arguments

GENeralcall specifies the GENeralcall address type.

STARtbyte specifies the STARtbyte address type.

HSmode specifies the HSmode address type

EEPROM specifies the EEPROM address type.

USER specifies a user address.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue

This command specifies the address value to be used in an I2C search if the search condition is ADDRess or ADDRANDDATA (address and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition

Arguments

<bin> is the address in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition

This command specifies the search condition to use for an I2C search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition
{STARt|STOP|REPEATstart|ACKMISS|ADDRess|DATA|ADDRANDDATA}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition?
```

Arguments

`STARt` specifies a search based on a start condition.

`STOP` specifies a search based on a stop condition.

`REPEATstart` specifies a search based on a repeat of start condition.

`ACKMISS` specifies a search based on a missing acknowledgement condition.

`ADDRess` specifies a search based on an address.

`DATA` specifies a search based on a data condition.

`ADDRANDDATA` specifies a search based on an address and data condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection

This command specifies the data direction to use for an I2C search: either read, write, or either. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection
{READ|WRITE|NOCARE}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection?
```

Arguments

`READ` specifies a read condition.

`WRITE` specifies a write condition.

`NOCARE` specifies either a read or write condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe

This command specifies the length of the data string, in bytes, to be used for an I2C search, if the search condition is set to DATA or ADDRANDDATA (address and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition

Arguments <NR1> is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue

This command specifies the data value to be used in an I2C search, if the search condition is set to DATA or ADDRANDDATA (address and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue?
```

Arguments <bin> is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

This command specifies the search condition for a LIN search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition
{SYNCField|IDentifier|DATA|IDANDDATA|WAKEup|SLEEP|ERROR}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition?
```

Arguments

SYNCField specifies to search on the sync field.

IDentifier specifies to search on the identifier.

DATA specifies to search on the data.

IDANDDATA specifies to search on the identifier and the data.

WAKEup specifies to search on wake up.

SLEEP specifies to search on sleep.

ERROR specifies to search on errors.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:CONDITION? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:CONDITION SYNCFIELD indicating a search on the sync field.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue

This command specifies the high data value to be used in a LIN search, if the search condition is set to IDentifier or IDANDDATA (identifier and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

Arguments

<QString> is a quoted string of 1s, 0s, or Xs representing the binary data string to be used in a LIN search if the search condition is IDentifier or IDANDDATA (identifier and data).

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "XXXX

UNEQual sets the LIN data qualifier to not equal.

LESSEQual sets the LIN data qualifier to less than or equal.

MOREEQual sets the LIN data qualifier to greater than or equal.

INrange sets the LIN data qualifier to in range.

OUTrange sets the LIN data qualifier to out of range.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER LESSthan sets the data qualifier to lessthan.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER EQUAL indicating the data qualifier is equal.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe

This command specifies the length of the data string, in bytes, to be used in a LIN search, if the search condition is set to IDentifier or IDANDDATA (identifier and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

Arguments

<NR1> is the length of the data in bytes.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE 8 sets the LIN data size is 8 bytes.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE 1 indicating that the LIN data size is 1 byte.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue

This command specifies the data value to be used in a LIN search if the search condition is set to IDentifier or IDANDDATA (identifier and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

Arguments <QString> is the binary data string for the search.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:VALUE "XXXXXXXX" indicating the data value is don't care.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE

This command specifies the error type used for a LIN search.SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE
{SYNC|PARity|CHecksum|HEADertime|RESPtime|FRAMetime}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE?
```

Arguments

SYNC specifies a sync error type.

PARity specifies a parity error type.

CHecksum specifies a checksum error type.

HEADertime specifies a header time error type.

RESPtime specifies a response time error type.

RAMetime specifies a frame time error type.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:ERRTYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:ERRTYPE SYNC indicating a SYNC error type.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue

This command specifies the binary address string used for LIN search if search condition is set to IDentifier or IDANDDATA (identifier and data). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

Arguments

<QString> is a quoted string specifying the binary address string to be used in a LIN search if the search condition is set to IDentifier or IDANDDATA (identifier and data).

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "XXXXXX" indicating the binary address is undefined.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

When the MIL-STD-1553 bus search condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue to specify the lower limit of the range.) SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:HIVALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:HIVALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

Arguments

QString is a quoted string of up to 5 characters where the allowable characters are 0, 1, and X.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue “01000” sets the upper limit of the remote terminal address range to 01000 (when the search condition has been set to MIL1553B, and the qualifier has been set to INrange or OUTrange).

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue? might return “XXXXX”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

When the MIL-STD-1553 bus search condition is set to COMMAND, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the search. When the MIL-STD-1553 bus search condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the remote terminal address range. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue "01000" sets the remote terminal address to be used in the search to 01000.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue? might return 01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the qualifier to be used with the remote terminal address field. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:
COMMAND:ADDRess:QUALifier {LESSthan|MOREthan|EQual
|UNEQual|LESSEQual|MOREEQual|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:QUALifier?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

Arguments

LESSthan sets the Command Address qualifier to less than.

MOREthan sets the Command Address qualifier to greater than.

EQual sets the Command Address qualifier to equal.

UNEQual sets the Command Address qualifier to not equal.

LESSEQual sets the Command Address qualifier to less than or equal.

MOREEQual sets the Command Address qualifier to greater than or equal.

INrange sets the Command Address qualifier to in range.

OUTrange sets the Command Address qualifier to out of range.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier EQual sets the qualifier to be used with the remote terminal address to equal.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier? might return INRANGE.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the search. (Use the commandSEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress to specify Word Count or Mode Code.) In Word Count mode, this field defines the number of data words that is to be transmitted, or received, depending on the T/R bit setting. (Use the commandSEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit to set the T/R bit.) A word count value of 0 actually indicates a transfer of 32 data words. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1 and X.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt "01000" sets the bit pattern for the Word Count/Mode Code field to 01000.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt? might return "XXXXX".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the Command word parity that is to be used in the search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity ZERo sets the Command word parity bit to 0.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity? might return 0, 1 or X.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the search. When the

sub-address value is set to 00000 or 11111 binary, it specifies that the command is a “Mode Code” command. Any other value specifies that it is a “Word Count” command. The default is all X’s (don’t care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *The sub-address field is used to direct data to different functions within the subsystem for values 1 — 30.*

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
SUBADdress <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
SUBADdress?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:SUBADdress “01000”` sets the sub-address to be used in the search to 01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies that the transmit/receive bit (bit 9) is to be used in the search. The transmit/receive bit defines the direction of information flow, and is always from the point of view of the remote terminal. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit
{RX|TX|X}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments RX (logic 0) directs the instrument to search for a TX or "transmit" from a remote terminal .

TX (logic 1) directs the instrument to search for an RX or "receive" from a remote terminal.

X indicates “don’t care".

Examples TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX directs the instrument to search for a TX or “transmit” from a remote terminal.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX? might return TX.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

This command specifies a word type or condition within a MIL-STD-1553 bus word to search for. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *There are three types of MIL-STD-1553 (Aircraft) bus words: Command, Status, and Data, all sharing a common structure twenty bits in length. The first three bits are used as a synchronization field. The last bit is the odd parity of the previous 16 bits.*

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition
{SYNC|COMMAND|STATus|DATA|TIMe|ERRor}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition?
```

Related Commands Most of the other `SEARCH:SEARCH1:TRIGger:A:BUS:B<x>:MIL1553B` commands are impacted by the setting of this command.

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

BUS:B<x>:MIL1553B:SOUrce

Arguments `SYNC` refers to the 3–bit sync pulse that precedes each word.

`COMMAND` is one of 3 16–bit word types. It specifies the function that a remote terminal is to perform.

`STATus` is one of 3 16–bit word types. Remote terminals respond to valid message transmissions via status words.

`DATA` is one of 3 16–bit word types.

`TIMe` specifies to search for either the RT (remote terminal response time), or the IMG (Inter-message Gap). Use the commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier, SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit, and SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit to specify the time parameters.

`ERRor` specifies to search for a signaling error. (You can specify which type of error — Parity, Sync, Manchester or Non-contiguous Data — by using the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE.)

NOTE. *Use the* `SEARCH:SEARCH1:TRIGger:A:BUS:B<x>:MIL1553B:CONDition:STATus:BIT` *commands to set the following bits:*

9 — message error
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

10 — instrumentation
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

11 — SRQ (service request)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

15 — BCR (broadcast command received)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

16 — busy
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

17 — subsystem flag
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

18 — DBCA (dynamic bus control acceptance)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

19 — terminal flag
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:CONDition STAT` sets the word type to search for to `STATus`.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:CONDition?` might return DATA.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

When the MIL-STD-1553 bus search condition is set to `DATa`, this command specifies the data parity bit to be used in the search. Returned values are 0, 1, or X (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:PARity 1` sets the data parity bit to be used in a MIL-STD-1553 bus search to 1.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:PARity?` might return 0, indicating that the data parity bit to be used in a MIL-STD-1553 bus search is set to 0.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

When the MIL-STD-1553 bus search condition is set to DATa, this command specifies the data binary pattern to be used in the search. This is a 16-bit field. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

Arguments

QString is a quoted string of up to 16 characters, where the allowable characters are 0, 1, and X.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:VALue “01000”` sets the data binary pattern to be used in a MIL-STD-1553 bus search to 01000.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:VALue?` might return XXXXXXXXXXX01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE

When the MIL-STD-1553 bus search condition is set to `ERRor`, this command specifies the signaling error type to be used in the search: Parity, Sync, Manchester or Data. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
{PARity|SYNC|MANCHester|DATA}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

PARity — an incorrect parity setting.

SYNc — the high to low, or low to high transition doesn’t happen in the middle of the sync time as it should.

MANCHester — no transition in a bit time.

DATA — a non-contiguous data error.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:ERRTYPE PARity` sets the error type to be used in the search to PARITY.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:ERRTYPE?` might return SYNC.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

When the MIL-STD-1553 bus search condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue to specify the lower limit.) The default is all X's (don't care).`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
HIVALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
HIVALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue "01000" sets the upper limit of the range of the terminal address to 01000 (when the search condition is set to MIL1553B, and the qualifier is set to INrange or OUTrange).

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue? might return "XXXXX".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the qualifier to be used with the address field. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
QUALifier {LESSthan|MOREthan|EQual|UNEQual|LESSEQual|
MOREEQual|INrange| OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
QUALifier?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

Arguments

LESSthan sets the Status Address qualifier to less than.

MOREthan sets the Status Address qualifier to greater than.

EQual sets the Status Address qualifier to equal.

UNEQual sets the Status Address qualifier to not equal.

LESSEQual sets the Status Address qualifier to less than or equal.

MOREEQual sets the Status Address qualifier to greater than or equal.

INrange sets the Status Address qualifier to in range.

OUTrange sets the Status Address qualifier to out of range.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier MOREthan sets the qualifier to be used with the address field to greater than.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier? might return MORETHAN.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the search. When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the range. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue to specify the upper limit of the range.) The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the value of the 5–bit remote terminal address to be used in the search, when the qualifier has been set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the lower limit of the range to 01000, if the qualifier has been set to `INrange` or `OUTrange.`

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue?` might return "01000".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the search. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax `SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR {0|1|X|ZERo|ONE|NOCARE|OFF|ON}`

`SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR?`

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments `0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR NOCARE sets the BCR bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the search. Returned values are 0, 1, or X (don’t care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY {0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BUSY NOCARE sets the status word busy bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BUSY? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA {0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA NOCARE sets the status word dynamic bus control acceptance (DBCA) bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR {0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:INSTR NOCARE` sets the status word status word instrumentation bit value to be used in the search to X.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:INSTR?` might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the status word message error bit value (bit 9) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

`SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME {0|1|X|ZERo|ONE|NOCARE|OFF|ON}`

`SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME?`

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:MENOCARE sets the status word message error bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ {0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SRQ NOCARE sets the status word SRQ bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SRQ? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
SUBSF {0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
SUBSF?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X (“don’t care”) which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X (“don’t care”) which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SUBSF NOCARE` sets the status word subsystem flag bit value to be used in the search to X.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SUBSF?` might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the status word terminal flag bit value (bit 19) to be used in the search. Returned values are 0, 1, or X (don’t care, which is the default). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:TF NOCARE sets the status word terminal flag bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:TF? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status parity bit value to be used in the search. Returned values are 0, 1, or X (don’t care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:PARity ONE` sets the parity bit value to be used in the search to 1.`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:PARity?` might return X, indicating that the parity doesn't matter.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

When the MIL-STD-1553 bus search condition is set to `TIMe`, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG). (You can specify RT or IMG using the SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments

<NR3> is a floating point number that specifies either the minimum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit 3.0000e-6 would set either the remote terminal response time (RT) or the inter-message gap (IMG) to 3.00 µS.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit? might return 2.0000e-6, indicating that the RT or IMG has been set to 2.00 µS.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG). (You can specify RT or IMG using the SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

Arguments

<NR3> is a floating point number that specifies either the maximum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit 80.0000e-6 would set either the remote terminal response time (RT) or the inter-message gap (IMG) to be used in the search to 80.0 µS.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit? might return 100.0000e-6, indicating that the RT or IMG has been set to 100.00 µS.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies the search data time qualifier. (This includes a smaller set of arguments than other qualifier commands.)B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier {LESSthan|MOREthan|INrange|OUTrange}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments

LESSthan sets the Time qualifier to less than minimum.

MOREthan sets the Time qualifier to greater than maximum

INrange sets the Time qualifier to inside range.

OUTrange sets the Time qualifier to out of range.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier LESSthan sets the Time qualifier to less than minimum.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier? might return OUTRANGE.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue

This command specifies the data value to be used in a Parallel search. SEARCH<x> is the search number and B<x> is the bus number (1-4), except for MDO3000, which has only two buses. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue?
```

Arguments <QString> is the binary data string.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

This command specifies the condition to be used in an RS-232 search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition
{RXSTArt|RXDATA|RXENDPacket|TXSTArt|TXDATA|TXENDPacket}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition?
```

Arguments RXSTArt specifies a search based on the RX Start Bit.

RXDATA specifies a search based on RX Data.

RXENDPacket specifies a search based on the RX End of Packet condition.

TXSTArt specifies a search base on the TX Start Bit.

TXDATA specifies a search based on TX Data.

TXENDPacket specifies a search based on the TX End of Packet condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe

This command specifies the length of the data string to be used in an RS-232 search, if the search condition is set to RXDATA. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

Arguments <NR1> is the length of the data string in Bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue

This command specifies the data value to be used in an RS-232 search, if the condition is set to RXDATA. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe

This command specifies the length of the data string to be used for an RS-232 search if the search condition is set to TXDATA. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

Arguments <NR1> is the length of the data string in Bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue

This command specifies the data value to be used for an RS-232 search, if the condition is set to RXDATA. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition

This command specifies the search condition for a SPI search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition
{SS|STARTofframe|MISO|MOSI|MISOMOSI}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition?
```

Related Commands BUS:B<x>:SPI:IDLETime,

BUS:B<x>:SPI:FRAMING

Arguments SS specifies a search based on the Slave Selection condition.

STARTofframe is applicable when BUS:B<x>:SPI:FRAMING is set to IDLEtime. When the search condition is set to STARTofframe, the instrument searches on the first SPI clock after an idle time when there are no clocks.

MISO specifies a search based on the Master-In Slave-Out condition.

MOSI specifies a search based on the Master-Out Slave-In condition.

MISOMOSI specifies a search based on the Master-In Slave-Out and Master-Out Slave-In conditions.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:VALue

This command specifies the data in value to be used in an SPI search, if the search condition is set to MISO or MISOMOSI. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:
VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:
VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition

Arguments <bin> is the data string in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:VALue

This command specifies the data out value to be used in an SPI search if the search the condition is set to MOSI, or MISOMOSI. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:
VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:
VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition

Arguments <bin> is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe

This command specifies the length of the data string to be used in an SPI search, if the search condition is MISO, MOSI, or MISOMOSI. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/Bmodels or MDO3EMBD application module for MDO3000 models.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition

Arguments <NR1> is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue

This command specifies the upper limit of the address string for the inside-of-range and outside-of-range qualifiers to be used in aUSB search. Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue to set the lower limit. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition,

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue

Arguments <QString> within the range 0000000 to 1111111 (00 hex to 7F hex).

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE "0001000" sets the upper limit to binary 0001000 (08 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE "1111111", which indicates that the upper limit is 1111111 (7F hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue

This command specifies the address value for the lower limit for inside-of-range and outside-of-range qualifiers to be used in a USB search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments <QString> within the range 0000000 to 1111111 (00 hex to 7F hex).

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE "0001000" sets the binary address to 0001000 (08 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE "1000000", which indicates that the binary address is 100000 (40 hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

This command specifies the search condition for a USB search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition
{SYNC|RESET|SUSPEND|RESUME|EOP|TOKENPacket|DATAPacket
|HANDSHAKEPacket|SPECIALPacket|ERRor}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition?
```

Arguments

`SYNC` specifies to search for a Sync field of a packet.

`RESET` specifies to search for a reset condition.

`SUSPEND` specifies to search for a suspend condition.

`RESUME` specifies to search for a resume condition.

`EOP` specifies to search for an end-of-packet signal.

`TOKENPacket` specifies to search for a token packet.

`DATAPacket` specifies to search for a data packet

`HANDSHAKEPacket` specifies to search for a handshake packet.

`SPECIALPacket` specifies to search for a special status packet.

`ERRor` specifies to search for an error condition.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION TOKENPACKET` sets the search condition to be a token packet.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION?` might return `:SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION SYNC`, which indicates that the search condition is a sync field.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:HIVALue

This command specifies the upper limit data value for the inside-of-range and outside-of-range qualifiers to be used in a USB search, when the search condition is set to `DATAPacket`. Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue to set the lower limit. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition,

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue

Arguments <QString> within the range 00000000 to 11111111 (00 hex to FF hex).

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:HIVALUE "00001000" sets the upper limit to binary 00001000 (08 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:HIVALUE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:HIVALUE "01111111", which indicates that the upper limit is 01111111 (7F hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:OFFSet

This command specifies the data offset in bytes to search for in a USB search. The minimum and default values are 0 and the maximum is 1024. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:OFFSet <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:OFFSet?
```

Arguments <NR1> is number in the range 0 to 1024.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:OFFSET 36 sets the data offset to 36.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:OFFSET? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:OFFSET 0, indicating that the data offset is the default value, 0.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:SIZe

This command specifies the number of contiguous data bytes to search for in a USB search. The minimum and default values are 1 and the maximum value is 16. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:SIZe?
```

Arguments <NR1> is number in the range 1 to 16.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:SIZE 4 sets the oscilloscope to search on four contiguous data bytes.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:SIZE? might return , :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:SIZE 6 indicating that the oscilloscope will search on 6 contiguous data bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:TYPe

This command specifies the data type to be used in a USB search, when the search condition is set to DATAPacket. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:TYPe
{ANY|DATA0|DATA1}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:TYPe?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

`ANY` indicates either a DATA0 or DATA1 data packet type.

`DATA0` indicates a DATA0 data packet type.

`DATA1` indicates a DATA1 data packet type.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:TYPE DATA0` sets the oscilloscope to search on a DATA0 data packet type.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:TYPE?` might return `:SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:TYPE DATA1`, indicating that the data packet type is set to DATA1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue

This command specifies the lower limit value for the inside-of-range and outside-of-range qualifiers to be used in a USB search, when the search condition is set to `DATAPacket`. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

`<QString>` within the range 00000000 to 11111111 (00 hex to FF hex).

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:VALUE "00001000" sets the binary address to 00001000 (08 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:VALUE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:VALUE "01000000", which indicates that the binary address is 0100000 (40 hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue

This command specifies the endpoint value to be used for a USB search. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

<QString> within the range 0000 to 1111 (00 hex to 0F hex).

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE "1000" sets the binary address to 1000 (08 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE "1001", which indicates that the binary address is 1001 (09 hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ERRTYPE

This command specifies the error type to search for in a USB search, when the search condition is set to ERRor. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ERRTYPE
{PID|CRC5|CRC16|BITSTUFFing}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ERRTYPE?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments `PID` indicates the error type is set to packet ID.

`CRC5` indicates the error type is set to 5-bit CRC.

`CRC16` indicates the error type is set to 16-bit CRC.

`BITSTUFFing` indicates the error type is set to bit stuffing.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION PID` sets the error search condition to packet ID.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION?` might return `:SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION PID`, indicating the error search condition is packet ID.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:HANDSHAKEType

This command specifies the handshake type to be used in a USB search. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:HANDSHAKEType
{ANY|NAK|ACK|STALL}
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:HANDSHAKEType?

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments ANY indicates the oscilloscope will search for any handshake type.

NAK indicates the oscilloscope will search for when a device cannot send or receive data.

ACK indicates the oscilloscope will search for when a packet is successfully received.

STALL indicates the oscilloscope will search for when a device requires intervention from the host.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE ACK sets the handshake type to acknowledgement.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE STALL, indicating that the handshake type is set to stall.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:QUALifier

This command specifies the qualifiers for address, endpoint and data to be used in a USB search . SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual
|MOREEQual|INrange|OUTrange}
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:QUALifier?

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

LESSthan indicates the oscilloscope will search for a value that is less than a set value.

MOREthan indicates the oscilloscope will search for a value that is greater than a set value.

EQual indicates the oscilloscope will search for a value that is equal to a set value.

UNEQual indicates the oscilloscope will search for a value that is not equal to a set value.

LESSEQual indicates the oscilloscope will search for a value that is less than or equal to a set value.

MOREEQual indicates the oscilloscope will search for a value that is greater than or equal to a set value.

INrange indicates the oscilloscope will search for a value that is within a range set by two values.

OUTrange indicates the oscilloscope will search for a value that is outside of a range set by two values.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:QUALIFIER LESSTHAN sets the oscilloscope to search when an address, data, or endpoint value is less than a set value.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:QUALIFIER? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:QUALIFIER EQUAL indicating that the search condition is to search when an address, data, or endpoint is equal to a set value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber

This command specifies the value for the start of frame to be used in a USB search, when the search condition is set to TOKENPacket, and the token type is set to SOF (Start of Frame). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber
<QString>
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber?

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition, SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType

Arguments <QString> within the range 000 0000 0000 to 111 1111 1111 (000 hex to 7FF hex).

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER "00000001000" sets the start of frame number to 00000001000 (008 hex).

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER "00000001001", which indicates that the start of frame number is 00000001001 (009 hex).

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

This command specifies the packet ID (PID) for the special packet to be used in a USB search: any, preamble or reserved. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType {ANY|PREamble|RESERVed}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType?

Arguments ANY indicates the oscilloscope will search for any type of special packet.

PREamble indicates the oscilloscope will search for a preamble special packet.

RESERVed indicates the oscilloscope will search for a reserved special packet.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS1:USB:SPECIALTYPE PREAMBLE sets the special packet type to preamble.

SEARCH:SEARCH1:TRIGGER:A:BUS1:USB:SPECIALTYPE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS1:USB:SPECIALTYPE PREAMBLE, indicating that the special type is set to preamble.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue

When searching on a high-speed USB split transaction, this command specifies the split transaction endpoint type value to search for. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Search

Syntax

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue {NOCARE|CONTRol|ISOchronous|BULK|INTERRUPT}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue?

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments

NOCARE — any endpoint type.

CONTRol — control endpoint type.

ISOchronous — isochronous endpoint type.

BULK — bulk endpoint type (BULK-IN or BULK-OUT).

INTERRUPT — interrupt endpoint type (Interrupt-IN).

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:ET:VALue iso sets the endpoint type to search for to isochronous.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:ET:VALue? might return BULK, indicating that the bulk endpoint type has been specified to search for.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue

When searching on a high-speed USB split transaction, this command specifies the split transaction hub address value to search for. The value can be up to 7 characters long. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses. .

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments QString is a quoted string of up to 7 characters. The valid characters are 0 and 1.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:HUB:VALue "001010" sets the split transaction hub address to search for to 001010.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:HUB:VALue? might return XXXXXXX, indicating that the hub address value to search for doesn't matter.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue

When searching on a high-speed USB split transaction, this command specifies the split transaction port address value to search for. The value can be up to 7 characters long. The default is all X's (don't care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments `QString` is a quoted string of up to 7 characters. The valid characters are 0 and 1.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:PORT:VALue` "001010" sets the split transaction hub address to search for to 001010.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:PORT:VALue?` might return XXXXXXX, indicating that the hub address value to search for doesn't matter.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue

When searching on a high-speed USB split transaction, this command specifies whether to search for the start or complete phase of the split transaction, based on the Start/Complete bit field value. (0 = Start, 1 = Complete). The default is NOCARE. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue
{NOCARE|SSPLIT|CSPLIT}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments `NOCARE` — search for either the start or complete phase of the split transaction.

`SSPLIT` — search for the start phase of the split transaction.

CSPLIT — search for the complete phase of the split transaction.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:SC:VALue SSPLIT specifies to search for the start phase of the split transaction.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:SC:VALue? might indicate NOCARE, specifying that it doesn't matter whether to search for the start or complete phase of the split transaction.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue

When searching for a high-speed USB split transaction, this command specifies the split transaction start/end bit value to search for.SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *The start and end bits are interpreted based on the type of split transaction:*

For Interrupt and control transactions, the S bit means Speed: 0 = Full Speed, 1 = Low Speed.

For bulk IN/OUT and isochronous IN start-split transactions, the S field must be 0.

For bulk/control IN/OUT, interrupt IN/OUT, and isochronous IN start-split transactions, the E field must be 0.

For full-speed isochronous OUT start-split transactions, the S (Start) and E (End) fields specify how the high-speed data payload corresponds to data for a full-speed data packet as shown below:

S E High-speed to Full-speed Data Relation

0 0 High-speed data is the middle of the full-speed data payload.

0 1 High-speed data is the end of the full-speed data payload.

1 0 High-speed data is the beginning of the full-speed data payload.

1 1 High-speed data is all of the full speed data payload.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue
{NOCARE|FULLSPeed|LOWSPeed|ISOSTART|ISOMID|ISOEND|ISOALL}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments

NOCARE — any combination of S and E bits.

FULLSPeed — S bit = 0, E bit = 0.

LOWSPeed — S bit = 1, E bit = 0.

ISOSTART — S bit = 1, E bit = 0.

ISOMID — see note above.

ISOEND — see note above.

ISOALL — see note above.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:SE:VALue ISOEND specifies to search for the ISOEND split transaction value.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:USB:SPLit:SE:VALue? might return FULLSPEED.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType

This command specifies the token type to be used in a USB search: any, start of frame, out, in, or setup. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType
{ANY|SOF|OUT|IN|SETUP}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType?
```

Arguments

ANY indicates any of the token types.

SOF indicates a SOF (start-of-frame) token type

OUT indicates an OUT token type.

IN indicates an IN token type.

SETUP indicates a SETUP token type.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:TOKENTYPE SETUP sets the token type to SETUP.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:TOKENTYPE? might return :SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:TOKENTYPE SOF if the token type is SOF.

SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce

This command specifies the source of a bus search. <x> is the search number. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce {B1|B2|B3|B4}
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce?
```

Arguments

B1 specifies the Bus 1 source.

B2 specifies the Bus 2 source.

B3 specifies the Bus 3 source.

B4 specifies the Bus 4 source.

SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe

This command specifies the slope to be used in an edge search: rising, falling or either. <x> is the search number. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe {RISe|FALL|EITHer}
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe?
```

Arguments

RISe specifies a rising edge.

FALL specifies a falling edge.

EITHer specifies to trigger on either the rising or falling edge of a signal.

SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce

This command specifies the source waveform to be used in an edge search . <x> is the search number. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|D0|D1|D2|D3
|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF_AMPlitude|
RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce?
```

Arguments

CH1–4 specifies an analog channel as the source waveform.

MATH specifies the math waveform as the source waveform.

REF1–4 specifies a reference waveform as the source waveform.

D0–D15 specifies a digital channel as the source waveform.

RF_AMPlitude|RF_FREQuency|RF_PHASe specify an RF time domain trace as the source. (MDO4000/B only.)

SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>

This command sets the threshold level to use when searching on an analog waveform. x can be 1 - 4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x> {<NR3>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>?
```

Arguments

<NR3> is a floating point number that sets the threshold level to search for, in Volts, when searching on channel <x>.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH

This command sets the threshold level to use when searching on the math waveform.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH {<NR3>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH?
```

Arguments

<NR3> is a floating point number that sets the threshold level to search for, in Volts, when searching on a math waveform.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>

This command sets the threshold level to use when searching on a reference waveform.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x> {<NR3>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>?
```

Arguments

<NR3> is a floating point number that sets the threshold level to search for, in Volts, when searching on a reference waveform.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_AMPlitude

This command sets the threshold level to use when searching on the RF Amplitude vs. Time trace.

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_AMPlitude
{<NR3>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_AMPlitude?
```

Arguments <NR3> is a floating point number that sets the threshold level, in Volts, to use when searching on the RF Amplitude vs. Time trace.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_FREQuency

This command sets the threshold level to use when searching on the RF Frequency vs. Time trace.

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_FREQuency
{<NR3>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_FREQuency?
```

Arguments <NR3> is a floating point number that sets the threshold level, in Volts, to use when searching on the RF Frequency vs. Time trace.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_PHASe

This command sets the threshold level to use when searching on the RF Phase vs. Time trace.

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_PHASe {<NR1>|ECL|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:RF_PHASe?
```

Arguments <NR3> is a floating point number that sets the threshold level, in Volts, to use when searching on the RF Phase vs. Time trace.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion

This command specifies the logic operator to be used in a logic search. <x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion {AND|NANd|NOR|OR}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion?
```

Arguments AND places a mark if all conditions are true.

NANd places a mark if any of the conditions are false.

NOR places a mark if all conditions are false.

OR places a mark if any of the conditions are true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>

This command specifies the logic condition to be used in a logic search when the input is an analog channel. SEARCH<x> is the search number, which is always 1, and CH<x> is the channel number, which can be 1–4.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>?
```

Arguments `HIGH` specifies the logic high.

`LOW` specifies the logic low.

`X` specifies a "don't care" state.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE

This command specifies the clock edge condition (rising or falling) to be used in a logic search. <x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE
{FALL|RISe}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE?
```

Arguments `RISe` specifies a rising edge.

`FALL` specifies a falling edge.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce

This command specifies the clock source to be used in a logic search. <x> is the search number, which is always 1. If a clock source is defined, then the logic search is determined by the state of the other inputs at the clock transition. If no clock source is defined, then the logic search is determined only by the state of the inputs.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF|NONe|D0|D1|D2|D3|D4|D5|D6|D7|D8
|D9|D10|D11|D12|D13|D14|D15|RF_AMPlitude|
RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce?
```

Arguments `CH1–4` specifies an analog channel as the clock source.

`MATH` specifies the math waveform as the clock source.

`REF` specifies the reference waveform as the clock source.

NONe specifies no clock source.

D0-D15 specifies a digital channel as the clock source.

RF_AMPlitude|RF_FREQuency|RF_PHASe specify an RF time domain trace as the clock source. (MDO4000/B only.)

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>

This command specifies the logic condition to be used in a logic search when the input is a digital channel. SEARCH<x> is the search number, which is always 1, and D<x> is the digital channel number, which can be D0 – D16.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH

This command specifies the logic condition of the math input to be used in a logic search. <x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>

This command specifies the logic condition of the reference waveform to be used in a logic search. SEARCH<x> is the search number, which is always 1, and REF<x> is the reference channel number, which can be 1–4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude

This command specifies the logic criteria to search for when searching using the RF Amplitude vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude to search for an instance when the waveform goes higher or lower than the specified threshold. “LOW” specifies to only set a mark when the RF_AMPlitude waveform drops below the logic threshold; likewise, “HIGH” specifies to set a mark when the waveform goes above the logic threshold. “X” specifies “don’t care”. SEARCH<x> is the search number, which is always 1.

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_AMPlitude?
```

Related Commands TRIGger:A:LOGIc:INPut:RF

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

Examples

`SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_AMPlitude HIGH` specifies to set a mark when the waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude.

`SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_AMPlitude?` might return HIGH, indicating that the search engine has been set to set a mark when a waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency

This command specifies the logic criteria to search for when searching using the RF Frequency vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency to search for an instance when the waveform goes higher or lower than the specified threshold. "LOW" specifies to only set a mark when the RF_FREQuency waveform drops below the logic threshold; likewise, "HIGH" specifies to set a mark when the waveform goes above the logic threshold. "X" specifies "don't care". `SEARCH<X>` is the search number, which is always 1.

Conditions

MDO4000/B models only.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency?
```

Related Commands

TRIGger:A:LOGIc:INPut:RF

Arguments

`HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a "don't care" condition.

Examples

`SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_FREQuency HIGH` specifies to set a mark when the waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency.

`SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_FREQuency?` might return HIGH, indicating that the search engine has been set to set a mark when a waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe

This command specifies the logic criteria to search for when searching using the RF Phase vs. Time trace. This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe to search for an instance when the waveform goes higher or lower than the specified threshold. "LOW" specifies to only set a mark when the RF_PHASe waveform drops below the logic threshold; likewise, "HIGH" specifies to set a mark when the waveform goes above the logic threshold. "X" specifies "don't care". SEARCH<x> is the search number, which is always 1.

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe?
```

Related Commands TRIGger:A:LOGIc:INPut:RF

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a "don't care" condition.

Examples

SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_PHASe HIGH specifies to set a mark when the waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe.

SEARCH:SEARCH1:TRIGger:A:LOGic:INPut:RF_PHASe? might return HIGH, indicating that the search engine has been set to set a mark when a waveform goes above the logic threshold specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>

This command specifies the logic condition to be used in a logic search when the input is an analog channel. SEARCH<x> is the search number, which is always 1, and CH<x> is the analog channel number, which can be 1– 4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>?
```

Arguments

`HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn

This command specifies the qualifier to be used in a logic pattern search. <x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn
{TRUe|FALSe|LESSthan|Than|EQual|UNEQual}

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn?
```

Arguments

`TRUe` places a mark when the pattern becomes true.

`FALSe` places a mark when the pattern becomes false.

`LESSthan` places a mark if the specific pattern is true less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command.

`Than` places a mark if the specific pattern is true longer than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

`EQual` places a mark if the specific pattern is true longer than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command, but less than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

`UNEQual` places a mark if the specific pattern is true less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command, or longer than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit

This command specifies the maximum time that the selected pattern may be true and still generate an A logic pattern search to place a mark. <x> is the search number, which is always 1

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit?
```

Arguments <NR3> is a floating point number that specifies the maximum amount of time to hold the pattern true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit

This command specifies the minimum time that the selected pattern may be true and still generate an A logic pattern search to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit?
```

Arguments <NR3> is a floating point number that specifies the minimum amount of time to hold the pattern true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>

This command specifies the channel threshold level for a logic search to determine where to place a mark. SEARCH<x> is the search number, which is always 1, and CH<x> is the channel number, which can be 1–4.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x> {<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>?
```

Arguments <NR3> is a floating point number that specifies the search level, in volts.

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH

This command specifies the math waveform threshold level for a logic search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>

This command specifies the reference waveform threshold level for a logic search to determine where to place a mark. SEARCH<x> is the search number, which is always 1, and REF<x> is the reference channel number, which can be 1–4.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude

This command specifies the threshold to use when searching the RF Amplitude vs.Time waveform. (Same as the command SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude.) SEARCH<x> is the search number, which is always 1.

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_AMPlitude?
```

Related Commands TRIGger:A:LOGIc:THReshold:RF

Examples `SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_AMPlitude` 1.5 sets the search's threshold to 1.5V.

`SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_AMPlitude?` might return 1.5, indicating that the search's threshold is 1.5V.

Following is an example command sequence showing how to generate a single search mark on the RF_AMPLitude waveform when the waveform is logic 0 (less than 1.5V):

```
SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_AMPlitude 1.5
```

```
SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_AMPlitude LOW
```

```
SEARCH:SEARCH1:STATE 1
```

```
SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST
RF_AMPLITUDE,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,
0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency

This command specifies the threshold to use when searching the RF Frequency vs. Time waveform. (It does the same thing as the command `SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency`.) This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_FREQuency to search for an instance when the RF Frequency vs. Time waveform goes higher or lower than the specified threshold. `SEARCH<x>` is the search number, which is always 1.

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_FREQuency?
```

Related Commands TRIGger:A:LOGIc:THReshold:RF

Examples `SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_FREQuency 1.00E+6` sets the search's threshold to 1 MHz.

`SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_FREQuency?` might return 1.00E+6, indicating that the search's threshold is 1 MHz.

Following is an example command sequence showing how to generate a single search mark on the RF_FREQuency waveform when the waveform is logic 0 (less than 1 MHz):

```
SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_FREQuency 1.00E+6

SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_FREQuency LOW

SEARCH:SEARCH1:STATE 1

SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST RF_FREQuency,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe

This command specifies the threshold, in degrees, to use when searching the RF Phase vs. Time waveform. (It does the same thing as `SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe`.) This command is used together with SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:RF_PHASe to search for an instance when the RF Phase vs. Time waveform goes higher or lower than the specified threshold. `SEARCH<x>` is the search number, which is always 1.

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe {<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:RF_PHASe?
```

Related Commands TRIGger:A:LOGIc:THReshold:RF

Examples `SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_PHASe 4.500E+1` sets the search's threshold to 45 degrees.

SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_PHASe? might return 4.500E+1, indicating that the search's threshold is 45 degrees.

Following is an example command sequence showing how to generate a single search mark on the RF_PHASe waveform when the waveform is logic 0 (less than 45 degrees):

```
SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:RF_PHASe 4.500E+1

SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_PHASe LOW

SEARCH:SEARCH1:STATE 1

SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST
RF_PHASe,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,
0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>

This command specifies the lower threshold of the channel waveform to be used in a search. This setting is applied to all channel searches that use a lower threshold. SEARCH<x> is the search number, which is always 1, and CH<x> is the channel number, which can be 1–4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH

This command specifies the math waveform lower threshold to determine where to place a mark. This setting is applied to all math searches that use a lower threshold.
SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>

This command specifies the reference waveform lower threshold to determine where to place a mark. This setting is applied to all reference searches that use a lower threshold.
SEARCH<x> is the search number, which is always 1, and REF<x> is the reference channel number, which is 1–4.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude

This command specifies the threshold for RF Amplitude vs. Time trace searches. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold.

(To specify the upper threshold for runt and transition searches, use the command SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_AMPlitude.)

Conditions MDO4000/B models only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude?
```

Related Commands TRIGger:A:LOWerthreshold:RF

Arguments <NR3> is a floating point number that specifies the lower threshold for the RF Amplitude vs. Time trace, in Volts.

Examples

`SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_AMPlitude 0.1` sets the lower threshold to 0.1V.

`SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_AMPlitude?` might return 1.00E–1, indicating that the lower threshold has been set to 0.1V.

Following is an example command sequence showing how to generate a single search mark on the RF_AMPLitude waveform when the waveform is logic 0 (less than 1.5V):

```
SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_AMPlitude 1.5

SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_AMPlitude LOW

SEARCH:SEARCH1:STATE 1

SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST
RF_AMPLITUDE,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,
0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency

This command specifies the threshold for RF Frequency vs. Time trace searches. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold.

(To specify the upper threshold for runt and transition searches, use the command SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency.)

Conditions

MDO4000/B models only.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_FREQuency?
```

Related Commands

TRIGger:A:LOWerthreshold:RF, SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency

Arguments

`<NR3>` is a floating point number that specifies the threshold for the time domain trace, in Hz.

Examples

`SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_FREQuency 100.0E+6` sets the lower threshold to 100 MHz.

SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_FREQuency? might return 100.0E+6, indicating that the lower threshold has been set to 100 MHz.

Following is an example command sequence showing how to generate a single search mark on the RF_FREQuency waveform when the waveform is logic 0 (less than 1 MHz):

```
SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_FREQuency 1.00E+6
SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_FREQuency LOW
SEARCH:SEARCH1:STATE 1
SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST
RF_FREQuency,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,
0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe

This command specifies the lower threshold, in degrees, for searching the RF Phase vs. Time waveform. For runt and transition searches, this level is the lower threshold. For other search types, this is the single threshold.

(To specify the upper threshold for runt and transition searches, use the command SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_PHASe.)

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe {<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_PHASe?
```

Related Commands TRIGger:A:LOWerthreshold:RF

Arguments <NR3> is a floating point number that specifies the threshold for the time domain trace, in degrees.

Examples SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_PHASe 15 sets the lower threshold for the RF Phase vs. time trace to 15 degrees.

SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_PHASe? might return 0.0e+0, indicating that the trace is not turned on.

Following is an example command sequence showing how to generate a single search mark on the RF_PHASe waveform when the waveform is logic 0 (less than 45 degrees):

```
SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:RF_PHASe 4.500E+1

SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:RF_PHASe LOW

SEARCH:SEARCH1:STATE 1

SEARCH:SEARCH1:LIST? :SEARCH:SEARCH1:LIST
RF_PHASe,2.4702,2.4702,2.4702,-19.0119E-6,0.0E+0,0.0E+0,
0.0E+0
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit

This command specifies the upper limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit to specify the lower limit of the range.)

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit

Arguments <NR3> is a floating point number that represents the higher value of a range.

Examples To find all pulses in the waveform record with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:LOWLimit 100.0E-9

SEARCH:SEARCH1:TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9

SEARCH:SEARCH1:TRIGger:A:PULSEWidth:WHEn OUTside
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit

This command specifies the lower limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values.

(Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn

Arguments <NR3> is a floating point number that represents the lower value of a range.

Examples To find all pulses in the waveform record with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:WHEn OUTside
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity

This command specifies the polarity for a pulse search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity
{NEGative|POSitive}
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity?
```

Arguments POSITIVe places a mark only when the polarity of the pulse is positive.

NEGative places a mark only when the polarity of the pulse is negative.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce

This command specifies the source waveform for a pulse search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|D0|D1|D2|D3|D4
|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF_AMPlitude|
RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce?
```

Arguments

`CH1–4` specifies an analog channel as the source waveform.

`MATH` specifies the math waveform as the source waveform.

`REF1–4` specifies a reference waveform as the source waveform.

`D0–D15` specifies a digital channel as the source waveform.

`RF_AMPlitude|RF_FREQuency|RF_PHASe` specify an RF vs. time trace as the source. (MDO4000/B models only.)

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn

This command specifies to search the waveform record for pulses with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth), OR whose widths fall outside of or within a specified range of two values (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit). `SEARCH<X>` is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn
{LESSthan|MOREthan|EQual|UNEQual|WIThin|OUTside}

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn?
```

Arguments

`LESSthan` searches for pulse widths less than the time set using the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command.

`MOREthan` searches for pulse widths greater than the time set using the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command.

`EQual` searches for pulse widths equal to the time set by the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command within a tolerance of ±5%.

UNEQual searches for pulse widths unequal to the time set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth within a tolerance of ±5%.

WIThin searches for pulse widths less than the specified HIGHLimit and greater than the specified LOWLimit. The limits are specified using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit.

OUTside searches for pulse widths greater than the specified HIGHLimit or less than the specified LOWLimit. The limits are specified using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit.

Examples

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn LESSTHAN 2.0000E-9 causes the oscilloscope to search the record for pulses shorter than 2 ns duration.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn? might return SEARCH:SEARCH<x>:TRIGGER:A:PULSEWIDTH:WHEN GREATER THAN 2.0000E-9 indicating that searches are set to detect pulses greater than 2 ns duration.

To find all pulses in the waveform record with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:WHEn OUTside
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth

This command specifies the width setting to use, in seconds, when searching the waveform record for pulses of a certain width (duration). SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth?
```

Arguments

<NR3> is a floating point number that specifies the pulse width.

Examples

`SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth 5.0E-6` sets the pulse width to search for to 5 µs in duration.

`SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth?` might return `SEARCH:SEARCH<x>:TRIGGER:A:PULSEWIDTH:WIDTH 2.0000E-9` indicating that the oscilloscope is set to search for pulses of 2 ns in duration.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity

This command specifies the polarity setting for a runt search to determine where to place a mark. `SEARCH<x>` is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity
{EITher|NEGative|POSitive}

SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity?
```

Arguments

`POSitive` places a mark when the rising edge crosses the low threshold and the falling edge re-crosses the low threshold without either edge ever crossing the high threshold.

`NEGative` places a mark when the falling edge crosses the high threshold and the rising edge re-crosses the high threshold without either edge ever crossing the low threshold.

`EITher` places a mark on a runt of either polarity.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce

This command specifies the source setting for a runt search to determine where to place a mark. `SEARCH<x>` is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|RF_AMPlitude|
RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce?
```

Arguments

CH1–CH4 specifies an analog channel as the runt search source.

MATH specifies the math waveform as the runt search source.

REF1–REF4 specifies a reference waveform as the runt search source.

RF_AMPlitude|RF_FREQuency|RF_PHASe specify an RF time domain trace as the source. (MDO4000/B models only.)

SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn

This command specifies the condition setting for a runt search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn
{LESSthan|than|EQual|UNEQual|OCCURS}
```

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn?
```

Arguments

LESSthan argument sets the oscilloscope to search if the a runt pulse is detected with width less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth command.

than argument sets the oscilloscope to search if the a runt pulse is detected with width than the time set by the SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth command.

EQual argument sets the oscilloscope to search when the pattern is true for a time period equal to the time period specified in SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth within a ±5% tolerance.

UNEQual argument sets the oscilloscope to search when the pattern is true for a time period greater than or less than (but not equal) the time period specified in SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth within a ±5% tolerance.

OCCURS argument specifies a search event if a runt of any detectable width occurs.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth

This command specifies the width setting for a runt search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth <NR3>
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth?
```

Arguments

<NR3> is a floating point number that specifies the minimum width, in seconds.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE

This command specifies the clock slope setting for a setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE {FALL|RISe}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE?
```

Arguments

FALL specifies polarity as the clock falling edge.

RISe specifies polarity as the clock rising edge.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce

This command specifies the clock source setting for a setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF3|REF3|REF4|D0|D1|D2|D3|D4
|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF_AMPlitude|
RF_FREQuency|RF_PHASe}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce

Arguments

CH1–4 specifies an analog channel as the clock source waveform.

MATH specifies the math waveform as the clock source waveform.

REF1–4 specifies a reference waveform as the clock source waveform.

D0–D15 specifies a digital channel as the clock source waveform.

RF_AMPlitude|RF_FREQuency|RF_PHASe specifies an RF time domain trace as the clock source waveform. (MDO4000/B only.)

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold

This command specifies the clock threshold setting for an setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold
{<NR3>|TTL|ECL}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

ECL specifies a preset ECL high level of -1.3V.

<NR3> is a floating point number that specifies the clock level, in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce

This command specifies the data source setting for an setup/hold search to determine where to place a mark. <x> is the search number. You cannot specify the same source for both clock and data.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|
REF3|REF4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12
|D13|D14|D15|RF_AMPlitude|RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce

Arguments CH1–4 specifies an analog channel as the data source.

MATH specifies the math waveform as the data source.

REF1-4 specifies a reference waveform as the data source.

D0-D15 specifies a digital input as the data source (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed).

RF_AMPlitude|RF_FREQuency|RF_PHASe specify an RF time domain trace as the data source. (MDO4000/B models only.)

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold

This command specifies the data threshold setting for an setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold
{<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold?
```

Arguments

TTL specifies a preset TTL high level of 1.4 V.

<NR3> is a floating point number that specifies the clock level, in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime

This command specifies the hold time setting for an setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime?
```

Arguments

<NR3> is a floating point number that specifies the hold time setting in seconds. Positive values for hold time occur after the clock edge. Negative values occur before the clock edge.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime

This command specifies the setup time setting for an setup/hold search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime?
```

Arguments <NR3> is a floating point number that specifies the setup time for setup and hold violation searching.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}

This command specifies the search setup and hold threshold for the math waveform. This helps to determine where to place search marks. Search<x> is the search number, which is always 1.

Conditions MSO/MDO4000/B oscilloscopes only as well as MDO3000 series models with option MDO3MSO installed.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}?
```

Arguments <NR3> is a floating point number that specifies the lower threshold in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>

This command specifies the search setup and hold threshold for the selected reference waveform. This helps to determine where to place search marks. Search<x> is the search number, which is always 1. REF<x> is the reference waveform number, which can be 1–4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x> <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>?
```

Arguments

<NR3> is a floating point number that specifies the lower threshold in volts.

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity

When searching using the TIMEOut search type, this commands specifies the polarity to be used. Use the command SEARCH:SEARCH<x>:TRIGger:A:TYPe to specify the timeout search type. SEARCH<x> is the search number, which is always 1.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity
{STAYSHigh|STAYSLow|EITher}

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:TYPe

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe

Arguments

STAYSHigh — Search when the polarity stays high during the timeout time.

STAYSLow — Search when the polarity stays low during the timeout time.

EITher — Search when the polarity is either high or low.

Examples

SEARCH:SEARCH1:TRIGger:A:TIMEOut:POLarity STAYSHigh specifies to search for the condition that the polarity stays high during the timeout time.

SEARCH:SEARCH1:TRIGger:A:TIMEOut:POLarity? might return EITHER. This indicates that the search has been set for timeout when the polarity remains either high or low for longer than the specified timeout time.

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce

When searching using the TIMEOut search type, this command specifies the source. The available sources are live channels, reference waveforms, the math waveform, or the digital channels. The default is channel 1. The timeout search

type is selected using SEARCH:SEARCH<x>:TRIGger:A:TYPe. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|D0|D1|D2|D3|
D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|
RF_AMPlitude|RF_FREQuency|RF_PHASe}

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce?
```

Related Commands TRIGger:A:TIMEOut:SOUrce

SEARCH:SEARCH<x>:TRIGger:A:TYPe

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity

Arguments CH1–4 specifies to use one of the analog channels as the source waveform.

MATH specifies to use the math waveform as the as the source waveform.

REF1–4 specifies to use one of the reference waveforms 1–4 as the as the source waveform.

D0-D15 specifies to use one of the digital channels as the source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

RF_AMPlitude|RF_FREQuency|RF_PHASe specify an RF time domain trace as the source. (MDO4000/B models only.)

Examples SEARCH:SEARCH1:TRIGger:A:TIMEOut:SOUrce CH4 specifies to use channel 4 as the source for the timeout search.

SEARCH:SEARCH1:TRIGger:A:TIMEOut:SOUrce? might return CH1, indicating that channel 1 has been set as the source for the timeout search.

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe

When searching using the TIMEOut search type, this command specifies the timeout time, in seconds. The default and minimum is 4.0E-9 seconds and the maximum is 8.0 seconds. The resolution is 800.0E-12 which means that the increments of time specified is 800 picoseconds. The timeout search type is

selected using SEARCH:SEARCH<x>:TRIGger:A:TYPe.SEARCH<x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe <NR3>
SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:TIMe?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:TYPe

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:POLarity

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce

Arguments <NR3> is a floating point number that specifies the timeout time, in seconds. The default is 8.0000E-9.

Examples `SEARCH:SEARCH1:TRIGger:A:TIMEOut:TIMe 4.0E-9` specifies the timeout time of 4.0 nsec.

`SEARCH:SEARCH1:TRIGger:A:TIMEOut:TIMe?` might return 8.0000E-9, which is the default.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime

This command specifies the transition delta time setting to be used as the value to compare against when a transition time is found. <SEARCH<x> is the search number, which is always 1.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime
<NR3>
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime?
```

Arguments <NR3> is a floating point number that specifies the transition time, in seconds.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity

This command specifies the polarity setting for an transition search to determine where to place a mark. SEARCH<x> is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity
{EITher|NEGative|POSitive}

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity?
```

Arguments

`POSitive` specifies that a pulse edge must traverse from the lower (most negative) to higher (most positive) level for transition searching to occur.

`NEGative` specifies that a pulse edge must traverse from the upper (most positive) to lower (most negative) level for transition searching to occur.

`EITher` specifies either positive or negative polarity.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce

This command specifies the source for a transition search to determine where to place a mark. `SEARCH<x>` is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|RF_AMPlitude|
RF_FREQuency|RF_PHASe}
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce?
```

Arguments

`CH1–CH4` specifies one input channel as the source.

`MATH` specifies the math waveform as the source.

`REF1–REF4` specifies a reference waveform as the source. `RF_AMPlitude|RF_FREQuency|RF_PHASe` specify an RF time domain trace as the source. (MDO4000/B models only.) Also requires installation of an MDO4TRIG application module.)

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn

This command specifies the condition for a transition search. `SEARCH<x>` is the search number, which is always 1.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn
{SLOWer|FASTer|EQual|UNEQual}
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn?
```

Arguments

FASTer sets the search to occur when the transitioning signal is faster than the set volts/second rate.

SLOWer sets the search to occur when the transitioning signal is slower than the set volts/second rate.

EQual sets the search to occur when the transitioning signal is equal to the set volts/second rate within a ±5% tolerance.

UNEQual sets the search to occur when the transitioning signal is not equal to the set volts/second rate ±5%.

SEARCH:SEARCH<x>:TRIGger:A:TYPe

This command specifies the search type to determine where to place a mark. The default search type is EDGe. SEARCH<x> is the search number, which is always 1.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.)*

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:TYPe
{EDGe|PULSEWidth|SETHold|RUNt|TRANsition|LOGIc|TIMEOut|BUS
(with the appropriate application module installed)}

SEARCH:SEARCH<x>:TRIGger:A:TYPe?
```

Arguments

EDGe is the default search. An edge search occurs when a signal passes through a specified voltage level in a specified direction and is controlled by the SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce and SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe commands.

PULSEWIdth searches when a pulse is found that has the specified polarity, and is either inside or outside the limits as specified by SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit and SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit. The polarity is selected using the SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity command.

SETHold specifies a setup and hold search.

RUNt searches for when a pulse crosses the first preset voltage threshold, but does not cross the second preset threshold before recrossing the first. The thresholds are set using the SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x> and SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x> commands.

TRANsition searches for when a pulse crosses both thresholds in the same direction as the specified polarity and the transition time between the two threshold crossings is greater or less than the specified time delta.

LOGic specifies that a search occurs when specified conditions are met, and is controlled by the SEARCH:A:LOGIc commands.

TIMEout specifies that a search occurs when no pulse is detected in a specified time.

BUS specifies that a search occurs when a communications signal is found.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>

This command specifies the channel waveform upper threshold to determine where to place a mark. This setting is applied to all channel searches that uses an upper threshold.SEARCH<x> is the search number, which is always 1, and CH<x> is the channel number, which is 1–4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH

This command specifies the math waveform upper threshold to determine where to place a mark. This setting is applied to all math waveform searches that uses an upper threshold. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>

This command specifies the reference waveform upper threshold to determine where to place a mark. This setting is applied to all reference waveform searches that use an upper threshold. SEARCH<x> is the search number, which is always 1, and REF<x> is the reference channel number, which can be 1–4.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_AMPlitude

For a runt or transition search using the RF Amplitude vs. Time trace, this command specifies the upper threshold to be used by the search engine. (To specify the lower threshold, use the command SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude.)

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_AMPlitude
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_AMPlitude?
```

Related Commands TRIGger:A:UPPerthreshold:RF

Arguments <NR3> is a floating point number that specifies the threshold for the time domain trace, in volts.

Examples SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_AMPlitude 1 sets the upper threshold to 1V.

SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_AMPlitude? might return 1.000E+0, indicating that the upper threshold has been set to 1V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency

For a runt or transition search using the RF Frequency vs. Time trace, this command specifies the upper threshold to be used by the search engine. (To specify the lower threshold, use the command SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude.)

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency
{<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_FREQuency?
```

Related Commands TRIGger:A:UPPerthreshold:RF

Arguments <NR3> is a floating point number that specifies the threshold for the time domain trace, in Hz.

Examples `SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_FREQuency 100.0E+6` sets the upper threshold to 100 MHz.

`SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_FREQuency?` might return 100.0E+6, indicating that the upper threshold has been set to 100 MHz.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_PHASe

This command specifies the upper threshold to be used by the search engine when performing a runt or transition search using the RF Phase vs. Time trace.

(To specify the lower threshold, use the command SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:RF_AMPlitude.)

Conditions MDO4000/B models only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_PHASe {<NR3>}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:RF_PHASe?
```

Related Commands TRIGger:A:UPPerthreshold:RF

Arguments <NR3> is a floating point number that specifies the threshold for the time domain trace, in degrees.

Examples SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_PHASe 15 sets the upper threshold to 15 degrees.

SEARCH:SEARCH1:TRIGger:A:UPPerthreshold:RF_PHASe? might return 15, indicating that the upper threshold has been set to 15 degrees.

SEARCH:SPECTral:LIST? (Query Only)

This query will return a list of all automatically placed peak markers displayed in the frequency domain graticule. (To return information about manual markers, use the MARKER:M<x> commands.) This query returns entries in the form of an enumeration value, which is the source waveform, as well as 7 <NR3> values, which specify the automatic peak marker attributes.

If manual markers are not turned on, this list will also include the Reference Marker. (To determine which value is the Reference Marker, query using RF:REFLevel and compare it with the values.) If manual markers are turned on, this list will not include the Reference Marker (when manual markers are turned on, the Reference Marker is MARKER:M1).

Conditions MDO4000/B models only.

Group RF

Syntax SEARCH:SPECTral:LIST?

Related Commands MARKER:PEAK:THReshold, MARKER:TYPe, MARKER:PEAK:STATE MARKER:PEAK:MAXimum

Returns The query is returned in the form:

(<Enum>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>,<NR3>) ..

<Enum> is the source waveform.

The 7 NR3 automatic peak marker attributes returned are as follows:

Start — start value in percent of record

End — end value in percent of record

Focus — focus value in percent of record

X value — horizontal value of the focus point in the mark's waveform units

Y value — vertical value of the focus point in the mark's waveform units

Delta X value — difference from the Reference Marker.

Delta Y value — difference from the Reference Marker.

If no user time marks have been set, the query returns NONe,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0,0.0E0.

Examples `SEARCH:SPECTral:LIST?` might return
RF_NORMAL,50.2000,50.2000,50.2000,100.0000E+6,3.6624,0.0E+0,0.0E+0;
RF_NORMAL,70.2000,70.20
00,70.2000,200.0000E+6,-45.7444,0.0E+0,0.0E+0;
RF_NORMAL,90.2000,90.2000,90.2000,300.0000E+ 6,-43.6428,0.0E+0,0.0E+0

This indicates that the markers automatically mark three peaks on the RF Normal trace. Each marker is delineated by a semicolon. The values that follow each RF_NORMAL record are Start, End, Focus, X value, Y value, Delta X value, Delta Y value, respectively.

SELect? (Query Only)

Queries which waveforms are displayed.

Group Vertical

Syntax `SELect?`

Examples `SELECT??` might return the following

```
:SELECT:BUS1 0;BUS2 0;CH1 1;CH2 0;CH3 0;CH4 0;MATH 0;REF1
0;REF2 0;REF3 0;REF4 0;CONTROL CH1
```

SELect:{BUS<x>|B<x>}

This command turns on and off the display of the waveform for <x>, where x is the bus number 1-4 (can be 1–4). The query returns whether the channel is on or off but does not indicate whether it is the specified waveform.

Group Vertical

Syntax
```
SELect:{BUS<x>|B<x>} {OFF|ON|0|1}
SELect:{BUS<x>|B<x>}?
```

Arguments `ON` or 1 turns the specified waveform display on.

`OFF` or 0 turns the specified waveform display off.

SELect:CH<x>

Turns the display of the channel <x> waveform on or off, where <x > is the channel number, which can be 1–4. This command also resets the acquisition. The query returns whether the channel is on or off but does not indicate whether it is the specified waveform.

Group Vertical

Syntax
```
SELect:CH<x> {ON|OFF|1|0}
SELect:CH<x>?
```

Arguments `ON` or 1 turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` or 0 turns off the display of the specified waveform.

Examples `SELECT:CH2 ON` turns the channel 2 waveform display on, and selects channel 2.

`SELECT:CH1?` might return `:SELECT:CH1 1` indicating that channel 1 is being displayed.

SELect:CONTROl

This command selects a waveform to be used with channel-related commands such as the cursor commands. In addition to selecting the waveform, it turns on the display of the waveform, if it wasn't on already.

Group Vertical

Syntax
```
SELect:CONTROl {CH1|CH2|CH3|CH4
|MATH|REF1|REF2|REF3|REF4|BUS1|BUS2|BUS3|BUS4|D0|D1|D2|D3|D4
```

|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF_AMPlitude|RF_FREQuency|RF_PHASe|RF_NORMal|RF_AVErage| RF_MAXHold|RF_MINHold}

SELect:CONTROl?

Arguments

CH1–4 specifies a channel waveform as the waveform affected by the front-panel controls.

MATH specifies the math waveform as the waveform that is affected by the front-panel controls.

BUS1–4 specifies a bus waveform as the waveform affected by the front-panel controls.

D0–D15 specifies a digital waveform as the waveform affected by the front-panel controls. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed).

|RF_AMPlitude|RF_FREQuency|RF_PHASe (MDO4000/B models only)

and RF_NORMal|RF_AVErage|RF_MAXHold| RF_MINHold specify an RF trace as the waveform affected by the front-panel controls.

Returns

NONE if all the channels are turned off. NONE is ignored on input.

Examples

SELECT:CONTROL CH2 resets acquisition displays on channel 2, and causes the selected waveform to be the implied object of waveform commands.

SELECT:CONTROL? might return :SELECT:CONTROL MATH indicating that math is the implied object of waveform commands.

SELect:DAll (No Query Form)

This command turns on or off all digital channels (D0 — D15).

NOTE. *This command applies only to MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.*

Group

Vertical

Syntax

SELect:DAll {ON|OFF|0|1}

Related Commands

SELect:CONTROl**:SELect:CONTROl**:SELect:D<0-15>

SELect:D<x>

Arguments This command takes a Boolean argument, which means it can be used to either turn all digital channels on or all digital channels off.

Examples `SELect:DAll 1` turns on all digital channels.

SELect:D<x>

Turns on the display of the digital channel <x> and resets the acquisition. <x > is the channel number, which can be 0–15. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

Group Vertical

Syntax
```
SELect:D<x> {<NR1>|OFF|ON}
SELect:D<x>?
```

Arguments `ON` turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` turns off the display of the specified waveform.

`<NR1>` = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples `SELECT:D2 ON` turns the digital channel 2 waveform display on, and selects digital channel 2.

`SELECT:D2?` might return `:SELECT:D2 1` indicating that digital channel 2 is being displayed.

SELect{:MATH|:MATH1}

Turns on and off the display of the math waveform. The query returns whether the math waveform is on or off but does not indicate whether it is the selected waveform.

Group Vertical

Syntax
```
SELect{:MATH|:MATH1} {ON|OFF|<NR1>}
SELect{:MATH|:MATH1}?
```

Arguments

ON turns on the display of the specified waveform. This waveform also becomes the selected waveform.

OFF turns off the display of the specified waveform.

<NR1> = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples

SELECT:MATH ON turns the math waveform display on, and selects it.

SELECT:MATH? might return :SELECT:MATH 1 indicating that the math waveform is being displayed.

SELect:REF<x>

Turns on and off the display of the reference waveform <x>. The <x > variable represents the reference channel number, which can be 1–4. The query returns whether the channel is on or off.

Group

Vertical

Syntax

```
SELect:REF<x> {ON|OFF|<NR1>}
SELect:REF<x>?
```

Arguments

ON turns on the display of the specified waveform. This waveform also becomes the selected waveform.

OFF turns off the display of the specified waveform.

<NR1> = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples

SELECT:REF2 ON turns the channel 2 waveform display on, and selects reference waveform 2.

SELECT:REF2? might return :SELECT:REF2 1 indicating that reference waveform 2 is being displayed.

SELect:RF_AMPlitude

This command switches the RF Amplitude vs. Time trace display on or off in the time domain graticule.

Conditions

MDO4000/B models only.

Group RF

Syntax
```
SELect:RF_AMPlitude {OFF|ON|0|1}
SELect:RF_AMPlitude?
```

Arguments `OFF` or `0` turns the RF Amplitude vs. Time trace display off.

`ON` or `1` turns it on.

SELect:RF_AVErage

This command switches the RF Average trace display on or off in the frequency domain graticule.

Conditions MDO models only.

Group RF

Syntax
```
SELect:RF_AVErage {OFF|ON|0|1}
SELect:RF_AVErage?
```

Arguments `OFF` or `0` turns the RF Average trace display off.

`ON` or `1` turns it on.

SELect:RF_FREQuency

This command switches the RF Frequency vs. Time trace display on or off in the time domain graticule.

Conditions MDO4000/B models only.

Group RF

Syntax
```
SELect:RF_FREQuency {OFF|ON|0|1}
SELect:RF_FREQuency?
```

Arguments `OFF` or `0` turns the RF Frequency vs. Time trace display off.

`ON` or `1` turns it on.

SELect:RF_MAXHold

This command switches the frequency domain Max Hold trace display on or off in the frequency domain graticule.

Conditions MDO models only.

Group RF

Syntax

```
SELect:RF_MAXHold {OFF|ON|0|1}
SELect:RF_MAXHold?
```

Arguments `OFF` or `0` turns the frequency domain Max Hold trace display off.

`ON` or `1` turns it on.

SELect:RF_MINHold

This command switches the frequency domain Min Hold trace display on or off in the frequency domain graticule.

Conditions MDO models only.

Group RF

Syntax

```
SELect:RF_MINHold {OFF|ON|0|1}
SELect:RF_MINHold?
```

Arguments `OFF` or `0` turns the frequency domain Min Hold display off.

`ON` or `1` turns it on.

SELect:RF_NORMal

This command switches the frequency domain Normal trace display on or off in the frequency domain graticule.

Conditions MDO models only.

Group RF

Syntax

```
SELect:RF_NORMal {OFF|ON|0|1}
SELect:RF_NORMal?
```

Arguments

OFF or 0 turns the frequency domain Normal trace display off.

ON or 1 turns it on.

SELect:RF_PHASe

This command switches the RF Phase vs. Time trace display on or off in the time domain graticule.

Conditions

MDO4000/B models only.

Group

RF

Syntax

```
SELect:RF_PHASe {OFF|ON|0|1}
SELect:RF_PHASe?
```

Arguments

OFF or 0 turns the RF Phase vs. Time trace display off.

ON or 1 turns it on.

SET? (Query Only)

Returns the commands that list the oscilloscope settings except for configuration information for the calibration values, the WFMInpre? query, and the WFMOutpre? query. This query allows you to record or "learn" the current oscilloscope settings. You can use these commands to return the oscilloscope to the state it was in when you made the SET? query. The SET? query always returns command headers, regardless of the setting of the HEADer|:HDR command. This is because the returned commands are intended to be sent back to the oscilloscope as a command string. The VERBose command can still be used to specify whether the returned headers should be abbreviated or full-length.

This command is identical to the *LRN? command.

Group

Miscellaneous

Syntax

```
SET?
```

Related Commands HEADer|:HDR, *LRN?, VERBose

Examples SET? returns a long response, part of which could be as follows: :SET :ACQUIRE:STOPAFTER RUnsTOP;STATE 1;MODE SAMPLE;NUMENV INFINITE;NUMAVG 16;SAMPLINGMODE RT;:HEADER 1;:LOCK NONE;:LANGUAGE ENGLISH;:VERBOSE 1;:ALIAS:STATE 0;: DISPLAY:COLOR:PALETTE NORMAL;:DISPLAY:STYLE:DOTSONLY 0;:DISPLAY:PERSISTENCE 0.0000;CLOCK 1;GRATICULE FULL;INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT HIGH;:HARDCOPY:INKSAVER OFF;LAYOUT LANDSCAPE;PREVIEW 0; :SAVE:IMAGE:FILEFORMAT BMP;:SAVE:WAVEFORM:FILEFORMAT INTERNAL;:SAVE:ASSIGN:TYPE SETUP;:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL 20.0000E-3;LEVEL:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3 800.0000E-3;CH4 800.0000E-3;: TRIGGER:A:LOWERTHRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:HOLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;:TRIGGER:A :LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT 4.0000E-9;:TRIGGER:A :SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD 20.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;

SETUP<x>:DATE? (Query Only)

Returns the date when the oscilloscope setup was saved for the specified channel <x>, where x can be 1 through 10.

Group Save and Recall

Syntax SETUP<x>:DATE?

Examples SETUP4:DATE? might return SETUP4:DATE: 04-18-06 which is the setup date for channel 4.

SETUP<x>:LABEL

This command specifies the setup label for the specified channel <x>, where x can be 1 through 10.

Group Save and Recall

Syntax `SETUP<x>:LABEL <Qstring>`

Arguments `<Qstring>` is an alphanumeric string of characters, enclosed in quotes, that defines the label text for SETUP<x>. The length of the string is limited to 30 characters.

Examples `SETUP:LABEL?` might return `SETUP1:LABEL: TEST 2` which is the label setup for channel 1.

SETUP<x>:TIME? (Query Only)

Returns the time when the oscilloscope setup was saved for the specified channel <x>, where x can be 1 through 10.

Group Save and Recall

Syntax `SETUP<x>:TIME?`

Examples `SETUP2:TIME?` might return "`SETUP2:TIME: 15:24:07` which is the setup time for channel 2.

SOCKETServer:ENAble

This command enables or disables the socket server which supports a Telnet or other TCP/IP socket connection to send commands and queries to the instrument. The default state is enabled. (See page 1-9, *Setting Up Remote Communications Software*.)

NOTE. *If the socket server state is 0 (disabled) and this command is sent to enable the socket server when the port is in use by another service, then the error event code 221 (settings conflict) is posted to the event queue, and the socket server remains disabled. In this case, select a different port number and attempt to enable the socket server again.*

Group Miscellaneous

Syntax
```
SOCKETServer:ENAble {ON|OFF|<NR1>}
SOCKETServer:ENAble?
```

Related Commands SOCKETServer:PROTOCol, SOCKETServer:PORT

Arguments `ON` enables the socket server.

`OFF` disables the socket server.

`<NR1> = 0` disables the socket server; any other value turns it on.

Examples `SOCKETServer:ENAble ON` enables the socket server.

`SOCKETServer:ENAble?` might return 1, indicating that the socket server is enabled (the default).

SOCKETServer:PORT

This command sets the TCPIP port for the socket server connection. If the socket server is enabled and the port specified is in use by another service, then the error event code 221 (Settings conflict) is posted to the event queue and the socket server remains in its current state (i.e. enabled/disabled and port address remain unchanged). The default port is 4000.

Group Miscellaneous

Syntax
```
SOCKETServer:PORT <NR1>
SOCKETServer:PORT?
```

Related Commands SOCKETServer:ENAble, SOCKETServer:PROTOCol

Arguments `<NR1>` is an integer that specifies the port for the socket server connection.

Examples `SOCKETServer:PORT 1080` sets the socket server port to port 1080.

`SOCKETServer:PORT?` might return 4000, indicating that port 4000 is currently the TCPIP port for the socket server connection.

SOCKETServer:PROTOCol

This command sets the protocol for the socket server. When set to TERMinal, a session startup message is sent to the socket, and a command prompt is provided. When set to NONe, these features are disabled, allowing the server to be used for raw socket transactions, such as with a VISA socket connection. The default setting is NONe. (See page 1-9, *Setting Up Remote Communications Software*.)

Terminal protocol supports the following commands and protocol:

Tektronix Instrument Control Terminal Session Control commands:

Tektronix Instrument Control Terminal Session Control commands:

!t <timeout>: set the response timeout in milliseconds.

!d : send device clear to the instrument.

!r : read response from instrument.

!h : print this usage info.

Commands containing a ? are treated as queries and responses are read automatically.

Note: Backspace key and delete key do not work when sent to the oscilloscope. It is best to use a terminal that supports line editing before sending the line to the oscilloscope.

Group Miscellaneous

Syntax

```
SOCKETServer:PROTOCol {TERMinal|NONe}
SOCKETServer:PROTOCol?
```

Related Commands SOCKETServer:PORT, SOCKETServer:ENAble

Arguments TERMinal specifies that a session startup message be sent to the socket, and a command prompt is provided.

NONe disables these features, allowing the server to be used for raw socket transactions.

Examples SOCKETServer:PROTOCol TERMinal sets the protocol to terminal, so that a session startup message is sent to the socket, and a command prompt is provided.

SOCKETServer:PROTOCol? might return NONE, indicating that the protocol is set to support raw socket connections.

*SRE

The *SRE (Service Request Enable) command specifies the bits in the Service Request Enable Register. (See page 3-1, *Registers*.)

Group Status and Error

Syntax

```
*SRE <NR1>
*SRE?
```

Related Commands *CLS, DESE, *ESE, *ESR?, EVENT?, EVMsg?, FACtory, *STB?

Arguments <NR1> is an integer whose values can be 0, 16, 32, or 48. These correspond to the following *SRE bits:

0 – service request is disabled

16 – request service when the MAV (message available) bit (bit 4) of the SBR (status byte register) is true

32 – request service when the ESB (event status) bit (bit 5) of the SBR (status byte register) is true

48 – request service when either the MAV or ESB bits of the SBR (status byte register) is true

Other argument values may provide unexpected results.

NOTE. *The power-on default for SRER is 0 if *PSC is 1. If *PSC is 0, the SRER maintains the previous power cycle value through the current power cycle.*

Examples *SRE 48 sets the bits in the SRER to binary 00110000.

*SRE? might return 32, showing that the bits in the SRER have the binary value of 00100000.

*STB? (Query Only)

*STB? (Read Status Byte) returns the contents of the Status Byte Register (SBR) using the Master Summary Status (MSS) bit. (See page 3-1, *Registers*.)

Group Status and Error

Syntax *STB?

Related Commands *CLS, DESE, *ESE, *ESR?, EVENT?, EVMsg?, FACtory, *SRE

Returns <NR1>

Examples *STB? might return 96, showing that the SBR contains the binary value 01100000.

TEKSecure (No Query Form)

This command initializes both waveform and setup memories, overwriting any previously stored data. These are the WFMInpre?, WFMOutpre?, and DATa command values after the TEKSecure operation.

```
:WFMOUTPRE:BYT_NR 1 :WFMOUTPRE:BIT_NR 8 :WFMOUTPRE:ENCDG
BIN :WFMOUTPRE:BN_FMT RI :WFMOUTPRE:BYT_OR MSB
:WFMOUTPRE:WFID "Ch1, DC coupling, 100.0mV/div,
4.000us/div, 10000 points, Sample mode" :WFMOUTPRE:NR_PT
10000 :WFMOUTPRE:PT_FMT Y :WFMOUTPRE:XUNIT "s"
:WFMOUTPRE:XINCR 4.0000E-9 :WFMOUTPRE:XZERO -20.0000E-6
:WFMOUTPRE:PT_OFF 0 :WFMOUTPRE:YUNIT "V" :WFMOUTPRE:YMULT
4.0000E-3 :WFMOUTPRE:YOFF 0.0000 :WFMOUTPRE:YZERO 0.0000
:WFMINPRE:BYT_NR 1 :WFMINPRE:BIT_NR 8 :WFMINPRE:ENCDG
BIN :WFMINPRE:BN_FMT RI :WFMINPRE:BYT_OR MSB
:WFMINPRE:NR_PT 10000 :WFMINPRE:PT_FMT Y :WFMINPRE:XUNIT
"s" :WFMINPRE:XINCR 4.0000E-9 :WFMINPRE:XZERO 0.0000
:WFMINPRE:PT_OFF 0 :WFMINPRE:YUNIT "V" :WFMINPRE:YMULT
4.0000E-3 :WFMINPRE:YOFF 0.0000 :WFMINPRE:YZERO 0.0000
DATA:DESTINATION REF1 DATA:ENCDG RIBINARY DATA:SOURCE CH1
DATA:START 1 DATA:STOP 10000 DATA:WIDTH 1
```

NOTE. *The TEKSecure command can take up to five minutes to complete. The oscilloscope is inoperable during this period.*

Group Miscellaneous

Syntax TEKSecure

Examples TEKSECURE initializes both waveform and setup memories.

This is a program example of how to generate an SRQ when TEKSECURE completes:

```
# Bit 0 of the DESE (Device Event Status Enable Register)
# enables OPC to be reported to the SESR (Standard Event
# Status Register)
DESE 255
# Bit 0 of the ESER (Event Status Enable Register)
# enables OPC to be summarized in the ESB (Event Status #
Bit) of the SBR (Status Byte Register)
*ESE 255
# Bit 5 of the SRE (Service Request Enable Register)
enables
# the generation of SRQ when the ESB bit of the SBR
becomes # TRUE
*SRE 32
TEKSECURE;*OPC
```

When the TEKSECURE operation has completed, the OPC bit of the SESR will be TRUE and SRQ will have been generated.

TIMe

This command specifies the time that the oscilloscope displays.

Group Miscellaneous

Syntax

```
TIMe <QString>
TIMe?
```

Related Commands DATE

Arguments <QString> is a time in the form "hh:mm:ss" where hh refers to a two-digit hour number, mm refers to a two-digit minute number from 00 to 59, and ss refers to a two-digit second number from 00 to 59.

Examples TIME "14:00:00" sets the time to exactly 2:00 p.m.

TIME? might return :TIME "14:05:17" indicating the current time is set to 2:05 p.m. and 17 seconds.

TOTaluptime? (Query Only)

This query returns the total number of hours that the oscilloscope has been powered on since the nonvolatile memory was last programmed (usually since the initial manufacturing process).

Group Miscellaneous

Syntax `TOTaluptime?`

*TRG (No Query Form)

Performs a group execute trigger on commands defined by *DDT.

Group Miscellaneous

Syntax `*TRG`

Related Commands *DDT

Examples `*TRG` immediately executes all commands that have been defined by *DDT.

TRIGger (No Query Form)

Forces a trigger event to occur.

Group Trigger

Syntax
```
TRIGger FORCe
TRIGger?
```

Arguments `FORCe` creates a trigger event. If TRIGger:STATE is set to READy, the acquisition will complete. Otherwise, this command will be ignored.

Examples `TRIGGER FORCE` forces a trigger event to occur.

TRIGger:A

Sets the A trigger level automatically to 50% of the range of the minimum and maximum values of the trigger input signal. The query returns current A trigger parameters. The trigger level is the voltage threshold through which the trigger source signal must pass to generate a trigger event. This command works for the following cases: Edge Trigger (when source is not AC line or power), Logic

Trigger (when Clock Source is not Off or Logic Pattern is Don't Care), and Pulse Width Trigger.

Group Trigger

Syntax

```
TRIGger:A SETLevel
TRIGger:A?
```

Related Commands TRIGger:A:EDGE?,

TRIGger:A:LOGIc?,

Arguments `SETLevel` sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

Examples `TRIGGER:A SETLEVEL` sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

`TRIGGER:A?` might return a long response with A trigger parameters, some of which could be as follows: `:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL 20.0000E-3;LEVEL:CH1 20.0000E-3;CH2 0.0000; CH3 0.0000;CH4 0.0000;:TRIGGER:A:UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3 8 00.0000E-3;CH4 800.0000E-3;:TRIGGER:A:LOWERTHRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:HOLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD: CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X; CH2 X;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;MO RELIMIT 4.0000E-9;:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD 20.000 0E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD 0.0000;:TRIGGER:A:SETHOLD:HOLD TIME 4.0000E-9;SETTIME 4.0000E-9;:TRIGGER:A:PULSE:CLASS TRANSITION;:TRIGGER:A:PULSEWIDTH:SOURCE CH1;POLARITY POSITIVE;WHEN LESSTHAN;WIDTH 4.0000E-9;:TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE;WHEN OCCURS;WIDTH 4.0000E-9;:TRIGGER:A:TRANSITION:SOURCE CH1;POLARITY POSITIVE;WHEN SLOWER;DELTATIME 4.0000E-9;:TRIGGER:A:VIDEO :POLARITY POSITIVE;SOURCE CH1;STANDARD NTSC;SYNC ALLLINES;HOLDOFF:FIELD 0.0000;: TRIGGER:A:VIDEO:CUSTOM:FORMAT PROGRESSIVE;SCAN`

```
RATE15K;:TRIGGER:A:VIDEO:LINE 1;H DTV:FORMAT
HD1080I60;:TRIGGER:A:BUS:SOURCE B1;B1:I2C:CONDITION
START;DATA:VALUE "XXXXXXXX";SIZE 1;START 0.0000;DIRECTION
NOCARE;:TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE
ADDR7;TYPE USER;VALUE
"XXXXXXX";:TRIGGER:A:BUS:B1:SPI:CONDITION MOSI;DATA:OUT
:VALUE "XXXXXXXX";:TRIGGER:A:BUS:B1:SPI:DATA:IN:VALUE
"XXXXXXXX";:TRIGGER:A:BUS: B1:SPI:DATA:SIZE 1;START 0.0000;:
```

TRIGger:A:BANDWidth:RF:HIGH? (Query Only)

Returns the high end of the power level trigger bandwidth range as an NR3 value in hertz. This is the value that is displayed in the user interface when the trigger source is RF.

This command requires the MDO4TRIG advanced trigger feature to be enabled.

Conditions MDO models only

Group Trigger

Syntax `TRIGger:A:BANDWidth:RF:HIGH?`

TRIGger:A:BANDWidth:RF:LOW? (Query Only)

Returns the low end of the power level trigger bandwidth range as an NR3 value in hertz. This is the value that is displayed in the user interface when the trigger source is RF.

This command requires the MDO4TRIG advanced trigger feature to be enabled.

Conditions MDO models only

Group Trigger

Syntax `TRIGger:A:BANDWidth:RF:LOW?`

TRIGger:A:BUS

This command specifies the bus type to trigger on. It supports CAN, I²C, SPI, RS-232, Ethernet, MIL-STD-1553, LIN, USB, audio, FlexRay buses (with the

appropriate application module installed) as well as parallel signals (MDO4000/B and MDO3000 series with option MDO3MSO only.). There are up to four buses, B1–B4, except for MDO3000, which only has two buses, B1–B2. Each bus can be independently set to one of the serial trigger types.

Conditions

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3COMP.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals on the MDO4000/B and MSO4000B and DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

A table is available listing the commands enabled by each application module. (See page G-1, *Application Module-enabled Commands*.)

Group Trigger

Syntax

```
TRIGger:A:BUS
{I2C|SPI|CAN|RS232C|PARallel|USB|LIN|FLEXRay|AUDio|
ETHERnet|MIL1553B}
TRIGger:A:BUS?
```

Arguments

`I2C` specifies the Inter-IC bus.

`SPI` specifies the Serial Peripheral Interface bus (not available on two-channel models).

`CAN` specifies the Controller Area Network bus.

`RS232C` specifies the RS-232C bus.

PARallel specifies the Parallel bus.

USB specifies the USB bus.

LIN specifies the LIN bus.

FLEXRay specifies the FLexRay bus.

AUDio specifies the audio bus.

ETHERnet specifies the Ethernet bus.

MIL1553B specifies the MIL-STD-1553 bus.

TRIGger:A:BUS:B<x>:AUDio:CONDition

This command sets the condition (start of frame or matching data) to be used when triggering on an audio bus signal. B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:CONDition {SOF|DATA}
TRIGger:A:BUS:B<x>:AUDio:CONDition?
```

Arguments SOF enables triggering on the start of frame.

DATA enables triggering on matching data.

TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue

This command sets the upper word value to be used when triggering on an audio bus signal. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue <String>
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue?
```

TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet

This command sets the data offset value to be used when triggering on an audio bus signal. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet?
```

Arguments <NR1> is the data offset value.

TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier

This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used when triggering on an audio bus signal. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|INrange|OUTrang
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier?
```

Arguments

`LESSthan` sets the qualifier to less than.

`MOREthan` sets the qualifier to greater than.

`EQual` sets the qualifier to equal.

`UNEQual` sets the qualifier to not equal.

`LESSEQual` sets the qualifier to less than or equal.

`MOREEQual` sets the qualifier to greater than or equal.

`INrange` sets the qualifier to in range.

`OUTrange` sets the qualifier to out of range.

TRIGger:A:BUS:B<x>:AUDio:DATa:VALue

This command sets the lower word value to be used when triggering on an audio bus signal. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

`B<x>` is the bus number (1-4), which is 1–4.

Conditions

This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue <String>
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue?
```

Arguments

`<String>` specifies the trigger data lower word.

TRIGger:A:BUS:B<x>:AUDio:DATa:WORD

This command sets the alignment of the data (left, right or either) to be used to trigger on an audio bus signal. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

`B<x>` is the bus number (1-4), which is 1–4.

Conditions

This command requires a DPO4AUDIO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUDIO application module on MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD {EITher|LEFt|RIGht}
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD?
```

Arguments `EITher` aligns the trigger data to either left or right.

`LEFt` aligns the trigger data to the left.

`RIGht` aligns the trigger data to the right.

TRIGger:A:BUS:B<x>:CAN:CONDition

This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used when triggering on a CAN bus signal. `B<x>` is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:CAN:CONDition
{SOF|FRAMEtype|IDentifier|DATA|IDANDDATA|EOF|ACKMISS:ERROR}
TRIGger:A:BUS:B<x>:CAN:CONDition?
```

Arguments `SOF` enables triggering on the start of frame.

`FRAMEtype` enables triggering on the type of frame.

`IDentifier` enables triggering on a matching identifier.

`DATA` enables triggering on matching data.

`IDANDDATA` enables triggering on a matching identifier and matching data.

`EOF` enables triggering on the end of frame.

`ACKMISS` enables triggering on a missing acknowledge.

`ERROR` specifies a search based on a bit stuffing error.

Examples `TRIGGER:A:BUS:B1:CAN:CONDITION?` might return :TRIGGER:A:BUS:B1:CAN:CONDITION EOF indicating an end of file condition.

TRIGGER:A:BUS:B1:CAN:CONDITION DATA enables triggering on matching CAN data.

TRIGger:A:BUS:B<x>:CAN:DATa:DIRection

This command sets the data direction (read, write or "nocare") to be used to search on a CAN bus signal. The trigger condition must be set to IDentifier (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection {READ|WRITE|NOCARE}
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection?
```

Arguments

READ sets the CAN data direction to READ.

WRITE sets the CAN data direction to WRITE.

NOCARE sets the CAN data direction to either.

Examples TRIGGER:A:BUS:B1:CAN:DATA:DIRECTION WRITE sets the CAN data direction to Write.

TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

This command sets the qualifier (<, >, =, not =, <=) to be used when triggering on a CAN bus signal. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
{LESSthan|Than|EQual|UNEQual|LESSEQual|EQual}
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier?
```

Arguments

`LESSthan` sets the oscilloscope to trigger when the data is less than the qualifier value.

`Than` sets the oscilloscope to trigger when the data is than the qualifier value.

`EQual` sets the oscilloscope to trigger when the data is equal to the qualifier value.

`UNEQual` sets the oscilloscope to trigger when the data is not equal to the qualifier value.

`LESSEQual` sets the oscilloscope to trigger when the data is less than or equal to the qualifier value.

`EQual` sets the oscilloscope to trigger when the data is than or equal to the qualifier value.

Examples

`TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER LESSTHAN` sets the oscilloscope to trigger when the data is less than the qualifier value.

`TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER?` might return `:TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER THAN`, indicating that the oscilloscope is set to trigger when the data is than the qualifier value.

TRIGger:A:BUS:B<x>:CAN:DATa:SIZe

This command sets the length of the data string, in bytes, to be used when triggering on a CAN bus signal. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number (1-4), which is 1–4.

Conditions

This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe?
```

Arguments

`<NR1>` is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:CAN:DATa:VALue

This command sets the binary data value to be used when triggering on a CAN bus signal. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:CAN:DATa:VALue?
```

Arguments <QString> is the data value in binary format. The only allowed characters in the QString are 0, 1, and X.

Examples TRIGGER:A:BUS:B1:CAN:DATA:VALUE 1011 sets the CAN data value to 1011.

TRIGger:A:BUS:B<x>:CAN:FRAMEtype

This command sets the frame type (data, remote, error or overload) to be used when triggering on a CAN bus signal. The trigger condition must be set to FRAMEtype (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:FRAMEtype
{DATA|REMote|ERRor|OVERLoad}
TRIGger:A:BUS:B<x>:CAN:FRAMEtype?
```

Arguments DATA specifies a data frame type.

REMote specifies a remote frame type.

ERRor specifies an error frame type.

OVERLold specifies an overload frame type.

Examples TRIGGER:A:BUS:B1:CAN:FRAMETYPE DATA sets the CAN trigger frame type to DATA.

TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe

This command sets the addressing mode (standard or extended format) to be used when triggering on a CAN bus signal. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe
{STandard|EXTended}
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe?
```

Arguments STandard specifies the standard addressing mode.

EXTended specifies the extended addressing mode.

TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue

This command sets the binary address value to be used when triggering on a CAN bus signal. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). B<x> is the bus number (1-4), which is 1–4.

Conditions This command requires a DPO4AUTO application module on DPO/MSO4000B and MDO4000/B models and a MDO3AUTO application module on MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue <QString>
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue?
```

Arguments

<QString> is up to 29 bits specifying the binary identifier value. The only allowed characters in the QString are 0, 1, and X.

Examples

TRIGGER:A:BUS:B1:CAN:IDENTIFIER:VALUE 1011 sets the identifier value to 1011.

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

This command specifies a field or condition within an Ethernet frame to trigger on. B<x> is the bus number B1–B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:CONDition
{SFD|MACADDRess|MACLENgth|IPHeader|TCPHeader|DATa|EOP|IDLe
|FCSError|QTAG}

TRIGger:A:BUS:B<x>:ETHERnet:CONDition?
```

Related Commands

Most of the other TRIGger:A:BUS:B<x>:ETHERnet commands are impacted by the setting of this command.

BUS:B<x>:ETHERnet:PROTOcol

TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments

SFD — Start of frame delimiter.

MACADDRess — MAC addresses field.

MACLENgth — MAC length/type field.

IPHeader — IP header field. This argument is only available when PROTOCOL is set to IPv4 (using the command BUS:B<x>:ETHERnet:PROTOcol).

TCPHeader — TCP header field. This argument is only available when PROTOCOL is set to IPv4 (using the command BUS:B<x>:ETHERnet:PROTOcol).

DATa — TCP/IPv4 or MAC protocol client data field. Use the command BUS:B<x>:ETHERnet:PROTOcol to specify either TCP/IPv4 or OTHER. If the protocol is set to OTHER, then DATa refers to the MAC client data.

EOP — End of Packet field.

IDLe — Idle field.

FCSError — Frame Check Sequence Error (CRC) field.

QTAG — IEEE 802.1Q (VLAN) control information field. In order to use QTAG as a trigger condition, the frame type must be set to QTAG (using TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe).

Examples

TRIGger:A:BUS:B1:ETHERnet:CONDition MACADDRess sets the trigger field to MACADDRess.

TRIGger:A:BUS:B1:ETHERnet:CONDition? might return DATA.

TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

When the Ethernet trigger condition is set to DATa, and the qualifier is set to either INrange orOUTrange, this command specifies the upper data value of the range. (Use the command TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue to specify the lower limit of the range.) The default is all X's (don't care). B<x> is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

Arguments

QString is a quoted string whose length varies depending on the size setting, up to 32 bits. (Use the command TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe to specify the size.) The allowable characters are 0, 1, and X. The bits specified

in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:ETHERnet:DATa:HIVALue` "XXXXXXXXXXXXXXXXXXXXXXXX00001000" sets the upper limit of the range to XXXXXXXXXXXXXXXXXXXXXXXX00001000 (when the trigger condition is set to `DATa`, and the qualifier is set to `INrange` or `OUTrange).`

`TRIGger:A:BUS:B1:ETHERnet:DATa:HIVALue?` might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"

TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet

When the Ethernet trigger condition is set to `DATa`, this command specifies where in the data field to look for the data trigger value. It specifies the offset into the data field, in bytes, where the value will be matched. The default is —1 (don't care). `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

Arguments

`<NR1>` is an integer whose minimum and default values are -1 (don't care) and maximum is 1,499.

Examples

`TRIGger:A:BUS:B1:ETHERnet:DATa:OFFSet 36` sets the data offset to 36 bytes.

`TRIGger:A:BUS:B1:ETHERnet:DATa:OFFSet?` might return –1, indicating that the data offset value is the default value, –1, meaning "don't care".

TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

When the Ethernet trigger condition is set to DATa, this command specifies the number of contiguous TCP/IPv4/MAC client data bytes to trigger on. B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

Arguments The minimum and default values are 1 and maximum is 16, except when the qualifier is set to Inside Range or Outside Range. In these cases, the maximum size is 4.

Examples TRIGger:A:BUS:B1:ETHERnet:DATa:SIZe 4 sets the oscilloscope to trigger on 4 contiguous data bytes.

TRIGger:A:BUS:B1:ETHERnet:DATa:SIZe? might return 6, indicating that the oscilloscope is set to trigger on 6 contiguous data bytes.

TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

When the Ethernet trigger condition is set to DATa, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value to trigger on. When the Ethernet trigger condition is set to DATa, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the range. (Use the command TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue to set the upper limit of the range.) The default is all X's (don't care). B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet

TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe

TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

Arguments

QString is a quoted string where the allowable characters are 0, 1, and X. The allowable number of characters depends on the setting for size (using TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe). The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:ETHERnet:DATa:VALue "00001000"` sets the binary data to trigger on to 00001000, assuming the qualifier is set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`, and `DATa:SIZe` is set to 1 byte.

`TRIGger:A:BUS:B1:ETHERnet:DATa:VALue "00001000"` sets the lower limit of the range to 00001000, assuming the qualifier is set to `INrange` or `OUTrange`, and`DATa:SIZe` is set to 1 byte.

TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe

This command specifies the Ethernet frame type: either Basic or QTag (IEEE 802.1Q, or VLAN tagging). The default is Basic. `B<x>` is the bus number B1-B4.

NOTE. *Once this command is used to specify QTAG, then the command TRIGger:A:BUS:B<x>:ETHERnet:CONDition can be used to specify QTAG as the condition to trigger on.*

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe {BASic|QTAG}
TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments BASic is the standard Ethernet frame.

QTAG is the Q-Tag Ethernet frame (also called VLAN tagging.)

Examples TRIGger:A:BUS:B1:ETHERnet:FRAMETYPe QTAG sets the frame type to QTag (VLAN tagging).

TRIGger:A:BUS:B1:ETHERnet:FRAMETYPe? might return BASIC, indicating the frame type is a standard Ethernet frame.

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

When the Ethernet trigger condition is set to IPHeader, this command specifies the value of the 32–bit destination address that is to be used in the trigger (along with the source address and protocol value). The IP destination address is a standard IP address such as 192.168.0.1. The default is all X's (don't care). B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

BUS:B<x>:ETHERnet:PROTOcol

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:IPHeader:DESTinationaddr:VALue` “00011001001000010110100000000001” sets the IP destination address to trigger on to 192.168.0.1.

`TRIGger:A:BUS:B1:ETHERnet:IPHeader:DESTinationaddr:VALue` might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX01".

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

When the Ethernet trigger condition is set to `IPHeader`, this command specifies the value of the 8–bit protocol field that is to be used in the trigger (along with the source and destination addresses). The default is all X’s (don’t care). `B<x>` is the bus number B1-B4.

NOTE. *Commonly used protocol values are 1 (ICMP), 2 (IGMP), 6 (TCP) and 17 (UDP).*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

Arguments QString is a quoted string of up to 8 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGGER:A:BUS:B1:ETHERNET:IPHEADER:PROTOCOL:VALUE` “01010010” would set the value to be used in the trigger to 01010010.

`TRIGger:A:BUS:B1:ETHERnet:IPHeader:PROTOcol:VALue?` might return “XXXXXXXX”.

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue

When the Ethernet trigger condition is set to `IPHeader`, this command specifies the value of the 32–bit source address that is to be used in the trigger (along with the destination address and protocol value). The IP source address is a standard IP address such as 192.168.0.1. The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue

TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:IPHeader:SOUrceaddr:VALue "00011001001000010110100000000001"` sets the IP source address to trigger on to 192.168.0.1.

`TRIGger:A:BUS:B1:ETHERnet:IPHeader:SOUrceaddr:VALue` might return "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX01".

TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue

When the Ethernet trigger condition is set to `MACADDress`, this command specifies the 48–bit MAC destination address that is to be used in the trigger (along with the source address value). The default is all X's (don't care). `B<x>` is the bus number B1-B4.

NOTE. *MAC Addresses are 48–bit values such as 08:00:11:1E:C9:AE hex.*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue

Arguments QString is a quoted string of up to 48 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:DESTination:VALue` ”XXXXXXXXXX01010111111100000001111010101010101000” would set the MAC destination address to trigger on to XX:35:FC:07:AA:C8 hex.

`TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:DESTination:VALue?` might return ”XXXXXXXXXX01010111111100000001111010101010101000”.

TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue

When the Ethernet trigger condition is set to`MACADDress`, this command specifies the 48–bit MAC source address value that is to be used in the trigger (along with the destination address value). The default is all X’s (don’t care). `B<x>` is the bus number B1-B4.

NOTE. *MAC Addresses are 48–bit values such as 08:00:11:1E:C9:AE hex.*

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue

Arguments

QString is a quoted string of up to 48 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:SOUrce:VALue` ”XXXXXXXXXX01010111111100000001111010101010101000” would set the MAC destination address to trigger on to XX:35:FC:07:AA:C8 hex.

`TRIGger:A:BUS:B1:ETHERnet:MAC:ADDRess:SOUrce:VALue?` might return ”XXXXXXXXXX01010111111100000001111010101010101000”.

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

When the Ethernet trigger condition is set to `MACLENgth`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper data value of the range. (Use the command TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue to specify the lower limit of the range.) The default is all X’s (don’t care). `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue

Arguments

QString is a quoted string of up toe 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue "XXXXXXXX00001000"` sets the upper limit of the range to the hexadecimal value XX08 (when the trigger condition is set to `MACLENgth`, and the qualifier is set to `INrange` or `OUTrange)`.

`TRIGGER:A:BUS:B1:ETHERNET:MAC{:LENGTH|:TYPE}:HIVALUE?` might return "XXXXXXXX00001000".

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue

When the Ethernet trigger condition is set to `MACLENgth`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the 16–bit value to trigger on. When the qualifier is set to `INrange` or `OUTrange`, this command specifies the lower limit of the range. (Use the command TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue to set the upper limit of the range.) The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Conditions

This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

Arguments

QString is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth|:TYPe}:VALue "XXXXXXXX00001000"` sets the MAC length/type value to trigger on the hexadecimal value XX08, assuming the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`.

TRIGger:A:BUS:B1:ETHERnet:MAC{:LENgth|:TYPe}:VALue "XXXXXXXX00001000" sets the lower limit of the range to the hexadecimal value XX08, assuming the qualifier is set to INrange or OUTrange.

TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue

When the Ethernet trigger condition is set to QTAG, this command specifies the 32–bit Q-Tag value to trigger on. The default is all X's (don't care). B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue <QString>
TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

TRIGGER:A:BUS:B1:ETHERNET:QTAG:VALUE "XXXXXXXXXXXXXXXXXXXX010010001010" would specify to trigger on the Q-Tag value of hexadecimal XXXXX48A.

TRIGGER:A:BUS:B1:ETHERNET:QTAG:VALUE? might return "XXXXXXXXXXXXXXXXXXXX010010001010".

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier

This command specifies the qualifier to be used when the Ethernet trigger condition is set to MACLENgth or DATa. Normally, the Ethernet qualifier is set to "Equal to". B<x> is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}

TRIGger:A:BUS:B<x>:ETHERnet:QUALifier?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue

TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue

TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue

Examples `TRIGger:A:BUS:B1:ETHERnet:QUALifier LESSthan` sets the `MACLENgth or DATa` qualifier to less than.

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

When the Ethernet trigger condition is set to `TCPHeader`, this command specifies the 32–bit acknowledgement number that is to be used in the trigger (along with the destination and source port addresses and the sequence number). The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue <QString>
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:TCPHeader:ACKnum:VALue "XXXXXXXXXXXXXXXXXXXX00001000"` sets the acknowledgement number to be used in the trigger to hexadecimal XXXXXX08.

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

When the Ethernet trigger condition is set `TCPHeader`, this command specifies the 16–bit destination port address value that is to be used in the trigger (along with the acknowledgement value, source port address and the sequence number). The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

Arguments QString is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:TCPHeader:DESTinationport:VALue "XXXXXXXX00100010"` would set the destination port address value that is to be used in the trigger to hexadecimal XX22.

`TRIGger:A:BUS:B1:ETHERnet:TCPHeader:DESTinationport:VALue?` might return "XXXXXXXXXXXXXXXX".

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

When the Ethernet trigger condition is set to `TCPHeader`, this command specifies the 32–bit sequence number that is to be used in the trigger (along with the destination and source port addresses and the acknowledgement value). The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue <QString>
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

Arguments QString is a quoted string of up to 32 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SEQnum:VALue "XXXXXXXXXXXXXXXXXXXX000100010001"` would set the sequence number that is to be used in the trigger to hexadecimal XXXXX111.

`TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SEQnum:VALue?` might return "XXXXXXXXXXXXXXXXXXXX0010010100" .

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

When the Ethernet trigger condition is set to `TCPHeader`, this command specifies the 16–bit source port address that is to be used in the trigger (along with the destination port address, the sequence number and the acknowledgement number). The default is all X's (don't care). `B<x>` is the bus number B1-B4.

Conditions This command requires a DPO4ENET application module for DPO/MSO4000B and MDO4000/B models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue
<QString>
TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:ETHERnet:CONDition

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue

TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue

Arguments QString is a quoted string of up to 16 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SOUrceport:VALue` "XXXX000010100110" would set the source port address that is to be used in the trigger to hexadecimal X0A6.

`TRIGger:A:BUS:B1:ETHERnet:TCPHeader:SOUrceport:VALue?` might return "XXXXX01001010110".

TRIGger:A:BUS:B<x>:FLEXray:CONDition

This command specifies the condition to use when triggering on a FlexRay bus signal (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error). `B<x>` is the bus number B1-B4, except for MDO3000, which has two buses B1–B2..

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CONDition
{SOF|FRAMEType|IDentifier|CYCLEcount|HEADer|DATA
|IDANDDATA|EOF|ERROR}

TRIGger:A:BUS:B<x>:FLEXray:CONDition?
```

Arguments

SOF sets the trigger condition to start of frame.

FRAMEType sets the trigger condition to frame type.

IDentifier sets the trigger condition to identifier.

CYCLEcount sets the trigger condition to cycle count.

HEADer sets the trigger condition to header.

DATA sets the trigger condition to data.

IDANDDATA sets the trigger condition to id and data.

EOF sets the trigger condition to end of frame.

ERROR sets the trigger condition to error.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:CONDITION? might return TRIGGER:A:BUS:B1:FLEXRAY:CONDITION SOF indicating the FlexRay condition is start of frame.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue

This command specifies the high value when triggering on a FlexRay bus cycle count field. (Use TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue to set the low value.) The trigger condition must be set to CYCLEcount (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue?
```

Arguments

<QString> is a quoted string that is the cycle count high value.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE “110010” sets the cycle count high value to 110010.

TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE? might return TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "XXXXXX" indicating the cycle count high value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus cycle count field. The trigger condition must be set to CYCLEcount (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier?
```

Arguments

LESSthan sets the cycle count qualifier to less than.

MOREthan sets the cycle count qualifier to more than.

EQual sets the cycle count qualifier to equal.

UNEQual sets the cycle count qualifier to not equal.

LESSEQual sets the cycle count qualifier to less than or equal.

MOREEQual sets the cycle count qualifier to greater than or equal.

INrange sets the cycle count qualifier to in range.

OUTrange sets the cycle count qualifier to out of range.

Examples TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER LESSTHAN sets the cycle count qualifier to LESSTHAN.

TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER? might return TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER EQUAL indicating that the cycle count qualifier is set to EQUAL.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue

This command specifies the low value when triggering on the FlexRay bus cycle count field. (Use TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue to set the upper value.) The trigger condition must be set to CYCLEcount (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue?
```

Arguments <QString> is a quoted binary data string that represents the cycle count low value.

Examples TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE “11001101” sets the cycle count value to 11001101.

TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE? might return TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE "XXXXXX" indicating the cycle count value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue

This command specifies the high value when triggering on the FlexRay bus data field. (Use TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue to set the lower value.) The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue?
```

Arguments

<QString> is a quoted string that is the binary data high value.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "11001101XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXX1" sets the binary data string high value to "11001101XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXX1".

TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXX" indicating the binary data string high value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet

This command specifies the offset of the data string, in bytes, when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet?
```

Arguments

<NR1> is the offset of the data string in bytes. A byte offset of -1 signifies “don't care”, and no byte offset is used. The instrument will trigger on or match any byte value that fits.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 0 indicating that a data offset of 0.

TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier?
```

Arguments

LESSthan sets the data qualifier to less than.

MOREthan sets the data qualifier to greater than.

EQual sets the data qualifier to eqaual.

UNEQual sets the data qualifier to not equal.

LESSEQual sets the data qualifier to less than or equal.

MOREEQual sets the data qualifier to greater than or equal.

INrange sets the data qualifier to in range.

OUTrange sets the data qualifier to out of range.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER LESSTHAN sets the data qualifier to LESSTHAN.

TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER EQUAL indicating the data qualifier is EQUAL.

TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe

This command specifies the length of the data string, in bytes, when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or

IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe?
```

Arguments <NR1> is the FlexRay data string length, in bytes.

Examples TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 8 sets the data string size to 8 bytes.

TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 1 indicating the data size is 1 byte.

TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue

This command specifies the low value when triggering on the FlexRay bus data field. (Use TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue to set the upper value.) The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue?
```

Arguments <QString> is a quoted string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE “11001101” sets the FlexRay data value for triggering to 11001101.

TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE "XXXXXXXX" indicating the FlexRay data value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE

This command specifies the end of file type (static, dynamic or any) when triggering on the FlexRay bus EOF field. The trigger condition needs to be set to EOF (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE {STATic|DYNAMic|ANY}
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE?
```

Arguments

STATic specifies triggering on the STATIC end of file type.

DYNAMic specifies triggering on the DYNAMIC end of file type.

ANY specifies triggering on a STATIC or DYNAMIC end of file type.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE ANY sets the FlexRay end of file type to ANY.

TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE? might return TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE STATIC indicating the FlexRay end of file type is STATIC

TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE

This command specifies the error type when triggering on the FlexRay bus signal. The trigger condition needs to be set to ERROR (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE
{CRCHeader|CRCTrailer|SYNCFrame|STARTupnosync|NULLFRStatic|
NULLFRDynamic}
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE?
```

Arguments

`CRCHeader` sets the error type to CRCHeader.

`CRCTrailer` sets the error type to CRCTrailer.

`SYNCFrame` sets the error type to SYNCFrame.

`STARTupnosync` sets the error type to STARTupnosync.

`NULLFRStatic` sets the error type to NULLFRStatic.

`NULLFRDynamic` sets the error type to NULLFRDynamic.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE SYNCFRAME` sets the trigger type is SYNCFRAME.

`TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE CRCHEADER` indicating the FlexRay trigger type is CRCHeader.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue

This command specifies the high value when triggering on the FlexRay bus frame ID field. (Use TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue to set the low value.) The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue?
```

Arguments

<QString> is a quoted string that is the binary frame ID high value.

Examples

TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE “11001100101” sets the frame ID high value to 11001100101.

TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE? might return TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE "XXXXXXXXXX" indicating the frame ID high value is “don't care”.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier

This command specifies the qualifier to use when triggering on the FlexRay bus frame ID field. The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier?
```

Arguments

LESSthan sets the frame ID qualifier to less than.

MOREthan sets the frame ID qualifier to greater than.

EQual sets the frame ID qualifier to equal.

UNEQual sets the frame ID qualifier to not equal.

LESSEQual sets the frame ID qualifier to less than or equal.

MOREEQual sets the frame ID qualifier to greater than or equal.

INrange sets the frame ID qualifier to in range.

OUTrange sets the frame ID qualifier to out of range.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER LESSTHAN` sets the frame ID qualifier to less than.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER EQUAL` indicating the frame ID qualifier is set to equal.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue

This command specifies the low value when triggering on the FlexRay bus frame ID field. (Use TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue to set the high value.) The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue?
```

Arguments

`<QString>` is a quoted string that is the FlexRay frame ID low value.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE “11001100101”` sets the frame ID value to 11001100101.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "XXXXXXXXXXX"` indicating the frame ID value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEType

This command specifies the frame type (normal, payload, null, sync or startup) when triggering on the FlexRay bus signal. The trigger condition needs to be set to FRAMEType (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEType
{NORMal|PAYLoad|NULL|SYNC|STARTup}
```

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEType?
```

Arguments `NORMal` specifies the normal frame type.

`PAYLoad` specifies the payload frame type.

`NULL` specifies the null frame type.

`SYNC` specifies the sync frame type.

`STARTup` specifies the startup frame type.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE PAYLOAD` sets the frame type to payload.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE NORMAL` indicating the frame type is set to normal.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC

This command specifies the CRC portion of the binary header string when triggering on the FlexRay bus signal. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC?
```

Arguments <QString> is a quoted string that is the CRC portion of the binary header string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC “11001100101” sets the CRC portion of the binary header string to 11001100101.

TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC? might return TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC "XXXXXXXXXX" indicating the CRC portion of the binary header string is don't care.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount

This command specifies the cycle count portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount?
```

Arguments <QString> is a quoted string that is the cycle count portion of the binary header string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT “110010” sets the cycle count to 110010.

TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT? might return TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "XXXXXX" indicating the cycle count is don't care.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID

This command specifies the frame ID portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID?
```

Arguments <QString> is a quoted string that represents the frame ID portion of the binary header string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "11001100101" sets the frame ID portion of the binary header string to 11001100101.

TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID? might return TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "XXXXXXXXXXX" indicating the frame ID portion of the binary header string is "don't care".

TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits

This command specifies the indicator bits portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits?
```

Arguments <QString> is a quoted string that is the indicator bits portion of the binary header string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "11001" sets the indicator bits portion of the header string to 11001.

TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS? might return TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "XXXXX" indicating that the indicator bits portion of the header string are “don't cares”.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength

This command specifies the payload length portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTOMAX application module for DPO/MSO4000B and MDO4000/B models or MDO3FLEX application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength?
```

Arguments <QString> is the length of the payload portion of the Binary header string.

Examples TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH “1100101" sets the FlexRay header paylength to 1100101.

TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH? might return TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH "XXXXXXX" indicating the FlexRay header paylength is don't care.

TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe

This command specifies the I²C address mode to 7 or 10-bit. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe {ADDR7|ADDR10}
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe?
```

Arguments

ADDR7 specifies the 7-bit I²C address mode.

ADDR10 specifies the 10-bit I²C address mode.

Examples

TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE ADDR10 sets the I2C address mode to 10-bit.

TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe

This command specifies the I²C address type. The only supported address type is USER. Applies to bus <x>, where x is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
{GENeralcall|STARtbyte|HSmode|EEPROM|USER}

TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe?
```

Arguments

GENeralcall specifies a general call address.

STARtbyte specifies a start byte address.

HSmode specifies a high-speed mode address.

EEPROM specifies an EEPROM address.

USER specifies a user address.

TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue

This command specifies the binary address string used for the I²C trigger if the trigger condition is ADDRESS or ADDRANDDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue?
```

Arguments <QString> is up to 7 or 10-bits depending on the address mode that specifies the address. The only allowed characters in the QString are 0, 1, and X.

Examples TRIGGER:A:BUS:B1:I2C:ADDRESS:VALUE 1011 sets the I²C address value to XXX1011.

TRIGger:A:BUS:B<x>:I2C:CONDition

This command specifies the trigger condition for an I²C trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:I2C:CONDition
{STARt|STOP|REPEATstart|ACKMISS|ADDRess|DATA|ADDRANDDATA}

TRIGger:A:BUS:B<x>:I2C:CONDition?
```

Arguments STARt specifies a search based on start condition.

STOP specifies a search based on stop condition.

REPEATstart specifies a search based on repeat of start condition.

ACKMISS specifies a search based on missing acknowledgement condition.

ADDRess specifies a search based on address.

DATA specifies a search based on data.

ADDRANDDATA specifies a search based on address and data.

Examples TRIGGER:A:BUS:B1:I2C:CONDITION START specifies start as the I²C trigger condition.

TRIGger:A:BUS:B<x>:I2C:DATa:DIRection

This command specifies the I²C trigger type to be valid on a Read, Write, or Either condition. Read or write is indicated by the R/W bit in the I²C protocol. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection {READ|WRITE|NOCARE}
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection?
```

Arguments READ specifies read as the data direction.

WRITE specifies write as the data direction.

NOCARE specifies either as the data direction.

Examples TRIGGER:A:BUS:B1:I2C:DATA:DIRECTION WRITE specifies write as the I²C data direction.

TRIGger:A:BUS:B<x>:I2C:DATa:SIZe

This command specifies the length of the data string in bytes to be used for an I2C trigger if the trigger condition is DATA or ADDRANDDATA. Applies to bus <x>, where x is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe?
```

Arguments

<NR1> is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:I2C:DATa:VALue

This command specifies the binary data string used for I2C triggering if the trigger condition is DATA or ADDRANDDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:I2C:DATa:VALue?
```

Arguments

<QString> is the binary data string, where the number of bits is 8 times the number of bytes specified. The only allowed characters in the string are 0, 1, and X.

TRIGger:A:BUS:B<x>:LIN:CONDition

This command specifies the trigger condition for LIN. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:CONDition
{SYNCField|IDentifier|DATA|IDANDDATA|WAKEup|SLEEP|ERROR}

TRIGger:A:BUS:B<x>:LIN:CONDition?
```

Arguments

SYNCField sets the LIN trigger condition to sync field.

IDentifier sets the LIN trigger condition to identifier.

DATA sets the LIN trigger condition to data.

IDANDDATA sets the LIN trigger condition to id and data.

WAKEup sets the LIN trigger condition to wake up.

SLEEP sets the LIN trigger condition to sleep.

ERROR sets the LIN trigger condition to error.

Examples

TRIGGER:A:BUS:B1:LIN:CONDITION ERROR sets the LIN trigger condition to error.

TRIGGER:A:BUS:B1:LIN:CONDITION? might return TRIGGER:A:BUS:B1:LIN:CONDITION SYNCFIELD indicating the LIN trigger condition is sync field.

TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue

This command specifies the binary data string to be used for LIN trigger if trigger condition is ID or IDANDDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue?
```

Arguments

<QString> is a quoted string that is the binary data string used for LIN trigger if the trigger condition is ID or IDANDDATA.

Examples

TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "11001010" sets the high value to 11001010.

TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE? might return TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "XXXXXXXX"indicating the high value is don't care.

TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier

This command specifies the LIN data qualifier. This only applies if the trigger condition is IDANDDATA or DATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier?
```

Arguments

LESSthan sets the LIN data qualifier to less than.

MOREthan sets the LIN data qualifier to greater than.

EQual sets the LIN data qualifier to equal.

UNEQual sets the LIN data qualifier to not equal.

LESSEQual sets the LIN data qualifier to less than or equal.

MOREEQual sets the LIN data qualifier to greater than or equal.

INrange sets the LIN data qualifier to in range.

OUTrange sets the LIN data qualifier to out of range.

Examples

TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER OUTRANGE sets the data qualifier to out of range.

TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER? might return TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER EQUAL indicating the data qualifier is set to equal.

TRIGger:A:BUS:B<x>:LIN:DATa:SIZe

This command specifies the length of the data string in bytes to be used for LIN trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe?
```

Arguments <NR1> is the size of the data string in bytes.

Examples TRIGGER:A:BUS:B1:LIN:DATA:SIZE 8 sets the data size to 8 bytes.

TRIGGER:A:BUS:B1:LIN:DATA:SIZE? might return TRIGGER:A:BUS:B1:LIN:DATA:SIZE 1 indicating the data size is 1 byte.

TRIGger:A:BUS:B<x>:LIN:DATa:VALue

This command specifies the binary data string to be used for LIN trigger condition if trigger condition is ID or IDANDDATA.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:LIN:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:LIN:DATa:VALue?
```

Arguments <QString> is a quoted string that is the LIN trigger data value.

Examples TRIGGER:A:BUS:B1:LIN:DATA:VALUE “11001101”sets the data value to 11001101.

TRIGGER:A:BUS:B1:LIN:DATA:VALUE? might return TRIGGER:A:BUS:B1:LIN:DATA:VALUE "XXXXXXXX" indicating the data value is don't care.

TRIGger:A:BUS:B<x>:LIN:ERRTYPE

This command specifies the error type be used for LIN trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:ERRTYPE
{SYNC|PARity|CHecksum|HEADertime|RESPtime|FRAMetime}
TRIGger:A:BUS:B<x>:LIN:ERRTYPE?
```

Arguments

SYNC sets the LIN error type to SYNC.

PARity sets the LIN error type to parity.

CHecksum sets the LIN error type to checksum.

HEADertime sets the LIN error type to header time.

RESPtime sets the LIN error type to response time.

FRAMetime sets the LIN error type to frame time.

Examples

TRIGGER:A:BUS:B1:LIN:ERRTYPE CHECKSUM sets the LIN error type to checksum.

TRIGGER:A:BUS:B1:LIN:ERRTYPE? might return TRIGGER:A:BUS:B1:LIN:ERRTYPE SYNC indicating the LIN error type is SYNC.

TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue

This command specifies the binary address string used for LIN trigger if the trigger condition is ID or IDANDDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AUTO application module for DPO/MSO4000B and MDO4000/B models or MDO3AUTO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue <QString>
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue?
```

Arguments <QString> is the binary address string used for LIN trigger if the trigger condition is ID or IDANDDATA.

Examples TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "110010" sets the identifier value to 110010.

TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE? might return TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "XXXXXX" indicating the identifier value is XXXXXX.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue to specify the lower limit of the range.) The default is all X's (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue
<QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

Arguments QString is a quoted string of up to 5 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:MIL1553B:HIVALue` "01000" sets the upper limit of the remote terminal address range to 01000 (when the trigger condition has been set to `MIL1553B`, and the qualifier has been set to `INrange` or `OUTrange)`.

`TRIGger:A:BUS:B1:MIL1553B:HIVALue?` might return "XXXXX".

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies the qualifier to be used with the remote terminal address field. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

Arguments `LESSthan` sets the Command Address qualifier to less than.

`MOREthan` sets the Command Address qualifier to greater than.

`EQual` sets the Command Address qualifier to equal.

`UNEQual` sets the Command Address qualifier to not equal.

`LESSEQual` sets the Command Address qualifier to less than or equal.

`MOREEQual` sets the Command Address qualifier to greater than or equal.

`INrange` sets the Command Address qualifier to in range.

OUTrange sets the Command Address qualifier to out of range.

Examples

TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier EQual sets the qualifier to be used with the remote terminal address to equal.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier? might return INRANGE.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger. When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the remote terminal address range. The default is all X's (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue "01000" sets the remote terminal address to be used in the trigger to 01000.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue? might return 01000.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the trigger. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress to specify Word Count or Mode Code.) In Word Count mode, this field defines the number of data words that is to be transmitted, or received, depending on the T/R bit setting. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit to set the T/R bit.) A word count value of 0 actually indicates a transfer of 32 data words. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1 and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt “01000” sets the bit pattern for the Word Count/Mode Code field to 01000.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt? might return “XXXXX”.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity

When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the Command word parity that is to be used in the trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity ZERo sets the Command word parity bit to 0.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity? might return 0, 1 or X.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the trigger. When the sub-address value is set to 00000 or 11111 binary, it specifies that the command is a "Mode Code" command. Any other value specifies that it is a "Word Count" command. The default is all X's (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *The sub-address field is used to direct data to different functions within the subsystem for values 1 — 30.*

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:MIL1553B:COMMAND:SUBADdress "01000"` sets the sub-address to be used in the trigger to 01000.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies that the transmit/receive bit (bit 9) is to be used in the trigger. The transmit/receive bit defines the direction of information flow, and is always from the point of view of the remote terminal. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit {RX|TX|X}
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments

RX (logic 0) directs the instrument to trigger on a TX or "transmit" from a remote terminal .

TX (logic 1) directs the instrument to trigger on an RX or "receive" from a remote terminal.

X indicates “don’t care".

Examples

TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX directs the instrument to trigger on a TX or “transmit” from a remote terminal.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX? might return TX.

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

This command specifies a word type or condition within a MIL-STD-1553 bus word to trigger on. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *There are three types of MIL-STD-1553 (Aircraft) bus words: Command, Status, and Data, all sharing a common structure twenty bits in length. The first three bits are used as a synchronization field. The last bit is the odd parity of the previous 16 bits.*

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:CONDition
{SYNC|COMMAND|STATus|DATA|TIMe|ERRor}

TRIGger:A:BUS:B<x>:MIL1553B:CONDition?
```

Related Commands

Most of the other TRIGger:A:BUS:B<x>:MIL1553B commands are impacted by the setting of this command.

BUS:B<x>:MIL1553B:POLarity

BUS:B<x>:MIL1553B:SOUrce

Arguments

SYNC refers to the 3–bit sync pulse that precedes each word.

COMMAND is one of 3 16–bit word types. It specifies the function that a remote terminal is to perform.

STATus is one of 3 16–bit word types. Remote terminals respond to valid message transmissions via status words.

DATA is one of 3 16–bit word types.

TIMe specifies to trigger on either the RT (remote terminal response time), or the IMG (Inter-message Gap). Use the commands TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier, TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit, and TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit to specify the time parameters.

ERRor specifies to trigger upon a signaling error. (You can specify which type of error — Parity, Sync, Manchester or Non-contiguous Data — by using the TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE command.)

NOTE.

Use the TRIGger:A:BUS:B<x>:MIL1553B:CONDition:STATus:BIT commands to set the following bits:

9 — message error
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

10 — instrumentation
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

11 — SRQ (service request)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

15 — BCR (broadcast command received)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

16 — busy
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

17 — subsystem flag
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

18 — DBCA (dynamic bus control acceptance)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

19 — terminal flag
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

Examples

`:TRIGger:A:BUS:B1:MIL1553B:CONDition STATus` sets the word type to trigger on to STATus.

`:TRIGger:A:BUS:B1:MIL1553B:CONDition?` might return DATA.

TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

When the MIL-STD-1553 bus trigger condition is set to DATa, this command specifies the data parity bit to be used in the trigger. Returned values are 0, 1, or X (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:DATa:PARity 1 sets the data parity bit to be used in a MIL-STD-1553 bus trigger to 1.

TRIGger:A:BUS:B1:MIL1553B:DATa:PARity? might return 0, indicating that the data parity bit to be used in a MIL-STD-1553 bus trigger is set to 0.

TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

When the MIL-STD-1553 bus trigger condition is set to DATa, this command specifies the data binary pattern to be used in the trigger. This is a 16-bit field. The default is all X's (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

Arguments QString is a quoted string of up to 16 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples TRIGger:A:BUS:B1:MIL1553B:DATa:VALue "01000" sets the data binary pattern to be used in a MIL-STD-1553 bus trigger to 01000.

TRIGger:A:BUS:B1:MIL1553B:DATa:VALue? might return XXXXXXXXXXX01000.

TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE

When the MIL-STD-1553 bus trigger condition is set to ERRor, this command specifies the signaling error type to be used in the trigger: Parity, Sync, Manchester or Data. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
{PARity|SYNC|MANCHester|DATA}

TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

PARity — an incorrect parity setting.

SYNc — the high to low, or low to high transition doesn't happen in the middle of the sync time as it should.

MANCHester — no transition in a bit time.

DATA — a non-contiguous data error.

Examples

`TRIGger:A:BUS:B1:MIL1553B:ERRTYPE PARity` sets the error type to be used in the trigger to PARITY.

`TRIGger:A:BUS:B1:MIL1553B:ERRTYPE?` might return SYNC.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

When the MIL-STD-1553 bus trigger condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue to specify the lower limit.) The default is all X's (don't care).`B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:MIL1553B:HIVAL` "01000" sets the upper limit of the range of the terminal address to 01000 (when the trigger condition is set to `MIL1553B`, and the qualifier is set to `INrange` or `OUTrange)`.

`TRIGger:A:BUS:B1:MIL1553B:HIVAL?` might return "XXXXX".

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the qualifier to be used with the address field. The default is EQUAL. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

Arguments `LESSthan` sets the Status Address qualifier to less than.

`MOREthan` sets the Status Address qualifier to greater than.

`EQual` sets the Status Address qualifier to equal.

`UNEQual` sets the Status Address qualifier to not equal.

`LESSEQual` sets the Status Address qualifier to less than or equal.

MOREEQual sets the Status Address qualifier to greater than or equal.

INrange sets the Status Address qualifier to in range.

OUTrange sets the Status Address qualifier to out of range.

Examples

TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier MOREthan sets the qualifier to be used with the address field to greater than.

TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier? might return MORETHAN.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

When the MIL-STD-1553 bus trigger condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger. When the MIL-STD-1553 bus trigger condition is set to STATus, and the qualifier is set to INrange or OUTrange, this command specifies the lower limit of the range. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue to specify the upper limit of the range.) The default is all X's (don't care). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the value of the 5–bit remote terminal address to be used in the trigger, when the qualifier has been set to `LESSthan`, `MOREthan`, `EQual`, `UNEQual`, `LESSEQual` or `MOREEQual`.

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the lower limit of the range to 01000, if the qualifier has been set to `INrange` or `OUTrange`.

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue?` might return "01000".

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR NOCARE sets the BCR bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:BUSY NOCARE sets the status word busy bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:BUSY? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA {0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA?

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA NOCARE sets the status word dynamic bus control acceptance (DBCA) bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:INSTR ZERo sets the status word instrumentation bit value to be used in the trigger to 0.

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:INSTR? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the trigger.

Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME NOCARE sets the status word message error bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples `TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SRQ NOCARE` sets the status word SRQ bit value to be used in the trigger to X.

`TRIGger:A:BUS:B1:MIL1553B:STATUS:BIT:SRQ?` might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word subsystem flag bit value (bit 17) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SUBSF NOCARE sets the status word subsystem flag bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SUBSF? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word terminal flag bit value (bit 19) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples `TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:TF NOCARE` sets the status word terminal flag bit value to be used in the trigger to X.

`TRIG:A:BUS:B1:MIL1553B:STAT:BIT:TF?` might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status parity bit value to be used in the trigger. Returned values are 0, 1, or X (don’t care, which is the default). B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STAT:PAR ONE sets the parity bit value to be used in the trigger to 1.

TRIG:A:BUS:B1:MIL1553B:STATUS:PARity? might return X, indicating that the parity doesn't matter.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

When the MIL-STD-1553 bus trigger condition is set to TIMe, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG). (You can specify RT or IMG using the TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit <NR3>
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments

<NR3> is a floating point number that specifies either the minimum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

`TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit 3.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to 3.00 µS.

`TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit?` might return 2.0000e-6, indicating that the RT or IMG has been set to 2.00 µS.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG). (You can specify the RT and IMG using the TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.)

Conditions

This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit <NR3>
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

Arguments

`<NR3>` is a floating point number that specifies either the maximum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

`TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit 80.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to be used in the trigger to 80.0 µS.

`TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit?` might return 100.0000e-6, indicating that the RT or IMG has been set to 100.00 µS.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies the trigger data time qualifier. (This includes a smaller set of arguments

than other qualifier commands.)B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4AERO application module for DPO/MSO4000B and MDO4000/B models or MDO3AERO application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier
{LESSthan|MOREthan|INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments LESSthan sets the Time qualifier to less than minimum.

MOREthan sets the Time qualifier to greater than maximum

INrange sets the Time qualifier to inside range.

OUTrange sets the Time qualifier to out of range.

Examples TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier LESSthan sets the Time qualifier to less than minimum.

TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier? might return OUTRANGE.

TRIGger:A:BUS:B<x>:PARallel:VALue

This command specifies the binary data string to be used for a Parallel trigger. Applies to bus <x>, where x is the bus number (1-4), except for MDO3000, which has only two buses.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:PARallel:VALue <QString>
TRIGger:A:BUS:B<x>:PARallel:VALue?
```

Arguments

<QString> is the binary data string.

TRIGger:A:BUS:B<x>:RS232C:CONDition

This command specifies the condition for an RS-232C trigger, where x is the bus number (1-4), except for MDO3000, which has only two buses. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:CONDition
{RXSTArt|RXDATA|RXENDPacket|TXSTArt|TXDATA|TXENDPacket}
TRIGger:A:BUS:B<x>:RS232C:CONDition?
```

Arguments

RXSTArt specifies a search based on the RX Start Bit.

RXDATA specifies a search based on RX Data.

RXENDPacket specifies a search based on the RX End of Packet condition.

TXSTArt specifies a search base on the TX Start Bit.

TXDATA specifies a search based on TX Data.

TXENDPacket specifies a search based on the TX End of Packet condition.

TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe

This command specifies the length of the data string in Bytes for an RS-232 Trigger if the trigger condition is RXDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe?
```

Arguments <NR1> is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue

This command specifies the binary data string for an RS-232 trigger if the trigger condition involves RX. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue?
```

Arguments <Qstring> is the binary data string to be used for the trigger.

TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe

This command specifies the length of the data string for an RS-232 trigger if the trigger condition is TXDATA. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe?
```

Arguments <NR1> is the length of the data string in Bytes.

TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue

This command specifies the binary data string for an RS-232 trigger if the condition involves TX. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4COMP application module for DPO/MSO4000B and MDO4000/B models or MDO3COMP application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue?
```

Arguments <Qstring> is the binary data string to be used for the trigger.

TRIGger:A:BUS:B<x>:SPI:CONDition

This command specifies the trigger condition for a SPI trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:CONDition
{SS|STARTofframe|MISO|MOSI|MISOMOSI}

TRIGger:A:BUS:B<x>:SPI:CONDition?
```

Related Commands BUS:B<x>:SPI:IDLETime,

BUS:B<x>:SPI:FRAMING

Arguments

SS specifies the Slave Selection condition.

STARTofframe is applicable when BUS:B<x>:SPI:FRAMING is set to IDLEtime. When the trigger condition is set to STARTofframe, the instrument triggers on the first SPI clock after an idle time when there are no clocks.

MISO specifies the Master-In Slave-Out condition.

MOSI specifies the Master-Out Slave-In condition.

MISOMOSI specifies the Master-In Slave-Out and Master-Out Slave-In conditions.

TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue

This command specifies the binary data string to be used for a SPI trigger if the trigger condition is MISO or MISOMOSI. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue <QString>
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue?
```

Arguments

<QString> is the binary data string, where the number of bits is 8 times the number of bytes specified. The only allowed characters in the string are 0, 1, and X.

TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue

This command specifies the binary data string to be used for a SPI trigger if the trigger condition is MOSI or MISOMOSI. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue <QString>
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue?
```

Arguments

<QString> is the binary data string with the number of bits specified by the TRIGger:A:BUS:B<x>:SPI:DATa:SIZe command. The only allowed characters in the QString are 0, 1, and X.

TRIGger:A:BUS:B<x>:SPI:DATa:SIZe

This command specifies the length of the data string to be used for a SPI trigger if the trigger condition is MISO, MOSI, or MISOMOSI. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires a DPO4EMBD application module for DPO/MSO4000B and MDO4000/B models or MDO3EMBD application module for MDO3000 models.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe?
```

Arguments

<NR1> is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue

This command specifies the binary address string for the upper limit for inside-of-range and outside-of-range qualifiers for the USB trigger. Use the command TRIGger:A:BUS:B<x>:USB:ADDRess:VALue to set the lower limit. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue <QString>
TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition,

TRIGger:A:BUS:B<x>:USB:ADDRess:VALue

Arguments <QString> within the range 0000000 to 1111111 (00 hex to 7F hex).

Examples TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE "0001000" sets the upper limit to binary 0001000 (08 hex).

TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE? might return :TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE "1111111", which indicates that the upper limit is 1111111 (7F hex).

TRIGger:A:BUS:B<x>:USB:ADDRess:VALue

This command specifies the binary address string to be used for USB trigger.

This command also specifies the binary address string for the lower limit for inside-of-range and outside-of-range qualifiers for the USB trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:ADDRess:VALue <Qstring>
TRIGger:A:BUS:B<x>:USB:ADDRess:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments <QString> within the range 0000000 to 1111111 (00 hex to 7F hex).

Examples TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE "0001000" sets the binary address to 0001000 (08 hex).

TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE? might return :TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE "1000000", which indicates that the binary address is 100000 (40 hex).

TRIGger:A:BUS:B<x>:USB:CONDition

This command specifies the trigger condition for the USB trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:CONDition
{SYNC|RESET|SUSPEND|RESUME|EOP|TOKENPacket|DATAPacket
|HANDSHAKEPacket|SPECIALPacket|ERRor}

TRIGger:A:BUS:B<x>:USB:CONDition?
```

Arguments

SYNC indicates triggering on a Sync field of a packet.

RESET sets triggering on a reset condition.

SUSPEND sets triggering on a suspend condition.

RESUME sets triggering on a resume condition.

EOP indicates triggering on an end-of-packet signal.

TOKENPacket indicates triggering on a token packet.

DATAPacket indicates triggering on a data packet

HANDSHAKEPacket indicates triggering on a handshake packet.

SPECIALPacket indicates triggering on a special status packet.

ERRor indicates triggering on an error condition.

Examples

TRIGGER:A:BUS:B1:USB:CONDITION TOKENPACKET sets the trigger condition to be a token packet.

TRIGGER:A:BUS:B1:USB:CONDITION? might return :TRIGGER:A:BUS:B1:USB:CONDITION SYNC, which indicates that the trigger condition is a sync field.

TRIGger:A:BUS:B<x>:USB:DATa:HIVALue

This command specifies the binary data string for the upper limit for inside-of-range and outside-of-range qualifiers for the USB trigger when the trigger condition is

DATAPacket. Use the command TRIGger:A:BUS:B<x>:USB:DATa:VALue to set the lower limit. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:USB:DATa:HIVALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition,

TRIGger:A:BUS:B<x>:USB:DATa:VALue

Arguments <QString> within the range 00000000 to 11111111 (00 hex to FF hex).

Examples TRIGGER:A:BUS:B1:USB:DATA:HIVALUE "00001000" sets the upper limit to binary 00001000 (08 hex).

TRIGGER:A:BUS:B1:USB:DATA:HIVALUE? might return :TRIGGER:A:BUS:B1:USB:DATA:HIVALUE "01111111", which indicates that the upper limit is 01111111 (7F hex).

TRIGger:A:BUS:B<x>:USB:DATa:OFFSet

This command specifies the data offset in bytes to trigger on. The minimum and default values are 0 and the maximum is 1024. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:USB:DATa:OFFSet?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments <NR1> is number in the range 0 to 1024.

Examples `TRIGGER:A:BUS:B1:USB:DATA:OFFSET 36` sets the data offset to 36.

`TRIGGER:A:BUS:B1:USB:DATA:OFFSET?` might return `:TRIGGER:A:BUS:B1:USB:DATA:OFFSET 0`, indicating that the data offset is the default value, 0.

TRIGger:A:BUS:B<x>:USB:DATa:SIZe

This command specifies the number of contiguous data bytes to trigger on. The minimum and default values are 1 and maximum is 16. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:USB:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:USB:DATa:SIZe?
```

Arguments <NR1> is number in the range 1 to 16.

Examples `TRIGGER:A:BUS:B1:USB:DATA:SIZE 4` sets the oscilloscope to trigger on four contiguous data bytes.

`TRIGGER:A:BUS:B1:USB:DATA:SIZE?` might return `:TRIGGER:A:BUS:B1:USB:DATA:SIZE 6` indicating that the oscilloscope will trigger on 6 contiguous data bytes.

TRIGger:A:BUS:B<x>:USB:DATa:TYPe

This command specifies the data type for when the trigger condition is set to DATAPacket. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:USB:DATa:TYPe {ANY|DATA0|DATA1}
TRIGger:A:BUS:B<x>:USB:DATa:TYPe?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments `ANY` indicates either a DATA0 or DATA1 data packet type.

`DATA0` indicates a DATA0 data packet type.

`DATA1` indicates a DATA1 data packet type.

Examples `TRIGGER:A:BUS:B1:USB:DATA:TYPE DATA0` sets the oscilloscope to trigger on a DATA0 data packet type.

`TRIGGER:A:BUS:B1:USB:DATA:TYPE?` might return `:TRIGGER:A:BUS:B1:USB:DATA:TYPE DATA1`, indicating that the data packet type is set to DATA1.

TRIGger:A:BUS:B<x>:USB:DATa:VALue

This command specifies the binary data string to be used for the USB trigger when the trigger condition is DATAPacket.

This command also specifies the binary data string for the lower limit for inside-of-range and outside-of-range qualifiers for the USB trigger when trigger condition is DATAPacket. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:USB:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:USB:DATa:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments <QString> within the range 00000000 to 11111111 (00 hex to FF hex).

Examples TRIGGER:A:BUS:B1:USB:DATA:VALUE "00001000" sets the binary address to 00001000 (08 hex).

TRIGGER:A:BUS:B1:USB:DATA:VALUE? might return :TRIGGER:A:BUS:B1:USB:DATA:VALUE "01000000", which indicates that the binary address is 0100000 (40 hex).

TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue

This command specifies the binary endpoint string to be used for the USB trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue <QString>
TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments <QString> within the range 0000 to 1111 (00 hex to 0F hex).

Examples TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE "1000" sets the binary address to 1000 (08 hex).

TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE? might return :TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE "1001", which indicates that the binary address is 1001 (09 hex).

TRIGger:A:BUS:B<x>:USB:ERRTYPE

This command specifies the error type to be used when the trigger condition is set to ERRor. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:ERRTYPE {PID|CRC5|CRC16|BITSTUFFing}
TRIGger:A:BUS:B<x>:USB:ERRTYPE?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

PID indicates the error type is set to packet ID.

CRC5 indicates the error type is set to 5-bit CRC.

CRC16 indicates the error type is set to 16-bit CRC.

BITSTUFFing indicates the error type is set to bit stuffing.

Examples

TRIGGER:A:BUS:B1:USB:ERRTYPE PID sets the error trigger condition to packet ID.

TRIGGER:A:BUS:B1:USB:ERRTYPE? might return :TRIGGER:A:BUS:B1:USB:TYPE PID, indicating the error trigger condition is packet ID.

TRIGger:A:BUS:B<x>:USB:HANDSHAKEType

This command specifies the handshake type for the USB trigger. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:HANDSHAKEType {ANY|NAK|ACK|STALL}
TRIGger:A:BUS:B<x>:USB:HANDSHAKEType?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

ANY indicates the oscilloscope will trigger on any handshake type.

NAK indicates the oscilloscope will trigger when a device cannot send or receive data.

ACK indicates the oscilloscope will trigger when a packet is successfully received.

STALL indicates the oscilloscope will trigger when a device requires intervention from the host.

Examples

TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE ACK sets the handshake type to acknowledgement.

TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE? might return :TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE STALL, indicating that the handshake type is set to stall.

TRIGger:A:BUS:B<x>:USB:QUALifier

This command specifies the USB trigger qualifier for address, endpoint and data. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual
|MOREEQual|INrange|OUTrange}

TRIGger:A:BUS:B<x>:USB:QUALifier?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

`LESSthan` triggers on an input value that is less than a set value.

`MOREthan` triggers on an input value that is greater than a set value.

`EQual` triggers on an input value that is equal to a set value.

`UNEQual` triggers on an input value that is not equal to a set value.

`LESSEQual` triggers on an input value that is less than or equal to a set value.

`MOREEQual` triggers on an input value that is more than or equal to a set value.

`INrange` triggers on an input value that is within a range set by two values.

`OUTrange` triggers on an input value that is outside of a range set by two values.

Examples

`TRIGGER:A:BUS:B1:USB:QUALIFIER LESSTHAN` sets the oscilloscope to trigger when an address, data, or endpoint value is less than a set value.

`TRIGGER:A:BUS:B1:USB:QUALIFIER?` might return `:TRIGGER:A:BUS:B1:USB:QUALIFIER EQUAL` indicating that the trigger condition is to trigger when an address, data, or endpoint is equal to a set value.

TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber

This command specifies the binary data string to be used for start of frame number, when the trigger condition is Token Packet and the token type is Start of Frame. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber <QString>
TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber?
```

Related Commands

TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

`<QString>` within the range 000 0000 0000 to 111 1111 1111 (000 hex to 7FF hex).

Examples

`TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER "00000001000"` sets the start of frame number to 00000001000 (008 hex).

TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER? might return :TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER "00000001001", which indicates that the start of frame number is 00000001001 (009 hex).

TRIGger:A:BUS:B<x>:USB:SPECIALType

This command specifies the packet ID (PID) for the special packet. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SPECIALType {ANY|PREamble|RESERVed}
TRIGger:A:BUS:B<x>:USB:SPECIALType?
```

Related Commands TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

ANY indicates any type of special packet.

PREamble indicates a preamble special packet.

RESERVed indicates a reserved special packet.

Examples

TRIGGER:A:BUS1:USB:SPECIALTYPE PREAMBLE sets the special packet type to preamble.

TRIGGER:A:BUS1:USB:SPECIALTYPE? might return :TRIGGER:A:BUS1:USB:SPECIALTYPE PREAMBLE, indicating that the special type is set to preamble.

TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue

When triggering on a high-speed USB split transaction, this command specifies the split transaction endpoint type value to trigger on. B<x> is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue
{NOCARE|CONTRol|ISOchronous|BULK|INTERRUPT}

TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments

`NOCARE` — any endpoint type.

`CONTRol` — control endpoint type.

`ISOchronous` — isochronous endpoint type.

`BULK` — bulk endpoint type (BULK-IN or BULK-OUT).

`INTERRUPT` — interrupt endpoint type (Interrupt-IN).

Examples

`TRIGger:A:BUS:B1:USB:SPLit:ET:VALue iso` sets the endpoint type to trigger on to isochronous.

`TRIGger:A:BUS:B1:USB:SPLit:ET:VALue?` might return BULK, indicating that the bulk endpoint type has been specified to trigger on.

TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue

When triggering on a high-speed USB split transaction, this command specifies the split transaction hub address value to trigger on. The value can be up to 7 characters long. The default is all X's (don't care).`B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue <QString>
TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments `QString` is a quoted string of up to 7 characters. The valid characters are 0 and 1.

Examples `TRIGger:A:BUS:B1:USB:SPLit:HUB:VALue` "001010" sets the split transaction hub address to trigger on to 001010.

`TRIGger:A:BUS:B1:USB:SPLit:HUB:VALue?` might return XXXXXXX, indicating that the hub address value to trigger on doesn't matter.

TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue

When triggering on a high-speed USB split transaction, this command specifies the split transaction port address value to trigger on. The value can be up to 7 characters long. The default is all X's (don't care).`B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue <QString>
TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments `QString` is a quoted string of up to 7 characters. The valid characters are 0 and 1.

Examples `TRIGger:A:BUS:B1:USB:SPLit:PORT:VALue` "001010" sets the split transaction hub address to trigger on to 001010.

`TRIGger:A:BUS:B1:USB:SPLit:PORT:VALue?` might return XXXXXXX, indicating that the hub address value to trigger on doesn't matter.

TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue

When triggering on a high-speed USB split transaction, this command specifies whether to trigger on the start or complete phase of the split transaction, based on the Start/Complete bit field value. (0 = Start, 1 = Complete). The default is NOCARE.`B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue {NOCARE|SSPLIT|CSPLIT}
TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments

`NOCARE` — trigger on either the start or complete phase of the split transaction.

`SSPLIT` — trigger on the start phase of the split transaction.

`CSPLIT` — trigger on the complete phase of the split transaction.

Examples

`TRIGger:A:BUS:B1:USB:SPLit:SC:VALue SSPLIT` specifies to trigger on the start phase of the split transaction.

`TRIGger:A:BUS:B1:USB:SPLit:SC:VALue?` might indicate NOCARE, specifying that it doesn't matter whether to trigger on the start or complete phase of the split transaction.

TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue

When triggering on a high-speed USB split transaction, this command specifies the split transaction start/end bit value to trigger on. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

NOTE. *The start and end bits are interpreted based on the type of split transaction:*

For Interrupt and control transactions, the S bit means Speed: 0 = Full Speed, 1 = Low Speed.

For bulk IN/OUT and isochronous IN start-split transactions, the S field must be 0.

For bulk/control IN/OUT, interrupt IN/OUT, and isochronous IN start-split transactions, the E field must be 0.

For full-speed isochronous OUT start-split transactions, the S (Start) and E (End) fields specify how the high-speed data payload corresponds to data for a full-speed data packet as shown below:

S E High-speed to Full-speed Data Relation

0 0 High-speed data is the middle of the full-speed data payload.

0 1 High-speed data is the end of the full-speed data payload.

1 0 High-speed data is the beginning of the full-speed data payload.

1 1 High-speed data is all of the full speed data payload.

Conditions This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue
{NOCARE|FULLSPeed|LOWSPeed|ISOSTART|ISOMID|ISOEND|ISOALL}
```

```
TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:USB:SPECIALType

Arguments

`NOCARE` — any combination of S and E bits.

`FULLSPeed` — S bit = 0, E bit = 0.

`LOWSPeed` — S bit = 1, E bit = 0.

`ISOSTART` — S bit = 1, E bit = 0.

`ISOMID` — see note above.

`ISOEND` — see note above.

`ISOALL` — see note above.

Examples

`TRIGger:A:BUS:B1:USB:SPLit:SE:VALue ISOEND` specifies to trigger on the ISOEND split transaction value.

`TRIGger:A:BUS:B1:USB:SPLit:SE:VALue?` might return FULLSPEED.

TRIGger:A:BUS:B<x>:USB:TOKENType

This command specifies the token type for the USB trigger. `B<x>` is the bus number (1-4), except for MDO3000, which has only two buses.

Conditions

This command requires the DPO4USB application module to be installed, except for MDO3000 models, which require the MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:USB:TOKENType {ANY|SOF|OUT|IN|SETUP}
TRIGger:A:BUS:B<x>:USB:TOKENType?
```

Related Commands

TRIGger:A:BUS:B<x>:USB:CONDition

Arguments

`ANY`

indicates any of the token types.

`SOF` indicates a SOF (start-of-frame) token type

`OUT` indicates an OUT token type.

`IN` indicates an IN token type.

`SETUP` indicates a SETUP token type.

Examples

`TRIGGER:A:BUS:B1:USB:TOKENTYPE SETUP` sets the token type to SETUP.

`TRIGGER:A:BUS:B1:USB:TOKENTYPE?` might return `:TRIGGER:A:BUS:B1:USB:TOKENTYPE SOF` if the token type is SOF.

TRIGger:A:BUS:SOUrce

This command specifies the source for a serial or parallel bus trigger, with the appropriate application module installed.

Conditions

- For I²C or SPI bus signals, install the DPO4EMBD application module, except for MDO3000 models, which require MDO3EMBD.
- For RS-232, RS-422, RS-485, or UART bus signals, install the DPO4COMP module, except for MDO3000 models, which require MDO3COMP.
- For I²S, Left Justified (LJ), Right Justified (RJ), or TDM bus signals, install the DPO4AUDIO module, except for MDO3000 models, which require MDO3AUDIO.
- For CAN or LIN bus signals, install the DPO4AUTO or DPO4AUTOMAX module, except for MDO3000 models, which require MDO3AUTO.
- For FlexRay bus signals, install the DPO4AUTOMAX module, except for MDO3000 models, which require MDO3FLEX.
- For Ethernet signals on the MDO4000/B and MSO4000B and DPO4000B, install the DPO4ENET module. Note that ≥350 MHz bandwidth models are recommended for 100BASE-TX.
- For MIL-STD-1553 bus signals, install the DPO4AERO module, except for MDO3000 models, which require MDO3AERO.
- For USB bus signals, install the DPO4USB module, except for MDO3000 models, which require MDO3USB. Note that 1 GHz bandwidth models are recommended for high-speed (HS) USB.

A table is available listing the commands enabled by each application module. (See page G-1, *Application Module-enabled Commands*.)

Group Trigger

Syntax

```
TRIGger:A:BUS:SOUrce {B1|B2|B3|B4}
TRIGger:A:BUS:SOUrce?
```

Arguments

`B1` specifies the Bus 1 source.

`B2` specifies the Bus 2 source.

`B3` specifies the Bus 3 source.

`B4` specifies the Bus 4 source.

TRIGger:A:EDGE? (Query Only)

Returns the trigger source, coupling, and slope for the A edge trigger.

Group Trigger

Syntax `TRIGger:A:EDGE?`

Related Commands TRIGger:A:LOGIc?

Examples `TRIGGER:A:EDGE?` might return `:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC; SLOPE RISE` indicating the trigger source, coupling, and slope for the A edge trigger.

TRIGger:A:EDGE:COUPling

This command specifies the type of coupling for the A edge trigger.

Group Trigger

Syntax
```
TRIGger:A:EDGE:COUPling {AC|DC|HFRej|LFRej|NOISErej}
TRIGger:A:EDGE:COUPling?
```

Related Commands TRIGger:A:EDGE:SOUrce,

TRIGger:A:EDGE:SLOpe

Arguments `AC` specifies AC trigger coupling,

`DC` specifies DC trigger coupling, which passes all input signals to the trigger circuitry.

`HFRej` specifies high-frequency rejection coupling, which attenuates signals above 50 kHz before passing the signals to the trigger circuitry.

`LFRej` specifies low-frequency rejection coupling, which attenuates signals below 50 kHz before passing the signals to the trigger circuitry.

`NOISErej` specifies noise-rejection coupling, which provides stable triggering by increasing the trigger hysteresis. Increased hysteresis reduces the trigger sensitivity to noise but may require greater trigger signal amplitude.

Examples `TRIGGER:A:EDGE:COUPLING DC` sets the A edge trigger coupling to DC.

`TRIGGER:A:EDGE:COUPLING?` might return `:TRIGGER:A:EDGE:COUPLING DC` indicating that the A edge trigger coupling is set to DC.

TRIGger:A:EDGE:SLOpe

This command specifies the slope for the A edge trigger: rising, falling or either.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.)*

Group Trigger

Syntax

```
TRIGger:A:EDGE:SLOpe {RISe|FALL|EITHer}
TRIGger:A:EDGE:SLOpe?
```

Related Commands TRIGger:A:EDGE:SOUrce,

TRIGger:A:EDGE:COUPling

Arguments `RISe` specifies to trigger on the rising or positive edge of a signal.

`FALL` specifies to trigger on the falling or negative edge of a signal.

`EITHer` specifies to trigger on either the rising or falling edge of a signal.

Examples `TRIGGER:A:EDGE:SLOPERISE` sets the A edge trigger slope to positive, which triggers on the rising edge of the signal.

`TRIGGER:A:EDGE:SLOPE?` might return `:TRIGGER:A:EDGE:SLOPE FALL` indicating that the A edge trigger slope is negative.

TRIGger:A:EDGE:SOUrce

This command specifies the source for the A edge trigger.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.),*

To set the trigger voltage threshold level for the edge, pulse width, runt, transition (rise/fall or slew rate) trigger, use TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Group Trigger

Syntax

```
TRIGger:A:EDGE:SOUrce {AUX|CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|LINE|RF}

TRIGger:A:EDGE:SOUrce?
```

Related Commands

TRIGger:A:EDGE:SLOpe,

TRIGger:A:EDGE:COUPling

Arguments

`AUX` specifies an external trigger using the auxiliary input connector located on the front panel of the oscilloscope. (For MSO/DPO4000B series models or 2-channel MDO3000 models only.)

`CH1-CH4` specifies an analog input channel as the A edge trigger source.

`D0-D15` specifies a digital channel as the source (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed).

`LINE` specifies the AC power line as the trigger source.

`RF` specifies the internal RF power level as the trigger source. (MDO4000/B models only. MDO4TRIG application module is not necessary.)

Examples

`TRIGGER:A:EDGE:SOURCECH1` sets channel 1 as the A edge trigger source.

`TRIGGER:A:EDGE:SOURCE?` might return `:TRIGGER:A:EDGE:SOURCE CH1` indicating that channel 1 is the A edge trigger source.

TRIGger:A:HOLDoff? (Query Only)

Returns the A trigger holdoff parameters. These parameters specify the time period during which the trigger circuitry is not looking to generate a trigger event.

Group

Trigger

Syntax

```
TRIGger:A:HOLDoff?
```

Related Commands

TRIGger:A:HOLDoff:TIMe

Examples

`TRIGGER:A:HOLDOFF?` might return `:TRIGGER:A:HOLDOFF:TIME 900.0000E-09;BY DEFAULT` indicating that the A edge trigger holdoff time (by default) is 900 ns.

TRIGger:A:HOLDoff:TIMe

This command specifies the A trigger holdoff time.

Group Trigger

Syntax

```
TRIGger:A:HOLDoff:TIMe <NR3>
TRIGger:A:HOLDoff:TIMe?
```

Arguments <NR3> is a floating point number that specifies the holdoff time in seconds. The range is from 20 ns through 8.0 s.

Examples TRIGGER:A:HOLDOFF:TIME ? might return :TRIGGER:A:HOLDOFFTIME 1.2000E-06 indicating that the A trigger holdoff time is set to 1.2 µs.

TRIGGER:A:HOLDOFF:TIME 10 sets the A trigger holdoff time to 10 s.

TRIGger:A:LEVel:AUXin

This command sets the threshold voltage level to use for an Edge, Pulse Width, Runt or Rise/Fall (aka Transition, aka Slew Rate) trigger when triggering on the Aux Input connector signal.

Conditions This command is not available for MDO4000/B series models, or 4-channel MDO3000 series models as they have no Aux Input connector.

Group Trigger

Syntax

```
TRIGger:A:LEVel:AUXin {<NR3>|ECL|TTL}
TRIGger:A:LEVel:AUXin?
```

Arguments <NR3> is a floating point number that sets the trigger threshold level, in Volts, for the Aux Input connector.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

TRIGger:A:LEVel:CH<x>

This command sets the threshold voltage level to use for an Edge, Pulse Width, Runt or Rise/Fall (aka Transition, aka Slew Rate) trigger when triggering on an analog channel waveform. x can be 1 - 4. Each channel can have an independent trigger level.

Group Trigger

Syntax

```
TRIGger:A:LEVel:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:LEVel:CH<x>?
```

Arguments <NR3> is a floating point number that sets the trigger threshold level, in Volts, for the specified analog channel.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

TRIGger:A:LEVel:D<x>

This command sets the threshold voltage level to use for an Edge or Pulse Width trigger when triggering on a digital channel waveform. <x> can be 1 - 16. Each channel can have an independent trigger level.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Conditions MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.

Group Trigger

Syntax

```
TRIGger:A:LEVel:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LEVel:D<x>?
```

Arguments <NR3> is a floating point number that sets the trigger threshold level, in Volts, for the specified digital channel.

ECL sets the threshold level to a preset ECL high level of -1.3V.

TTL sets the threshold level to a preset TTL high level of 1.4V.

TRIGger:A:LOGIc? (Query Only)

Returns all of the A logic trigger parameters.

Group Trigger

Syntax TRIGger:A:LOGIc?

Related Commands TRIGger:A:LOGIc:CLAss

Examples TRIGGER:A:LOGIC? might return :TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2 0.0000; CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;:TRIGGER :A:LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT 4.0000E-9;:TRIGGER:A:LOGIC:PATTERN:DELTATIME 4.0000E-9

TRIGger:A:LOGIc:CLAss

This command specifies what kind of logic trigger to use (either logic or setup/hold). You also need to set the trigger type to LOGIC using the command TRIGger:A:TYPe.

The LOGIC argument sets the oscilloscope to trigger on logical combinations of the channels (set using the TRIGger:A:LOGIc:INPut commands as well as TRIGger:A:LOGIc:FUNCtion). You can use up to 20 channels for a logic trigger (4 analog and 16 digital). With an MDO4000/B, you can also use the internal RF power level in a logic trigger (requires installation of an MDO4TRIG application module). You can perform logic triggering using a clock; when TRIGger:A:LOGIc:INPut:CLOCk:SOUrce is set to one of the channels, the oscilloscope triggers when the specified logical combination of the remaining channels is true during a transition on the clock channel. You can also perform logic triggering without using a clock (by setting TRIGger:A:LOGIc:INPut:CLOCk:SOUrce to NONE), so that the oscilloscope triggers when the specified logical combination of data channels is met. Without a clock, you can also use the command TRIGger:A:LOGIc:PATtern:DELTatime.

The SETHold argument sets the oscilloscope to trigger on setup and hold violations between a data source and a clock source. The clocking and data levels are used to determine if a clock or data transition has occurred. You can use up to 20 channels as Setup and Hold trigger data sources (4 analog and 16 digital) using TRIGger:A:SETHold:DATa:SOUrce. You can use one channel input as the clock signal (TRIGger:A:SETHold:CLOCk:SOUrce). The data sources cannot include the waveform specified for the clock source.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:CLAss {LOGIC|SETHold}
TRIGger:A:LOGIc:CLAss?
```

Related Commands TRIGger:A:TYPe,

TRIGger:A:PULse:CLAss

Arguments LOGIC – Use with the commands TRIGger:A:LOGIc:FUNCtion, TRIGger:A:LOGIc:INPut:CH<x>, TRIGger:A:LOGIc:INPut:CLOCk:EDGE, TRIGger:A:LOGIc:INPut:CLOCk:SOUrce, TRIGger:A:LOGIc:INPut:D<x>, and TRIGger:A:LOGIc:INPut:RF. If you would like to use the logic trigger without a clock, you can also use the command TRIGger:A:LOGIc:PATtern:DELTatime.

SETHold – Use with the commands TRIGger:A:SETHold:CLOCk:EDGE, TRIGger:A:SETHold:CLOCk:SOUrce, TRIGger:A:SETHold:CLOCk:THReshold, TRIGger:A:SETHold:DATa:SOUrce, TRIGger:A:SETHold:DATa:THReshold, TRIGger:A:SETHold:HOLDTime, TRIGger:A:SETHold:SETTime, TRIGger:A:SETHold:THReshold:CH<x>, and TRIGger:A:SETHold:THReshold:D<x>.

Examples TRIGGER:A:LOGIC:CLASS? might return :TRIGGER:A:LOGIC:CLASS LOGIC

TRIGGER:A:LOGIC:CLASS LOGIC sets the trigger A logic class to LOGIc, which causes the oscilloscope to trigger when the specified logical combinations of channels 1, 2, 3, and 4 are met.

TRIGger:A:LOGIc:FUNCtion

This command specifies the logical combination of the input channels for the A pattern and A state logic triggers.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:FUNCtion {AND|NANd|NOR|OR}
TRIGger:A:LOGIc:FUNCtion?
```

Related Commands TRIGger:A:LOGIc:INPut:CH<x>

Arguments

AND specifies to trigger if all conditions are true.

NANd specifies to trigger if any of the conditions is false.

NOR specifies to trigger if all conditions are false.

OR specifies to trigger if any of the conditions is true.

Examples

TRIGGER:A:LOGIC:FUNCTION? might return :TRIGGER:A:LOGIC:FUNCTION NAND

which indicates that the oscilloscope will trigger if the AND logic conditions are false.

TRIGGER:A:LOGIC:FUNCTION AND sets the logical combination of channels to be true when all conditions are true.

TRIGger:A:LOGIc:INPut? (Query Only)

Returns the logic input values for all channels. If a clock channel is defined, it returns the clock source and edge.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut?
```

Examples

TRIGGER:A:LOGIC:INPUT? might return :TRIGGER:A:LOGIC:INPUT:CH1 HIGH;CH2 X;CH3 X indicating that a logic high is expected on channel 1 while channel 2 and channel three are “don't care.”

TRIGger:A:LOGIc:INPut:CH<x>

This command specifies the logical input condition for the channel specified by <x>.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CH<x> {HIGH|LOW|X}
TRIGger:A:LOGIc:INPut:CH<x>?
```

Arguments

`HIGH` specifies the logic high.

`LOW` specifies the logic low.

`X` specifies a "don't care" state.

Examples

`TRIGGER:A:LOGIC:INPUT:CH1?` might return `:TRIGGER:LOGIC:INPUT:CH1 X` indicating that the setting for the A logic trigger input to channel 1 does not matter.

`TRIGGER:A:LOGIC:INPUT:CH2 HIGH` sets the A logic trigger input to logic HIGH for channel 2.

TRIGger:A:LOGIc:INPut:CLOCk:EDGE

Sets the polarity of the clock channel.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CLOCk:EDGE {FALL|RISe}
TRIGger:A:LOGIc:INPut:CLOCk:EDGE?
```

Arguments

`RISe` specifies to trigger on the rising or positive edge of a signal.

`FALL` specifies to trigger on the falling or negative edge of a signal.

TRIGger:A:LOGIc:INPut:CLOCk:SOUrce

This command specifies the channel to use as the clock source. The clock can be selected as `NONE`. A selection of `None` implies pattern trigger. Any other selection implies state trigger.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CLOCk:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF|NONE}

TRIGger:A:LOGIc:INPut:CLOCk:SOUrce?
```

Arguments

`CH1-CH4` specifies an analog channel as the clock source.

`D0-D15` specifies a digital channel as the clock source. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed).

`RF` specifies the internal RF power level as the clock source. (MDO4000/B models only. Also requires installation of an MDO4TRIG application module.)

`NONE` specifies a Pattern trigger.

TRIGger:A:LOGIc:INPut:D<x>

This command specifies the logic pattern for a trigger on digital channel <x>, where x is the channel number.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:D<x> {HIGH|LOW|X}
TRIGger:A:LOGIc:INPut:D<x>?
```

Arguments

`High` specifies the logic high state.

`Low` specifies the logic low state.

`X` specifies a "don't care" state.

TRIGger:A:LOGIc:INPut:RF

This command specifies the logic level to use when the internal RF power level is the source for a logic pattern trigger.

Conditions

MDO4000/B models only. Also requires installation of an MDO4TRIG application module

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:RF {HIGH|LOW|X}
TRIGger:A:LOGIc:INPut:RF?
```

Related Commands

TRIGger:A:LOGIc:THReshold:RF, TRIGger:A:LOGIc:FUNCtion, TRIGger:A:LOGIc:PATtern:WHEn

Arguments

HIGH specifies to trigger on a high logic level.

LOW specifies to trigger on a low logic level.

X specifies a “don't care” condition.

Examples

TRIGger:A:LOGIc:INPut:RF HIGH specifies to trigger on a high logic level when the internal RF power level is the source for a logic pattern trigger.

TRIGger:A:LOGIc:INPut:RF? might return X, indicating that it doesn't matter whether the logic level is high or low.

TRIGger:A:LOGIc:PATtern? (Query Only)

Returns the conditions used for generating an A logic pattern trigger, with respect to the defined input pattern, and identifies the time that the selected pattern may be true and still generate the trigger.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern?
```

Examples

```
TRIGGER:A:LOGIC:PATTERN? might return
:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 HIGH;CH2
LOW;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN
LESSTHAN;WHEN:LESSLIMIT 16.0000E-9;LIMIT
16.0000E-9;:TRIGGER:A:LOGIC:PATTERN:DELTATIME 16.0000E-9
```

TRIGger:A:LOGIc:PATtern:DELTatime

This command specifies the pattern trigger delta time value. The time value is used as part of the pattern trigger condition to determine if the duration of a logic pattern meets the specified time constraints.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:DELTatime <NR3>
TRIGger:A:LOGIc:PATtern:DELTatime?
```

Arguments

<NR3> is a floating point value with exponent that sets the pattern trigger time value. This argument has a range of 39.6E–9 (39.6 ns) to 10.0E0 (10 s), in

increments of 13.2 ns. Values that are not an increment of 13.2 ns are rounded to the nearest correct value.

Examples `TRIGGER:A:LOGIC:PATTERN:DELTATIME 71.28E-8` sets the pattern trigger delta time value to 712.8 ns.

TRIGger:A:LOGIc:PATtern:WHEn

This command specifies the pattern logic condition on which to trigger the oscilloscope.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:WHEn
{TRUe|FALSe|LESSthan|MOREthan|EQual|UNEQual}

TRIGger:A:LOGIc:PATtern:WHEn?
```

Arguments

`TRUE` triggers the oscilloscope when the pattern becomes true.

`FALSE` triggers the oscilloscope when the pattern becomes false.

`LESSTHAN` triggers the oscilloscope when the input pattern is true for a time period less than the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`.

`MORETHAN` triggers the oscilloscope when the input pattern is true for a time period more (greater) than the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`.

`EQUAL` triggers the oscilloscope when the input pattern is true for a time period equal to the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`, within a ±5% tolerance.

`UNEQUAL` triggers the oscilloscope when the input pattern is true for a time period greater than or less than (not equal to) the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`, within a ±5% tolerance.

Examples `TRIGGER:A:LOGIC:PATTERN:WHEN LESSTHAN` sets the oscilloscope to trigger when the pattern is true for a time period less than the pattern trigger delta time setting.

TRIGger:A:LOGIc:THReshold:CH<x>

This command sets or queries the trigger A logic threshold voltage for the specified channel x.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:THReshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:LOGIc:THReshold:CH<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:LOGIC:THRESHOLD:CH2 3.0E-3 sets the A logic trigger threshold voltage for Channel 2 to 3 mV.

TRIGGER:A:LOGIC:THRESHOLD:CH3? might return :TRIGGER:A:LOGIC:THRESHOLD:CH3 1.2000E+00, indicating that the A logic trigger threshold voltage for Channel 3 is 1.2 V.

TRIGger:A:LOGIc:THReshold:D<x>

This command specifies the trigger A logic threshold level for the specified digital channel <x>. This commands affects all trigger types using the digital channel.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group Trigger

Syntax

```
TRIGger:A:LOGIc:THReshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LOGIc:THReshold:D<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold level in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

TRIGger:A:LOGIc:THReshold:RF

This command specifies the threshold to use when the internal RF power level is the source for a logic trigger. It will affect all trigger types using the channel.

Conditions MDO4000/B models only. Also requires installation of an MDO4TRIG application module.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:THReshold:RF {<NR3>}
TRIGger:A:LOGIc:THReshold:RF?
```

Related Commands TRIGger:A:LOGIc:INPut:RF, TRIGger:A:LOGIc:FUNCtion, TRIGger:A:LOGIc:PATtern:WHEn

Arguments <NR3> is a floating point number that specifies the threshold to use, in the currently selected RF units (using RF:UNIts). The range is (ref level – 40 dBm) to (ref level + 10 dBm), but never less than –65 dBm or more than +30 dBm.

Examples `TRIGger:A:LOGIc:THReshold:RF –1.000E+1` sets the threshold to –10 dBm (when the selected RF units are dBm).

`TRIGger:A:LOGIc:THReshold:RF?` might return -30.0000, indicating that the threshold set to –30.000 dBm (assuming the units are currently set to dBm).

TRIGger:A:LOWerthreshold{:AUX|:EXT}

This command specifies the lower threshold for the Aux Input connector.Used for the following trigger types: runt, transition.

Conditions This command is not available for MDO4000/B series models, or the 4-channel MDO3000 series models as they have no Aux Input connector. However, the 2-channel MDO3000 models do have an auxin, so this command is available.

Group Trigger

Syntax

```
TRIGger:A:LOWerthreshold{:AUX|:EXT} {<NR3>|ECL|TTL}
TRIGger:A:LOWerthreshold{:AUX|:EXT}?
```

Arguments

<NR3> is a floating point number that specifies the threshold level in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

TRIGger:A:LOWerthreshold:CH<x>

This command specifies the lower threshold for the channel selected. Each channel can have an independent level. Used in runt and transition triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold:CH<x> {ECL|TTL|<NR3>}
TRIGger:A:LOWerthreshold:CH<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the clock level, in volts.

Examples

TRIGGER:A:LOWERTHRESHOLD:CH2 50E-3 sets the lower limit threshold for CH2 of the pulse runt trigger to 50 mV.

TRIGGER:A:LOWERTHRESHOLD:CH2? might return :TRIGGER:A:LOWERTHRESHOLD:CH2 1.2000E-01 indicating that the lower limit threshold for CH2 of the pulse runt trigger is set to 120 mV.

TRIGger:A:LOWerthreshold:D<x>

Sets the lower threshold for the digital channel selected. Each channel can have an independent level. Used in runt and transition as the lower threshold. Used for all other trigger types as the single level/threshold.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LOWerthreshold:D<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:LOWERTHRESHOLD:D1 0.5 sets the lower threshold to 0.5 volts.

TRIGGER:A:LOWERTHRESHOLD:D1? might return TRIGGER:A:LOWERTHRESHOLD:D1 -1.3000 indicating the lower threshold is set to -1.3 volts.

TRIGger:A:LOWerthreshold:RF

This command specifies the lower threshold when using the internal RF power level for a RUNT trigger, or the single threshold in the cases of the PULSE and TIMEOUT triggers.

To specify the upper threshold for the internal RF power level for the RUNT trigger type, use the command TRIGger:A:UPPerthreshold:RF. To choose the RUNT trigger type, use the command TRIGger:A:PULse:CLAss.

Conditions

MDO4000/B models only. Also requires installation of an MDO4TRIG application module.

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold:RF {<NR3>}
TRIGger:A:LOWerthreshold:RF?
```

Related Commands

TRIGger:A:TYPe, TRIGger:A:EDGE:COUPling, TRIGger:A:EDGE:SLOpe, TRIGger:A:UPPerthreshold:RF

Arguments

<NR3> is a floating point number that specifies the threshold to use, in the currently selected RF units (using RF:UNIts). The range is (ref level – 40 dBm) to (ref level + 10 dBm), but never less than –65 dBm or more than +30 dBm.

Examples `TRIGger:A:LOWerthreshold:RF –1.000E+1` sets the threshold to –10 dBm.

`TRIGger:A:LOWerthreshold:RF?` might return -30.0000, indicating that the threshold set to –30.000 dBm (assuming the units are currently set to dBm).

TRIGger:A:MODe

This command specifies the A trigger mode.

Group Trigger

Syntax
```
TRIGger:A:MODe {AUTO|NORMal}
TRIGger:A:MODe?
```

Arguments `AUTO` generates a trigger if one is not detected within a specified time period.

`NORMal` waits for a valid trigger event.

Examples `TRIGGER:A:MODE NORMAL` specifies that a valid trigger event must occur before a trigger is generated.

`TRIGGER:A:MODE ?` might return `:TRIGGER:A:MODE NORMAL` indicating that a valid trigger event must occur before a trigger is generated.

TRIGger:A:PULse:CLAss

This command specifies which kind of pulse to trigger on (either runt, width, transition (rise/fall or slew rate) or timeout). You also need to set the trigger type to `PULSe` using the command TRIGger:A:TYPe.

To set the trigger source for a pulse trigger, use TRIGger:A:RUNT:SOUrce, TRIGger:A:PULSEWidth:SOUrce, TRIGger:A{:TRANsition|:RISEFall}:SOUrce, or TRIGger:A:TIMEOut:SOUrce.

To set the trigger voltage threshold level for a pulse trigger, use TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Group Trigger

Syntax
```
TRIGger:A:PULse:CLAss {RUNt|WIDth|TRANsition|TIMEOut}
TRIGger:A:PULse:CLAss?
```

Related Commands TRIGger:A:TYPe, TRIGger:A:RUNT?, TRIGger:A{:TRANsition|:RISEFall}?

Arguments

`RUNt` triggers when a pulse crosses the first preset voltage threshold but does not cross the second preset threshold before recrossing the first. Use with the command TRIGger:A:RUNT:SOUrce, TRIGger:A:RUNT:POLarity, TRIGger:A:RUNT:WHEn, and TRIGger:A:RUNT:WIDth.

`WIDth` triggers when a pulse is found that has the specified width or duration and is either inside or outside the specified time limits. Use with the commands TRIGger:A:PULSEWidth:HIGHLimit, TRIGger:A:PULSEWidth:LOWLimit, TRIGger:A:PULSEWidth:POLarity, TRIGger:A:PULSEWidth:SOUrce, TRIGger:A:PULSEWidth:WHEn, and TRIGger:A:PULSEWidth:WIDth.

`TRANsition` (AKA rise/fall or slew rate) triggers when a pulse crosses both thresholds in the same direction as the specified polarity and the transition time between the two threshold crossings is greater or less than the specified time delta. Use with the commands TRIGger:A{:TRANsition|:RISEFall}:DELTatime, TRIGger:A{:TRANsition|:RISEFall}:POLarity, TRIGger:A{:TRANsition|:RISEFall}:SOUrce, and TRIGger:A{:TRANsition|:RISEFall}:WHEn,

`TIMEout` triggers when no pulse is detected within a specified time. The signal stays above, below, or either above or below, a set value for a set amount of time. Use with the commands TRIGger:A:TIMEOut:TIMe, TRIGger:A:TIMEOut:POLarity, TRIGger:A:TIMEOut:SOUrce

Examples

`TRIGGER:A:PULSE:CLASS WIDTH` specifies a width pulse for the A trigger.

`TRIGGER:A:PULSE:CLASS?` might return `:TRIGGER:A:PULSE:CLASS WIDTH` indicating that the trigger is set to activate on a pulse of a specified polarity and width.

TRIGger:A:PULSEWidth:HIGHLimit

This command specifies the upper limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:LOWLimit to specify the lower value of the range.)

Group

Trigger

Syntax

```
TRIGger:A:PULSEWidth:HIGHLimit <NR3>
TRIGger:A:PULSEWidth:HIGHLimit?
```

Related Commands

TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:LOWLimit

Arguments

`<NR3>` is a floating point number that represents the higher value of the range.

Examples To trigger on pulses with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
TRIGger:A:PULSEWidth:LOWLimit 100.0E-9

TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9

TRIGger:A:PULSEWidth:WHEn OUTside
```

TRIGger:A:PULSEWidth:LOWLimit

This command specifies the lower limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:LOWLimit <NR3>
TRIGger:A:PULSEWidth:LOWLimit?
```

Related Commands TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:HIGHLimit

Arguments <NR3> is a floating point number that represents the lower value of the range.

Examples To trigger on pulses with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
TRIGger:A:PULSEWidth:LOWLimit 100.0E-9

TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9

TRIGger:A:PULSEWidth:WHEn OUTside
```

TRIGger:A:PULSEWidth:POLarity

This command specifies the polarity for a pulse width trigger.

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:POLarity {NEGative|POSitive}
TRIGger:A:PULSEWidth:POLarity?
```

Arguments

NEGative specifies a negative pulse.

POSitive specifies a positive pulse.

Examples

TRIGGER:A:PULSEWIDTH:POLARITY NEGATIVE sets the pulse polarity to negative.

TRIGGER:A:PULSEWIDTH:POLARITY? might return :TRIGGER:A:WIDTH:POLARITY POSITIVE indicating a positive pulse.

TRIGger:A:PULSEWidth:SOUrce

This command specifies the source waveform for a pulse width trigger.

Group

Trigger

Syntax

```
TRIGger:A:PULSEWidth:SOUrce
{CH1|CH2|CH3|CH4|LINE|AUX|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|
D10|D11|D12|D13|D14|D15|RF}

TRIGger:A:PULSEWidth:SOUrce?
```

Arguments

CH1–CH4 specifies an analog input channel as the pulse-width trigger source.

AUX specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope. (For MSO/DPO 4000B series models and 2-channel MDO3000 models only.)

LINE specifies AC line voltage as the trigger source.

D0–D15 specifies a digital channel as the trigger source.

RF specifies the internal RF power level as the trigger source. (MDO4000/B models only. Also requires installation of an MDO4TRIG application module.)

Examples

TRIGGER:A:PULSEWIDTH:SOURCE CH1 sets channel 1 as the pulse width source.

TRIGGER:A:PULSEWIDTH:SOURCE? might return :TRIGGER:A:PULSEWIDTH:SOURCE CH1 indicating that channel 1 is the pulse width trigger source.

TRIGger:A:PULSEWidth:WHEn

This command specifies to trigger when a pulse is detected with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using TRIGger:A:PULSEWidth:WIDth), OR whose width falls outside of or within a

specified range of two values (set using TRIGger:A:PULSEWidth:LOWLimit and TRIGger:A:PULSEWidth:HIGHLimit).

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:WHEn
{LESSthan|MOREthan|EQual|UNEQual|WIThin|OUTside}
TRIGger:A:PULSEWidth:WHEn?
```

Related Commands TRIGger:A:PULSEWidth:WIDth

TRIGger:A:PULSEWidth:LOWLimit

TRIGger:A:PULSEWidth:HIGHLimit

TRIGger:A:PULSEWidth:SOUrce

Arguments `LESSthan` causes a trigger when a pulse is detected with a width less than the time set by the TRIGger:A:PULSEWidth:WIDth command.

`MOREthan` causes a trigger when a pulse is detected with a width greater than the time set by the TRIGger:A:PULSEWidth:WIDth command.

`EQual` causes a trigger when a pulse is detected with a width equal to the time period specified in TRIGger:A:PULSEWidth:WIDth within a ±5% tolerance.

`UNEQual` causes a trigger when a pulse is detected with a width greater than or less than (but not equal) the time period specified in TRIGger:A:PULSEWidth:WIDth within a ±5% tolerance.

`WIThin` causes a trigger when a pulse is detected that is within a range set by two values.

`OUTside` causes a trigger when a pulse is detected that is outside of a range set by two values.

Examples `TRIGGER:A:PULSEWIDTH:WHEN LESSTHAN 2.0000E-9` causes the oscilloscope to trigger when a pulse is detected that is shorter than 2 ns.

`TRIGGER:A:PULSEWIDTH:WHEN?` might return `:TRIGGER:A:PULSEWIDTH:WHEN GREATER THAN 2.0000E-9` indicating that a trigger will be caused when a pulse is detected greater than 2 ns.

To trigger on pulses with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
```

```
TRIGger:A:PULSEWidth:WHEn OUTside
```

TRIGger:A:PULSEWidth:WIDth

This command specifies the pulse width (duration), in seconds, for triggering on pulses whose widths are greater than, less than, equal to, or not equal to the specified value.

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:WIDth <NR3>
TRIGger:A:PULSEWidth:WIDth?
```

Related Commands TRIGger:A:PULSEWidth:WHEn

Arguments <NR3> is a floating point number that specifies the pulse width in seconds.

Examples TRIGGER:A:PULSEWIDTH:WIDTH 5.0E-6 sets the pulse width to 5 µs.

TRIGGER:A:PULSEWIDTH:WIDTH? might return :TRIGGER:A:PULSEWIDTH:WIDTH 2.0000E-9 indicating that the pulse width is set to 2 ns.

TRIGger:A:RUNT? (Query Only)

Returns the current A runt trigger parameters.

Group Trigger

Syntax TRIGger:A:RUNT?

Examples TRIGGER:A:RUNT? might return :TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE;WHEN OCCURS;WIDTH 4.0000E-9.

TRIGger:A:RUNT:POLarity

This command specifies the polarity for the runt trigger.

Group Trigger

Syntax

```
TRIGger:A:RUNT:POLarity {EITher|NEGative|POSitive}
TRIGger:A:RUNT:POLarity?
```

Arguments

`POSitive` indicates that the rising edge crosses the low threshold and the falling edge recrosses the low threshold without either edge ever crossing the high threshold.

`NEGative` indicates that the falling edge crosses the high threshold and the rising edge recrosses the high threshold without either edge ever crossing the low threshold.

`EITher` triggers on a runt of either polarity.

Examples

`TRIGGER:A:RUNT:POLARITY NEGATIVE` specifies that the polarity of the A pulse runt trigger is negative.

`TRIGGER:A:RUNT:POLARITY?` might return `:TRIGGER:A:RUNT:POLARITY POSITIVE` indicating that the polarity of the A pulse runt trigger is positive.

TRIGger:A:RUNT:SOUrce

This command specifies the source waveform for the A runt trigger.

Group

Trigger

Syntax

```
TRIGger:A:RUNT:SOUrce {CH1|CH2|CH3|CH4|RF}
TRIGger:A:RUNT:SOUrce?
```

Arguments

`CH1–CH4` specifies the analog channel number to use as the source waveform for the runt trigger. To specify the threshold levels when using CH1–CH4 as the source, use TRIGger:A:LOWerthreshold:CH<x> and TRIGger:A:UPPerthreshold:CH<x>.

`RF` specifies the internal RF power level as the source (MDO4000/B models only, and requires installation of an MDO4TRIG application module.) To specify the threshold levels when using RF power level as the source, use TRIGger:A:LOWerthreshold:RF and TRIGger:A:UPPerthreshold:RF.

Examples

`TRIGGER:A:RUNT:SOURCE CH4` sets channel 4 as the trigger source.

`TRIGGER:A:RUNT:SOURCE?` might return `:TRIGGER:A:RUNT:SOURCE CH2` indicating that channel 2 is the trigger source.

TRIGger:A:RUNT:WHEn

This command specifies the type of pulse width the trigger checks for when it detects a runt.

Group Trigger

Syntax

```
TRIGger:A:RUNT:WHEn {LESSthan|MOREthan|EQual|UNEQual|OCCURS}
TRIGger:A:RUNT:WHEn?
```

Related Commands TRIGger:A:RUNT:WIDth

Arguments

`OCCURS` argument specifies a trigger event if a runt of any detectable width occurs.

`LESSthan` argument sets the oscilloscope to trigger if the a runt pulse is detected with width less than the time set by the TRIGger:A:RUNT:WIDth command.

`MOREthan` argument sets the oscilloscope to trigger if the a runt pulse is detected with width greater than the time set by the TRIGger:A:RUNT:WIDth command.

`EQual` argument sets the oscilloscope to trigger if a runt pulse is detected with width equal to the time period specified in TRIGger:A:RUNT:WIDth within a ±5% tolerance.

`NOTEQual` argument sets the oscilloscope to trigger if a runt pulse is detected with width greater than or less than (but not equal to) the time period specified in TRIGger:A:RUNT:WIDth within a ±5% tolerance.

Examples

`TRIGGER:A:RUNT:WHEN MORETHAN` sets the runt trigger to occur when the oscilloscope detects a runt in a pulse wider than the specified width.

`TRIGGER:A:RUNT:WHEN?` might return `:TRIGGER:A:PULSE:RUNT:WHEN OCCURS` indicating that a runt trigger will occur if the oscilloscope detects a runt of any detectable width.

TRIGger:A:RUNT:WIDth

This command specifies the width, in seconds, for a runt trigger.

To set the trigger voltage threshold level for the edge, pulse width, runt, or transition (rise/fall or slew rate) trigger, use TRIGger:A:LEVel:AUXin, TRIGger:A:LEVel:CH<x>, or TRIGger:A:LEVel:D<x>.

Group Trigger

Syntax

```
TRIGger:A:RUNT:WIDth <NR3>
TRIGger:A:RUNT:WIDth?
```

Related Commands

TRIGger:A:RUNT:WHEn

Arguments

<NR3> is a floating point number that specifies the minimum width, in seconds.

Examples

TRIGGER:A:RUNT:WIDTH 15E-6 sets the minimum width of the pulse runt trigger to 15 µs.

TRIGGER:A:RUNT:WIDTH? might return :TRIGGER:A:PULSE:RUNT:WIDTH 2.0000E-09 indicating that the minimum width of a pulse runt trigger is 2 ns.

TRIGger:A:SETHold? (Query Only)

Returns the clock edge polarity, voltage threshold and source input; data voltage threshold and source; and both setup and hold times for setup and hold violation triggering.

Group

Trigger

Syntax

```
TRIGger:A:SETHold?
```

Examples

```
TRIGGER:A:SETHOLD? might return
:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD
100.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD
80.0000E-3;:TRIGGER:A:SETHOLD:HOLDTIME 20.0000E-9;SETTIME
8.0000E-9
```

TRIGger:A:SETHold:CLOCk? (Query Only)

Returns the clock edge polarity, voltage threshold, and source input for setup and hold triggering.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:CLOCk?
```

Examples `TRIGGER:A:SETHOLD:CLOCK?` might return
`:TRIGGER:A:SETHOLD:CLOCK:SOURCE EXT;EDGE FALL;THRESHOLD 1.4000`

TRIGger:A:SETHold:CLOCk:EDGE

This command specifies the clock edge polarity for setup and hold triggering.

Group Trigger

Syntax
```
TRIGger:A:SETHold:CLOCk:EDGE {FALL|RISe}
TRIGger:A:SETHold:CLOCk:EDGE?
```

Arguments `FALL` specifies polarity as the clock falling edge.

`RISe` specifies polarity as the clock rising edge.

Examples `TRIGGER:A:SETHOLD:CLOCK:EDGE RISE` specifies the polarity as the clock rising edge.

`TRIGGER:A:SETHOLD:CLOCK:EDGE?` might return `:TRIGGER:A:SETHOLD:CLOCK:EDGE RISE` indicating that polarity is specified as the clock rising edge.

TRIGger:A:SETHold:CLOCk:SOUrce

This command specifies the clock source for the setup and hold triggering. You cannot specify the same source for both clock and data.

Group Trigger

Syntax
```
TRIGger:A:SETHold:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12
|D13|D14|D15|AUX}

TRIGger:A:SETHold:CLOCk:SOUrce?
```

Related Commands TRIGger:A:SETHold:DATa:SOUrce

Arguments

CH1–CH4 specifies the analog channel to use as the clock source waveform.

D0–D15 specifies the digital channel to use as the clock source waveform. (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed.)

AUX specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope. (For MSO/DPO4000B series models and 2-channel MDO3000 models only.)

Examples

TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1 specifies channel 1 as the clock source for a setup and hold trigger operation.

TRIGGER:A:SETHOLD:CLOCK:SOURCE? might return :TRIGGER:A:SETHOLD:CLOCK:SOURCE CH4 indicating that channel 4 is the clock source for a setup and hold trigger operation.

TRIGger:A:SETHold:CLOCk:THReshold

This command specifies the clock voltage threshold for the setup and hold trigger.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:CLOCk:THReshold {<NR3>|TTL}
TRIGger:A:SETHold:CLOCk:THReshold?
```

Arguments

<NR3> is a floating point number that specifies the clock level, in volts.

TTL specifies a preset TTL high level of 1.4 V.

Examples

TRIGGER:A:SETHOLD:CLOCK:THRESHOLD TTL specifies the preset TTL value of 1.4 V as the clock threshold for the setup and hold trigger.

TRIGGER:A:SETHOLD:CLOCK:THRESHOLD? might return :TRIGGER:A:LOGIC:SETHOLD:CLOCK:THRESHOLD 1.2000E+00 indicating that the clock threshold for the setup and hold trigger is 1.2 V.

TRIGger:A:SETHold:DATa? (Query Only)

Returns the voltage threshold and data source for the setup and hold trigger.

Group

Trigger

Syntax `TRIGger:A:SETHold:DATa?`

Related Commands TRIGger:A:SETHold:CLOCk?

Examples `TRIGGER:A:SETHOLD:DATA?` might return
`:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD 80.0000E-3`

TRIGger:A:SETHold:DATa:SOUrce

This command specifies the data source or sources for setup and hold triggering. You can specify any combination of sources as long as none of them are also the clock source.

For MSO/MDO4000/B models, (and MDO3000 models with the MDO3MSO option installed), you can specify any combination of CH1-CH4 and D0-D15 as the data sources. On the MSO4000B and 2-channel MDO3000 models, you can also use Aux Input.

Data sources for DPO models may be one of CH1-CH4 or the Aux Input.

Group Trigger

Syntax
```
TRIGger:A:SETHold:DATa:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15| AUX}
TRIGger:A:SETHold:DATa:SOUrce?
```

Related Commands TRIGger:A:SETHold:CLOCk:SOUrce

Arguments `CH1–CH4` specifies an analog input channel as the data source for the setup and hold trigger.

`D0–D15` specifies a digital channel as the source (MSO/MDO4000/B models only as well as MDO3000 models with option MDO3MSO installed).

`AUX` specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope. (For MSO/DPO4000B series models and 2-channel MDO3000 models only.)

Examples `TRIGGER:A:SETHOLD:DATA:SOURCE CH1` sets channel 1 as the data source for the setup and hold trigger.

`TRIGGER:A:SETHOLD:DATA:SOURCE CH1,D0,D15` specifies Ch1, D0 and D15 as three data sources for the setup/hold trigger.

TRIGGER:A:SETHOLD:DATA:SOURCE? might return :TRIGGER:A:LOGIC:SETHOLD:DATA:SOURCE CH1,D0,D15 indicating that channel 1, digital channel 0, and digital channel 15 are the current data sources for the setup and hold trigger.

TRIGger:A:SETHold:DATa:THReshold

This command specifies the data voltage threshold for setup and hold trigger.

Group Trigger

Syntax

```
TRIGger:A:SETHold:DATa:THReshold {<NR3>|TTL}
TRIGger:A:SETHold:DATa:THReshold?
```

Arguments TTL specifies the preset TTL high level of 1.4 V.

<NR3> is a floating point number that specifies the setup and hold data level, in volts.

Examples TRIGGER:A:SETHOLD:DATA:THRESHOLD TTL specifies the preset high level of 1.4 V as the current data voltage level for the setup and hold trigger.

TRIGGER:A:SETHOLD:DATA:THRESHOLD? might return :TRIGGER:A:SETHOLD:DATA:THRESHOLD 1.2000E+00 indicating that 1.2 V is the current data voltage level for the setup and hold trigger.

TRIGger:A:SETHold:HOLDTime

This command specifies the hold time for setup and hold violation triggering.

Group Trigger

Syntax

```
TRIGger:A:SETHold:HOLDTime <NR3>
TRIGger:A:SETHold:HOLDTime?
```

Arguments <NR3> is a floating point number that specifies the hold time setting, in seconds. Positive values for hold time occur after the clock edge. Negative values occur before the clock edge.

Examples TRIGGER:A:SETHOLD:HOLDTIME 3.0E-3 sets the hold time for the setup and hold trigger to 3 ms.

TRIGGER:A:SETHOLD:HOLDTIME? might return :TRIGGER:A:SETHOLD:HOLDTIME 2.0000E-09 indicating that the current hold time for the setup and hold trigger is 2 ns.

TRIGger:A:SETHold:SETTime

This command specifies the setup time for setup and hold violation triggering.

Group Trigger

Syntax

```
TRIGger:A:SETHold:SETTime <NR3>
TRIGger:A:SETHold:SETTime?
```

Arguments <NR3> is a floating point number that specifies the setup time for setup and hold violation triggering.

Examples TRIGGER:A:SETHOLD:SETTIME 3.0E-6 specifies that the current setup time for setup and hold trigger is 3 µs.

TRIGGER:A:SETHOLD:SETTIME? might return :TRIGGER:A:LOGIC:SETHOLD:SETTIME 2.0000E-09 indicating that the current setup time for setup and hold trigger is 2 ns.

TRIGger:A:SETHold:THReshold:CH<x>

This command specifies the threshold for the analog channel <x>. x can be 1–4. All trigger types using the channel are affected.

Group Trigger

Syntax

```
TRIGger:A:SETHold:THReshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:SETHold:THReshold:CH<x>?
```

Arguments <NR3> is a floating point number that specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples TRIGGER:A:SETHOLD:THRESHOLD:CH1 1.5 sets the channel 1 threshold to 1.5 volts.

TRIGGER:A:SETHOLD:THRESHOLD:CH1? might return TRIGGER:A:SETHOLD:THRESHOLD:CH1 0.0E+0 indicating the channel 1 threshold is set to 0.0 volts.

TRIGger:A:SETHold:THReshold:D<x>

This command sets the threshold for the specified digital channel. <x> can be D0 - D15. All trigger types using the digital channel are affected.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group Trigger

Syntax

```
TRIGger:A:SETHold:THReshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:SETHold:THReshold:D<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:SETHOLD:THRESHOLD:D1 ECL sets the threshold to ECL levels.

TRIGGER:A:SETHOLD:THRESHOLD:D1? might return TRIGGER:A:SETHOLD:THRESHOLD:D1 -1.3000 indicating the threshold is set to -1.3 volts.

TRIGger:A:TIMEOut:POLarity

When triggering using the TIMEOut trigger type, this commands specifies the polarity to be used. The timeout trigger type is selected using TRIGger:A:PULse:CLAss TIMEOut.

Group Trigger

Syntax

```
TRIGger:A:TIMEOut:POLarity {STAYSHigh|STAYSLow|EITher}
TRIGger:A:TIMEOut:POLarity?
```

Related Commands

TRIGger:A:TIMEOut:SOUrce

TRIGger:A:TIMEOut:TIMe

TRIGger:A:PULse:CLAss

Arguments

STAYSHigh — Trigger when the polarity stays high during the timeout time specified by the command TRIGger:A:PULse:CLAss.

STAYSLow — Trigger when the polarity stays low during the timeout time specified by the command TRIGger:A:PULse:CLAss.

EITher — Trigger when the polarity is either high or low.

Examples

`TRIGger:A:TIMEOut:POLarity STAYSHigh` specifies to trigger when the polarity stay high during the timeout time when triggering using the TIMEOut trigger type (selected using TRIGger:A:PULse:CLAss TIMEOut).

`TRIGger:A:TIMEOut:POLarity?` might return EITHER, indicating that the polarity doesn't matter when triggering using the TIMEOut trigger type.

TRIGger:A:TIMEOut:SOUrce

When triggering using the `TIMEOut` trigger type, this command specifies the source. The available sources are live channels, the digital channels, the Aux Input connector, or RF power level (MDO4000/B only). The default is channel 1. The timeout trigger type is selected using TRIGger:A:PULse:CLAss TIMEOut.

Group

Trigger

Syntax

```
TRIGger:A:TIMEOut:SOUrce {CH1|CH2|CH3|CH4|LINE|AUX|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|RF}
```

```
TRIGger:A:TIMEOut:SOUrce?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:TIMEOut:SOUrce

TRIGger:A:TIMEOut:TIMe

TRIGger:A:TIMEOut:POLarity

TRIGger:A:PULse:CLAss

Arguments

`CH1–4` specifies an analog channel as the timeout trigger source.

`AUX` specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope. (For MSO/DPO 4000B series models and 2-channel MDO3000 models only.)

`LINE` specifies the AC line as the timeout trigger source.

`D0–D15` specifies a digital channel as the timeout trigger source (MSO4000B/MDO4000/B models only, or MDO3000 models with the MDO3MSO option enabled).

`RF` specifies that the internal RF power level can be used as the timeout trigger source. (MDO4000/B models only, and requires installation of an MDO4TRIG application module.)

Examples

`TRIGger:A:TIMEOut:SOUrce CH4` specifies to use channel 4 as the source for the timeout trigger.

`TRIGger:A:TIMEOut:SOUrce?` might return CH1, indicating that channel 1 has been set as the source for the timeout trigger.

TRIGger:A:TIMEOut:TIMe

When triggering using the `TIMEOut` trigger type, this command specifies the timeout time, in seconds. The default and minimum is 4.0E-9 seconds and the maximum is 8.0 seconds. The resolution is 800.0E-12 which means that the increments of time specified is 800 picoseconds. The timeout trigger type is selected using TRIGger:A:PULse:CLAss TIMEOut

Group

Trigger

Syntax

```
TRIGger:A:TIMEOut:TIMe <NR3>
TRIGger:A:TIMEOut:TIMe?
```

Related Commands

TRIGger:A:TIMEOut:POLarity

TRIGger:A:TIMEOut:SOUrce

TRIGger:A:PULse:CLAss

Arguments

<NR3> is a floating point number that specifies the timeout time, in seconds.

Examples

`:TRIGger:A:TIMEOut:TIMe 4.0E-9` specifies the timeout time of 4.0 nsec.

`:TRIGger:A:TIMEOut:TIMe?` might return 8.0000E-9, which is the default.

TRIGger:A{:TRANsition|:RISEFall}? (Query Only)

Returns transition time trigger parameters.

Group Trigger

Syntax `TRIGger:A{:TRANsition|:RISEFall}?`

Related Commands TRIGger:A:UPPerthreshold:CH<x> , TRIGger:A:LOWerthreshold:CH<x>

Examples `TRIGGER:A::TRANSITION?` might return
`:TRIGGER:A:TRANSITION:POLARITY POSITIVE;WHEN SLOWER;DELTATIME 8.0000E-9`

TRIGger:A{:TRANsition|:RISEFall}:DELTatime

This command specifies the delta time used in calculating the transition value for the transition trigger.

Group Trigger

Syntax
`TRIGger:A{:TRANsition|:RISEFall}:DELTatime <NR3>`
`TRIGger:A{:TRANsition|:RISEFall}:DELTatime?`

Arguments `<NR3>` is a floating point number that specifies the delta time, in seconds.

Examples `TRIGGER:A:TRANSITION:DELTATIME 15E-6` sets the delta time of the transition trigger to 15 µs.

`TRIGGER:A:TRANSITION:DELTATIME?` might return `:TRIGGER:A :TRANSITION:DELTATIME 2.0000E-09` indicating that the delta time of the transition trigger is set to 2 ns.

TRIGger:A{:TRANsition|:RISEFall}:POLarity

This command specifies the polarity for the transition trigger.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:POLarity
{EITher|NEGative|POSitive}

TRIGger:A{:TRANsition|:RISEFall}:POLarity?
```

Arguments

`POSitive` indicates that a pulse edge must traverse from the lower (most negative) to higher (most positive) level for transition triggering to occur.

`NEGative` indicates that a pulse edge must traverse from the upper (most positive) to lower (most negative) level for transition triggering to occur.

`EITher` indicates either positive or negative polarity.

Examples

`TRIGGER:A:TRANSITION:POLARITY NEGATIVE` sets the transition polarity to negative.

`TRIGGER:A:TRANSITION:POLARITY?` might return `:TRIGGER:A:TRANSITION:POLARITY EITHER` indicating that the polarity can be either positive or negative.

TRIGger:A{:TRANsition|:RISEFall}:SOUrce

This command specifies the source for a transition trigger.

Group

Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:SOUrce {CH1|CH2|CH3|CH4}
TRIGger:A{:TRANsition|:RISEFall}:SOUrce?
```

Arguments

`CH1–CH4` specifies one of the analog channels to be used as the source for a transition trigger.

Examples

`TRIGGER:A:TRANSITION:SOURCE CH4` sets channel 4 as the source for the transition trigger.

`TRIGGER:A:TRANSITION:SOURCE?` might return `:TRIGGER:A:TRANSITION:SOURCE CH2` indicating that channel 2 is the source for the transition trigger.

TRIGger:A{:TRANsition|:RISEFall}:WHEn

This command specifies whether to check for a transitioning signal that is faster or slower than the specified delta time.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:WHEn
{SLOWer|FASTer|EQual|UNEQual}

TRIGger:A{:TRANsition|:RISEFall}:WHEn?
```

Arguments

`FASTer` sets the trigger to occur when the signal transition time is faster than the time set by `TRIGger:A:TRANsition:DELTatime`.

`SLOWer` sets the trigger to occur when the signal transition time is slower than the time set by.`TRIGger:A:TRANsition:DELTatime`.

`EQual` sets the trigger to occur when the signal transition time is equal to the time set by `TRIGger:A:TRANsition:DELTatime`.

`UNEQual` sets the trigger to occur when the signal transition time is not equal to the time set by `TRIGger:A:TRANsition:DELTatime`.

Examples

`TRIGGER:A:TRANSITION:WHEN SLOWER` sets the trigger to occur when the signal transition time is slower than the time set by the `TRIGger:A:TRANsition:DELTatime` command.

`TRIGGER:A:TRANSITION:WHEN?` might return `:TRIGGER:A:TRANSITION:WHEN FASTER`

TRIGger:A:TYPe

This command sets the type of A trigger (either edge, logic, pulse, bus or video). If you set the trigger type to LOGIc, you also need to set the logic trigger class (logic or setup/hold) using the command TRIGger:A:LOGIc:CLAss. If you set the trigger type to PULSe, you also need to set the pulse trigger class (either runt, width, transition or timeout), using the command TRIGger:A:PULse:CLAss. If you set the trigger type to BUS, you also need to set the bus type (CAN, I²C, SPI, RS-232, Ethernet, MIL-STD-1553, LIN, USB, audio, FlexRay, or parallel) using the command TRIGger:A:BUS.

NOTE. *A series of example command sequences showing different searches and triggers is included as an appendix. (See page F-1, Search and Trigger Command Sequence Examples.)*

Group Trigger

Syntax

```
TRIGger:A:TYPe {EDGe|LOGIc|PULSe|BUS|VIDeo}
TRIGger:A:TYPe?
```

Related Commands

TRIGger:A:EDGE?,

TRIGger:A:LOGIc:CLASs,

TRIGger:A:BUS

Arguments

`EDGe` is the default trigger. A trigger event occurs when a signal passes through a specified voltage level in a specified direction and is controlled by the TRIGger:A:EDGE? commands.

`LOGIc` specifies that a trigger occurs when specified conditions are met and is controlled by the TRIGger:A:LOGIc? commands. This trigger type is equivalent to the logic and setup/hold triggers found in the user interface. Use TRIGger:A:LOGIc:CLASs to further select the logic trigger class (either `LOGIC` or `SETHOLD`).

`PULSe` specifies that a trigger occurs when a specified pulse is found. Use TRIGger:A:PULse:CLASs to further select the pulse trigger class (either runt, width, transition or timeout).

`BUS` specifies that a trigger occurs when a bus signal is found. Supports CAN, I²C, SPI, RS-232, Ethernet, MIL-STD-1553, LIN, USB, audio, FlexRay buses (with the appropriate application module installed) as well as parallel buses (MSO4000B, MDO4000/B, and MDO3000 Series oscilloscopes with option MDO3MSO installed only). Use TRIGger:A:BUS to set the bus type.

`VIDeo` specifies that the trigger occurs when a video signal is found.

Examples

`TRIGGER:A:TYPE PULSe` sets the A trigger type to PULSE.

`TRIGGER:A:TYPE?` might return `:TRIGGER:A:TYPE PULSE` indicating that the A trigger type is a pulse trigger.

TRIGger:A:UPPerthreshold:CH<x>

This command sets the upper threshold for channel <x>, where x is the analog channel number 1–4. Each channel can have an independent level. Used only for runt and transition trigger types.

Group

Trigger

Syntax

```
TRIGger:A:UPPerthreshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:UPPerthreshold:CH<x>?
```

Arguments

<NR3> is a floating point number that specifies the threshold level, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:UPPERTHRESHOLD:CH2 50E-3 sets the upper limit of the pulse runt trigger to 50 mV for channel 2.

TRIGGER:A:UPPERTHRESHOLD:CH2? might return :TRIGGER:A:UPPERTHRESHOLD:CH2 1.2000E-01 indicating that the upper limit of the pulse runt trigger is set to 120 mV.

TRIGger:A:UPPerthreshold:RF

This command specifies the upper threshold when the internal RF power level is used during runt triggering. To specify the lower threshold for the RUNT trigger type as well as the single threshold for the Pulse and Timeout trigger types, use the command TRIGger:A:LOWerthreshold:RF. To choose the RUNT trigger type, use the command TRIGger:A:PULse:CLAss. To specify RF power as a source during runt triggering, use TRIGger:A:RUNT:SOUrce.

Conditions

MDO4000/B models only. Also requires installation of an MDO4TRIG application module.

Group

Trigger

Syntax

```
TRIGger:A:UPPerthreshold:RF {<NR3>}
TRIGger:A:UPPerthreshold:RF?
```

Related Commands

TRIGger:A:TYPe, TRIGger:A:LOWerthreshold:RF

Arguments

<NR3> is a floating point number that specifies the threshold to use, in the currently selected RF units (using RF:UNIts). The range is (ref level – 40 dBm) to (ref level + 10 dBm), but never less than –65 dBm or more than +30 dBm.

Examples

TRIGger:A:UPPerthreshold:RF –1.000E+1 sets the threshold to –10 dBm.

TRIGger:A:UPPerthreshold:RF? might return -30.0000, indicating that the threshold set to –30.000 dBm (assuming the units are currently set to dBm).

TRIGger:A:VIDeo? (Query Only)

Returns the A trigger video parameters.

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo?
```

Examples `TRIGGER:A:VIDEO?` might return `:TRIGGER:A:VIDEO:STANDARD BILEVELCUSTOM;SYNC ALLLINES;LINE 4;HOLDOFF:FIELD 0.0E+0;:TRIGGER:A:VIDEO:POLARITY POSITIVE;CUSTOM:FORMAT PROGRESSIVE;LINEPERIOD 63.5600E-6;SYNCINTERVAL 4.7200E-6`

TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}

This command sets the video trigger format (either interlaced or progressive) to use for triggering on video signals. To use this command, you must also set the video standard to `BILevelcustom` or `TRILevelcustom` (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}
{INTERLAced|PROGressive}
TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}?
```

Arguments `INTERLAced` argument sets the format to interlaced video lines.

`PROGressive` argument sets the format to progressive video lines.

Examples `TRIGGER:A:VIDEO:CUSTOM:FORMAT PROGRESSIVE` sets the custom format for the A video trigger to progressive lines.

TRIGGER:A:VIDEO:CUSTOM:FORMAT? might return :TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED indicating that interlaced is selected as the custom format for the A video trigger.

TRIGger:A:VIDeo:CUSTom:LINEPeriod

This command sets the line period for the standard under test. To use this command, you must also set the video standard to BILevelcustom or TRILevelcustom (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:CUSTom:LINEPeriod <NR3>
TRIGger:A:VIDeo:CUSTom:LINEPeriod?
```

Arguments <NR3> is the custom video line period.

Examples TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD 50.5E-6 sets the video line period to 50.5 µs.

TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD? might return TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD 63.5600E-6 indicating the video line period is set to 63.56 µs.

TRIGger:A:VIDeo:CUSTom:SYNCInterval

This command sets the sync interval for the standard under test to use for triggering on video signals. This is only required for BiLevel Custom. To use this command, you must also set the video standard to BILevelcustom (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:CUSTom:SYNCInterval <NR3>
TRIGger:A:VIDeo:CUSTom:SYNCInterval?
```

Arguments

<NR3> is the sync interval.

Examples

TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL 4.0E-6 sets the sync interval is set to 4.0 µs.

TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL? might return TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL 4.7200E-6 indicating the sync interval is set to 4.72 µs.

TRIGger:A:VIDeo:HOLDoff:FIELD

This command sets the video trigger holdoff, in terms of video fields, to use for triggering on video signals.

Conditions

This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:HOLDoff:FIELD <NR3>
TRIGger:A:VIDeo:HOLDoff:FIELD?
```

Arguments

<NR3> argument is a real number from 0.0 to 8.5 in increments of 0.5. The argument sets the number of fields that the oscilloscope waits before rearming the video trigger.

Examples

TRIGGER:A:VIDEO:HOLDOFF:FIELD? might return :TRIGger:A:VIDeo:HOLdoff:FIELD 5 indicating that the oscilloscope is set to wait 5 video fields before rearming the trigger.

TRIGGER:A:VIDEO:HOLDOFF:FIELD 4.5 sets the oscilloscope to wait 4.5 video fields before rearming the trigger.

TRIGger:A:VIDeo:LINE

This command lets you set the specific video line number to be used for triggering on a video signal. You must also use the TRIGger:A:VIDeo{:SYNC|:FIELD} command to specify NUMERic as the video field to use.

Conditions

This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:LINE <NR1>
TRIGger:A:VIDeo:LINE?
```

Related Commands

TRIGger:A:VIDeo{:SYNC|:FIELD}

Arguments

<NR1> argument is an integer that sets the video line number on which the oscilloscope triggers. The following table lists the valid choices, depending on the active video standard.

Video Standard	Line Number Range
525/NTSC	1–525
625/PAL	1–625
SECAM	1–625

The following HDTV and custom standards become available with installation of a DPO4VID application module:

Video Standard	Line Number Range
480	1–525
576	1–625
720	1–750
875	1–875
1080	1–1125
Bilevel Custom	4–3000
Trilevel Custom	4–3000

Examples

TRIGGER:A:VIDEO:LINE 23 sets the oscilloscope to trigger on the line 23.

TRIGGER:A:VIDEO:LINE ? might return :TRIGger:A:VIDeo:LINE 10 indicating that the oscilloscope is set to trigger on line 10.

TRIGger:A:VIDeo:POLarity

This command sets the polarity to use for triggering on video signals.

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:POLarity {NEGative|POSitive}
TRIGger:A:VIDeo:POLarity?
```

Arguments `POSitive` argument sets the oscilloscope to trigger on a positive video sync pulse.

`NEGative` argument sets the oscilloscope to trigger on a negative video sync pulse.

Examples `TRIGGER:A:VIDEO:POLARITY NEGATIVE` sets the oscilloscope to trigger on a negative video pulse.

`TRIGGER:A:VIDEO:POLARITY?` might return `:TRIGger:A:VIDeo:POLARITY POSITIVE` indicating that the oscilloscope is set to trigger on a positive video sync pulse.

TRIGger:A:VIDeo:SOUrce

This command sets the source channel to use for triggering on video signals (CH1-4).

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:SOUrce
{CH1|CH2|CH3|CH4}
TRIGger:A:VIDeo:SOUrce?
```

Arguments `CH1–CH4` specifies the input channel to use as the A video trigger.

Examples

`TRIGGER:A:VIDEO:SOURCE CH1` sets Channel 1 as the source for the video trigger operation.

`TRIGGER:A:VIDEO:SOURCE?` might return `:TRIGger:A:VIDeo:SOURCE CH2` indicating that the source for the video trigger operation is set to Channel 2.

TRIGger:A:VIDeo:STANdard

This command sets the standard to use for triggering on video signals.

Conditions

This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:STANdard {NTSc|PAL|SECAM|BILevelcustom|
TRILevelcustom| HD480P60|HD576P50|HD720P30|HD720P50
|HD720P60|HD875I60|HD1080P24|HD1080SF24|HD1080I50
|HD1080I60|HD1080P25|HD1080P30|HD1080P50|HD1080P60}
```

```
TRIGger:A:VIDeo:STANdard?
```

Related Commands

TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}, TRIGger:A:VIDeo:CUSTom:LINEPeriod, TRIGger:A:VIDeo:CUSTom:SYNCInterval

Arguments

`NTSc` sets the oscilloscope to trigger on video signals that meet the NTSC 525/60/2:1 standard (a line rate of 525 lines per frame and a field rate of 60 Hz).

`PAL` sets the oscilloscope to trigger on video signals that meet the NTSC 625/50/2:1 standard (a line rate of 625 lines per frame and a field rate of 50 Hz).

`SECAM` sets the oscilloscope to trigger on video signals that meet the SECAM standard.

`BILevelcustom` sets the oscilloscope to trigger on video horizontal scan rate parameters defined by the TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}, TRIGger:A:VIDeo:CUSTom:LINEPeriod and TRIGger:A:VIDeo:CUSTom:SYNCInterval commands. (Requires installation of a DPO4VID application module for 4000 series models.)

`TRILevelcustom` sets the oscilloscope to trigger on video horizontal scan rate parameters defined by the TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe}, TRIGger:A:VIDeo:CUSTom:LINEPeriod command. (Requires installation of a DPO4VID application module for 4000 series models.)

HD480P60|HD576P50|HD720P30|HD720P50|HD720P60|HD875I60|HD1080P24|HD1080SF24|HD1080I50|HD1080I60|HD1080P25|HD1080P30|HD1080P50|HD1080P60 set the oscilloscope to trigger on an HDTV video signal that meets standards defined in the following table. (Requires installation of a DPO4VID application module for 4000 series models.)

Table 2-56: Available HDTV formats

HDTV format	Description
480p60	525 lines (480 active), 640 or 704 x 480 pixel, progressive, 60 fps
576p50	EDTV with 625 lines (576 active), 1024 x 576 pixel, progressive, 50 fps
720p30	750 lines (720 active), 1280 x 720 pixel, progressive, 30 fps
720p50	750 lines (720 active), 1280 x 720 pixel, progressive, 50 fps
720p60	750 lines (720 active), 1280 x 720 pixel, progressive, 60 fps
875i60	875 active lines, interlaced, 60 fps
1080i50	1125 Lines (1080 active), 1920 x 1080 pixel, interlaced, 50 fps
1080i60	1125 lines (1080 active), 1920 x 1080 pixel, interlaced, 60 fps
1080p24	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 24 fps
1080sF24	1125 lines (1080 active), 1920 x 1080 pixel, progressive (sF), 24 fps
1080p25	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 25 fps
1080P30	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 30 fps
1080P50	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 50 fps
1080P60	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 60 fps

Examples

TRIGGER:A:VIDEO:STANDARD NTSC sets the oscilloscope to trigger on NTSC-standard video signals.

TRIGGER:A:VIDEO:STANDARD? might return :TRIGger:A:VIDeo:STANDARD NTSC indicating that the oscilloscope is set to trigger on an NTSC format.

TRIGger:A:VIDeo{:SYNC|:FIELD}

This command sets the video field to use for triggering on video signals (odd fields, even fields, all fields, all lines, numeric).

Conditions This command requires a DPO4VID application module to use any standard besides NTSc, PAL, or SECAM, except for MDO3000 models, which do not require an application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo{:SYNC|:FIELD}
{ODD|EVEN|ALLFields|ALLLines|NUMERic}
TRIGger:A:VIDeo{:SYNC|:FIELD}?
```

Arguments `ODD` argument sets the oscilloscope to trigger on interlaced video odd fields.

`EVEN` argument sets the oscilloscope to trigger on interlaced video even fields.

`ALLFields` argument sets the oscilloscope to trigger on all fields.

`ALLLines` argument sets the oscilloscope to trigger on all video lines.

`NUMERic` argument sets the oscilloscope to trigger on the video signal line specified by the TRIGger:A:VIDeo:LINE command.

Examples `TRIGGER:A:VIDEO:FIELD EVEN` sets the A video trigger so that it will trigger on even fields.

`TRIGGER:A:VIDEO:FIELD?` might return `:TRIGGER:A:VIDEO:FIELD ALLFIELDS` indicating that the A video will trigger on all video fields.

TRIGger:B

Sets the B trigger level to 50% of minimum and maximum. The query form of this command returns the B trigger parameters. This command is similar to selecting B Event (Delayed) Trigger Setup from the Trigger menu and then viewing the current setups.

Group Trigger

Syntax

```
TRIGger:B SETLevel
TRIGger:B?
```

Related Commands TRIGger:A

Arguments SETLevel sets the B trigger level to 50% of MIN and MAX.

Examples TRIGGER:B SETLEVEL sets the B trigger level to 50% of MIN and MAX.

TRIGGER:B? might return the following B trigger parameters:
:TRIGGER:B:STATE 0;TYPE EDGE; LEVEL -220.0000E-3;BY TIME;EDGE:SOURCE CH1;SLOPE RISE;COUPLING DC; :TRIGGER:B:TIME 16.0000E-9;EVENTS:COUNT 2

TRIGger:B:BY

Selects or returns whether the B trigger occurs after a specified number of events or a specified period of time after the A trigger.

Group Trigger

Syntax
```
TRIGger:B:BY {EVENTS|TIMe}
TRIGger:B:BY?
```

Related Commands TRIGger:B:EVENTS:COUNt, TRIGger:B:TIMe, ,

Arguments EVENTS sets the B trigger to take place following a set number of trigger events after the A trigger occurs. The number of events is specified by TRIGger:B:EVENTS:COUNt.

TIMe sets the B trigger to occur a set time after the A trigger event. The time period is specified by TRIGger:B:TIMe.

Examples TRIGGER:B:BY TIME sets the B trigger to occur at a set time after the A trigger event.

TRIGGER:B:BY? might return :TRIGGER:B:BY EVENTS indicating that the B trigger takes place following a set number of trigger events after the A trigger occurs.

TRIGger:B:EDGE? (Query Only)

Returns the source, slope, and coupling for B trigger.

Group Trigger

Syntax `TRIGger:B:EDGE?`

Related Commands TRIGger:B:EDGE:COUPling,

TRIGger:B:EDGE:SLOpe,

TRIGger:B:EDGE:SOUrce

Examples `TRIGGER:B:EDGE?` might return `:TRIGGER:B:EDGE:SOURCE CH1; SLOPE RISE;COUPLING DC`

TRIGger:B:EDGE:COUPling

This command specifies the type of coupling for the B edge trigger.

Group Trigger

Syntax
```
TRIGger:B:EDGE:COUPling {DC|HFRej|LFRej|NOISErej}
TRIGger:B:EDGE:COUPling?
```

Related Commands TRIGger:B:EDGE?

Arguments `DC` selects `DC` trigger coupling.

`HFRej` selects high-frequency reject coupling.

`LFRej` selects low-frequency reject coupling.

`NOISErej` selects `DC` low sensitivity.

Examples `TRIGGER:B:EDGE:COUPLING DC` selects DC for the B trigger coupling.

`TRIGGER:B:EDGE:COUPLING?` might return `:TRIGGER:B:EDGE:COUPLING HFR` which indicates that the B trigger type is set to high-frequency reject coupling.

TRIGger:B:EDGE:SLOpe

This command specifies the slope for the B trigger.

Group Trigger

Syntax
```
TRIGger:B:EDGE:SLOpe {RISe|FALL}
TRIGger:B:EDGE:SLOpe?
```

Related Commands TRIGger:B:EDGE?

Arguments `RISe` triggers on the rising or positive edge of a signal.

`FALL` triggers on the falling or negative edge of a signal.

Examples `TRIGGER:B:EDGE:SLOPE FALL` sets the B edge trigger to occur on the falling slope.

`TRIGGER:B:EDGE:SLOPE?` might return `:TRIGGER:B:EDGE:SLOPE RISE` indicating that the B edge trigger occurs on the rising slope.

TRIGger:B:EDGE:SOUrce

This command specifies the source for the B trigger.

Group Trigger

Syntax
```
TRIGger:B:EDGE:SOUrce {CH1|CH2|CH3|CH4|AUX|LINE|RF}
TRIGger:B:EDGE:SOUrce?
```

Related Commands TRIGger:B:EDGE?

Arguments `CH1–4` specifies an analog channel as the B trigger source.

`AUX` specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope as the B trigger source. (For MSO/DPO 4000B series models and 2-channel MDO3000 models only.)

`LINE` specifies the AC power line as the B trigger source.

`RF` specifies to use the internal RF power level as the source. (MDO4000/B models only). Also requires installation of an MDO4TRIG application module.)

Examples `TRIGGER:B:EDGE:SOURCE CH4` sets channel 4 as the input source for the B trigger.

TRIGGER:B:EDGE:SOURCE? might return :TRIGGER:B:EDGE:SOURCE CH1 indicating that the current input source for the B trigger is channel 1.

TRIGger:B:EVENTS? (Query Only)

Returns the current B trigger events parameter.

Group Trigger

Syntax TRIGger:B:EVENTS?

Related Commands TRIGger:B:EVENTS:COUNt

Examples TRIGGER:B:EVENTS? might return

:TRIGGER:B:EVENTS:COUNT 2

indicating that 2 events must occur before the B trigger occurs.

TRIGger:B:EVENTS:COUNt

This command specifies the number of events that must occur before the B trigger (when TRIG:DELay:BY is set to EVENTS).

Group Trigger

Syntax
```
TRIGger:B:EVENTS:COUNt <NR1>
TRIGger:B:EVENTS:COUNt?
```

Related Commands TRIGger:B:EVENTS?

Arguments <NR1> is the number of B trigger events, which can range from 1 to 10,000,000.

Examples TRIGGER:B:EVENTS:COUNT 4 specifies that the B trigger will occur four trigger events after the A trigger.

TRIGGER:B:EVENTS:COUNT? might return :TRIGGER:B:EVENTS:COUNT 2 indicating that two events must occur after the A trigger before the B trigger can occur.

TRIGger:B:LEVel

This command specifies the level for the B trigger.

Group Trigger

Syntax

```
TRIGger:B:LEVel {TTL|<NR3>}
TRIGger:B:LEVel?
```

Related Commands TRIGger:B, TRIGger:B:EDGE:SOUrce

Arguments

TTL specifies a preset TTL high level of 1.4 V.

<NR3> is a floating point number that specifies the B trigger level, in volts.

Examples

TRIGGER:B:LEVEL TTL sets the B trigger level to 1.4 V.

TRIGGER:B:LEVEL? might return :TRIGGER:B:LEVEL 173.0000E-03 indicating that the B trigger level is currently set at 173 mV.

TRIGger:B:LEVel:CH<x>

This command specifies the B trigger level for channel <x>, where x is the channel number. Each Channel can have an independent Level.

Group Trigger

Syntax

```
TRIGger:B:LEVel:CH<x> {ECL|TTL|<NR3>}
TRIGger:B:LEVel:CH<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the trigger level in user units (usually volts).

Examples

TRIGGER:B:LEVEL:CH2? might return :TRIGGER:B:LEVEL:CH2 1.3000E+00 indicating that the B edge trigger is set to 1.3 V for channel 2.

TRIGGER:B:LEVEL:CH3 TTL sets the B edge trigger to TTL high level for channel 3.

TRIGger:B:LEVel:D<x>

This command specifies the B trigger level for digital channel <x>, where x is the channel number. Each channel can have an independent level.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group Trigger

Syntax

```
TRIGger:B:LEVel:D<x> {ECL|TTL|<NR3>}
TRIGger:B:LEVel:D<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the trigger level in user units (usually volts).

TRIGger:B:LOWerthreshold:CH<x>

This command specifies the B trigger lower threshold for the channel <x>, where x is the channel number. Each channel can have an independent level. Used in runt and transition triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

Group Trigger

Syntax

```
TRIGger:B:LOWerthreshold:CH<x> {ECL|TTL|<NR3>}
TRIGger:B:LOWerthreshold:CH<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is a floating point number that specifies the threshold level, in volts.

TRIGger:B:LOWerthreshold:D<x>

Sets or queries the lower threshold for the digital channel selected. Each channel can have an independent level. Used in runt and transition triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

NOTE. *MDO3000 models only have two digital threshold controls: one for digital channels D0 - D7, and the other for D8 - D15. Digital channel trigger levels cannot be set independently for these models. Changing one digital channel's threshold level changes all of the channels' levels in the same set.*

Group Trigger

Syntax

```
TRIGger:B:LOWerthreshold:D<x> {<NR3>|ECL|TTL}
TRIGger:B:LOWerthreshold:D<x>?
```

Arguments

`<NR3>` is a floating point number that specifies the threshold in volts.

`ECL` specifies a preset ECL high level of -1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

Examples

`TRIGGER:B:LOWERTHRESHOLD:D1?` might return `TRIGGER:B:LOWERTHRESHOLD:D1 1.4000` indicating the threshold is set to 1.4 volts.

TRIGger:B:STATE

This command specifies the state of B trigger activity. If the B trigger state is on, the B trigger is part of the triggering sequence. If the B trigger state is off, then only the A trigger causes the trigger event.

Group Trigger

Syntax

```
TRIGger:B:STATE {ON|OFF|<NR1>}
TRIGger:B:STATE?
```

Related Commands TRIGger:A:MODe

Arguments

`ON` specifies that the B trigger is active and in causes trigger events conjunction with the A trigger.

OFF specifies that only the A trigger causes trigger events.

<NR1> a 0 turns off the B trigger; any other value activates the B trigger.

Examples

TRIGGER:B:STATE ON sets the B trigger to active, making it capable of causing trigger events.

TRIGGER:B:STATE? might return :TRIGGER:B:STATE 0 indicating that the B trigger is inactive and that only the A trigger causes trigger events.

TRIGger:B:TIMe

This command specifies B trigger delay time. The B Trigger time applies only if TRIGger:B:BY is set to TIMe.

Group

Trigger

Syntax

```
TRIGger:B:TIMe <NR3>
TRIGger:B:TIMe?
```

Related Commands

TRIGger:B:BY, TRIGger:B:EVENTS:COUNt

Arguments

<NR3> is a floating point number that specifies the B trigger delay time in seconds.

Examples

TRIGGER:B:TIME 4E-6 sets the B trigger delay time to 4 µs.

TRIGGER:B:TIME? might return :TRIGGER:B:TIME 16.0000E-9 indicating that the B trigger time is set to 16 ns.

TRIGger:B:TYPe

This command specifies the type of B trigger. The only supported B trigger type is EDGE.

Group

Trigger

Syntax

```
TRIGger:B:TYPe EDGE
TRIGger:B:TYPe?
```

Related Commands

TRIGger:A:TYPe

Arguments `EDGE` sets the B trigger type to edge.

Examples `TRIGGER:B:TYPE EDGE` sets the B trigger type to edge.

`TRIGGER:B:TYPE?` might return `:TRIGGER:B:TYPE EDGE`.

TRIGger:EXTernal? (Query Only)

Returns all external trigger-related parameters for the probe attached to the Aux Input connector.

Conditions For MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Trigger

Syntax `TRIGger:EXTernal?`

TRIGger:EXTernal:PRObe

This command specifies the attenuation factor value of the probe attached to the Aux Input connector.

Conditions For MSO/DPO4000B series models and 2-channel MDO3000 models only.

Group Trigger

Syntax
```
TRIGger:EXTernal:PRObe <NR3>
TRIGger:EXTernal:PRObe?
```

Arguments `<NR3>` is a floating point number that specifies the attenuation factor of the probe.

Examples `TRIGGER:EXTERNAL:PROBE?` might return `:TRIGGER:EXTERNAL:PROBE 1.0E1` for a 10X probe.

TRIGger:EXTernal:YUNIts? (Query Only)

Returns the vertical (Y) units of the probe attached to the Aux In connector.

Conditions For MSO/DP04000B series models and 2-channel MDO3000 models only.

Group Trigger

Syntax `TRIGger:EXTernal:YUNits?`

Examples `TRIGGER:EXTERNAL:YUNITS?` might return `TRIGGER:EXTERNAL:YUNITS "A"` if the probe connected to Aux In is a current probe.

TRIGger:FREQuency? (Query Only)

Returns the trigger frequency in hertz if available. If the trigger frequency is not currently available, the IEEE Not A Number (NaN = 99.10E+36) value is returned. The maximum precision of the returned frequency is 12 digits.

Use the DISplay:TRIGFrequency command to enable/disable the calculation of the trigger frequency.

Group Trigger

Syntax `TRIGger:FREQuency?`

Related Commands DISplay:TRIGFrequency

Examples `TRIGGER:FREQUENCY?` might return `TRIGGER:FREQUENCY 99.10+36` indicating that the trigger frequency is not available.

TRIGger:STATE? (Query Only)

Returns the current state of the triggering system.

Group Trigger

Syntax `TRIGger:STATE?`

Related Commands TRIGger:A:MODe

Returns ARMED indicates that the oscilloscope is acquiring pretrigger information.

AUTO indicates that the oscilloscope is in the automatic mode and acquires data even in the absence of a trigger.

READY indicates that all pretrigger information has been acquired and that the oscilloscope is ready to accept a trigger.

SAVE indicates that the oscilloscope is in save mode and is not acquiring data.

TRIGGER indicates that the oscilloscope triggered and is acquiring the post trigger information.

Examples TRIGGER:STATE? might return :TRIGGER:STATE ARMED indicating that the pretrigger data is being acquired.

*TST? (Query Only)

Tests (self-test) the interface and returns a 0.

Group Miscellaneous

Syntax *TST?

Examples *TST? always returns 0.

UNLock (No Query Form)

Unlocks the front panel. The command is equivalent to LOCk NONe.

Group Miscellaneous

Syntax UNLock ALL

Related Commands LOCk

Arguments ALL specifies that all front-panel buttons and knobs are unlocked.

Examples UNLOCK ALL unlocks all front-panel buttons and knobs.

USBDevice:CONFigure

Enables or disables the rear USB port for use with Pictbridge printers.

Group PictBridge

Syntax
```
USBDevice:CONFigure {DISabled|IMAge|USBTmc}
USBDevice:CONFigure?
```

Arguments `DISabled` disables the rear USB port.

`IMAge` enables the rear USB port as an SIC device.

`USBTmc` enables the rear USB port as a USBTMC device.

Examples `USBDEVICE:CONFIGURE IMAGE` enables the rear USB port as an SIC device

`USBDEVICE:CONFIGURE ?` might return `USBDEVICE:CONFIGURE USBT` indicating a USBTMC device.

USBTMC? (Query Only)

Returns the USBTMC information used by the USB hosts to determine the instrument interfaces.

Group Miscellaneous

Syntax
```
USBTMC?
```

USBTMC:PRODUCTID:DECimal? (Query Only)

This query returns the product ID number as a decimal. The product ID numbers vary for each instrument family and model. USBTMC stands for USB Test & Measurement Class, a protocol that allows GPIB-like communication with USB devices.

For product ID numbers, see the following table. (See Table 1-2.)

Group Miscellaneous

Syntax
```
USBTMC:PRODUCTID:DECimal?
```

Related Commands USBTMC:VENDORID:HEXadecimal?

USBTMC:VENDORID:DECimal?

USBTMC:PRODUCTID:HEXadecimal?

USBTMC:SERIALnumber?

Examples `USBTMC:PRODUCTID:DECimal?` might return a product ID value of 1033.

USBTMC:PRODUCTID:HEXadecimal? (Query Only)

This query returns the product ID number as a hexadecimal value. The product ID numbers vary for each instrument family and model. USBTMC stands for USB Test & Measurement Class, a protocol that allows GPIB-like communication with USB devices.

For product ID numbers, see the following table. (See Table 1-2.)

Group Miscellaneous

Syntax `USBTMC:PRODUCTID:HEXadecimal?`

Related Commands USBTMC:VENDORID:HEXadecimal?

USBTMC:VENDORID:DECimal?

USBTMC:PRODUCTID:DECimal?

USBTMC:SERIALnumber?

Examples `USBTMC:PRODUCTID:HEXadecimal?` might return a product ID value of 0x0409.

USBTMC:SERIALnumber? (Query Only)

This query returns the serial number of the oscilloscope. USBTMC stands for USB Test & Measurement Class, a protocol that allows GPIB-like communication with USB devices.

Group Miscellaneous

Syntax `USBTMC:SERIALnumber?`

Related Commands USBTMC:VENDORID:HEXadecimal?

USBTMC:VENDORID:DECimal?

USBTMC:PRODUCTID:DECimal?

USBTMC:PRODUCTID:HEXadecimal?

Examples `USBTMC:SERIALnumber?` might return a serial number value of WAY004.

USBTMC:VENDORID:DECimal? (Query Only)

This query returns the vendor ID number as a decimal. The decimal vendor ID for Tektronix instruments is 1689. USBTMC stands for USB Test & Measurement Class, a protocol that allows GPIB-like communication with USB devices.

Group Miscellaneous

Syntax `USBTMC:VENDORID:DECimal?`

Related Commands USBTMC:VENDORID:HEXadecimal?

USBTMC:PRODUCTID:HEXadecimal?

USBTMC:PRODUCTID:DECimal?

USBTMC:SERIALnumber?

Examples `USBTMC:VENDORID:DECimal?` might return a vendor ID value of 1689.

USBTMC:VENDORID:HEXadecimal? (Query Only)

This query returns the vendor ID number as a hexadecimal value. The hexadecimal vendor ID for Tektronix instruments is 0x699. USBTMC stands for USB Test & Measurement Class, a protocol that allows GPIB-like communication with USB devices.

Group Miscellaneous

Syntax `USBTMC:VENDORID:HEXadecimal?`

Related Commands USBTMC:PRODUCTID:HEXadecimal?

USBTMC:VENDORID:DECimal?

USBTMC:PRODUCTID:DECimal?

USBTMC:SERIALnumber?

Examples `USBTMC:VENDORID:HEXadecimal?` might return a vendor ID value of 0x0699.

VERBose

This command specifies the Verbose state that controls the length of keywords on query responses. Keywords can be both headers and arguments.

NOTE. *This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk). This command does affect the verbose state of both the USBTMC and VXI-11 interfaces. Refer to the Introduction for information.*

Group Miscellaneous

Syntax `VERBose {OFF|ON|<NR1>}`

Related Commands HEADer|:HDR,

*LRN?,

SET?

Arguments `OFF` sets the Verbose state to false, which returns minimum-length keywords for applicable setting queries.

`ON` sets the Verbose state to true, which returns full-length keywords for applicable setting queries.

`<NR1>` a 0 returns minimum-length keywords for applicable setting queries; any other value returns full-length keywords.

Examples `VERBOSE ON` enables the Verbose state.

`VERBOSE ?` might return `:VERB 0` indicating that the Verbose state is disabled.

VIDPic:AUTOContrast

Sets (or queries) the video picture automatic contrast state.

Automatic contrast uses histogram equalization to optimize the use of brightness levels; each brightness level occupies approximately the same area in the image.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models

Group Video Picture

Syntax

```
VIDPic:AUTOContrast {0|1|OFF|ON}
VIDPic:AUTOContrast?
```

Arguments `1` or `ON` turns on the auto contrast state for the video picture feature.

`0` or `OFF` turns it off.

Examples `VIDP:AUTOC ON` turns on the auto contrast state for the video picture feature.

VIDPic:AUTOContrast:UPDATERate

Sets (or queries) the number of frames between automatic contrast updates.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models

Group Video Picture

Syntax

```
VIDPic:AUTOContrast:UPDATERate <NR1>
VIDPic:AUTOContrast:UPDATERate?
```

Arguments Integer that represents the number of frames between automatic contrast updates, in the range of 0 to 100. The default is 20. A value of 0 results in no automatic contrast updates.

Examples `VIDP:AUTOC 25` sets the number of frames between automatic contrast updates to 25.

VIDPic:BRIGHTNess

Sets (or queries) the video picture brightness level as an integer percentage.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax

```
VIDPic:BRIGHTNess <NR1>
VIDPic:BRIGHTNess?
```

Arguments Integer that represents the video picture brightness level as an integer percentage, in the range of 0 to 100.

Examples `VIDP:BRIGHTN 49` sets the video picture brightness level to 49 percent.

VIDPic:CONTRast

Sets (or queries) the video picture contrast level as an integer percentage.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax

```
VIDPic:CONTRast <NR1>
VIDPic:CONTRast?
```

Arguments Integer that represents the video picture contrast level as an integer percentage, in the range of 0 to 100.

Examples `VIDP:CONTR 49` sets the video picture contrast level to 49 percent.

VIDPic:DISplay

Sets (or queries) the video picture display state.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:DISplay {0|1|OFF|ON}
VIDPic:DISplay?
```

Arguments `1` or `ON` turns on the video picture display feature.

`0` or `OFF` turns it off.

Examples `VIDP:DIS ON` turns on the video picture display feature.

VIDPic:FRAMETYPe

Sets (or queries) the video picture frame type (ODD, EVEN or INTERLAced).

Interlaced frames combine successive odd and even frames by displaying alternating lines from each. The resulting image has twice as many rows, which changes its aspect ratio.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:FRAMETYPe {ODD|EVEN|INTERLAced}
VIDPic:FRAMETYPe?
```

Arguments `ODD` sets the frame type to Odd.

`EVEN` sets the frame type to Even.

`INTERLAced` sets the frame type to Interlaced.

Examples `VIDP:FRAMETYP EVEN` sets the video picture frame type to Even.

VIDPic:LOCation:HEIght

Sets (or queries) the video picture height, in rows.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:HEIght <NR1>
VIDPic:LOCation:HEIght?
```

Arguments Integer that represents the video picture height, in rows. This value must be >= 1. The range is from 1 - 400.

Examples `VIDP:LOC:HEI 253` sets the video picture height to 253 rows.

VIDPic:LOCation:OFFSet

Sets (or queries) the video picture line-to-line offset. This is the amount of additional delay time to add between lines of the video picture.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:OFFSet <NR3>
VIDPic:LOCation:OFFSet?
```

Arguments Floating point number that represents the video picture line-to-line offset in the range of -63.5 microseconds to 63.5 microseconds, with a resolution 1.0E-10 (1.0 nsec). The default value is 56.6E-9.

Examples `VIDP:LOC:OFFS -63.5` sets the video picture line-to-line offset to -63.5 microseconds.

VIDPic:LOCation:STARt:LINE

Sets (or queries) the video picture starting line number.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:STARt:LINE <NR1>
VIDPic:LOCation:STARt:LINE?
```

Arguments Integer that represents the video picture starting line number, in the range of 0 to 1023. The default is 17.

Examples `VIDPIC:STAR:LINE 348` sets the video picture starting line number to 348.

VIDPic:LOCation:STARt:PIXel

Sets (or queries) the video picture starting pixel in each line

The range for this value varies with the instrument screen geometry. Each video line is an analog signal of nominally 63.5us duration (10.9us blanking + 52.6us active video) that can be sampled from 1MS/s to 100MS/s, giving from 52.6 to 5260 video samples or "pixels" per output line. The start pixel is the starting sample in each line; it is limited to a single line at the current sample rate, i.e. ranges between -10.9 to 52.6 and -1090 to +5260.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:STARt:PIXel <NR1>
VIDPic:LOCation:STARt:PIXel?
```

Arguments Integer that represents the video picture starting pixel number. The default is 0.

Examples `VIDP:LOC:STAR:PIX 347` sets the video picture starting pixel number to 347.

VIDPic:LOCation:WIDth

Sets (or queries) the video picture width, in columns.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:WIDth <NR1>
VIDPic:LOCation:WIDth?
```

Arguments Integer that represents the video picture width, in columns. This value must be >= 1. The range for this value is 1 – 750. The default is 526.

Examples `VIDPIC:LOC:WID 348` sets the video picture width to 348 columns.

VIDPic:LOCation:X

Sets (or queries) the video picture X origin location, in columns.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:X <NR1>
VIDPic:LOCation:X?
```

Arguments Integer that represents the video picture X origin location, in columns, where column 0 is the left-most edge of the display. The range for this value is 0 -749. The default is 112 [= (750 - 526) / 2].

Examples `VIDP:LOC:X 367` sets the video picture X origin location to column 367.

VIDPic:LOCation:Y

Sets (or queries) the video picture Y origin location, in rows.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:LOCation:Y <NR1>
VIDPic:LOCation:Y?
```

Arguments Integer that represents the video picture Y origin location, in rows, where row 0 is the top most edge of the display. The range for this value is 0 - 399. The default is 73. [= (400 - 254) / 2].

Examples `VIDP:LOC:Y 367` sets the video picture Y origin location to row 367.

VIDPic:SOUrce

Sets (or queries) the channel to use for the video picture source waveform.

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax
```
VIDPic:SOUrce {CH1|CH2|CH3|CH4}
VIDPic:SOUrce?
```

Arguments `CH1|CH2|CH3|CH4` specify which channel to use for the video picture source waveform.

Examples `VIDP:SOU CH3` specifies to use Channel 3 as the source waveform.

VIDPic:STANdard

Sets (or queries) which video picture standard to use (either NTSC or PAL).

Conditions MDO3000 series. Requires the DPO4VID application module for use with MSO/DPO4000B, MDO4000 and MDO4000B models.

Group Video Picture

Syntax

```
VIDPic:STANdard {NTSC|PAL}
VIDPic:STANdard?
```

Arguments

`NTSC` sets the video picture standard to NTSC (National Television Systems Committee).

`PAL` sets the video picture standard to PAL (Phase Alternation Line).

Examples

`VIDP:STAN PAL` sets the video picture standard to PAL.

*WAI (No Query Form)

Prevents the oscilloscope from executing further commands or queries until all pending commands that generate an OPC message are complete. This command allows you to synchronize the operation of the oscilloscope with your application program.(See page 3-7, *Synchronization Methods*.)

The `*WAI` command will stop execution until certain oscilloscope operations are complete. (See Table 3-3 on page 3-8.)

Group

Status and Error

Syntax

```
*WAI
```

Related Commands

BUSY?,

*OPT?

Examples

`*WAI` prevents the oscilloscope from executing any further commands or queries until all pending commands that generate an OPC message are complete.

WAVFrm? (Query Only)

This query returns the waveform preamble and the waveform data for the source waveform specified by the `DATa:SOUrce` command. This command is equivalent to sending both `WFMOutpre?` and `CURVe?`, with the additional provision that the response to `WAVFrm?` is guaranteed to provide a synchronized preamble and curve. The source waveform, as specified by `DATA:SOURCE`, must be active or the query will not return any data and will generate an error event.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WAVFrm?`

Related Commands CURVe,

DATa:SOUrce,

WFMOutpre?

Examples `WAVFRM?` might return the waveform data as: `:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID “Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode”;NR_PT 20;PT_FMT Y;XUNIT “s”;XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT “V”;YMULT 4.0000E-3;YOFF 0.0000;YZERO 0.0000;:CURVe 2,1,4,2,4,3,0,3,3,3,3,3,3,4,3,5,6,6,7,3`

For binary encodings, `WAVFRM?` might return the waveform data as: `:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR MSB;WFID “Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode”;NR_PT 10000;PT_FMT Y;XUNIT “s”;XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT “V”;YMULT 4.0000E-3;YOFF 0.0000;YZERO 0.0000;:CURVe #510000<10,000 binary data bytes>`

WFMInpre? (Query Only)

Returns the waveform formatting and scaling specifications to be applied to the next incoming `CURVe` command data.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax `WFMInpre?`

Related Commands WFMOutpre?

Examples `WFMINPRE?` might return the waveform formatting as `:WFMINPRE:BIT_NR 8;BN_FMT RI;BYT_NR 1; BYT_OR MSB;ENCDG BIN;NR_PT 500;PT_FMT Y; PT_OFF 0;XINCR 2.0000E-6;XZERO 1.7536E-6; XUNIT "s";YMULT 1.0000E-3;YOFF 0.0000; YZERO 0.0000;YUNIT "V"`

WFMInpre:BIT_Nr

This command specifies the number of bits per data point in the waveform data to be sent to the oscilloscope using the CURVe command. Changing this value also changes the value of WFMInpre:BYT_Nr.

(See page 2-93, *Waveform Transfer Command Group*.)

NOTE. *The WFMInpre:BYT_Nr and WFMInpre:BIT_Nr settings are directly related; setting one causes the other to be set accordingly. For example, WFMInpre:BYT_Nr 2 causes WFMInpre_BIT_Nr to be set to 16 (2 * 8 bits/byte). Similarly, setting WFMInpre:BIT_Nr to 16 causes WFMInpre:BYT_Nr to be set to 2.*

Group Waveform Transfer

Syntax

```
WFMInpre:BIT_Nr <NR1>
WFMInpre:BIT_Nr?
```

Related Commands WFMInpre:BYT_Nr

Arguments <NR1> number of bits per data point can be 8 , 16, 32 or 64.

Examples WFMINPRE:BIT_NR 16 sets the number of bits per waveform point to 16, for incoming data.

WFMINPRE:BIT_NR? might return :WFMINPRE:BIT_NR 8 indicating that incoming waveform data uses 8 bits per waveform point.

WFMInpre:BN_Fmt

This command specifies the format of the data for outgoing waveforms when WFMInpre:ENCdg is set to BINary. The format can either be RI (signed integer), RP (positive integer) or FP (floating point).

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:BN_Fmt {RI|RP|FP}
WFMInpre:BN_Fmt?
```

Related Commands WFMOutpre:BN_Fmt

WFMInpre:ENCdg

Arguments `RI` specifies signed integer data point representation.

`RP` specifies positive integer data point representation.

`FP` specifies floating point data representation.

Examples `WFMINPRE:BN_FMT RP` specifies positive integer data point representation.

`WFMINPRE:BN_FMT?` might return `:WFMINPRE:BN_FMT RI` indicating that the incoming data is currently interpreted as signed integers.

WFMInpre:BYT_Nr

This command specifies the number of bytes per data point in the waveform data to be sent to the oscilloscope using the `CURVe` command. Changing this value also changes the value of WFMInpre:BIT_Nr.

(See page 2-93, *Waveform Transfer Command Group*.)

NOTE. *The `WFMInpre:BYT_Nr` and `WFMInpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMInpre:BYT_Nr 2` causes `WFMInpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMInpre:BIT_Nr` to 16 causes `WFMInpre:BYT_Nr` to be set to 2.*

Group Waveform Transfer

Syntax
```
WFMInpre:BYT_Nr <NR1>
WFMInpre:BYT_Nr?
```

Related Commands WFMInpre:BIT_Nr

Arguments `<NR1>` is the number of bytes per data point. The number of bytes can be 1 or 2 for Analog, Math or the digital channels D0 – D15. It can be 4 or 8 for DIGital collection data. It must be 4 for frequency domain trace data.

Examples `WFMINPRE:BYT_NR 1` sets the number of bytes per incoming waveform data point to 1, which is the default setting.

WFMINPRE:BYT_NR? might return :WFMINPRE:BYT_NR 2 indicating that there are 2 bytes per incoming waveform data point.

WFMInpre:BYT_Or

This command specifies which byte of incoming binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMInpre:ENCdg is set to BINary and WFMInpre:BYT_Nr is 2.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:BYT_Or {LSB|MSB}
WFMInpre:BYT_Or?
```

Related Commands WFMInpre:ENCdg,

WFMInpre:BYT_Nr,

WFMOutpre:BYT_Or

Arguments LSB specifies that the least significant byte will be expected first.

MSB specifies that the most significant byte will be expected first.

Examples WFMINPRE:BYT_OR MSB sets the most significant incoming byte of incoming waveform data to be expected first.

WFMINPRE:BYT_OR? might return :WFMINPRE:BYT_OR LSB indicating that the least significant incoming CURVe data byte will be expected first.

WFMInpre:CENTERFREQuency

This command specifies the center frequency of the incoming RF trace (waveform), in hertz. The center frequency is a precise frequency at the center of the frequency domain display. In many applications, it is a carrier frequency.

Conditions MDO models only.

Group Waveform Transfer

Syntax

```
WFMInpre:CENTERFREQuency <NR3>
WFMInpre:CENTERFREQuency?
```

Arguments

<NR3> is a floating point number.

Examples

WFMInpre:CENTERFREQuency 3.0E+09 sets the center frequency to 3 GHz.

WFMInpre:CENTERFREQuency? might return 3.0E+09, indicating that the center frequency has been set to 3 GHz.

WFMInpre:DOMain

This command specifies whether the information being sent to a reference location should be treated as integer (time domain) information, or floating point (frequency domain) information, for the purposes of storing the data internally. The default is TIMe. This parameter should be set before using the CURVe command to transfer a waveform from a PC to an internal reference location.

Conditions

The FREQuency argument is only supported on MDO4000/B and MDO3000 series models. Attempts to set the domain to frequency on non-MDO models are ignored.

Group

Waveform Transfer

Syntax

```
WFMInpre:DOMain {TIMe|FREQuency}
WFMInpre:DOMain?
```

Related Commands

WFMInpre:WFMTYPe

Arguments

TIMe specifies to treat the information to be transferred as integer values.

FREQuency specifies to treat the information to be transferred as floating point values.

Examples

WFMInpre:DOMain FREQuency specifies to treat the information to be transferred from a PC to a reference location as floating point values.

WFMInpre:DOMain? might return TIME, indicating that the information is being treated as integer values (time domain).

WFMInpre:ENCdg

This command specifies the type of encoding of the incoming waveform data to be sent to the oscilloscope using the CURVe command. Supported types are BINary and ASCii.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:ENCdg {ASCii|BINary}
WFMInpre:ENCdg?
```

Related Commands WFMOutpre:ENCdg

Arguments

ASCii specifies that the incoming data is in ASCII format.

BINary specifies that the incoming data is in a binary format whose further interpretation requires knowledge of BYT_NR, BIT_NR, BN_FMT, and BYT_OR.

Examples

WFMINPRE:ENCDG ASC sets the format of incoming waveform data to ASCII format.

WFMINPRE:ENCDG ? might return :WFMINPRE:ENCDG BIN indicating that the incoming waveform data is in binary format.

WFMInpre:NR_Pt

This command specifies the number of data points that are in the incoming waveform record to be sent to the oscilloscope using the CURVe command.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:NR_Pt <NR1>
WFMInpre:NR_Pt?
```

Related Commands CURVe,

DATa,

DATa:STARt,

DATa:STOP,

SAVe:WAVEform,

SAVe:WAVEform:FILEFormat,

WFMOutpre:NR_Pt?

Arguments <NR1> is the number of data points if WFMInpre:PT_Fmt is set to Y. It is the number of min-max pairs if WFMInpre:PT_Fmt is set to ENV.

Examples WFMINPRE:NR_PT 10000 specifies that 10000 data points will be expected.

WFMINPRE:NR_PT ? might return :WFMINPRE:NR_PT 10000 indicating that there are 10000 data points in the expected incoming waveform record.

WFMInpre:PT_Fmt

This command specifies the acquisition format of the data points to be sent to the oscilloscope using the CURVE command. This can be Y for YT format, or ENV for envelope mode (min/max pairs). For YT format, each data value represents a single waveform data point. For envelope format, each data point represents a min/max pair, where the minimum value precedes the maximum value.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:PT_Fmt {ENV|Y}
WFMInpre:PT_Fmt?
```

Related Commands WFMOutpre:PT_Fmt?

Arguments ENV specifies that the waveform is to be transmitted in envelope mode as minimum and maximum point pairs. Only Y values are explicitly transmitted. Absolute coordinates are given by:

Xn = XZEro + XINcr (n - PT_Off)

Ynmax = YZEro + YMUlt (ynmax - YOFf)

Ynmin = YZEro + YMUlt (ynmin - YOFf)

Y specifies a normal waveform where one ASCII or binary data point is transmitted for each point in the waveform record. Only Y values are explicitly transmitted. Absolute coordinates are given by:

Xn = XZEro + XINcr (n - PT_Off)

Yn = YZEro + YMUlt (yn - YOFf)

Examples `WFMINPRE:PT_FMT ENV` sets the incoming waveform data point format to enveloped.

`WFMINPRE:PT_FMT?` might return `:WFMINPRE:PT_FMT ENV` indicating that the waveform is transmitted as minimum and maximum point pairs.

WFMInpre:PT_Off

The set form of this command is ignored. The query form always returns a 0. (This command is listed for compatibility with other Tektronix oscilloscopes.)

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax
```
WFMInpre:PT_Off <NR1>
WFMInpre:PT_Off?
```

Arguments Arguments are ignored.

WFMInpre:REFLevel

This command specifies the Reference Level of the incoming waveform. This command applies only to frequency domain waveforms. The Reference Level is adjustable from 10 pico Watts (–140dBm) to 1 Watt (+30dBm).

Conditions MDO models only.

Group Waveform Transfer

Syntax
```
WFMInpre:REFLevel <NR3>
WFMInpre:REFLevel?
```

Arguments `<NR3>` is a floating point number that specifies the Reference Level of the incoming waveform, in watts.

Examples

`WFMInpre:REFLevel 1E-3` sets the reference level to 1 mW.

`WFMInpre:REFLevel?` might return 1.0000E-3, indicating a Reference Level of 1 mW.

WFMInpre:SPAN

This command specifies the frequency span of the incoming RF trace. The span is the range of frequencies that can be observed around the center frequency.

Conditions

MDO models only.

Group

Waveform Transfer

Syntax

```
WFMInpre:SPAN <NR3>
WFMInpre:SPAN?
```

Arguments

`<NR3>` is a floating point number that can range from 1 kHz to 6 GHz on MDO4000/B series models. On MDO3000 models, the maximum span is 3 GHz if the MDO3SA option is installed. Without that option, the maximum is identical to the analog bandwidth - e.g., 500 MHz on an MDO3054 model.

Examples

`WFMinpre:SPAN 500.0E+6` sets the span to 500 MHz.

`WFMinpre:SPAN?` might return 500.0E+6, indicating that the span has been set to 500 MHz.

WFMInpre:WFMTYPe

This command specifies the type of waveform that is being transferred to the oscilloscope for storage in one of the REF1 - REF4 memory locations. The waveform type possibilities are the ANALOG, the RF time domain waveforms (RF_TD), or the RF frequency domain waveforms (RF_FD). The default is ANALOG. This parameter should be set before using the `CURVe` command to transfer a waveform from a PC to an internal reference location.

The type of waveform that is being transferred in turn determines which window will display it on the instrument screen: the time domain window or frequency domain window. Both the analog and RF-TD arguments specify the time domain window; the RF_FD argument specifies the frequency domain window.

NOTE. *This command is not applicable for digital waveforms.*

Conditions The RF_FD type waveform is only supported on MDO4000/B series models.

The RF_TD type waveform is supported on both MDO4000/B and MDO3000 models.

Group Waveform Transfer

Syntax
```
WFMInpre:WFMTYPe {ANALOG|RF_TD|RF_FD}
WFMInpre:WFMTYPe?
```

Related Commands WFMInpre:DOMain

Arguments ANALOG — this type includes Channels 1–4 and the Math waveform, and specifies to display it in the time domain window.

RF_TD — this type includes the three RF time domain traces (RF Amplitude vs. Time, RF Frequency vs. Time, and RF Phase vs. Time) and specifies to display it in the time domain window.

RF_FD — this type includes the four RF frequency domain traces (RF Normal, RF Average, RF Max Hold, and RF Min Hold) and specifies to display it in the frequency domain window.

Examples `WFMInpre:WFMTYPe RF_FD` specifies the type of the incoming waveform as a frequency domain trace (to be displayed on the frequency domain window).

`WFMInpre:WFMTYPe?` might return ANALOG, indicating that the incoming waveform type is either Channel 1–4 or Math (to be displayed on the time domain window).

WFMInpre:XINcr

This command specifies the horizontal interval between incoming waveform points sent to the oscilloscope using the CURVE command. The units are time, in seconds, or frequency, in hertz, and can be specified or queried using the `WFMInpre:XUNit` command.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax
```
WFMInpre:XINcr <NR3>
WFMInpre:XINcr?
```

Related Commands WFMInpre:XUNit,

WFMOutpre:XINcr?

Arguments <NR3> is a floating point number that specifies the horizontal interval representation.

Examples WFMINPRE:XINCR 3E-3 sets the interval between incoming waveform points to 3 ms.

WFMINPRE:XINCR ? might return :WFMINPRE:XINCR 1.0000E-3 indicating that if WFMInpre:XUNit is set to "s", there is a 1 ms interval between incoming waveform points.

WFMInpre:XUNit

This command specifies the horizontal units of the x-axis of the data points being sent to the oscilloscope using the CURVE command. This value can be in “s” for seconds, or “Hz”.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax
```
WFMInpre:XUNit <QString>
WFMInpre:XUNit?
```

Related Commands WFMOutpre:XUNit?

Arguments <QString> contains the characters that represent the horizontal units for the incoming waveform.

Examples WFMINPRE:XUNIT "HZ" specifies that the horizontal units for the incoming waveform are hertz.

WFMINPRE:XUNIT? might return :WFMINPRE:XUNIT "s" indicating that the horizontal units for the incoming waveform are seconds.

WFMInpre:XZEro

This command specifies the position value of the first data point in the incoming waveform record being sent to the oscilloscope using the CURVE command.

The units are determined or queried using the WFMInpre:XUNit command and are typically time, in seconds, or frequency, in hertz. This time or frequency is relative to the time or frequency of the trigger, which is always 0. Thus, the XZEro value can be negative.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:XZEro <NR3>
WFMInpre:XZEro?
```

Related Commands WFMInpre:XINcr,

WFMInpre:XUNit,

WFMOutpre:XZEro?

Arguments <NR3> is the floating point value of the position, in XUNits, of the first sample in the incoming waveform. If XUNits is "s", <NR3> is the time of the first sample in the incoming waveform.

Examples WFMINPRE:XZERO 5.7E-6, which indicates the trigger occurred 5.7 µs before the first sample in the waveform.

WFMINPRE:XZERO? might return :WFMINPRE:XZEro -7.5000E-6 indicating that the trigger occurs 7.5 µs after the first sample in the waveform.

WFMInpre:YMUlt

This command specifies the vertical scale multiplying factor to be used to convert the incoming data point values being sent to the oscilloscope, from digitizing levels into the units specified by the WFMInpre:YUNit command. For one byte waveform data, there are 256 digitizing levels. For two byte waveform data there are 65,536 digitizing levels.

The WFMInpre:YMUlt, WFMInpre:YOFf, and WFMInpre:YZEro values are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing level; curve_in_dl is a data point value in the CURVe data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

(See page 2-93, *Waveform Transfer Command Group*.)

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

Group Waveform Transfer

Syntax

```
WFMInpre:YMUlt <NR3>
WFMInpre:YMUlt?
```

Related Commands DATa:DESTination,

WFMInpre:BYT_Nr,

WFMInpre:YUNit

Arguments <NR3> is a floating point number that specifies the vertical scale factor per digitizing level of the incoming waveform points.

Examples WFMINPRE:YMULT? might return :WFMINPRE:YMULT 40.0000E-3, which (if YUNit is "V") indicates that the vertical scale is 40 mV/digitizing level (1V/div for 8-bit data).

WFMINPRE:YMULT 20E-3 specifies that (if WFMInpre:YUNit is "V" and WFMInpre:BYT_Nr is 1), the vertical scale is 20 mV/digitizing level (500 mV/div).

WFMInpre:YOFf

This command specifies the vertical position of the destination reference waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. Variations in this number are analogous to changing the vertical position of the waveform.

The WFMInpre:YMUlt, WFMInpre:YOFf, and WFMInpre:YZEro commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing levels, and curve_in_dl is a data point value in the CURVe data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

(See page 2-93, Waveform Transfer Command Group.)

Group Waveform Transfer

Syntax

```
WFMInpre:YOFf <NR3>
WFMInpre:YOFf?
```

Related Commands WFMInpre:BYT_Nr

WFMInpre:YMUlt

WFMOutpre:YOFf?

Arguments <NR3> is a floating point number that specifies the vertical offset in digitizing levels.

Examples WFMINPRE:YOFF 50 specifies that the zero reference point for the incoming waveform is 50 digitizing levels (2 divisions, for 8-bit data; 0.0078125 division for 16-bit data) above the center of the graticule.

WFMINPRE:YOFF? might return :WFMINPRE:YOFF 25 indicating the vertical position of the incoming waveform is 25 digitizing levels.

WFMInpre:YUNit

This command specifies the vertical units of data points in the incoming waveform record sent to the oscilloscope using the CURVE command. This can be any of several string values, depending upon the vertical units of the waveform being sent.

Supported units are: %, /Hz, A, A/A, A/V, A/W, A/dB, A/s, AA, AW, AdB, As, B, Hz, IRE, S/s, V, V/A, V/V, V/W, V/dB, V/s, VV, VW, VdB, volts, Vs, W, W/A, W/V, W/W, W/dB, W/s, WA, WV, WW, WdB, Ws, dB, dB/A, dB/V, dB/W, dB/dB, dBA, dBV, dBW, dBdB, day, degrees, div, hr, min, ohms, percent, s

NOTE. *(See page 2-93, Waveform Transfer Command Group.)*

Group Waveform Transfer

Syntax

```
WFMInpre:YUNit <QString>
WFMInpre:YUNit?
```

Related Commands

WFMOutpre:YUNit?

Arguments

<QString> contains the characters that represent the vertical units for the incoming waveform.

Examples

WFMINPRE:YUNIT? might return :WFMINPRE:YUNIT "V" indicating the vertical units for the incoming waveform are volts.

WFMINPRE:YUNIT "A" specifies that the vertical units for the incoming waveform are Amperes.

WFMInpre:YZEro

This command specifies the vertical offset of the destination reference waveform in units specified by the WFMInpre:YUNit command. Variations in this number are analogous to changing the vertical offset of the waveform.

The WFMInpre:YMUlt, WFMInpre:YOFf, and WFMInpre:YZEro commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing levels; curve_in_dl is a data point value in the CURVe data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

(See page 2-93, Waveform Transfer Command Group.)

Group

Waveform Transfer

Syntax

```
WFMInpre:YZEro <NR3>
WFMInpre:YZEro?
```

Related Commands

WFMInpre:YUNit

WFMInpre:YZEro

Arguments <NR3> is a floating point number that specifies the offset in in units specified by the WFMInpre:YUNit command (YUNits).

Examples WFMINPRE:YZERO 1.5E+0 specifies that the zero reference point for the incoming waveform is 1.5 V below the center of the data range (given that WFMInpre:YUNit is set to V).

WFMINPRE:YZERO? might return :WFMINPRE:YZEro 7.5000E-6 indicating that the zero reference for the incoming waveform is 7.5 µV below the center of the data range (given that WFMInpre:YUNit is set to V).

WFMOutpre? (Query Only)

This query returns the information needed to interpret the waveform data points returned by the CURVe? query. It returns the waveform transmission and formatting parameters for the waveform specified by the DATa:SOUrce command. If the waveform specified by the DATa:SOUrce command is not displayed, the oscilloscope returns only the waveform transmission parameters (BYT_Nr, BIT_Nr, ENCdg, BN_Fmt, BYT_Or) and sets an error event indicating that the source waveform is not turned on.

The Waveform Transfer command group text contains more comprehensive information. (See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *For command sequence examples, see Appendix D. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

Example 7: RF Frequency Domain Waveform

Group Waveform Transfer

Syntax WFMOutpre?

Examples

WFMOUTPRE? ? might return the waveform formatting data as:
:WFMOUTPRE:BYT_NR 2;BIT_NR 16;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID “Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode”;NR_PT 10000;PT_FMT Y;XUNIT “s”;XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT “V”;YMULT 15.6250E-6;YOFF :”6.4000E+3;YZERO 0.0000

WFMOutpre:BIT_Nr

This command specifies the number of bits per data point in the outgoing waveform being transferred using the CURVe? query. Changing the value of WFMOutpre:BIT_Nr also changes the values of WFMOutpre:BYT_Nr and DATa:WIDth. The waveform is specified by the DATa:SOUrce command.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *The WFMOutpre:BYT_Nr and WFMOutpre:BIT_Nr settings are directly related; setting one causes the other to be set accordingly. For example, WFMOutpre:BYT_Nr 2 causes WFMOutpre_BIT_Nr to be set to 16 (2 * 8 bits/byte). Similarly, setting WFMOutpre:BIT_Nr to 16 causes WFMOutpre:BYT_Nr to be set to 2.*

Group

Waveform Transfer

Syntax

```
WFMOutpre:BIT_Nr <NR1>
WFMOutpre:BIT_Nr?
```

Related Commands

DATa:SOUrce,

DATa:WIDth,

WFMOutpre:BYT_Nr

Arguments

<NR1> is the number of bits per data point and can be 8, 16, 32 or 64.

Examples

WFMOUTPRE:BIT_NR 16 sets the number of bits per waveform point to 16 for outgoing waveforms.

WFMOUTPRE:BIT_NR? might return :WFMOUTPRE:BIT_NR 8 indicating that outgoing waveforms use 8 bits per waveform point.

WFMOutpre:BN_Fmt

This command specifies the format of the binary data for outgoing waveforms when `WFMOutpre:ENCdg` is set to `BINary`. The format can be RI (signed integer) or RP (positive integer) for analog channels, and FP for RF frequency domain traces. Changing the value of WFMOutpre:BN_Fmt also changes the value of DATa:ENCdg. The waveform is specified by the DATa:SOUrce command.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax

```
WFMOutpre:BN_Fmt {RI|RP|FP}
WFMOutpre:BN_Fmt?
```

Related Commands DATa:ENCdg,

DATa:SOUrce

Arguments `RI` specifies signed integer data point representation.

`RP` specifies positive integer data point representation.

`FP` specifies floating point data representation

Examples `WFMOUTPRE:BN_FMT RP` specifies that outgoing waveform data will be in positive integer format.

`WFMOUTPRE:BN_FMT?` might return `:WFMOUTPRE:BN_FMT RI` indicating that the outgoing waveform data is currently in signed integer format.

WFMOutpre:BYT_Nr

This command specifies the data width for the outgoing waveform specified by the DATa:SOUrce command. (This command is synonymous with `:DATa:WIDTH`.) Note that changing WFMOutpre:BYT_Nr also changes WFMOutpre:BIT_Nr and DATa:WIDth.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *The* `WFMOutpre:BYT_Nr` *and* `WFMOutpre:BIT_Nr` *settings are directly related; setting one causes the other to be set accordingly. For example,* `WFMOutpre:BYT_Nr 2` *causes* `WFMOutpre_BIT_Nr` *to be set to 16 (2 * 8 bits/byte). Similarly, setting* `WFMOutpre:BIT_Nr` *to 16 causes* `WFMOutpre:BYT_Nr` *to be set to 2.*

Group Waveform Transfer

Syntax

```
WFMOutpre:BYT_Nr <NR1>
WFMOutpre:BYT_Nr?
```

Related Commands DATa:SOUrce,

DATa:WIDth,

WFMOutpre:BIT_Nr

Arguments `<NR1>` is the number of bytes per data point. The number of bytes can be 1 or 2 for Analog, Math or the digital channels D0 – D15. It can be 4 or 8 for DIGital collection data. It must be 4 for frequency domain trace data.

Examples `WFMOUTPRE:BYT_NR 1` sets the number of bytes per outgoing waveform data point to 1, which is the default setting.

`WFMOUTPRE:BYT_NR?` might return `:WFMOUTPRE:BYT_NR 2` indicating that there are 2 bytes per outgoing waveform data point.

WFMOutpre:BYT_Or

This command specifies which byte of outgoing binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMOutpre:ENCdg is set to BINary and WFMOutpre:BYT_Nr is 2. Changing WFMOutpre:BYT_Or also changes DATa:ENCdg (if DATa:ENCdg is not ASCIi).

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax

```
WFMOutpre:BYT_Or {LSB|MSB}
WFMOutpre:BYT_Or?
```

Related Commands

WFMOutpre:ENCdg,

WFMOutpre:BYT_Nr

Arguments

`LSB` specifies that the least significant byte will be transmitted first.

`MSB` specifies that the most significant byte will be transmitted first.

Examples

`WFMOUTPRE:BYT_OR MSB` sets the most significant outgoing byte of waveform data to be transmitted first.

`WFMOUTPRE:BYT_OR?` might return `:WFMOUTPRE:BYT_OR LSB` indicating that the least significant data byte will be transmitted first.

WFMOutpre:CENTERFREQuency? (Query Only)

This query returns the center frequency of the incoming waveform. For non-MDO models, this query always returns 0.

The center frequency is a precise frequency at the center of the display of the frequency domain graticule. In many applications, it is a carrier frequency.

Conditions

MDO models only.

Group

Waveform Transfer

Syntax

```
WFMOutpre:CENTERFREQuency?
```

Examples

`WFMOutpre:CENTERFREQuency?` might return 1.0E+9, indicating a center frequency of 1 GHz.

WFMOutpre:DOMain? (Query Only)

This query returns the domain of the outgoing waveform — either TIMe or FREQuency. If the domain is TIMe, it indicates that the data is to be treated as integer information. If the domain is FREQuency, it indicates that the data is to be treated as floating point information.

Conditions MDO models only.

Group Waveform Transfer

Syntax `WFMOutpre:DOMain?`

Examples `WFMOutpre:DOMain` might return FREQuency, indicating that the outgoing waveform is one of the four RF frequency domain traces (RF_NORMal, RF_AVErage, RF_MINHOLD, RF_MAXHOLD).

WFMOutpre:ENCdg

This command specifies the type of encoding (BINary or ASCii) of the outgoing waveform data queried using the `CURVe?` query. (This can also be set using the DATa:ENCdg command, which provides the ability to set `WFMOutpre:ENCdg`, `WFMOutpre:BN_Fmt`, and `WFMOutpre:BYT_Or` using a single command.)

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax
```
WFMOutpre:ENCdg {ASCii|BINary}
WFMOutpre:ENCdg?
```

Related Commands DATa:ENCdg,

WFMOutpre:BYT_Nr,

WFMOutpre:BYT_Or,

WFMOutpre:BIT_Nr,

WFMOutpre:BN_Fmt

Arguments `ASCii` specifies that the outgoing data is to be in ASCII format. Waveforms will be sent as `<NR1>` numbers.

`BINary` specifies that outgoing data is to be in a binary format whose further specification is determined by WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr, WFMOutpre:BN_Fmt and WFMOutpre:BYT_Or.

Examples WFMOUTPRE:ENCDG? might return :WFMOUTPRE:ENCDG BIN indicating that outgoing waveform data will be sent in binary format.

WFMOUTPRE:ENCDG ASC specifies that the outgoing waveform data will be sent in ASCII format.

WFMOutpre:NR_Pt? (Query Only)

This query returns the number of data points in the waveform record that will be transmitted in response to a CURVe? query. This value is the adjusted range specified by DATA:START and DATA:STOP commands. Note that the oscilloscope automatically adjusts the DATA:START and DATA:STOP values when the DATA:STOP value is less than the DATA:START value, and when the DATA:START and/or DATA:STOP value is greater than the record length of the source waveform. The adjusted DATA:START and DATA:STOP values determine WFMOUTPRE:NR_PT. (You can use DATa:STARt and DATa:STOP to transfer partial waveforms.) If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-93, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax WFMOutpre:NR_Pt?

Related Commands CURVe,

DATa,

DATa:STARt,

DATa:STOP,

SAVe:WAVEform,

SAVe:WAVEform:FILEFormat,

WFMInpre:NR_Pt

Examples WFMOUTPRE:NR_PT? might return :WFMOUTPRE:NR_PT 10000 indicating that there are 10000 data points to be sent.

WFMOutpre:PT_Fmt? (Query Only)

This query returns the point format of the data points in the outgoing waveform record transferred using the CURVe? query. The returned values can be Y, which

indicates normal waveform points for YT format, or ENV, which indicates envelope mode format in which the data is returned as a series of min/max pairs. The minimum value precedes the maximum.

The outgoing waveform is specified by the DATa:SOUrce command. The query command will time out and an error will be generated if the waveform specified by DATa:SOUrce is not turned on.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_Fmt?`

Related Commands CURVe, DATa:SOUrce

Examples `WFMOUTPRE:PT_FMT?` might return `:WFMOutpre:PT_Fmt ENV` indicating that the waveform data is a series of min-max pairs.

WFMOutpre:PT_Off? (Query Only)

This query always returns 0 if the waveform specified by `DATA:SOUrce` is on or displayed. If the waveform is not displayed, the query form generates an error. (It is provided for compatibility with other Tektronix oscilloscopes).

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_Off?`

Related Commands DATa:SOUrce

Arguments Arguments are ignored.

Examples `WFMOUTPRE:PT_OFF?` might return `WFMOUTPRE:PT_OFF 0`.

WFMOutpre:PT_ORder? (Query Only)

This query returns the point ordering, which is always linear (included for compatibility with other Tektronix oscilloscopes).

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_ORder?`

Related Commands DATa:SOUrce

Examples `WFMOUTPRE:PT_ORDER?` returns `:WFMOUTPRE:PT_ORDER LINEAR`.

WFMOutpre:REFLEvel? (Query Only)

This query returns the Reference Level of the outgoing waveform. It applies only to the four frequency domain waveforms (RF Normal, RF Average, RF Max Hold, and RF Min Hold). The units are in watts.

Conditions MDO models only.

Group Waveform Transfer

Syntax `WFMOutpre:REFLEvel?`

Examples `WFMOutpre:REFLevel?` might return 1.0000E-3, indicating a Reference Level of 1 mW.

WFMOutpre:SPAN? (Query Only)

This query returns the frequency span of the outgoing waveform. For non-MDO models, this query always returns 0.0.

The span is the range of frequencies you can observe around the center frequency.

Conditions MDO models only.

Group Waveform Transfer

Syntax `WFMOutpre:SPAN?`

Examples `RF:SPAN?` might return 10.0000E+6, indicating the span is 10MHz.

WFMOutpre:WFId? (Query Only)

This query returns a string that describes several aspects of the acquisition parameters for the source waveform, including Source, Coupling, Vertical Scale, Horizontal Scale, Record Length and Acquisition Mode. If the waveform specified by DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:WFId?`

Related Commands DATa:SOUrce

Returns `<QString>` comprises the following comma-separated fields documented in the tables below:

Table 2-57: Waveform Suffixes

Field	Description	Examples
Source	The source identification string as it appears in the front-panel scale factor readouts.	“CH1–4” “Math1 “Ref1–4"
Coupling	A string describing the vertical coupling of the waveform (the Source1 waveform in the case of Dual Waveform Math).	“AC coupling” “DC couplng” “GND coupling”
Vert Scale	A string containing the vertical scale factor of the unzoomed waveform. The numeric portion will always be four digits. The examples cover all supported units.	“100.0 mV/div” “20.00 dB/div” “45.00 deg/div” “785.4 mrad/div” “500.0 µVs/div” “10.00 kV/s/div” “200.0 mV/div” “50.00 unk/div”

Table 2-57: Waveform Suffixes (cont.)

Field	Description	Examples
Horiz Scale	A string containing the horizontal scale factor of the unzoomed waveform. The numeric portion will always be four digits. The examples cover all supported units.	“100 ms/div” “10.00 kHz/div”
Record Length	A string containing the number of waveform points available in the entire record. The numeric portion is given as an integer.	“1000 points”
Acquisition Mode	A string describing the mode used to acquire the waveform.	“Sample mode” “Pk Detect mode” “Envelope mode” “Average mode”
Center Frequency	A string containing the center frequency value of the waveform.	“2.400GHz”
Span	A string containing the frequency span value of the waveform.	“20.00MHz”
Reference Level	A string containing the reference level value of the waveform.	“1.000mW”

Examples

`WFMOUTPRE:WFID?` might return `:WFMOUTPRE:WFID "Ch1, DC coupling,100.0mvolts/div,500.0µs/div, 1000 points, Sample mode"`

WFMOutpre:WFMTYPe? (Query Only)

This query returns the type of the outgoing waveform. RF_FD indicates an RF frequency domain waveform; RF_TD indicates an RF time domain waveform; ANALOG indicates Channel 1–4 or the Math waveform. The default is analog. For non-MDO models, this query always returns ANALOG.

The type of waveform that is being transferred in turn determines which window will display it on the instrument screen: (the time domain window or frequency domain window). Both the analog and RF-TD arguments specify the time domain window; the RF_RD argument specifies the frequency domain window.

Conditions

MDO models only. No RF time domain waveforms are available for the MDO3000 series.

Group

Waveform Transfer

Syntax

`WFMOutpre:WFMTYPe?`

Returns ANALOG, RF_FD or RF_TD

Examples WFMOutpre:WFMTYPe? might return RF_FD, which indicates that the outgoing waveform is an RF frequency domain waveform (RF_AVErage, RF_MAXHold, RF_MINHold, or RF_NORMal).

WFMOutpre:XINcr? (Query Only)

This query returns the horizontal point spacing in units of time (seconds), or frequency (hertz) between data points in the waveform record transferred using the :CURVe? query. This value corresponds to the sampling interval.

If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax WFMOutpre:XINcr?

Related Commands DATa:SOUrce,

WFMOutpre:XUNit?

Examples WFMOUTPRE:XINCR? might return :WFMOUTPRE:XINCR 10.0000E-6 indicating that the horizontal sampling interval is 10 µs/point.

WFMOutpre:XUNit? (Query Only)

This query indicates the horizontal units of the x-axis of the waveform record transferred using the CURVe? query. Typically, this value is "s" when the waveform source is displayed in the time domain, and "Hz" when the waveform source is displayed in the frequency domain. When the waveform source is Math or a reference waveform, the value can be "s" or "Hz".

If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:XUNit?`

Related Commands DATa:SOUrce

Examples `WFMOUTPRE:XUNIT?` might return `:WFMOUTPRE:XUNIT "HZ"` indicating that the horizontal units for the waveform are in hertz.

WFMOutpre:XZEro? (Query Only)

This query returns the time coordinate, in seconds, or frequency, in hertz, of the first data point in the outgoing waveform record transferred using the `CURVe?` query. This time or frequency is relative to the time of the trigger, which is always 0. Thus, the XZEro time or frequency can be negative. You can query the units using the WFMOutpre:XUNit? command. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:XZEro?`

Related Commands DATa:SOUrce, WFMOutpre:XUNit?

Examples `WFMOUTPRE:XZERO?` might return `:WFMOUTPRE:XZERO 5.6300E-9` indicating that the trigger occurred 5.63 ns before the first sample in the waveform record.

WFMOutpre:YMUlt? (Query Only)

This query returns the vertical scale multiplying factor used to convert the waveform data point values in the outgoing waveform record from digitizing levels to the YUNit units. You can determine the units by using the `WFMOutpre:YUNit` query.

See the description of the WFMInpre:YMUlt command to see how this scale factor is used to convert waveform sample values to volts.

If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YMUlt?`

Related Commands DATa:SOUrce,

WFMInpre:YMUlt

Examples `WFMOUTPRE:YMULT?` might return `:WFMOUTPRE:YMULT 4.0000E-3` indicating that the vertical scale for the corresponding waveform is 100 mV/div (for 8-bit waveform data or 0.390625 V/div for 16–bit data).

WFMOutpre:YOFf? (Query Only)

This query returns the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. See the description of WFMInpre:YOFf to see how this position is used to convert waveform sample values to volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YOFf?`

Related Commands DATa:SOUrce,

WFMOutpre:BYT_Nr

Examples `WFMOUTPRE:YOFF?` might return `:WFMOUTPRE:YOFF -50.0000E+0` indicating that the position indicator for the waveform was 50 digitizing levels (2 divisions) below center screen (for 8-bit waveform data).

WFMOutpre:YUNit? (Query Only)

This query returns the units of data points in the outgoing waveform record transferred using the CURVe? query. This can be any of several string values, depending upon the vertical units of the source waveform (specified by the DATa:SOUrce command). Typically, this is "V" for volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax

```
WFMOutpre:YUNit?
```

Related Commands DATa:SOUrce

Examples WFMOUTPRE:YUNIT? might return :WFMOUTPRE:YUNIT "dB" indicating that the vertical units for the waveform are measured in decibels.

WFMOutpre:YZEro? (Query Only)

This query returns the vertical offset of the source waveform. You can determine the units using the WFMOutpre:YUNit? query. See the description of WFMInpre:YZEro to see how this offset is used to convert waveform sample values to volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-93, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax

```
WFMOutpre:YZEro?
```

Related Commands DATa:SOUrce,

WFMOutpre:YUNit?

Examples WFMOUTPRE:YZERO? might return :WFMOUTPRE:YZERO -100.0000E-3 indicating that vertical offset is set to -100 mV.

ZOOm? (Query Only)

Returns the current vertical and horizontal positioning and scaling of the display.

Group Zoom

Syntax ZOOm?

Examples ZOOM? might return :ZOOM:MODE 1;GRATICULE:SIZE 80;SPLIT EIGHTYTWENTY;:ZOOM:ZOOM1:STATE 1;SCALE 400. 0000E-12;POSITION 46.8986;FACTOR 50.0000E+3;HORIZONTAL:POSITION 46.8986;SCALE 40 0.0000E-12

ZOOm{:MODe|:STATE}

Turns Zoom mode on or off. The Zoom query returns the current state of Zoom mode. This command is equivalent to pressing the zoom button located on the front panel.

Group Zoom

Syntax ZOOm{:MODe|:STATE} {ON|OFF|<NR1>}
ZOOm{:MODe|:STATE}

Arguments ON turns on Zoom mode.

OFF turns off Zoom mode.

<NR1> is an integer. 0 turns off Zoom mode; any other value turns on Zoom mode.

Examples ZOOM:MODE OFF turns off Zoom mode.

ZOOM:MODE? might return :ZOOM:MODE 1 indicating that Zoom mode is currently turned on.

ZOOm:ZOOM<x>? (Query Only)

Returns the current vertical and horizontal positioning and scaling of the display. <x> can only be 1.

Group Zoom

Syntax `ZOOm:ZOOM<x>?`

Examples `ZOOM:ZOOM1?` might return `:ZOOM:ZOOM1:STATE 1;SCALE 400.0000E-12;POSITION 46.8986;FACTOR 50.0000E+3;HORIZONTAL:POSITION 46.8986;SCALE 400.0000E-12`.

ZOOm:ZOOM<x>:FACtor? (Query Only)

Returns the zoom factor of a particular zoom box. <x> can only be 1.

Group Zoom

Syntax `ZOOm:ZOOM<x>:FACtor?`

Returns `<NR1>` is an integer that specifies the zoom factor of a zoom box.

ZOOm:ZOOM<x>:POSition

Sets the horizontal position of the zoom box, in terms of 0 to 100.0% of upper window. <x> can only be 1.

Group Zoom

Syntax
```
ZOOm:ZOOM<x>:POSition <NR3>
ZOOm:ZOOM<x>:POSition?
```

Arguments `<NR3>` is a floating point number that specifies the horizontal position as a percent of the upper window.

ZOOm:ZOOM<x>:SCAle

This command specifies the horizontal scale of the zoom box. <x> can only be 1.

Group Zoom

Syntax

```
ZOOm:ZOOM<x>:SCAle <NR3>
ZOOm:ZOOM<x>:SCAle?
```

Arguments <NR3> is a floating point number that specifies the horizontal scale of the zoom box.

ZOOm:ZOOM<x>:STATE

This command turns the specified zoom on or off. <x> can only be 1.

Group Zoom

Syntax

```
ZOOm:ZOOM<x>:STATE {ON|OFF|<NR1>}
ZOOm:ZOOM<x>:STATE?
```

Arguments ON turns Zoom 1 on.

OFF turns Zoom 1 off.

<NR1> is an integer. 0 disables the specified zoom; any other value enables the specified zoom.

Examples ZOOM:ZOOM1:STATE ON turns Zoom1 on.

ZOOM:ZOOM1:STATE? might return :ZOOM:ZOOM1:STATE 1 indicating that Zoom1 is on.

ZOOm:ZOOM<x>:TRIGPOS? (Query Only)

This query returns the time at the center of the zoom box relative to the trigger position of the currently selected time domain waveform.

Group Zoom

Syntax `ZOOm:ZOOM<x>:TRIGPOS?`

Examples `ZOOm:ZOOM<x>:TRIGPOS?` might return 306.2500E+3, indicating that 306.2500E+3 seconds have passed between the center of the zoom box and the trigger position.

Status and Events

Status and Events

The oscilloscope provides a status and event reporting system for the Ethernet, GPIB (with the TEK-USB-488 Adapter), and USB interfaces. This system informs you of certain significant events that occur within the oscilloscope.

The oscilloscope status handling system consists of five 8-bit registers and two queues for each interface. The remaining Status subtopics describe these registers and components. They also explain how the event handling system operates.

Registers

Overview

The registers in the event handling system fall into two functional groups:

- Status Registers contain information about the status of the oscilloscope. They include the Standard Event Status Register (SESR).
- Enable Registers determine whether selected types of events are reported to the Status Registers and the Event Queue. They include the Device Event Status Enable Register (DESER), the Event Status Enable Register (ESER), and the Service Request Enable Register (SRER).

Status Registers

The Standard Event Status Register (SESR) and the Status Byte Register (SBR) record certain types of events that may occur while the oscilloscope is in use. IEEE Std 488.2-1987 defines these registers.

Each bit in a Status Register records a particular type of event, such as an execution error or message available. When an event of a given type occurs, the oscilloscope sets the bit that represents that type of event to a value of one. (You can disable bits so that they ignore events and remain at zero. See Enable Registers). Reading the status registers tells you what types of events have occurred.

The Standard Event Status Register (SESR). The SESR records eight types of events that can occur within the oscilloscope. Use the *ESR? query to read the SESR register. Reading the register clears the bits of the register so that the register can accumulate information about new events.

NOTE. *TekVISA applications use SESR bit 6 to respond to any of several events, including some front panel actions.*

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-1: The Standard Event Status Register (SESR)

Table 3-1: SESR Bit Functions

Bit	Function	
7 (MSB)	PON	`Power On.` Shows that the oscilloscope was powered on. On completion, the diagnostic self tests also set this bit.
6	URQ	`User Request.` Indicates that an application event has occurred. *See note.
5	CME	`Command Error.` Shows that an error occurred while the oscilloscope was parsing a command or query.
4	EXE	`Execution Error.` Shows that an error executing a command or query.
3	DDE	`Device Error.` Shows that a device error occurred.
2	QYE	`Query Error.` Either an attempt was made to read the Output Queue when no data was present or pending, or that data in the Output Queue was lost.
1	RQC	`Request Control.` This is not used.
0 (LSB)	OPC	`Operation Complete.` Shows that the operation is complete. This bit is set when all pending operations complete following an *OPC command.

The Status Byte Register (SBR). Records whether output is available in the Output Queue, whether the oscilloscope requests service, and whether the SESR has recorded any events.

Use a Serial Poll or the *STB? query to read the contents of the SBR. The bits in the SBR are set and cleared depending on the contents of the SESR, the Event Status Enable Register (ESER), and the Output Queue. When you use a Serial Poll to obtain the SBR, bit 6 is the RQS bit. When you use the *STB? query to obtain the SBR, bit 6 is the MSS bit. Reading the SBR does not clear the bits.

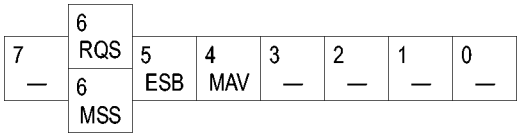


Figure 3-2: The Status Byte Register (SBR)

Table 3-2: SBR Bit Functions

Bit	Function	
7 (MSB)	———	Not used.
6	RQS	`Request Service.` Obtained from a serial poll. Shows that the oscilloscope requests service from the GPIB controller.
6	MSS	`Master Status Summary.` Obtained from *STB? query. Summarizes the ESB and MAV bits in the SBR.
5	ESB	`Event Status Bit.` Shows that status is enabled and present in the SESR.

Table 3-2: SBR Bit Functions (cont.)

Bit	Function	
4	MAV	`Message Available.` Shows that output is available in the Output Queue.
3	————	Not used.
2	————	Not used.
1–0	————	Not used.

Enable Registers

DESER, ESER, and SRER allow you to select which events are reported to the Status Registers and the Event Queue. Each Enable Register acts as a filter to a Status Register (the DESER also acts as a filter to the Event Queue) and can prevent information from being recorded in the register or queue.

Each bit in an Enable Register corresponds to a bit in the Status Register it controls. In order for an event to be reported to a bit in the Status Register, the corresponding bit in the Enable Register must be set to one. If the bit in the Enable Register is set to zero, the event is not recorded.

Various commands set the bits in the Enable Registers. The Enable Registers and the commands used to set them are described below.

The Device Event Status Enable Register (DESER). This register controls which types of events are reported to the SESR and the Event Queue. The bits in the DESER correspond to those in the SESR.

Use the DESE command to enable and disable the bits in the DESER. Use the DESE? query to read the DESER.

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-3: The Device Event Status Enable Register (DESER)

The Event Status Enable Register (ESER). This register controls which types of events are summarized by the Event Status Bit (ESB) in the SBR. Use the *ESE command to set the bits in the ESER. Use the *ESE? query to read it.

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-4: The Event Status Enable Register (ESER)

The Service Request Enable Register (SRER). This register controls which bits in the SBR generate a Service Request and are summarized by the Master Status Summary (MSS) bit.

Use the *SRE command to set the SRER. Use the *SRE? query to read the register. The RQS bit remains set to one until either the Status Byte Register is read with a Serial Poll or the MSS bit changes back to a zero.

7	6	5	4	3	2	1	0
—	—	ESB	MAV	—	—	—	—

Figure 3-5: The Service Request Enable Register (SRER)

*PSC Command

The *PSC command controls the Enable Registers contents at power-on. Sending *PSC 1 sets the Enable Registers at power on as follows:

- DESER 255 (equivalent to a DESe 255 command)
- ESER 0 (equivalent to an *ESE 0 command)
- SRER 0 (equivalent to an *SRE 0 command)

Sending *PSC 0 lets the Enable Registers maintain their values in nonvolatile memory through a power cycle.

NOTE. *To enable the PON (Power On) event to generate a Service Request, send *PSC 0, use the DESe and *ESE commands to enable PON in the DESER and ESER, and use the *SRE command to enable bit 5 in the SRER. Subsequent power-on cycles will generate a Service Request.*

Queues

The *PSC command controls the Enable Registers contents at power-on. Sending *PSC 1 sets the Enable Registers at power on as follows:

Output Queue

The oscilloscope stores query responses in the Output Queue and empties this queue each time it receives a new command or query message after an <EOM>. The controller must read a query response before it sends the next command (or query) or it will lose responses to earlier queries.

CAUTION. *When a controller sends a query, an <EOM>, and a second query, the oscilloscope normally clears the first response and outputs the second while reporting a Query Error (QYE bit in the ESER) to indicate the lost response. A fast controller, however, may receive a part or all of the first response as well. To avoid this situation, the controller should always read the response immediately after sending any terminated query message or send a DCL (Device Clear) before sending the second query.*

Event Queue

The Event Queue stores detailed information on up to 33 events. If than 32 events stack up in the Event Queue, the 32nd event is replaced by event code 350, "Queue Overflow."

Read the Event Queue with the EVENT? query (which returns only the event number), with the EVMSG? query (which returns the event number and a text description of the event), or with the ALLEV? query (which returns all the event numbers along with a description of the event). Reading an event removes it from the queue.

Before reading an event from the Event Queue, you must use the *ESR? query to read the summary of the event from the SESR. This makes the events summarized by the *ESR? read available to the EVENT? and EVMSG? queries, and empties the SESR.

Reading the SESR erases any events that were summarized by previous *ESR? reads but not read from the Event Queue. Events that follow an *ESR? read are put in the Event Queue but are not available until *ESR? is used again.

Event Handling Sequence

The following figure shows how to use the status and event handling system. In the explanation that follows, numbers in parentheses refer to numbers in the figure.

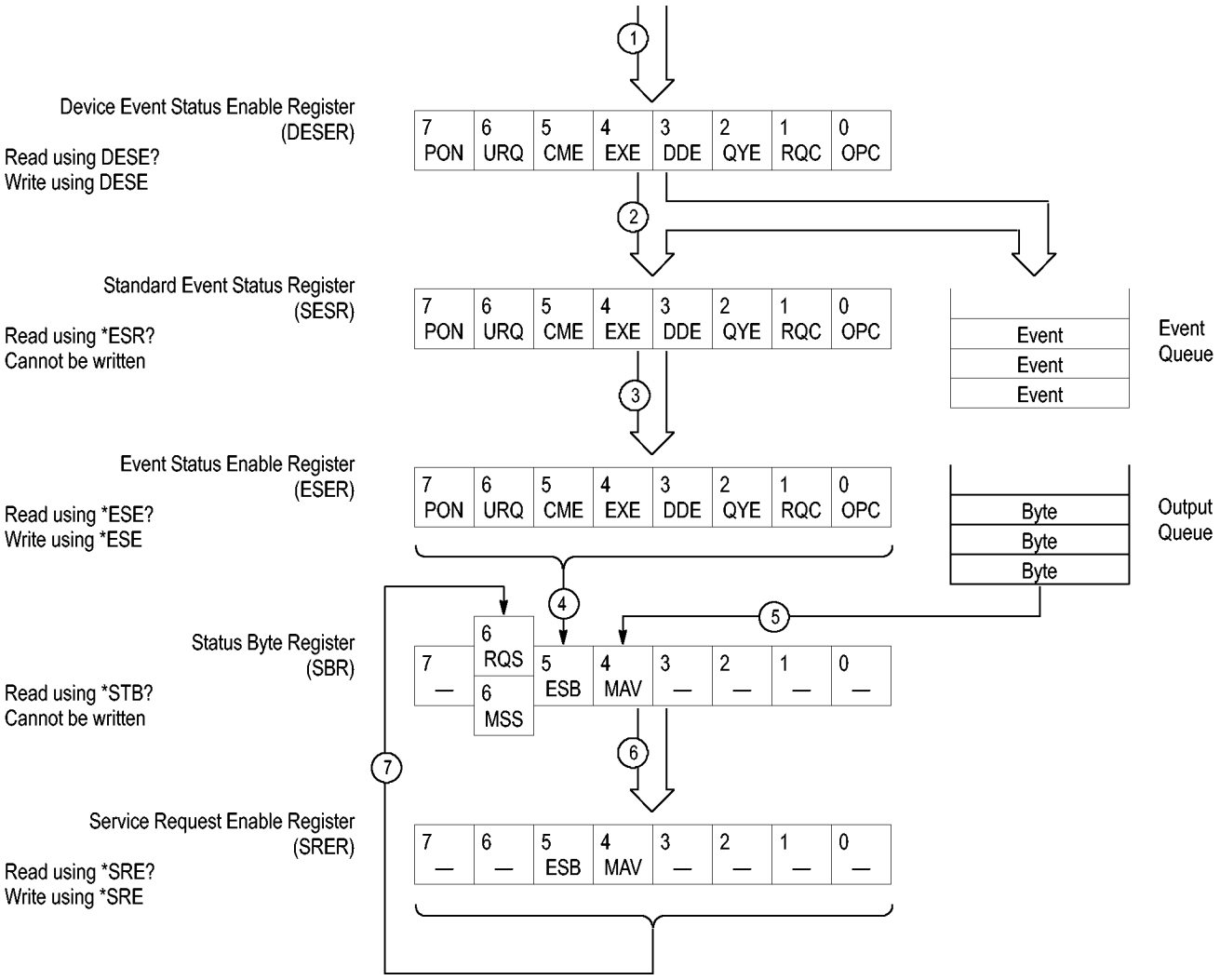


Figure 3-6: Status and Event Handling Process

When an event occurs, a signal is sent to the DESER (1). If that type of event is enabled in the DESER (that is, if the bit for that event type is set to 1), the appropriate bit in the SESR is set to one, and the event is recorded in the Event Queue (2). If the corresponding bit in the ESER is also enabled (3), then the ESB bit in the SBR is set to one (4).

When output is sent to the Output Queue, the MAV bit in the SBR is set to one (5).

When a bit in the SBR is set to one and the corresponding bit in the SRER is enabled (6), the MSS bit in the SBR is set to one and a service request is generated (7).

Synchronization Methods

Overview

Although most commands are completed almost immediately after being received by the oscilloscope, some commands start a process that requires time. For example, once a single sequence acquisition command is executed, depending upon the applied signals and trigger settings, it may take an extended period of time before the acquisition is complete. Rather than remain idle while the operation is in process, the oscilloscope will continue processing other commands. This means that some operations will not be completed in the order that they were sent. Furthermore, sometimes the result of an operation depends upon the result of an earlier operation. A first operation must complete before the next one is processed.

In order to handle these situations, the oscilloscope status and event reporting system allows you to synchronize the operation of the oscilloscope with your application program, using the Operation Complete function. Note, however, that only some operations are able to take advantage of this function; a table is provided below of commands that support this.

The following commands are used to synchronize the oscilloscope functions using Operation Complete. See examples of how to use these commands later on in this section:

*OPT? — sending the *OPC command will set bit 0 of the SESR (Standard Events Status Register). The bit will only be set high when all pending operations that generate an OPC message have finished execution. (The SESR is queried using *ESR?) The `*OPC?` query form returns 1 only when all operations have completed, or a device clear is received.

*WAI — prevents the oscilloscope from executing further commands or queries until all pending commands that generate an OPC message are complete.

BUSY? — returns the status of operations: 1 means there are pending operations, 0 means that all pending operations are complete.

NOTE. *Some OPC operations may require an extended period of time to complete or may never complete. For example, a single sequence acquisition may never complete when no trigger event occurs. You should be aware of these conditions and tailor your program accordingly by:*

— setting the timeout sufficiently for the anticipated maximum time for the operation and

*— handle a timeout appropriately by querying the SESR (*ESR?) and event queue (EVMsg? or ALLEv?).*

NOTE. *The *OPC command form can also be used to cause an SRQ to be generated upon completion of all pending operations. This requires that the ESB (Event Status Bit, bit 5) of the SRER (Service Request Enable Regiser) is set, and the OPC bit (bit 0) of the DESR (Device Event Status Enable Register) and the ESER (Event Status Enable Register) are set. (The SRER is set/queried using *SRE. The DESR is set/queried using DESE. The ESER is set/queried using *ESE.)*

Only a subset of oscilloscope operations support the Operation Complete function (OPC):

Table 3-3: Oscilloscope operations that can generate OPC

Command	Conditions
ACQuire:STATE <non-zero NR1> | ON |RUN	Only when in single sequence acquisition mode
:AUTOSet < EXECute | UNDo >	
CALibrate:INTERNal	
CALibrate:INTERNal:STARt	
CALibrate:FACtory STARt	
CALibrate:FACtory CONTinue	
CALibrate:FACtory PREVious	
CH<x>:PRObe:AUTOZero EXECute	
CH<x>:PRObe:DEGAUss EXECute	
DIAg:STATE EXECute	
FACtory	
HARDCopy	
HARDCopy START	
MASK:TESt:SRQ:COMPLetion (1|ON)	upon completion of test
MASK:TESt:SRQ:FAILure (1|ON)	upon failure of test
:POWer:RIPPle < VERTAUTOset | VERTDEFault >	
RECAll:MASK <file>	
RECAll:SETUp (<file as quoted string>|FACtory)	
RECAll:WAVEform <.ISF or .CSV file >,< REF1|REF2|REF3|REF4 >	
:RF:REFLevel AUTO	
*RST	
SAVe:IMAGe <file as quoted string>	
SAVe:SETUp <file as quoted string>	
SAVe:WAVEform < source wfm >, (< REF1|REF2|REF3|REF4 >|< file >)	

Table 3-3: Oscilloscope operations that can generate OPC (cont.)

Command	Conditions
TEKSecure	
:TRIGger:A SETLevel	

Example of Acquiring and Measuring a Single-Sequence Waveform

For example, a typical application might involve acquiring a single-sequence waveform and then taking a measurement on the acquired waveform. You could use the following command sequence to do this:

```
/** Set up conditional acquisition **/
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/** Acquire waveform data **/
ACQUIRE:STATE ON
/** Set up the measurement parameters **/
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/** Take amplitude measurement **/
MEASUREMENT:MEAS1:VALUE?
```

The acquisition of the waveform requires extended processing time. It may not finish before the oscilloscope takes an amplitude measurement (see the following figure). This can result in an incorrect amplitude value.

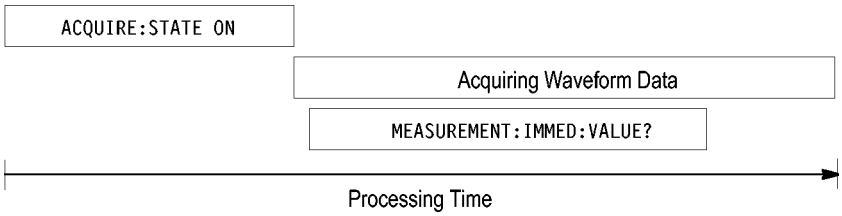


Figure 3-7: Command Processing Without Using Synchronization

To ensure the oscilloscope completes waveform acquisition before taking the measurement on the acquired data, you can synchronize the program using *WAI, BUSY, *OPC, and *OPC?.

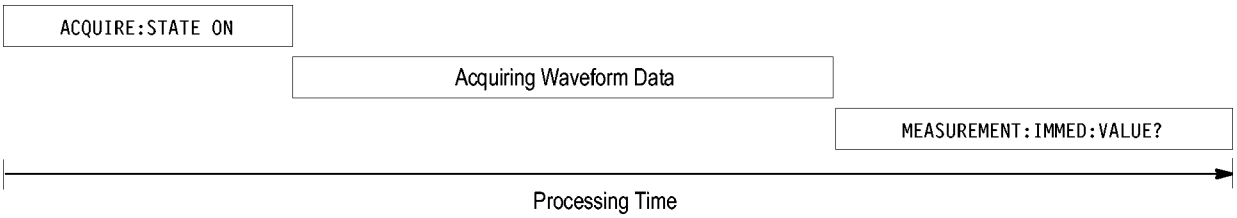


Figure 3-8: Processing Sequence With Synchronization

Example of Using the *OPC Command

If the corresponding status registers are enabled, the *OPC command sets the OPC bit in the Standard Event Status Register (SESR) when an operation is complete. You achieve synchronization by using this command with either a serial poll or service request handler.

Serial Poll Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

When the operation is complete, the OPC bit in the Standard Event Status Register (SESR) will be enabled and the Event Status Bit (ESB) in the Status Byte Register will be enabled.

The same command sequence using the *OPC command for synchronization with serial polling looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Enable the status registers */
DESE 1
*ESE 1
*SRE 0
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement.*/
*OPC
While serial poll = 0, keep looping
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This technique requires less bus traffic than did looping on BUSY.

Service Request Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

You can also enable service requests by setting the ESB bit in the Service Request Enable Register (SRER) using the *SRE command. When the operation is complete, the oscilloscope will generate a Service Request.

The same command sequence using the *OPC command for synchronization looks like this

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Enable the status registers */
DESE 1
*ESE 1
*SRE 32
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement*/
*OPC
```

The program can now do different tasks such as talk to other devices. The SRQ, when it comes, interrupts those tasks and returns control to this task.

```
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

Example of Using the *OPC? Query

The *OPC? query places a 1 in the Output Queue once an operation that generates an OPC message is complete. The *OPC? query does not return until all pending OPC operations have completed. Therefore, your time-out must be set to a time at least as long as the longest expected time for the operations to complete.

The same command sequence using the *OPC? query for synchronization looks like this:

```
/* Set up single sequence acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
```

```
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement*/
*OPC?
```

Wait for read from Output Queue.

```
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This is the simplest approach. It requires no status handling or loops. However, you must set the controller time-out for longer than the acquisition operation.

Example of Using the *WAI Command

The *WAI command forces completion of previous commands that generate an OPC message. No commands after the *WAI are processed before the OPC message(s) are generated

The same command sequence using the *WAI command for synchronization looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking
the measurement*/
*/
*WAI
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

The controller can continue to write commands to the input buffer of the oscilloscope, but the commands will not be processed by the oscilloscope until all in-process OPC operations are complete. If the input buffer becomes full, the controller will be unable to write commands to the buffer. This can cause a time-out.

Example of Using the BUSY Query

The BUSY? query allows you to find out whether the oscilloscope is busy processing a command that has an extended processing time such as single-sequence acquisition.

The same command sequence, using the BUSY? query for synchronization, looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking
the measurement */
While BUSY? keep looping
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This sequence lets you create your own wait loop rather than using the *WAI command. The BUSY? query helps you avoid time-outs caused by writing too many commands to the input buffer. The controller is still tied up though, and the repeated BUSY? query will result in bus traffic.

Messages

The information contained in the topics above covers all the programming interface messages the oscilloscope generates in response to commands and queries.

For most messages, a secondary message from the oscilloscope gives detail about the cause of the error or the meaning of the message. This message is part of the message string and is separated from the main message by a semicolon.

Each message is the result of an event. Each type of event sets a specific bit in the SESR and is controlled by the equivalent bit in the DESER. Thus, each message is associated with a specific SESR bit. In the message tables, the associated SESR bit is specified in the table title, with exceptions noted with the error message text.

No Event

The following table shows the messages when the system has no events or status to report. These have no associated SESR bit.

Table 3-4: No Event Messages

Code	Message
0	No events to report; queue empty
1	No events to report; new events pending *ESR?

Command Error

The following table shows the command error messages generated by improper syntax. Check that the command is properly formed and that it follows the rules in the section on command Syntax.

Table 3-5: Command Error Messages (CME Bit 5)

Code	Message
100	Command error
101	Invalid character
102	Syntax error
103	Invalid separator
104	Data type error
105	GET not allowed
108	Parameter not allowed
109	Missing parameter
110	Command header error
112	Program mnemonic too long
113	Undefined header
120	Numeric data error
121	Invalid character in numeric
123	Exponent too large
124	Too many digits
130	Suffix error
131	Invalid suffix
134	Suffix too long
140	Character data error
141	Invalid character data
144	Character data too long
150	String data error
151	Invalid string data
152	String data too long
160	Block data error
161	Invalid block data
170	Command expression error
171	Invalid expression

Execution Error

The following table lists the execution errors that are detected during execution of a command.

Table 3-6: Execution Error Messages (EXE Bit 4)

Code	Message
200	Execution error
221	Settings conflict
222	Data out of range
224	Illegal parameter value
241	Hardware missing
250	Mass storage error
251	Missing mass storage
252	Missing media
253	Corrupt media
254	Media full
255	Directory full
256	File name not found
257	File name error
258	Media protected
259	File name too long
270	Hardcopy error
271	Hardcopy device not responding
272	Hardcopy is busy
273	Hardcopy aborted
274	Hardcopy configuration error
280	Program error
282	Insufficient network printer information
283	Network printer not responding
284	Network printer server not responding
286	Program runtime error
287	Print server not found
2200	Measurement error, Measurement system error
2201	Measurement error, Zero period
2202	Measurement error, No period, second waveform
2203	Measurement error, No period, second waveform
2204	Measurement error, Low amplitude, second waveform
2205	Measurement error, Low amplitude, second waveform
2206	Measurement error, Invalid gate
2207	Measurement error, Measurement overflow

Table 3-6: Execution Error Messages (EXE Bit 4) (cont.)

Code	Message
2208	Measurement error, No backwards Mid Ref crossing
2209	Measurement error, No second Mid Ref crossing
2210	Measurement error, No Mid Ref crossing, second waveform
2211	Measurement error, No backwards Mid Ref crossing
2212	Measurement error, No negative crossing
2213	Measurement error, No positive crossing
2214	Measurement error, No crossing, target waveform
2215	Measurement error, No crossing, second waveform
2216	Measurement error, No crossing, target waveform
2217	Measurement error, Constant waveform
2219	Measurement error, No valid edge - No arm sample
2220	Measurement error, No valid edge - No arm cross
2221	Measurement error, No valid edge - No trigger cross
2222	Measurement error, No valid edge - No second cross
2223	Measurement error, Waveform mismatch
2224	Measurement error, WAIT calculating
2225	Measurement error, No waveform to measure
2226	Measurement error, Null Waveform
2227	Measurement error, Positive and Negative Clipping
2228	Measurement error, Positive Clipping
2229	Measurement error, Negative Clipping
2230	Measurement error, High Ref < Low Ref
2231	Measurement error, No statistics available
2233	Requested waveform is temporarily unavailable
2235	Math error, invalid math description
2240	Invalid password
2241	Waveform requested is invalid
2244	Source waveform is not active
2245	Saveref error, selected channel is turned off
2250	Reference error, the reference waveform file is invalid
2253	Reference error, too many points received
2254	Reference error, too few points received
2259	File too big
2270	Alias error
2271	Alias syntax error
2273	Illegal alias label
2276	Alias expansion error

Table 3-6: Execution Error Messages (EXE Bit 4) (cont.)

Code	Message
2277	Alias redefinition not allowed
2278	Alias header not found
2285	TekSecure(R) Pass
2286	TekSecure(R) Fail
2500	Setup error, file does not look like a setup file
2501	Setup warning, could not recall all values from external setup
2620	Mask error, too few points received
2760	Mark limit reached
2761	No mark present
2762	Search copy failed

Device Error

The following table lists the device errors that can occur during oscilloscope operation. These errors may indicate that the oscilloscope needs repair.

Table 3-7: Device Error Messages (DDE Bit 3)

Code	Message
310	System error
311	Memory error
312	PUD memory lost
314	Save/recall memory lost

System Event

The following table lists the system event messages. These messages are generated whenever certain system conditions occur.

Table 3-8: System Event Messages

Code	Message
400	Query event
401	Power on (PON bit 7 set)
402	Operation complete (OPC bit 0 set)
403	User request (URQ bit 6 set)
404	Power fail (DDE bit 3 set)
405	Request control
410	Query INTERRUPTED (QYE bit 2 set)
420	Query UNTERMINATED (QYE bit 2 set)
430	Query DEADLOCKED (QYE bit 2 set)
440	Query UNTERMINATED after indefinite response (QYE bit 2 set)

Table 3-8: System Event Messages (cont.)

Code	Message
468	Knob/Keypad value changed
472	Application variable changed

Execution Warning

The following table lists warning messages that do not interrupt the flow of command execution. They also notify you of possible unexpected results.

Table 3-9: Execution Warning Messages (EXE Bit 4)

Code	Message
528	Parameter out of range
532	Curve data too long, Curve truncated
533	Curve error, Preamble values are inconsistent
540	Measurement warning, Uncertain edge
541	Measurement warning, Low signal amplitude
542	Measurement warning, Unstable histogram
543	Measurement warning, Low resolution
544	Measurement warning, Uncertain edge
545	Measurement warning, Invalid in minmax
546	Measurement warning, Need 3 edges
547	Measurement warning, Clipping positive/negative
548	Measurement warning, Clipping positive
549	Measurement warning, Clipping negative

Table 3-10: Execution Warning Messages (EXE Bit 4)

Code	Message
540	Measurement warning
541	Measurement warning, Low signal amplitude
542	Measurement warning, Unstable histogram
543	Measurement warning, Low resolution
544	Measurement warning, Uncertain edge
545	Measurement warning, Invalid min max
546	Measurement warning, Need 3 edges
547	Measurement warning, Clipping positive/negative
548	Measurement warning, Clipping positive
549	Measurement warning, Clipping negative

Internal Warning

The following table shows internal errors that indicate an internal fault in the oscilloscope.

Table 3-11: Internal Warning Messages

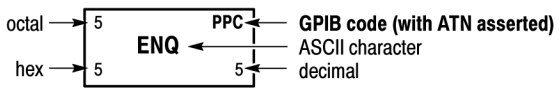
Code	Message
630	Internal warning, 50Ω overload

Appendices

Appendix A: Character Set

B7 B6 B5 BITS B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
0 0 0 0	0 NUL 0 0	20 DLE 10 16	40 LA0 SP 20 32	60 LA16 0 30 48	100 TA0 @ 40 64	120 TA16 P 50 80	140 SA0 ` 60 96	160 SA16 p 70 112
0 0 0 1	1 GTL SOH 1 1	21 LL0 DC1 11 17	41 LA1 ! 21 33	61 LA17 1 31 49	101 TA1 A 41 65	121 TA17 Q 51 81	141 SA1 a 61 97	161 SA17 q 71 113
0 0 1 0	2 STX 2 2	22 DC2 12 18	42 LA2 " 22 34	62 LA18 2 32 50	102 TA2 B 42 66	122 TA18 R 52 82	142 SA2 b 62 98	162 SA18 r 72 114
0 0 1 1	3 ETX 3 3	23 DC3 13 19	43 LA3 # 23 35	63 LA19 3 33 51	103 TA3 C 43 67	123 TA19 S 53 83	143 SA3 c 63 99	163 SA19 s 73 115
0 1 0 0	4 SDC EOT 4 4	24 DCL DC4 14 20	44 LA4 $ 24 36	64 LA20 4 34 52	104 TA4 D 44 68	124 TA20 T 54 84	144 SA4 d 64 100	164 SA20 t 74 116
0 1 0 1	5 PPC ENQ 5 5	25 PPU NAK 15 21	45 LA5 % 25 37	65 LA21 5 35 53	105 TA5 E 45 69	125 TA21 U 55 85	145 SA5 e 65 101	165 SA21 u 75 117
0 1 1 0	6 ACK 6 6	26 SYN 16 22	46 LA6 & 26 38	66 LA22 6 36 54	106 TA6 F 46 70	126 TA22 V 56 86	146 SA6 f 66 102	166 SA22 v 76 118
0 1 1 1	7 BEL 7 7	27 ETB 17 23	47 LA7 ' 27 39	67 LA23 7 37 55	107 TA7 G 47 71	127 TA23 W 57 87	147 SA7 g 67 103	167 SA23 w 77 119
1 0 0 0	10 GET BS 8 8	30 SPE CAN 18 24	50 LA8 (28 40	70 LA24 8 38 56	110 TA8 H 48 72	130 TA24 X 58 88	150 SA8 h 68 104	170 SA24 x 78 120
1 0 0 1	11 TCT HT 9 9	31 SPD EM 19 25	51 LA9) 29 41	71 LA25 9 39 57	111 TA9 I 49 73	131 TA25 Y 59 89	151 SA9 i 69 105	171 SA25 y 79 121
1 0 1 0	12 LF A 10	32 SUB 1A 26	52 LA10 * 2A 42	72 LA26 : 3A 58	112 TA10 J 4A 74	132 TA26 Z 5A 90	152 SA10 j 6A 106	172 SA26 z 7A 122
1 0 1 1	13 VT B 11	33 ESC 1B 27	53 LA11 + 2B 43	73 LA27 ; 3B 59	113 TA11 K 4B 75	133 TA27 [5B 91	153 SA11 k 6B 107	173 SA27 { 7B 123
1 1 0 0	14 FF C 12	34 FS 1C 28	54 LA12 , 2C 44	74 LA28 < 3C 60	114 TA12 L 4C 76	134 TA28 \ 5C 92	154 SA12 l 6C 108	174 SA28 ¦ 7C 124
1 1 0 1	15 CR D 13	35 GS 1D 29	55 LA13 – 2D 45	75 LA29 = 3D 61	115 TA13 M 4D 77	135 TA29] 5D 93	155 SA13 m 6D 109	175 SA29 } 7D 125
1 1 1 0	16 SO E 14	36 RS 1E 30	56 LA14 . 2E 46	76 LA30 > 3E 62	116 TA14 N 4E 78	136 TA30 ^ 5E 94	156 SA14 n 6E 110	176 SA30 ~ 7E 126
1 1 1 1	17 SI F 15	37 US 1F 31	57 LA15 / 2F 47	77 UNL ? 3F 63	117 TA15 O 4F 79	137 UNT – 5F 95	157 SA15 o 6F 111	177 RUBOUT (DEL) 7F 127
	ADDRESSED COMMANDS	UNIVERSAL COMMANDS	LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS	

KEY



Tektronix
REF: ANSI STD X3.4-1977
IEEE STD 488.1-1987
ISO STD 646-2973

Appendix B: Reserved Words

This is a list of reserved words for your instrument. Capital letters identify the required minimum spelling.

*CAL
*CLS
*DDT
*ESE
*ESR
*IDN
*LRN
*OPC
*OPT
*PSC
*PUD
*RCL
*RST
*SAV
*SRE
*STB
*TRG
*TST
*WAI
0
1
2
3
7
8
9
A
ABORt
ABSolute
AC
ACDCRMS
ACK
ACKMISS
ACKMISSERROR
ACKnum
ACPR
ACQ
ACQCOMPLete
ACQLENGTH
ACQuire
ACRMS
ACTION
ACTIVeprinter
ACTIVity
ACTONEVent
ADD
ADDR10
ADDR7
ADDRANDDATA
ADDRess
ADDress
ADJACENTPAIRs
ADVMATH
ADVTRIG
ADVanced
AFG
ALIas
ALIas[
ALL
ALLEv
ALLFields
ALLLines
ALTERNATE
ALWAYS
AMPLitude
AMPSVIAVOLTs
AMPlitude
ANALOG
ANALOg
AND
ANY
APPKey
APPLication
APPLications
APPpwr
ARB
ARBitrary
ARB
AREa
ASCII
ASCIi
ASCii
ASSIgn
ATRIGger
AUDIO
AUDio
AUTO
AUTOContrast
AUTORange
AUTOSCale
AUTOSet
AUTOZero
AUTOmatic
AUX
AUXIN
AUXOUT
AUXOut
AUXin
AUXout
AVAILable
AVErage
Auto
B
B1
B2
B3
B4
BACKLight
BACKWards
BANDWidth
BANdwidth
BASE
BASic
BCR
BDIFFBP
BILevelcustom
BINary
BIT
BITDelay
BITOrder
BITRate
BITSTUFFing
BIT_Nr
BIT
BLAckmanharris
BLOCKHEX
BM
BMP
BN_Fmt
BOTh
BOX
BOXPcnt
BRIGHTNess
BTRIGger
BULK
BURst
BUS
BUS1
BUS2
BUS3
BUS4
BUSWAVEFORMS
BUSY
BUS
BY
BYPass
BYT_Nr
BYT_Or
Block
BlockWfmInDTO
B
C1
C2
C3
CALCmethod
CALIBRATABLe
CALibrate
CAN
CANH
CANL
CARD
CARDIac
CAREa
CATalog
CENTER
CENTERFREQuency
CH1
CH2
CH3
CH4
CHANBW
CHANSPACing
CHANnel
CHannel
CHecksum
CH
CLASSALIMit
CLAss
CLEAR
CLEARMenu
CLEARSNapshot
CLEar
CLIPPing
CLOCKCoax

CLOCKSymmetrical
CLOCk
CMEan
CMOS_2_5V
CMOS_3_3V
CMOS_5_0V
COLUMN
COMMAND
COMPLetion
CONDCALCmethod
CONDition
CONDuction
CONFIGuration
CONFigure
CONTROl
CONTRast
CONTRol
COPYACTive
COPy
COUNt
COUPling
CP
CPU
CR
CRC
CRC16
CRC5
CRCHeader
CRCTrailer
CREATE
CREATEmask
CRITerion
CRMs
CROSSHair
CSPLIT
CURRENTSOurce
CURRent
CURSor
CURSors
CURVe
CURrent
CURsor
CUSTOMMask
CUSTom
CWD
CYCLEcount
D
D0
D1
D10
D11
D12
D13
D14
D15
D2
D3
D4
D5
D6
D7
D8
D9
DATA
DATA0
DATA1
DATABits
DATAPacket
DATE
DATEPrint
DATa
DAll
DB
DBCA
DBM
DBMA
DBMV
DBUA
DBUV
DBUW
DC
DCREJect
DDT
DECimal
DEFLT
DEFault
DEFine
DEGAUss
DEGrees
DELEte
DELEte[
DELIMiter
DELTa
DELTatime
DELay
DELayed
DELete
DELta
DEMO
DESE
DESKew
DESTination
DESTinationaddr
DESTinationport
DESkew
DETECTionmethod
DHCPbootp
DIAg
DIFFerential
DIGITAl
DIGital
DIR
DIRection
DISPLAYSTYle
DISPlay
DISabled
DISplay
DISplaymode
DMINus
DNS
DOMAINname
DOMain
DOTsonly
DPLUs
DRAFT
DRIve
DS1
DS1A
DS1C
DS1Rate
DS2
DS2RATECoax
DS2RATESymmetrical
DS3
DS3Rate
DS4NA
DS4XNA
DSOContra
DSODouble
DSOSingle
DSOTiming
DUAL
DUty
DVM
DYNAMic
D
E
E1Coax
E1Symmetrical
E2
E3
ECL
EDECAy
EDGE
EDGE
EDGe
EEPROM
EITHer
EITher
EMAIL
EMEM
ENABle
ENAble
ENCdg
END
ENDPoint
ENERGY
ENERGYLoss
ENET
ENET100BASETX
ENET10BASET
ENGLish
ENV
ENVelope
EOF
EOFTYPE
EOP
EQual
ERISe
ERROR
ERRTYPE
ERRlog
ERRor
ESCOPEENABle
ET
ETHERNET
ETHERnet
EVEN
EVENT
EVENTS
EVENTTYPe
EVENTtable
EVMsg
EVQty
EXCURsion
EXECute
EXT
EXTVIDEO
EXTended
EXTernal
FACtor
FACtory
FAIL
FAILURES
FAILure
FAILures
FALL
FALSe
FALling
FASTAcq
FASTPHOTO
FASTer

FAStest
FCSError
FFT
FIELD
FIFty
FILEFormat
FILESystem
FILter
FINE
FIRst
FIVEdivs
FIXEDFREQValue
FIXEDFREQuency
FLATtop
FLAg
FLEXRAY
FLEXRay
FLEXray
FOCUS
FOLder
FORCEDRange
FORCe
FORMat
FORWards
FP
FPAnel
FPbinary
FRAME
FRAMEID
FRAMESync
FRAMETYPe
FRAMEType
FRAMETypeid
FRAMEtype
FRAMING
FRAMetime
FRAme
FREE
FREESpace
FREErun
FRENch
FREQREFerence
FREQRef
FREQuency
FROMADDRess
FULL
FULLSPeed
FULl
FUNCtion
FUNDamental
G703DS1
G703DS3
GAIN
GATEMid
GATESOurce
GATEWay
GATIng
GATe
GATing
GAUSsian
GENeralcall
GENerate
GERMan
GNDCPLG
GPIBUsb
GRAph
GRAticule
GRId
GROUPing
HAGAKIPCARD
HAGAKIPcard
HALFgrat
HAMming
HANDSHAKEPacket
HANDSHAKEType
HANning
HARDCopy
HARM3ALTernate
HARM5ALTernate
HARMSOURce
HARMonics
HARlt;1-400>
HAVERSINe
HBArs
HD1080I50
HD1080I60
HD1080P24
HD1080P25
HD1080P30
HD1080P50
HD1080P60
HD1080SF24
HD480P60
HD576P50
HD720P30
HD720P50
HD720P60
HD875I60
HDR
HDtv
HEADER
HEADer
HEADertime
HEIght
HERtz
HEXadecimal
HFRej
HIGH
HIGHLevel
HIGHLimit
HIGHZ
HIRes
HISTOGRAM
HIStogram
HIStory
HITS
HIVALue
HOLD
HOLDTime
HOLDoff
HORZ
HORizontal
HORizontal[
HOSTALIASNAMe
HPOS
HS
HSCAle
HST1
HST2
HST3
HST4
HST5
HST6
HSmode
HTRIGPOS
HTTPPort
HUB
HYSTeresis
I2C
I2S
ICRESTfactor
ID
IDANDDATA
IDFORmat
IDLETime
IDLEtime
IDLe
IDPrint
IDentifier
IEC
IECMAX
IMAGESize
IMAGe
IMAge
IMMed
IMPEDance
IMPedance
IN
IN2P5BY3P25
IN4BY6
IN8BY10
INDBits
INDICators
INDIvidual
INDependent
INFInite
INFMAXimum
INFMINimum
INIT
INITialize
INKSaver
INPUTPOWer
INPut
INSTR
INTENSITy
INTERLAced
INTERNal
INTERRUPT
INTERnal
INVERTed
INVert
INVerted
INrange
IO
IPADDress
IPHeader
IPv4
IRMS
ISCLOCKed
ISOALL
ISOEND
ISOMID
ISOSTART
ISOchronous
ITALian
JAPAnese
KAIser
L
L2
L4
LA1DB
LA2DB
LA3DB
LABEL
LABel
LAN
LANGuage
LANdscape
LARge
LAYout
LDIR
LEFt

LENgth
LESSEQual
LESSLimit
LESSthan
LEVELPreset
LEVel
LF
LFRej
LICENSE
LIMITMask
LIMITS
LIMit
LIN
LINE
LINEAr
LINEFREQuency
LINEPeriod
LINear
LIST
LJ
LOAd
LOCation
LOCk
LOG
LOGIC
LOGIc
LOOP
LORENtz
LOW
LOWCurrent
LOWERFreq
LOWLevel
LOWLimit
LOWSPeed
LOWVoltage
LOWerthreshold
LSB
LXI
MAC
MACADDRess
MACLENgth
MAG
MAGnivu
MAIn
MAIn
MANCHester
MANual
MARK
MARKER
MARKSINCOLumn
MARgin
MASK
MASK
MATH
MATH1
MATHVAR
MATH[1]
MATLAB
MAX
MAXAmps
MAXBytedelim
MAXSAMPLERate
MAXSamplerate
MAXVolts
MAXWatts
MAXimum
ME
MEAN
MEAS
MEASUre
MEASUrement
MEAS
MEASx
MEDium
MEG
MESSage
METHod
MID
MIL
MIL1553B
MIN
MINImum
MINMax
MINUSpeak
MINimum
MISO
MISOMOSI
MIXED2
MIXed
MKDir
MM100BY150
MM54BY86
MODe
MODel
MODulation
MOREEQual
MORELimit
MOREthan
MOSI
MOUNT
MSB
M
NAK
NAME
NAMe
NANd
NDUty
NEDGECount
NEGative
NETWORKCONFig
NETWORKDRIVES
NEWpass
NEXT
NEXt
NO
NOCARE
NOISEAdd
NOISEDensity
NOISErej
NOISe
NOISeNR1
NONe
NOPARity
NOR
NORMAL
NORMal
NOTCOMPuted
NOVershoot
NPULSECount
NR1
NR1RangesL21000
NR2NR2NR2NR2
NR3
NR3NR3NR3NR3
NR3RangesD001000
NR3RangesD1e61E6
NRMAL
NR_HARMonics
NR_Pt
NTIMES
NTIMes
NTSC
NTSc
NULL
NULLFRDynamic
NULLFRStatic
NULl
NUMACQs
NUMACq
NUMAVg
NUMBUS
NUMCHANnels
NUMCYCles
NUMENTries
NUMERic
NUMEnv
NUMHORZ
NUMMEAS
NUMPoints
NUMREFS
NUMSLICEs
NUMVERT
NWIdth
NrfWfmInDTO
OBSPERiod
OBW
OCCURS
ODD
OFF
OFFSet
ON
ONCE
ONE
ONFAIL
OPTion
OR
OTHER
OUT
OUTPut
OUTrange
OUTside
OVERLoad
OWNer
PACKET
PAL
PALEtte
PAPERSize
PAPERType
PARallel
PARity
PASS
PASSFail
PASSWord
PATtern
PAUSe
PAYLength
PAYLoad
PDUty
PEAK
PEAKdetect
PEDGECount
PERCENTdown
PERCent
PERIod
PERSistence
PERcent
PHASENoise
PHASEangle
PHASe
PHOTO
PICTBridge
PID

PING
PIXel
PK2Pk
PLAIN
PLOTTYPe
PLUSpeak
PNG
POHC
POHCLIMit
POHL
POINTS
POLARCord
POLar
POLarity
PORT
PORTRait
PORTUguese
POSITION
POSition
POSitive
POVershoot
POWERFACtor
POWERFactor
POWERLEVel
POWERLoss
POWer
POWerupstatus
PPULSECount
PREAmp
PRESS
PREVIEW
PREViewstate
PREVious
PREamble
PRINT
PRINTQual
PRINTer
PRODDELta
PRODUCT
PRODUCTID
PRODuct
PROGressive
PROPDELay
PROTOCol
PROTOcol
PRObe
PT_Fmt
PT_ORder
PT_Off
PULSEWidth
PULSe
PULse
PWIdth
QString
QStringQString
QTAG
QTY
QUALifier
QUALity
Qstring
R1
R2
R3
R4
RADIUS
RADIUS
RAMP
RATDELta
RATIO
RATio
RBW
RDELta
RDSon
REACTpwr
READ
READFile
READOUT
RECAll
RECDESkew
RECLENS
RECOrdlength
RECTX
RECTY
RECTangular
REF
REF1
REF2
REF3
REF4
REFERence
REFLEvel
REFLevel
REFOut
REFS
REF
REFx
REM
REMote
REName
REPEATCount
REPEATstart
REPeat
RESERVed
RESET
RESOlution
RESPonsetime
RESPtime
RESUME
RESUlt
RESistance
RESult
RESults
RF
RF_AMPlitude
RF_AVErage
RF_BB_IQ
RF_FD
RF_FREQuency
RF_MAXHold
RF_MINHold
RF_NORMal
RF_PHASe
RF_TD
RI
RIBinary
RIGht
RIPPle
RISEFall
RISe
RISing
RJ
RMDir
RMS
ROM
ROSC
ROSc
RP
RPBinary
RS232C
RUN
RUNSTop
RUNT
RUNt
RWINClude
RX
RXDATA
RXENDPacket
RXSTArt
SAMPLERate
SAMPLEpoint
SAMple
SAVEALL
SAVEIMAGE
SAVEWFM
SAVe
SC
SCAle
SCLk
SCOPE
SCREEN
SCREen
SDATa
SE
SEARCH
SEARCHtotrigger
SECAM
SEConds
SEG
SELECTED
SELect
SELected
SEQnum
SEQuence
SERIALnumber
SERVICENAMe
SERnumber
SET
SETALLtorec
SETHold
SETLevel
SETTODEFaults
SETTime
SETUP
SETUP
SETUp
SFD
SFPbinary
SHOW
SIGNEDDECimal
SIGnal
SINC
SINE
SINGleended
SIZe
SLEEP
SLEWRate
SLICESELect
SLICETIMe
SLOT
SLOWer
SLOpe
SMAll
SMTPLOGIn
SMTPPASSWord
SMTPPort
SMTPServer
SNAPShot
SNAp
SOA
SOCKETServer
SOF
SOFFRAMENUMber

SOLid
SOURCe
SOURce
SOUrce
SOUrceaddr
SOUrce
SOUrceport
SPAN
SPANRbwratio
SPANish
SPC
SPECIALPacket
SPECIALType
SPECTRUM
SPECTRUMMode
SPECTRUMTrace
SPECTRogram
SPECTral
SPI
SPLit
SPREADSheet
SPace
SQUELCH
SQUare
SRIbinary
SRPbinary
SRQ
SS
SSPLIT
STALL
STANDARDMask
STANDard
STANdard
STARTofframe
STARTup
STARTupnosync
STARt
STARtbyte
STATE
STATE
STATIstics
STATic
STATus
STAYSHigh
STAYSLow
STDdev
STOP
STOPACQ
STOPAfter
STOPOnviol
STOPOnviolation
STS1Eye
STS1Pulse
STS3
STSX3
STYle
STandard
SUBADdress
SUBNETMask
SUBSF
SUSPEND
SWITCHingloss
SWLoss
SYMmetry
SYNC
SYNCField
SYNCFrame
SYNCInterval
SourceDestination
String
TABle
TCPHeader
TDM
TEKSecure
TEMPErature
TEMPLate
TEMPerature
TERMinal
TERmination
TEST
TESTS
TESTnumber
TESt
TF
THDELta
THDF
THDR
THETA
THETA
THReshold
TIFf
TIME
TIMEOut
TIMe
TIQ
TOADDRess
TOFF
TOKENPacket
TOKENType
TOLerance
TON
TOTal
TOTaluptime
TOUSER
TOVershoot
TRACk
TRANSFER
TRANsition
TRBit
TRIGFrequency
TRIGPOS
TRIGTOSAMP
TRIGger
TRIGgered
TRIGgertosearch
TRILevelcustom
TRUEpwr
TRUe
TTL
TURN
TURNON
TWEnty
TWOfifty
TX
TXDATA
TXENDPacket
TXRX
TXSTArt
TYPe
Than
UA1DB
UA2DB
UA3DB
UNDo
UNEQual
UNIts
UNLock
UNMOUNT
UPDATERate
UPPERFreq
UPPerthreshold
USB
USBDevice
USBTMC
USBTmc
USE
USER
USERLIST
V1X
V2X
VALue
VAR
VBArs
VCEsat
VCRESTfactor
VDELTa
VENDORID
VERBose
VERTAUTOset
VERTDEFault
VERTINVert
VERTical
VERT
VIDPIC
VIDPic
VIDeo
VIOLATIONS
VISUAL
VOFFSet
VOLTAGESOurce
VOLTage
VOLts
VPOS
VRMS
VSCAle
WAKEup
WAVEFORMS
WAVEform
WAVFrm
WEIghting
WFId
WFMInpre
WFMOutpre
WFMTYPe
WHEn
WIDth
WINdow
WITHYT
WIThin
WORD
WORDSel
WRITE
WRITEFile
X
X1Y1X2Y2
XDELta
XFF
XINcr
XMAX
XMIN
XUNit
XY
XZEro
Y
YDELta
YES
YMAX
YMIN
YMUlt
YOFf
YUNIts
YUNit

```
YUNits          ZERo            ZOOm
YZEro           ZOOM
```

Appendix C: Factory Defaults

Default Setup

The following table lists the default values for each command.

NOTE. *Find the most up-to-date default values for your instrument and software by performing a TekSecure command, saving the instrument setup and looking at the instrument or setup file.*

Table C-1: Default Values

Item	Description
ACQUIRE:FASTACQ:PALETTE	TEMPERATURE
ACQUIRE:FASTACQ:STATE	0
ACQUIRE:MAGNIVU	0
ACQUIRE:MODE	SAMPLE
ACQUIRE:NUMAVG	16
ACQUIRE:NUMENV	INFINITE
ACQUIRE:STATE	1
ACQUIRE:STOPAFTER	RUNSTOP
ACTONEVENT:ACTION:AUXOUT:STATE	0
ACTONEVENT:ACTION:EMAIL:SETUP:TOADDRESS	"TestString"
ACTONEVENT:ACTION:EMAIL:STATE	0
ACTONEVENT:ACTION:PRINT:STATE	0
ACTONEVENT:ACTION:SAVEIMAGE:STATE	0
ACTONEVENT:ACTION:SAVEWFM:STATE	0
ACTONEVENT:ACTION:SRQ:STATE	0
ACTONEVENT:ACTION:STOPACQ:STATE	1
ACTONEVENT:ACTION:VISUAL:STATE	0
ACTONEVENT:EVENTTYPE	NONE
ACTONEVENT:NUMACQS	1
ACTONEVENT:REPEATCOUNT	1.0000
AFG:AMPLITUDE	500.0000E-3
AFG:ARBITRARY:EMEM:POINTS:ENCDG	ASCII
AFG:FREQUENCY	100.0E+3
AFG:FUNCTION	SINE
AFG:HIGHLEVEL	250.0000E-3
AFG:LEVELPRESET	USER
AFG:LOWLEVEL	-250.0000E-3

Table C-1: Default Values (cont.)

Item	Description
AFG:NOISEADD:PERCENT	0.0E+0
AFG:NOISEADD:STATE	0
AFG:OFFSET	0.0E+0
AFG:OUTPUT:LOAD:IMPEDANCE	HIGHZ
AFG:PERIOD	9.9999999999916E-6
AFG:PHASE	0.0E+0
AFG:PULSE:WIDTH	1.0E-6
AFG:RAMP:SYMMETRY	50.0000
AFG:SQUARE:DUTY	50.0000
ALIAS:STATE	0
APPLICATION:TYPE	POWER
AUXOUT:SOURCE	ATRIGGER
BUS:B1:AUDIO:BITDELAY	1
BUS:B1:AUDIO:BITORDER	MSB
BUS:B1:AUDIO:CHANNEL:SIZE	24
BUS:B1:AUDIO:CLOCK:POLARITY	RISE
BUS:B1:AUDIO:CLOCK:SOURCE	CH1
BUS:B1:AUDIO:DATA:POLARITY	NORMAL
BUS:B1:AUDIO:DATA:SIZE	24
BUS:B1:AUDIO:DISPLAY:FORMAT	SIGNEDDECIMAL
BUS:B1:AUDIO:FRAME:SIZE	8
BUS:B1:AUDIO:FRAMESYNC:POLARITY	RISE
BUS:B1:AUDIO:FRAMESYNC:SOURCE	CH2
BUS:B1:AUDIO:TYPE	I2S
BUS:B1:AUDIO:WORDSEL:POLARITY	NORMAL
BUS:B1:AUDIO:WORDSEL:SOURCE	CH2
BUS:B1:CAN:BITRATE	500000
BUS:B1:CAN:PROBE	CANH
BUS:B1:CAN:SAMPLEPOINT	50
BUS:B1:CAN:SOURCE	CH1
BUS:B1:DISPLAY:FORMAT	HEXADECIMAL
BUS:B1:DISPLAY:TYPE	BUS
BUS:B1:FLEXRAY:BITRATE	10000000
BUS:B1:FLEXRAY:CHANNEL	A
BUS:B1:FLEXRAY:SIGNAL	BDIFFBP
BUS:B1:FLEXRAY:SOURCE	CH1
BUS:B1:I2C:ADDRESS:RWINCLUDE	0

Table C-1: Default Values (cont.)

Item	Description
BUS:B1:I2C:CLOCK:SOURCE	CH1
BUS:B1:I2C:DATA:SOURCE	CH2
BUS:B1:LABEL	"Parallel"
BUS:B1:LIN:BITRATE	19200
BUS:B1:LIN:IDFORMAT	NOPARITY
BUS:B1:LIN:POLARITY	NORMAL
BUS:B1:LIN:SAMPLEPOINT	50
BUS:B1:LIN:SOURCE	CH1
BUS:B1:LIN:STANDARD	V2X
BUS:B1:MIL1553B:POLARITY	NORMAL
BUS:B1:MIL1553B:RESPONSETIME:MAXIMUM	12.0000E-6
BUS:B1:MIL1553B:RESPONSETIME:MINIMUM	4.0000E-6
BUS:B1:MIL1553B:SOURCE	CH1
BUS:B1:PARALLEL:BIT0:SOURCE	D0
BUS:B1:PARALLEL:BIT10:SOURCE	D10
BUS:B1:PARALLEL:BIT11:SOURCE	D11
BUS:B1:PARALLEL:BIT12:SOURCE	D12
BUS:B1:PARALLEL:BIT13:SOURCE	D13
BUS:B1:PARALLEL:BIT14:SOURCE	D14
BUS:B1:PARALLEL:BIT15:SOURCE	D15
BUS:B1:PARALLEL:BIT16:SOURCE	CH1
BUS:B1:PARALLEL:BIT17:SOURCE	CH2
BUS:B1:PARALLEL:BIT18:SOURCE	CH3
BUS:B1:PARALLEL:BIT19:SOURCE	CH4
BUS:B1:PARALLEL:BIT1:SOURCE	D1
BUS:B1:PARALLEL:BIT2:SOURCE	D2
BUS:B1:PARALLEL:BIT3:SOURCE	D3
BUS:B1:PARALLEL:BIT4:SOURCE	D4
BUS:B1:PARALLEL:BIT5:SOURCE	D5
BUS:B1:PARALLEL:BIT6:SOURCE	D6
BUS:B1:PARALLEL:BIT7:SOURCE	D7
BUS:B1:PARALLEL:BIT8:SOURCE	D8
BUS:B1:PARALLEL:BIT9:SOURCE	D9
BUS:B1:PARALLEL:CLOCK:EDGE	RISING
BUS:B1:PARALLEL:CLOCK:ISCLOCKED	NO
BUS:B1:PARALLEL:CLOCK:SOURCE	CH1
BUS:B1:PARALLEL:WIDTH	16

Table C-1: Default Values (cont.)

Item	Description
BUS:B1:POSITION	0.0E+0
BUS:B1:RS232C:BITRATE	9600
BUS:B1:RS232C:DATABITS	8
BUS:B1:RS232C:DELIMITER	LF
BUS:B1:RS232C:DISPLAYMODE	FRAME
BUS:B1:RS232C:PARITY	NONE
BUS:B1:RS232C:POLARITY	NORMAL
BUS:B1:RS232C:RX:SOURCE	OFF
BUS:B1:RS232C:TX:SOURCE	CH1
BUS:B1:SPI:BITORDER	MSB
BUS:B1:SPI:CLOCK:POLARITY	RISE
BUS:B1:SPI:CLOCK:SOURCE	CH1
BUS:B1:SPI:DATA:IN:POLARITY	HIGH
BUS:B1:SPI:DATA:IN:SOURCE	OFF
BUS:B1:SPI:DATA:OUT:POLARITY	HIGH
BUS:B1:SPI:DATA:OUT:SOURCE	CH3
BUS:B1:SPI:DATA:SIZE	8
BUS:B1:SPI:FRAMING	SS
BUS:B1:SPI:IDLETIME	5.0000E-6
BUS:B1:SPI:SELECT:POLARITY	LOW
BUS:B1:SPI:SELECT:SOURCE	CH2
BUS:B1:STATE	0
BUS:B1:TYPE	PARALLEL
BUS:B1:USB:BITRATE	FULL
BUS:B1:USB:PROBE	DIFFERENTIAL
BUS:B1:USB:SOURCE:DIFFERENTIAL	CH1
BUS:B1:USB:SOURCE:DMINUS	CH2
BUS:B1:USB:SOURCE:DPLUS	CH1
BUS:B2:AUDIO:BITDELAY	1
BUS:B2:AUDIO:BITORDER	MSB
BUS:B2:AUDIO:CHANNEL:SIZE	24
BUS:B2:AUDIO:CLOCK:POLARITY	RISE
BUS:B2:AUDIO:CLOCK:SOURCE	CH1
BUS:B2:AUDIO:DATA:POLARITY	NORMAL
BUS:B2:AUDIO:DATA:SIZE	24
BUS:B2:AUDIO:DISPLAY:FORMAT	SIGNEDDECIMAL
BUS:B2:AUDIO:FRAME:SIZE	8

Table C-1: Default Values (cont.)

Item	Description
BUS:B2:AUDIO:FRAMESYNC:POLARITY	RISE
BUS:B2:AUDIO:FRAMESYNC:SOURCE	CH2
BUS:B2:AUDIO:TYPE	I2S
BUS:B2:AUDIO:WORDSEL:POLARITY	NORMAL
BUS:B2:AUDIO:WORDSEL:SOURCE	CH2
BUS:B2:CAN:BITRATE	500000
BUS:B2:CAN:PROBE	CANH
BUS:B2:CAN:SAMPLEPOINT	50
BUS:B2:CAN:SOURCE	CH1
BUS:B2:DISPLAY:FORMAT	HEXADECIMAL
BUS:B2:DISPLAY:TYPE	BUS
BUS:B2:FLEXRAY:BITRATE	10000000
BUS:B2:FLEXRAY:CHANNEL	A
BUS:B2:FLEXRAY:SIGNAL	BDIFFBP
BUS:B2:FLEXRAY:SOURCE	CH1
BUS:B2:I2C:ADDRESS:RWINCLUDE	0
BUS:B2:I2C:CLOCK:SOURCE	CH1
BUS:B2:I2C:DATA:SOURCE	CH2
BUS:B2:LABEL	"Parallel"
BUS:B2:LIN:BITRATE	19200
BUS:B2:LIN:IDFORMAT	NOPARITY
BUS:B2:LIN:POLARITY	NORMAL
BUS:B2:LIN:SAMPLEPOINT	50
BUS:B2:LIN:SOURCE	CH1
BUS:B2:LIN:STANDARD	V2X
BUS:B2:MIL1553B:POLARITY	NORMAL
BUS:B2:MIL1553B:RESPONSETIME:MAXIMUM	12.0000E-6
BUS:B2:MIL1553B:RESPONSETIME:MINIMUM	4.0000E-6
BUS:B2:MIL1553B:SOURCE	CH1
BUS:B2:PARALLEL:BIT0:SOURCE	D0
BUS:B2:PARALLEL:BIT10:SOURCE	D10
BUS:B2:PARALLEL:BIT11:SOURCE	D11
BUS:B2:PARALLEL:BIT12:SOURCE	D12
BUS:B2:PARALLEL:BIT13:SOURCE	D13
BUS:B2:PARALLEL:BIT14:SOURCE	D14
BUS:B2:PARALLEL:BIT15:SOURCE	D15
BUS:B2:PARALLEL:BIT16:SOURCE	CH1

Table C-1: Default Values (cont.)

Item	Description
BUS:B2:PARALLEL:BIT17:SOURCE	CH2
BUS:B2:PARALLEL:BIT18:SOURCE	CH3
BUS:B2:PARALLEL:BIT19:SOURCE	CH4
BUS:B2:PARALLEL:BIT1:SOURCE	D1
BUS:B2:PARALLEL:BIT2:SOURCE	D2
BUS:B2:PARALLEL:BIT3:SOURCE	D3
BUS:B2:PARALLEL:BIT4:SOURCE	D4
BUS:B2:PARALLEL:BIT5:SOURCE	D5
BUS:B2:PARALLEL:BIT6:SOURCE	D6
BUS:B2:PARALLEL:BIT7:SOURCE	D7
BUS:B2:PARALLEL:BIT8:SOURCE	D8
BUS:B2:PARALLEL:BIT9:SOURCE	D9
BUS:B2:PARALLEL:CLOCK:EDGE	RISING
BUS:B2:PARALLEL:CLOCK:ISCLOCKED	NO
BUS:B2:PARALLEL:CLOCK:SOURCE	CH1
BUS:B2:PARALLEL:WIDTH	16
BUS:B2:POSITION	0.0E+0
BUS:B2:RS232C:BITRATE	9600
BUS:B2:RS232C:DATABITS	8
BUS:B2:RS232C:DELIMITER	LF
BUS:B2:RS232C:DISPLAYMODE	FRAME
BUS:B2:RS232C:PARITY	NONE
BUS:B2:RS232C:POLARITY	NORMAL
BUS:B2:RS232C:RX:SOURCE	OFF
BUS:B2:RS232C:TX:SOURCE	CH1
BUS:B2:SPI:BITORDER	MSB
BUS:B2:SPI:CLOCK:POLARITY	RISE
BUS:B2:SPI:CLOCK:SOURCE	CH1
BUS:B2:SPI:DATA:IN:POLARITY	HIGH
BUS:B2:SPI:DATA:IN:SOURCE	OFF
BUS:B2:SPI:DATA:OUT:POLARITY	HIGH
BUS:B2:SPI:DATA:OUT:SOURCE	CH3
BUS:B2:SPI:DATA:SIZE	8
BUS:B2:SPI:FRAMING	SS
BUS:B2:SPI:IDLETIME	5.0000E-6
BUS:B2:SPI:SELECT:POLARITY	LOW
BUS:B2:SPI:SELECT:SOURCE	CH2

Table C-1: Default Values (cont.)

Item	Description
BUS:B2:STATE	0
BUS:B2:TYPE	PARALLEL
BUS:B2:USB:BITRATE	FULL
BUS:B2:USB:PROBE	DIFFERENTIAL
BUS:B2:USB:SOURCE:DIFFERENTIAL	CH1
BUS:B2:USB:SOURCE:DMINUS	CH2
BUS:B2:USB:SOURCE:DPLUS	CH1
BUS:LOWERTHRESHOLD:CH1	0.0E+0
BUS:LOWERTHRESHOLD:CH2	0.0E+0
BUS:LOWERTHRESHOLD:CH3	0.0E+0
BUS:LOWERTHRESHOLD:CH4	0.0E+0
BUS:LOWERTHRESHOLD:MATH	0.0E+0
BUS:LOWERTHRESHOLD:REF1	0.0E+0
BUS:LOWERTHRESHOLD:REF2	0.0E+0
BUS:LOWERTHRESHOLD:REF3	0.0E+0
BUS:LOWERTHRESHOLD:REF4	0.0E+0
BUS:UPPERTHRESHOLD:CH1	800.0000E-3
BUS:UPPERTHRESHOLD:CH2	800.0000E-3
BUS:UPPERTHRESHOLD:CH3	800.0000E-3
BUS:UPPERTHRESHOLD:CH4	800.0000E-3
BUS:UPPERTHRESHOLD:MATH	0.0E+0
BUS:UPPERTHRESHOLD:REF1	0.0E+0
BUS:UPPERTHRESHOLD:REF2	0.0E+0
BUS:UPPERTHRESHOLD:REF3	0.0E+0
BUS:UPPERTHRESHOLD:REF4	0.0E+0
CH1:AMPSVIAVOLTS:ENABLE	0
CH1:AMPSVIAVOLTS:FACTOR	10.0000
CH1:BANDWIDTH	1.0000E+9
CH1:COUPLING	DC
CH1:DESKEW	0.0E+0
CH1:INVERT	0
CH1:LABEL	""
CH1:OFFSET	0.0E+0
CH1:POSITION	0.0E+0
CH1:PROBE:FORCEDRANGE	0.0E+0
CH1:PROBE:GAIN	1.0000
CH1:PROBE:PROPDELAY	0.0E+0

Table C-1: Default Values (cont.)

Item	Description
CH1:SCALE	100.0000E-3
CH1:TERMINATION	1.0000E+6
CH1:YUNITS	"V"
CH2:AMPSVIAVOLTS:ENABLE	0
CH2:AMPSVIAVOLTS:FACTOR	10.0000
CH2:BANDWIDTH	1.0000E+9
CH2:COUPLING	DC
CH2:DESKEW	0.0E+0
CH2:INVERT	0
CH2:LABEL	""
CH2:OFFSET	0.0E+0
CH2:POSITION	0.0E+0
CH2:PROBE:FORCEDRANGE	0.0E+0
CH2:PROBE:GAIN	1.0000
CH2:PROBE:PROPDELAY	0.0E+0
CH2:SCALE	100.0000E-3
CH2:TERMINATION	1.0000E+6
CH2:YUNITS	"V"
CH3:AMPSVIAVOLTS:ENABLE	0
CH3:AMPSVIAVOLTS:FACTOR	10.0000
CH3:BANDWIDTH	1.0000E+9
CH3:COUPLING	DC
CH3:DESKEW	0.0E+0
CH3:INVERT	0
CH3:LABEL	""
CH3:OFFSET	0.0E+0
CH3:POSITION	0.0E+0
CH3:PROBE:FORCEDRANGE	0.0E+0
CH3:PROBE:GAIN	1.0000
CH3:PROBE:PROPDELAY	0.0E+0
CH3:SCALE	100.0000E-3
CH3:TERMINATION	1.0000E+6
CH3:YUNITS	"V"
CH4:AMPSVIAVOLTS:ENABLE	0
CH4:AMPSVIAVOLTS:FACTOR	10.0000
CH4:BANDWIDTH	1.0000E+9
CH4:COUPLING	DC

Table C-1: Default Values (cont.)

Item	Description
CH4:DESKEW	0.0E+0
CH4:INVERT	0
CH4:LABEL	""
CH4:OFFSET	0.0E+0
CH4:POSITION	0.0E+0
CH4:PROBE:FORCEDRANGE	0.0E+0
CH4:PROBE:GAIN	1.0000
CH4:PROBE:PROPDELAY	0.0E+0
CH4:SCALE	100.0000E-3
CH4:TERMINATION	1.0000E+6
CH4:YUNITS	"V"
CURSOR:FUNCTION	OFF
CURSOR:HBARS:POSITION1	0.0E+0
CURSOR:HBARS:POSITION2	0.0E+0
CURSOR:HBARS:UNITS	BASE
CURSOR:MODE	INDEPENDENT
CURSOR:SOURCE	AUTO
CURSOR:VBARS:POSITION1	-12.00E-6
CURSOR:VBARS:POSITION2	12.00E-6
CURSOR:VBARS:UNITS	SECONDS
CURSOR:XY:READOUT	RECTANGULAR
CURSOR:XY:RECTANGULAR:X:POSITION1	0.0E+0
CURSOR:XY:RECTANGULAR:X:POSITION2	0.0E+0
CURSOR:XY:RECTANGULAR:Y:POSITION1	0.0E+0
CURSOR:XY:RECTANGULAR:Y:POSITION2	0.0E+0
D0:LABEL	""
D0:POSITION	80.0000E-3
D0:THRESHOLD	1.4000
D10:LABEL	""
D10:POSITION	80.0000E-3
D10:THRESHOLD	1.4000
D11:LABEL	""
D11:POSITION	80.0000E-3
D11:THRESHOLD	1.4000
D12:LABEL	""
D12:POSITION	80.0000E-3
D12:THRESHOLD	1.4000

Table C-1: Default Values (cont.)

Item	Description
D13:LABEL	""
D13:POSITION	80.0000E-3
D13:THRESHOLD	1.4000
D14:LABEL	""
D14:POSITION	80.0000E-3
D14:THRESHOLD	1.4000
D15:LABEL	""
D15:POSITION	80.0000E-3
D15:THRESHOLD	1.4000
D1:LABEL	""
D1:POSITION	80.0000E-3
D1:THRESHOLD	1.4000
D2:LABEL	""
D2:POSITION	80.0000E-3
D2:THRESHOLD	1.4000
D3:LABEL	""
D3:POSITION	80.0000E-3
D3:THRESHOLD	1.4000
D4:LABEL	""
D4:POSITION	80.0000E-3
D4:THRESHOLD	1.4000
D5:LABEL	""
D5:POSITION	80.0000E-3
D5:THRESHOLD	1.4000
D6:LABEL	""
D6:POSITION	80.0000E-3
D6:THRESHOLD	1.4000
D7:LABEL	""
D7:POSITION	80.0000E-3
D7:THRESHOLD	1.4000
D8:LABEL	""
D8:POSITION	80.0000E-3
D8:THRESHOLD	1.4000
D9:LABEL	""
D9:POSITION	80.0000E-3
D9:THRESHOLD	1.4000
DATA:DESTINATION	REF1

Table C-1: Default Values (cont.)

Item	Description
DATA:ENCDG	RIBINARY
DATA:SOURCE	CH1
DATA:START	1
DATA:STOP	10000
DESKEW:DISPLAY	1
DISPLAY:CLOCK	1
DISPLAY:DIGITAL:ACTIVITY	0
DISPLAY:DIGITAL:HEIGHT	MEDIUM
DISPLAY:GRATICULE	FULL
DISPLAY:INTENSITY:BACKLIGHT	HIGH
DISPLAY:INTENSITY:BACKLIGHT:AUTODIM:ENABLE	1
DISPLAY:INTENSITY:BACKLIGHT:AUTODIM:TIME	60
DISPLAY:INTENSITY:GRATICULE	75
DISPLAY:INTENSITY:WAVEFORM	35
DISPLAY:PERSISTENCE	0.0E+0
DISPLAY:STYLE:DOTSONLY	0
DISPLAY:TRIGFREQUENCY	0
DISPLAY:XY	OFF
DISPLAY:XY:WITHYT	0
DVM:AUTORANGE	0
DVM:DISPLAYSTYLE	FULL
DVM:MODE	OFF
DVM:SOURCE	CH1
EMAIL:SETUP:FROMADDRESS	"TestString"
EMAIL:SETUP:HOSTALIASNAME	"TestString"
EMAIL:SETUP:SMTPLOGIN	"TestString"
EMAIL:SETUP:SMTPPORT	25
EMAIL:SETUP:SMTPSERVER	"TestString"
FASTACQ:STATE	0
HARDCOPY:INKSAVER	1
HARDCOPY:LAYOUT	LANDSCAPE
HARDCOPY:PREVIEW	0
HEADER	0
HISTOGRAM:BOXPCNT	20.0000,20.0000,80.0000,80.0000
HISTOGRAM:DISPLAY	LINEAR
HISTOGRAM:MODE	OFF
HISTOGRAM:SOURCE	CH1

Table C-1: Default Values (cont.)

Item	Description
HORIZONTAL:DELAY:MODE	1
HORIZONTAL:DELAY:TIME	0.0E+0
HORIZONTAL:POSITION	50.0000
HORIZONTAL:RECORDLENGTH	10000
HORIZONTAL:SCALE	4.0000E-6
LOCK	NONE
MARKER:M1:FREQUENCY:ABSOLUTE	0.0E+0
MARKER:M2:FREQUENCY:ABSOLUTE	0.0E+0
MARKER:MANUAL	0
MARKER:PEAK:EXCURSION	30.0000
MARKER:PEAK:MAXIMUM	5
MARKER:PEAK:STATE	1
MARKER:PEAK:THRESHOLD	-50.0000
MARKER:TYPE	ABSOLUTE
MASK:COPY:SOURCE	NONE
MASK:DISPLAY	0
MASK:LOCK	0
MASK:MARGIN:PERCENT	0.0E+0
MASK:MARGIN:STATE	0
MASK:POLARITY	POSITIVE
MASK:SOURCE	CH1
MASK:STANDARD	NONE
MASK:STOPONVIOLATION	0
MASK:TEMPLATE:SOURCE	CH1
MASK:TEMPLATE:TOLERANCE:HORIZONTAL	200.0000E-3
MASK:TEMPLATE:TOLERANCE:VERTICAL	200.0000E-3
MASK:TEST:AUXOUT:COMPLETION	0
MASK:TEST:AUXOUT:FAILURE	0
MASK:TEST:COMPLETION:CRITERION	WAVEFORM
MASK:TEST:DELAY	0.0E+0
MASK:TEST:HARDCOPY	0
MASK:TEST:REPEAT	0
MASK:TEST:SAVEIMAGE	0
MASK:TEST:SAVEWFM	0
MASK:TEST:SRQ:COMPLETION	0
MASK:TEST:SRQ:FAILURE	0
MASK:TEST:STATE	0

Table C-1: Default Values (cont.)

Item	Description
MASK:TEST:STOP:FAILURE	0
MASK:TEST:THRESHOLD	1
MASK:TEST:TIME	INFINITE
MASK:TEST:WAVEFORM	INFINITE
MASK:USER:AMPLITUDE	1.0000
MASK:USER:HSCALE	400.0000E-6
MASK:USER:HTRIGPOS	500.0000E-3
MASK:USER:LABEL	""
MASK:USER:RECORDLENGTH	10000
MASK:USER:SEG1:POINTS	-1000.0000E-9,0.0E+0,1000.0000E-9,-1.0000,1000.0000E-9,1.000
MASK:USER:SEG2:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG3:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG4:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG5:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG6:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG7:POINTS	0.0E+0,0.0E+0
MASK:USER:SEG8:POINTS	0.0E+0,0.0E+0
MASK:USER:TRIGTOSAMP	100.0000E-6
MASK:USER:VOFFSET	0.0E+0
MASK:USER:VPOS	0.0E+0
MASK:USER:VSCALE	100.0000E-3
MASK:USER:WIDTH	400.0000E-6
MATH:AUTOSCALE	1
MATH:DEFINE	"CH1+CH2"
MATH:HORIZONTAL:POSITION	50.0000
MATH:HORIZONTAL:SCALE	4.0000E-6
MATH:HORIZONTAL:UNITS	"s"
MATH:LABEL	""
MATH:SPECTRAL:MAG	DB
MATH:SPECTRAL:WINDOW	HANNING
MATH:TYPE	DUAL
MATH:VERTICAL:POSITION	0.0E+0
MATH:VERTICAL:SCALE	100.0000E-3
MATH:VERTICAL:UNITS	"V"
MATHVAR:VAR1	0.0E+0
MATHVAR:VAR2	0.0E+0
MEASUREMENT:GATING	SCREEN

Table C-1: Default Values (cont.)

Item	Description
MEASUREMENT:IMMED:DELAY:DIRECTION	FORWARDS
MEASUREMENT:IMMED:DELAY:EDGE1	RISE
MEASUREMENT:IMMED:DELAY:EDGE2	RISE
MEASUREMENT:IMMED:SOURCE1	CH1
MEASUREMENT:IMMED:SOURCE2	CH2
MEASUREMENT:IMMED:TYPE	PERIOD
MEASUREMENT:INDICATORS:STATE	OFF
MEASUREMENT:MEAS1:DELAY:DIRECTION	FORWARDS
MEASUREMENT:MEAS1:DELAY:EDGE1	RISE
MEASUREMENT:MEAS1:DELAY:EDGE2	RISE
MEASUREMENT:MEAS1:SOURCE1	CH1
MEASUREMENT:MEAS1:SOURCE2	CH2
MEASUREMENT:MEAS1:STATE	0
MEASUREMENT:MEAS1:TYPE	PERIOD
MEASUREMENT:MEAS2:DELAY:DIRECTION	FORWARDS
MEASUREMENT:MEAS2:DELAY:EDGE1	RISE
MEASUREMENT:MEAS2:DELAY:EDGE2	RISE
MEASUREMENT:MEAS2:SOURCE1	CH1
MEASUREMENT:MEAS2:SOURCE2	CH2
MEASUREMENT:MEAS2:STATE	0
MEASUREMENT:MEAS2:TYPE	PERIOD
MEASUREMENT:MEAS3:DELAY:DIRECTION	FORWARDS
MEASUREMENT:MEAS3:DELAY:EDGE1	RISE
MEASUREMENT:MEAS3:DELAY:EDGE2	RISE
MEASUREMENT:MEAS3:SOURCE1	CH1
MEASUREMENT:MEAS3:SOURCE2	CH2
MEASUREMENT:MEAS3:STATE	0
MEASUREMENT:MEAS3:TYPE	PERIOD
MEASUREMENT:MEAS4:DELAY:DIRECTION	FORWARDS
MEASUREMENT:MEAS4:DELAY:EDGE1	RISE
MEASUREMENT:MEAS4:DELAY:EDGE2	RISE
MEASUREMENT:MEAS4:SOURCE1	CH1
MEASUREMENT:MEAS4:SOURCE2	CH2
MEASUREMENT:MEAS4:STATE	0
MEASUREMENT:MEAS4:TYPE	PERIOD
MEASUREMENT:METHOD	AUTO
MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH	0.0E+0

Table C-1: Default Values (cont.)

Item	Description
MEASUREMENT:REFLEVEL:ABSOLUTE:LOW	0.0E+0
MEASUREMENT:REFLEVEL:ABSOLUTE:MID1	0.0E+0
MEASUREMENT:REFLEVEL:ABSOLUTE:MID2	0.0E+0
MEASUREMENT:REFLEVEL:METHOD	PERCENT
MEASUREMENT:REFLEVEL:PERCENT:HIGH	90.0000
MEASUREMENT:REFLEVEL:PERCENT:LOW	10.0000
MEASUREMENT:REFLEVEL:PERCENT:MID1	50.0000
MEASUREMENT:REFLEVEL:PERCENT:MID2	50.0000
MEASUREMENT:STATISTICS:MODE	ALL
MEASUREMENT:STATISTICS:WEIGHTING	32
MESSAGE:BOX	167,67,167,83
MESSAGE:SHOW	""
MESSAGE:STATE	0
PICTBRIDGE:DATEPRINT	DEFLT
PICTBRIDGE:IDPRINT	OFF
PICTBRIDGE:IMAGESIZE	DEFLT
PICTBRIDGE:PAPERSIZE	DEFLT
PICTBRIDGE:PAPERTYPE	DEFLT
PICTBRIDGE:PRINTQUAL	DEFLT
POWER:CURRENTSOURCE	CH2
POWER:DISPLAY	0
POWER:GATESOURCE	NONE
POWER:GATING	OFF
POWER:HARMONICS:DISPLAY:SELECT	ALL
POWER:HARMONICS:DISPLAY:TYPE	GRAPH
POWER:HARMONICS:FREQREF	HARMSOURCE
POWER:HARMONICS:FREQREF:FIXEDFREQVALUE	60.0000
POWER:HARMONICS:IEC:CLASS	A
POWER:HARMONICS:IEC:FILTER	1
POWER:HARMONICS:IEC:FUNDAMENTAL	16.0000
POWER:HARMONICS:IEC:GROUPING	1
POWER:HARMONICS:IEC:INPUTPOWER	100
POWER:HARMONICS:IEC:LINEFREQUENCY	60
POWER:HARMONICS:IEC:OBSPERIOD	10.0000
POWER:HARMONICS:IEC:POWERFACTOR	900.0000E-3
POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD	MEAS
POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT	1.0000

Table C-1: Default Values (cont.)

Item	Description
POWER:HARMONICS:MIL:LINEFREQUENCY	400
POWER:HARMONICS:MIL:POWERLEVEL	LOW
POWER:HARMONICS:NR_HARMONICS	40
POWER:HARMONICS:SOURCE	CURRENT
POWER:HARMONICS:STANDARD	NONE
POWER:INDICATORS	0
POWER:MODULATION:SOURCE	VOLTAGE
POWER:MODULATION:TYPE	PWIDTH
POWER:QUALITY:DISPLAY:APPPWR	0
POWER:QUALITY:DISPLAY:FREQUENCY	0
POWER:QUALITY:DISPLAY:ICRESTFACTOR	0
POWER:QUALITY:DISPLAY:IRMS	0
POWER:QUALITY:DISPLAY:PHASEANGLE	0
POWER:QUALITY:DISPLAY:POWERFACTOR	0
POWER:QUALITY:DISPLAY:REACTPWR	0
POWER:QUALITY:DISPLAY:TRUEPWR	0
POWER:QUALITY:DISPLAY:VCRESTFACTOR	0
POWER:QUALITY:DISPLAY:VRMS	0
POWER:QUALITY:FREQREFERENCE	VOLTAGE
POWER:REFLEVEL:ABSOLUTE:HIGH	0.0E+0
POWER:REFLEVEL:ABSOLUTE:LOW	0.0E+0
POWER:REFLEVEL:ABSOLUTE:MID1	0.0E+0
POWER:REFLEVEL:ABSOLUTE:MID2	0.0E+0
POWER:REFLEVEL:ABSOLUTE:MID3	50.0000
POWER:REFLEVEL:HYSTERESIS	10.0000
POWER:REFLEVEL:METHOD	PERCENT
POWER:REFLEVEL:PERCENT:HIGH	90.0000
POWER:REFLEVEL:PERCENT:LOW	10.0000
POWER:REFLEVEL:PERCENT:MID1	50.0000
POWER:REFLEVEL:PERCENT:MID2	50.0000
POWER:REFLEVEL:PERCENT:MID3	50.0000
POWER:RIPPLE:SOURCE	VOLTAGE
POWER:SOA:LINEAR:XMAX	500.0000
POWER:SOA:LINEAR:XMIN	0.0E+0
POWER:SOA:LINEAR:YMAX	50.0000
POWER:SOA:LINEAR:YMIN	0.0E+0
POWER:SOA:LOG:XMAX	1.0000E+3

Table C-1: Default Values (cont.)

Item	Description
POWER:SOA:LOG:XMIN	100.0000E-3
POWER:SOA:LOG:YMAX	100.0000
POWER:SOA:LOG:YMIN	100.0000E-3
POWER:SOA:MASK:DEFINE	0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000,300.0000,0.0E+
POWER:SOA:MASK:MAXAMPS	30.0000
POWER:SOA:MASK:MAXVOLTS	300.0000
POWER:SOA:MASK:MAXWATTS	750.0000
POWER:SOA:MASK:STATE	LIMITS
POWER:SOA:MASK:STOPONVIOL	0
POWER:SOA:PLOTTYPE	LOG
POWER:STATISTICS:MODE	ALL
POWER:STATISTICS:WEIGHTING	32
POWER:SWLOSS:CONDCALCMETHOD	VOLTAGE
POWER:SWLOSS:DISPLAY	ALL
POWER:SWLOSS:GATE:POLARITY	RISE
POWER:SWLOSS:GATE:TURNON	1.5000
POWER:SWLOSS:RDSON	20.0000E-3
POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID	50.0000
POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT	1.0000
POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE	5.0000
POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID	50.0000
POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT	5.0000
POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE	5.0000
POWER:SWLOSS:VCESAT	2.0000
POWER:TYPE	NONE
POWER:VOLTAGESOURCE	CH1
REF1:HORIZONTAL:DELAY:TIME	16.0000E-6
REF1:HORIZONTAL:SCALE	4.0000E-6
REF1:VERTICAL:POSITION	0.0E+0
REF1:VERTICAL:SCALE	100.0000E-3
REF2:HORIZONTAL:DELAY:TIME	16.0000E-6
REF2:HORIZONTAL:SCALE	4.0000E-6
REF2:VERTICAL:POSITION	0.0E+0
REF2:VERTICAL:SCALE	100.0000E-3
REF3:HORIZONTAL:DELAY:TIME	16.0000E-6
REF3:HORIZONTAL:SCALE	4.0000E-6
REF3:VERTICAL:POSITION	0.0E+0

Table C-1: Default Values (cont.)

Item	Description
REF3:VERTICAL:SCALE	100.0000E-3
REF4:HORIZONTAL:DELAY:TIME	16.0000E-6
REF4:HORIZONTAL:SCALE	4.0000E-6
REF4:VERTICAL:POSITION	0.0E+0
REF4:VERTICAL:SCALE	100.0000E-3
RF:DETECTIONMETHOD:MODE	AUTO
RF:DETECTIONMETHOD:RF_AVERAGE	PLUSPEAK
RF:DETECTIONMETHOD:RF_MAXHOLD	PLUSPEAK
RF:DETECTIONMETHOD:RF_MINHOLD	MINUSPEAK
RF:DETECTIONMETHOD:RF_NORMAL	PLUSPEAK
RF:FREQUENCY	1.50E+9
RF:MEASURE:ACPR:ADJACENTPAIRS	1
RF:MEASURE:ACPR:CHANBW	4.0000E+6
RF:MEASURE:ACPR:CHANSPACING	5.0000E+6
RF:MEASURE:CP:CHANBW	10.0000E+6
RF:MEASURE:OBW:CHANBW	10.0000E+6
RF:MEASURE:OBW:PERCENTDOWN	99.0000
RF:MEASURE:TYPE	NONE
RF:POSITION	0.0E+0
RF:PROBE:FORCEDRANGE	0.0E+0
RF:PROBE:GAIN	1.0000
RF:PROBE:PREAMP:MODE	AUTO
RF:RBW	3.0000E+6
RF:RBW:MODE	AUTO
RF:REFLEVEL	0.0E+0
RF:RF_AVERAGE:NUMAVG	16
RF:SCALE	10.0000
RF:SPAN	3.0E+9
RF:SPANRBWRATIO	1.0000E+3
RF:SPECTROGRAM:SLICESELECT	0
RF:SPECTROGRAM:STATE	0
RF:SPECTRUMMODE	FREERUN
RF:UNITS	DBM
RF:WINDOW	KAISER
ROSC:SOURCE	INTERNAL
SAVE:ASSIGN:TYPE	WAVEFORM
SAVE:IMAGE:FILEFORMAT	PNG

Table C-1: Default Values (cont.)

Item	Description
SAVE:IMAGE:INKSAVER	1
SAVE:IMAGE:LAYOUT	PORTRAIT
SAVE:WAVEFORM:FILEFORMAT	SPREADSHEET
SAVE:WAVEFORM:FILEFORMAT:RF_BB_IQ	TIQ
SAVE:WAVEFORM:GATING	NONE
SEARCH:SEARCH1:STATE	0
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:DATA:HIVALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:DATA:OFFSET	0
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:DATA:VALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:AUDIO:DATA:WORD	EITHER
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:DATA:DIRECTION	NOCARE
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:FRAMETYPE	DATA
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:IDENTIFIER:MODE	STANDARD
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:CAN:IDENTIFIER:VALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET	-1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE	STATIC
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE	CRCHEADER
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE	NORMAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT	"XXXXXX"

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE	ADDR7
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:ADDRESS:TYPE	USER
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:ADDRESS:VALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:CONDITION	START
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:DATA:DIRECTION	NOCARE
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:I2C:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:CONDITION	SYNCFIELD
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:ERRTYPE	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:HIVALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:VALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:COUNT	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:SUBADDRESS	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:COMMAND:TRBIT	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:CONDITION	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:DATA:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:DATA:VALUE	"XXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:ERRTYPE	PARITY
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:HIVALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:VALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:BCR	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:BUSY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:DBCA	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:INSTR	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:ME	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:SRQ	X

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:SUBSF	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:TF	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:STATUS:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:TIME:LESSLIMIT	4.0000E-6
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:TIME:MORELIMIT	12.0000E-6
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:MIL1553B:TIME:QUALIFIER	MORETHAN
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:PARALLEL:VALUE	"XXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:RS232C:CONDITION	TXSTART
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:RS232C:RX:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:RS232C:RX:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:RS232C:TX:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:RS232C:TX:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:CONDITION	SS
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:DATA:MISO:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:DATA:MOSI:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:CONDITION	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:HIVALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:OFFSET	-1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:TYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE	"XXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:ERRTYPE	PID
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:SPECIALTYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B1:USB:TOKENTYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:DATA:HIVALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:DATA:OFFSET	0
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:DATA:VALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:AUDIO:DATA:WORD	EITHER

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:DATA:DIRECTION	NOCARE
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:FRAMETYPE	DATA
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:IDENTIFIER:MODE	STANDARD
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:CAN:IDENTIFIER:VALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:CONDITION	SOF
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:HIVALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:VALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:DATA:HIVALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:DATA:OFFSET	-1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:EOFTYPE	STATIC
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:ERRTYPE	CRCHEADER
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:HIVALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:VALUE	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:FRAMETYPE	NORMAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:HEADER:CRC	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:HEADER:CYCLECOUNT	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:HEADER:FRAMEID	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:HEADER:INDBITS	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:FLEXRAY:HEADER:PAYLENGTH	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:ADDRESS:MODE	ADDR7
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:ADDRESS:TYPE	USER
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:ADDRESS:VALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:CONDITION	START
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:DATA:DIRECTION	NOCARE
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:I2C:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:CONDITION	SYNCFIELD
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:DATA:HIVALUE	"XXXXXXXX"

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:DATA:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:ERRTYPE	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:LIN:IDENTIFIER:VALUE	"XXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:HIVALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:VALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:COUNT	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:SUBADDRESS	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:COMMAND:TRBIT	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:CONDITION	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:DATA:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:DATA:VALUE	"XXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:ERRTYPE	PARITY
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:HIVALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:VALUE	"XXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:BCR	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:BUSY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:DBCA	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:INSTR	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:ME	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:SRQ	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:SUBSF	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:TF	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:STATUS:PARITY	X
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:TIME:LESSLIMIT	4.0000E-6
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:TIME:MORELIMIT	12.0000E-6
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:MIL1553B:TIME:QUALIFIER	MORETHAN
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:PARALLEL:VALUE	"XXXXXXXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:RS232C:CONDITION	TXSTART
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:RS232C:RX:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:RS232C:RX:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:RS232C:TX:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:RS232C:TX:DATA:VALUE	"XXXXXXXX"

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:CONDITION	SS
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:DATA:MISO:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:DATA:MOSI:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:ADDRESS:HIVALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:ADDRESS:VALUE	"XXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:CONDITION	SYNC
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:DATA:HIVALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:DATA:OFFSET	-1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:DATA:SIZE	1
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:DATA:TYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:DATA:VALUE	"XXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:ENDPOINT:VALUE	"XXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:ERRTYPE	PID
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:HANDSHAKETYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:QUALIFIER	EQUAL
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:SOFFRAMENUMBER	"XXXXXXXXXXX"
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:SPECIALTYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:B2:USB:TOKENTYPE	ANY
SEARCH:SEARCH1:TRIGGER:A:BUS:SOURCE	B1
SEARCH:SEARCH1:TRIGGER:A:EDGE:SLOPE	RISE
SEARCH:SEARCH1:TRIGGER:A:EDGE:SOURCE	CH1
SEARCH:SEARCH1:TRIGGER:A:LEVEL	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:CH1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:CH2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:CH3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:CH4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:MATH	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:REF1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:REF2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:REF3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LEVEL:REF4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:FUNCTION	AND
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CH1	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CH2	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CH3	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CH4	X

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CLOCK:EDGE	RISE
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:CLOCK:SOURCE	NONE
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D0	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D1	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D10	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D11	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D12	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D13	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D14	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D15	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D2	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D3	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D4	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D5	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D6	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D7	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D8	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:D9	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:MATH	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:REF1	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:REF2	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:REF3	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:INPUT:REF4	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D0	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D1	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D10	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D11	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D12	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D13	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D14	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D15	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D2	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D3	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D4	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D5	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D6	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D7	X

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D8	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:INPUT:D9	X
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:WHEN	TRUE
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:CH1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:CH2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:CH3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:CH4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:MATH	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:REF1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:REF2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:REF3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOGIC:THRESHOLD:REF4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:CH1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:CH2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:CH3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:CH4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:MATH	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:REF1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:REF2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:REF3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:LOWERTHRESHOLD:REF4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:PULSEWIDTH:HIGHLIMIT	12.0000E-9
SEARCH:SEARCH1:TRIGGER:A:PULSEWIDTH:LOWLIMIT	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:PULSEWIDTH:POLARITY	POSITIVE
SEARCH:SEARCH1:TRIGGER:A:PULSEWIDTH:WHEN	LESSTHAN
SEARCH:SEARCH1:TRIGGER:A:PULSEWIDTH:WIDTH	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:RUNT:POLARITY	POSITIVE
SEARCH:SEARCH1:TRIGGER:A:RUNT:WHEN	OCCURS
SEARCH:SEARCH1:TRIGGER:A:RUNT:WIDTH	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:CLOCK:EDGE	RISE
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:CLOCK:SOURCE	CH1
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:CLOCK:THRESHOLD	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:DATA:SOURCE	NONE
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:DATA:THRESHOLD	9.91E+37
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:HOLDTIME	8.0000E-9

Table C-1: Default Values (cont.)

Item	Description
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:SETTIME	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:CH1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:CH2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:CH3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:CH4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:MATH	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:REF1	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:REF2	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:REF3	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:SETHOLD:THRESHOLD:REF4	0.0E+0
SEARCH:SEARCH1:TRIGGER:A:TIMEOUT:POLARITY	STAYSHIGH
SEARCH:SEARCH1:TRIGGER:A:TIMEOUT:TIME	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:TRANSITION:DELTATIME	8.0000E-9
SEARCH:SEARCH1:TRIGGER:A:TRANSITION:POLARITY	POSITIVE
SEARCH:SEARCH1:TRIGGER:A:TRANSITION:WHEN	SLOWER
SEARCH:SEARCH1:TRIGGER:A:TYPE	EDGE
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:CH1	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:CH2	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:CH3	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:CH4	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:MATH	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:REF1	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:REF2	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:REF3	800.0000E-3
SEARCH:SEARCH1:TRIGGER:A:UPPERTHRESHOLD:REF4	800.0000E-3
SELECT:BUS1	0
SELECT:BUS2	0
SELECT:CH1	1
SELECT:CH2	0
SELECT:CH3	0
SELECT:CH4	0
SELECT:CONTROL	CH1
SELECT:D0	0
SELECT:D1	0
SELECT:D10	0
SELECT:D11	0
SELECT:D12	0

Table C-1: Default Values (cont.)

Item	Description
SELECT:D13	0
SELECT:D14	0
SELECT:D15	0
SELECT:D2	0
SELECT:D3	0
SELECT:D4	0
SELECT:D5	0
SELECT:D6	0
SELECT:D7	0
SELECT:D8	0
SELECT:D9	0
SELECT:DALL	0
SELECT:MATH	0
SELECT:REF1	0
SELECT:REF2	0
SELECT:REF3	0
SELECT:REF4	0
SELECT:RF_AVERAGE	0
SELECT:RF_MAXHOLD	0
SELECT:RF_MINHOLD	0
SELECT:RF_NORMAL	0
TRIGGER:A:BUS:B1:AUDIO:CONDITION	SOF
TRIGGER:A:BUS:B1:AUDIO:DATA:HIVALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B1:AUDIO:DATA:OFFSET	0
TRIGGER:A:BUS:B1:AUDIO:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:AUDIO:DATA:VALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B1:AUDIO:DATA:WORD	EITHER
TRIGGER:A:BUS:B1:CAN:CONDITION	SOF
TRIGGER:A:BUS:B1:CAN:DATA:DIRECTION	NOCARE
TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:CAN:DATA:SIZE	1
TRIGGER:A:BUS:B1:CAN:DATA:START	0.0E+0
TRIGGER:A:BUS:B1:CAN:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:CAN:FRAMETYPE	DATA
TRIGGER:A:BUS:B1:CAN:IDENTIFIER:MODE	STANDARD
TRIGGER:A:BUS:B1:CAN:IDENTIFIER:VALUE	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:CONDITION	SOF

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE	"XXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE	"XXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET	-1
TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE	1
TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE	STATIC
TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE	CRCHEADER
TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE	NORMAL
TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT	"XXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS	"XXXXX"
TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH	"XXXXXXX"
TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE	ADDR7
TRIGGER:A:BUS:B1:I2C:ADDRESS:TYPE	USER
TRIGGER:A:BUS:B1:I2C:ADDRESS:VALUE	"XXXXXXX"
TRIGGER:A:BUS:B1:I2C:CONDITION	START
TRIGGER:A:BUS:B1:I2C:DATA:DIRECTION	NOCARE
TRIGGER:A:BUS:B1:I2C:DATA:SIZE	1
TRIGGER:A:BUS:B1:I2C:DATA:START	0.0E+0
TRIGGER:A:BUS:B1:I2C:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:LIN:CONDITION	SYNCFIELD
TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:LIN:DATA:SIZE	1
TRIGGER:A:BUS:B1:LIN:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:LIN:ERRTYPE	SYNC
TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE	"XXXXXX"
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:HIVALUE	"XXXXX"
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:ADDRESS:VALUE	"XXXXX"

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:COUNT	"XXXXX"
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:PARITY	X
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:SUBADDRESS	"XXXXX"
TRIGGER:A:BUS:B1:MIL1553B:COMMAND:TRBIT	X
TRIGGER:A:BUS:B1:MIL1553B:CONDITION	SYNC
TRIGGER:A:BUS:B1:MIL1553B:DATA:PARITY	X
TRIGGER:A:BUS:B1:MIL1553B:DATA:VALUE	"XXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B1:MIL1553B:ERRTYPE	PARITY
TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:HIVALUE	"XXXXX"
TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:MIL1553B:STATUS:ADDRESS:VALUE	"XXXXX"
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:BCR	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:BUSY	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:DBCA	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:INSTR	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:ME	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:SRQ	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:SUBSF	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:BIT:TF	X
TRIGGER:A:BUS:B1:MIL1553B:STATUS:PARITY	X
TRIGGER:A:BUS:B1:MIL1553B:TIME:LESSLIMIT	4.0000E-6
TRIGGER:A:BUS:B1:MIL1553B:TIME:MORELIMIT	12.0000E-6
TRIGGER:A:BUS:B1:MIL1553B:TIME:QUALIFIER	MORETHAN
TRIGGER:A:BUS:B1:PARALLEL:VALUE	"XXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B1:RS232C:CONDITION	TXSTART
TRIGGER:A:BUS:B1:RS232C:RX:DATA:SIZE	1
TRIGGER:A:BUS:B1:RS232C:RX:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:RS232C:TX:DATA:SIZE	1
TRIGGER:A:BUS:B1:RS232C:TX:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:SPI:CONDITION	SS
TRIGGER:A:BUS:B1:SPI:DATA:IN:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:SPI:DATA:OUT:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:SPI:DATA:SIZE	1
TRIGGER:A:BUS:B1:SPI:DATA:START	0.0E+0
TRIGGER:A:BUS:B1:USB:ADDRESS:HIVALUE	"XXXXXXX"
TRIGGER:A:BUS:B1:USB:ADDRESS:VALUE	"XXXXXXX"
TRIGGER:A:BUS:B1:USB:CONDITION	SYNC

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B1:USB:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:USB:DATA:OFFSET	-1
TRIGGER:A:BUS:B1:USB:DATA:SIZE	1
TRIGGER:A:BUS:B1:USB:DATA:TYPE	ANY
TRIGGER:A:BUS:B1:USB:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B1:USB:ENDPOINT:VALUE	"XXXX"
TRIGGER:A:BUS:B1:USB:ERRTYPE	PID
TRIGGER:A:BUS:B1:USB:HANDSHAKETYPE	ANY
TRIGGER:A:BUS:B1:USB:QUALIFIER	EQUAL
TRIGGER:A:BUS:B1:USB:SOFFRAMENUMBER	"XXXXXXXXXXX"
TRIGGER:A:BUS:B1:USB:SPECIALTYPE	ANY
TRIGGER:A:BUS:B1:USB:TOKENTYPE	ANY
TRIGGER:A:BUS:B2:AUDIO:CONDITION	SOF
TRIGGER:A:BUS:B2:AUDIO:DATA:HIVALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B2:AUDIO:DATA:OFFSET	0
TRIGGER:A:BUS:B2:AUDIO:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:AUDIO:DATA:VALUE	"XXXXXXXXXXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B2:AUDIO:DATA:WORD	EITHER
TRIGGER:A:BUS:B2:CAN:CONDITION	SOF
TRIGGER:A:BUS:B2:CAN:DATA:DIRECTION	NOCARE
TRIGGER:A:BUS:B2:CAN:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:CAN:DATA:SIZE	1
TRIGGER:A:BUS:B2:CAN:DATA:START	0.0E+0
TRIGGER:A:BUS:B2:CAN:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:CAN:FRAMETYPE	DATA
TRIGGER:A:BUS:B2:CAN:IDENTIFIER:MODE	STANDARD
TRIGGER:A:BUS:B2:CAN:IDENTIFIER:VALUE	"XXXXXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:CONDITION	SOF
TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:HIVALUE	"XXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:FLEXRAY:CYCLECOUNT:VALUE	"XXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:DATA:OFFSET	-1
TRIGGER:A:BUS:B2:FLEXRAY:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:FLEXRAY:DATA:SIZE	1
TRIGGER:A:BUS:B2:FLEXRAY:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:EOFTYPE	STATIC

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B2:FLEXRAY:ERRTYPE	CRCHEADER
TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:HIVALUE	"XXXXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:FLEXRAY:FRAMEID:VALUE	"XXXXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:FRAMETYPE	NORMAL
TRIGGER:A:BUS:B2:FLEXRAY:HEADER:CRC	"XXXXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:HEADER:CYCLECOUNT	"XXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:HEADER:FRAMEID	"XXXXXXXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:HEADER:INDBITS	"XXXXX"
TRIGGER:A:BUS:B2:FLEXRAY:HEADER:PAYLENGTH	"XXXXXXX"
TRIGGER:A:BUS:B2:I2C:ADDRESS:MODE	ADDR7
TRIGGER:A:BUS:B2:I2C:ADDRESS:TYPE	USER
TRIGGER:A:BUS:B2:I2C:ADDRESS:VALUE	"XXXXXXX"
TRIGGER:A:BUS:B2:I2C:CONDITION	START
TRIGGER:A:BUS:B2:I2C:DATA:DIRECTION	NOCARE
TRIGGER:A:BUS:B2:I2C:DATA:SIZE	1
TRIGGER:A:BUS:B2:I2C:DATA:START	0.0E+0
TRIGGER:A:BUS:B2:I2C:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:LIN:CONDITION	SYNCFIELD
TRIGGER:A:BUS:B2:LIN:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:LIN:DATA:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:LIN:DATA:SIZE	1
TRIGGER:A:BUS:B2:LIN:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:LIN:ERRTYPE	SYNC
TRIGGER:A:BUS:B2:LIN:IDENTIFIER:VALUE	"XXXXXX"
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:HIVALUE	"XXXXX"
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:ADDRESS:VALUE	"XXXXX"
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:COUNT	"XXXXX"
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:PARITY	X
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:SUBADDRESS	"XXXXX"
TRIGGER:A:BUS:B2:MIL1553B:COMMAND:TRBIT	X
TRIGGER:A:BUS:B2:MIL1553B:CONDITION	SYNC
TRIGGER:A:BUS:B2:MIL1553B:DATA:PARITY	X
TRIGGER:A:BUS:B2:MIL1553B:DATA:VALUE	"XXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B2:MIL1553B:ERRTYPE	PARITY
TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:HIVALUE	"XXXXX"

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:QUALIFIER	EQUAL
TRIGGER:A:BUS:B2:MIL1553B:STATUS:ADDRESS:VALUE	"XXXXX"
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:BCR	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:BUSY	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:DBCA	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:INSTR	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:ME	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:SRQ	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:SUBSF	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:BIT:TF	X
TRIGGER:A:BUS:B2:MIL1553B:STATUS:PARITY	X
TRIGGER:A:BUS:B2:MIL1553B:TIME:LESSLIMIT	4.0000E-6
TRIGGER:A:BUS:B2:MIL1553B:TIME:MORELIMIT	12.0000E-6
TRIGGER:A:BUS:B2:MIL1553B:TIME:QUALIFIER	MORETHAN
TRIGGER:A:BUS:B2:PARALLEL:VALUE	"XXXXXXXXXXXXXXXX"
TRIGGER:A:BUS:B2:RS232C:CONDITION	TXSTART
TRIGGER:A:BUS:B2:RS232C:RX:DATA:SIZE	1
TRIGGER:A:BUS:B2:RS232C:RX:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:RS232C:TX:DATA:SIZE	1
TRIGGER:A:BUS:B2:RS232C:TX:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:SPI:CONDITION	SS
TRIGGER:A:BUS:B2:SPI:DATA:IN:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:SPI:DATA:OUT:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:SPI:DATA:SIZE	1
TRIGGER:A:BUS:B2:SPI:DATA:START	0.0E+0
TRIGGER:A:BUS:B2:USB:ADDRESS:HIVALUE	"XXXXXXX"
TRIGGER:A:BUS:B2:USB:ADDRESS:VALUE	"XXXXXXX"
TRIGGER:A:BUS:B2:USB:CONDITION	SYNC
TRIGGER:A:BUS:B2:USB:DATA:HIVALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:USB:DATA:OFFSET	-1
TRIGGER:A:BUS:B2:USB:DATA:SIZE	1
TRIGGER:A:BUS:B2:USB:DATA:TYPE	ANY
TRIGGER:A:BUS:B2:USB:DATA:VALUE	"XXXXXXXX"
TRIGGER:A:BUS:B2:USB:ENDPOINT:VALUE	"XXXX"
TRIGGER:A:BUS:B2:USB:ERRTYPE	PID
TRIGGER:A:BUS:B2:USB:HANDSHAKETYPE	ANY
TRIGGER:A:BUS:B2:USB:QUALIFIER	EQUAL

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:BUS:B2:USB:SOFFRAMENUMBER	"XXXXXXXXXXX"
TRIGGER:A:BUS:B2:USB:SPECIALTYPE	ANY
TRIGGER:A:BUS:B2:USB:TOKENTYPE	ANY
TRIGGER:A:BUS:SOURCE	B1
TRIGGER:A:EDGE:COUPLING	DC
TRIGGER:A:EDGE:SLOPE	RISE
TRIGGER:A:EDGE:SOURCE	CH1
TRIGGER:A:HOLDOFF:TIME	20.0000E-9
TRIGGER:A:LEVEL	0.0E+0
TRIGGER:A:LEVEL:CH1	0.0E+0
TRIGGER:A:LEVEL:CH2	0.0E+0
TRIGGER:A:LEVEL:CH3	0.0E+0
TRIGGER:A:LEVEL:CH4	0.0E+0
TRIGGER:A:LEVEL:D0	1.4000
TRIGGER:A:LEVEL:D1	1.4000
TRIGGER:A:LEVEL:D10	1.4000
TRIGGER:A:LEVEL:D11	1.4000
TRIGGER:A:LEVEL:D12	1.4000
TRIGGER:A:LEVEL:D13	1.4000
TRIGGER:A:LEVEL:D14	1.4000
TRIGGER:A:LEVEL:D15	1.4000
TRIGGER:A:LEVEL:D2	1.4000
TRIGGER:A:LEVEL:D3	1.4000
TRIGGER:A:LEVEL:D4	1.4000
TRIGGER:A:LEVEL:D5	1.4000
TRIGGER:A:LEVEL:D6	1.4000
TRIGGER:A:LEVEL:D7	1.4000
TRIGGER:A:LEVEL:D8	1.4000
TRIGGER:A:LEVEL:D9	1.4000
TRIGGER:A:LOGIC:CLASS	LOGIC
TRIGGER:A:LOGIC:FUNCTION	AND
TRIGGER:A:LOGIC:INPUT:CH1	X
TRIGGER:A:LOGIC:INPUT:CH2	X
TRIGGER:A:LOGIC:INPUT:CH3	X
TRIGGER:A:LOGIC:INPUT:CH4	X
TRIGGER:A:LOGIC:INPUT:CLOCK:EDGE	RISE
TRIGGER:A:LOGIC:INPUT:CLOCK:SOURCE	NONE

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:LOGIC:INPUT:D0	X
TRIGGER:A:LOGIC:INPUT:D1	X
TRIGGER:A:LOGIC:INPUT:D10	X
TRIGGER:A:LOGIC:INPUT:D11	X
TRIGGER:A:LOGIC:INPUT:D12	X
TRIGGER:A:LOGIC:INPUT:D13	X
TRIGGER:A:LOGIC:INPUT:D14	X
TRIGGER:A:LOGIC:INPUT:D15	X
TRIGGER:A:LOGIC:INPUT:D2	X
TRIGGER:A:LOGIC:INPUT:D3	X
TRIGGER:A:LOGIC:INPUT:D4	X
TRIGGER:A:LOGIC:INPUT:D5	X
TRIGGER:A:LOGIC:INPUT:D6	X
TRIGGER:A:LOGIC:INPUT:D7	X
TRIGGER:A:LOGIC:INPUT:D8	X
TRIGGER:A:LOGIC:INPUT:D9	X
TRIGGER:A:LOGIC:PATTERN:DELTATIME	8.0000E-9
TRIGGER:A:LOGIC:PATTERN:WHEN	TRUE
TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT	8.0000E-9
TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT	8.0000E-9
TRIGGER:A:LOGIC:THRESHOLD:CH1	0.0E+0
TRIGGER:A:LOGIC:THRESHOLD:CH2	0.0E+0
TRIGGER:A:LOGIC:THRESHOLD:CH3	0.0E+0
TRIGGER:A:LOGIC:THRESHOLD:CH4	0.0E+0
TRIGGER:A:LOGIC:THRESHOLD:D0	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D1	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D10	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D11	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D12	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D13	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D14	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D15	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D2	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D3	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D4	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D5	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D6	1.4000

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:LOGIC:THRESHOLD:D7	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D8	1.4000
TRIGGER:A:LOGIC:THRESHOLD:D9	1.4000
TRIGGER:A:LOWERTHRESHOLD:CH1	0.0E+0
TRIGGER:A:LOWERTHRESHOLD:CH2	0.0E+0
TRIGGER:A:LOWERTHRESHOLD:CH3	0.0E+0
TRIGGER:A:LOWERTHRESHOLD:CH4	0.0E+0
TRIGGER:A:LOWERTHRESHOLD:D0	1.4000
TRIGGER:A:LOWERTHRESHOLD:D1	1.4000
TRIGGER:A:LOWERTHRESHOLD:D10	1.4000
TRIGGER:A:LOWERTHRESHOLD:D11	1.4000
TRIGGER:A:LOWERTHRESHOLD:D12	1.4000
TRIGGER:A:LOWERTHRESHOLD:D13	1.4000
TRIGGER:A:LOWERTHRESHOLD:D14	1.4000
TRIGGER:A:LOWERTHRESHOLD:D15	1.4000
TRIGGER:A:LOWERTHRESHOLD:D2	1.4000
TRIGGER:A:LOWERTHRESHOLD:D3	1.4000
TRIGGER:A:LOWERTHRESHOLD:D4	1.4000
TRIGGER:A:LOWERTHRESHOLD:D5	1.4000
TRIGGER:A:LOWERTHRESHOLD:D6	1.4000
TRIGGER:A:LOWERTHRESHOLD:D7	1.4000
TRIGGER:A:LOWERTHRESHOLD:D8	1.4000
TRIGGER:A:LOWERTHRESHOLD:D9	1.4000
TRIGGER:A:MODE	AUTO
TRIGGER:A:PULSE:CLASS	WIDTH
TRIGGER:A:PULSEWIDTH:HIGHLIMIT	12.0000E-9
TRIGGER:A:PULSEWIDTH:LOWLIMIT	8.0000E-9
TRIGGER:A:PULSEWIDTH:POLARITY	POSITIVE
TRIGGER:A:PULSEWIDTH:WHEN	LESSTHAN
TRIGGER:A:PULSEWIDTH:WIDTH	8.0000E-9
TRIGGER:A:RUNT:POLARITY	POSITIVE
TRIGGER:A:RUNT:WHEN	OCCURS
TRIGGER:A:RUNT:WIDTH	8.0000E-9
TRIGGER:A:SETHOLD:CLOCK:EDGE	RISE
TRIGGER:A:SETHOLD:CLOCK:SOURCE	CH1
TRIGGER:A:SETHOLD:CLOCK:THRESHOLD	0.0E+0
TRIGGER:A:SETHOLD:DATA:SOURCE	NONE

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:SETHOLD:DATA:THRESHOLD	9.91E+37
TRIGGER:A:SETHOLD:HOLDTIME	8.0000E-9
TRIGGER:A:SETHOLD:SETTIME	8.0000E-9
TRIGGER:A:SETHOLD:THRESHOLD:CH1	0.0E+0
TRIGGER:A:SETHOLD:THRESHOLD:CH2	0.0E+0
TRIGGER:A:SETHOLD:THRESHOLD:CH3	0.0E+0
TRIGGER:A:SETHOLD:THRESHOLD:CH4	0.0E+0
TRIGGER:A:SETHOLD:THRESHOLD:D0	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D1	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D10	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D11	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D12	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D13	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D14	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D15	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D2	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D3	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D4	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D5	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D6	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D7	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D8	1.4000
TRIGGER:A:SETHOLD:THRESHOLD:D9	1.4000
TRIGGER:A:TIMEOUT:POLARITY	STAYSHIGH
TRIGGER:A:TIMEOUT:TIME	8.0000E-9
TRIGGER:A:TRANSITION:DELTATIME	8.0000E-9
TRIGGER:A:TRANSITION:POLARITY	POSITIVE
TRIGGER:A:TRANSITION:WHEN	SLOWER
TRIGGER:A:TYPE	EDGE
TRIGGER:A:UPPERTHRESHOLD:CH1	800.0000E-3
TRIGGER:A:UPPERTHRESHOLD:CH2	800.0000E-3
TRIGGER:A:UPPERTHRESHOLD:CH3	800.0000E-3
TRIGGER:A:UPPERTHRESHOLD:CH4	800.0000E-3
TRIGGER:A:VIDEO:CUSTOM:FORMAT	PROGRESSIVE
TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD	63.5600E-6
TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL	4.7200E-6
TRIGGER:A:VIDEO:HOLDOFF:FIELD	0.0E+0

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:A:VIDEO:LINE	1
TRIGGER:A:VIDEO:POLARITY	POSITIVE
TRIGGER:A:VIDEO:STANDARD	NTSC
TRIGGER:A:VIDEO:SYNC	ALLLINES
TRIGGER:B:BY	TIME
TRIGGER:B:EDGE:COUPLING	DC
TRIGGER:B:EDGE:SLOPE	RISE
TRIGGER:B:EDGE:SOURCE	CH1
TRIGGER:B:EVENTS:COUNT	1
TRIGGER:B:LEVEL	0.0E+0
TRIGGER:B:LEVEL:CH1	0.0E+0
TRIGGER:B:LEVEL:CH2	0.0E+0
TRIGGER:B:LEVEL:CH3	0.0E+0
TRIGGER:B:LEVEL:CH4	0.0E+0
TRIGGER:B:LEVEL:D0	1.4000
TRIGGER:B:LEVEL:D1	1.4000
TRIGGER:B:LEVEL:D10	1.4000
TRIGGER:B:LEVEL:D11	1.4000
TRIGGER:B:LEVEL:D12	1.4000
TRIGGER:B:LEVEL:D13	1.4000
TRIGGER:B:LEVEL:D14	1.4000
TRIGGER:B:LEVEL:D15	1.4000
TRIGGER:B:LEVEL:D2	1.4000
TRIGGER:B:LEVEL:D3	1.4000
TRIGGER:B:LEVEL:D4	1.4000
TRIGGER:B:LEVEL:D5	1.4000
TRIGGER:B:LEVEL:D6	1.4000
TRIGGER:B:LEVEL:D7	1.4000
TRIGGER:B:LEVEL:D8	1.4000
TRIGGER:B:LEVEL:D9	1.4000
TRIGGER:B:LOWERTHRESHOLD:CH1	0.0E+0
TRIGGER:B:LOWERTHRESHOLD:CH2	0.0E+0
TRIGGER:B:LOWERTHRESHOLD:CH3	0.0E+0
TRIGGER:B:LOWERTHRESHOLD:CH4	0.0E+0
TRIGGER:B:LOWERTHRESHOLD:D0	1.4000
TRIGGER:B:LOWERTHRESHOLD:D1	1.4000
TRIGGER:B:LOWERTHRESHOLD:D10	1.4000

Table C-1: Default Values (cont.)

Item	Description
TRIGGER:B:LOWERTHRESHOLD:D11	1.4000
TRIGGER:B:LOWERTHRESHOLD:D12	1.4000
TRIGGER:B:LOWERTHRESHOLD:D13	1.4000
TRIGGER:B:LOWERTHRESHOLD:D14	1.4000
TRIGGER:B:LOWERTHRESHOLD:D15	1.4000
TRIGGER:B:LOWERTHRESHOLD:D2	1.4000
TRIGGER:B:LOWERTHRESHOLD:D3	1.4000
TRIGGER:B:LOWERTHRESHOLD:D4	1.4000
TRIGGER:B:LOWERTHRESHOLD:D5	1.4000
TRIGGER:B:LOWERTHRESHOLD:D6	1.4000
TRIGGER:B:LOWERTHRESHOLD:D7	1.4000
TRIGGER:B:LOWERTHRESHOLD:D8	1.4000
TRIGGER:B:LOWERTHRESHOLD:D9	1.4000
TRIGGER:B:STATE	0
TRIGGER:B:TIME	8.0000E-9
TRIGGER:B:TYPE	EDGE
VERBOSE	1
VIDPIC:AUTOCONTRAST	1
VIDPIC:AUTOCONTRAST:UPDATERATE	20
VIDPIC:BRIGHTNESS	50
VIDPIC:CONTRAST	50
VIDPIC:DISPLAY	0
VIDPIC:FRAMETYPE	ODD
VIDPIC:LOCATION:HEIGHT	254
VIDPIC:LOCATION:OFFSET	56.6000E-9
VIDPIC:LOCATION:START:LINE	17
VIDPIC:LOCATION:START:PIXEL	0.0E+0
VIDPIC:LOCATION:WIDTH	526
VIDPIC:LOCATION:X	112
VIDPIC:LOCATION:Y	73
VIDPIC:SOURCE	CH1
VIDPIC:STANDARD	NTSC
ZOOM:MODE	0
ZOOM:ZOOM1:POSITION	50.0000
ZOOM:ZOOM1:SCALE	4.0000E-6
ZOOM:ZOOM1:STATE	0

Appendix D: Waveform Transfer (WFMOutpre and CURVe Query) Examples

Here are several examples of command sequences using the WFMOutpre? and CURVe? queries to transfer data from the oscilloscope to a PC, with different data sources, including Analog, Digital, Digital Collection, and RF frequency domain waveforms. Each command sequence example is followed by an explanation of the returned WFMOutpre? results. The WFMOutpre? values act as settings that apply to the CURVe query data being transferred.

NOTE. *In order to guarantee that the waveform data returned from CURVE? queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using ACQuire:STOPAfter SEQuence.*

Example 1: Analog Waveform (Channels 1–4)

Goal: Transfer 10,000 points of analog channel waveform data from the oscilloscope to a PC.

Command	Comment
:DATa:SOUrce CH1	
:DATa:START 1	
:DATa:STOP 10000	
:WFMOutpre:ENCdg BINARY	
:WFMOutpre:BYT_Nr 1	
:HEADer 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR MSB;WFID "Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode";NR_PT 10000;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT "V";YMULT 4.0000E-3;YOFF 0.0E+0;YZERO 0.0E+0
:CURVE?	Returns 10,000 data points: :CURVe #510000<10,000 binary bytes of waveform data.>

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
BYT_NR 1	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 8	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG BINARY	This value specifies the encoding of the waveform data. To change this value (the other possibility is ASCii), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query.
NR_PT 10000	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT "s"	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 4.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -20.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)

WFMOutpre? Query results	Explanation
YUNIT "V"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, volts. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 4.0000E-3	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 2: Digital Waveform (Channels D0-D15)

Goal: Transfer 25 points of digital channel waveform data from the oscilloscope to a PC.

Command	Comment
:DATa:SOUrce D5	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 1	
:HEADer 1	
:VERBose 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "D5, unknown coupling, 100.0us/div, 10000 points, Digitalmode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe 0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 1	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 8	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "D5, unknown coupling, 100.0us/div, 10000 points, Digital mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query. It cannot be changed.
NR_PT 25	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only. (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT “s”	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is “s”, representing seconds. When using the math waveform as a source, the value can be “s” or “Hz”. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 100.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -500.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)

WFMOutpre? Query results	Explanation
YUNIT "State"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.0000	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 3: The Digital Collection with 4 Bytes Per Point and MagniVu Off

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 4 bytes per point and MagniVu off.

Command	Comment
:DATa:SOUrce DIGital	
:ACQuire:MAGnivu 0	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 4	
:HEADer 1	
:VERBose 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 4;BIT_NR 32;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe FB386,FB366,FB3E6,FB366,FB3E6,FB32E,FB3A2,FB32E,FB3AA,FB366, FB3EA,FB366,FB3E2,FB36,FB3E6,FB366,FB3E6,FB346,FB3C6,FB346,FB3C6, FB34E,FB3C2,FB34E,FB3CA

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes. For example, a 4-byte digital collection value of FB386 should be interpreted as 000FB386.*

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 4	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 32	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query. It cannot be changed.
NR_PT 25	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT "s"	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. For live channels, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)

WFMOutpre? Query results	Explanation
XINCR 100.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -500.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
YUNIT "State"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.0000	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 4: The Digital Collection with 8 Bytes Per Point and MagniVu Off

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 8 bytes per point and MagniVu off.

Command	Comment
:DATa:SOUrce DIGital	
:ACQuire:MAGnivu 0	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 8	
:HEADer 1	
:VERBose 1	

Command	Comment
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 8;BIT_NR 64;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe 80000FB386,E0000FB386,80000FB3E6,80000FB3E6,80000FB3E6, C8000FB3A6,8C000FB3A6, 8C000FB3A6,84000FB3AE,CC000FB3A6, 8C000FB3E6,8C000FB3E6,84000FB3E6,80000FB3E6,80000FB3E6, 80000FB3E6,80000FB3E6,A0000FB3C6,80000FB3C6,80000FB3C6, 80000FB3C6,88000FB3C6,8C000FB3C6, 8C000FB3C6,84000FB3CE

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 8	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 64	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.

WFMOutpre? Query results	Explanation
WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query. It cannot be changed.
NR_PT 25	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT "s"	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 100.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -500.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
YUNIT "State"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.0000	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 5: The Digital Collection with 4 Bytes Per Point and MagniVu On

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 4 bytes per point and MagniVu on.

Command	Comment
:DATa:SOUrce DIGital	
:ACQuire:MAGnivu 1	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 4	
:HEADer 1	
:VERBose 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 4;BIT_NR 32;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 1.2121E-9;XZERO -6.0606E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe FB6E6,FB666,FB6E6,FB666,FB666,FB6E6,FB666,FB6E6,FB666, FB666, FB6E6,FB666,FB6E6,FB6E6,FB666,FB6E6,FB666,FB666, FB6E6,FB666,FB6E6,FB6E6,FB666,FB6E6,FB666

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 4	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 32	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nrcommand. Note that changing this value automatically changes the BYT_NR value accordingly.

WFMOutpre? Query results	Explanation
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query. It cannot be changed.
NR_PT 25	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT "s"	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 1.2121E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -6.0606E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
YUNIT "State"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.0000	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)

WFMOutpre? Query results	Explanation
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 6: The Digital Collection with 8 Bytes Per Point and MagniVu On

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 8 bytes per point and MagniVu on.

Command	Comment
:DATa:SOUrce DIGital	
:ACQuire:MAGnivu 1	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 8	
:HEADer 1	
:VERBose 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 8;BIT_NR 64;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 1.2121E-9;XZERO -6.0606E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe 80000FB787,80000FB787,E8000FB787,8C000FB7E7,8C000FB7E7, 84000FB7EF,CC000FB7A7,8C000FB7A7,8C000FB7A7,84000FB7A7, 84000FB7A7,80000FB7A7,80000FB7A7,80000FB7A7,80000FB7A7, 80000FB7A7,80000FB7A7,80000FB7A7,C8000FB7A7,8C000FB7E7, 8C000FB7E7,84000FB7EF,CC000FB7A7,8C000FB7A7,8C000FB7A7

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the* `WAVFrm?` *query, which concatenates the* `WFMOutpre?` *and* `CURVe?` *queries.*

WFMOutpre? Query results	Explanation
`WFMOUTPRE:BYT_NR 8`	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the `BIT_NR` value accordingly. (This value can also be set using the DATa:WIDth command.)
`BIT_NR 64`	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the `BYT_NR` value accordingly.
`ENCDG ASCII`	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the `WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,`: and `WFMOutpre:BYT_Or` values using a single command.)
`BN_FMT RI`	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
`BYT_OR MSB`	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
`WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"`	This quoted string represents information about the source waveform that would be returned by a. `WFMOutpre:WFId?` query. It cannot be changed.
`NR_PT 25`	This value indicates the number of data points in the waveform record. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
`PT_FMT Y`	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
`PT_ORDER LINEAR`	This value is always `LINear`.
`XUNIT "s"`	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
`XINCR 1.2121E-9`	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
`XZERO -6.0606E-6`	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)

WFMOutpre? Query results	Explanation
PT_OFF 0	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
YUNIT "State"	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.0000	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 7: RF Frequency Domain Waveform

Goal: Transfer 5 points of RF frequency domain data from the oscilloscope to a PC using 4 bytes per point.

NOTE. *A frequency domain waveform used in data transfer from the oscilloscope to a PC or other device may be one of the four RF frequency domain traces or the Spectrum Math waveform.*

Command	Comment
:DATa:SOUrce RF_NORMal	
:DATa:STARt 495	
:DATa:STOP 505	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 4	
:HEADer 1	
:VERBose 1	

Command	Comment
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 4;BIT_NR 32;ENCDG ASCII;BN_FMT FP;BYT_OR MSB;WFID "RF_NORMAL, unknown coupling, 10.00W/div, 200.0MHz/div, 1001 points, Sample mode, Center Freq: 2.400GHz, Span: 2.000GHz, Reference Level: 1.000mW";NR_PT 21;PT_FMT Y;PT_ORDER LINEAR;XUNIT "Hz";XINCR 2.0000E+6;XZERO 1.4000E+9;PT_OFF 0;YUNIT "W";YMULT 1.5625E-3;YOFF 0.0E+0;YZERO 0.0E+0;DOMAIN FREQUENCY;WFMTYPE RF_FD;CENTERFREQUENCY 2.4000E+9;SPAN 2.0000E+9;REFLEVEL 1.0000E-3
:CURVe?	Returns the following values. Each value represents a data point: :CURVE 2.43108E-10,1.62648E-10,2.78478E-10,4.15163E-10,7.66223E-10,7.63905E-10,3.68375E-10,3.42668E-10,3.06422E-10,1.81561E-10,2.0223E-10,4.24327E-10,1.95298E-10,2.1304E-10,9.41791E-11,4.56513E-10,4.33067E-10,6.57215E-11,1.65388E-10,9.09116E-10,5.39507E-10

WFMOutpre? Query results	Explanation
BYT_NR 4	This value specifies the number of bytes per data point in the waveform data. This value is fixed for RF frequency domain traces.
BIT_NR 32	This value specifies the number of bits per data point in the waveform data. This value is fixed for RF frequency domain traces.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility for RF frequency domain traces is FPBINARY), use the WFMOutpre:ENCdg command. This value can also be set using the DATa:ENCdg command.
BN_FMT FP	This value specifies the binary format, which in this case is FP (floating point). This value is fixed for RF frequency domain traces. Note: This field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: This field is not applicable for ASCii encoding.
WFID "RF_NORMAL, unknown coupling, 10.00W/div, 200.0MHz/div, 1001 points, Sample mode, Center Freq: 2.400GHz, Span: 2.000GHz, Reference Level: 1.000mW"	This quoted string represents information about the source waveform that would be returned by a WFMOutpre:WFId? Query. It cannot be changed.
NR_PT 21	This value indicates the number of data points in the waveform record. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: This value is typically equal to the full record length of the RF frequency domain trace, but you also have the option to transfer only a portion of the record using the DATs:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YF (Amplitude vs. Frequency) format. This is query only. (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.
PT_ORDER LINEAR .	This value is always LINear

XUNIT "Hz"	This value indicates the units of the x-axis of the waveform record. This value is always “Hz” for RF frequency domain traces. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 2.0000E+6	This value indicates the frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO 1.4000E+9	This value indicates the frequency, in hertz, of the first data point in the waveform record. This frequency is relative to the time of the trigger, which is always 0. This XZEro frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
YUNIT "W"	This value indicates the units of data points in the waveform record. This value depends on the vertical units of the source waveform – in this case, watts. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 1.5625E-3	This value indicates the multiplying factor to convert the data point values to the units specified by the:WFMOutpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform. This value is unused for RF frequency domain traces and is always 0.
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform. This value is unused for RF frequency domain traces and is always 0.
DOMAIN FREQUENCY	This value indicates the domain in which the source waveform is displayed and stored. For RF time domain traces, the domain is Time and waveform transfer information is treated as integer information. For RF frequency domain traces, the domain is Frequency and waveform transfer information is treated as floating point information. This is query only. (If you would like to determine only this value, use the WFMOutpre:DOMain? query.)
WFMTYPE RF_FD	This value indicates the type of the source waveform. RF_FD indicates an RF frequency domain trace (frequency domain waveform). This is query only. (If you would like to determine only this value, use the WFMOutpre:WFMTYPe? query.)
CENTERFREQUENCY 2.4000E+9	This value indicates the center frequency, in hertz, of the source waveform. This is query only. (If you would like to determine only this value, use the WFMOutpre:CENTERFREQuency? query.)
SPAN 2.0000E+9	This value indicates the frequency span, in hertz, of the source waveform. This is query only. (If you would like to determine only this value, use the WFMOutpre:SPAN? query.)
REFLEVEL 1.0000E-3	This value indicates the reference level, in watts, of the source waveform. This is query only. (If you would like to determine only this value, use the WFMOutpre:REFLEvel? query.)

Appendix E: Mask/Limit Command Sequence Examples

This section provides some sample mask command sequences that show you how to accomplish a few typical tasks.

Example 1: Creating custom masks

Goal: Create a custom mask, run a test that stops on violation, and determine the number of hits per mask segment.

Command	Comment
*RST	Resets the oscilloscope to the factory default settings.
:MASK:CUSTOM INIT	This should display a triangle mask with one segment using the default horizontal and vertical scope settings. (Note: the default horizontal scale is 4 µsec/div.)
	You can verify that it's a custom mask by querying:
MASK:STANDARD?	Should return CUSTOM.
	Next, use mask commands to specify the mask parameters:
:MASK:USER:AMPLitude 100.0000E-3 :MASK:USER:VSCALe 100.0000E-3 :MASK:USER:VPOS 0.0E+0 :MASK:USER:VOFFSet 0.0E+0 :MASK:USER:HSCALE 4.0000E-6 :MASK:USER:HTRIGPOS 500.0000E-3 :MASK:USER:WIDth 4.0000E-6 :MASK:USER:RECOrdlength 10000 :MASK:USER:TRIGTOSAMP 0.0E+0	
	Next, substitute a customized mask for the initial mask by creating two blue bands across the screen, one above and one below the x-axis. Note the dimensions of the display are 40e-6 X 10e-3 (10*horizontal_scale X 10*vertical_scale). The number of horizontal divisions is 10. The points in these lists are presented in a counter clock-wise manner starting with the lower # left hand corner (-20e-6, .1) for SEG1 and (-20e-6,-.2) for SEG2:
:MASK:USER:SEG1:POINTS -20e-6,.1,20e-6,.1,20e-6,.2,-20e-6,.2 :MASK:USER:SEG2:POINTS -20e-6,-.2,20e-6,-.2,20e-6,-.1,-20e-6,-.1	
	Next, force a failure. Generate 100KHz sine wave, amplitude 0.22 volt, offset 0.0.
:ACQUIRE:STATE?	Should return 1, indicating that acquisitions are taking place.
:MASK:STOPONVIOLATION ON	This command will cause waveform acquisitions to stop upon the first occurrence of a waveform violation once the test starts.
:MASK:TEST:STATE ON	Starts the test.
:ACQUIRE:STATE?	Should now return 0, verifying that waveform acquisitions have stopped.

Command	Comment
	You can use the following queries to count the hits and get other information about the test. Total hits should equal the sum of the SEG1 and SEG2 hits.
:MASK:COUNT:HITS? :MASK:COUNT:SEG1:HITS? :MASK:COUNT:SEG2:HITS? :MASK:COUNT:TOTAL? :MASK:COUNT:VIOLATIONS? :MASK:COUNT:WAVEFORMS?	:MASK:COUNT:VIOLATIONS? should return 1, since stoponviolation was set.

Example 2: Modifying an existing mask

Goal: Modify an existing standard mask, save the modified mask, then recall the modified mask.

NOTE. *This example does not apply for MDO3000 series models.*

Command	Comment
*RST	Resets the oscilloscope to the factory default settings.
:MASK:STANDARD DS1C	This command displays a standard DS1C mask.
:MASK:STANDARD?	Should return DS1C.
:MASK:CUSTOM COPYACTIVE	This command copies the currently displayed mask and designates it as a custom mask.
:MASK:STANDARD?	Should now return CUSTOM.
	You can query to find out the points of each segment:
:MASK:USER:SEG1:POINTS?	Should return -155.3300E-9,420.0000E-3,-41.2100E-9,420.0000E-3, -6.3400E-9,2.1000,-6.3400E-9,4.6200,82.4200E-9,4.6200,82.4200E-9,4.4100, 171.1800E-9,4.4100,171.1800E-9,2.1000,206.0500E-9,420.0000E-3, 320.1700E-9,420.0000E-3,320.1700E-9,6.3000,-155.3300E-9,6.3000
:MASK:USER:SEG2:POINTS?	Should return -155.3300E-9,-2.1000,320.1700E-9,-2.1000,320.1700E-9, -420.0000E-3,152.1600E-9,-420.0000E-3,152.1600E-9,2.1000,114.1200E-9, 3.9900,50.7200E-9,3.9900,12.6800E-9,2.1000,12.6800E-9,-420.0000E-3,-155.3300E-9, -420.0000E-3
:MASK:USER:SEG3:POINTS?	Should return 0.0E+0,0.0E+0 since this mask has only 2 segments.
	Next, you can modify the mask.
:MASK:USER:SEG2 DELETE	The bottom segment of the mask (segment 2) should disappear from the display.
:MASK:USER:SEG2:POINTS?	Should now return 0.0E+0,0.0E+0.
	Create a new segment 2:
:MASK:USER:SEG2:POINTS [Enter new points for segment 2 here]	The MASK:USER:SEG2:POINTS command specifies the X-Y coordinate pairs of all points in the specified segment, using waveform units. There can be up to 8 segments. A new segment 2 should appear on the display.

Command	Comment
	Now, you may save your custom mask. You can save either the mask definition itself, or the mask definition plus the rest of the scope settings. In both cases, the information is saved to the current working directory.
:SAVE:MASK '"FOO.MSK"	or SAVE:SETUP "FOO.SET"'
	To recall the mask, use the commands RECAll:MASK "FOO.MSK" or RECAll:SETUP "FOO.SET"

Example 3: Creating a limit (template) mask

Goal: Create a limit (template) mask and then, upon violation, save the waveform data and image to a USB device or a network drive.

Command	Comment
	First, install a USB mass storage device into one of the available slots on the instrument or mount a network drive. The DPO/MSO4000B series has 2 USB host ports ("E:" and "F:") on the front of the instrument and 2 USB host ports ("G:" and "H:") on the rear of the instrument. The MDO3000 series has one USB host port on the front (E:) and one on the back (F:). Additionally, they support mounting network drives as "I:" through "Z:" (See the command FILESystem:MOUNT:DRIve for more information). The default working directory for file system access via the programmatic interface is "E:". You can create a directory on that drive if desired by using the FILESystem:MKDIR command. For example, FILESys:MKDIR "E:/MyMaskTestWaveforms". Next, set the current working directory (CWD) to the drive/directory that you desire to have the waveform file saved to. For example FILESystem:CWD "E:/MyMaskTestWaveforms". # Next, select the type of waveform file you desire to save: SPREADSheet or INTERNal using the SAVe:WAVEForm:FILEFormat {SPREADSheet | INTERNal} command. See the command SAVe:WAVEForm:FILEFormat for more information.
*RST	Resets the oscilloscope to the factory default settings.
:APPLICATION:TYPE LIMITMASK	This sets the application type to limit mask.
:MASK:TEMPLATE:SOURCE CH1	This command specifies the source waveform to be used to create a template mask. The source can be either one of four channels, or one of four saved reference waveforms
	Generate a 300KHz sine wave, 0.2 volt peak to peak, with no offset. Position the waveform so that the signal is centered in the screen. Now, create a template mask, which will be based on the settings of the MASK:TEMPLate:SOUrce, MASK:TEMPLate:TOLerance:HORizontal, and MASK:TEMPLate:TOLerance:VERTical commands. (If you do not specify the horizontal or vertical tolerances, the default tolerance of one minor division will be used.)
:MASK:TEMPLATE:CREATEMASK	The limit mask should appear on the screen.
:MASK:STOPONVIOLATION ON	This command will stop the waveform acquisitions upon the first occurrence of a waveform violation.
:MASK:TEST:SAVEWFM ON	Once the test starts, this command will save an ISF or CSV file (depending upon the setting of (SAVe:WAVEForm:FILEFormat) of the waveform from Channel 1 upon mask violation to a file # in the current working directory.

Command	Comment
:MASK:TEST:SAVEIMAGE ON	Once the test starts, this command will save a .PNG, .BMP or .TIF file (depending upon the setting of SAVe:IMAGe:FILEFormat) of the waveform from Channel 1 upon mask violation to a file in the current working directory.
:MASK:TEST:STATE 1	This starts the test.
	Next, force a mask violation. Generate a 300KHz sine wave, 0.22 volt Peak to peak, 0.0 offset.
:ACQUIRE:STATE?	This query should return 0, indicating that the acquisitions have stopped, because a violation has taken place.
:FILESYSTEM:DIR?	This query should show that a new waveform and a new screen image file have been saved to the current working directory.

Appendix F: Search and Trigger Command Sequence Examples

The following are some example command sequences that show a variety of different searches and triggers. The commands in these sequences are not order-dependent.

To use these examples, connect channel 1, channel 2, channel 3 and channel 4 to the probe compensation signal located on the right hand side of the front panel.

The search and trigger command group sections contain more information on general search and trigger concepts. (See page 2-61, *Search Command Group*.) (See page 2-75, *Trigger Command Group*.)

Example 1: Single Threshold Edge Search

Goal: Search the channel 2 waveform and place a mark at each instance where it crosses below a threshold of 1.4 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH2 1	Turns the CH2 waveform on.
:AUTOSet EXECute	Autosets the displayed waveform CH2. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe EDGE	Specifies that this will be an edge search (a mark will be placed when the source waveform passes through a specified threshold level in the specified direction).
:SEARCH:SEARCH1:TRIGger:A:EDGE:SOUrce CH2	Specifies the CH2 waveform as the source waveform.
:SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:CH2 1.4	Specifies 1.4 volts as the threshold level.
:SEARCH:SEARCH1:TRIGger:A:EDGE:SLOpe FALL	Specifies the falling edge as the direction.
:SEARCH:SEARCH1:STATE 1	Turns the search on.
:SEARCH:SEARCH1:TOTal?	Returns 4, indicating that CH2 fell below the 1.4 volt threshold 4 times.
:SEARCH:SEARCH1:LIST?	Returns a list of the 4 marks: **CH2**,11.2411,11.2411,11.2411,-1.5504E-3, 0.0E+0,0.0E+0,0.0E+0;**CH2**,37.0737,37.0737,37.0737, -517.0517E-6,0.0E+0,0.0E+0,0.0E+0;**CH2**,62.9163,62.9163,62.9163, 516.6517E-6,0.0E+0,0.0E+0, 0.0E+0;**CH2**,88.7489,88.7489,88.7489, 1.5500E-3,0.0E+0,0.0E+0,0.0E+0

Example 2: Single Threshold Edge Trigger

Goal: Trigger on the channel 2 waveform when the waveform crosses below a threshold of 1.4 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH2 1	Turns the CH2 waveform on.
:TRIGger:A:TYPe EDGE	Specifies that this will be an edge trigger (trigger will occur when the source waveform passes through a specified threshold level in the specified direction).
:TRIGger:A:EDGE:SOUrce CH2	Specifies the CH2 waveform as the source waveform.
:TRIGger:A:LOWerthreshold:CH2 1.4	Specifies 1.4 volts as the threshold level.
:TRIGger:A:EDGE:SLOpe FALL	Specifies as falling edge as the direction.
:TRIGger:STATE?	Should return TRIGGER, not AUTO.

Example 3: Dual Threshold Runt Search

Goal: Search the channel 3 waveform for negative runt pulses and place a mark at each instance when the waveform drops below an upper threshold of 1.4 volts, but does not cross a lower threshold of -2 volts before re-crossing the upper threshold. The pulse width must be less than 600 microseconds.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH3 1	Turns the CH3 waveform on.
:AUTOSet EXECute	Autosets the displayed waveform CH3. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe RUNT	Specifies that this will be a runt search (a mark will be placed on a pulse amplitude that crosses one threshold but fails to cross a second threshold before re-crossing the first).
:SEARCH:SEARCH1:TRIGger:A:EDGE:SOUrce CH3	Specifies to use channel 3 as the source waveform.
:SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:CH3 -2	Specifies to use -2 volts as the lower threshold.
:SEARCH:SEARCH1:TRIGger:A:UPPerthreshold: CH3 1.4	Specifies to use 1.4 volts as the upper threshold.
:SEARCH:SEARCH1:TRIGger:A:RUNT:POLarity NEGative	Specifies to search for when the runt polarity is negative.
:SEARCH:SEARCH1:TRIGger:A:RUNT:WIDth 600E-6	Specifies a pulse width of 600E-6 seconds.
:SEARCH:SEARCH1:TRIGger:A:RUNT:WHEn LESSthan	Specifies to search for when the pulse width is less than 600E-6 seconds.
:SEARCH:SEARCH1:STATE 1	Turns the search on.

Command	Comment
:SEARCH:SEARCH1:TOTal?	Returns 3, indicating that 3 total negative runt pulses were less than 600E-6 seconds wide
:SEARCH:SEARCH1:LIST?	Returns a list of 3 marks: **CH3**,11.2311,24.1624,24.1624,1.0335E3,0.0E+0,0.0E+0,0.0E+0;**CH3**,37.0837, 50.0150,50.0150,600.0600E9,0.0E+0,0.0E+0,0.0E+0;**CH3**,62.9263,75.8576, 75.8576,1.0343E-3,0.0E+0,0.0E+0,0.0E+0

NOTE. *You could use a similar command sequence with a transition type search.*

Example 4: Single Threshold Logic Search on Three Waveforms

Goal: Search the channel 1, 2 and 3 waveforms and place a mark at each instance when either channel 1 is above 1.4 volts, channel 2 is above 1.5 volts, or channel 3 is above 1.3 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH1 1	Turns the CH1 waveform on.
:SELect:CH2 1	Turns the CH2 waveform on.
:SELect:CH3 1	Turns the CH3 waveform on.
:AUTOSet EXECute	Autosets the displayed waveforms CH1, CH2 and CH3. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe LOGIc	Specifies that this will be a logic search (a mark will be placed when all channels transition to the specified state).
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH1 HIGH	Specifies the Boolean logic criteria for channel 1; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH2 HIGH	Specifies the Boolean logic criteria for channel 2; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH3 HIGH	Specifies the Boolean logic criteria for channel 3; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH1 1.4	Specifies to use 1.4 volts as the threshold for CH1.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH2 1.5	Specifies to use 1.5 volts as the threshold for CH2.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH3 1.3	Specifies to use 1.3 volts as the threshold for CH3.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:PATtern:WHEn TRUE	Specifies the condition for generating a logic pattern search; in this case, true.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:FUNCtion OR	Specifies the logic operator for the logic search; in this case, OR.
:SEARCH:SEARCH1:STATE 1	Turns the search on.

Command	Comment
:SEARCH:SEARCH1:TOTal?	Returns 3 or 4, indicating 3 or 4 times when one of channels 1, 2 or 3 became high. Note: Depending upon the number of transitions displayed, you may get 3 or 4 search marks for this example. If you get 3 search marks, try adjusting the horizontal position until you see 4 search marks.
:SEARCH:SEARCH1:LIST?	Returns a list of 3 marks on 3 waveforms: **CH1**,24.1600,24.1600,24.1600,1.0336E3,0.0E+0,0.0E+0, 0.0E+0;**CH2**,24.1600,24.1600,24.1600,1.0336E3,0.0E+0, 0.0E+0,0.0E+0;**CH3**,24.1600,24.1600,24.1600,1.0336E3, 0.0E+0,0.0E+0,0.0E+0;**CH1**,50.0000,50.0000,50.0000,0.0E+0, 0.0E+0,0.0E+0,0.0E+0;**CH2**,50.0000,50.0000,50.0000, 0.0E+0,0.0E+0,0.0E+0,0.0E+0;**CH3**,50.0000,50.0000,50.0000,0.0E+0, 0.0E+0,0.0E+0,0.0E+0;**CH1**,75.8300,75.8300,75.8300, 1.0332E3,0.0E+0,0.0E+0,0.0E+0;**CH2**,75.8300,75.8300,75.8300,1.0332E3, 0.0E+0,0.0E+0,0.0E+0;**CH3**,75.8300,75.8300,75.8300,1.0332E-3 ,0.0E+0,0.0E+0,0.0E+0

Appendix G: Application Module-enabled Commands

This table lists the commands that become available with installation of an application module.

Application Module	Commands
DPO4AERO, MDO3AERO	Aerospace Serial Triggering and Analysis Module. Enables triggering on packet-level information on MIL-STD-1553 buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.
	BUS:B<x>:MIL1553B:POLarity
	BUS:B<x>:MIL1553B:RESPonsetime:MAXimum
	BUS:B<x>:MIL1553B:RESPonsetime:MINimum
	BUS:B<x>:MIL1553B:SOUrce
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

Application Module	Commands
DPO4AERO, MDO3AERO	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress
	TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit
	TRIGger:A:BUS:B<x>:MIL1553B:CONDition
	TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
	TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue
	TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
	TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
	TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit
	TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit
	TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

Application Module	Commands
DPO4AUDIO, MDO3AUDIO	Audio Serial Triggering and Analysis Module. Enables triggering on packet-level information on I2S, LJ, RJ, and TDM audio buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.
	BUS:B<x>:AUDio:BITDelay
	BUS:B<x>:AUDio:BITOrder
	BUS:B<x>:AUDio:CHANnel:SIZe
	BUS:B<x>:AUDio:CLOCk:POLarity
	BUS:B<x>:AUDio:CLOCk:SOUrce
	BUS:B<x>:AUDio:DATa:POLarity
	BUS:B<x>:AUDio:DATa:SIZe
	BUS:B<x>:AUDio:DATa:SOUrce
	BUS:B<x>:AUDio:DISplay:FORMat
	BUS:B<x>:AUDio:FRAME:SIZe
	BUS:B<x>:AUDio:FRAMESync:POLarity
	BUS:B<x>:AUDio:FRAMESync:SOUrce
	BUS:B<x>:AUDio:TYPe
	BUS:B<x>:AUDio:WORDSel:POLarity
	BUS:B<x>:AUDio:WORDSel:SOUrce
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD
	TRIGger:A:BUS:B<x>:AUDio:CONDition
	TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue
	TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet
	TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
	TRIGger:A:BUS:B<x>:AUDio:DATa:VALue
	TRIGger:A:BUS:B<x>:AUDio:DATa:WORD

Application Module	Commands
DPO4AUTO, MDO3AUTO	Automotive Serial Triggering and Analysis Module. Enables triggering on packet-level information on CAN and LIN buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.
	BUS:B<x>:CAN:BITRate
	BUS:B<x>:CAN:PRObe
	BUS:B<x>:CAN:SAMPLEpoint
	BUS:B<x>:CAN:SOUrce
	BUS:B<x>:LIN:BITRate
	BUS:B<x>:LIN:IDFORmat
	BUS:B<x>:LIN:POLarity
	BUS:B<x>:LIN:SAMPLEpoint
	BUS:B<x>:LIN:SOUrce
	BUS:B<x>:LIN:STANDard
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue
	TRIGger:A:BUS:B<x>:CAN:CONDition
	TRIGger:A:BUS:B<x>:CAN:DATa:DIRection
	TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
	TRIGger:A:BUS:B<x>:CAN:DATa:SIZe
	TRIGger:A:BUS:B<x>:CAN:DATa:VALue
	TRIGger:A:BUS:B<x>:CAN:FRAMEtype
	TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe
	TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue
	TRIGger:A:BUS:B<x>:LIN:CONDition
	TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue
	TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier
	TRIGger:A:BUS:B<x>:LIN:DATa:SIZe
	TRIGger:A:BUS:B<x>:LIN:DATa:VALue
	TRIGger:A:BUS:B<x>:LIN:ERRTYPE
	TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue

Application Module	Commands
DPO4AUTOMAX	Extended Automotive Serial Triggering and Analysis Module. Enables triggering on packet-level information on CAN, LIN, and FlexRay buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, packet decode tables with time-stamp information, and eye diagram analysis software. The DPO4AUTOMAX application module enables all the commands listed above for the DPO4AUTO application module, plus the following additional commands: BUS:B<x>:FLEXray:BITRate BUS:B<x>:FLEXray:CHannel BUS:B<x>:FLEXray:SIGnal BUS:B<x>:FLEXray:SOUrce SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength TRIGger:A:BUS:B<x>:FLEXray:CONDition TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE

Application Module	Commands
DPO4AUTOMAX	TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue TRIGger:A:BUS:B<x>:FLEXray:FRAMEType TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength
MDO3FLEX	TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue TRIGger:A:BUS:B<x>:FLEXray:FRAMEType TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength
DPO4COMP, MDO3COMP	Computer Serial Triggering and Analysis Module. Enables triggering on packet-level information on RS-232/422/485/UART buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.

Application Module	Commands
	BUS:B<x>:RS232C:BITRate
	BUS:B<x>:RS232C:DATABits
	BUS:B<x>:RS232C:DELIMiter
	BUS:B<x>:RS232C:DISplaymode
	BUS:B<x>:RS232C:PARity
	BUS:B<x>:RS232C:POLarity
	BUS:B<x>:RS232C:RX:SOUrce
	BUS:B<x>:RS232C:TX:SOUrce
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue
	TRIGger:A:BUS:B<x>:RS232C:CONDition
	TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe
	TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
	TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe
	TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue

Application Module	Commands
DPO4EMBD, MDO3EMBD	Embedded Serial Triggering and Analysis Module. Enables triggering on packet-level information on I2C and SPI buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.
	BUS:B<x>:I2C:ADDRess:RWINClude
	BUS:B<x>:I2C{:CLOCk|:SCLk}:SOUrce
	BUS:B<x>:I2C{:DATa|:SDAta}:SOUrce
	BUS:B<x>:SPI:BITOrder
	BUS:B<x>:SPI{:CLOCk|:SCLk}:POLarity
	BUS:B<x>:SPI{:CLOCk|:SCLk}:SOUrce
	BUS:B<x>:SPI:DATa{:IN|:MISO}:POLarity
	BUS:B<x>:SPI:DATa{:IN|:MISO}:SOUrce
	BUS:B<x>:SPI:DATa{:OUT|:MOSI}:POLarity
	BUS:B<x>:SPI:DATa{:OUT|:MOSI}:SOUrce
	BUS:B<x>:SPI:DATa:SIZe
	BUS:B<x>:SPI:FRAMING
	BUS:B<x>:SPI:IDLETime
	BUS:B<x>:SPI{:SELect|:SS}:POLarity
	BUS:B<x>:SPI{:SELect|:SS}:SOUrce
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe
	TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe
	TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
	TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue
	TRIGger:A:BUS:B<x>:I2C:CONDition
	TRIGger:A:BUS:B<x>:I2C:DATa:DIRection
	TRIGger:A:BUS:B<x>:I2C:DATa:SIZe
	TRIGger:A:BUS:B<x>:I2C:DATa:VALue
	TRIGger:A:BUS:B<x>:SPI:CONDition
	TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue
	TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue
	TRIGger:A:BUS:B<x>:SPI:DATa:SIZe

Application Module	Commands
DPO4ENET	Ethernet Serial Triggering and Analysis Module. Enables triggering on packet-level information on 10BASE-T and 100BASE-TX buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information.
	BUS:B<x>:ETHERnet:PRObe
	BUS:B<x>:ETHERnet:PROTOcol
	BUS:B<x>:ETHERnet:SOUrce:DIFFerential
	BUS:B<x>:ETHERnet:SOUrce:DMINus
	BUS:B<x>:ETHERnet:SOUrce:DPLUs
	BUS:B<x>:ETHERnet:TYPe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:CONDition
	TRIGger:A:BUS:B<x>:ETHERnet:DATa:HIVALue
	TRIGger:A:BUS:B<x>:ETHERnet:DATa:OFFSet
	TRIGger:A:BUS:B<x>:ETHERnet:DATa:SIZe
	TRIGger:A:BUS:B<x>:ETHERnet:DATa:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:FRAMETYPe
	TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:DESTinationaddr:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:PROTOcol:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:IPHeader:SOUrceaddr:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:DESTination:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:MAC:ADDRess:SOUrce:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:HIVALue

Application Module	Commands
DPO4ENET	TRIGger:A:BUS:B<x>:ETHERnet:MAC{:LENgth|:TYPe}:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:QTAG:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:QUALifier
	TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:ACKnum:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:DESTinationport:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SEQnum:VALue
	TRIGger:A:BUS:B<x>:ETHERnet:TCPHeader:SOUrceport:VALue

Application Module	Commands
DPO4LMT, MDO3LMT	Enables testing against limit masks generated from "golden" waveforms and mask testing using custom user-defined masks.
	APPLication:TYPe
	MASK:COPy:SOUrce
	MASK:COPy:USER
	MASK:COUNt
	MASK:COUNt:FAILURES?
	MASK:COUNt:HITS?
	MASK:COUNt:SEG<x>:HITS?
	MASK:COUNt:TESTS?
	MASK:COUNt:VIOLATIONS?
	MASK:COUNt:WAVEFORMS?
	MASK:CUSTom
	MASK:DISplay
	MASK:LOCk
	MASK:MARgin:PERCent
	MASK:SOUrce
	MASK:STANdard
	MASK:STOPOnviolation
	MASK:TEMPLate:CREATEmask
	MASK:TEMPLate:SOUrce
	MASK:TEMPLate:TOLerance:HORizontal
	MASK:TEMPLate:TOLerance:VERTical
	MASK:TESt:AUXout:COMPLetion
	MASK:TESt:AUXout:FAILure
	MASK:TESt:COMPLetion:CRITerion
	MASK:TESt:DELay
	MASK:TESt:HARDCopy
	MASK:TESt:REPeat
	MASK:TESt:SAVEIMAGE
	MASK:TESt:SAVEWFM
	MASK:TESt:SRQ:COMPLetion
	MASK:TESt:SRQ:FAILure
	MASK:TESt:STATE
	MASK:TESt:STATus?
	MASK:TESt:STOP:FAILure
	MASK:TESt:THReshold

Application Module	Commands
DPO4LMT, MDO3LMT	MASK:TESt:TIME
	MASK:TESt:WAVEform
	MASK:USER:AMPLitude
	MASK:USER:HSCAle
	MASK:USER:HTRIGPOS
	MASK:USER:LABel
	MASK:USER:RECOrdlength
	MASK:USER{:SEG<x>|:MASK<x>}
	MASK:USER{:SEG<x>|:MASK<x>}:NR_Pt?
	MASK:USER{:SEG<x>|:MASK<x>}:POINTS
	MASK:USER:TRIGTOSAMP
	MASK:USER:VOFFSet
	MASK:USER:VPOS
	MASK:USER:VSCAle
	MASK:USER:WIDth
	RECAll:MASK
	SAVe:MASK

Application Module	Commands
DPO4PWR, MDO3PWR	Power Analysis Application Module. Enables quick and accurate analysis of power quality, switching loss, harmonics, safe operating area (SOA), modulation, ripple, and slew rate (dI/dt, dV/dt).
	APPLication:TYPe
	POWer:CURRENTSOurce
	POWer:QUALity:VCRESTfactor?
	POWer:DISplay
	POWer:GATESOurce
	POWer:GATing
	POWer:HARMonics:DISplay:SELect
	POWer:HARMonics:DISplay:TYPe
	POWer:HARMonics:FREQRef
	POWer:HARMonics:FREQRef:FIXEDFREQValue
	POWer:HARMonics:IEC:CLAss
	POWer:HARMonics:IEC:FILter
	POWer:HARMonics:IEC:FUNDamental
	POWer:HARMonics:IEC:GROUPing
	POWer:HARMonics:IEC:INPUTPOWer
	POWer:HARMonics:IEC:LINEFREQuency
	POWer:HARMonics:IEC:OBSPERiod
	POWer:HARMonics:IEC:POWERFACtor
	POWer:HARMonics:MIL:FUNDamental:CALCmethod
	POWer:HARMonics:MIL:FUNDamental:USER:CURrent
	POWer:HARMonics:MIL:LINEFREQuency
	POWer:HARMonics:MIL:POWERLEVel
	POWer:HARMonics:NR_HARMonics
	POWer:HARMonics:RESults:HAR<1-400>:FREQuency?
	POWer:HARMonics:RESults:HAR<1-400>:IECMAX?
	POWer:HARMonics:RESults:HAR<1-400>:LIMit?
	POWer:HARMonics:RESults:HAR<1-400>:PHASe?
	POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute?
	POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent?
	POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit?
	POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL?
	POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit?
	POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL?
	POWer:HARMonics:RESults:IEC:FUNDamental?
	POWer:HARMonics:RESults:IEC:HARM3ALTernate?
	POWer:HARMonics:RESults:IEC:HARM5ALTernate?

Application Module	Commands
DPO4PWR, MDO3PWR	POWer:HARMonics:RESults:IEC:POHC?
	POWer:HARMonics:RESults:IEC:POHL?
	POWer:HARMonics:RESults:IEC:POWer?
	POWer:HARMonics:RESults:IEC:POWERFactor?
	POWer:HARMonics:RESults:PASSFail?
	POWer:HARMonics:RESults:RMS?
	POWer:HARMonics:RESults:SAVe
	POWer:HARMonics:RESults:THDF?
	POWer:HARMonics:RESults:THDR?
	POWer:HARMonics:SOURce
	POWer:HARMonics:STANDard
	POWer:INDICators
	POWer:MODulation:SOUrce
	POWer:MODulation:TYPe
	POWer:QUALity:APPpwr?
	POWer:QUALity:DISplay:APPpwr
	POWer:QUALity:DISplay:FREQuency
	POWer:QUALity:DISplay:ICRESTfactor
	POWer:QUALity:DISplay:IRMS
	POWer:QUALity:DISplay:PHASEangle
	POWer:QUALity:DISplay:POWERFACtor
	POWer:QUALity:DISplay:REACTpwr
	POWer:QUALity:DISplay:TRUEpwr
	POWer:QUALity:DISplay:VCRESTfactor
	POWer:QUALity:DISplay:VRMS
	POWer:QUALity:FREQREFerence
	POWer:QUALity:FREQuency?
	POWer:QUALity:ICRESTfactor?
	POWer:QUALity:IRMS?
	POWer:QUALity:PHASEangle?
	POWer:QUALity:POWERFACtor?
	POWer:QUALity:REACTpwr?
	POWer:QUALity:TRUEpwr?
	POWer:QUALity:VRMS?
	POWer:REFLevel:ABSolute
	POWer:REFLevel:ABSolute:HIGH
	POWer:REFLevel:ABSolute:LOW
	POWer:REFLevel:ABSolute:MID<x>
	POWer:REFLevel:HYSTeresis

Application Module	Commands
DPO4PWR, MDO3PWR	POWer:REFLevel:METHod
	POWer:REFLevel:PERCent
	POWer:REFLevel:PERCent:HIGH
	POWer:REFLevel:PERCent:LOW
	POWer:REFLevel:PERCent:MID<x>
	POWer:RIPPle
	POWer:RIPPle:RESults:AMPLitude?
	POWer:RIPPle:RESults:MAX?
	POWer:RIPPle:RESults:MEAN?
	POWer:RIPPle:RESults:MIN?
	POWer:RIPPle:RESults:STDdev?
	POWer:RIPPle:SOUrce
	POWer:SOA:LINear:XMAX
	POWer:SOA:LINear:XMIN
	POWer:SOA:LINear:YMAX
	POWer:SOA:LINear:YMIN
	POWer:SOA:LOG:XMAX
	POWer:SOA:LOG:XMIN
	POWer:SOA:LOG:YMAX
	POWer:SOA:LOG:YMIN
	POWer:SOA:MASK:DEFine
	POWer:SOA:MASK:MAXAmps
	POWer:SOA:MASK:MAXVolts
	POWer:SOA:MASK:MAXWatts
	POWer:SOA:MASK:NR_Pt?
	POWer:SOA:MASK:STATE
	POWer:SOA:MASK:STOPOnviol
	POWer:SOA:PLOTTYPe
	POWer:SOA:RESult:FAILures:QTY?
	POWer:SOA:RESult:NUMACq?
	POWer:SOA:RESult:STATE?
	POWer:STATIstics
	POWer:STATIstics:MODe
	POWer:STATIstics:WEIghting
	POWer:SWLoss:CONDCALCmethod
	POWer:SWLoss:CONDuction:ENERGY:MAX?
	POWer:SWLoss:CONDuction:ENERGY:MEAN?
	POWer:SWLoss:CONDuction:ENERGY:MIN?
	POWer:SWLoss:CONDuction:POWer:MAX?
	POWer:SWLoss:CONDuction:POWer:MEAN?
	POWer:SWLoss:CONDuction:POWer:MIN?

Application Module	Commands
DPO4PWR, MDO3PWR	POWer:SWLoss:DISplay
	POWer:SWLoss:GATe:POLarity
	POWer:SWLoss:GATe:TURNON
	POWer:SWLoss:NUMCYCles?
	POWer:SWLoss:RDSon
	POWer:SWLoss:REFLevel:ABSolute:GATEMid
	POWer:SWLoss:REFLevel:ABSolute:LOWCurrent
	POWer:SWLoss:REFLevel:ABSolute:LOWVoltage
	POWer:SWLoss:REFLevel:PERCent:GATEMid
	POWer:SWLoss:REFLevel:PERCent:LOWCurrent
	POWer:SWLoss:REFLevel:PERCent:LOWVoltage
	POWer:SWLoss:TOFF:ENERGY:MAX?
	POWer:SWLoss:TOFF:ENERGY:MEAN?
	POWer:SWLoss:TOFF:ENERGY:MIN?
	POWer:SWLoss:TOFF:POWer:MAX?
	POWer:SWLoss:TOFF:POWer:MEAN?
	POWer:SWLoss:TOFF:POWer:MIN?
	POWer:SWLoss:TON:ENERGY:MAX?
	POWer:SWLoss:TON:ENERGY:MEAN?
	POWer:SWLoss:TON:ENERGY:MIN?
	POWer:SWLoss:TON:POWer:MAX?
	POWer:SWLoss:TON:POWer:MEAN?
	POWer:SWLoss:TON:POWer:MIN?
	POWer:SWLoss:TOTal:ENERGY:MAX?
	POWer:SWLoss:TOTal:ENERGY:MEAN?
	POWer:SWLoss:TOTal:ENERGY:MIN?
	POWer:SWLoss:TOTal:POWer:MAX?
	POWer:SWLoss:TOTal:POWer:MEAN?
	POWer:SWLoss:TOTal:POWer:MIN?
	POWer:SWLoss:VCEsat
	POWer:TYPe
	POWer:VOLTAGESOurce

Application Module	Commands
DPO4USB, MDO3USB	USB Serial Triggering and Analysis Module. Enables triggering on packet-level content for low-speed, full-speed, and high-speed USB serial buses. Also enables analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time-stamp information for low-speed, full-speed, and high-speed USB serial buses.
	BUS:B<x>:USB:BITRate
	BUS:B<x>:USB:PRObe
	BUS:B<x>:USB:SOUrce:DIFFerential
	BUS:B<x>:USB:SOUrce:DMINus
	BUS:B<x>:USB:SOUrce:DPLUs
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ADDRess:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:CONDition
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:HIVALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:OFFSet
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:SIZe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:TYPe
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:DATa:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:ERRTYPE
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:HANDSHAKEType
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:QUALifier
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPECIALType
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue
	SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:USB:TOKENType
	TRIGger:A:BUS:B<x>:USB:ADDRess:HIVALue
	TRIGger:A:BUS:B<x>:USB:ADDRess:VALue
	TRIGger:A:BUS:B<x>:USB:CONDition
	TRIGger:A:BUS:B<x>:USB:DATa:HIVALue
	TRIGger:A:BUS:B<x>:USB:DATa:OFFSet
	TRIGger:A:BUS:B<x>:USB:DATa:SIZe
	TRIGger:A:BUS:B<x>:USB:DATa:TYPe
	TRIGger:A:BUS:B<x>:USB:DATa:VALue
	TRIGger:A:BUS:B<x>:USB:ENDPoint:VALue
	TRIGger:A:BUS:B<x>:USB:ERRTYPE
	TRIGger:A:BUS:B<x>:USB:HANDSHAKEType

Application Module	Commands
DPO4USB, MDO3USB	TRIGger:A:BUS:B<x>:USB:QUALifier TRIGger:A:BUS:B<x>:USB:SOFFRAMENUMber TRIGger:A:BUS:B<x>:USB:SPECIALType TRIGger:A:BUS:B<x>:USB:SPLit:ET:VALue TRIGger:A:BUS:B<x>:USB:SPLit:HUB:VALue TRIGger:A:BUS:B<x>:USB:SPLit:PORT:VALue TRIGger:A:BUS:B<x>:USB:SPLit:SC:VALue TRIGger:A:BUS:B<x>:USB:SPLit:SE:VALue TRIGger:A:BUS:B<x>:USB:TOKENType
DPO4VID	HDTV and Custom (nonstandard) Video Triggering Module. Not necessary for MDO3000 series as these features come standard.
	TRIGger:A:VIDeo:CUSTom{:FORMat|:TYPe} TRIGger:A:VIDeo:CUSTom:LINEPeriod TRIGger:A:VIDeo:CUSTom:SYNCInterval TRIGger:A:VIDeo:STANdard (The application module enables the arguments for HDTV and custom (nonstandard) to be used with this command.)
MDO4TRIG	Advanced RF Power Level Triggering Module. Enables the power level on the RF input to be used as a source in the following trigger types: Pulse Width, Runt, Timeout, Logic, and Sequence.
	TRIGger:A:LOGIc:CLAss * TRIGger:A:LOGIc:INPut:CLOCk:SOUrce* TRIGger:A:LOGIc:INPut:RF TRIGger:A:LOGIc:THReshold:RF TRIGger:A:LOWerthreshold:RF TRIGger:A:PULSEWidth:SOUrce* TRIGger:A:RUNT:SOUrce* TRIGger:A:TIMEOut:SOUrce* TRIGger:A:UPPerthreshold:RF TRIGger:B:EDGE:SOUrce* * The application module enables the RF argument for this command.

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