TELEDYNE TEST TOOLS
Everywhereyoulook™

Programming Manual

T3AWG2152
Simple AFG
Rev. 1.0

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1. PREFACE

Scope of this document is to describe the use of SCPI commands with the T3AWG2152 and T3AWG2152-D Arbitrary Waveform Generators when used in Function Generator Operational Mode (AFG).

1.1 ABBREVIATIONS AND TERMS

Abbreviation	Description
SW	Software
UI	User Interface
API	Application Programming Interface
SCPI	Standard Commands for Programmable Instruments
AFG	Arbitrary Function Generator
VISA	Virtual Instrument Software Architecture

Table 1: Abbreviations and terms

1.2 REVISION HISTORY

Rev.	Document Changes	Date
1.0	First release	July 16, 2020

Table 2: Revision History

2. SYNTAX AND COMMANDS

2.1 COMMAND SYNTAX

2.1.1 Syntax Overview

Control the operations and functions of the instrument through the LAN interface 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 instrument uses to process them. See the Command Groups topic for a listing of the commands by command group or use the index to locate a specific command.
Refer to the following table for the symbols that are used.

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

Table 3: Syntax symbols and their meanings

2.1.2 Command and Query Structure

Overview

Commands consist of set commands and query commands (usually called commands and queries). Commands modify instrument settings or tell the instrument to perform a specific action. Queries cause the instrument 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 on the end.
For example, the set command *OUTPut1:STATe ON* has a query form *OUTPut1:STATe?*.
Not all commands have both a set and a query form. Some commands have only set and some have only query.

Messages

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

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.

Table 4: Message symbols and their meanings

Commands

Commands cause the instrument 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 of 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 instrument to return status or setting information.
Queries have the structure:
[:]<Header>?
[:]<Header>?[<Space><Argument>[<Comma><Argument>]...]

2.1.3 Command Entry

Rules

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 instrument ignores commands consisting of any combination of white space characters and line feeds.

Abbreviating

You can abbreviate many instrument commands. Each command in this documentation shows the abbreviations in capitals. For example, enter the command *SOURce1:VOLTage* simply as *SOUR:VOLT*.

Concatenating

Use a semicolon (;) to concatenate any combination of set commands and queries.
The instrument executes concatenated commands in the order received. When concatenating commands and queries, 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 *SOURce1:VOLTage 1V* and *SOURce1:VOLTage:OFFSet 0.5V*, can be concatenated into the following single command:
   SOURce1:VOLTage 1V;: SOURce1:VOLTage:OFFSet 0.5V
2. Never precede a star (*) command with a semicolon (;) or colon (:).

Terminating

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

Symbol	Meaning
<EOM>	Message terminator

Table 5: Message terminator and meaning

For messages sent to the instrument, the end-of-message terminator must be the END message (EOI asserted concurrently with the last data byte). The instrument always terminates messages with LF and EOI. It allows white space before the terminator. For example, it allows CR LF.

2.1.4 Parameter Types

Parameters are indicated by angle brackets, such as <file_name>. There are several different types of parameters, as listed in the following table. The parameter type is listed after the parameter. Some parameter types are defined specifically for the instrument command set and some are defined by SCPI.

Parameter type	Description	Example
Boolean	Boolean numbers or values	ON or 1 OFF or 0
NR1 numeric	Integers	0, 1, 15, –1
NR2 numeric	Decimal numbers	1.2, 3.141,–6.5
NR3 numeric	Floating point numbers	3.1415E+9
NRf numeric	Flexible decimal numbers that may be type NR1, NR2, or NR3	See NR1, NR2, and NR3 examples in this table
String	Alphanumeric characters (must be within quotation marks)	"Testing 1, 2, 3"

Table 6: Parameter types, their descriptions, and examples

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 ("). For example: "this is a quoted string". This documentation represents these arguments as follows:

Symbol	Meaning
<QString >	Quoted string of ASCII text

Table 7: String symbol and meaning

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 simply by repeating the quote. For example: "here is a " " mark".
4. Strings can have upper or lower case characters.
5. A carriage return or line feed embedded in a quoted string does not terminate the string, but is treated as just another character in the string.

Here are some invalid strings:

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

Units and SI Prefix

If the decimal numeric argument refers to voltage, frequency, impedance, or time, express it using SI units instead of using the scaled explicit point input value format <NR3>. (SI units are units that conform to the System International d'Unites standard.) For example, use the input format 200 mV or 1.0 MHz instead of 200.0E-3 or 1.0E+6, respectively, to specify voltage or frequency.

Omit the unit when you describe commands, but include the SI unit prefix. Enter both uppercase and lowercase characters. The following list shows examples of units you can use with the commands.

- V for voltage (V).
- HZ for frequency (Hz).

The SI prefixes, which must be included, are shown in the following table. You can enter both uppercase and lowercase characters.

SI prefix [1]	Corresponding power
EX	10^{18}
PE	10^{15}
T	10^{12}
G	10^{9}
MA	10^{6}
K	10^{3}
M	10^{-3}
U [2]	10^{-6}
N	10^{-9}
P	10^{-12}
F	10^{-15}
A	10^{-18}

Table 8: SI prefixes and their indexes

1. Note that the prefix m/M indicates 10^{-3} when the decimal numeric argument denotes voltage or time, but indicates 10^{6} when it denotes frequency.
2. Note that the prefix u/U is used instead of "μ".

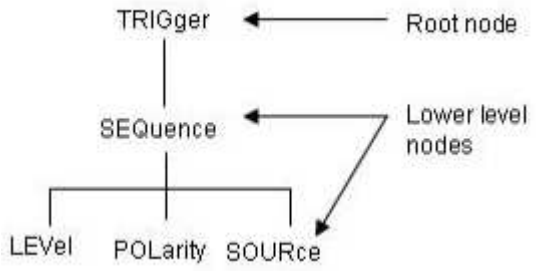
Since M (m) can be interpreted as 1E-3 or 1E6 depending on the units, use mV for V, and MHz for Hz.

The SI prefixes need units.

Correct: 10MHz, 10E+6Hz, 10E+6
Incorrect: 10M

2.1.5 SCPI Commands and Queries

The Arbitrary Function Generator uses a command language based on the SCPI standard. The SCPI (Standard Commands for Programmable Instruments) standard was created by a consortium to provide guidelines for remote programming of instruments. These guidelines provide a consistent programming environment for instrument control and data transfer. This environment uses defined programming messages, instrument responses and data formats that operate across all SCPI instruments, regardless of manufacturer.
The SCPI language is based on a hierarchical or tree structure that represents a subsystem (see following figure). The top level of the tree is the root node; it is followed by one or more lower-level nodes.



You can create commands and queries from these subsystem hierarchy trees.
Commands specify actions for the instrument to perform. Queries return measurement data and information about parameter settings.

3.1 The Registers

3.1.1 The Standard Event Status Register (SESR)

BIT	Name	Description
7 (MSB)	PON Power On.	Shows that the instrument was powered on. On completion, the diagnostic tests also set this bit.
6	URQ User Request.	Indicates that an application event has occurred. *See preceding note.
5	CME Command Error.	Shows that an error occurred while the instrument 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

Table 9: Standard Event Status Register (SESR)

3.1.2 The Status Byte Register (SBR)

BIT	Name	Description
7 (MSB)	-	Not used
6	RQS Request Service	Obtained from a serial poll. Shows that the instrument 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.

BIT	Name	Description
4	MAV Message Available	Shows that output is available in the Output Queue
3	-	Not used
2	-	Not used
1	-	Not used
0 (LSB)	-	Not used

Table 10: Status Byte Register (SBR)

3.1.3 The Operation Condition Register (OCR)

BIT	Name	Description
7 (MSB)	-	Not used
6	-	Not used
5	-	Not used
4	-	Not used
3	-	Not used
2	-	Not used
1	WTRIG CH2	Waiting for trigger. Indicates whether the instrument is waiting for trigger on CH2.
0 (LSB)	WTRIG CH1	Waiting for trigger. Indicates whether the instrument is waiting for trigger on CH1.

Table 11: Operation Condition Register (OCR)

3.1.4 The Operation Event Register (OEVR)

This register has the same content as the OCR register.

3.1.5 The Questionable Event Register (QEVR), Questionable Condition Register (QCR) and Questionable Enable Register (QENR).

All these registers are not used.

3.1.6 DESER, ESER, SRER 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 as follows.

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.

Event Status Enable Register (ESER).
This 8-bit register mask the SESR register, it 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.

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.

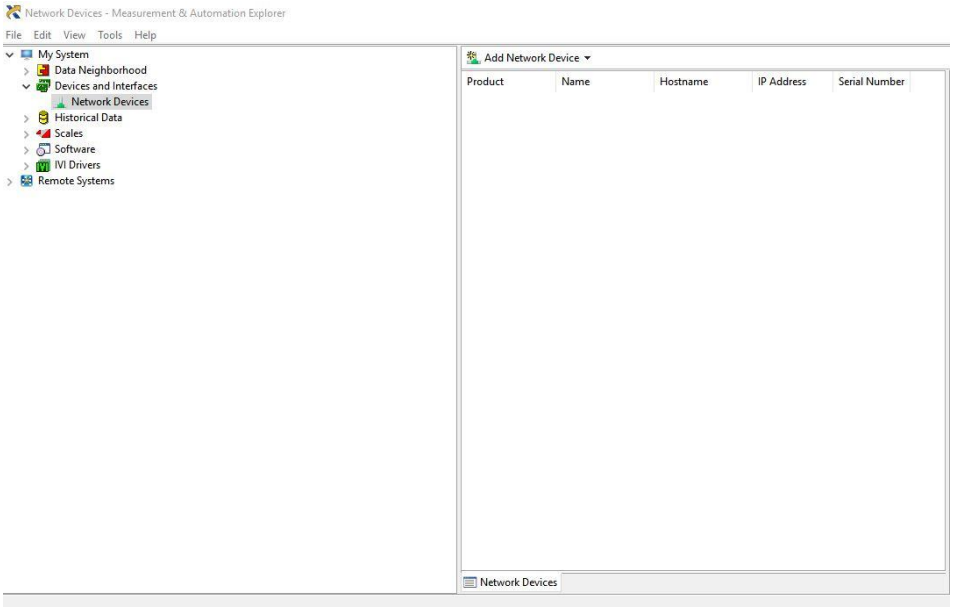
4. REMOTE CONTROL

You can connect your instrument to a network for printing, file sharing, and Internet access, among other functions. Consult with your network administrator and use the standard Windows utilities to configure the instrument for your network.
The instrument can be controlled using VXI-11 (LAN) protocol. It allows you to control the instrument remotely by using SCPI commands.

4.1 Prerequisite

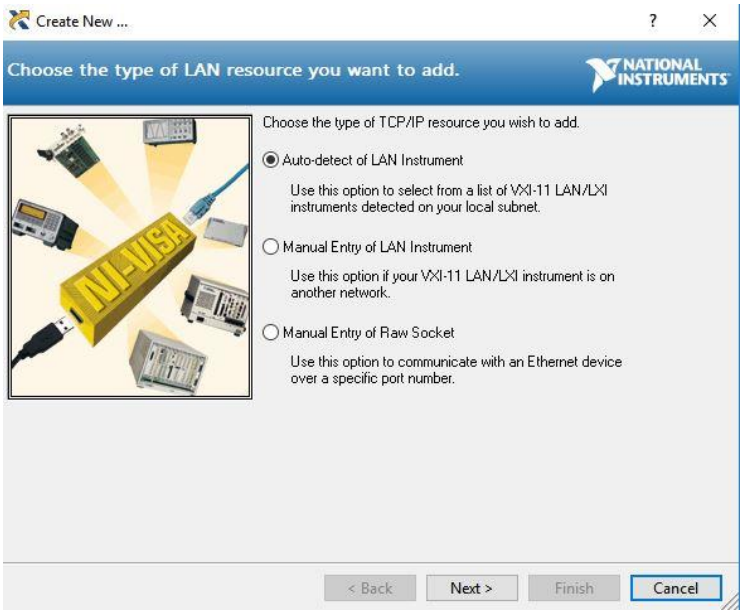
NI-VISA
VISA provides the programming interface between the hardware and development environments such as Visual Studio .NET, LabVIEW, LabWindows/CVI, Measurement Studio for Microsoft Visual Studio and MatLab. NI-VISA is the National Instruments implementation of the VISA I/O standard. NI-VISA includes software libraries, interactive utilities such as NI I/O Trace and the VISA Interactive Control, and configuration programs through Measurement & Automation Explorer for all your development needs.

1. Connect your LAN cable to the instrument.
2. On the Client-PC you must install the latest NIVISA package that you can find here http://www.ni.com/download/ni-visa-18.5/7973/en/
3. Launch the NI-MAX tool on the Client-PC

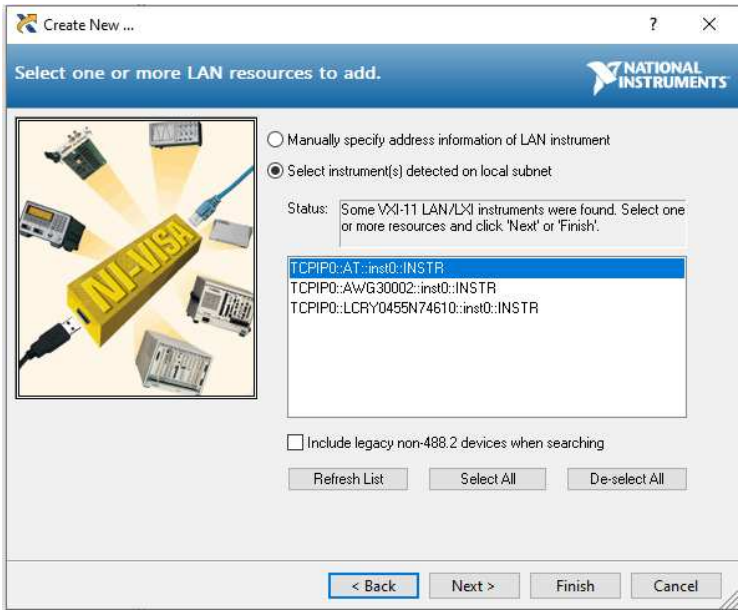


Press Add Network Device → VISA TCP/IP Resource…

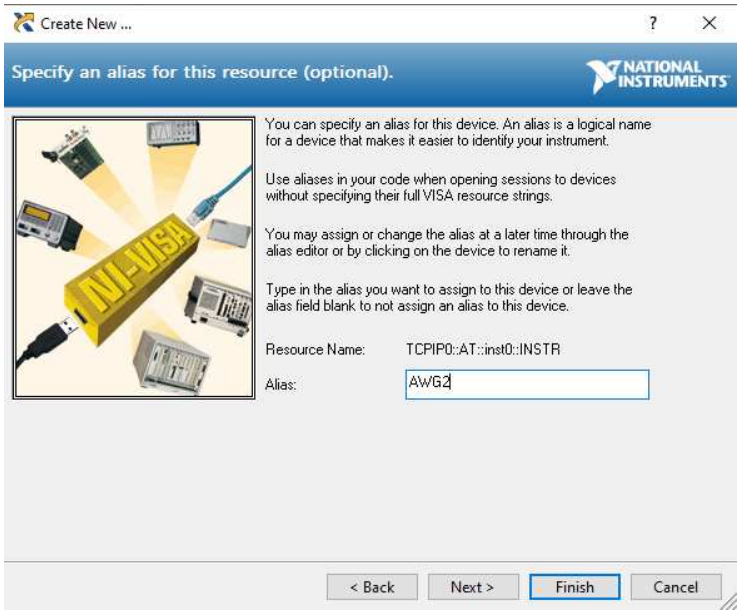
4. Select Auto-detect of LAN Instrument



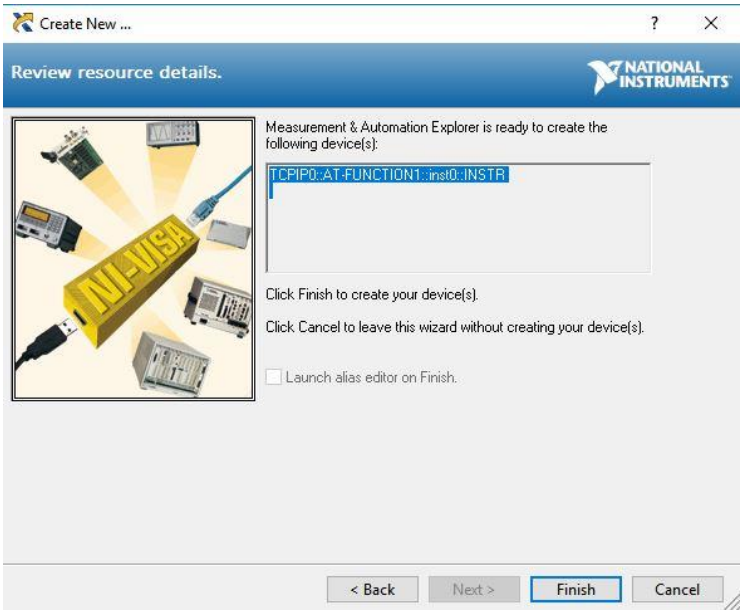
5. The panel will retrieve the discovered instruments on the LAN network, you should select the AT series one.



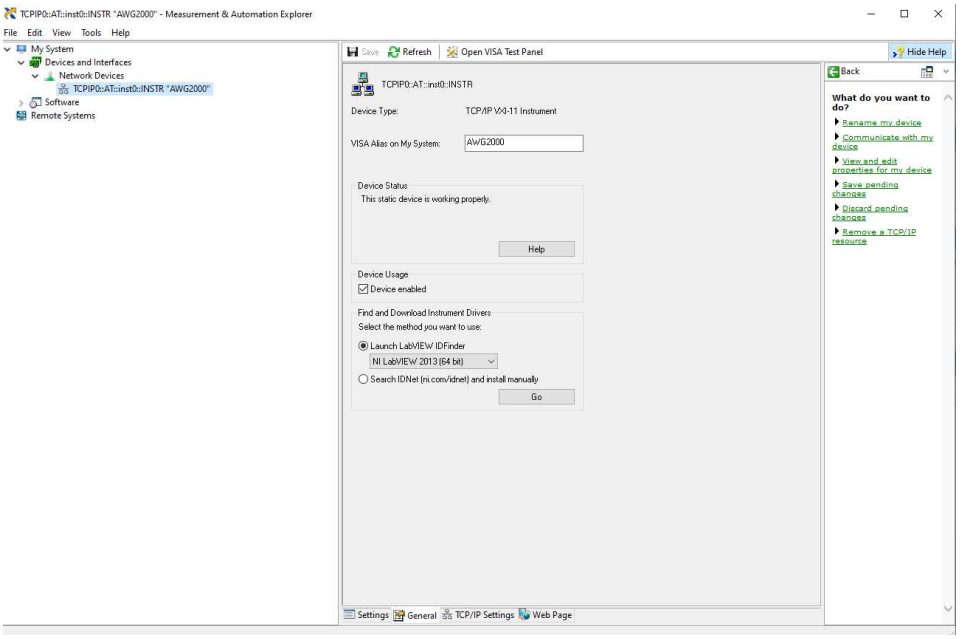
6. Specify an Alias for the selected resource



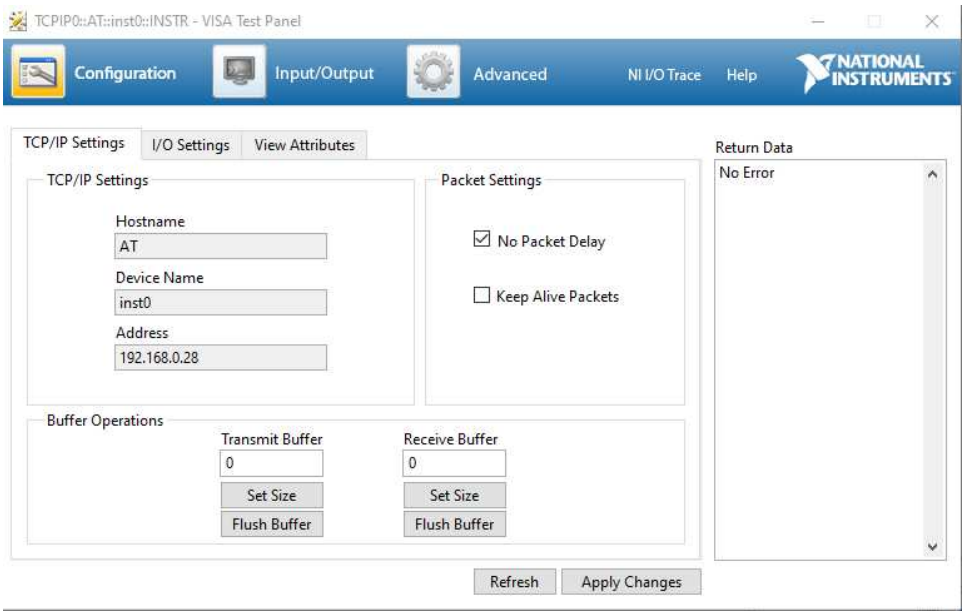
7. Press Finish



8. The AT resource will be available in the Network Devices list

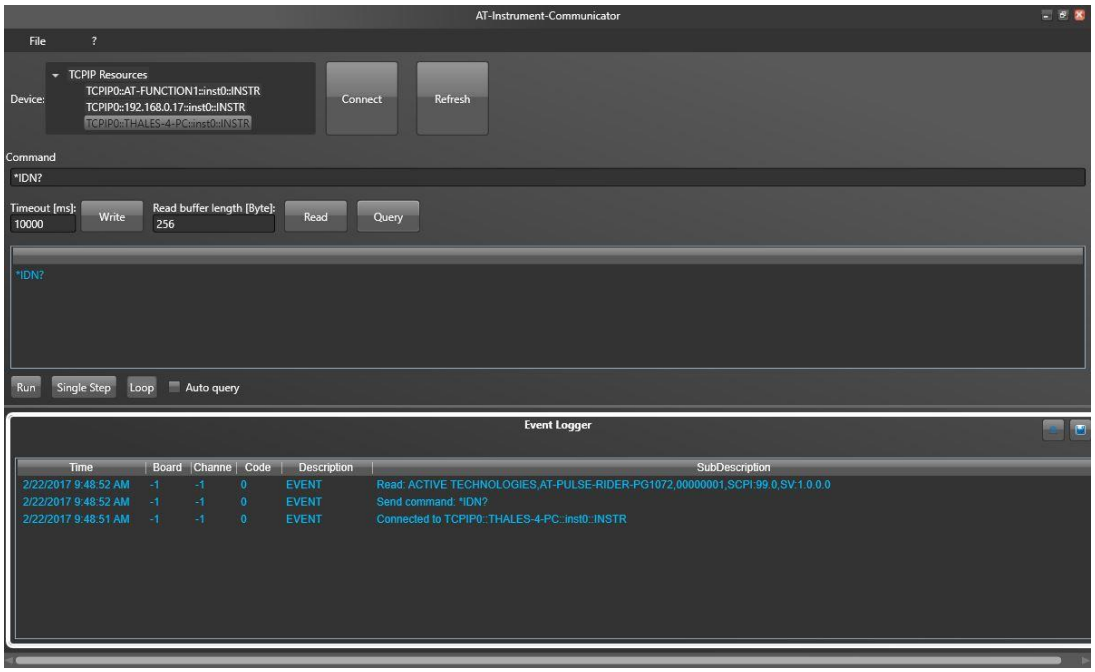


9. Now you can send the SCPI commands to the AT resource using the NI Visa Test Panel or the AT-Instrument-Communicator



10. On the Client-PC (IP Address) or AWG instrument (LocalHost), launch the AT-Instrument-Communicator tool

4.1.1.1 *AT Instrument Communicator*



The AT-Instrument-Communicator software is a client-side component tool that uses NI-VISA on each remote PC, you must install a copy of NIVISA to make use of this client-side component (please follow the Prerequisite steps).

1. On the Client-PC launch the *AT Instrument Communicator* setup you can find in the folder "SDK_AFG_2000_RevX" and install the software.
2. Select the AT resource on the Device list
3. Press the Connect button
4. If the instrument connection will be established, the SCPI command button will be enabled.
5. Write *IDN? in the command
6. Press the Query button
7. In the Event Logger list, the instrument should respond like this: ACTIVE TECHNOLOGIES,AFG2152,T0302I000001,SCPI 99.0,SV 1.0.0 where T0302I000001 is the serial number, SCPI 99.0 is the SCPI command version and SV 1.0.0 is the Software Version.
8. A command script is a list of SCPI commands (one command for each line) saved in a txt file; you can send a command script using the File → Load Script menu item.

4.2 Command Groups

The following commands refer to the parameters [n] and [m] that depend on the instrument model.	**Parameter [n] = Available Channels**	**Parameter [m] = Available Marker Outputs**
AWG2152	1 | 2	1

Table 12: Models and available parameters

4.2.1 Date and Time Commands

The date and time commands allow you to query the system date and time. The following table describes the date and time commands.

Command	Description
DATE	Query the system date
TIME	Query the system time

Table 13: Date and Time Commands

4.2.2 File System Commands

You can use the file commands to manipulate files and directories in the file system. The following table describes the file commands.

Command	Description
FILEsystem:CATalog?	Query the list of file and directory in the current working directory
FILEsystem:COPY	Copy a file from one location in the file system to another location
FILEsystem:CWDirectory	Change the current working directory in the file system
FILEsystem:DELete	Delete a file or directory in the file system
FILEsystem:HARDdisk?	Query the hard disk drive present on the instrument
FILEsystem:LOCK	Lock or unlock a file in the file system, or query if a file is locked
FILEsystem:MDIRectory	Create a directory in the file system
FILEsystem:UDISk?	Query the USB-disk drive connected to the instrument

Table 14: File System Commands

4.2.3 Memory Commands

Memory commands let you manage the setup memory. The following table describes the memory commands.

Command	Description
MEMory:RECall	Recall a specified project file in the file system
MEMory:SAVE	Save the current project file in the file system
MEMory:STATe:DELete	Delete the setup memory
MEMory:STATe:LOCK	Lock or unlock the setup memory and query whether the memory is locked
MEMory:STATe:VALid?	Query the availability of setup memory
*RCL	Recall instrument settings from setup memory
*SAV	Save instrument settings to setup memory

Table 15: Memory Commands

4.2.4 Mass Memory Commands

Mass memory commands let you change mass memory attributes. The following table describes the mass memory commands.

Command	Description
MMEMory:LOAD:STATe	Copy a setup file to internal setup memory
MMEMory:STORe:STATe	Copy a setup file from setup memory to a specified file in the file system

Table 16: Mass Memory Commands

4.2.5 Output Commands

Output commands let you set output attributes. The following table describes the output commands.

Command	Description
OUTPut[n][:STATe]	Set or query the output state (on or off) on a specified channel
OUTPut[n]:IMPedance	Set or query the output load impedance
OUTPut[n]:POLarity	Set or query the polarity of the waveform on a specified channel
OUTPut[n]:LOW:IMPedance	Set or query the instrument output low impedance

Table 17: Output Commands

4.2.6 Display Commands

Display commands let you to manage features related to the user interface.

Command	Description
HCOPy:SDUMp[:IMMediate]	Create a screen shot of the display screen
DISPlay:CHANnel	Change the selected output page on the user interface

Table 18: HCopy Command

4.2.7 Source Commands

Source commands let you set output waveform parameters. The following table describes the source commands.

Command	Description
[SOURce[n]]:AM[:DEPTh]	Set or query Amplitude Modulation depth
[SOURce[n]]:AM:INTernal:FREQuency	Set or query internal modulation frequency
[SOURce[n]]:AM:INTernal:FUNCtion	Set or query modulation waveform
[SOURce[n]]:AM:INTernal:FUNCtion:EFILe	Set or query a modulating waveform from file (EFILe)
[SOURce[n]]:AM:STATe	Enable or disable AM and query the state of AM
[SOURce[n]]:BURSt:MODE	Set or query the burst mode
[SOURce[n]]:BURSt:NCYCles	Set or query the burst count
[SOURce[n]]:BURSt[:STATe]	Enable or disable burst mode and query the burst mode
[SOURce[n]]:BURSt:TDELay	Set or query burst mode trigger delay time
[SOURce[n]]:COMBine:FEED	Set or query whether to add internal noise to an output signal for the specified channel
[SOURce[n]]:FM[:DEViation]	Set or query the peak frequency deviation
SOURce[n]]:FM:INTernal:FREQuency	Set or query the internal modulation frequency
[SOURce[n]]:FM:INTernal:FUNCtion	Set or query the internal modulation waveform
[SOURce[n]]:FM:INTernal:FUNCtion:EFILe	Set or query the modulating waveform from file (EFILe)
[SOURce[n]]:FM:STATe	Enable or disable Frequency Modulation and query the FM state

Command	Description
[SOURce[n]]:FREQuency[:CW | :FIXed]	Set or query the output waveform frequency
[SOURce[n]]:FREQuency:MODE	Set or query the frequency sweep state
[SOURce[n]]:FREQuency:STARt	Set or query the sweep start frequency
[SOURce[n]]:FREQuency:STOP	Set or query the sweep stop frequency
[SOURce[n]]:FSKey[:FREQuency]	Set or query the FSK hop frequency
[SOURce[n]]:FSKey:INTernal:RATE	Set or query the FSK internal modulation rate
[SOURce[n]]:FSKey:STATe	Enable or disable FSK modulation and query the FSK modulation state
[SOURce[n]]:PSKey[:FREQuency]	Set or query PSK modulation rate
[SOURce[n]]:PSKey:PHASe[:ADJust]	Set or query the PSK phase hop
[SOURce[n]]:PSKey:STATe	Enable or disable PSK modulation and query the FSK modulation state
[SOURce[n]]:FUNCtion:EFILe	Set or query the output waveform from file (EFILe)
[SOURce[n]]:FUNCtion:RAMP:SYMMetry	Set or query ramp waveform symmetry
[SOURce[n]]:FUNCtion[:SHAPe]	Set or query the shape of the carrier waveform
[SOURce[n]]:INITDELay	Set or query the initial delay
[SOURce[n]]:PHASe[:ADJust]	Set or query the output waveform phase
[SOURce[n]]:PM[:DEViation]	Set or query the peak phase deviation of phase modulation
[SOURce[n]]:PM:INTernal:FREQuency	Set or query the internal modulation frequency
[SOURce[n]]:PM:INTernal:FUNCtion	Set or query the internal modulation waveform
[SOURce[n]]:PM:INTernal:FUNCtion:EFILe	Set or query the PM modulating waveform from file(EFILe)
[SOURce[n]]:PM:STATe	Enable or disable PM modulation and query the PM modulation state
[SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]	Set or query the internal noise level added to the output signal
[SOURce[n]]:PULSe:DCYCle	Set or query the pulse waveform duty cycle

Command	Description
[SOURce[n]]:PULSe:PERiod	Set or query the pulse waveform period
[SOURce[n]]:PULSe:TRANsition[:LEADing]	Set or query the pulse waveform leading edge time
[SOURce[n]]:PULSe:TRANsition:TRAiling	Set or query the pulse waveform trailing edge time
[SOURce[n]]:PULSe:WIDTh	Set or query the pulse waveform width
[SOURce[n]]:PWM:INTernal:FREQuency	Set or query the Pulse Width Modulation frequency
[SOURce[n]]:PWM:INTernal:FUNCtion	Set or query the PWM moidulating waveform
[SOURce[n]]:PWM:INTernal:FUNCtion :EFILe	Set or query the modulating waveform from file (EFILe)
[SOURce[n]]:PWM:STATe	Set or query the Pulse Width Modulation status
[SOURce[n]]:PWM[:DEViation]:DCYCle	Set or query the Pulse Width Modulation deviation
[SOURce]:ROSCillator:SOURce	Set or query the clock reference input source
[SOURce]:ROSCillator:FREQuency	Set or query the clock reference input frequency
[SOURce[n]]:SWEep:HTIMe	Set or query the sweep hold time
[SOURce[n]]:SWEep:MODE	Set or query the sweep mode
[SOURce[n]]:SWEep:NSTEP	Set or query the number of step of the upstair sweep
[SOURce[n]]:SWEep:RTIMe	Set or query the sweep return time
[SOURce[n]]:SWEep:SPACing	Set or query the sweep spacing
[SOURce[n]]:SWEep:SPACing:EFILe	Set o query the the sweep profile from file (EFILe)
[SOURce[n]]:SWEep:TIME	Set or query the sweep time
[SOURce[n]]:VOLTage:UNIT	Set or query the output amplitude units
[SOURce[n]]:VOLTage[:LEVel] [:IMMediate]:HIGH	Set or query the output signal high level
[SOURce[n]]:VOLTage[:LEVel] [:IMMediate]:LOW	Set or query the output signal low level
[SOURce[n]]:VOLTage[:LEVel] [:IMMediate][:AMPLitude]	Set or query the output amplitude

Command	Description
[SOURce[n]]:DOUBLEPULSe:PULSe[m] :AMPLitude	Set or query the amplitude of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[m] :TRANsition[:LEADing]	Set or query the leading edge of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[m] :TRANsition:TRAiling	Set or query the trailing edge of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[m] :WIDTh	Set or query the width of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:DOUBLEPULSe:PULSe[m] :DELay	Set or query the delay of the first or of the second pulse of the double pulse waveform.
[SOURce[n]]:COUPLE:STATe	Enable or disable the channel coupling
[SOURce[n]]:COUPLE:AMPLitude:STATe	Enable or disable the channel coupling for the amplitude parameter
[SOURce[n]]:COUPLE:AMPLitude:RATio	Set or query the ratio for the amplitude parameter in coupling mode
[SOURce[n]]:COUPLE:AMPLitude:OFFSet	Set or query the offset for the amplitude parameter in coupling mode
[SOURce[n]]:COUPLE:OFFSet:STATe	Enable or disable the channel coupling for the offset parameter
[SOURce[n]]:COUPLE:OFFSet:RATio	Set or query the ratio for the offset parameter in coupling mode
[SOURce[n]]:COUPLE:OFFSet:OFFSet	Set or query the offset for the offset parameter in coupling mode
[SOURce[n]]:COUPLE:FREQuency:STATe	Enable or disable the channel coupling for the frequency parameter
[SOURce[n]]:COUPLE:FREQuency:RATio	Set or query the ratio for the frequency parameter in coupling mode
[SOURce[n]]:COUPLE:FREQuency:OFFSet	Set or query the offset for the frequency parameter in coupling mode
[SOURce[n]]:COUPLE:PHASe:STATe	Enable or disable the channel coupling for the phase parameter
[SOURce[n]]:COUPLE:PHASe:RATio	Set or query the ratio for the phase parameter in coupling mode
[SOURce[n]]:COUPLE:PHASe:OFFSet	Set or query the offset for the amplitude parameter in coupling mode
[SOURce[n]]:COUPLE:DCYCle:STATe	Enable or disable the channel coupling for the duty cycle parameter

Command	Description
[SOURce[n]]:COUPLE:DCYCle:RATio	Set or query the ratio for the duty cycle parameter in coupling mode
[SOURce[n]]:COUPLE:DCYCle:OFFSet	Set or query the offset for the duty cycle parameter in coupling mode
[SOURce[n]]:COUPLE:LEADing:STATe	Enable or disable the channel coupling for the leading edge parameter
[SOURce[n]]:COUPLE:LEADing:RATio	Set or query the ratio for the leading edge parameter in coupling mode
[SOURce[n]]:COUPLE:LEADing:OFFSet	Set or query the offset for the leading edge parameter in coupling mode
[SOURce[n]]:COUPLE:TRAiling:STATe	Enable or disable the channel coupling for the trailing edge parameter
[SOURce[n]]:COUPLE:TRAiling:RATio	Set or query the ratio for the trailing edge parameter in coupling mode
[SOURce[n]]:COUPLE:TRAiling:OFFSet	Set or query the offset for the trailing edge parameter in coupling mode
[SOURce[n]]:COUPLE:SYMMetry:STATe	Enable or disable the channel coupling for the ramp symmetry parameter
[SOURce[n]]:COUPLE:SYMMetry:RATio	Set or query the ratio for the ramp symmetry parameter in coupling mode
[SOURce[n]]:COUPLE:SYMMetry:OFFSet	Set or query the offset for the ramp symmetry parameter in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:AMPLitude:STATe	Enable or disable the channel coupling for the amplitude parameter of the double pulse waveform
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:AMPLitude:RATio	Set or query the ratio for the amplitude parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:AMPLitude:OFFSet	Set or query the offset for the amplitude parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:LEADing:STATe	Enable or disable the channel coupling for the leading edge parameter of the double pulse waveform
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:LEADing:RATio	Set or query the ratio for the leading edge parameter of the double pulse waveform in coupling mode

Command	Description
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:LEADing:OFFSet	Set or query the offset for the leading edge parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:TRAiling:STATe	Enable or disable the channel coupling for the trailing edge parameter of the double pulse waveform
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:TRAiling:RATio	Set or query the ratio for the trailing edge parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:TRAiling:OFFSet	Set or query the offset for the trailing edge parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:WIDTh:STATe	Enable or disable the channel coupling for the width parameter of the double pulse waveform
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:WIDTh:RATio	Set or query the ratio for the width parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:WIDTh:OFFSet	Set or query the offset for the width parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:DELay:STATe	Enable or disable the channel coupling for the delay parameter of the double pulse waveform
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:DELay:RATio	Set or query the ratio for the delay parameter of the double pulse waveform in coupling mode
[SOURce[n]]:COUPLE:DOUBLEPULSe :PULSe[m]:DELay:OFFSet	Set or query the offset for the delay parameter of the double pulse waveform in coupling mode
[SOURce[n]]:VOLTage:LIMit:HIGH	Set or query the output amplitude upper limit
[SOURce[n]]:VOLTage:LIMit:LOW	Set or query the output amplitude lower limit
[SOURce[n]]:ATTEnuator:STATe	Enable or disable the output attenuator

Table 19: Source Commands

4.2.8 Device commands

Use the following commands to control the device:

Command	Description
AFGControl:START	Run the instrument
AFGControl:STOP	Stop the instrument
AFGControl:STATus	Return the status of the instrument

Command	Description
AFGControl:COPY	Copies all parameter data from one channel to the other
AFGControl:AWGSwitch	Switchs from AT-Simple-AFG to AT-True-ARB software

Table 20: Device Commands

4.2.9 Status Commands

Status commands let you determine the status of the instrument. The following table describes the status commands

Command	Description
STATus:OPERation[:EVENt]?	Return the value in the Operation Event Register
STATus:OPERation:CONDition?	Return the contents of the Operation Condition Register
STATus:OPERation:ENABle	Set or query the mask for the Operation Enable Register
STATus:QUEStionable[:EVENt]?	Return the value in the Questionable Event Register
STATus:QUEStionable:CONDition?	Return the contents of the Questionable Condition Register
STATus:QUEStionable:ENABle	Set or query the mask for the Questionable Enable Register
STATus:PRESet	Preset SCPI Enable Register
*CLS	Clear all event registers and queue
*ESE	Set or query the Event Status Enable Register
*ESR?	Return the contents of the Standard Event Status Register
*SRE	Set or query the Service Request Enable Register
*STB?	Read the Status Byte Register

Table 21: Status Commands

4.2.10 Synchronization Group Commands

Synchronization commands let you synchronize the operation of the instrument. The following table describes the synchronization commands.

Command	Description
*OPC	Set or query the operation complete message
*WAI	Wait to continue until pending commands complete

Table 22: Synchronization group commands

4.2.11 System Group Commands

System commands let you control miscellaneous instrument functions. The following table describes the system commands.

Command	Description
*IDN?	Returns identification information for the instrument
*RST	Resets the instrument to its default state
SYSTem:BEEPer[:IMMediate]	Generate an audible tone
SYSTem:BEEPer:STATe	Set or query the beeper state
SYSTem:ERRor[:NEXT]?	Return the contents of the error event queue
SYSTem:KCLick[:STATe]	Enable or disable the key-click and user interface touch sound; query the status of key clicks
SYSTem:TLOCk[:STATe]	Lock or unlock the touch screen interface and query the lock state of the UI
SYSTem:ULANguage?	Query the language for the display screen
SYSTem:VERSion?	Return the SCPI conformance version information

Table 23: System group commands

4.2.12 Trace Commands

Trace commands allow you to save, recall, set, and query data points in arbitrary buffer memory. The following table describes the trace commands.

Command	Description
TRACe[n][:DATA]	Send or return waveform data in the Arb Buffer of the selected channel
TRACe[n]:POINts	Query the number of points in the Arb Buffer for waveform data
TRACe[n]:SAVE	Save the contents of Arbitrary Buffer to a file in the system
TRACe[n]:RECall	Recall the contents of Arbitrary Buffer from a specific file in the file system

Table 24: Trace group commands

4.2.13 Trigger Group Commands

The trigger commands let you control all aspects of triggering. The following table describes the trigger commands.

Command	Description
ABORt	Reset and initialize the trigger system
*TRG	Generates a trigger event
TRIGger[:SEQuence][:IMMediate]	Generates a trigger event
TRIGger[:SEQuence]:THREshold	Set or query the trigger threshold of an input signal

TRIGger[:SEQuence]:SLOPe	Set or query the slope of the trigger signal
TRIGger[:SEQuence]:SOURce	Set or query the source of the trigger signal
TRIGger[:SEQuence]:TIMer	Set or query the internal rate
TRIGger[:SEQuence]:IMPedance	Set or query the trigger input impedance
TRIGger[m]:OUTPut:AMPLitude	Set or query the marker out amplitude
TRIGger[m]:OUTPut:DELay	Set or query the skew of the marker out
TRIGger[m]:OUTPut:STATe	Enables or disables the marker out
TRIGger[m]:OUTPut:LINk	Links the marker out to an output channel

Table 25: Trigger group commands

4.3 COMMAND DESCRIPTIONS

Command	IDN (Query only)
Description	This command queries the instrument indentifier.
Group	System
Syntax	*IDN?
Related Commands	None
Arguments	None
Returns	<Manufacturer>,<Model>,<Serial Number>,<SCPI Version>,<Firmware Version> Where: <Manufacturer>::= ACTIVE TECHNOLOGIES <Model>::=AFG2152 <Serial Number>::=indicates an actual serial number) <SCPI Version>::=SCPI:99.0 FV:1.0 <Software Version>::=SV: 1.0.0 (1.0.0. is system software version)
Example	*IDN? Example return: TELEDYNE LECROY,T3AWG2152,T0302I000001,SCPI:99.0,SV:1.0.0

Table 26: *IDN?

Command	DATE (Query only)
Description	This command queries the system date.
Group	Date and Time
Syntax	DATE?
Related Commands	TIME
Arguments	None

Returns	<date_string>::<string> Returns a date in the format "DATE yyyy-mm-dd".
Example	DATE? Example return: "DATE 2020-01-22," which means the system date is January 22nd, 2020.

Table 27: DATE?

Command	TIME (Query only)
Description	This command queries the system time.
Group	Date and Time
Syntax	TIME?
Related Commands	DATE
Arguments	None
Returns	<time_string>::=<string> returns the current system time in the format "TIME hh:mm:ss".
Example	TIME? Example return: "TIME 12:25:30"

Table 28: TIME?

Command	FILEsystem:CATalog (Query only)
Description	This command returns the list of all file and directory contained in the Current Working Directory. This command is query only.
Group	File System
Syntax	FILESystem:CATalog?
Related Commands	FILEsystem:CWDirectory
Arguments	None
Returns	<NR1>,<NR1>[,<file_name>,<file_type>,<file_size>]... Where: The first <NR1> indicates the total amount of storage currently used, in bytes. The second <NR1> indicates the available free space in storage, in bytes. <file_name> is the exact name of a file. <file_type> is DIR for directory, otherwise it is blank. <file_size> is the size of the file, in bytes.
Example	FILESystem:CATalog? Example return: 32751616,27970560,"SAMPLE1.afs,,5412"

Table 29: FILEsystem:CATalog

Command	FILEsystem:COPY
Description	This command copies a file in the file system to another file in the file system. This command causes an error if filename1 (source file) in the

	file system doesn't exist, if filename2 (destination file) is locked, or if the destination directory is locked. The allowed file extensions are ".txt", ".afs", ".bmp". There is no query form of this command.
Group	File System
Syntax	FILEsystem:COPY <filename1>,<filename2>
Related Commands	FILEsystem:LOCK FILEsystem:DELete FILEsystem:CWDirectory
Arguments	<filename1>::=<Qstring> specifies a source file name in the instrument file system. <filename2>::=<Qstring> specifies a destination file name in the instrument file system. You can insert absolute or relative path: if the path is relative, it starts from the Current Working Directory.
Returns	None
Example	FILEsystem:COPY "SAMPLE1.afs","SAMPLE2.afs" Copies the file named "SAMPLE1.afs" to the file "SAMPLE2.afs" in the Current Working Directory.

Table 30: FILEsystem:COPY

Command	FILEsystem:CWDirectory
Description	This command changes or queries the current working directory in the instrument file system.
Group	File System
Syntax	FILEsystem:CWDirectory <directory_path> FILEsystem:CWDirectory?
Related Commands	FILEsystem:LOCK FILEsystem:DELete
Arguments	*<directory_name>::=<Qstring> indicates the working directory in the file system that you want to change.* *The default value is:* *"C:\Users\AT\AppData\Local\Active Technologies\AT-FUNCTION-RIDER\AWG21XX\"* Note: The last folder of this path depends on the model.
Returns	<directory_name>::=<Qstring>
Example	FILEsystem:CWDirectory "C:\Users" Change the current directory to C:\Users.

Table 31: FILEsystem:CWDirectory

Command	FILEsystem:DELete
Description	This command deletes a file or directory from the file system. If a specified file in file storage locked and cannot be deleted, this command causes an error. The allowed file extensions are ".txt", ".afs", ".bmp". You can delete a directory if it is empty. There is no query form of this command.
Group	File System
Syntax	FILEsystem:DELete <file_name>
Related Commands	FILEsystem:CWDirectory MEMory:SAVE
Arguments	<file_name>::=<Qstring> specifies a file to be deleted. You can insert absolute or relative path: if the path is relative, it starts from the Current Working Directory.
Return	None
Example	FILEsystem:DELete "SETUP1.afs" Delete the file " SETUP1.afs" in the current working directory of the file system.

Table 32: FILEsystem:DELete

Command	FILEsystem:HARDdisk (Query only)
Description	This command queries the hard disk drive. This command is query only.
Group	File System
Syntax	FILEsystem:HARDdisk?
Related Commands	FILEsystem:UDISk?
Arguments	None
Return	<driver1;driver2;driver3…>
Example	FILEsystem:HARDdisk? Example return: "C:\;D:\;E:\;F:\"

Table 33: FILEsystem:HARDdisk

Command	FILEsystem:LOCK
Description	This command sets or queries whether to lock a file in the file system. If you lock a file, you cannot overwrite or delete it. The allowed file extensions are ".txt", ".afs", ".bmp".
Group	File System
Syntax	FILEsystem:LOCK <file_name>, {ON|OFF|0|1} FILEsystem:LOCK? <file_name>

Related Commands	FILEsystem:CWDirectory
Arguments	<file_name> ::= Qstring, the file to lock, unlock or query the lock state. ON or 1 locks the specified file in the file system. OFF or 0 allows you to overwrite or delete a file or directory in the file system
Return	<NR1> 0 means that the selected memory is not locked, 1 means that it is locked.
Example	FILEsystem:LOCK "SETUP1.afs",ON Lock the file "SETUP1.afs".

Table 34: FILEsystem:LOCK

Command	FILEsystem:MDIRectory
Description	This command creates a directory in the file system. Note that the process is iterative, then it can create directory and subdirectories. There is no query form of this command.
Group	File System
Syntax	FILEsystem:MDIRectory <directory_name>
Related Commands	None
Arguments	<directory_name>::=<Qstring> specifies a directory name to be created. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Return	None
Example	FILEsystem:MDIRectory "SAMPLE1" Create a directory named "SAMPLE1" in the Current Working Directory.

Table 35: FILEsystem:MDIRectory

Command	FILEsystem:UDISk? (Query only)
Description	This command queries the USB-disk drive. This command is query only.
Group	File System
Syntax	FILEsystem:UDISk?
Related Commands	FILEsystem:HARDdisk?
Arguments	None
Return	<driver1;driver2;driver3…>
Example	FILEsystem:UDISk? Example return: "G:\;H:\;"

Table 36: FILEsystem:UDISk?

Command	MEMory:RECall
Description	This command recalls a project file from a specified file in the file system to the current project. If the specified file does not exist or its format is wrong, this command causes an error. There is no query form of this command.
Group	Memory
Syntax	MEMory:RECall <file_name>
Related Commands	MEMory:SAVE
Arguments	<file_name>::=<Qstring> specifies a setup file to recall. The file path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	None
Example	MEMory:RECall "SETUP1.afs" Recalls a file in file storage named SETUP1.afs into the current project.

Table 37: MEMory:RECall

Command	MEMory:SAVE
Description	This command saves the current project file to a specified file in the file system. If the specified file in the file system is locked, this command causes an error. You cannot create a new file if the directory is locked. There is no query form of this command.
Group	Memory
Syntax	MEMory:SAVE <file_name>
Related Commands	MEMory:RECall
Arguments	<file_name>::=<Qstring> specifies a file name in the file system. The file path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	None
Example	MEMory:SAVE "SETUP1 " Copies the current project file to a file named "SETUP1 " in the file system.

Table 38: MEMory:SAVE

Command	MEMory:STATe:DELete
Description	This command deletes the contents of specified setup memory. If the specified setup memory is locked and cannot be deleted, this command causes an error. There is no query form of this command.
Group	Memory

Syntax	MEMory:STATe:DELete {0|1|2|3|4}
Related Commands	*SAV *RCL MEMory:STATe:LOCK
Arguments	{0|1|2|3|4} specifies the location of setup memory.
Returns	None
Example	MEMory:STATe:DELete 1 Delete the contents of the setup memory 1.

Table 39: MEMory:STATe:DELete

Command	MEMory:STATe:LOCK
Description	This command locks or unlocks the specified setup memory. If you lock a setup memory, you cannot overwrite or delete it. You cannot execute this command for the setup memory of location numbered+ 0 (last setup memory). If a setup memory is not valid the command returns an error, but the query is allowed. The query form of this command returns the lock state of the setup memory.
Group	Memory
Syntax	MEMory:STATe:LOCK {1|2|3|4},{ON|OFF|0|1} MEMory:STATe:LOCK? {1|2|3|4}
Related Commands	None
Arguments	ON | 1 locks the specified location of setup memory, OFF | 0 allows you to overwrite or delete the specified location of setup memory.
Returns	<NR1> 0 means that the selected memory is not locked, 1 means that it is locked.
Example	MEMory:STATe:LOCK 1,ON Lock the setup memory of location number 1

Table 40: MEMory:STATe:LOCK

Command	MEMory:STATe:VALid? (Query only)
Description	This command returns the availability of a setup memory. This command is query only.
Group	Memory
Syntax	MEMory:STATe:VALid? {0|1|2|3|4}
Related Commands	None
Arguments	{0|1|2|3|4} specifies the location of setup memory.
Returns	<NR1>

	1 means that the specified setup memory has been saved. 0 means that the specified setup memory has been deleted.
Example	MEMory:STATe:VALid? 0 Example return: 1, means that the setup memory 0 has been saved.

Table 41: MEMory:STATe:VALid?

Command	*RCL
Description	This command restores the state of the instrument from a copy of the settings stored in the setup memory. If the specified setup memory is deleted, this command causes an error. The setup memory location numbered 0 contains the last settings saved when you power of the instrument. There is no query form of this command.
Group	Memory
Syntax	*RCL {0|1|2|3|4}
Related Commands	*SAV
Arguments	{0|1|2|3|4} specifies the location of the setup memory.
Returns	None
Example	*RCL 3 Restores the instrument settings from a copy of the settings stored in memory location 3.

Table 42: *RCL

Command	*SAV
Description	This command stores the current settings of the Arbitrary Function Generator to a specified setup memory location. If the memory location is already valid it will be overwritten. The setup memory location numbered 0 (last setup memory) is automatically overwritten with the current settings when you power off the instrument. If the specified number setup memory is locked, this command causes an error. There is no query form of this command.
Group	Memory
Syntax	*SAV {0|1|2|3|4}
Related Commands	*RCL
Arguments	{0|1|2|3|4} specifies the location of setup memory.
Returns	None
Example	*SAV 2 Save the current instrument state in the memory location 2

Table 43: *SAV

Command	HCOPy:SDUMp[:IMMediate]
Description	This command copies the current screen shot to a file in the file system. The file will be named with the format "year-month-day-hour-minus-seconds.bmp" in the system folder: "C:\Screenshots\". There is no query form of this command.
Group	HCopy
Syntax	HCOPy:SDUMp[:IMMediate]
Related Commands	None
Arguments	None
Returns	None
Example	HCOPy:SDUMp Copy the screen shot to the "C:\Screenshots\" system folder.

Table 44: HCOPy:SDUMp[:IMMediate]

Command	DISPlay:CHANnel
Description	This command selects the user interface output channel page. There is no query form of this command.
Group	Display
Syntax	DISPlay:CHANnel {OUT1 | OUT2 | OUT3 | OUT4 }
Related Commands	None
Arguments	<channel>:={OUT1 | OUT2 | OUT3 | OUT4} Note: <channel> string depends on the instrument model
Returns	None
Example	DISPlay:CHANnel OUT2 The user interface displays the output2 page.

Table 45: DISPlay:CHANnel

Command	MMEMory:LOAD:STATe
Description	This command copies a setup file in the file system to an internal setup memory location. If the memory location is already valid it will be overwritten. If a specified internal setup memory is locked, this command causes an error. When you power-off the instrument, the memory location 0 is automatically overwritten with the current instrument setup. There is no query form of this command.
Group	Mass Memory
Syntax	MMEMory:LOAD:STATe {0 | 1 | 2 | 3 | 4},<file_name>

Related Commands	MEMory:STATe:LOCK MMEMory:STORe:STATe
Arguments	{0|1|2|3|4} specifies the location of setup memory. <file_name>::=<Qstring> specifies a setup file to be copied. The file path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	None
Example	MMEMory:LOAD:STATe 1,"SETUP1.afs" Copies a file named SETUP1.afs in the file system into the internal memory location 1

Table 46: MMEMory:LOAD:STATe

Command	MMEMory:STORe:STATe
Description	This command copies a setup memory location to a specified file in the file system. If the file already exists it will be overwritten. If the specified file in the file system is locked, this command causes an error. You cannot create a new file if the directory is locked. If the setup memory is deleted, this command causes an error. <file_name> is a quoted string that defines the file name and path. There is no query form of this command.
Group	Mass Memory
Syntax	MMEMory:STORe:STATe {0|1|2|3|4},<file_name>
Related Commands	MMEMory:LOAD:STATe MEMory:STATe:LOCK
Arguments	{0|1|2|3|4} specifies the location of setup memory. <file_name>::=<Qstring> specifies a file name in the file system. The file path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	None
Example	MMEMory:STORe:STATe 1,"SETUP1.afs" Copies the setup in the setup memory location 1 to a file named "SETUP1.afs" in the Current Working Directory.

Table 47: MMEMory:STORe:STATe

Command	OUTPut[n][:STATe]
Description	This command enables or disables the output for the specified channel. The query form of this command returns the output state of the channel.
Group	Output

Syntax	OUTPut[n][:STATe] {ON|OFF|0|1} OUTPut[n][:STATe]?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables the arbitrary function generator output. OFF|0 disables the arbitrary function generator output.
Returns	<NR1> 1 means that the output is enabled. 0 means that the output is disabled.
Example	OUTPut1:STATe ON Set the arbitrary function generator output channel 1 (OUT 1) to ON.

Table 48: OUTPut[n][:STATe]

Command	OUTPut[n]:IMPedance
Description	This command sets the output load impedance for the specified channel. The specified value is used for amplitude, offset, and high/low level settings. You can set the impedance to any value from 1 Ω to 1 MΩ. The default value is 50 Ω. The query form of this command returns the current set impedance, minimum or maximum load impedance setting in ohms.
Group	Output
Syntax	The value of n indicates the channel number. OUTPut[n]:IMPedance <ohms> OUTPut[n]:IMPedance? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <ohms>::=< NR1 >[<units>] Where: <units>::=OHM is the value of the load impedance in ohms
Returns	<ohms>::=<NR1>
Example	OUTPut1:IMPedance 60 Set the channel 1 (CH 1) load impedance to 60 Ohm.

Table 49: OUTPut[n]:IMPedance

Command	OUTPut[n]:LOW:IMPedance
Description	This command sets the instrument impedance to low (5 Ohm) that means the output is short-circuited using a relay. If the output impedance is set to false, the instrument impedance is set to 50 Ohm (default).

	The query form of this command returns the instrument impedance.
Group	Output
Syntax	The value of n indicates the channel number. ON | 1 sets the instrument impedance to 5 Ohm. OFF | 0 sets the instrument impedance to 50 Ohm.
Related Commands	None
Arguments	<NR1> 1 means that the instrument impedance is set to Low (5Ohm) 0 means that the instrument impedance is set to 50 Ohm
Returns	<ohms>::=<NR1>
Example	OUTPut1:LOW:IMPedance ON sets the instrument impedance to Low.

Table 50: OUTPut[n]:LOW:IMPedance

Command	OUTPut[n]:POLarity
Description	This command inverts the output waveform relative to the zero level. The query form of this command returns the polarity for the specified channel.
Group	Output
Syntax	OUTPut[n]:POLarity {NORMal | INVerted} OUTPut[n]:POLarity?
Related Commands	None
Arguments	The value of n indicates the channel number. NORMal sets the specified output waveform polarity to Normal. INVerted sets the specified output waveform polarity to Inverted.
Returns	<NR1> 0 means the polarity is normal, 1 means the polarity is inverted.
Example	OUTPut1:POLarity NORMal Set the channel 1 (CH 1) waveform polarity to Normal.

Table 51: OUTPut[n]:POLarity

Command	[SOURce[n]]:AM[:DEPTh]
Description	This command sets or queries the AM modulation depth for the specified channel. This command and this query will cause an error if it is not in the AM modulation state.
Group	Source
Syntax	[SOURce[n]]:AM:DEPTh <depth> [SOURce[n]]:AM:DEPTh? [MINimum | MAXimum]

Related Commands	None
Arguments	The value of n indicates the channel number. <depth>::=<NR2>[<units>] Where: <NR2> is the depth of modulating frequency. <units>::=PCT MINimum queries the modulation depth minimum value. MAXimum queries the modulation depth maximum value.
Returns	<depth>
Example	SOURce1:AM:DEPth 70 Set the depth of the modulating signal on channel (CH 1) to 70%

Table 52: [SOURce[n]]:AM[:DEPTh]

Command	[SOURce[n]]:AM:INTernal:FREQuency
Description	This command sets or queries the internal AM modulation frequency for the specified channel. This command will cause an error if it is not in the AM modulation state.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:AM:INTernal:FREQuency <frequency> [SOURce[n]]:AM:INTernal:FREQuency? [MINimum|MAXimum]
Related Commands	
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz|kHz|MHz]. MINimum queries the modulation frequency minimum value. MAXimum queries the modulation frequency maximum value.
Returns	<frequency>
Example	SOURce1:AM:INTernal:FREQuency 10kHz Set the channel 1 (CH 1) internal modulation frequency to 10 kHz.

Table 53: [SOURce[n]]:AM:INTernal:FREQuency

Command	[SOURce[n]]:AM:INTernal:FUNCtion
Description	This command sets or queries the AM modulating waveform for the specified channel. You can use this command only when the internal modulation source is selected. If you specify EFILe when there is no EFILe or the EFILe is not yet defined, this command causes an error. This command and this query will cause an error if

	not in the AM modulation state. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:AM:INTernal:FUNCtion {SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise | ARBB | EFILe} [SOURce[n]]:AM:INTernal:FUNCtion?
Related Commands	
Arguments	The value of n indicates the channel number. SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise One of six types of function waveform can be selected as a modulating signal. ARBB | EFILe can be selected as a modulating file.
Returns	SIN | SQU | TRI | RAMP | NRAM | PRN | ARBB | EFILe
Example	SOURce1:AM:INTernal:FUNCtion SQUare Select square as the shape of modulating waveform for the channel 1 (CH 1) output

Table 54: [SOURce[n]]:AM:INTernal:FUNCtion

Command	[SOURce[n]]:AM:INTernal:FUNCtion:EFILe
Description	This command sets or queries the EFILe name used as a modulating waveform for AM modulation. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc". If the file is not set the query returns "". If the file contains more than 16834 samples, it will be decimated. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:AM:INTernal:FUNCtion:EFILe <file_name> [SOURce[n]]:AM:INTernal:FUNCtion:EFILe?
Related Commands	FILEsystem:CWDirectory
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_path>
Example	SOURce1:AM:INTernal:FUNCtion:EFILe "SAMPLE1.txt" Sets a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 55: [SOURce[n]]:AM:INTernal:FUNCtion:EFILe

Command	[SOURce[n]]:AM:STATe
Description	This command enables or disables AM modulation for the specified channel. The query version of this command returns the state of AM modulation. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:AM:STATe { ON | OFF | 0 | 1} [SOURce[n]]:AM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON | 1 enables AM modulation. OFF | 0 disables AM modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:AM:STATe ON Enable the channnel 1 (CH 1) AM modulation.

Table 56: [SOURce[n]]:AM:STATe

Command	[SOURce[n]]:BURSt:MODE
Description	This command sets or queries the burst mode for the specified channel. This command will cause an error if not in the BURST state. When you change the burst mode from gated to triggered, by default it set a burst of N cycles, where N is the last number of cycles. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:BURSt:MODE {TRIGgered | GATed} [SOURce[n]]:BURSt:MODE?
Related Commands	None
Arguments	The value of n indicates the channel number. TRIGgered means that triggered mode is selected for the burst mode. GATed means that gated mode is selected for the burst mode.
Returns	TRIG | GAT
Example	SOURce1:BURSt:MODE TRIGgered Selects the triggered mode.

Table 57: [SOURce[n]]:BURSt:MODE

Command	[SOURce[n]]:BURSt:NCYCles
Description	This command sets or queries the number of cycles (burst count) to be output in burst mode for the specified channel. The query version of this command returns a number or INF if the burst count is set to INFinity. This command will cause an error if not in BURST state. Is not possible modify the number of cycles while the instrument is running, if this command is sent during the running mode an error occurs.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:BURSt:NCYCles {<cycles> | INFinity | MINimum | MAXimum} [SOURce[n]]:BURSt:NCYCles? [MINimum | MAXimum]
Related Commands	None
Arguments	<cycles>::=<NR1> Where: <NR1> is the burst count. The value of n indicates the channel number. The burst count ranges from 1 to 4,294,967,294. INFinity sets the burst count to infinite. MINimum queries or sets the minimum count. MAXimum queries or sets the maximum count.
Returns	<cycles>
Example	SOURce1:BURSt:NCYCles 2 Sets the channel 1 (CH 1) burst count to 2.

Table 58: [SOURce[n]]:BURSt:NCYCles

Command	[SOURce[n]]:BURSt[:STATe]
Description	This command enables or disables the burst mode for the specified channel. The query version of this command returns the state of burst mode. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:BURSt:STATe { ON | OFF | 0 | 1} [SOURce[n]]:BURSt:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number.

	ON|1 enables the burst mode. OFF| disables the burst mode.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:BURSt:STATe ON Enable the burst mode for channel 1 (CH 1).

Table 59: [SOURce[n]]:BURSt[:STATe]

Command	[SOURce[n]]:BURSt:TDELay
Description	This command sets or queries delay time in the burst mode for the specified channel. It specifies a time delay between the trigger and the signal output. This command is available only in the triggered burst mode. This command will cause an error if not in the BURST state. If you change the delay while the instrument is running, the burst is reset and the voltage level will be move to the offset level, instead of wait on the last sample. When you send this command, if the instrument is running it will be stopped. NOTE: this command changes the initial delay of the channel for all the run mode.
Group	Source
Syntax	[SOURce[n]]:BURSt:TDELay <delay> } [SOURce[n]]:BURSt:TDELay?[MINimum | MAXimum]
Related Commands	[SOURce[1 | 2]:INITDELay
Arguments	The value of n indicates the channel number. <delay>::=<NRf>[<units>] Where: <units>::=[s | ms | µs | ns] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>
Example	SOURce1:BURSt:TDELay 20ms Set the channel 1 (CH 1) delay time to 20 ms

Table 60: [SOURce[n]]:BURSt:TDELay

Command	[SOURce[n]]:COMBine:FEED
Description	This command sets or queries whether to add the internal noise to the output signal for the specified channel. When you specify the internal noise, you can set or query the noise level by using the [SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude] command.

	To disable the internal noise function, specify "". If the carrier is Noise, this command causes an error.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:COMBine:FEED {"NOISe"|""} [SOURce[n]]:COMBine:FEED?
Related Commands	[SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]
Arguments	The value of n indicates the channel number. NOISe indicates that the internal noise is added to the output signal. "" disables the internal noise function.
Returns	"NOIS"| ""
Example	SOURce1:COMBine:FEED "NOISe" Add a noise signal to the channel 1 (CH 1) output signal.

Table 61: [SOURce[n]]:COMBine:FEED

Command	[SOURce[n]]:FM[:DEViation]
Description	This command sets or queries the peak frequency deviation of FM modulation for the specified channel. The range of the frequency deviation setting depends on the waveform selected as the carrier and on its frequency. This command will cause an error if not in the frequency modulation state. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	The value of n indicates the channel number. [SOURce[n]]:FM:DEViation <deviation> [SOURce[n]]:FM:DEViation?[MINimum|MAXimum]
Related Commands	None
Arguments	<deviation>::=<NRf>[<units>] Where: <NRf> is the frequency deviation. <units>::=[Hz|kHz|MHz] MINimum queries the minimum deviation. MAXimum queries the maximum deviation.
Returns	<deviation>
Example	SOURce1:FM:DEViation 1.0MHz Set the channel 1 (CH 1) frequency deviation to 1.0 MHz.

Table 62: [SOURce[n]]:FM[:DEViation]

Command	[SOURce[n]]:FM:INTernal:FREQuency

Description	This command sets or queries the internal modulation frequency of FM modulation for the specified channel. This command will cause an error if not in frequency modulation state.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FREQuency <frequency> [SOURce[n]]:FM:INTernal:FREQuency?[MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FM:INTernal:FREQuency 10kHz Set the channel 1 (CH 1) internal modulation frequency to 10 kHz.

Table 63: [SOURce[n]]:FM:INTernal:FREQuency

Command	[SOURce[n]]:FM:INTernal:FUNCtion
Description	This command sets or queries the FM modulating waveform for the specified channel. You can use this command only when the internal modulation source is selected. If you specify EFILe when there is no EFILe or the EFILe is not yet defined, this command causes an error. This command will cause an error if not in the frequency modulation state. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FUNCtion {SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise | ARBB | EFILe} [SOURce[n]]:FM:INTernal:FUNCtion?
Related Commands	
Arguments	The value of n indicates the channel number. SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise One of six types of function waveform can be selected as a modulating signal. ARBB | EFILe can be selected as a modulating file.
Returns	SIN | SQU | TRI | RAMP | NRAM | PRN | ARBB | EFILe
Example	SOURce1:FM:INTernal:FUNCtion SQUare Select square as the shape of modulating waveform for the channel 1 (CH 1) output.

Table 64: [SOURce[n]]:FM:INTernal:FUNCtion

Command	[SOURce[n]]:FM:INTernal:FUNCtion:EFILE
Description	This command sets or queries the EFILe name used as a modulating waveform for FM modulation. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc". If the file is not set the query returns "". If the file contains more than 16834 samples, it will be decimated. This command returns "" if the EFILe is not set. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FM:INTernal:FUNCtion:EFILe <file_name> [SOURce[n]]:FM:INTernal:FUNCtion:EFILe?
Related Commands	
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:FM:INTernal:FUNCtion:EFILe "SAMPLE1.txt" Sets a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 65: [SOURce[n]]:FM:INTernal:FUNCtion:EFILE

Command	[SOURce[n]]:FM:STATe
Description	This command enables or disables frequency modulation (FM). The query version of this command returns the state of frequency modulation. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FM:STATe { ON|OFF|0|1} [SOURce[n]]:FM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables FM modulation. OFF|0 disables FM modulation.
Returns	<NR1> 0 means disable FM modulation, 1 means enable FM modulation.

Example	SOURce1:FM:STATe ON Enable the channel 1 FM modulation.

Table 66: [SOURce[n]]:FM:STATe

Command	[SOURce[n]]:FREQuency[:CW | :FIXed]
Description	This command sets or queries the frequency of the output waveform for the specified channel. This command is available when the Run Mode is set to any setting other than Sweep. The output frequency range setting depends on the type of output waveform. If you change the type of output waveform, it may change the output frequency because changing waveform types affects the setting range of the output frequency. The output frequency range setting depends also on the amplitude parameter.
Group	Source
Syntax	[SOURce[n]]:FREQuency[:CW | :FIXed] <frequency> [SOURce[n]]:FREQuency[:CW | :FIXed]? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the output frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FREQuency:FIXed 500kHz Set the channel 1 (CH 1) output frequency to 500 kHz when the Run Mode is set to any setting other than Sweep.

Table 67: [SOURce[n]]:FREQuency[:CW | :FIXed]

Command	[SOURce[n]]:FREQuency:MODE
Description	This command sets or queries the frequency sweep state. For the Pulse function the sweep is not allowed. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FREQuency:MODE {CW | FIXed | SWEep} [SOURce[n]]:FREQuency:MODE?
Related Commands	[SOURce[n]]:FREQuency[:CW | :FIXed] [SOURce[n]]:FREQuency:STARt

	[SOURce[n]]:FREQuency:STOP
Arguments	The value of n indicates the channel number. CW | FIXed means that the instrument is in Continuous Mode. SWEep means that the instrument is in Sweep Mode.
Returns	CW | SWE
Example	SOURce1:FREQuency:MODE SWEep Specify the sweep command set for controlling the CH 1 output frequency

Table 68: [SOURce[n]]:FREQuency:MODE

Command	[SOURce[n]]:FREQuency:STARt
Description	This command sets or queries the start frequency of a sweep for the specified channel. This command is always used with the [SOURce[n]]:FREQuency:STOP command. The start frequency range setting depends on the waveform selected for sweep and on the amplitude in case of Sine function. This command will cause an error if not in the Sweep state. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FREQuency:STARt <frequency> [SOURce[n]]:FREQuency:STARt? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:FREQuency:MODE [SOURce[n]]:FREQuency:STOP
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the start frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FREQuency:STARt 10KHz Set the start frequency of channel 1 (CH 1) to 10 kHz.

Table 69: [SOURce[n]]:FREQuency:STARt

Command	[SOURce[n]]:FREQuency:STOP
Description	This command sets or queries the stop frequency of sweep for the specified channel. This command is always used with the [SOURce[n]]:FREQuency:STARt command. The stop frequency range setting depends on the waveform selected for sweep and on the amplitude in case of Sine function. This command will cause an error

	if not in the Sweep state. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FREQuency:STOP <frequency> [SOURce[n]]:FREQuency:STOP? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:FREQuency:MODE [SOURce[n]]:FREQuency:STARt
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the stop frequency. <units>::=[Hz | kHz | MHz]
Returns	<frequency>
Example	SOURce1:FREQuency:STOP 100kHz Set the sweep stop frequency of channel 1 (CH 1) to 100 kHz.

Table 70: [SOURce[n]]:FREQuency:STOP

Command	[SOURce[n]]:FSKey[:FREQuency]
Description	This command sets or queries the hop frequency of FSK modulation for the specified channel. This command will cause an error if not in the FSKEY state. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FSKey[:FREQuency] <frequency> [SOURce[n]]:FSKey[:FREQuency]? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the hop frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:FSKey:FREQuency 1.0MHz Set the hop frequency of channel 1 FSK modulation to 1.0 MHz.

Table 71: [SOURce[n]]:FSKey[:FREQuency]

Command	[SOURce[n]]:FSKey:INTernal:RATE
Description	This command sets or queries the internal modulation rate of FSK modulation for the specified channel. This command will cause an error if not in the FSKEY run mode.

Group	Source
Syntax	[SOURce[n]]:FSKey:INTernal:RATE <rate> [SOURce[n]]:FSKey:INTernal:RATE? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <rate>::=<NRf>[<units>] Where: <NRf> is the modulation rate. <units>::=[Hz | kHz | MHz] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<rate>
Example	SOURce1:FSKey:INTernal:RATE 50Hz Set the channel 1 (CH 1) internal modulation rate to 50 Hz.

Table 72: [SOURce[n]]:FSKey:INTernal:RATE

Command	[SOURce[n]]:FSKey:STATe
Description	This command enables or disables FSK modulation. The query form of this command returns the state of FSK modulation. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FSKey:STATe { ON|OFF|0|1} [SOURce[n]]:FSKey:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables FSK modulation. OFF|0 disables FSK modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:FSKey:STATe ON Enable the channel 1 (CH 1) FSK modulation.

Table 73: [SOURce[n]]:FSKey:STATe

Command	[SOURce[n]]:PSKey[:FREQuency]
Description	This command sets or queries the frequency of PSK modulation for the specified channel. This command will cause an error if not in the PSK state.
Group	Source

Syntax	[SOURce[n]]:PSKey[:FREQuency] <frequency> } [SOURce[n]]:PSKey[:FREQuency]? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the hop frequency. <units>::=[Hz | kHz | MHz]. MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:PSKey:FREQuency 1.0MHz Set the hop frequency of channel 1 (CH 1) PSK modulation to 1.0 MHz.

Table 74: [SOURce[n]]:PSKey[:FREQuency]

Command	[SOURce[n]]:PSKey:PHASe[:ADJust]
Description	This command sets or queries the phase of the modulating signal of PSKEY modulation for the specified channel. The value is in degrees. This command will cause an error if not in PSKEY run mode.
Group	Source
Syntax	[SOURce[n]]:PSK:PHASe[:ADJust] <phase> } [SOURce[n]]:PSK:PHASe[:ADJust]? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <phase>::=<NR3>[<units>] Where: <NR3> is the phase of modulating signal. <units>::=[°|DEG]. MINimum queries the minimum phase value. MAXimum queries the maximum phase value.
Returns	<phase>
Example	SOURce1:PSK:PHASe:ADJust 85DEG Set the value for the phase of the channel 1 (CH 1) PSK modulating waveform to 85 degrees.

Table 75: [SOURce[n]]:PSKey:PHASe[:ADJust]

Command	[SOURce[n]]:PSKey:STATe
Description	This command enables or disables PSK modulation. The query version of this command returns the state of PSK modulation. When you send this command and the state changes, if the instrument is running it will be stopped.

Group	Source
Syntax	[SOURce[n]]:PSKey:STATe { ON|OFF|0|1} [SOURce[n]]:PSKey:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables PSK modulation. OFF|0 disables PSK modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:PSKey:STATe ON Enable the channel 1 (CH 1) PSK modulation.

Table 76: [SOURce[n]]:PSKey:STATe

Command	[SOURce[n]]:FUNCtion:EFILe
Description	This command sets or queries the EFILe name used as carrier waveform. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc". This query returns "" if the EFILe is not set. If the file contains more than 16834 samples, it will be decimated. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FUNCtion:EFILe <file_name> [SOURce[n]]:FUNCtion:EFILe?
Related Commands	[SOURce[n]]:FUNCtion[:SHAPe]
Arguments	The value of n indicates the channel number. <file_name>::= <Qstring> specifies a file name in the file system. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:FUNCtion:EFILe "SAMPLE1.txt" Sets a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 77: [SOURce[n]]:FUNCtion:EFILe

Command	[SOURce[n]]:FUNCtion:RAMP:SYMMetry
Description	This command sets or queries the symmetry of the ramp waveform for the specified channel. If the carrier is not "Ramp", this command causes an error.

Group	Source
Syntax	[SOURce[n]]:FUNCtion:RAMP:SYMMetry <symmetry> [SOURce[n]]:FUNCtion:RAMP:SYMMetry? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <symmetry>::=<NR2>[<units>] Where: <NR2> is the symmetry. <units>::=PCT MINimum queries the minimum symmetry value. MAXimum queries the maximum symmetry value.
Returns	<symmetry>
Example	SOURce1:FUNCtion:RAMP:SYMMetry 80.5 Set the symmetry of the channel 1 (CH 1) ramp waveform to 80.5%

Table 78: [SOURce[n]]:FUNCtion:RAMP:SYMMetry

Command	[SOURce[n]]:FUNCtion[:SHAPe]
Description	This command sets or queries the shape of the carrier waveform. Setting the carrier, it is necessary to meet some condition listed in the below table. When you send this command and the function changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:FUNCtion[:SHAPe] {SINusoid | SQUare | PULSe | RAMP | PRNoise | DC | SINC | GAUSsian | LORentz | ERISe | EDECay | HAVersine | ARBB | EFILe | DOUBLEPULse} [SOURce[n]]:FUNCtion[:SHAPe]?
Related Commands	None
Arguments	The value of n indicates the channel number. SINusoid | SQUare | PULSe | RAMP | PRNoise | DC | SINC | GAUSsian | LO Rentz | ERISe | EDECay | HAVersine | ARBB | EFILe | DOUBLEPULse If you select a waveform shape that is not allowed with a particular modulation, sweep, or burst, it causes an error and the function does not change. If you specify EFILe when there is no EFILe or the EFILe is not yet defined, this command causes an error and the change will not be applied. If you change the waveform, the output frequency may change to meet the frequency range of the new waveform. If you select "PRNoise" when the additive noise is on, it causes an error. To disable the additive noise use the command:

[SOURce[n]]:COMBine:FEED. When you send this command, if the instrument is running it will be stopped.
The following table shows the combinations of modulation type and the shape of output waveform.

	Sine, Square, Ramp, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine, ARBB, EFILE	Pulse	Double Pulse	Noise, DC
AM	√			
FM	√			
PM	√			
FSK	√			
PSK	√			
PWM		√		
Sweep	√			
Burst	√	√	√	

The following table shows the combinations of voltage unit for the amplitude and the shape of output waveform.

	Vpp	Vrms	dBm
Sine	√	√	√
Square	√	√	
Ramp	√	√	
Pulse	√	√	
Sinc	√	√	
Noise	√ (Vpk)		
DC level			
Gaussian	√	√	
Lorentz	√	√	
Exponential Rise	√	√	
Exponential Decay	√	√	
Haversine	√	√	
Double Pulse	√		
ARBB	√		
EFILE	√		

Returns

SIN | SQU | PULS | RAMP | PRN | DC | SINC | GAUS | LOR | ERIS | EDEC | HAV | ARBB | EFILe | DOUBLEPULse

Example	SOURce1:FUNCtion:SHAPe SQUare Select the shape of channel 1 output waveform to square waveform.

Table 79: [SOURce[n]]:FUNCtion[:SHAPe]

Command	[SOURce[n]]:INITDELay
Description	This command sets or queries the initial delay for the selected output channel. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:INITDELay <delay> [SOURce[n]]: INITDELay? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <delay>::=<NRf>[<units>] Where: <NRf> is the intial delay value. <units>::=[ns | µs | ms | s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>
Example	SOURce1:INITDELay 300E-9 Set the output 1 initial delay to 300 ns.

Table 80: [SOURce[n]]:INITDELay

Command	[SOURce[n]]:PHASe[:ADJust]
Description	This command sets or queries the phase of the output waveform for the specified channel. The value is in degrees.
Group	Source
Syntax	[SOURce[n]]:PHASe[:ADJust] <phase> [SOURce[n]]:PHASe[:ADJust]? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <phase>::=<NR3>[<units>] Where: <NR3> is the phase of output frequency. <units>::=[° | DEG]. MINimum queries the minimum phase value. MAXimum queries the maximum phase value.
Returns	<phase>

Example	SOURce1:PHASe 45DEG Set the phase to 45 degrees

Table 81: [SOURce[n]]:PHASe[:ADJust]

Command	[SOURce[n]]:PM[:DEViation]
Description	This command sets or queries the peak frequency deviation of PM modulation for the specified channel. This command will cause an error if not in PM mode.
Group	Source
Syntax	[SOURce[n]]:PM:DEViation <deviation> [SOURce[n]]:PM:DEViation? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <deviation>::=<NR3>[<units>] Where: <NR3> is the phase deviation. <units>::=[° | DEG]. MINimum queries the minimum deviation. MAXimum queries the maximum deviation.
Returns	<deviation>
Example	SOURce1:PM:DEViation 60 DEG Set the phase deviation for the channel 1 to 60 degrees.

Table 82: [SOURce[n]]:PM[:DEViation]

Command	[SOURce[n]]:PM:INTernal:FREQuency
Description	This command sets or queries the internal modulation frequency of PM modulation for the specified channel. You can use this command only when the internal modulation source is selected. This command will cause an error if not in PM mode.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FREQuency <frequency> [SOURce[n]]:PM:INTernal:FREQuency? [MINimum | MAXimum]
Related Commands	
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>

Example	SOURce1:PM:INTernal:FREQuency 10kHz Set the channel 1 (CH 1) internal modulation frequency to 10 kHz

Table 83: [SOURce[n]]:PM:INTernal:FREQuency

Command	[SOURce[n]]:PM:INTernal:FUNCtion
Description	This command sets or queries the modulating waveform of PM modulation for the specified channel. You can use this command only when the internal modulation source is selected. If you specify EFILe when there is no EFILe or the EFILe is not yet defined, this command causes an error. This command will cause an error if not in PM mode. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FUNCtion {SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise | ARBB | EFILe} [SOURce[n]]:PM:INTernal:FUNCtion?
Related Commands	
Arguments	The value of n indicates the channel number. SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise One of six types of function waveform can be selected as a modulating function. ARBB | EFILe can be selected as a modulating file.
Returns	SIN | SQU | TRI | RAMP | NRAM | PRN | ARBB | EFILe
Example	SOURce1:PM:INTernal:FUNCtion SQUare Select square as the shape of modulating waveform for the channel 1 (CH 1) output.

Table 84: [SOURce[n]]:PM:INTernal:FUNCtion

Command	[SOURce[n]]:PM:INTernal:FUNCtion:EFILe
Description	This command sets or queries an EFILe name used as a modulating waveform for PM modulation. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc". This query returns "" if the EFILe is not set. If the file contains more than 16834 samples, it will be decimated. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:PM:INTernal:FUNCtion:EFILe <file_name> [SOURce[n]]:PM:INTernal:FUNCtion:EFILe?
Related Commands	

Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:PM:INTernal:FUNCtion:EFILe "SAMPLE1.txt" Sets up a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 85: [SOURce[n]]:PM:INTernal:FUNCtion:EFILe

Command	[SOURce[n]]:PM:STATe
Description	This command enables or disables PM modulation. The query version of this command returns the state of PM modulation. When you send this command and the state changes, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:PM:STATe {ON|OFF|0|1} [SOURce[n]]:PM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables PM modulation. OFF|0 disables PM modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:PM:STATe ON Enable the channel 1 (CH 1) PM modulation

Table 86: [SOURce[n]]:PM:STATe

Command	[SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]
Description	This command sets or queries the internal noise level to add to the output signal for the specified channel. The value represents the peak voltage of the noise level. You can set or query whether to add the internal noise to the output signal using the [SOURce[n]]:COMBine:FEED command.
Group	Source
Syntax	[SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude] {<voltage>|MINimum|MAXimum}

	[SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COMBine:FEED
Arguments	The value of n indicates the channel number. <voltage>::=<NR3>[<units>] Where: <NR3> is the peak noise level. <units>::=[mV | V] MINimum sets or queries the minimum noise level. MAXimum sets or queries the maximum noise level.
Returns	<voltage>
Example	SOURce1:POWer:LEVel:IMMediate:AMPLitude 0.5 Set the internal noise level that is added to the CH1 output signal to 0.5 Vpk.

Table 87: [SOURce[n]]:POWer[:LEVel][:IMMediate][:AMPLitude]

Command	[SOURce[n]]:PULSe:DCYCle
Description	This command sets or queries the duty cycle of the pulse waveform for the specified channel. The arbitrary function generator will hold the settings of leading edge and trailing edge when the duty cycle is varied. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:DCYCle <percent> [SOURce[n]]:PULSe:DCYCle? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:PULSe:WIDTh
Arguments	The value of n indicates the channel number. <percent>::=<NR2>[<units>] Where: <NR2> is the duty cycle. <units>::=PCT MINimum queries the minimum duty cycle. MAXimum queries the maximum duty cycle.
Returns	<percent>
Example	SOURce1:PULSe:DCYCle 80.5 Set the duty cycle of the pulse waveform on channel 1 (CH 1) to 80.5%.

Table 88: [SOURce[n]]:PULSe:DCYCle

Command	[SOURce[n]]:PULSe:PERiod

Description	This command sets or queries the period for the pulse waveform. This command and this query will cause an error if the carrier function is different from Pulse. NOTE: the pulse period is related to the frequency, then if you change the pulse period, it also affects the frequency of the next carrier that you set.
Group	Source
Syntax	[SOURce[n]]:PULSe:PERiod <period> [SOURce[n]]:PULSe:PERiod? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <period>::=<NRf>[<units>] Where: <NRf> is the pulse period. <units>::=[ns | µs | ms | s] MINimum queries the minimum period. MAXimum queries the maximum period.
Returns	<period>
Example	SOURce1:PULSe:PERiod 200ns Set the channel 1 pulse period to 200 ns.

Table 92: [SOURce[n]]:PULSe:PERiod

Command	[SOURce[n]]:PULSe:TRANsition[:LEADing]
Description	This command sets or queries the leading edge time of the pulse waveform. Note that the value is about the leading edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:TRANsition[:LEADing] <seconds> [SOURce[n]]:PULSe:TRANsition[:LEADing]? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:PULSe:TRANsition:TRAiling
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the leading edge time of pulse waveform. <units>::=[ns | µs | ms | s] MINimum queries the minimum transition time. MAXimum queries the maximum transition time.
Returns	<seconds>
Example	SOURce1:PULSe:TRANsition:LEADing 200ns Set the channel 1 (CH 1) leading edge time to 200 ns

Table 89: [SOURce[n]]:PULSe:TRANsition[:LEADing]

Command	[SOURce[n]]:PULSe:TRANsition:TRAiling
Description	This command sets or queries the trailing edge time of the pulse waveform. Note that the value is about the leading edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:TRANsition:TRAiling <seconds> [SOURce[n]]:PULSe:TRANsition:TRAiling? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:PULSe:TRANsition[:LEADing]
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>]. Where: <NRf> is the trailing edge of pulse waveform. <units>::=[ns | µs | ms | s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<seconds>
Example	SOURce1:PULSe:TRANsition:TRAiling 200ns Set the trailing edge time to 200 ns.

Table 90: [SOURce[n]]:PULSe:TRANsition:TRAiling

Command	[SOURce[n]]:PULSe:WIDTh
Description	This command sets or queries the pulse width for the specified channel. Pulse Width = Period × Duty Cycle / 100. The pulse width must be less than the period. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:PULSe:WIDTh <seconds> [SOURce[n]]:PULSe:WIDTh? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:PULSe:DCYCle
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the pulse width. <units>::=[ns | µs | ms | s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<width>
Example	SOURce1:PULSe:WIDTh 200ns Set the channel 1 (CH 1) pulse width to 200 ns.

Table 91: [SOURce[n]]:PULSe:WIDTh

Command	[SOURce[n]]:PWM:INTernal:FREQuency
Description	This command sets or queries the internal modulation frequency of PWM modulation for the specified channel. You can use this command only when the internal modulation source is selected. This command will cause an error if not in PWM mode.
Group	Source
Syntax	[SOURce[n]]:PWM:INTernal:FREQuency <frequency> [SOURce[n]]:PWM:INTernal:FREQuency? [MINimum | MAXimum]
Related Commands	
Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the modulation frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce1:PWM:INTernal:FREQuency 10kHz Set the channel 1 (CH 1) internal frequency to 10 kHz.

Table 92: [SOURce[n]]:PWM:INTernal:FREQuency

Command	[SOURce[n]]:PWM:INTernal:FUNCtion
Description	This command sets or queries the modulating waveform of PWM modulation for the specified channel. You can use this command only when the internal modulation source is selected. If you specify EFILe when there is no EFILe or the EFILe is not yet defined, this command causes an error. This command will cause an error if not in PWM mode. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:PWM:INTernal:FUNCtion {SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise | ARBB | EFILe} [SOURce[n]]:PWM:INTernal:FUNCtion?
Related Commands	
Arguments	The value of n indicates the channel number. SINusoid | SQUare | TRIangle | RAMP | NRAMp | PRNoise One of six types of function waveform can be selected as a modulating signal. ARBB | EFILe can be selected as a modulating file.
Returns	SIN | SQU | TRI | RAMP | NRAM | PRN | ARBB | EFILe

Example	SOURce1:PWM:INTernal:FUNCtion SQUare Select square as the shape of modulating waveform for the channel 1 output.

Table 93: [SOURce[n]]:PWM:INTernal:FUNCtion

Command	[SOURce[n]]:PWM:INTernal:FUNCtion:EFILe
Description	This command sets or queries an EFILe name used as a modulating waveform for PWM modulation. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc The query version of this command returns "" if the the EFILe is not set. If the file contains more than 16834 samples, it will be decimated. When you send this command, if the instrument is running it will be stopped.
Group	Source
Syntax	[SOURce[n]]:PWM:INTernal:FUNCtion:EFILe <file_name> [SOURce[n]]:PWM:INTernal:FUNCtion:EFILe?
Related Commands	None
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> parameter includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.
Returns	<file_name>
Example	SOURce1:PWM:INTernal:FUNCtion:EFILe "SAMPLE1.txt" Sets a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 94: [SOURce[n]]:PWM:INTernal:FUNCtion:EFILe

Command	[SOURce[n]]:PWM:STATe
Description	This command enables or disables PWM modulation. The query form of this command returns the state of PWM modulation. Before activate the PWM it is necessary to select the Pulse as carrier.
Group	Source
Syntax	[SOURce[n]]:PWM:STATe {ON | OFF | 0 | 1} [SOURce[n]]:PWM:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON | 1 enables PWM modulation.

	OFF|0 disables PWM modulation.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:PWM:STATe ON Enable the channel 1 PWM modulation.

Table 95: [SOURce[n]]:PWM:STATe

Command	[SOURce[n]]:PWM[:DEViation]:DCYCle
Description	This command sets or queries the PWM deviation in percent for the specified channel. The setting range must meet the following conditions: • Deviation ≤ Pulse Width – PWmin • Deviation ≤ Pulse Period – Pulse Width – PWmin • Deviation ≤ Pulse Width – (Leading Edge Time + Trailing Edge Time) / 0.8 • Deviation ≤ Pulse Period – Pulse Width – (Leading Edge Time + Trailing Edge Time) / 0.8 • Where: PWmin is the minimum pulse width. This command will cause an error if not in PWM mode.
Group	Source
Syntax	[SOURce[n]]:PWM[:DEViation]:DCYCle <percent> [SOURce[n]]:PWM[:DEViation]:DCYCle? [MINimum|MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <percent>::=<NR2>[<units>] Where: <NR2> is the PWM deviation. <units>::=PCT
Returns	<deviation>
Example	SOURce1:PWM:DCYCle 5.0 Set the channel 1 (CH 1) PWM deviation to 5.0%

Table 96: [SOURce[n]]:PWM[:DEViation]:DCYCle

Command	[SOURce]:ROSCillator:FREQuency
Description	This command sets or queries the clock frequency of the external reference.
Group	Source
Syntax	[SOURce]:ROSCillator:FREQuency <frequency> [SOURce]:ROSCillator:FREQuency? [MINimum|MAXimum]
Related Commands	[SOURce]:ROSCillator:SOURce

Arguments	The value of n indicates the channel number. <frequency>::=<NRf>[<units>] Where: <NRf> is the external reference frequency. <units>::=[Hz | kHz | MHz] MINimum queries the minimum frequency. MAXimum queries the maximum frequency.
Returns	<frequency>
Example	SOURce:ROSCillator:FREQuency 10MHZ Set the reference clock in to 10 MHz.

Table 97: [SOURce]:ROSCillator:FREQuency

Command	[SOURce]:ROSCillator:SOURce
Description	This command sets or queries the reference clock to either internal or external. When you try to set External, if the frequency of the external reference is different from the frequency set through [SOURce]:ROSCillator:FREQuency command, this command causes an error and the source will be reset to Internal.
Group	Source
Syntax	[SOURce]:ROSCillator:SOURce {INTernal | EXTernal} [SOURce]:ROSCillator:SOURce?
Related Commands	[SOURce]:ROSCillator:FREQuency
Arguments	The value of n indicates the channel number. INTernal means that the reference clock is set to internal. EXTernal means that the reference clock is set to external.
Returns	INT | EXT
Example	SOURce:ROSCillator:SOURce INTernal Select the internal clock reference.

Table 98: [SOURce]:ROSCillator:SOURce

Command	[SOURce[n]]:SWEep:NSTEP
Description	This command sets or queries the Number of Step of the Upstair Sweep. The step number ranges from 1 to 2,048. This command will cause an error if not in Upstair Sweep mode.
Group	Source
Syntax	[SOURce[n]]:SWEep:NSTEP <step number> [SOURce[n]]:SWEep:NSTEP? [MINimum | MAXimum]
Related Commands	None

Arguments	The value of n indicates the channel number. <step number>::=<NR1> Where: <NR1> is the burst count. MINimum queries the minimum number of steps. MAXimum queries the maximum number of steps.
Returns	<step number>
Example	SOURce1:SWEep:NSTEP 8 Sets the channel 1 sweep step to 8.

Table 99: [SOURce[n]]:SWEep:NSTEP

Command	[SOURce[n]]:SWEep:HTIMe
Description	This command sets or queries the sweep hold time. Hold time represents the amount of time that the frequency remains stable after reaching the stop frequency. This command and this query will cause an error if not in Sweep mode. Is not possible modify the hold time while the instrument is running, if this command is sent during the running mode an error occurs.
Group	Source
Syntax	[SOURce[n]]:SWEep:HTIMe <seconds> [SOURce[n]]:SWEep:HTIMe? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the hold time in seconds. <units>::=[ns | µs | ms | s] MINimum queries the minimum hold time. MAXimum queries the maximum hold time.
Returns	<seconds>
Example	SOURce1:SWEep:HTIMe 1ms Sets the channel 1 hold time to 1 ms.

Table 100: [SOURce[n]]:SWEep:HTIMe

Command	[SOURce[n]]:SWEep:MODE
Description	This command selects repeat or trigger for the sweep trigger mode for the specified channel. The query version of this command returns the sweep trigger mode for the specified channel.
Group	Source
Syntax	[SOURce[n]]:SWEep:MODE {AUTO | MANual} [SOURce[n]]:SWEep:MODE?
Related Commands	None

Arguments	The value of n indicates the channel number. AUTO sets the sweep mode to repeat generation. The instrument outputs a continuous sweep at a rate specified by Sweep Rise Time, Hold Time, and Return Time. MANual sets the sweep mode to trigger. The instrument outputs one sweep when a trigger input is received and wait on the start frequency.
Returns	AUTO | MAN
Example	SOURce1:SWEep:MODE AUTO Set the channel 1 sweep mode to repeat. The instrument outputs a continuous sweep.

Table 101: [SOURce[n]]:SWEep:MODE

Command	[SOURce[n]]:SWEep:RTIMe
Description	This command sets or queries the sweep return time. Return time represents the amount of time from stop frequency through start frequency. Return time does not include hold time. This command and this query will cause an error if not in Sweep mode. Is not possible modify the return time while the instrument is running, if this command is sent during the running mode an error occurs.
Group	Source
Syntax	[SOURce[n]]:SWEep:RTIMe <seconds> [SOURce[n]]:SWEep:RTIMe? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the return time in seconds. <units>::=[ns | µs | ms | s] MINimum queries the minimum return time. MAXimum queries the maximum return time.
Returns	<return time>
Example	SOURce1:SWEep:RTIMe 1ms Sets the channel 1 (CH 1) return time to 1 ms.

Table 102: [SOURce[n]]:SWEep:RTIMe

Command	[SOURce[n]]:SWEep:SPACing
Description	This command selects the spacing for the sweep for the specified channel. The query form of this command returns the type for the

	sweep spacing for the specified channel. When you send this command, if the instrument is running it will be stopped. NOTE: when you select USER or ARBB the time to walk the sweep profile is given by the sum of sweep rise time, sweep hold time and sweep return time.
Group	Source
Syntax	[SOURce[n]]:SWEep:SPACing {LINear | LOGarithmic | UPStair | ARBB | USER} [SOURce[n]]:SWEep:SPACing?
Related Commands	[SOURce[n]]:SWEep:NSTEP [SOURce[n]]:SWEep:SPACing:EFILe
Arguments	The value of n indicates the channel number. LINear sets the sweep spacing to linear. LOGarithmic sets the sweep spacing to logarithmic. UPStair sets the sweep spacing to stepped. ARBB allows to import a sweep profile from the arbitrary buffer. USER allows to import a sweep profile from EFILE.
Returns	LIN | LOG | UPS | USER | ARBB
Example	SOURce1:SWEep:SPACing LINear Set the channel 1 (CH1) sweep spacing to linear.

Table 103: [SOURce[n]]:SWEep:SPACing

Command	[SOURce[n]]:SWEep:SPACing:EFILe
Description	This command sets or queries an EFILe name used as sweep profile. A file name must be specified in the file system, the valid file extensions are ".txt", ".csv" and ".trc". If the file is not set the query returns "". If the file contains more than 16834 samples, it will be decimated. The query version of this command returns "" if the the EFILe is not set.
Group	Source
Syntax	[SOURce[n]]:SWEep:SPACing:EFILe <file_name> [SOURce[n]]:SWEep:SPACing:EFILe?
Related Commands	None
Arguments	The value of n indicates the channel number. <file_name>::=<Qstring> specifies a file name in the file system. The <file_name> parameter includes the path. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory.

Returns	<file_name>
Example	SOURce1:SWEep:SPACing:EFILe "SAMPLE1.txt" Sets a file named "SAMPLE1" in the Current Working Directory of the file system.

Table 104: [SOURce[n]]:SWEep:SPACing:EFILe

Command	[SOURce[n]]:SWEep:TIME
Description	This command sets or queries the sweep rise time for the sweep. The sweep time does not include hold time and return time. This command will cause an error if not in Sweep mode. Is not possible modify the rise time while the instrument is running, if this command is sent during the running mode an error occurs.
Group	Source
Syntax	[SOURce[n]]:SWEep:TIME <seconds> [SOURce[n]]:SWEep:TIME? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. <seconds>::=<NRf>[<units>] Where: <NRf> is the sweep rise time in seconds. <units>::=[ns | µs | ms | s] MINimum queries the minimum sweep rise time. MAXimum queries the maximum sweep rise time.
Returns	<sweep time>
Example	SOURce1:SWEep:TIME 100ms Set the channel 1 (CH 1) sweep rise time to 100 ms.

Table 105: [SOURce[n]]:SWEep:TIME

Command	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH
Description	This command sets or queries the high level of the waveform for the specified channel. The high level could be limited by noise level to not exceed the maximum amplitude. If the carrier is Noise or DC level, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH <voltage> [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW
Arguments	The value of n indicates the channel number.

	<voltage>::=<NRf>[<units>] Where: <NRf> is the high level of output amplitude. <units>::=[mV | V] MINimum queries the minimum high voltage level. MAXimum queries the maximum high voltage level.
Returns	<high level>
Example	SOURce1:VOLTage:LEVel:IMMediate:HIGH 1V Set the high level of channel 1 (CH 1) output amplitude to 1 V.

Table 106: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH

Command	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW
Description	This command sets or queries the low level of the waveform for the specified channel. The low level could be limited by noise level to not exceed the maximum amplitude. If the carrier is Noise or DC level, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW <voltage> } [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:HIGH
Arguments	The value of n indicates the channel number. <voltage>::=<NRf>[<units>] Where: <NRf> is the low level of the output amplitude. <units>::=[mV | V] MINimum queries the minimum low voltage level. MAXimum queries the maximum low voltage level.
Returns	<low level>
Example	SOURce1:VOLTage:LEVel:IMMediate:LOW -1V Set the low level of channel 1 (CH 1) output amplitude to -1 V.

Table 107: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:LOW

Command	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet
Description	This command sets or queries the offset level for the specified channel. The offset range setting depends on the amplitude parameter.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet <voltage> [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

Arguments	The value of n indicates the channel number. <voltage>::=<NRf>[<units>] Where: <NRf> is the offset voltage level. <units>::=[mV | V] MINimum queries the minimum offset level. MAXimum queries the maximum offset level.
Returns	<offset>
Example	SOURce1:VOLTage:LEVel:IMMediate:OFFSet 500mV Set the channel 1 offset level to 500 mV.

Table 108: [SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet

Command	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
Description	This command sets or queries the output amplitude for the specified channel. The measurement unit of amplitude depends on the selection operated using the [SOURce[n]]:VOLTage:UNIT command. If the carrier is Noise the amplitude is Vpk instead of Vpp. If the carrier is DC level this command causes an error. The range of the amplitude setting could be limited by the frequency and offset parameter of the carrier waveform.
Group	Source
Syntax	[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] <amplitude> [SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:VOLTage[:LEVel][:IMMediate]:OFFSet [SOURce[n]]:VOLTage:UNIT
Arguments	The value of n indicates the channel number. <amplitude>::=<NRf> Where: <NRf> is the output amplitude. This parameter does not have the measurement unit because it is defined by [SOURce[n]]:VOLTage:UNIT command. MINimum queries the minimum amplitude. MAXimum queries the maximum amplitude.
Returns	<amplitude><unit> Where <units>::=[VPP | VRMS | DBM | VPK] VPK is used only for the noise as carrier.
Example	SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 1 Set the channel 1 output amplitude to 1, the unit depends on the selecting one.

Table 109: [SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

<table>
<tr><td>Command</td><td>[SOURce[n]]:VOLTage:UNIT</td></tr>
<tr><td>Description</td><td>This command sets or queries the units of output amplitude for the specified channel. This command does not affect the offset, high level, or low level of output.</td></tr>
<tr><td>Group</td><td>Source</td></tr>
<tr><td>Syntax</td><td>[SOURce[n]]:VOLTage:UNIT [VPP | VRMS | DBM]
[SOURce[n]]:VOLTage:UNIT?</td></tr>
<tr><td>Related Commands</td><td>[SOURce[n]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]</td></tr>
<tr><td>Arguments</td><td>The value of n indicates the channel number.
VPP sets the units of the output voltage to Vp-p.
VRMS sets the units of the output voltage to Vrms.
DBM sets the units of the output voltage to dBm.
The following table shows the possible association between waveform and measurement unit for the amplitude.
<table>
<tr><td></td><td>Vpp</td><td>Vrms</td><td>dBm</td></tr>
<tr><td>Sine</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Square</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Ramp</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Pulse</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Sinc</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Noise</td><td>√ (Vpk)</td><td></td><td></td></tr>
<tr><td>DC level</td><td></td><td></td><td></td></tr>
<tr><td>Gaussian</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Lorentz</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Exponential Rise</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Exponential Decay</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Haversine</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Double Pulse</td><td>√</td><td></td><td></td></tr>
<tr><td>ARBB</td><td>√</td><td></td><td></td></tr>
<tr><td>EFILE</td><td>√</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Returns</td><td>VPP | VRMS | DBM</td></tr>
<tr><td>Example</td><td>SOURce1:VOLTage:UNIT VPP
Set the voltage units to Vp-p.</td></tr>
</table>

Table 110: [SOURce[n]]:VOLTage:UNIT

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:AMPLitude
Description	This command sets or queries the amplitude of the first or of the second pulse for the specified channel in the double pulse waveform. Note: If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:AMPLitude [SOURce[n]]:DOUBLEPULSe:PULSe[m]:AMPLitude? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. The value of m indicates the pulse number. <voltage>::=<NRf>[<units>] Where: <NRf> is the amplitude value. <units>::=[mV | V] MINimum queries the minimum amplitude value. MAXimum queries the maximum amplitude voltage.
Returns	<voltage>
Example	SOURce1:DOUBLEPULSe:PULSe1:AMPLitude 2 Set the pulse 1 amplitude value of channel 1 to 2 V.

Table 111: [SOURce[n]]:DOUBLEPULSe:PULSe[m]:AMPLitude

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition[:LEADing]
Description	This command sets or queries the leading edge time of the first or the second pulse in the double pulse waveform. Note that the value is about the leading edge between 10% and 90%. Note: If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition[:LEADing] <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition[:LEADing]? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition:TRAiling
Arguments	The value of n indicates the channel number. The value of m indicates the pulse number.

	<seconds>::=<NRf>[<units>] Where: <NRf> is the leading edge time of pulse waveform. <units>::=[ns | µs | ms | s] MINimum queries the minimum transition time. MAXimum queries the maximum transition time.
Returns	<seconds>
Example	SOURce1:DOUBLEPULSe:PULSe1:TRANsition:LEADing 100ns Set the first pulse 1 relative to the double pulse of the channel 1 (CH 1) leading edge time to 100 ns

Table 112: [SOURce[n]]:PULSe:TRANsition[:LEADing]

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition:TRAiling
Description	This command sets or queries the trailing edge time of the first or the second pulse in the double pulse waveform. Note: If the carrier is different from Double Pulse, this command and this query cause an error. Note that the value is about the leading edge between 10% and 90%. If the carrier is different from Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition:TRAiling <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe[m]:TRANsition:TRAiling? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:PULSe:TRANsition[:LEADing]
Arguments	The value of n indicates the channel number. The value of m indicates the pulse number. <seconds>::=<NRf>[<units>]. Where: <NRf> is the trailing edge of pulse waveform. <units>::=[ns | µs | ms | s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<seconds>
Example	SOURce1:DOUBLEPULSe:PULSE1:TRANsition:TRAiling 200ns Set the trailing edge time of the first pulse to 200 ns.

Table 113: [SOURce[n]]:PULSe:TRANsition:TRAiling

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:WIDTh
Description	This command sets or queries the pulse width of the first or of the second pulse in the double pulse waveform for the specified

	channel. Pulse Width = Period × Duty Cycle / 100. The pulse width must be less than the period. If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe1:WIDTh <seconds> [SOURce[n]]:DOUBLEPULSe:PULSe1:WIDTh? [MINimum | MAXimum]
Related Commands	
Arguments	The value of n indicates the channel number. The value of m indicates the pulse number. <seconds>::=<NRf>[<units>] Where: <NRf> is the pulse width. <units>::=[ns | μs | ms | s] MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<width>
Example	SOURce1:DOUBLEPULSe:PULSe1:WIDTh 100ns Set the first pulse waveform width of the double pulse to 100 ns.

Table 114: [SOURce[n]]:DOUBLEPULSe:PULSe[m]:WIDTh

Command	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:DELay
Description	This command sets or queries the delay for first or the second pulse in the double pulse waveform. Important Note: the delay of the second pulse is a delta delay relative to the end of the first pulse. If the carrier is different from Double Pulse, this command and this query cause an error.
Group	Source
Syntax	[SOURce[n]]:DOUBLEPULSe:PULSe[m]:DELay <delay> [SOURce[n]]:DOUBLEPULSe:PULSe[m]:DELay ? [MINimum | MAXimum]
Related Commands	None
Arguments	The value of n indicates the channel number. The value of m indicates the pulse number. <delay>::=<NRf>[<units>] Where: <NRf> is the intial delay value. <units>::=[ns | μs | ms | s]

	MINimum queries the minimum delay. MAXimum queries the maximum delay.
Returns	<delay>
Example	SOURce1:DOUBLEPULSe:PULSe1:DELay 300E-9 Set the delay of the first pulse of the double pulse waveform to 300 ns.

Table 115: [SOURce[n]]:DOUBLEPULSe:PULSe[m]:DELay

Command	[SOURce[n]]:COUPLE:STATe
Description	This command enables or disables the channels coupling between the selected channel and the CH1. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number and n must be greater than 1. ON | 1 enables the channels coupling. OFF | 0 disables the channels coupling.
Returns	<NR1> 0 means channels coupling disabled, 1 means channels coupling enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1.

Table 116: [SOURce[n]]:COUPLE:STATe

Command	[SOURce[n]]:COUPLE:AMPLitude:STATe
Description	This command enables or disables the channel coupling for the amplitude parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple.

	Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:AMPLitude:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:AMPLitude:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON | 1 enables the channels coupling for the amplitude parameter. OFF | 0 disables the channels coupling for the amplitude parameter.
Returns	<NR1> 0 means channel coupling for the amplitude parameter is disabled, 1 means channels coupling for the amplitude parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:AMPLitude:STATe ON Enable the channels coupling for the amplitude parameter

Table 117: [SOURce[n]]:COUPLE:AMPLitude:STATe

Command	[SOURce[n]]:COUPLE:AMPLitude:RATio
Description	This command sets or queries the ratio for the amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:AMPLitude:RATio <ratio> [SOURce[n]]:COUPLE:AMPLitude:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:AMPLitude:OFFSet
Arguments	The value of n indicates the channel number.

	n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:AMPLitude:RATio 2.5 Set the amplitude ratio to 2.5

Table 118: [SOURce[n]]:COUPLE:AMPLitude:RATio

Command	[SOURce[n]]:COUPLE:AMPLitude:OFFSet
Description	This command sets or queries the offset for the amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:AMPLitude:OFFSet <offset> [SOURce[n]]:COUPLE:AMPLitude:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:AMPLitude:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[mV | V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:AMPLitude:OFFSet 1.5 Set the Offset for the amplitude parameter to 1.5 V

Table 119: [SOURce[n]]:COUPLE:AMPLitude:OFFSet

Command	[SOURce[n]]:COUPLE:OFFSet:STATe
Description	This command enables or disables the channel coupling for the offset parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:OFFSet:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE:OFFSet:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON|1 enables the channels coupling for the offset parameter. OFF|0 disables the channels coupling for the offset parameter.
Returns	<NR1> 0 means channel coupling for the offset parameter is disabled, 1 means channels coupling for the offset parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:OFFSet:STATe ON Enable the channels coupling for the offset parameter

Table 120: [SOURce[n]]:COUPLE:OFFSet:STATe

Command	[SOURce[n]]:COUPLE:OFFSet:RATio
Description	This command sets or queries the ratio for the offset parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:OFFSet:RATio <ratio> [SOURce[n]]:COUPLE:OFFSet:RATio? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:OFFSet:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:OFFSet:RATio 2.5 Set the offset ratio to 2.5

Table 121: [SOURce[n]]:COUPLE:OFFSet:RATio

Command	[SOURce[n]]:COUPLE:OFFSet:OFFSet
Description	This command sets or queries the offset for the offset parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:OFFSet:OFFSet <offset> [SOURce[n]]:COUPLE:OFFSet:OFFSet? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:OFFSet:RATio

Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[mV | V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:OFFSet:OFFSet 2 Set the Offset for the offset parameter to 2 V

Table 122: [SOURce[n]]:COUPLE:OFFSet:OFFSet

Command	[SOURce[n]]:COUPLE:FREQuency:STATe
Description	This command enables or disables the channel coupling for the frequency parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:FREQuency:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:FREQuency:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON | 1 enables the channels coupling for the offset parameter. OFF | 0 disables the channels coupling for the offset parameter.
Returns	<NR1> 0 means channel coupling for the frequency parameter is disabled, 1 means channels coupling for the frequency parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:FREQuency:STATe ON Enable the channels coupling for the frequency parameter

Table 123: [SOURce[n]]:COUPLE:FREQuency:STATe

Command	[SOURce[n]]:COUPLE:FREQuency:RATio
Description	This command sets or queries the ratio for the frequency parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:FREQuency:RATio <ratio> [SOURce[n]]:COUPLE:FREQuency:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:FREQuency:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:FREQuency:RATio 2.5 Set the frequency ratio to 2.5

Table 124: [SOURce[n]]:COUPLE:FREQuency:RATio

Command	[SOURce[n]]:COUPLE:FREQuency:OFFSet
Description	This command sets or queries the offset for the frequency parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:FREQuency:OFFSet <offset> [SOURce[n]]:COUPLE:FREQuency:OFFSet? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:FREQuency:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[Hz|kHz|MHz]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:FREQuency:OFFSet 1MHz Set the Offset for the frequency parameter to 1 MHz

Table 125: [SOURce[n]]:COUPLE:FREQuency:OFFSet

Command	[SOURce[n]]:COUPLE:PHASe:STATe
Description	This command enables or disables the channel coupling for the phase parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:PHASe:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE:PHASe:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe

Arguments	The value of n indicates the channel number and n must be greater than 1. ON|1 enables the channels coupling for the offset parameter. OFF|0 disables the channels coupling for the offset parameter.
Returns	<NR1> 0 means channel coupling for the phase parameter is disabled, 1 means channels coupling for the phase parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE: PHASe:STATe ON Enable the channels coupling for the phase parameter

Table 126: [SOURce[n]]:COUPLE:PHASe:STATe

Command	[SOURce[n]]:COUPLE:PHASe:RATio
Description	This command sets or queries the ratio for the phase parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:PHASe:RATio <ratio> [SOURce[n]]:COUPLE:PHASe:RATio? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:PHASe:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>

Example	SOURce2:COUPLE:PHASe:RATio 2.5 Set the phase ratio to 2.5

Table 127: [SOURce[n]]:COUPLE:PHASe:RATio

Command	[SOURce[n]]:COUPLE:PHASe:OFFSet
Description	This command sets or queries the offset for the phase parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:PHASe:OFFSet <offset> [SOURce[n]]:COUPLE:PHASe:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:PHASe:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR3>[<units>] Where:<NR3> is the offset. <units>::=[° | DEG]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:PHASe:OFFSet 10DEG Set the Offset for the phase parameter to 10 degrees.

Table 128: [SOURce[n]]:COUPLE:PHASe:OFFSet

Command	[SOURce[n]]:COUPLE:DCYCle:STATe
Description	This command enables or disables the channel coupling for the ducty cycle parameter.

	Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DCYCle:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE: DCYCle:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON|1 enables the channels coupling for the offset parameter. OFF|0 disables the channels coupling for the offset parameter.
Returns	<NR1> 0 means channel coupling for the duty cycle parameter is disabled, 1 means channels coupling for the duty cycle parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DCYCle:STATe ON Enable the channels coupling for the duty cycle parameter

Table 129: [SOURce[n]]:COUPLE:DCYCle:STATe

Command	[SOURce[n]]:COUPLE:DCYCle:RATio
Description	This command sets or queries the ratio for the duty cycle parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.

Group	Source
Syntax	[SOURce[n]]:COUPLE:DCYCle:RATio <ratio> [SOURce[n]]:COUPLE:DCYCle:RATio? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DCYCle:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DCYCle:RATio 2.5 Set the frequency duty cycle to 2.5

Table 130: [SOURce[n]]:COUPLE:DCYCle:RATio

Command	[SOURce[n]]:COUPLE:DCYCle:OFFSet
Description	This command sets or queries the offset for the duty cycle parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DCYCle:OFFSet <offset> [SOURce[n]]:COUPLE:DCYCle:OFFSet? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DCYCle:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR2>[<units>] Where: <NR2> is the offset. <units>::=PCT MINimum queries the minimum offset. MAXimum queries the maximum offset.

	The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DCYCle:OFFSet 10.5 Set the Offset for the duty cycle parameter to 10.5 %

Table 131: [SOURce[n]]:COUPLE:DCYCle:OFFSet

Command	[SOURce[n]]:COUPLE:LEADing:STATe
Description	This command enables or disables the channel coupling for the leading edge parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:LEADing:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE:LEADing:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON|1 enables the channels coupling for the leading edge parameter. OFF|0 disables the channels coupling for the leading edge parameter.
Returns	<NR1> 0 means channel coupling for the leading edge parameter is disabled, 1 means channels coupling for the leading edge parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:LEADing:STATe ON Enable the channels coupling for the leading edge parameter

Table 132: [SOURce[n]]:COUPLE:LEADing:STATe

Command	[SOURce[n]]:COUPLE:LEADing:RATio

Description	This command sets or queries the ratio for the leading edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:LEADing:RATio <ratio> [SOURce[n]]:COUPLE:LEADing:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:LEADing:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:LEADing:RATio 2.5 Set the leading edge ratio to 2.5

Table 133: [SOURce[n]]:COUPLE:LEADing:RATio

Command	[SOURce[n]]:COUPLE:LEADing:OFFSet
Description	This command sets or queries the offset for the leading edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:LEADing:OFFSet <offset> [SOURce[n]]:COUPLE:LEADing:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:LEADing:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:LEADing:OFFSet 10ns Set the Offset for the leading edge parameter to 10 ns.

Table 134: [SOURce[n]]:COUPLE:LEADing:OFFSet

Command	[SOURce[n]]:COUPLE:TRAiling:STATe
Description	This command enables or disables the channel coupling for the trailing edge parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:TRAiling:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:TRAiling:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1.

	ON|1 enables the channels coupling for the trailing edge parameter. OFF|0 disables the channels coupling for the trailing edge parameter.
Returns	<NR1> 0 means channel coupling for the trailing edge parameter is disabled, 1 means channels coupling for the trailing edge parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:TRAiling:STATe ON Enable the channels coupling for the trailing edge parameter

Table 135: [SOURce[n]]:COUPLE:TRAiling:STATe

Command	[SOURce[n]]:COUPLE:TRAiling:RATio
Description	This command sets or queries the ratio for the trailing edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:TRAiling:RATio <ratio> [SOURce[n]]:COUPLE:TRAiling:RATio? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:COUPLE:TRAiling:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.

Returns	<ratio>
Example	SOURce2:COUPLE:TRAiling:RATio 2.5 Set the trailing edge ratio to 2.5

Table 136: [SOURce[n]]:COUPLE:LEADing:RATio

Command	[SOURce[n]]:COUPLE:TRAiling:OFFSet
Description	This command sets or queries the offset for the trailing edge parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:TRAiling:OFFSet <offset> [SOURce[n]]:COUPLE:TRAiling:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:TRAiling:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:TRAiling:OFFSet 10ns Set the Offset for the trailing edge parameter to 10 ns.

Table 137: [SOURce[n]]:COUPLE:TRAiling:OFFSet

Command	[SOURce[n]]:COUPLE:SYMMetry:STATe

Description	This command enables or disables the channel coupling for the ramp symmetry parameter. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:SYMMetry:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE:SYMMetry:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. ON|1 enables the channels coupling for the ramp symmetry parameter. OFF|0 disables the channels coupling for the ramp symmetry parameter.
Returns	<NR1> 0 means channel coupling for the ramp symmetry parameter is disabled, 1 means channels coupling for the ramp symmetry parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:SYMMetry:STATe ON Enable the channels coupling for the ramp symmetry parameter

Table 138: [SOURce[n]]:COUPLE:SYMMetry:STATe

Command	[SOURce[n]]:COUPLE:SYMMetry:RATio
Description	This command sets or queries the ratio for the ramp symmetry parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:SYMMetry:RATio <ratio> [SOURce[n]]:COUPLE:SYMMetry:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:SYMMetry:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:SYMMetry:RATio 2.5 Set the ramp symmetry ratio to 2.5

Table 139: [SOURce[n]]:COUPLE:SYMMetry:RATio

Command	[SOURce[n]]:COUPLE:SYMMetry:OFFSet
Description	This command sets or queries the offset for the ramp symmetry parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:SYMMetry:OFFSet <offset> [SOURce[n]]:COUPLE:SYMMetry:OFFSet? [MINimum | MAXimum]

Related Commands	[SOURce[n]]:COUPLE:SYMMetry:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. <offset>::=<NR2>[<units>] Where: <NR2> is the offset. <units>::=PCT MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:SYMMetry:OFFSet 20.5% Set the Offset for the trailing edge parameter to 20.5 %.

Table 140: [SOURce[n]]:COUPLE:SYMMetry:OFFSet

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:STATe
Description	This command enables or disables the channel coupling for the amplitude parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of m indicates the pulse number. ON | 1 enables the channels coupling for the amplitude parameter of the double pulse waveform. OFF | 0 disables the channels coupling for the amplitude parameter of the double pulse waveform.
Returns	<NR1>

	0 means channel coupling for the double pulse amplitude parameter is disabled, 1 means channels coupling for the double pulse amplitude parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:STATe ON Enable the channels coupling for the Pulse 1 amplitude parameter of the double pulse waveform.

Table 141: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:STATe

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:RATio
Description	This command sets or queries the ratio for the double pulse amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:RATio <ratio> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.

Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:RATio 2.5 Set the Pulse 1 amplitude ratio of the double pulse waveform to 2.5

Table 142: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:RATio

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:OFFSet
Description	This command sets or queries the offset for the double pulse amplitude parameter in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:OFFSet <offset> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[mV | V] MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:AMPLitude:OFFSet 1.5 Set the Pulse 1 Offset for the double pulse amplitude parameter to 1.5 V

Table 143: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:AMPLitude:OFFSet

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:STATe
Description	This command enables or disables the channel coupling for the leading edge parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:STATe { ON|OFF|0|1} [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of m indicates the pulse number. ON|1 enables the channels coupling for the leading edge parameter of the double pulse waveform. OFF|0 disables the channels coupling for the leading edge parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse leading edge parameter is disabled, 1 means channels coupling for the double pulse leading edge parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:DOUBLEPULSe:PULSe1:LEADing:STATe ON Enable the channels coupling for the Pulse 1 leading edge parameter of the double pulse waveform.

Table 144: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:STATe

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:RATio
Description	This command sets or queries the ratio for the leading edge parameter of the double pulse waveform in coupling mode.

	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:RATio <ratio> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:LEADing:RATio 2.5 Set the Pulse 1 leading edge ratio of the double pulse waveform to 2.5

Table 145: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:RATio

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:OFFSet
Description	This command sets or queries the offset for the leading edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding).

	The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:OFFSet <offset> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:LEADing:OFFSet 10ns Set the Offset for the Pulse 1 leading edge parameter of the double pulse waveform to 10 ns.

Table 146: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:LEADing:OFFSet

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:STATe
Description	This command enables or disables the channel coupling for the trailing edge parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source

Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of m indicates the pulse number. ON | 1 enables the channels coupling for the trailing edge parameter of the double pulse waveform. OFF | 0 disables the channels coupling for the trailing edge parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse trailing edge parameter is disabled, 1 means channels coupling for the double pulse trailing edge parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:DOUBLEPULSe:PULSe1:TRAiling:STATe ON Enable the channels coupling for the Pulse 1 trailing edge parameter of the double pulse waveform.

Table 147: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:STATe

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:RATio
Description	This command sets or queries the ratio for the trailing edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source

Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:RATio <ratio> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:TRAiling:RATio 2.5 Set the Pulse 1 trailing edge ratio of the double pulse waveform to 2.5

Table 148: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:RATio

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:OFFSet
Description	This command sets or queries the offset for the trailing edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:OFFSet <offset> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:TRAiling:RATio
Arguments	The value of n indicates the channel number.

	n must be greater than 1. The value of m indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:TRAiling:OFFSet 10ns Set the Offset for the Pulse 1 trailing edge parameter of the double pulse waveform to 10 ns.

Table 149: [SOURce[n]]:COUPLE:LEADing:OFFSet

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:STATe
Description	This command enables or disables the channel coupling for the width parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of m indicates the pulse number. ON | 1 enables the channels coupling for the width parameter of the double pulse waveform. OFF | 0 disables the channels coupling for the width parameter of the double pulse waveform.
Returns	<NR1>

	0 means channel coupling for the double pulse width parameter is disabled, 1 means channels coupling for the double pulse width parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:STATe ON Enable the channels coupling for the Pulse 1 trailing edge parameter of the double pulse waveform.

Table 150: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:STATe

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:RATio
Description	This command sets or queries the ratio for the width edge parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:RATio <ratio> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>

Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:RATio 2.5 Set the Pulse 1 width ratio of the double pulse waveform to 2.5

Table 151: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:RATio

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:OFFSet
Description	This command sets or queries the offset for the width parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:OFFSet <offset> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:WIDTh:OFFSet 10ns Set the Offset for the Pulse 1 width parameter of the double pulse waveform to 10 ns.

Table 152: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:WIDTh:OFFSet

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:STATe
Description	This command enables or disables the channel coupling for the delay parameter of the double pulse waveform. Once the channel coupling between two channels have been enabled using the [SOURce[n]]:COUPLE:STATe command, you have to use this commmand to select the parameter that you want to couple. Note: if [SOURce[n]] will be omitted the channels coupling will be made between the CH2 and the CH1.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:STATe { ON | OFF | 0 | 1} [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:STATe?
Related Commands	[SOURce[n]]:COUPLE:STATe
Arguments	The value of n indicates the channel number and n must be greater than 1. The value of m indicates the pulse number. ON | 1 enables the channels coupling for the delay parameter of the double pulse waveform. OFF | 0 disables the channels coupling for the delay parameter of the double pulse waveform.
Returns	<NR1> 0 means channel coupling for the double pulse delay parameter is disabled, 1 means channels coupling for the double pulse delay parameter is enabled.
Example	SOURce2:COUPLE:STATe ON Enable the channels coupling between the CH2 and the CH1. SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:STATe ON Enable the channels coupling for the Pulse 1 trailing edge parameter of the double pulse waveform.

Table 153: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:STATe

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:RATio
Description	This command sets or queries the ratio for the delay parameter of the double pulse waveform in coupling mode.

	The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset. This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:RATio <ratio> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:RATio? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:OFFSet
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <ratio>::=<NRf> Where: <NRf> is the ratio. MINimum queries the minimum ratio. MAXimum queries the maximum ratio. The default is 1.
Returns	<ratio>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:RATio 2.5 Set the Pulse 1 delay of the double pulse waveform to 2.5

Table 154: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:RATio

Command	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:OFFSet
Description	This command sets or queries the offset for the delay parameter of the double pulse waveform in coupling mode. The Channel Coupling allows you to specify that Channel 1 parameter like frequency, amplitude, offset etc. must be related to other channel's parameter by a ratio (multiplying) and an offset (adding). The equation of the channel coupling is the following: CHN Parameter = CH1 Parameter*Ratio + Offset.

	This command causes an error when the result of the formula exceeds the ranges of the CHN parameter.
Group	Source
Syntax	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:OFFSet <offset> [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:OFFSet? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:RATio
Arguments	The value of n indicates the channel number. n must be greater than 1. The value of m indicates the pulse number. <offset>::=<NRf>[<units>] Where: <NRf> is the offset. <units>::=[ns | µs | ms | s]. MINimum queries the minimum offset. MAXimum queries the maximum offset. The default is 0.
Returns	<offset>
Example	SOURce2:COUPLE:DOUBLEPULSe:PULSe1:DELay:OFFSet 10ns Set the Offset for the Pulse 1 delay parameter of the double pulse waveform to 10 ns.

Table 155: [SOURce[n]]:COUPLE:DOUBLEPULSe:PULSe[m]:DELay:OFFSet

Command	[SOURce[n]]:VOLTage:LIMit:HIGH
Description	This command sets or queries the higher limit of the output amplitude high level for the specified channel.
Group	Source
Syntax	[SOURce[n]]:VOLTage:LIMit:HIGH <voltage> [SOURce[n]]:VOLTage:LIMit:HIGH? [MINimum | MAXimum]
Related Commands	[SOURce[n]]:VOLTage:LIMit:LOW
Arguments	<voltage>::=<NRf>[<units>] Where: <NRf> is the higher limit of output amplitude. <units>::=[mV | V] MINimum queries the minimum high limit level. MAXimum queries the maximum high limit level.
Returns	<voltage>
Example	SOURce1:VOLTage:LIMit:HIGH 1V Set the higher limit of channel 1 output amplitude to 1 V.

Table 156: [SOURce[n]]:VOLTage:LIMit:HIGH

Command	[SOURce[n]]:VOLTage:LIMit:LOW
Description	This command sets or queries the lower limit of the output amplitude low level for the specified channel.
Group	Source
Syntax	[SOURce[n]]:VOLTage:LIMit:LOW <voltage> [SOURce[n]]:VOLTage:LIMit:LOW? [MINimum|MAXimum]
Related Commands	[SOURce[n]]:VOLTage:LIMit:HIGH
Arguments	<voltage>::=<NRf>[<units>] Where: <NRf> is the higher limit of output amplitude. <units>::=[mV|V] MINimum queries the minimum low limit level. MAXimum queries the maximum low limit level.
Returns	<voltage>
Example	SOURce1:VOLTage:LIMit:LOW 10mV Set the lower limit of channel 1 output amplitude to 10 mV.

Table 157: [SOURce[n]]:VOLTage:LIMit:LOW

Command	[SOURce[n]]:ATTEnuator:STATe
Description	This command sets or queries the attenuator state and enable or disable the attenuator.
Group	Source
Syntax	[SOURce[n]]:ATTEnuator:STATe {ON|OFF|0|1} [SOURce[n]]:ATTEnuator:STATe?
Related Commands	None
Arguments	The value of n indicates the channel number. ON|1 enables the attenuator for the specified channel. OFF|0 disables the attenuator for the specified channel.
Returns	<NR1> 0 means OFF, 1 means ON
Example	SOURce1:ATTEnuator:STATe ON Enable the attenuator for the channel 1.

Table 158: [SOURce[n]]:ATTEnuator:STATe

Command	AFGControl:START
Description	This command runs the instrument and starts the generation. There is no query form of this command.
Group	Device Commands

Syntax	AFGControl:START
Related Commands	AFGControl:STOP
Arguments	None
Returns	None
Example	AFGControl:START Send the start command to the function generator.

Table 159: AFGControl:START

Command	AFGControl:STOP
Description	This command stops the instrument. There is no query form of this command.
Group	Device Commands
Syntax	AFGControl:STOP
Related Commands	AFGControl:START
Arguments	None
Returns	None
Example	AFGControl:STOP Send the stop command to the function generator.

Table 160: AFGControl:STOP

Command	AFGControl:STATus (Query only)
Description	This command queries the status of the function generator. This command is query only.
Group	Device Commands
Syntax	AFGControl:STATus?
Related Commands	None
Arguments	None
Returns	0 if the instrument is in stopped state. 1 if the instrument is in run state.
Example	AFGControl:STATus? Return the status of the function generator.

Table 161: AFGControl:STATus

Command	AFGControl:COPY
Description	This command copies all parameter data from the source channel to the others.
Group	Device Commands

Syntax	AFGControl:COPY <source channel>
Related Commands	None
Arguments	<source channel>::=<NR1> Where <NR1> indicates the channel number.
Returns	None
Example	AFGControl:COPY 1 Copies the CH1 parameters into the others channels

Table 162: AFGControl:COPY

Command	AFGControl:AWGSwitch
Description	This command allows to switch from AT-Simple-AFG software to AT-True-ARB software.
Group	Device Commands
Syntax	AFGControl:AWGSwitch
Related Commands	None
Arguments	None
Returns	None
Example	AFGControl:AWGSwitch Launchs the AT-True-ARB software while AT-Simple-AFG is running.

Table 163: AFGControl:AWGSwitch

Command	*RST
Description	This command resets the instrument to its default state. There is no query form of this command.
Group	System
Syntax	*RST
Related Commands	None
Arguments	None
Returns	None
Example	*RST Resets the instrument.

Table 164: *RST

Command	SYSTem:BEEPer[:IMMediate]
Description	This command causes the instrument to beep immediately. There is no query form of this command.
Group	System

Syntax	SYSTem:BEEPer[:IMMediate]
Related Commands	None
Arguments	None
Returns	None
Example	SYSTem:BEEPer:IMMediate Causes an audible beep.

Table 165: SYSTem:BEEPer[:IMMediate]

Command	SYSTem:BEEPer:STATe
Description	This command enables or disables the instrument beeper. When the beeper is set to ON, the instrument will beep when an error is caused by remote command execution.
Group	System
Syntax	SYSTem:BEEPer:STATe { ON | OFF | 0 | 1 } SYSTem:BEEPer:STATe?
Related Commands	SYSTem:BEEPer[:IMMediate]
Arguments	ON | 1 enables the beeper. OFF | 0 disables the beeper.
Returns	<NR1> 1 means that the beeper is enabled, 0 means that it is disabled.
Example	SYSTem:BEEPer:STATe ON Enable the beeper function.

Table 166: SYSTem:BEEPer:STATe

Command	SYSTem:ERRor[:NEXT] (Query only)
Description	This command returns the contents of the Error/Event queue. This command is query only.
Group	System
Syntax	SYSTem:ERRor[:NEXT]?
Related Commands	SYSTem:BEEPer[:IMMediate]
Arguments	None
Returns	<NR1>::=<Error/event number> <Qstring>::=<Error/event description>
Example	SYSTem:ERRor:NEXT? Example return: "–221, Error on run mode: the AFG is not in the correct run mode for this operation". If the instrument detects an error or an event occurs, the event number and event message will be returned.

Table 167: SYSTem:ERRor[:NEXT]

Command	SYSTem:KCLick[:STATe]
Description	This command enables or disables the key click sound when you push the front panel buttons, turn the general-purpose knob or touch/click a control on the user interface.
Group	System
Syntax	SYSTem:KCLick[:STATe] { ON|OFF|0|1} SYSTem:KCLick[:STATe]?
Related Commands	ON|1 enables key click sound. OFF|0 disables key click sound.
Arguments	None
Returns	<NR1> 0 means OFF, 1 means ON
Example	SYSTem:KCLick:STATe ON Enable the key click sound.

Table 168: SYSTem:KCLick[:STATe]

Command	SYSTem:TLOCk[:STATe]
Description	This command locks or unlocks the touch screen interface. When you set the ON state (lock enabled), the events related to the touch screen will be disabled.
Group	System
Syntax	SYSTem:TLOCk[:STATe] { ON|OFF|0|1} SYSTem:TLOCk[:STATe]?
Related Commands	None
Arguments	ON locks the user interface. OFF unlocks the user interface.
Returns	<NR1> 1 means that the UI is locked, 0 means that it is unlocked.
Example	SYSTem:TLOCk:STATe ON Lock the user interface.

Table 169: SYSTem:TLOCk[:STATe]

Command	SYSTem:ULANguage (Query only)
Description	This command queries the language that the instrument uses to display the information on the screen. This command is query only.

Group	System
Syntax	SYSTem:ULANguage?
Related Commands	None
Arguments	None
Returns	ENGLish
Example	SYSTem:ULANguage? Example return: ENGLish, which means that the instrument displays information in English.

Table 170: SYSTem:ULANguage?

Command	SYSTem:VERSion (Query only)
Description	This command returns the SCPI conformance version of the instrument. This command is query only.
Group	System
Syntax	SYSTem:VERSion?
Related Commands	None
Arguments	None
Returns	<SCPI Version>::=YYYY.V Where: YYYY indicates the year. V indicates the version number for that year.
Example	SYSTem:VERSion? Example return: 1999.0

Table 171: SYSTem:VERSion?

Command	TRACe[n][:DATA]
Description	This command transfers the waveform data from the external controller to the arbitrary buffer of the selected channel. It's also possible choose which arbitrariry buffer select: arbitrary buffer for carrier, modulation or sweep. The query form of this command returns the binary block data. The maximum allowed length is 16384 samples. It's possible to transfer a larger number of samples but ony 16384 will be saved in the buffer and the others will be discarded. When you send this command, if the instrument is running it will be stopped.
Group	System
Syntax	TRACe[n][:DATA] [{CARrier|MODulation|SWEep}], <binary_block_data> TRACe[n][:DATA]? [{CARrier|MODulation|SWEep}]

	Where [{CARrier | MODulation | SWEep}] is an optional parameter
Related Commands	None
Arguments	The value of n indicates the channel number. CARrier | MODulation | SWEep specifies the arbitrary buffer target. <binary_block_data> is the waveform data in binary format. Example: #42000<DAB><DAB>...<DAB> The block data is composed by 4 field: • The character "#" that starts the binary block. • The first number (4) indicates number of digits of the byte count field. • The byte count field (2000) tells the length in byte of the transferred data. • <DAB> fields contain the data, each <DAB> is a sample, it is composed by 2 byte that represent an unsigned number between 0 and 65535 in big endian format. After the reception, the waveform is normalized to output the amplitude and the offset set through the specific commands, then it isn't important the absolute value of the samples, the best choice is to use the full available range, from 0 to 65535.
Returns	<binary_block_data>
Example	TRACe1:DATA CAR,#42000<DAB><DAB>...<DAB> Transmit a waveform of 1000 samples to the carrier arbitrary buffer memory of the channel 1 of the arbitrary function generator.

Table 172: TRACe[n][:DATA]

Command	TRACe[n]:POINts? (Query only)
Description	This command queries the number of data points for the waveform in the arbitrary buffer memory for the specified channel. It's also possible choose which arbitrariry buffer select: arbitrary buffer for carrier, modulation or sweep. This command is query only.
Group	Trace
Syntax	TRACe[n]:POINts? [MIN | MAX],[{CARrier | MODulation | SWEep}]
Related Commands	None
Arguments	The value of n indicates the channel number.

	MINimum queries the minimum number of samples. MAXimum queries the maximum number of samples. CARrier | MODulation | SWEep specifies the arbitrary buffer target.
Returns	<NR1>::= number of samples.
Example	TRACe1:POINts? MAX,CARrier Example return: 16384, which is the maximum number of points for arbitrary carrier buffer of channel 1.

Table 173: TRACe[n]:POINts?

Command	TRACe[n]:RECall
Description	This command recalls the contents of arbitrary buffer memory target (carrier, modulation or sweep) for the specified channel from a specified file in the file system. This command works only with ".txt", ".csv" and ".trc" files. There is no query form of this command.
Group	Trace
Syntax	TRACe[n]:RECall <filename>,[{CARrier | MODulation | SWEep}]
Related Commands	TRACe[n]:SAVE
Arguments	The value of n indicates the channel number. <filename>::= <Qstring> The file name you want to recall data from. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory. CARrier | MODulation | SWEep specifies the arbitrary buffer target.
Returns	None
Example	TRACe1:RECall "waveform1.txt",MODulation Recalls the waveform data in the arbitrary modulation buffer of the channel 1 from the file "waveform1.txt". The file is located in the Current Working Directory.

Table 174: TRACe[n]:RECall

Command	TRACe[n]:SAVE
Description	This command saves the contents of arbitrary buffer memory target (carrier, modulation or sweep) of the selected channel to a specified file in the file system. This command works only with ".txt" file, if the destination file exist and it isn't locked it will be overwritten. There is no query form of this command.
Group	Trace
Syntax	TRACe[n]:SAVE <filename>,[{CARrier | MODulation | SWEep}]
Related Commands	TRACe[n]:RECall

Arguments	The value of n indicates the channel number. <filename>::= <Qstring> The name of the file you want to save. The path can be absolute or relative, if you insert a relative path it starts from Current Working Directory. CARrier|MODulation|SWEep specifies the arbitrary buffer target.
Returns	None
Example	TRACE1:SAVE "waveform1.txt",SWEep Copies the waveform data in the arbitrary sweep buffer of the channel 1 to the file "waveform1.txt".

Table 175: TRACe[n]:SAVE

Command	STATus:OPERation[:EVENt]?
Description	This command returns the value in the Operation Event Register (OEVR) and clears the OEVR. This command is query only.
Group	Status
Syntax	STATus:OPERation[:EVENt]?
Related Commands	None
Arguments	None
Returns	<NR1>::=<bit_value>
Example	STATus:OPERation:EVENt? Example return: 2, which indicates that the OEVR contains the binary number 00000010 and the instrument CH2 is waiting for a trigger.

Table 176: STATus:OPERation[:EVENt]?

Command	STATus:OPERation:CONDition?
Description	This command returns the contents of the Operation Condition Register (OCR). This command is query only.
Group	Status
Syntax	STATus:OPERation:CONDition?
Related Commands	None
Arguments	None
Returns	<NR1>::=<bit_value>
Example	STATus:OPERation:CONDition? Example return: 2, which indicates that the OCR contains the binary number 00000010 and the instrument CH2 is waiting for a trigger.

Table 177: STATus:OPERation:CONDition?

Command	STATus:OPERation:ENABle
Description	This command queries the mask of the Operation Enable Register (OENR). Note that the OENR is not used.
Group	Status
Syntax	STATus:OPERation:ENABle?
Related Commands	None
Arguments	None
Returns	0
Example	STATus:OPERation:ENABle?

Table 178: STATus:OPERation:ENABle

Command	STATus:QUEStionable[:EVENt]?
Description	This command returns the value in the Questionable Event Register (QEVR) and clears the QEVR. This command is query only. Note that the QEVR is not used.
Group	Status
Syntax	STATus:QUEStionable[:EVENt]?
Related Commands	None
Arguments	None
Returns	0
Example	STATus:QUEStionable:EVENt?

Table 179: STATus:QUEStionable[:EVENt]?

Command	STATus:QUEStionable:CONDition?
Description	This command returns the contents of the Questionable Condition Register (QCR). This command is query only. Note that the QCR is not used.
Group	Status
Syntax	STATus:QUEStionable:CONDition?
Related Commands	
Arguments	None
Returns	0
Example	STATus:QUEStionable:CONDition?

Table 180: STATus:QUEStionable:CONDition?

Command	STATus:QUEStionable:ENABle

Description	This command queries the mask for the Questionable Enable Register (QENR). Note that the QENR is not used.
Group	Status
Syntax	STATus:QUEStionable:ENABle?
Related Commands	None
Arguments	None
Returns	0
Example	STATus:QUEStionable:ENABle?

Table 181: STATus:QUEStionable:ENABle

Command	STATus:PRESet
Description	This command presets the SCPI status registers (Operation Enable Register (OENR) and Questionable Enable Register (QENR)). There is no query form of this command.
Group	Status
Syntax	STATus:PRESet
Related Commands	None
Arguments	None
Returns	None
Example	STATus:PRESet Presets the SCPI status registers.

Table 182: STATus:PRESet

Command	*CLS
Description	This command clears all the event registers in Standard Event Status Register (SESR), the Status Byte Register SBR (except the MAV bit) and queues that are used in the arbitrary function generator status and event reporting system. There is no query form of this command
Group	Status
Syntax	*CLS
Related Commands	None
Arguments	None
Returns	None
Example	*CLS Clear all the event registers and queues.

Table 183: *CLS

Command	*ESE
Description	This command sets or queries the bits in the Event Status Enable Register (ESER) used in the status and events reporting system of the arbitrary function generator. The ESER prevents events from being reported to the Status Byte Register (STB). The query form of this command returns the contents of the ESER.
Group	Status
Syntax	*ESE <bit_value> *ESE?
Related Commands	*CLS *ESR? *SRE *STB?
Arguments	<NR1>::=<bit_value>
Returns	<bit_value>
Example	*ESE 177 Sets the ESER to 177 (binary 10110001), which determines that the PON, CME, EXE, and OPC bits should be set in SBR register. *ESE? Example return: 186, which indicates that the ESER contains the binary value 10111010.

Table 184: *ESE

Command	*ESR?
Description	This command returns the contents of the Standard Event Status Register (SESR) used in the status events reporting system in the arbitrary function generator. This command clears the SESR when it reads it. This command is query only.
Group	Status
Syntax	*ESR?
Related Commands	*CLS *ESE? *SRE *STB?
Arguments	None
Returns	<NR1> Indicates that the contents of the SESR is a decimal integer.

Example	*ESR? Example return: 181, which indicates that the SESR contains the binary number 10110101.

Table 185: *ESR?

Command	*SRE
Description	This command sets and queries the bits in the Service Request Enable Register (SRER).
Group	Status
Syntax	*SRE <bit_value> *SRE?
Related Commands	None
Arguments	<bit_value>::=<NR1> Where: <NR1> is a value from 0 through 255. The binary bits of the SRER are set according to this value. Using an out-of-range value causes an execution error.
Returns	<bit_value>
Example	*SRE 48 Set the bits in the SRER to binary 00110000. *SRE? Example return: 32, which means that the bits in the SRER have the binary value of 00100000

Table 186: *SRE

Command	*STB?
Description	This command returns the contents of the Status Byte Register (SBR) using the Master Summary Status (MSS) bit. This command is query only.
Group	Status
Syntax	*STB?
Related Commands	None
Arguments	<bit_value>::=<NR1> Where: <NR1> is a value from 0 through 255. The binary bits of the SRER are set according to this value. Using an out-of-range value causes an execution error.
Returns	<NR1>
Example	*STB? Example return: 96, which indicates that the SBR contains the binary value 01100000.

Table 187: *STB?

Command	*OPC
Description	This command generates the operation complete message by setting bit 0 in the Standard Event Status Register (SESR) when all pending commands that generate an OPC message are complete. The query version of this command places the ASCII character "1" into the output queue when all such *OPC commands are complete.
Group	Synchronization
Syntax	*OPC *OPC?
Related Commands	None
Arguments	None
Returns	<execution complete>::=1 Where: "1" indicates that all pending operations are complete.
Example	*OPC? Example return if all pending OPC operations are finished: 1. The arbitrary function generator always returns 1.

Table 188: *OPC

Command	*WAI
Description	This command prevents the instrument from executing further commands or queries until all pending commands that generate an operation complete (OPC) message are complete. There is no query form of this command.
Group	Synchronization
Syntax	*WAI
Related Commands	*OPC
Arguments	None
Returns	None
Example	*WAI Prevent the instrument from executing any further commands or queries until all pending commands that generate an OPC message are complete.

Table 189: *WAI

Command	*TRG
Description	This command generates a trigger event. There is no query form of this command.
Group	Trigger
Syntax	*TRG
Related Commands	ABORt TRIGger[:SEQuence][:IMMediate]
Arguments	None
Returns	None
Example	*TRG Generate a trigger event.

Table 190: *TRG

Command	TRIGger[:SEQuence][:IMMediate]
Description	This command forces a trigger event to occur. There is no query form of this command.
Group	Trigger
Syntax	TRIGger[:SEQuence][:IMMediate]
Related Commands	ABORt *TRG
Arguments	None
Returns	None
Example	TRIGger:SEQuence:IMMediate Generate a trigger event.

Table 191: TRIGger[:SEQuence][:IMMediate]

Command	ABORt
Description	This command resets the trigger event. There is no query form of this command.
Group	Trigger
Syntax	ABORt
Related Commands	*TRG TRIGger[:SEQuence][:IMMediate]
Arguments	None
Returns	None
Example	ABORt Reset the trigger system

Table 192: ABORt

Command	TRIGger[:SEQuence]:SOURce
Description	This command sets or queries the instrument trigger source.
Group	Trigger
Syntax	TRIGger[:SEQuence]:SOURce {TIMer | EXTernal | MANual} TRIGger[:SEQuence]:SOURce?
Related Commands	None
Arguments	<source>::= {TIMer | EXTernal | MANual} TIMer: the trigger is sent at regular intervals. EXTernal: the trigger come from the external BNC connector. MANual: the trigger is sent via software or using the trigger button on front panel.
Returns	TIM | EXT | MAN
Example	TRIGger:SOURce TIMer It sets the trigger source to timer. TRIGger:SOURce? Might return TIMer

Table 193: TRIGger[:SEQuence]:SOURce

Command	TRIGger[:SEQuence]:SLOPe
Description	This command sets or queries the instrument trigger input slope for the external source.
Group	Trigger
Syntax	TRIGger[:SEQuence]: SLOPe {RISING | FALLING | BOTH} TRIGger[:SEQuence]: SLOPe?
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<slope>::= {RISING | FALLING | BOTH}
Returns	<slope>
Example	TRIGger:SLOPe RISING It sets the trigger slope to rising edge. TRIGger:SLOPe? Might return RISING.

Table 194: TRIGger[:SEQuence]:SLOPe

Command	TRIGger[:SEQuence]:THREshold
Description	This command sets or queries the threshold of an external trigger signal when you select the external trigger input as trigger source with the TRIGger[:SEQuence]:SOURce command.

Group	Trigger
Syntax	TRIGger[:SEQuence]:THREshold <threshold> TRIGger[:SEQuence]:THREshold? [MINimum | MAXimum]
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<threshold>::= <NRf>[<units>] Where: <units>::=[mV | V] MINimum queries the minimum threshold level. MAXimum queries the maximum threshold level.
Returns	<threshold>
Example	TRIGger:SEQuence:THREshold 1 Set the external trigger input level to 1 V.

Table 195: TRIGger[:SEQuence]:THREshold

Command	TRIGger[:SEQuence]:TIMer
Description	This command sets or queries the timer for the trigger event.
Group	Trigger
Syntax	TRIGger[:SEQuence]:TIMer <interval> TRIGger[:SEQuence]:TIMer? [MINimum | MAXimum]
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<interval>::=<NRf> [<units>] Where: <NRf> is the timer value <units>::=[us | ms | s] MINimum queries the minimum time interval. MAXimum queries the maximum timer interval.
Returns	<interval>
Example	TRIGger:TIMer 0.5 It sets the trigger timer to 0.5 seconds. TRIGger:TIMer? MAXimum It might return 100 seconds

Table 196: TRIGger[:SEQuence]:TIMer

Command	TRIGger[:SEQuence]:IMPedance
Description	This command sets or queries the impedance of an external trigger signal when you select the external trigger input as trigger source with the TRIGger[:SEQuence]:SOURce command. It can be 50 Ohm or 1 KOhm
Group	Trigger
Syntax	TRIGger[:SEQuence]: IMPedance {50Ohm,1KOhm}

	TRIGger[:SEQuence]: IMPedance?
Related Commands	TRIGger[:SEQuence]:SOURce
Arguments	<impedance>::= {50Ohm | 1KOhm} Where: 50Ohm is 50 Ohm selection. 1KOhm is 1K Ohm selection.
Returns	< impedance>
Example	TRIGger:IMPedance 50Ohm It sets the trigger impedance to 50Ohm. TRIGger:IMPedance? It might return 50Ohm

Table 154: TRIGger[:SEQuence]:IMPedance

Command	TRIGger[m]:OUTPut:AMPLitude
Description	This command sets or queries the marker out voltage level for the specified channel. *Note:* the parameter m must be equal to 1.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:AMPLitude <voltage level> TRIGger[m]:OUTPut:AMPLitude? {MINimum | MAXimum}
Related Commands	None
Arguments	Where m indicates the marker out channel. <level>:=<NRf>[<units>] Where: <NRf> is the trigger output high level. <units>::=[V | mV]. MINimum queries the minimum level. MAXimum queries the maximum level.
Returns	<voltage level>
Example	TRIGger1:OUTPut:AMPLitude 2 It sets the marker out voltage to 2 Volts. TRIGger1:OUTPut:AMPLitude? MIN It might return 1 Volts.

Table 197: TRIGger[m]:OUTPut:AMPLitude

Command	TRIGger[m]:OUTPut:DELay
Description	This command sets or queries the marker out delay. *Note:* the parameter m must be equal to 1.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:DELay <skew>

	TRIGger[m]:OUTPut:DELay? [MINimum|MAXimum]
Related Commands	None
Arguments	Where m indicates the marker out channel. <skew>:=<NRf> [<units>] Where: <NRf> is the timer value <units>::=[ns|us|ms|s]
Returns	<skew>
Example	TRIGger1:OUTPut:DELay 1ns It sets the marker out delay to 1 ns. TRIGger1:OUTPut:DELay? MAXimum It might return 100 nanoseconds.

Table 198: TRIGger[m]:OUTPut:DELay

Command	TRIGger[m]:OUTPut:[:STATe]
Description	This command sets or queries the marker output state and enable or disable the marker out. *Note:* the parameter m must be equal to 1.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:STATe {ON|OFF|0|1} TRIGger[m]:OUTPut:STATe?
Related Commands	None
Arguments	Where m indicates the marker out channel. ON|1 enables the marker out for the specified channel. OFF|0 disables the marker out for the specified channel.
Returns	<NR1> 0 means OFF, 1 means ON
Example	TRIGger1:OUTPut:STATe ON Enable the marker out for the channel 1.

Table 199: TRIGger[m]:OUTPut:STATe

Command	TRIGger[m]:OUTPut:LINk <output>
Description	This command sets or queries links the marker output to the selected output. *Important Note:* On T3AWG2K series the marker out can be assigned to the outputs [1|2] or [1|2|3|4] depending on the available number of channels of the instrument.

	Note: the parameter m must be equal to 1.
Group	Trigger
Syntax	TRIGger[m]:OUTPut:LINk <output> TRIGger[m]:OUTPut:LINk?
Related Commands	None
Arguments	Where m indicates the marker out channel. <output>:=<NR1> Where: <NR1> is a value from 1 through 4 that means the output channel number assigned to the marker out.
Returns	<output channel>
Example	TRIGger1:OUTPut:LINk 2 Links the marker output channel 1 to the channel 2. TRIGger1:OUTPut:LINk? It might return 2

Table 200: TRIGger[m]:OUTPut:LINk

5. COMMAND ERRORS

Command errors are returned when there is a syntax error in the command.

Error code	Error message
-369	Out of Range Channel Coupling Error: the formula result is out of range
-368	Channel Coupling Error: it is not possible to couple this parameter
-367	Marker Link Error
-366	Instrument is importing a waveform
-365	Time Out Error
-360	Communication Error
-350	Queue Overflow
-340	Calibration Error
-330	Self Test Failed
-321	Out of Memory
-320	Storage Fault
-316	Instrument Setting Error
-314	Save/Recall Memory Lost
-313	Calibration Memory Lost
-311	Memory Error
-310	System Error

-307	License Error
-306	Waveform Range Error
-305	Waveform Length Error
-303	Waveform Not Found
-302	Error to parsing waveform block data
-301	Channels Error
-300	Device Specific Error
-250	File Error
-223	Parameter disabled and not modifiable
-222	Out of Range Error
-221	Invalid run mode: the AFG is not in the correct run mode for this operation
-104	Data Type Error
0	No error
5	Too many numeric suffices in Command Spec
10	No Input Command to parse
14	Numeric suffix is invalid value
16	Invalid value in numeric or channel list (the value doesn't meet the parameters already set)
17	Invalid number of dimensions in a channel list
20	Parameter of type Numeric Value overflowed its storage
30	Wrong units for parameter
40	Wrong type of parameter(s)
50	Wrong number of parameters
60	Unmatched quotation mark (single/double) in parameters
65	Unmatched bracket
70	Command keywords were not recognized
200	No entry in list to retrieve (number list or channel list)
210	Too many dimensions in entry to be returned in parameters
220	; plus End of line commands

6. PROGRAMMING EXAMPLES

The AFG-SDK contains several example scripts and other examples written using LabView, Microsoft Visual C++, Microsoft C# .NET, Python, Matlab.

The programs run on Microsoft Windows® PC-compatible systems equipped with NIVISA.

NI-VISA is the National Instruments implementation of the VISA I/O standard. NI-VISA includes software libraries, interactive utilities such as NI I/O Trace and the VISA Interactive Control, and configuration programs through Measurement & Automation Explorer for all your development needs.
Use NIVISA in software to write interoperable instrument drivers to handle communicating between software applications and your instrument.
You can download the latest version of NIVISA tools here:
http://www.ni.com/download/ni-visa-18.5/7973/en/

The example programs assume that the system recognizes the PC (external controller) resource name.
Refer to the NIVISA section of this manual for details about resource names.

6.1 Example Script

In the folder you can find some text files that show the use of the SCPI commands that controls the main features of the Function Generator. You can send them to the instrument using the AT-Instrument-Communicator.

6.2 Python examples

The Python examples are developed using Python 3.7 32 bit, they show how to communicate with the instrument and how to send a waveform to the instrument memory and generate the signal.
The communication is based on NI VISA, then before run these examples it is necessary to download and install the "pyvisa" that is the VISA version for Python language.

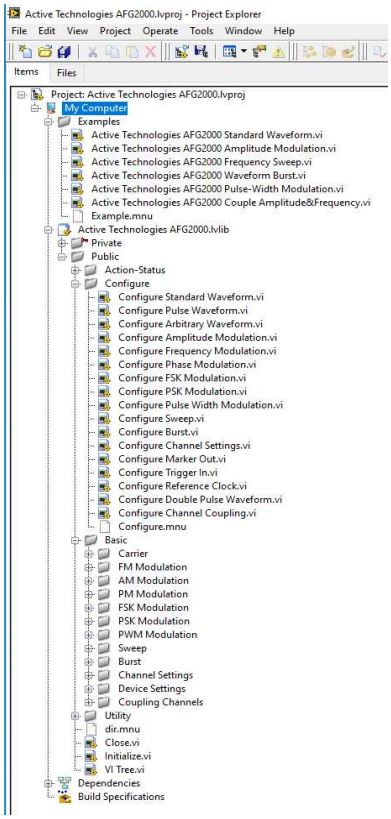
6.3 Matlab examples

The Matlab examples are developed using Matlab R2014b, in the folder you can find 2 files:

- Send_Wfm_Binary_Block: this function sends the samples from Matlab workspace to the instrument memory;
- Generation_Example: this example creates a parabolic waveform and send it to the instrument using the function showed above. When the generation started on channel 1 there is the parabolic waveform and on the channel 2 there is Sinc function from the instrument predefined. You can change some parameter such as Amplitude, Offset, Frequency and for the function generated in Matlab workspace you can change the Number of Samples and the function.

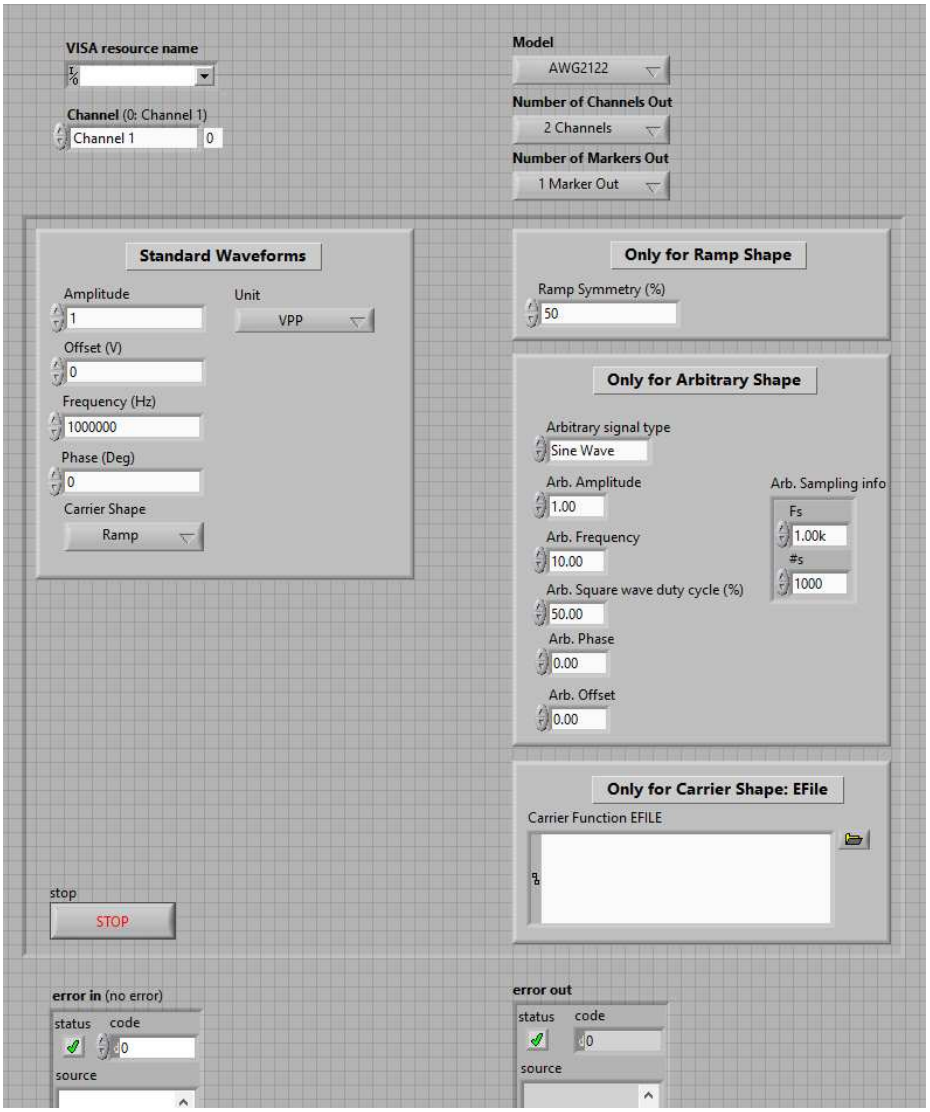
6.4 LabView examples

The LabView examples require at least LabView 2013 64 bit version, you should copy *SDK_AFG_2000_RevX\Active Technologies AFG2000* folder in *…\LabVIEW 2013\instr.lib* folder on your computer and open the file Active Technologies AFG2000.lvproj.



The LabView project contains several Vis that control the basic instrument features and six examples located in the folder *Examples*.

Double click on the project tree to launch the *Active_Technologies_AFG2000_Standard_Waveform.vi* example

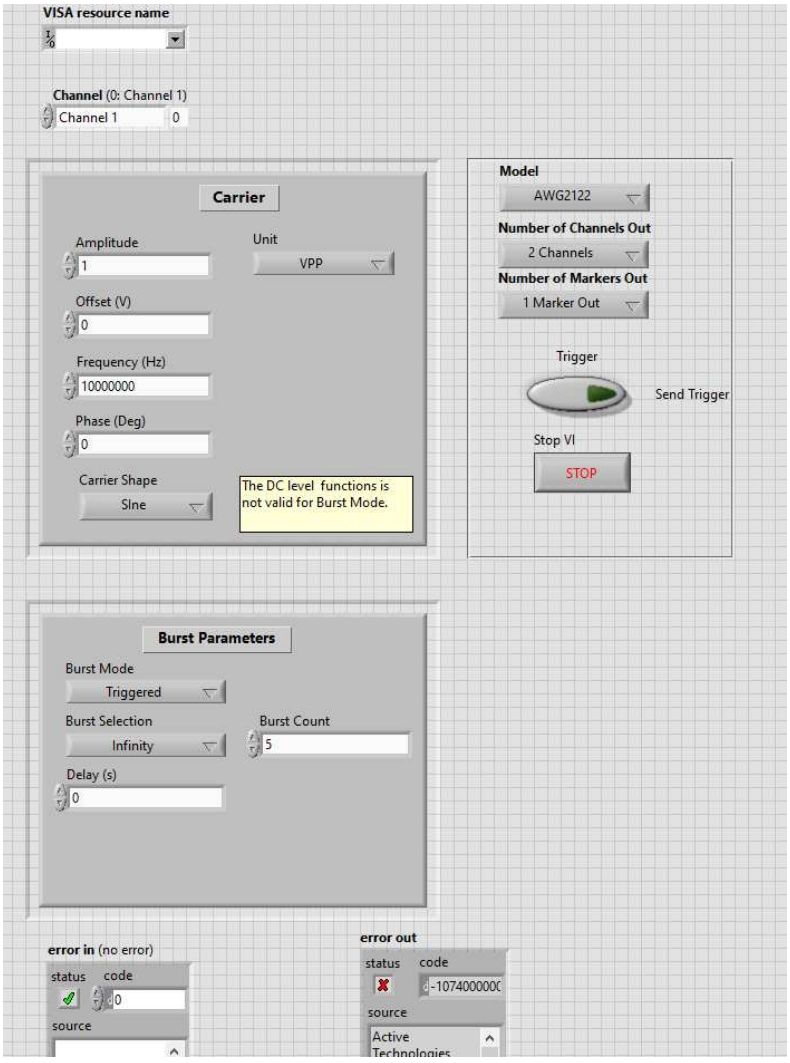


This example generates a standard waveform (Sine, Square, Ramp, Pulse, Sync, Gaussian, Lorentz, Exponential, Haversine) in Continuous Mode; before running the VI, you should select the AFG 2000 resources in the VISA resource name control.
You can change the Amplitude, Frequency, Offset, Phase and Symmetry (only for Ramp waveform) output parameters on the fly while the instrument is running.
You can generate an arbitrary waveform selecting from a file (Efile) or an array of sample (connect to the *Basic Function Generator VI* in this example).

A Pseudo Random Noise and a DC Level could also be generated.

Run the VI to start the generation, press the STOP button to stop the waveform generation.

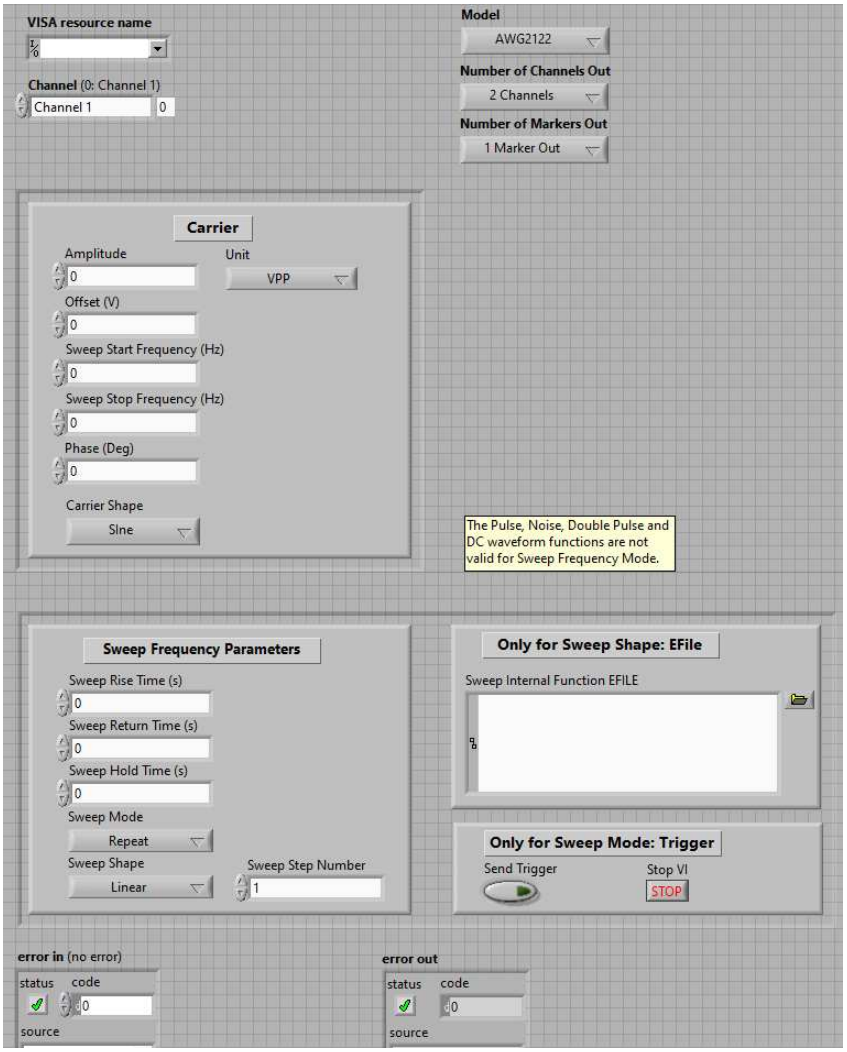
Double click on the project tree to open the *Active_Technologies_AFG2000_Waveform_Burst.vi* example



This example generates waveforms in Burst mode for the selected Channel; you can choose the carrier shape (DC waveform is not valid in this mode) and change Amplitude, Frequency, Offset and Phase parameters.

You can alse select between Trigger and Gated Mode (consult AWG-2000_AFG-UserManual for more informations about these two modality).
Run the VI to initialize the instrument and load the default parameters into the instrument; the Send Trigger button starts the waveform burst.
Press the STOP button to stop the waveform generation.

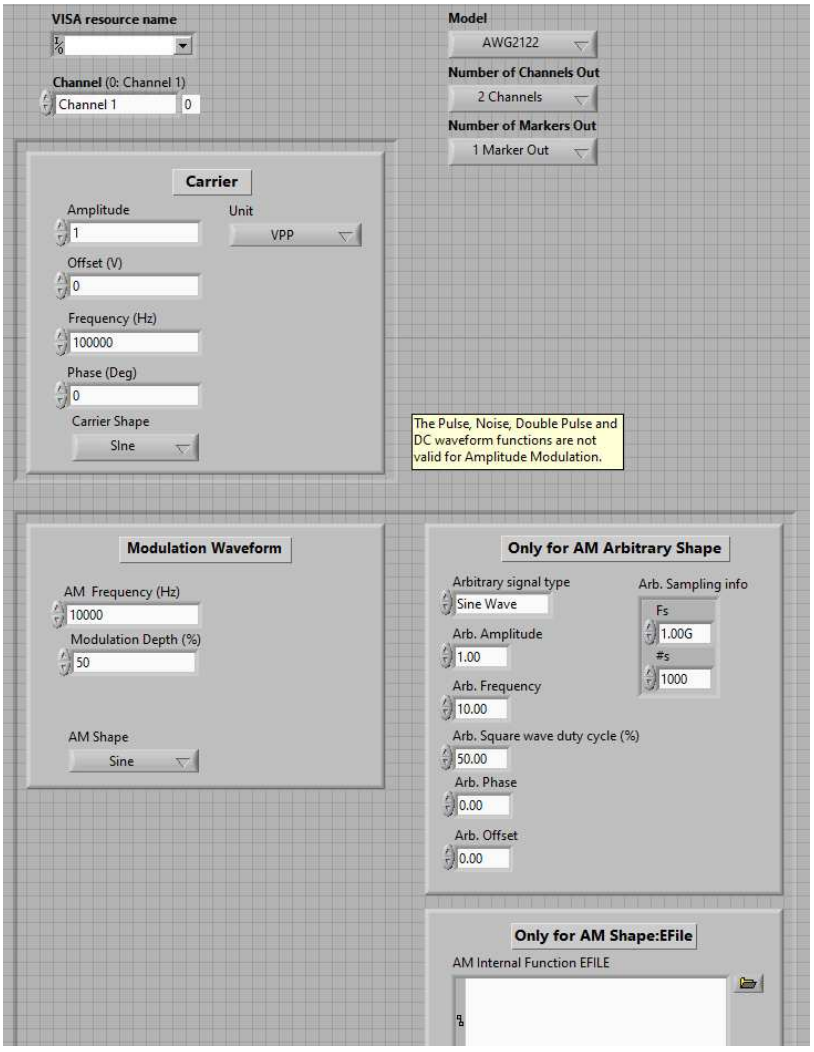
Double click on the project tree to open the *Active_Technologies_AFG2000_Frequency_Sweep.vi* example



This VI generates a frequency sweep of a carrier waveform (note that Pulse, PR Noise and DC are not valid waveforms in sweep mode). The sweep parameters that you can change

are Amplitude, Offset, Phase, Start Frequency(Hz), Stop Frequency(Hz), Return Time(s),Rise Time(s) and Hold Time(s).
You can also choose the profile of the Frequency Sweep (Sweep Shape option).
Run the VI to initialize the instrument parameters and start the generation; only for Trigger Sweep Mode press the SEND TRIGGER button to start the frequency sweep, press the STOP button to stop the waveform generation.

Double click on the project tree to open the *Active_Technologies_AFG2000_Amplitude_Modulation*.vi example



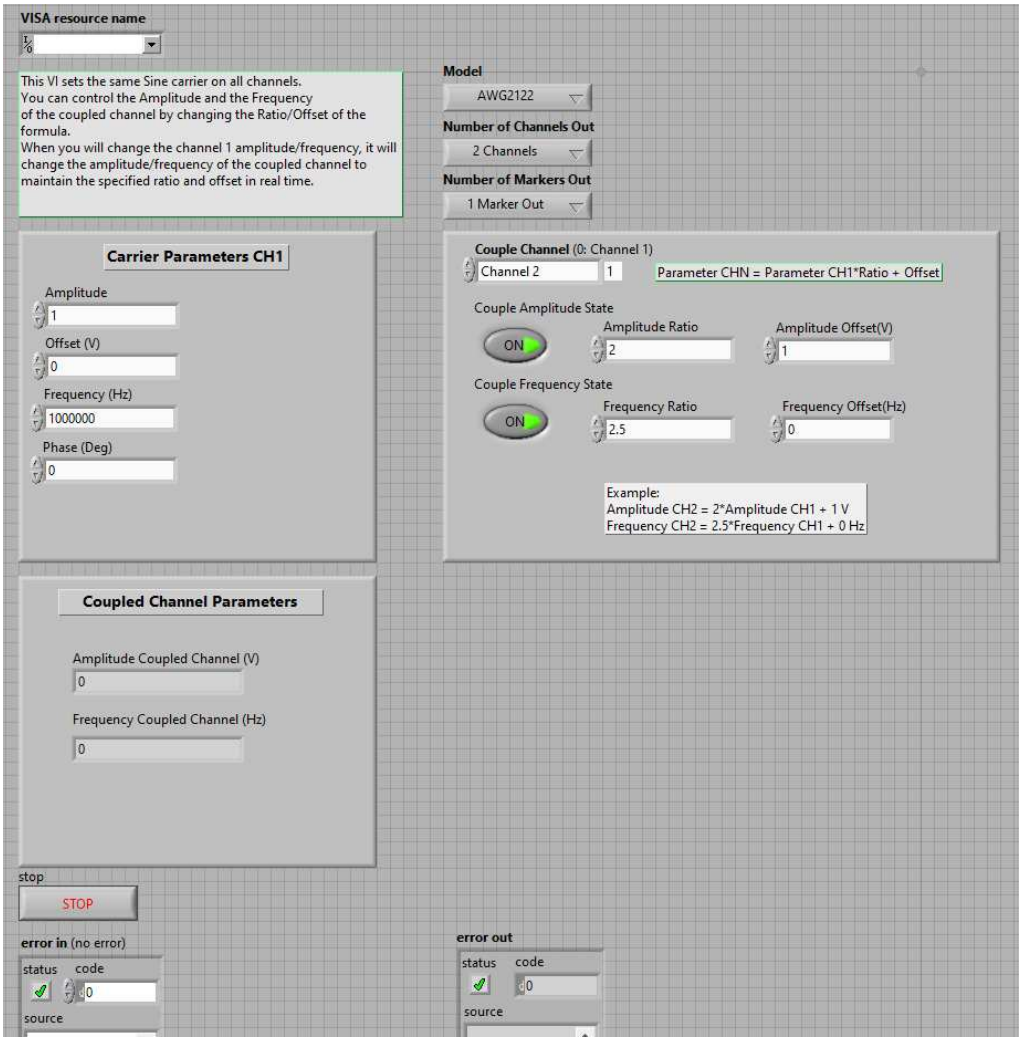
This VI generates an amplitude modulated waveform starting from a carrier defined by Shape, Amplitude, Frequency, Offset and Phase parameters (Pulse, Double Pulse, PR Noise and DC are not valid waveforms in AM mode).
You can change on the fly the AM frequency and the modulation Depth.

Double click on the project tree to open the *Active_Technologies_AFG2000_Pulse-Width_Modulation.vi* example

The PWM modulation is the only modulation supported by the Pulse waveform, so the carrier waveform is set Pulse by default.
You can change the rectangular Width, Period, duration of Trailing edge, duration of Leading edge and Deviation of the PWM every time you lounch the vi (note that all of the

previous parameters are linked each others and the deviation has to meet some particular conditions, consult the AWG-2000_AFG-UserManual for more details).

Double click on the project tree to open the *Active_Technologies_AFG2000_Couple_Amplitude&Frequency.vi* example

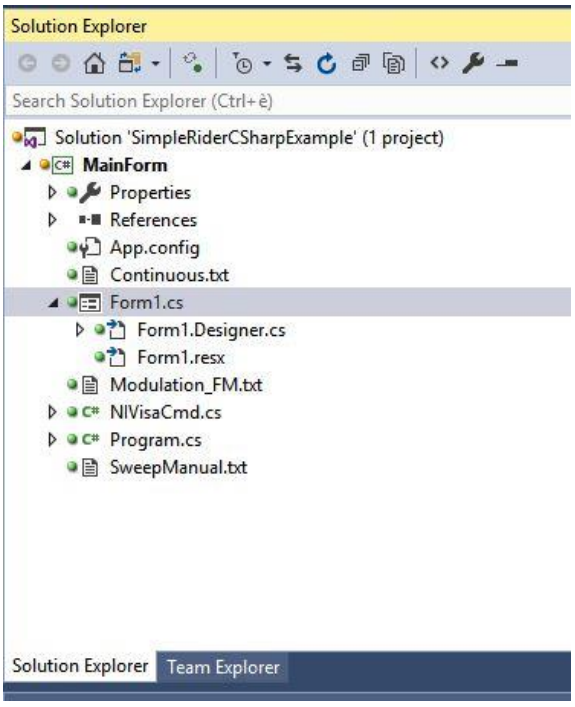


This example generates a sinusoidal waveform on channel 1 in Continuous Mode; you can change Amplitude, Frequency, Offset, Phase parameters on the fly while the instrument is running.
Furthermore, it is possible to couple one of the other channels through the Amplitude and Frequency parameters.

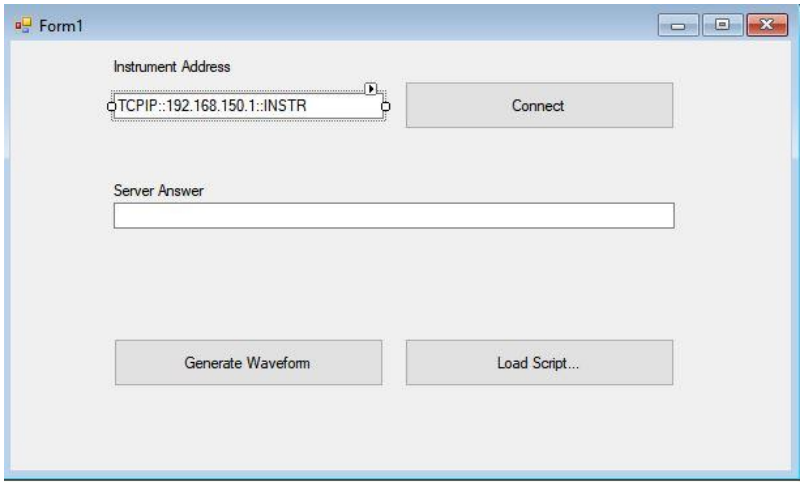
In this way the amplitude of couple channel will be equal to ($CH1_{amplitude}$)*Amplitude_Ratio + Amplitude_Offset; the Frequency of couple channel will be equal to ($CH1_{frequency}$)*Frequency_Ratio + Frequency_Offset.

6.5 Microsoft C# Example

The C# example is located under the folder AT_AFG_2000_Series_VS2017_Examples, you need to install Microsoft Visual Studio 2017 to open and launch the solution.



You should compile and launch the example; in the form you have to write the Instrument Address and press the Connect button to establish a connection with the instrument.
If the connection works correctly, the instrument should respond to the *IDN? command in the Server Answer textbox.



Clicking on the Generate Waveform button, you will send several SCPI commands to the instrument that will generate a single pulse waveform in Continuous mode.

```
private void btnGenerateWave_Click(object sender, EventArgs e)
{

    // Reset to default
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "*RST");
    // Set the channel 1 parameters
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:FUNCtion:SHAPe SINusoid");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:FREQuency 100MHZ");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:VOLTage:AMPLitude 1");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce1:VOLTage:OFFSet 0");
    // Set the channel 2 parameters
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:FUNCtion:SHAPe SQUare");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:FREQuency 5MHZ");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:VOLTage:HIGH 2");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "SOURce2:VOLTage:LOW 0");
    //Turn on the output channels
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "OUTPut1:STATe ON");
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "OUTPut2:STATe ON");
    //Start the generation
    tbAnswer.Text = vs.SendTo(sInstrumentAddress, "AFGControl:START");

}
```

The *Load Script…* button lets you to load a SCPI command script file; in the project folder there are three available scripts *Continuous.txt, Modulation_FM.txt and Sweep.txt*.

6.6 Microsoft C++ Example

The C++ example is located under the folder AT_AFG_2000_Series_VS2017_Examples\AFG2000MSVC\TCPIP
The example is written in Microsoft® Visual C++

```
#include "visa.h"

#include <stdio.h>
#include <stdlib.h>
#include <string>

static char outputBuffer[VI_FIND_BUFLEN];
static ViSession defaultRM, instr;
static ViStatus status;
static ViUInt32 count;
static char acBuffer[10000000] = "";
static unsigned int u32Timeout = 20000; //timeout value in milliseconds

static const char acInstrument[] = "TCPIP::192.168.150.1::INSTR"; // instrument address

ViStatus VisaWrite(std::string sInput)
{
	printf("viWrite - %s \n", sInput.c_str());

	status = viWrite (instr, (ViBuf)sInput.c_str(), sInput.length(), &count);

	if (status < VI_SUCCESS)
	{
		viStatusDesc(instr, status, outputBuffer);
		printf("viWrite failed with error code %x - %s\n", status, outputBuffer);
		viClose(defaultRM);
		exit (EXIT_FAILURE);
	}

	// In case of query command, retrieve the output string
	memset(outputBuffer, 0, sizeof(outputBuffer));

	status = viRead (instr, (ViBuf)outputBuffer, sizeof(outputBuffer), &count);

	if (status < VI_SUCCESS)
	{
		viStatusDesc(instr, status, outputBuffer);
		printf("viRead failed with error code %x - %s\n",status, outputBuffer);
		viClose(defaultRM);
		exit (EXIT_FAILURE);
	}

	outputBuffer[strlen(outputBuffer)-1] = 0;

	if(strlen(outputBuffer) > 0)
```

```
	{
		printf("The server response is:\n %s\n\n",outputBuffer);
	}

	return status;
}

int main()
{
	int iIndex = 0;
	FILE* pFile = NULL;
	ViFindList objFindList;

	/* First we will need to open the default resource manager. */
	status = viOpenDefaultRM (&defaultRM);
	if (status < VI_SUCCESS)
	{
		printf("Could not open a session to the VISA Resource Manager!\n");
		exit (EXIT_FAILURE);
	}

	status = viFindRsrc (defaultRM, "?*INSTR", &objFindList, &count, outputBuffer);
	if (status < VI_SUCCESS)
	{
		viStatusDesc(instr, status, outputBuffer);
		printf("viFindRsrc failed with error code %x - %s\n", status, outputBuffer);
		exit (EXIT_FAILURE);
	}

	printf("viFindRsrc - %s\n", outputBuffer);

	/* Now we will open a session via TCP/IP */
	status = viOpen (defaultRM, (ViRsrc) acInstrument, VI_NULL, u32Timeout, &instr);
	if (status < VI_SUCCESS)
	{
		printf ("An error occurred opening the session to %s\n", acInstrument);
		viClose(defaultRM);
		exit (EXIT_FAILURE);
	}

	// Set the timeout attribute
	viSetAttribute (instr, VI_ATTR_TMO_VALUE, u32Timeout);

	//Identify and reset the instrument
	VisaWrite("*IDN?");
	VisaWrite("*RST");
	//Set the Channel 1 Parameters
	VisaWrite("SOURce1:FUNCtion PULSe");
	VisaWrite("SOURce1:PULSe:DCYCle 60");
	VisaWrite("SOURce1:PULSe:DELay 0");
	VisaWrite("SOURce1:PULSe:PERiod 200ns");
	VisaWrite("SOURce1:PULSe:TRANsition:LEADing 10ns");
```

```
        VisaWrite("SOURce1:PULSe:TRANsition:TRAiling 20ns");
        VisaWrite("SOURce1:VOLTage:HIGH 2");
        VisaWrite("SOURce1:VOLTage:LOW 0");
        //Set the Channel 2 Parameters
        VisaWrite("SOURce2:FUNCtion SINusoid");
        VisaWrite("SOURce2:VOLTage 3");
        VisaWrite("SOURce2:VOLTage:OFFSet 0");
        VisaWrite("SOURce2:FREQuency 10MHz");
        VisaWrite("SOURce1:FREQuency:MODE CW");
        VisaWrite("SOURce2:FREQuency:MODE CW");
        // Turn On the Outputs
        VisaWrite("OUTPut1 ON");
        VisaWrite("OUTPut2 ON");
        // Start the generation
        VisaWrite("AFGControl:START");
        status = viClose (instr);
        status = viClose (defaultRM);
        printf ("\nHit enter to continue.");
        fflush(stdin);
        getchar();

        return 0;
}
```