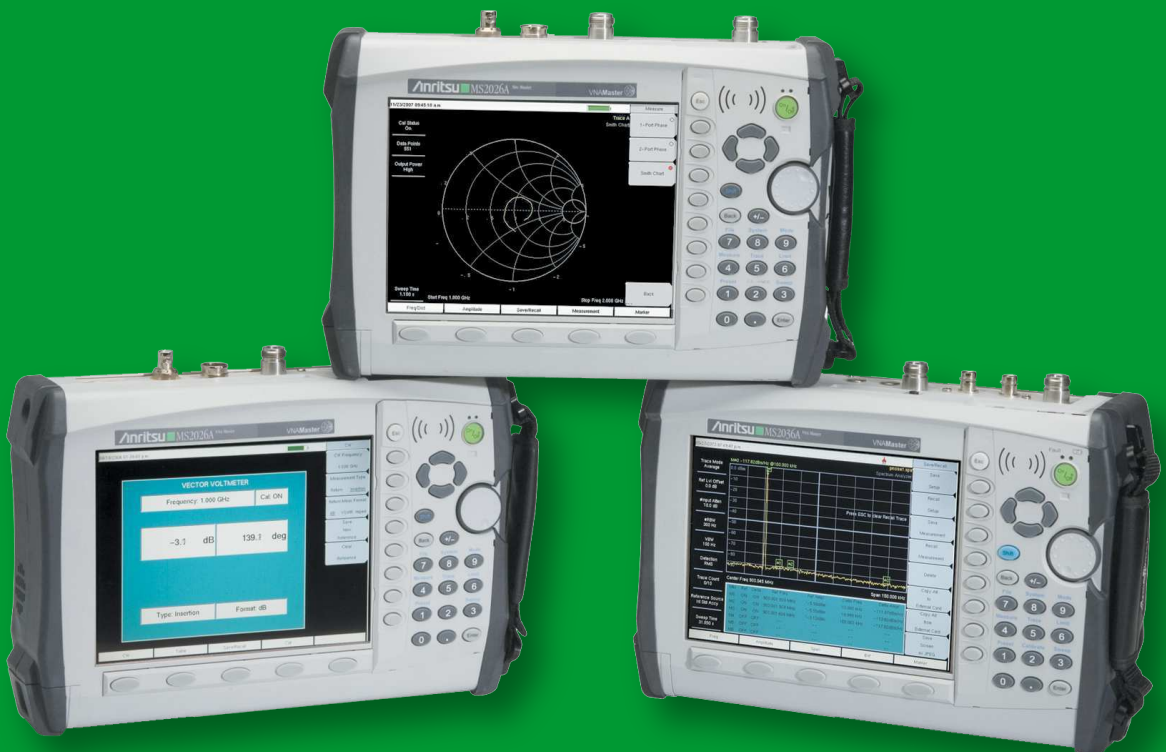


VNA Master™

MS2024A/MS2026A and
MS2034A/MS2036A

Vector Network Analyzer
2 MHz to 6 GHz

Spectrum Analyzer
9 kHz to 7.1 GHz



Remote Interface Reference Manual

Anritsu MS2024A/MS2026A and MS2034A/MS2036A
VNA Master

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1 Introduction

Scope of this Manual

This manual contains descriptions of the remote commands available for Anritsu's line of Master™ products.

While it does reference the equivalent front-panel interface for each command, it does not provide a complete front panel reference. Please see the appropriate product User Guide for that information.

References

IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. IEEE, New York, NY, 1992.

SCPI Standard-1999, *Standard Commands for Programmable Instruments Volume 1: Syntax and Style*. SCPI Consortium, San Diego, CA, 1999.

VNA Master with Spectrum Analysis MS2034A/MS2036A User's Guide (document #10580-00166). Anritsu Company, Morgan Hill, CA, 2004.

NI-VISA User Manual (document #370423A-01). National Instruments Corporation, Austin, TX, 2001.

Trademark Acknowledgments

NI-VISA and Lab VIEW are trademarks of National Instruments Corporation. VNA Master is a trademark of Anritsu Company.

Firmware Revisions

To check your current firmware revision, press Shift-8 (System), Status.

Remote commands are available in the applications beginning with the following firmware revisions:

Application	Firmware Revision
Spectrum Analyzer	1.12
Vector Network Analyzer	1.38

2 Programming Overview

Controller Interface

The physical interface is the RJ-45 connection on the instrument for 10BASE-T.

Data transfer takes place over Ethernet using TCP/IP and the VXI-11 protocol. In order to communicate with the instrument, the PC must have a VXI-11 client implementation, either as part of the controller program or by using a third party software package on the controlling PC. The examples in Appendix A of this manual are written using National Instruments' NI-VISA™ product.

Command Structure

Format

The Master™ product line implements a remote interface based on the 1999 SCPI Standard. This is an ASCII-based command set.

Some basic details are described below. For a more detailed description, see the SCPI Standard, available for download on the SCPI Consortium website.

Command Tree

SCPI commands are organized in a “tree” structure. The base of the tree is called the “root”. The “branches” are the functional subsystems. Each “branch” can have sub-branches. The final node is called the “leaf”. The entire sequence of branches, plus any leaf, makes up the command. For example, part of the “CALCulate” branch looks like the following:

```
:CALCulate
  :LIMit
    :ALARm
    :CLEAr
    :STATe
    :TYPE
    :VALue
    :POINT
      :FREQuency
      :VALue
```

Although they are at different levels in the tree, “FREQuency” and “VALue” are both leaves on the tree.

Branches and leaves can exist in the tree with the same name as long as they appear at different levels. For example, there is a “VALue” leaf at the tip of both of these branches:

```

:CALCulate           :CALCulate
  :LIMit             :LIMit
    :VALue           :POINT
                       :VALue

```

Subsystems

A colon (':') separates each subsystem. For example, the command `:SENSE:FREQUENCY:START <freq>` sets the start frequency. The start frequency is part of the `:FREQUENCY` subsystem which is part of the `:SENSE` subsystem. Stop frequency is also part of the `:SENSE:FREQUENCY` subsystem. It is specified by `:SENSE:FREQUENCY:STOP`.

Optional Subsystems

One subsystem at each “tree” level can be specified as optional. That is, the optional subsystem does not need to be specified to create a valid command. For example, if the specification is written as `[:SENSE] :FREQUENCY:START`, the `:SENSE` subsystem is optional. So, both `:SENS:FREQ:STAR` and `:FREQ:START` are valid commands and will have the same result.

Long Format vs. Short Format

Each keyword has a long format and a short format. The start frequency can be specified by `:SENSE:FREQUENCY:START` or `:SENS:FREQ:STAR`. The capital letters in the command specification indicate the short form of the command.

Only the short form and the long form are acceptable. For example, `:SENS:FREQUen:STA` is not an acceptable form of the command.

Case Sensitivity

Commands are not case sensitive. For example, `:SENS:FREQ:STAR 1 MHZ` and `:sens:freq:star 1 mhz` will have the same result.

Parameters

The command and its parameters are separated by a space. Parameters may be specified with optional units, depending on the command.

For example, `:SENS:FREQ:STAR 1 MHZ` sets the start frequency to 1 MHz.

Multiple parameters are separated by a comma (“,”).

Note that the instrument has no parameter validity check. Please double check the parameters before sending them to the instrument.

Query Format

Many commands have a query format that will return a parameter value or other data. For example, `:SENS:FREQ:STAR?` will return the current value of the start frequency.

Combining Multiple Commands

Multiple commands can be sent together if separated by a semi-colon (;). For example, `:SENSe:FREQ:STAR 1MHZ;:SENSe:FREQ:STOP 2 MHZ` would set the start frequency to 1 MHz and then set the stop frequency to 2 MHz.

Creating Valid Commands

Command Specification	Valid Forms
<code>[:SENSe] :FREQuency :STARt <freq></code>	The following all produce equivalent results: <code>:SENSe:FREQuency:STARt 1 MHZ</code> <code>:SENS:FREQ:STAR 1 MHZ</code> <code>:sense:frequency:start 1000000</code> <code>:FREQ:STAR 1000 KHZ</code>
<code>:CALCulate:MARKer [1] 2 3 4 5 6 :X <x-parameter></code>	The first 2 commands set the location of marker 1. The third command sets the location of marker 2. <code>:CALC:MARK:X 1 GHZ</code> <code>:CALC:MARK1:X 1 GHZ</code> <code>:CALC:MARK2:X 2 GHZ</code>
<code>:UNIT:POWer DBM DBV DBMV DBUV V W</code>	The following commands are identical: <code>:UNIT:POWer DBM</code> <code>:unit:pow dbm</code>
<code>:INITiate:CONTInuous OFF ON 0 1</code>	The following commands are identical: <code>:INITiate:CONTInuous OFF</code> <code>:init:cont 0</code>

Command Terminators

The <new line> character (ASCII 10) in the last data byte of a command string is used as a command terminator. Use of a command terminator will reset the command path to the root of the tree.

Conventions

The following conventions have been used throughout the document.

Notational Conventions

This document uses several notational conventions. They are listed below.

<code>:COMMands:WILL:LOOK:LIKE:THIS</code>	Commands will be formatted to differentiate them from text descriptions.
<code>:COMMand:QUERies:LOOK:LIKE:THIS?</code>	The query form of the command will be followed by a “?”
Front-panel key sequences use this formatting	Front-panel key presses will be formatted to differentiate them from text descriptions. Key presses are separated by a comma (“,”).
<code><identifier></code>	Identifiers will be enclosed in “<>”. They indicate that some type of data must be provided.
	The “ ” indicates that a choice must be made.
<code>[optional input]</code>	Optional input will be enclosed in “[]”.

Identifiers

The following identifiers have been used throughout the remote command definitions. Descriptions are provided here. In most cases, units will be specified with the individual command.

Identifier	Description
<amplitude>	Amplitude value. Units specified with the command.
<current>	Current. Units specified with the command.
<distance>	Distance. Units specified with the command.
<file name>	The name should be enclosed in either single quotes (' ') or double quotes (" "). The need for an extension will be documented with applicable commands.
<freq>	Frequency. Units specified with the command.
<integer>	Integer value, no units. Range specified with the command.
<number>	Numeric value, integer or real.
<percentage>	Percentage value from 0-100. Units are always "%".
<rel ampl>	Relative amplitude. Units are always dB.
<string>	The string should be enclosed in either single quotes (' ') or double quotes (" ").
<value>	Parameter value in units of y-axis. Units specified with the command.
<voltage>	Voltage. Units specified with the command.
<x-parameter>	Parameter value in the units of the x-axis. Units are specified with the command.

3 Remote Commands

3.1 IEEE Common Commands

These commands are specified in IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. IEEE, New York, NY, 1992.

Identity Query

*IDN?

This command returns the following information in `<string>` format separated by commas: manufacturer name (“Anritsu”), model number/options, serial number, firmware package number.

Note that the model number and options will be separated by a “/” and each option will be separated by a “/”.

For example, the return string might look like:

```
"Anritsu,MS2036A/25/27/31/10/5/15,3,1.00"
```

Reset

*RST

This command restores parameters in the current application as well as system settings to their factory default values.

System settings affected by this command are Ethernet configuration, language, volume and brightness.

Note that the unit will power-cycle after this command is executed.

Front Panel Access:	Shift-8 (System), System Options, Reset, Factory Defaults
See Also:	:SYSTem:PRESet

3.2 GPS System

SENSe Subsystem

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

[:SENSe] :GPS Subsystem

This subsystem includes commands that affect the optional GPS (Global Positioning System) on the instrument.

GPS On/Off

```
[ :SENSe ] :GPS OFF | ON | 0 | 1
```

[:SENSE] :GPS?

Enables/disables optional GPS capability.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-8(System), GPS, GPS On/Off
Required Options:	Option 31

GPS Reset**[:SENSE] :GPS :RESet**

Resets optional GPS receiver.

Front Panel Access:	Shift-8(System), GPS, Reset
Required Options:	Option 31

3.3 Spectrum Analyzer

This section contains the Spectrum Analyzer remote commands. The Spectrum Analyzer commands are only available for the MS2034A/MS2036A VNA Master.

Abort Subsystem

The abort subsystem includes commands that allow the user to stop current measurement activities on the instrument.

Abort

:ABORT

Restarts the current sweep and/or measurement. Resets the trigger system.

If :INITiate:CONTinuous is OFF (i.e. the instrument is in single sweep mode), send the command :INITiate[:IMMediate] to trigger the next sweep.

If :INITiate:CONTinuous is ON (i.e. the instrument is in continuous sweep mode) a new sweep will start immediately.

Front Panel Access:	Shift-3 (Sweep), Reset Sweep
See Also:	:INITiate:CONTinuous :INITiate[:IMMediate]

CALCulate Subsystem

The commands in this subsystem process data that has been collected via the SENSE subsystem.

:CALCulate:LIMit Subsystem

This subsystem defines the limit lines and controls the limit check.

Limit Alarm

:CALCulate:LIMit:ALARm OFF | ON | 0 | 1

:CALCulate:LIMit:ALARm?

Enables/disables the currently active limit line alarm.

Setting the value to ON or 1 will turn on the limit alarm.

Setting the value to OFF or 0 will turn off the limit alarm.

The query version of the command returns a 1 if the currently selected limit line alarm is set to ON and returns 0 if OFF.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:TYPE
Example:	To turn off limit alarm :CALCulate:LIMit:ALARm OFF OR :CALCulate:LIMit:ALARm 0
	To turn on limit alarm :CALCulate:LIMit:ALARm ON OR :CALCulate:LIMit:ALARm 1

Move Limit to Current Center Frequency

:CALCulate:LIMit:CENTer

Moves the center of the current active limit line to the center frequency.

If no limit line is turned on, a new flat default limit line is turned on.

Front Panel Access:	Shift-6 (Limit), Limit Advanced, Move Limit to Current Center Freq
Example:	To move the limit to the current center :CALCulate:LIMit:CENTer

Create Limit Envelope

:CALCulate:LIMit:ENVELOpe:CREate

Creates a limit envelope. This generates a limit line that formed a mask just above or below the existing signals.

Note that this command will turn on the currently selected limit line if it is not already on.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Envelope, Create Envelope
Example:	To create a limit envelope :CALCulate:LIMit:ENVELOpe:CREate

Limit Envelope Offset

:CALCulate:LIMit:ENVELOpe:OFFSet <amplitude>

:CALCulate:LIMit:ENVELOpe:OFFSet?

Sets limit envelope offset. This defines how far away from the measured signal the active limit envelope will be placed.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Factory Preset:	3dB for upper limit, -3dB for lower limit
Range:	-100dB - 100dB
Default Unit:	dB
Front Panel Access:	Shift-6(Limit), Limit Envelope, Upper Offset (If limit is toggled to Upper) or Lower Offset (If limit is toggled to Lower)
Example:	To set the limit envelope offset to 5dB :CALCulate:LIMit:ENVELOpe:OFFSet 5

Number of Limit Envelope Points

:CALCulate:LIMit:ENVELOpe:POINT <number>

:CALCulate:LIMit:ENVELOpe:POINT?

Sets the number of inflection point for the currently active limit envelope.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Factory Preset:	21
Range:	2-41
Front Panel Access:	Shift-6(Limit), Limit Envelope, Upper Point (If limit is toggled to Upper) or Lower Point (If limit is toggled to Lower)
Example:	To set the number of inflection point to 31 :CALCulate:LIMit:ENVELOpe:POINT 31

Limit Envelope Shape

:CALCulate:LIMit:ENVELOpe:SHAPE SQUARE|SLOPE

:CALCulate:LIMit:ENVELOpe:SHAPE?

Sets the currently active limit envelope shape.

Front Panel Access:	Shift-6(Limit), Limit Envelope, Upper Shape (If limit is toggled to Upper) or Lower Shape (If limit is toggled to Lower)
Example	To set the limit envelope to a square :CALCulate:LIMit:ENVELOpe:SHAPE SQUARE

Update Limit Envelope Frequency

:CALCulate:LIMit:ENVELOpe:UPDATE:X

Updates limit envelope frequency.

Note that this command is valid only if the limit envelope shape is set to a square.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Envelope, Update Square Envelope Frequency
Example:	To adjust the envelope frequency :CALCulate:LIMit:ENVELOpe:UPDATE:X

Update Limit Envelope Amplitude

:CALCulate:LIMit:ENVELOpe:UPDATE:Y

Updates the amplitude of the current limit without changing the frequencies of the inflection point.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Envelope, Update Envelope Amplitude
Example:	To adjust the limit envelope amplitude :CALCulate:LIMit:ENVELOpe:UPDATE:Y

Lower Limit Alarm

:CALCulate:LIMit:LOWer:ALARM OFF|ON|0|1

:CALCulate:LIMit:LOWer:ALARM?

Enables/disables the lower limit alarm.

It is a combination of the commands **:CALCulate:LIMit:TYPE 1;**

:CALCulate:LIMit:ALARM ON|OFF.

Setting the value to ON or 1 will turn on the lower limit alarm.

Setting the value to OFF or 0 will turn off the lower limit alarm.

The query version of the command returns a 1 if the lower limit line alarm is ON and returns 0 if OFF.

Note that using this command set the lower limit line active for editing.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:ALARm

Number of Lower Limit Points

:CALCulate:LIMit:LOWer:POINT?

Returns the number of points currently in the lower limit line.

Factory Preset / *RST:	2
See Also:	:CALCulate:LIMit:POINT?

Lower Limit State

:CALCulate:LIMit:LOWer[:STATE] OFF|ON|0|1

:CALCulate:LIMit:LOWer[:STATE]?

Turns the lower limit line ON or OFF.

It is a combination of the commands :CALCulate:LIMit:TYPE 1;

:CALCulate:LIMit:STATE ON|OFF.

The query version of the command returns a 1 if the lower limit line is ON and returns a 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
See Also:	:CALCulate:LIMit[:STATE]
Example:	To turn on lower limit :CALCulate:LIMit:LOWer ON OR :CALCulate:LIMit:LOWer 1 OR :CALCulate:LIMit:LOWer:STATE ON
	To turn off lower limit :CALCulate:LIMit:LOWer OFF OR :CALCulate:LIMit:LOWer 0 OR :CALCulate:LIMit:LOWer:STATE 0

Limit Line Type

:CALCulate:LIMit:LTYPe ABSolute|RELative
:CALCulate:LIMit:LTYPe?

Sets the currently active limit line type.

Absolute limit lines set the limit inflection points based upon the entered frequencies for each point.

Relative limit lines set the limit inflection points relative to the current center frequency.

Factory Preset/ *RST:	ABSolute
Front Panel Access:	Shift-6(Limit), Limit Advanced, Limit Line Type
Example:	To set the limit line type to relative :CALCulate:LIMit:LTYPe RELative

Limit Mirror

:CALCulate:LIMit:MIRRor

Creates a limit mirror.

Use `:CALCulate:LIMit:TYPe` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Advanced, Mirror Limit
See Also:	:CALCulate:LIMit:TYPe

Number of Limit Points

:CALCulate:LIMit:POINT?

Returns the number of points currently in the selected limit line.

Use `:CALCulate:LIMit:TYPe` to set the currently active limit line.

See Also:	:CALCulate:LIMit:TYPe
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Add Limit Point

:CALCulate:LIMit:POINT:ADD

Adds a new limit point to the currently active limit line.

Use `:CALCulate:LIMit:TYPe` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Add Point
See Also:	:CALCulate:LIMit:TYPe

Delete Limit Point

:CALCulate:LIMit:POINT:DElete

Deletes the currently active limit point. The active point becomes the point that is immediately to the left of the point that was deleted.

Note that deletion is only valid if there are more than 2 limit points.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Delete Point
Example:	To delete the currently active limit point <code>:CALCulate:LIMit:POINT:DElete</code>

Next Point Left

:CALCulate:LIMit:POINT:LEFT

Selects the limit point immediately to the left of the active point, making it active for editing or deleting.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Next Point Left
Example:	To select the point to the left of the active point <code>:CALCulate:LIMit:POINT:LEFT</code>

Next Point Right

:CALCulate:LIMit:POINT:RIGHT

Selects the limit point immediately to the right of the active point, making it active for editing or deleting.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Next Point Right
Example:	To select the point to the right of the active point <code>:CALCulate:LIMit:POINT:RIGHT</code>

Limit Point X Value

:CALCulate:LIMit:POINT:X <x-parameter>

:CALCulate:LIMit:POINT:X?

Sets the location of the active limit point on the x-axis at the specified location. `<x-parameter>` is defined in the current x-axis.

Note that this will change the Move Limit on the front panel to Point if it is currently set to Limit.

The query version of the command returns the location of the active limit point on the x-axis.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Default Unit:	Hz or for zero span in seconds
Front Panel Access:	Shift-6 (Limit), Limit Edit, Frequency
Example:	To set the active point to 5 Hertz :CALCulate:LIMit:POINt:X 5 OR :CALCulate:LIMit:POINt:X 5Hz
	To set the active point to 500 MHz :CALCulate:LIMit:POINt:X 500MHz
	To set the active point to 2.5 seconds (In zero span) :CALCulate:LIMit:POINt:X 2.5 OR :CALCulate:LIMit:POINt:X 2.5s
	To set the active point to 25 <i>us</i> (In zero span) :CALCulate:LIMit:POINt:X 25us

Limit Point Y Value

:CALCulate:LIMit:POINt:Y <y-parameter>

:CALCulate:LIMit:POINt:Y?

Sets the location of the active limit point on the y-axis at the specified location.

<y-parameter> is defined in the current y-axis.

Note that this will change the Move Limit on the front panel to Point if it is currently set to Limit.

The query version of the command returns the location of the active limit point on the y-axis.

Use :CALCulate:LIMit:TYPe to set the currently active limit line.

Default Unit:	Current y-axis unit.
Front Panel Access:	Shift-6 (Limit), Limit Edit, Amplitude
Example:	To set the active point to 5dBm :CALCulate:LIMit:POINt:Y 5 (If y-axis unit is dBm) OR :CALCulate:LIMit:POINt:Y 5dBm

Set Default Limit

:CALCulate:LIMit[:SET]:DEFault

Deletes all limit points for the currently active limit line and sets the default limit line value.

Note that this command will turn on the currently selected limit line if it is not already on.

The current selected limit line can be modified by using the command

:CALCulate:LIMit:TYPE.

Front Panel Access:	Shift-6 (Limit), Set Default Limit
Example:	To set the default limit line :CALCulate:LIMit:DEFault

Limit State

:CALCulate:LIMit[:STATe] OFF|ON|0|1

:CALCulate:LIMit[:STATe]?

Turns the currently selected limit line (upper or lower) ON or OFF.

If the value is set to ON or 1, the currently selected limit line is ON.

If the value is set to OFF or 0, the currently selected limit line is OFF.

The query version of the command returns a 1 if the currently selected limit line is ON and returns a 0 if OFF.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
Example:	To turn on the currently selected limit line :CALCulate:LIMit ON OR :CALCulate:LIMit:STATe ON OR :CALCulate:LIMit:STATe 1
	To turn off the currently selected limit line :CALCulate:LIMit OFF OR :CALCulate:LIMit:STATe 0 OR :CALCulate:LIMit 0

Limit Type

:CALCulate:LIMit:TYPE 0|1

:CALCulate:LIMit:TYPE?

Sets the limit line segment type (upper or lower) to be edited.

Set the value to 1 for Lower limit segment and 0 for Upper limit line segment.

The query version of the command returns a 1 if the lower limit line is currently active for editing and returns 0 if the upper limit line is currently active for editing.

Factory Preset/ *RST:	0
Front Panel Access:	Shift-6(Limit), Limit
Example:	To set upper limit line active for editing :CALCulate:LIMit:TYPe 0
	To set lower limit line active for editing :CALCulate:LIMit:TYPe 1

Upper Limit Alarm

:CALCulate:LIMit:UPPer:ALARm OFF|ON|0|1

:CALCulate:LIMit:UPPer:ALARm?

Enables/disables the alarm for the upper limit.

It is a combination of the commands :CALCulate:LIMit:TYPe 0;

:CALCulate:LIMit:ALARm ON|OFF.

Setting the value to ON or 1 will turn on the upper limit alarm.

Setting the value to OFF or 0 will turn off the upper limit alarm.

The query version of the command returns a 1 if the upper limit line alarm is ON and returns 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:ALARm

Upper Limit Alarm

:CALCulate:LIMit:UPPer:ALARm OFF|ON|0|1

:CALCulate:LIMit:UPPer:ALARm?

Enables/disables the alarm for the upper limit.

It is a combination of the commands :CALCulate:LIMit:TYPe 0;

:CALCulate:LIMit:ALARm ON|OFF.

Setting the value to ON or 1 will turn on the upper limit alarm.

Setting the value to OFF or 0 will turn off the upper limit alarm.

The query version of the command returns a 1 if the upper limit line alarm is ON and returns 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:ALARm

Number of Upper Limit Points

:CALCulate:LIMit:UPPer:POINT?

Returns the number of points currently in the upper limit line.

Factory Preset / *RST:	2
See Also:	:CALCulate:LIMit:POINT?

Upper Limit State

:CALCulate:LIMit:UPPer[:STATE] OFF|ON|0|1

:CALCulate:LIMit:UPPer[:STATE]?

Turns the upper limit line ON or OFF.

It is a combination of the commands `:CALCulate:LIMit:TYPE 0;`

`:CALCulate:LIMit:STATE ON|OFF.`

The query version of the command returns a 1 if the upper limit line is ON and returns a 0 if OFF.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
See Also:	:CALCulate:LIMit[:STATE]
Example:	To turn on upper limit :CALCulate:LIMit:UPPer ON OR :CALCulate:LIMit:UPPer 1 OR :CALCulate:LIMit:UPPer:STATE ON
	To turn off upper limit :CALCulate:LIMit:UPPer OFF OR :CALCulate:LIMit:UPPer 0 OR :CALCulate:LIMit:UPPer:STATE 0

Move Limit

:CALCulate:LIMit:VALue <value>

Sets the currently active limit line value. This command moves an entire single or multi-segment limit line up or down by the given <value>.

Note that this will change the Move Limit on the front panel to Limit if it is currently set to Point.

This command is equivalent to the command `:CALCulate:LIMit:Y`.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Amplitude
Default Unit:	Current y-axis unit.
See Also:	<code>:CALCulate:LIMit:Y</code>

Add Vertical

`:CALCulate:LIMit:VERTical:ADD`

Adds vertical. This will add two inflection points that share the same frequency and are centered midpoint between adjacent points.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Add Vertical
See Also:	<code>:CALCulate:LIMit:TYPE</code>

Limit X Value

`:CALCulate:LIMit:X <x-parameter>`

Sets the location of the active limit line on the x-axis at the specified location. This moves entire limit and moves the active limit point to the given value.

`<x-parameter>` is defined in the current x-axis.

Note that this will change the Move Limit on the front panel to Limit if it is currently set to Point.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Default Unit:	Hz or for zero span in seconds
Front Panel Access:	Shift-6 (Limit), Limit Edit, Frequency
Example:	To move the limit and set active point to 5Hz <code>:CALCulate:LIMit:X 5</code> OR <code>:CALCulate:LIMit:X 5Hz</code>
	To move the limit and set active point to 500 MHz <code>:CALCulate:LIMit:X 500MHz</code>
	To move the limit and set active point to 2.5 seconds (In zero span) <code>:CALCulate:LIMit:X 2.5</code> OR <code>:CALCulate:LIMit:X 2.5s</code>
	To move the limit and set active point to 25us (In zero span) <code>:CALCulate:LIMit:X 25us</code>

Limit Line Y Value

:CALCulate:LIMit:Y <y-parameter>

Sets the location of the active limit line on the y-axis at the specified location. This moves the entire limit and moves the current active limit point by the given value.

<y-parameter> is defined in the current y-axis.

Note that this will change the Move Limit on the front panel to Limit if it is currently set to Point.

Use :CALCulate:LIMit:TYPE to set the currently active limit line.

Default Unit:	Current y-axis unit.
Front Panel Access::	Shift-6 (Limit), Limit Edit, Amplitude
Example:	To move limit and set the active point to 5dbm :CALCulate:LIMit:Y 5 (If y-axis unit is dBm) OR :CALCulate:LIMit:Y 5dBm

:CALCulate:MARKer Subsystem

This subsystem contains commands to manipulate data markers.

Turn All Markers Off**:CALCulate:MARKer:AOff**

Turns off all markers.

Front Panel Access:	VNA: Marker, All Markers Off SPA: Marker, More, All Markers Off WCDMA: Marker, All Markers Off
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Marker Noise

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA:NOISE [:STATE]

OFF | ON | 0 | 1

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA:NOISE [:STATE] ?

Turns the delta marker noise on or off.

Note that if counter marker is set to on when setting marker noise to on, then counter marker will be set to off.

This command is not valid in zero span.

The query version of this command returns a 1 if the specified delta marker is noise marker and returns a 0 if not.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, More, Marker Noise
Example:	To turn on marker noise for delta marker #1 :CALCulate:MARKer1:DELTA:NOISE ON OR :CALCulate:MARKer1:DELTA:NOISE 1 OR :CALCulate:MARKer:DELTA:NOISE 1 OR :CALCulate:MARKer:DELTA:NOISE:STATE ON
	To turn on marker noise for delta marker #2 :CALCulate:MARKer2:DELTA:NOISE ON OR :CALCulate:MARKer2:DELTA:NOISE 1 OR :CALCulate:MARKer2:DELTA:NOISE:STATE ON
	To turn off marker noise #5 :CALCulate:MARKer5:DELTA:NOISE OFF OR :CALCulate:MARKer5:DELTA:NOISE 0 OR :CALCulate:MARKer5:DELTA:NOISE:STATE OFF

Delta Marker to Span

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:DELTA[:SET]:SPAN

Sets the total span width to the value of the specified delta marker.

Note that this command is valid only if delta marker is on.

Front Panel Access:	Marker, More Peak Options, Delta Marker to Span
Example:	To set the span to the value of delta marker #4 :CALCulate:MARKer4:DELTA:SPAN

Delta Marker State

:CALCulate:MARKer[1]|2|3|4|5|6:DELTA[:STATE] OFF|ON|0|1
:CALCulate:MARKer[1]|2|3|4|5|6:DELTA[:STATE]?

Sets the specified delta marker on or off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, Delta
Example:	To turn on delta marker #3 :CALCulate:MARKer3:DELTA ON OR :CALCulate:MARKer3:DELTA 1 OR :CALCulate:MARKer3:DELTA:STATE ON OR :CALCulate:MARKer3:DELTA:STATE 1
	To turn off delta marker #6 :CALCulate:MARKer6:DELTA OFF OR :CALCulate:MARKer6:DELTA:STATE OFF OR :CALCulate:MARKer6:DELTA:STATE 0

Delta Marker X Value

:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:X <x-parameter>
:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:X?

Sets the location of the delta marker on the x-axis at the specified location <x-parameter> + the reference marker x-axis. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the delta marker on the x-axis.

Default Unit:	Hz or seconds if in zero span
Front Panel Access:	Marker, Delta
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:X
Example:	If both the reference and delta marker #1 is currently at 1 GHz on the x-axis, send the command below to set the delta marker #1 to 2 GHz on the x-axis :CALCulate:MARKer1:DELTA:X 1GHz
	(In zero span) If both the reference and delta marker #1 is currently at 25 us on the x-axis, send the command below to set the delta marker to 50us on the x-axis: :CALCulate:MARKer1:DELTA:X 25us

Delta Marker Read Y Value

:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:Y?

Reads the current Y value for the specified delta marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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Marker Counter

:CALCulate:MARKer[1]|2|3|4|5|6:FCOunt[:STATE] OFF|ON|0|1

:CALCulate:MARKer[1]|2|3|4|5|6:FCOunt[:STATE]?

Turns the marker frequency counter on or off.

The marker counter is turned off when the selected marker is turned off.

If delta marker is on when setting marker counter to on, then delta marker will be turned off.

If noise marker is set to on when setting marker counter to on, then noise marker will be set to off.

This command is not valid in zero span.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, More, Counter Marker
Example:	To turn on frequency counter for reference marker # 2 :CALCulate:MARKer2:FCOunt ON OR :CALCulate:MARKer2:FCOunt 1

Marker Fixed State

:CALCulate:MARKer[1]|2|3|4|5|6:FIXed[:STATE] OFF|ON|0|1

:CALCulate:MARKer[1]|2|3|4|5|6:FIXed[:STATE]?

Sets the specified reference marker fixed state on or off. If Fixed is set to on, then the selected reference markers stay at the amplitude they were at when the marker is set to Fixed.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, More, Fixed Marker
Example:	To set reference marker #1 to fixed :CALCulate:MARKer:FIXed ON OR :CALCulate:MARKer:FIXed 1

Marker (Maximum) Peak Search

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:MAXimum

Puts the specified marker at the maximum amplitude in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Peak Search Marker, More Peak Options, Peak Search
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Marker (Maximum) Peak Search Left

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:MAXimum:LEFT

Puts the specified marker on the next highest peak to the left of the current peak.

The next highest peak must be above the peak threshold. If no point meets that criterion, the marker is set to the first point on the trace.

Front Panel Access:	Marker, More Peak Options, Next Peak Left
See Also:	:CALCulate:MARKer:PEAK:THReshold

Marker (Maximum) Peak Search Right

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:MAXimum:RIGHT

Puts the specified marker on the next highest peak to the right of the current peak.

The next highest peak must be above the peak threshold. If no point meets that criterion, the marker is set to the last point on the trace.

Front Panel Access:	Marker, More Peak Options, Next Peak Right
See Also:	:CALCulate:MARKer:PEAK:THReshold

Marker Noise

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:NOISE[:STATE] OFF|ON|0|1

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6:NOISE[:STATE]?

Turns the marker noise on or off for the specified reference marker.

Note that if counter marker is set to on when setting marker noise to on, then counter marker will be set to off.

This command is not valid in zero span.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, More, Marker Noise
Example:	To set reference marker #3 as noise marker :CALCulate:MARKer3:NOISE ON OR :CALCulate:MARKer3:NOISE 1

Peak Threshold

:CALCulate:MARKer:PEAK:THReshold <percentage>

:CALCulate:MARKer:PEAK:THReshold?

Sets the peak/valley threshold as a percentage of the display.

:CALCulate:MARKer:MAXimum:LEFT and

:CALCulate:MARKer:MAXimum:RIGHT use this value to determine whether a particular display point qualifies as a peak.

Factory Preset / *RST:	10%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Marker, More Peak Options, Peak Threshold

Marker Frequency to Center

:CALCulate:MARKer[1]|2|3|4|5|6[:SET]:CENTer

Sets the center frequency equal to the frequency of the specified marker.

Note that this will result in a change to the start and stop frequencies and may also result in a change to the span.

Note that this command is not valid in zero span.

Front Panel Access:	Marker, Marker Freq to Center
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Marker to Reference Level

:CALCulate:MARKer[1]|2|3|4|5|6[:SET]:RLEVEL

Sets the reference level equal to the measured amplitude of the specified marker.

Note that this may result in a change to the input attenuation.

Front Panel Access:	Marker, Marker to Ref Lvl
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Marker State

:CALCulate:MARKer[1]|2|3|4|5|6[:STATE] OFF|ON|0|1

:CALCulate:MARKer[1]|2|3|4|5|6[:STATE]?

Sets the specified marker on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, On/Off
Example:	To turn off reference marker #1 :CALCulate:MARKer1:STATE OFF

Marker Table State

:CALCulate:MARKer:TABLE[:STATE] OFF|ON|0|1

:CALCulate:MARKer:TABLE[:STATE]?

Turns the Marker Table on or off.

Setting the value to ON or 1 will turn on the marker table.

Setting the value to OFF or 0 will turn off the marker table.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, More, Marker Table
Example:	To turn on marker table :CALCulate:MARKer:TABLE ON OR :CALCulate:MARKer:TABLE 1

Marker X Value

:CALCulate:MARKer[1]|2|3|4|5|6:X <x-parameter>

:CALCulate:MARKer[1]|2|3|4|5|6:X?

Sets the location of the marker on the x-axis at the specified location. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the marker on the x-axis.

Note that the marker is snapped to the data point closest to the specified value.

If the specified marker is not on it will be set to on.

Default Unit:	Hz or seconds if in zero span
Front Panel Access:	Marker, [Marker 1/2/3/4/5/6]
Example:	To set reference marker #2 to 5 hertz on the x-axis :CALCulate:MARKer2:X 5 OR :CALCulate:MARKer2:X 5Hz
	To set reference marker #1 to 1.5 GHz on the x-axis :CALCulate:MARKer:X 1.5GHz OR :CALCulate:MARKer1:X 1.5GHz
	(In zero span) To set reference marker #3 to 1.5 seconds on the x-axis :CALCulate:MARKer3:X 1.5 OR :CALCulate:MARKer3:X 1.5s
	(In zero span) To set reference marker #1 to 25 us :CALCulate:MARKer:X 25us OR :CALCulate:MARKer1:X 25us

Marker Read Y Value

:CALCulate:MARKer[1|2|3|4|5|6]:Y?

Reads the current Y value for the specified marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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Display Subsystem

This subsystem provides commands that modify the display of data for the user. They do not modify the way in which data is returned to the controller.

Scale

:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision <rel ampl>

:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision?

Sets the scale (dB/division) for the y-axis.

Factory Preset / *RST:	10 dB/div
Range:	1 dB to 15 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Scale

Reference Level

:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel <amplitude>

:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel?

Sets the reference level amplitude value for the y-axis.

Note that this may cause a change in attenuation if the automatic input attenuation coupling is enabled.

Factory Preset / *RST:	10 dBm
Range:	With reference level offset = 0 dB: 30 dBm to -130 dBm
Default Unit:	Current active amplitude unit
Front Panel Access:	Amplitude, Reference Level
See Also:	:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFset <rel ampl>
Example:	To set the reference level to 15dBm (If y-axis is dBm) :DISPlay:WINDow:TRACe:Y:SCALE:RLEVel 15 OR :DISPlay:WINDow:TRACe:Y:SCALE:RLEVel 15dBm

Reference Level Offset

```
:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFSet <rel ampl>  
:DISPlay:WINDow:TRACe:Y[:SCALE]:RLEVel:OFFSet?
```

Sets the reference level offset value for the y-axis.

Factory Preset / *RST:	0 dB
Range:	-100 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Amplitude, RL Offset

Format Subsystem

This subsystem contains commands that determine the formatting of numeric data when it is transferred.

The format setting affects data in specific commands only. If a command is affected, it will be noted in the command description.

Numeric Data Format

```
:FORMat[:READings][:DATA] ASCii|INTeger,32|REAL, [<length>]  
:FORMat[:READings][:DATA]?
```

This command specifies the format in which data is returned in certain commands.

The optional <length> parameter is needed for REAL format only. It defines the length of the floating point number in bits. Valid values are 32 and 64. If no length is specified, the default length of REAL data is set to 64 bits.

ASCii format returns the data in comma-separated ASCII format. The units are the current instrument units. This format requires many more bytes so it will be the slowest format.

INTeger, 32 values are signed 32-bit integers in little-endian byte order. This format returns the data in 4-byte blocks. The units are always mdBm. For example, if the measured result was -12.345 dBm, that value would be sent as -12345.

REAL,32 values are 32-bit floating point numbers conforming to the IEEE 754 standard in little-endian byte order. This format returns the data in 4-byte binary format. The units are the current instrument units.

REAL,64 values are 64-bit floating point numbers conforming to the IEEE 754 standard in little-endian byte order. This format returns the data in 8-byte binary format. The units are the current instrument units. For a more precise reading, REAL,64 should be used instead of REAL,32 when the current instrument unit is set to Volt or Watt.

Both INTeger and REAL formats return a definite block length. Each transfer begins with an ASCII header such as #42204 for INTeger,32 and REAL,32 and #44408 for REAL,64. The first digit represents the number of following digits in the header (in this example, 4). The remainder of the header indicates the number of bytes that follow the header (in this example, 2204 for INT,32 and REAL,32 and 4408 for REAL,64). You then divide the number of following bytes by the number of bytes in the data format you've chosen (4 for both INTeger,32 and REAL,32...so 2204/4, and 8 for REAL,64) to get the number of data points (in this example, 551).

Factory Preset / *RST:	AScii
See Also:	:TRACe[:DATA]

INITiate Subsystem

This subsystem works with the ABORt and TRIGger subsystems to control the triggering of measurements.

Continuous/Single Sweep

:INITiate:CONTinuous OFF|ON|0|1

:INITiate:CONTinuous?

Specifies whether the sweep/measurement is triggered continuously.

If the value is set to ON or 1, another sweep/measurement is triggered as soon as the current one completes.

If continuous is set to OFF or 0, the instrument enters the “idle” state and waits for the :INITiate[:IMMediate] command or for :INITiate:CONTinuous ON.

The default value is ON. That is, sending :INIT:CONT is equivalent to sending :INIT:CONT ON

The query version of the command returns a 1 if the instrument is continuously sweeping/measuring and returns a 0 if the instrument is in single sweep/measurement mode.

Factory Preset / *RST:	ON
Front Panel Access:	Shift-3 (Sweep), Sweep (Single/Continuous)
See Also:	:INITiate[:IMMediate]

Data Broadcast

:INITiate:DBROadcast OFF|ON|0|1

:INITiate:DBROadcast?

Turns data broadcast on/off.

The query version of the command returns a 1 if broadcast data is ON, and returns 0 if OFF.

Front Panel Access:	Shift-8(System), Application Options, Broadcast Data
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Trigger Sweep/Measurement

:INITiate[:IMMEDIATE]

Initiates a sweep/measurement.

If **:INITiate:CONTinuous** is set to ON, this command is ignored.

Use this command in combination with **:STATus:OPERation?** to synchronize the capture of one complete set of data. When this command is sent, the “sweep complete” bit of **:STATus:OPERation?** is set to 0, indicating that the measurement has not completed. The data collection is then triggered. The controlling program can poll **:STATus:OPERation?** to determine the status. When the “sweep complete” bit is set to 1, data is ready to be retrieved.

Note that when averaging is on, the sweep complete bit will be set to complete if all the specified number of averages has completed.

Front Panel Access:	Shift-3 (Sweep), Manual Trigger
See Also:	:INITiate:CONTinuous :STATus:OPERation?

INSTRUMENT Subsystem

One instrument may contain many logical instruments (“modes”). This subsystem controls the selection of the current instrument mode.

Query Available Modes

:INSTrument:CATalog:FULL?

Returns a comma-separated list of available modes. Mode names are enclosed in double quotes (“ ”). Immediately following the string name is the application number.

For example: “SPA”1, “WCDMA”5, “VNA”2

Front Panel Access:	Shift-9 (Mode)
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Select Mode by Number

:INSTrument:NSElect <integer>

:INSTRument:NSElect?

Sets the instrument mode based on the value of <integer>.

The query version returns the number associated with the current mode.

Use :INSTRument:CATalog:FULL? to get a list of available mode names and their integer representations.

Factory Preset / *RST:	MS2721A: 1 MS2717A: 1 MT8220A: 1 MS2012A: 2 MS2024A: 2 MS2026A: 2 MS2034A: 2 MS2036A: 2
Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTRument:CATalog:FULL? :INSTRument[:SElect]

Select Mode by Name

:INSTRument[:SElect] <string>

:INSTRument[:SElect]?

Sets the instrument mode based on the mode name specified by <string>.

The query version returns the name of the current mode.

Use :INSTRument:CATalog:FULL? to get a list of available modes.

Factory Preset / *RST:	MS2721A: "SPA" MS2717A: "SPA" MT8220A: "SPA" MS2012A: "VNA" MS2024A: "VNA" MS2026A: "VNA" MS2034A: "VNA" MS2036A: "VNA"
Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTRument:CATalog:FULL? :INSTRument:NSElect

MMEMory Subsystem

The Mass MEMory subsystem contains functions that provide access to the instrument's setup and data storage.

Delete Setup/Measurement

:MMEMory:DELEte <file name>

Deletes the measurement or setup file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".stp" for setup and ".spa" for measurement.

Front Panel Access:	Shift-7 (File), Delete, Delete Selected File
See Also:	:MMEMory:STORE:STATE, :MMEMory:STORE:TRACE

Format Storage Device

MMEMory:INITialize [CFLash]

Formats the compact flash. Issuing this command will erase all files on an installed Compact Flash module and create the /usr directory for storage of measurements, setups and jpg files.

Front Panel Access:	Shift-7 (File), Directory Management, Format Compact Flash
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Recall Limit

:MMEMory:LOAD:LIMit <file name>

Recalls a previously stored limit from the current storage location. The saved limit setting to be loaded is specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".lim". Note that the trace specified by <file name> should be available at the current mass storage location.

Use the command **MMEMory:MSIS** to set the current mass storage location.

File Extensions:	".lim"
Front Panel Access:	Shift-7 (File), Recall, Recall Limit Line
See Also:	:MMEMory:STORE:LIMit
Example:	To recall trace with file name "limit" :MMEMory:LOAD:LIMit "limit.lim"

Recall Setup

:MMEMory:LOAD:STATe <integer>,<file name>

Loads the current setup from the file specified by <file name>.

The instrument must be in the mode of the saved setup in order to recall that setup. Use :INSTrument:SElect or :INSTrument:NSElect to set the mode.

<file name> should be enclosed in either single quotes (') or double quotes (") and should include the extension ".stp".

The <integer> parameter is not currently used, but it must be sent. Send a 1.

Front Panel Access:	Shift-7 (File), Recall, Recall Setup
See Also:	:MMEMory:STORe:STATe

Recall Measurement

:MMEMory:LOAD:TRACe <integer>,<file name>

Recalls a previously stored measurement trace from the current storage location. The saved measurement trace to be loaded is specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".spa". Note that the trace specified by <file name> should be available at the current mass storage location.

Use the command **MMEMory:MSIS** to set the current mass storage location.

Use the command **:TRACe [1] | 2 | 3:LOAD:DISPlay [:STATe]** to turn on or off the recalled trace view.

The <integer> parameter is not currently in used, but it must be sent. Send a 1.

File Extensions:	".spa"
Front Panel Access:	Shift-7 (File), Recall, Recall Measurement
See Also:	:MMEMory:STORe:TRACe
Example:	To recall trace with file name "trace" :MMEMory:LOAD:TRACe 1, "trace.spa"

Storage Location

MMEMory:MSIS INTernal | USB | CFLash

MMEMory:MSIS?

Sets the storage location.

Setting the storage location to **INTernal** will set the current storage location to be the internal memory.

Setting the storage location to **USB** will set the current storage location to be the USB Flash drive.

Setting the storage location to CFLash will set the current storage location to be the Compact Flash memory.

Note that changing the current location to save files causes the “Copy to Destination” on the front panel to be automatically changed if the selected current location is the same as the destination. When the change occurs, the instrument will cycle through each of the available storage locations. For example, if “Copy to Destination” is on CFLash and the “Current Location” is changed to CFLash, “Copy to Destination” will cycle to INTERNAL.

Note that the storage location must be available in order for it to be set.

Front Panel Access:	Shift-7 (File), Directory Management, Current Location
See Also:	:MMEMory:MSIS:DESTination

Copy From Current Location To Destination

MMEMory:MSIS:COPY

Copies all measurements, setups and jpg files stored in the current storage location to the “copy to destination” location.

Front Panel Access:	Shift-7 (File), Directory Management, Copy From Current Location To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:DESTination

Copy to Destination

MMEMory:MSIS:DESTination INTERNAL|USB|CFLash

MMEMory:MSIS:DESTination?

Sets the destination to where measurements and setups in the current storage location will be copied.

Setting the location to INTERNAL will result in copying the files that are stored at the current storage location to the internal memory when the command :MMEMory:MSIS:COPY is send.

Setting the location to USB will result in copying the files that are stored at the current storage location to the USB Flash drive when the command :MMEMory:MSIS:COPY is send..

Setting the location to CFLash will result in copying the files that are stored at the current storage location to the Compact Flash memory when the command :MMEMory:MSIS:COPY is send.

Note that changing the destination to which the instrument will save files to causes the “Current Location” on the front panel to be automatically changed if the selected destination is the same as the current location. When the change occurs, the instrument will cycle through each of the available storage locations. For example, if “Current Location” is on CFLash and the “Copy to Destination” is changed to CFLash, “Current Location” will cycle to INTernal.

Front Panel Access:	Shift-7 (File), Directory Management, Copy To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:COPI

Save Limit

:MMEMory:STORe:LIMit <file name>

Stores the current limit setup into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’’) and should not contain a file extension.

Use the command `MMEMory:MSIS` to set the current storage location.

Front Panel Access:	Shift-7 (File), Save, Save Limit Line
See Also:	:MMEMory:MSIS INTernal USB CFLash

Save Setup

:MMEMory:STORe:STATe <integer>, <file name>

Stores the current setup into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’’) and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Setup
See Also:	:MMEMory:LOAD:STATe

Save Measurement

:MMEMory:STORe:TRACe <integer>, <file name>

Stores the trace into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’’) and should not contain a file extension.

Use the command `MMEMory:MSIS` to set the current storage location.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Measurement
See Also:	:MMEMory:LOAD:TRACe :MMEMory:MSIS INTernal USB CFLash
Example:	To save the trace into the file name "trace" :MMEMory:STORe:TRACe 1,"trace"

SENSe Subsystem

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

[[:SENSe]:AVERage Subsystem

This subsystem contains commands related to the combination of the data from consecutive sweeps. Use commands in this subsystem to control sweep-to-sweep averaging and max hold functionality.

Number of Traces to Average

[[:SENSe]:AVERage:COUNT <integer>

[[:SENSe]:AVERage:COUNT?

Sets the number of traces to average.

Factory Preset / *RST:	10
Range:	2-65535
Front Panel Access:	Shift-5 (Trace), Trace A Operations, # of Averages

Trace Mode (Normal/Average/Max Hold/Min Hold)

[[:SENSe]:AVERage:TYPE NONE | SCALAr | MAXimum | MINimum

[[:SENSe]:AVERage:TYPE?

Specifies how successive traces are combined to produce the resulting display value.

Setting the TYPE to NONE is the equivalent of setting the trace mode to "Normal->A" on the front panel. The displayed value for a point will be the current measured value for that point.

Setting the TYPE to SCALAr is the equivalent of setting the trace mode to "Average->A" on the front panel. The displayed value for a point will be the average of the last <integer> measured values where <integer> is set by

[[:SENSe]:AVERage:COUNT.

Setting the TYPE to MAXimum is the equivalent of setting the trace mode to "Max Hold->A" on the front panel. The displayed value for a point will be the maximum measured value for that point over sweeps.

Setting the TYPE to MINimum is the equivalent of setting the trace mode to "Min Hold->A" on the front panel. The displayed value for a point will be the minimum measured value for that point over sweeps.

Factory Preset / *RST:	NONE
Front Panel Access:	Shift-5 (Trace), Trace A Operations
See Also:	[:SENSE] :AVERAge :COUNT
Example:	To set the TYPE to SCALAr :SENSe:AVERAge:TYPE SCALAr
	To set the TYPE to MAXimum :SENSe:AVERAge:TYPE MAXimum

[:SENSE] :BANDwidth | BWIDth Subsystem

This subsystem contains commands related to the filter bandwidth of the instrument.

Resolution Bandwidth

[:SENSE] :BANDwidth | BWIDth [:RESolution] <freq>

[:SENSE] :BANDwidth | BWIDth [:RESolution] ?

Sets the resolution bandwidth.

Note that using this command turns the automatic resolution bandwidth setting OFF.

Factory Preset / *RST:	3 MHz
Range:	10 Hz to 3 MHz in a 1:3 sequence
Default Unit:	Hz
Front Panel Access:	BW, RBW
See Also:	[:SENSE] :BANDwidth BWIDth [:RESolution] :AUTO

Resolution Bandwidth Coupling

[:SENSE] :BANDwidth | BWIDth [:RESolution] :AUTO OFF | ON | 0 | 1

[:SENSE] :BANDwidth | BWIDth [:RESolution] :AUTO ?

Sets the state of the coupling of the resolution bandwidth to the frequency span.

Setting the value to ON or 1 will result in the resolution bandwidth being coupled to the span. That is, when the span changes, the resolution bandwidth changes.

Setting the value to OFF or 0 will result in the resolution bandwidth being un-coupled from the span. That is, changing the span will not change the resolution bandwidth. When this command is issued, the resolution bandwidth setting itself will not change.

The default value is ON. That is, sending :SENS:BAND:RES:AUTO is equivalent to sending :SENS:BAND:RES:AUTO ON.

Factory Preset / *RST:	ON
Front Panel Access:	BW, Auto RBW
See Also:	[:SENSE] :BANDwidth BWIDth [:RESolution] :RATio

Resolution Bandwidth to Span Ratio

[:SENSe] :BANDwidth|BWIDth[:RESolution]:RATio <number>

[:SENSe] :BANDwidth|BWIDth[:RESolution]:RATio?

Sets the ratio of the resolution bandwidth to the span for use when the resolution bandwidth to span coupling is enabled.

Note that the front panel interface sets the inverse ratio: the span to the resolution bandwidth.

Factory Preset / *RST:	0.0033
Range:	0.00001 to 1
Front Panel Access:	BW, Span/RBW (note that this is the inverse ratio)
See Also:	[:SENSe] :BANDwidth BWIDth[:RESolution]:AUTO

Video Bandwidth

[:SENSe] :BANDwidth|BWIDth:VIDeo <freq>

[:SENSe] :BANDwidth|BWIDth:VIDeo?

Sets the video bandwidth.

Note that using this command turns the automatic video bandwidth setting OFF.

Factory Preset / *RST:	1 MHz
Range:	1 Hz to 3 MHz in a 1:3 sequence
Default Unit:	Hz
Front Panel Access:	BW, VBW
See Also:	[:SENSe] :BANDwidth BWIDth:VIDeo:AUTO

Video Bandwidth Coupling

[:SENSe] :BANDwidth|BWIDth:VIDeo:AUTO OFF|ON|0|1

[:SENSe] :BANDwidth|BWIDth:VIDeo:AUTO?

Sets the state of the coupling of the video bandwidth to the resolution bandwidth.

Setting the value to ON or 1 will result in the video bandwidth being coupled to the resolution bandwidth. That is, when the resolution bandwidth changes, the video bandwidth changes.

Setting the value to OFF or 0 will result in the video bandwidth being un-coupled from the resolution bandwidth. That is, changing the resolution bandwidth will not change the video bandwidth. When this command is issued, the video bandwidth setting itself will not change.

The default value is ON. That is, sending :SENS:BAND:VID:AUTO is equivalent to sending :SENS:BAND:VID:AUTO ON.

Factory Preset / *RST:	ON
Front Panel Access:	BW, Auto VBW
See Also:	[:SENSe] :BANDwidth BWIDth:VIDeo:RATio

Video Bandwidth to Resolution Bandwidth Ratio

`[:SENSe] :BANDwidth | BWIDth :VIDeo :RATio <number>`

`[:SENSe] :BANDwidth | BWIDth :VIDeo :RATio ?`

Sets the ratio of the video bandwidth to the resolution bandwidth for use when the video to resolution bandwidth coupling is enabled.

Note that the front panel interface sets the inverse ratio: the resolution bandwidth to the video bandwidth.

Factory Preset / *RST:	0.33
Range:	0.00001 to 1
Front Panel Access:	BW, RBW/VBW (note that this is the inverse ratio)
See Also:	[:SENSe] :BANDwidth BWIDth :VIDeo :AUTO

CORRection Subsystem

This subsystem provides commands for losses or gains external to the instrument.

Input Impedance

`[:SENSe] :CORRection :IMPedance [:INPut] [:MAGNitude] <integer>`

`[:SENSe] :CORRection :IMPedance [:INPut] [:MAGNitude] ?`

Sets the input impedance that will be used for amplitude correction and conversion between units (dBm vs. dBV vs. Volts, etc.).

If the value of <integer> is 50 no correction will be performed.

If the value of <integer> is 75 correction will be done based on Anritsu adapter 12N50-75B.

If the value of <integer> is anything else it will look to the value set by `[:SENSe] :CORRection :IMPedance [:INPut] :OFFSet` for the amplitude correction value. Unit conversion will be done as if the impedance is 75Ω.

If a value other than 50 or 75 is set, it will be returned as 2 by the query form of this command.

Factory Preset / *RST:	50
Range:	50, 75 all other values will be treated as described above
Front Panel Access:	Shift-8 (System), Application Options, Impedance
See Also:	[:SENSe] :CORRection :IMPedance [:INPut] :OFFSet

“Other” Input Impedance Loss

`[:SENSe] :CORRection :IMPedance [:INPut] :OFFSet <rel ampl>`

`[:SENSe] :CORRection :IMPedance [:INPut] :OFFSet ?`

Sets the value that will be used for amplitude correction when the value set by `[:SENSe] :CORRection :IMPedance [:INPut] [:MAGNitude]` is something other than 50 or 75. This value is not applied if the impedance is set to either 50 or 75.

Factory Preset / *RST:	0
Range:	0 dB to 100 dB
Default Unit:	dB
Front Panel Access:	Shift-8 (System), Application Options, Impedance
See Also:	[:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude]

[:SENSe] :DETECTOR Subsystem

This subsystem includes commands that affect acquisition data points on the instrument.

Detection Type

[:SENSe] :DETECTOR [:FUNCTION] POSitive | RMS | NEGative | SAMPLe
[:SENSe] :DETECTOR [:FUNCTION] ?

Sets the detection method for calculating each display point.

Each display point represents several measurements. The detection type determines how the display point is derived from its associated measurements.

POSitive Peak detection displays the maximum value of the associated measurements.

RMS detection displays the average power of the associated measurements.

NEGative Peak detection displays the minimum value of the associated measurements.

SAMPLe detection displays the “middle” point of those measurements associated with a display point. For example, if there are 3 measurement frequencies associated with a given display point, sample detection will display the value at the frequency of the second measurement point.

Factory Preset / *RST:	(Positive) Peak
Front Panel Access:	Shift-3(Sweep), Detection, Peak RMS Negative Sample

[:SENSe] :FREQUENCY Subsystem

Commands in this subsystem pertain to the frequency settings of the instrument.

Center Frequency

[:SENSe] :FREQUENCY :CENTER <freq>
[:SENSe] :FREQUENCY :CENTER ?

Sets the center frequency.

Note that changing the value of the center frequency will change the value of the coupled parameters Start Frequency and Stop Frequency. It may also change the value of the span.

Factory Preset / *RST:	3.55 GHz
Range:	10 Hz – 7.099999995 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Center Freq

External Reference Frequency

[:SENSe] :FREQuency:EXTeRnal <freq value>

[:SENSe] :FREQuency:EXTeRnal?

Sets the desired external reference frequency. The <freq value> in MHz must be one of the following 12 values:

1 , 1.2288 , 1.544 , 2.048 , 2.4576 , 4.8 , 4.9152 , 5 , 9.8304 , 10 , 13 , 19.6608

The query form of this command will return the external reference frequency in Hz.

Front Panel Access:	Shift-8 (System), Application Options, Ext. Ref Freq
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Signal Standard

[:SENSe] :FREQuency:SIGStandard <index>

[:SENSe] :FREQuency:SIGStandard?

Selects the desired signal standard from the list.

The <index> argument is a 1-based index of the position of the desired signal standard in the instrument's current signal standard list. The list can be seen on the instrument by choosing the "Signal Standard" soft-key button in the "Frequency" menu. The list can also be downloaded remotely and viewed using Anritsu Master Software Tools. For example, if the desired Signal Standard is the 3rd item on the list then the value of the <index> argument would be 3.

The query form of this command will return the index of the currently-selected Signal Standard on the list.

Front Panel Access:	Frequency, Signal Standard
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Channel Selection

[:SENSe] :FREQuency:SIGStandard:CHANnel <number>

[:SENSe] :FREQuency:SIGStandard:CHANnel?

Sets the channel number for the selected signal standard.

Front Panel Access:	Frequency, Channel
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Frequency Span

[:SENSe] :FREQuency :SPAN <freq>

[:SENSe] :FREQuency :SPAN?

Sets the frequency span. Setting the value of <freq> to 0 Hz is the equivalent of setting the span mode to zero span.

Note that changing the value of the frequency span will change the value of the coupled parameters Start Frequency and Stop Frequency and may change the Center Frequency.

Factory Preset / *RST:	7.1 GHz
Range:	0 Hz, 10 Hz – 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Span Span Span, Zero Span

Frequency Span - Full

[:SENSe] :FREQuency :SPAN :FULL

Sets the frequency span to full span.

Note that changing the value of the frequency span will change the value of the coupled parameters, Start Frequency and Stop Frequency and may change the Center Frequency.

Factory Preset / *RST:	7.1 GHz
Front Panel Access:	Span, Full Span

Frequency Span - Last

[:SENSe] :FREQuency :SPAN :PREVious

Sets the frequency span to the previous span value.

Note that changing the value of the frequency span will change the value of the coupled parameters, Start Frequency and Stop Frequency and may change the Center Frequency.

Front Panel Access:	Freq, Span, Last Span
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Start Frequency

[:SENSe] :FREQuency :START <freq>

[:SENSe] :FREQuency :START?

Sets the start frequency.

Note that in the spectrum analyzer, changing the value of the start frequency will change the value of the coupled parameters, Center Frequency and Span.

Note that in the VNA, changing the value of the start frequency may affect the DTF distance range.

Factory Preset / *RST:	SPA: 0 Hz VNA, MS2012A: 2 MHz VNA, MS2024A: 2 MHz VNA, MS2026A: 2 MHz
Range:	SPA: 0 Hz – 7.099999990 GHz VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A, 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Start Freq

Frequency Step

[:SENSe] :FREQuency :STEP [:INCRement] <freq>

[:SENSe] :FREQuency :STEP [:INCRement] ?

Sets the frequency step to the given frequency value.

Factory Preset / *RST:	1 MHz
Range:	1 Hz – 20 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Freq Step

Stop Frequency

[:SENSe] :FREQuency :STOP <freq>

[:SENSe] :FREQuency :STOP ?

Sets the stop frequency.

Note that in the spectrum analyzer, changing the value of the stop frequency will change the value of the coupled parameters, Center Frequency and Span.

Note that in the VNA, changing the value of the start frequency may affect the DTF distance range.

Factory Preset / *RST:	SPA: 7.1 GHz VNA, MS2012A: 2.5 GHz VNA, MS2024A: 4.0 GHz VNA, MS2026A: 6.0 GHz
Range:	SPA: 10 Hz – 7.1 GHz VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A, 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Stop Freq

[[:SENSE]:POWER Subsystem

This subsection relates to the power amplitude parameters of the instrument.

Input Attenuation

[[:SENSE]:POWER[:RF]:ATTenuation <rel ampl>

[[:SENSE]:POWER[:RF]:ATTenuation?

Sets the input attenuation.

Note that issuing this command will set the automatic input attenuation OFF.

Factory Preset / *RST:	30 dB
Range:	0 dB to 65 dB
Default Unit:	dB
Front Panel Access:	Amplitude, Atten Lvl
See Also:	[[:SENSE]:POWER[:RF]:ATTenuation:AUTO

Input Attenuation Coupling

[[:SENSE]:POWER[:RF]:ATTenuation:AUTO OFF|ON|0|1

[[:SENSE]:POWER[:RF]:ATTenuation:AUTO?

Sets the input attenuation coupling.

Setting the value to ON or 1 will result in the input attenuation being coupled to the reference level.

Setting the value to OFF or 0 will result in the input attenuation being un-coupled from the reference level. That is, changing the reference level will not change the input attenuation. When this command is issued, the input attenuator setting itself will not change.

The default value is ON. That is, sending :SENS:POW:ATT:AUTO is equivalent to sending :SENS:POW:ATT:AUTO ON.

Factory Preset / *RST:	ON
Front Panel Access:	Amplitude, Auto Atten
See Also:	[[:SENSE]:POWER[:RF]:ATTenuation

Preamp State

[[:SENSE]:POWER[:RF]:GAIN[:STATE] OFF|ON|0|1

[[:SENSE]:POWER[:RF]:GAIN[:STATE]?

Sets the state of the preamp.

Note that this may cause a change in the reference level and/or attenuation.

Factory Preset / *RST:	OFF
Front Panel Access:	Amplitude, Pre Amp

[[:SENSe]:SWEep Subsystem

This subsystem includes commands that affect the sweep generator of the instrument.

Minimum Sweep Time

[[:SENSe]:SWEep:TIME

[[:SENSe]:SWEep:TIME?

Sets the value of the minimum sweep time parameter. The sweep will complete in the shortest time possible greater than the specified time.

To sweep as fast as possible, enter the minimum value allowed for the sweep time.

Factory Preset / *RST:	50 μ s
Range:	10 μ s to 600000000 μ s
Default Unit:	Seconds
Front Panel Access:	Shift-3 (Sweep), Min Sweep Time

STATus Subsystem

The commands in this subsystem relate to the current operating state of the instrument.

Query Operation Status

:STATus:OPERation?

This command requests information about the current status of the instrument. Each bit of the return value represents some operation. Only a subset of the bits will be implemented for each application.

The number returned will be the decimal representation of the bit-wise OR of the enabled bits.

Bit	Decimal Value	Description
0	1	Not implemented
1	2	Not implemented
2	4	Not implemented
3	8	Not implemented
4	16	Not implemented
5	32	Not implemented
6	64	Not implemented
7	128	Not implemented
8	256	Sweep Complete – This bit will be set to 0 when the command <code>:INITiate[:IMMediate]</code> is sent to trigger a sweep. It will have a value of 1 when the sweep has completed. Note with averaging ON, the sweep complete bit is set when all the specified number of averages has completed.
9	512	Not implemented
10	1024	Not implemented
11	2048	Not implemented
12	4096	Not implemented
13	8192	Not implemented
14	16384	Not implemented
15	0	Will always be 0

SYSTEM Subsystem

This subsystem contains commands that affect instrument functionality that does not directly relate to data collection, display or transfer.

Query Installed Options

:SYSTEM:OPTions?

Returns a string of the installed options. Options will be separated by a “/”.

The string will return “NONE” if no options are installed.

See Also:	*IDN?
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Preset

:SYSTEM:PRESet

This command restores all application parameters to their factory preset values. This does not modify system parameters such as Ethernet configuration, language, volume or brightness.

Front Panel Access:	Shift-1 (Preset), Preset
See Also:	*RST

SYSTEM:FILE Subsystem

This subsystem provides commands that modify how file lists should be displayed on the instrument. They do not modify the way in which data is returned to the controller.

File Lists Sort Method

SYSTEM:FILE:SORT:METHod NAME | TYPE | DATE

SYSTEM:FILE:SORT:METHod?

Sets the file lists sort method.

Setting the sort method to NAME will result in file lists sorted by the name of the file.

Setting the sort method to TYPE will result in the file lists sorted by the type of file.

Setting the sort method to DATE will result in the file lists sorted by the date that the file was saved.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Method
See Also:	:SYSTEM:FILE:SORT:ORDER

File Lists Sort Order

SYSTem:FILE:SORT:ORDER ASCend|DESCend

SYSTem:FILE:SORT:ORDER?

Sets the file lists sort order.

Setting the sort order to ASCend will result in file lists sorted from lowest to highest.

Setting the sort order to DESCend will result in the file lists sorted from highest to lowest.

When sorting by name, the sort will place file names that start with numbers before file names that start with letters.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Order
See Also:	:SYSTem:FILE:SORT:METHOD

Trace Subsystem

This subsystem contains commands related to the transfer of trace data to and from the instrument.

Trace Data Transfer

:TRACe[:DATA] 1|2|3, (<header><block>)

:TRACe[:DATA]? [1]|2|3

This command transfers data from the controlling program to the instrument. The query form transfers trace data from the instrument to the controller. Data is transferred to the instrument enclosed in parentheses (<header><block>) and from the instrument as <header><block>.

The ASCII header specifies the number of data bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes in the <block>.

The format of the block data in the query form is specified by :FORMat:DATA. The block data in the command form is always sent in ASCII format.

Data can be transferred to and from the 3 available display traces. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The command form does not support setting all trace points to a single value. To do this, send the same value to each point.

Trace setup information can be acquired using :TRACe[:DATA]:PREamble?.

To acquire the data from trace A in the instrument send :TRACe[:DATA]? 1. A 551 point trace will be returned as #42204<block data>. <block> data could be in either INTeger,32 or REAL,32 format. In both cases, there will be 4 bytes per data point. So, 4 bytes per point * 551 data points gives 2204 bytes in <block> data. This example assumes that :FORMat:DATA INTeger,32 or :FORMat:DATA REAL,32 has been sent to the instrument before the query command is sent.

The query command will return a #0 if data is invalid for the active trace.

See Also:	:FORMat:DATA :TRACe[:DATA]:PREamble?
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Trace Copy

:TRACe:COPIY TRACE1, TRACE2 | TRACE3

Copies Trace A to either Trace B or Trace C.

Copying Trace A to Trace B is equivalent to pressing the shift-5(Trace), Trace B Operations, A->B on the front panel. This store Trace A into Trace B and turns on Trace B if it was off.

Copying Trace A to Trace C is equivalent to pressing the shift-5(Trace), Trace C Operations, A->C on the front panel. This store Trace A into Trace C and turns on Trace C if it was off.

Example:	To copy Trace A to Trace B :TRACe:COPIY TRACE1, TRACE2
	To copy Trace A to Trace C :TRACe:COPIY TRACE1, Trace3

Trace View State

:TRACe[1] | 2 | 3:DISPlay[:STATe] OFF | ON | 0 | 1

:TRACe[1] | 2 | 3:DISPlay[:STATe] ?

Specifies whether the specified trace should be displayable (visible) or hidden. TRACe1 corresponds to Trace A, TRACe2 corresponds to Trace B, and TRACe3 corresponds to Trace C.

Setting the value to ON or 1 will set the specified trace visible.

Setting the value to OFF or 0 will set the specified trace hidden.

Note that issuing this command will also set the specified trace as active trace.

Factory Preset/ *RST:	ON for Trace A OFF for Trace B OFF for Trace C
Front Panel Access:	Shift-5 (Trace), View/Blank
Example:	To set Trace A to Blank :TRACe:DISPlay OFF OR :TRACe1:DISPlay 0
	To set Trace B to View :TRACe2:DISPlay ON OR :TRACe2:DISPlay:STATE ON OR :TRACe2:DISPlay 1

Trace Exchange

:TRACe:EXCHange TRACE2, TRACE3

Swaps Trace B and Trace C.

Front Panel Access:	Shift-5 (Trace), Trace B Operations, B<->C OR Shift-5 (Trace), Trace C Operations, B<->C
Example:	To swap Trace B to Trace C :TRACe:EXCHange TRACE2, TRACE3

Trace View State

:TRACe [1] | 2 | 3 :LOAD:DISPlay[:STATE] OFF|ON|0|1

:TRACe [1] | 2 | 3 :LOAD:DISPlay[:STATE] ?

Specifies whether the specified recall trace should be displayable (visible) or hidden. TRACe1 corresponds to Trace A, TRACe2 corresponds to Trace B, and TRACe3 corresponds to Trace C.

Setting the value to ON or 1 will set the specified trace visible.

Setting the value to OFF or 0 will set the specified trace hidden.

Note that this command is valid only if there is a trace recalled.

Factory Preset/ *RST:	OFF
Front Panel Access:	Trace A: Shift-5 (Trace), Recalled Traces, Recalled A Trace B: Shift-5 (Trace), Recalled Traces, Recalled B Trace C: Shift-5 (Trace), Recalled Traces, Recalled C
Example:	To set Trace A to Blank :TRACe:LOAD:DISPlay OFF OR :TRACe1:LOAD:DISPlay 0
	To set Trace B to View :TRACe2:LOAD:DISPlay ON OR :TRACe2:LOAD:DISPlay:STATE ON OR :TRACe2:LOAD:DISPlay 1

Trace Load Operation

:TRACe:LOAD:OPERation <operation>

This command specifies the operation to be performed on the recalled traces. The <operation> must be one of the following values:

SETup | ATOB | BTOB | CTOB | ATOC | BTOC | CTOC | CLear

Setting the operation to SETup is equivalent to pressing the shift-5(Trace), Recalled Traces, Use Recalled Setup on the front panel.

Setting the operation to ATOB is equivalent to pressing the shift-5(Trace), Recalled Trace, Recalled Operations, Recalled A->B on the front panel. This copies the recalled trace A to trace B.

Setting the operation to BTOB is equivalent to pressing the shift-5(Trace), Recalled Traces, Recalled Operations, Recalled B->B. This copies the recalled Trace B to Trace B.

Setting the operation to CTOB is equivalent to pressing the shift-5(Trace), Recalled Traces, Recalled Operations, Recalled C->B. This copies the recalled Trace C to Trace B.

Setting the operation to ATOC is equivalent to pressing the shift-5(Trace), Recalled Traces, Recalled Operations, Recalled A->C. This copies the recalled Trace A to Trace C.

Setting the operation to BTOC is equivalent to pressing the shift-5(Trace), Recalled Traces, Recalled Operations, Recalled B->C. This copies the recalled Trace B to Trace C.

Setting the operation to CTOC is equivalent to pressing the shift-5(Trace), Recalled Traces, Recalled Operations, Recalled C->C. This copies the recalled Trace C to Trace C.

Setting the operation to CLEAr is equivalent to pressing the shift-5(Trace), Recalled Traces, Clear Recall. This clears all the recalled traces.

Note that this command is valid only if there is a trace recalled.

Example:	To use the recalled setup :TRACe:LOAD:OPERation SETup
	To clear the recalled traces :TRACe:LOAD:OPERation CLEAr
	To copy the recalled Trace A to Trace B :TRACe:LOAD:OPERation ATOB
	To copy the recalled Trace B to Trace B :TRACe:LOAD:OPERation BTOB

Trace A Operation

:TRACe1:OPERation NORMAl|MAXHold|MINHold|AVERAge
:TRACe1:OPERation?

This command specifies how successive traces are combined to produce the resulting display values.

Setting the operation to NORMAl is equivalent to pressing the shift-5(Trace), Trace A Operations, Normal->A on the front panel. This displays a trace based on the detection method selected.

Setting the operation to MAXHold is equivalent to pressing the shift-5(Trace), Trace A Operations, Max Hold->A on the front panel. This displays the largest signal for each display point over multiple sweeps.

Setting the operation to MINHold is equivalent to pressing the shift-5(Trace), Trace A Operations, Min Hold->A on the front panel. This displays the smallest signal for each display point over multiple sweeps.

Setting the operation to AVERAge is equivalent to pressing the shift-5(Trace), Trace A Operations, Average->A on the front panel. This displays the average value of multiple sweeps for each display point.

The query version of the command returns the current operation mode or “NONE” if no operation is set.

Factory Preset/ *RST:	NORMAl
See Also:	[:SENSE] :AVERAge :TYPE

Trace B Operation

:TRACe2:OPERation MAXHold|MINHold
:TRACe2:OPERation?

This command specifies how successive traces are combined to produce the resulting display values.

Setting the operation to MAXHold is equivalent to pressing the shift-5(Trace), Trace B Operations, Max Hold->B on the front panel. This displays the largest signal for each display point over multiple sweeps.

Setting the operation to MINHold is equivalent to pressing the shift-5(Trace), Trace B Operations, Min Hold->B on the front panel. This displays the smallest signal for each display point over multiple sweeps.

The query version of the command returns the current operation mode or “NONE” if no operation is set.

Factory Preset/ *RST:	NONE
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Trace C Operation

:TRACe3:OPERation MAXHold|MINHold|A-B|B-A
:TRACe3:OPERation?

This command specifies how successive traces are combined to produce the resulting display values.

Setting the operation to MAXHold is equivalent to pressing the shift-5(Trace), Trace C Operations, Max Hold->C on the front panel. This displays the largest signal for each display point over multiple sweeps.

Setting the operation to MINHold is equivalent to pressing the shift-5(Trace), Trace C Operations, Min Hold->C on the front panel. This displays the smallest signal for each display point over multiple sweeps.

Setting the operation to A-B is equivalent to pressing the shift-5(Trace), Trace C Operations, A-B->C. This displays the difference between trace A and trace B values in trace C.

Setting the operation to B-A is equivalent to pressing the shift-5(Trace), Trace C Operations, B-A->C. This displays the difference between trace B and trace A values in trace C.

The query version of the command returns the current operation mode or “NONE” if no operation is set.

Factory Preset/ *RST:	NONE
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Trace Header Transfer

:TRACe:PREamble? [1] | 2 | 3

Returns trace header information for the specified trace.

Data can be transferred to and from the 3 available display traces. Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The response begins with an ASCII header. The header specifies the number of following bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes that follow the header.

Parameters are returned in comma-delimited ASCII format. Each parameter will be returned as "NAME=VALUE[UNITS]."

Note that the parameters returns depend on the firmware version and that this document does not cover all parameter values returned by the command.

Valid parameter names are:

Parameter Name	Description
SN	Instrument serial #
UNIT_NAME	Instrument name
DESCR	Trace name
DATE	Trace date/time
BASE_VER	Base FW version
APP_NAME	Application name
APP_VER	Application FW version

Parameter Name	Description
UNITS	Amplitude units
CENTER_FREQ	Center freq
SPAN	Frequency span
FREQ_STEP	Frequency step size
RBW	Resolution bw
RBW_TYPE	RBW coupling auto/manual
VBW	Video bw
VBW_TYPE	VBW coupling auto/manual
RBW_VBW_RATIO	RBW/VBW ratio
SPAN_RBW_RATIO	Span/RBW ratio
INPUT_ATTEN	Input attenuation

ATTEN_TYPE	Attenuation coupling auto/manual
REFERENCE_LEVEL	Reference level
SCALE	Y-axis scale
PREAMP_SET	Preamp state
REF_LEVEL_OFFSET	Reference level offset
DETECTION	Detection type
TRACE_AVERAGE	Number of traces to average
SWEEP_TYPE	Single/continuous
CURRENT_SIGNAL	Current signal index
CURRENT_CHANNEL	Current signal channel
TRACE_MODE	Normal/Avg/Max
TRACE_STATUS	TRACE_A_VIEW_NOT_BLANK 0x0000000000000001 TRACE_A_WRITE_NOT_HOLD 0x0000000000000002 TRACE_A_DATA_VALID 0x0000000000000004 TRACE_B_VIEW_NOT_BLANK 0x0000000000010000 TRACE_B_WRITE_NOT_HOLD 0x0000000000020000 TRACE_B_DATA_VALID 0x0000000000040000 TRACE_C_VIEW_NOT_BLANK 0x0000000100000000 TRACE_C_WRITE_NOT_HOLD 0x0000000200000000 TRACE_C_DATA_VALID 0x0000000400000000 TRACE_C_IS_B_MINUS_A_ON 0x0000001000000000 TRACE_C_IS_A_MINUS_B_ON 0x0000002000000000
TRACE_COUNT	Number of traces averaged
UI_DATA_POINTS	Number of display points
IMPEDANCE	Input impedance
REFERENCE_FREQUENCY	Reference freq
SET_SWEEP_TIME	Minimum sweep time setting
TRIGGER_TYPE	Trigger type
VIDEO_TRIGGER_LEVEL	Video trigger level
TRIGGER_POSITION	Trigger position as a percent of the display
PEAK_THRESHOLD	Marker peak search threshold
MARKER_TABLE	Marker table status

Parameter Name	Description
ACTIVE_MEASUREMENT	Current measurement
ANTENNA	Antenna index
OCC_BW_METHOD	Occupied bandwidth method
OCC_BW_PERCENT	Occupied bandwidth % of power setting
OCC_BW_DBC	Occupied bandwidth dBc setting
OCC_BW_MEASURED_DB	Occupied bandwidth measured dBc value
OCC_BW_MEASURED_PERCENT	Occupied bandwidth measured % value
OCC_BW_VALUE	Measured occupied bandwidth
OCC_BW_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 3 OBW display indicators
CH_PWR_WIDTH	Channel power integration bandwidth
CH_PWR_VALUE	Measured channel power
CH_PWR_DENSITY	Measured channel power density
CH_PWR_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 channel power display indicators
ACPR_MAIN_CH_BW	ACPR main channel bw
ACPR_ADJC_CH_BW	ACPR adjacent channel bw
ACPR_CHANNEL_SPACING	ACPR channel spacing
ACPR_MAIN_CH_PWR	ACPR measured main channel power
ACPR_UPPER_CH_PWR	ACPR measured upper channel power
ACPR_LOWER_CH_PWR	ACPR measured lower channel power
ACPR_LOWER_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR lower channel display indicators
ACPR_MAIN_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR main channel display indicators
ACPR_UPPER_CH_LINE_MARKER_INFO	Mask off 16 bits at a time to get the display point location of the 2 ACPR upper channel display indicators
AM_FM_DEMOD_VOL	AM/FM demod volume
AM_FM_DEMOD_	AM/FM demod freq

FREQUENCY	
AM_FM_DEMOD_TYPE	AM/FM demod type
AM_FM_DEMOD_TIME	AM/FM demod time
AM_FM_LINE_MARKER	Display point location of the demodulation frequency
BEAT_FREQUENCY_OSC_FREQUENCY	BFO oscillator freq
CI_C_TYPE	C/I measurement carrier type
CI_C_VALUE	C/I measurement measured carrier power
CI_I_BB_VALUE	C/I measurement measured broadband interference power
CI_I_NB_VALUE	C/I measurement measured narrowband interference power
CI_I_WB_VALUE	C/I measurement measured wideband interference power
CI_BB_VALUE	C/I measurement with broadband interference
CI_NB_VALUE	C/I measurement with narrowband interference
CI_WB_VALUE	C/I measurement with wideband interference

Parameter Name	Description
MKR_SPA_FREQNx	Marker x frequency (where x is the marker number 0-11, 0 represent the reference marker #1 and 1 represent delta marker #1, 2 represent reference marker #2, and 3 represent delta marker #2, and so on)
MKR_SPA_POINTx	Reference marker x display point
MKR_SPA_MAGNTx	Reference marker x magnitude
MKR_SPA_PRCNTx	Reference marker x display percentage
MKR_SPA_FLAGSx	Reference marker x flags: SPA_MKR_FLAG_ON_OFF 0x00000001 SPA_MKR_FLAG_DELTA_MKR 0x00000002 SPA_MKR_FLAG_SELECTED 0x00000004 SPA_MKR_FLAG_DATA_INVALID 0x00000008 SPA_MKR_FLAG_DATA_STALE 0x00000010 SPA_MKR_FLAG_FIXED 0x00000020 SPA_MKR_FLAG_MASK 0x000000FF SPA_MKR_FLAG_DISPL_AMPL_HZ 0x00000100 SPA_MKR_FLAG_DISPL_AMPL_PER_HZ 0x00000200 SPA_MKR_FLAG_DISP_FLAG 0x00000F00 SPA_MKR_FLAG_RELATIVE 0x00001000 SPA_MKR_FLAG_STANDARD 0x10000000

	SPA_MKR_FIELD_STRENGTH	0x20000000
	SPA_MKR_NOISE	0x30000000
	SPA_MKR_COUNTER	0x40000000
	SPA_MKR_TIME	0x50000000
MKR_SPA_REF_TOx	Specifies which marker is the marker x reference to	
MKR_SPA_TRACEx	Specifies which trace the marker x is for.	

Parameter Name	Description
LIM_LFLAGS_UP	Upper limit flags: LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002
LIM_FREQNC_UPx	Upper limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_UPx	Upper limit point x amplitude
LIM_LFLAGS_LO	Lower limit flags: LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002
LIM_FREQNC_LOx	Lower limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_LOx	Lower limit point x amplitude

Tracking Generator Option Only:	
Parameter Name	Description
TG_SET_ON_OFF	Set tracking generator power; On/Off
TG_SET_OUTPUT_POWER	Set tracking generator output power; 0dBm to -40dBm
TG_REFERENCE_LEVEL	Tracking generator S21 normalized reference level; On/Off
TG_SCALE	Tracking generator specific scale for S21 normalized display only; +100 to -120 dBm
TG_UNITS	Tracking generator log / linear scale units. Currently defaulted to Log

	scale only; 0x00
TG_TRACE_STATUS	Tracking generator S21 normalized trace status; S21 OFF: 0x00 Normalizing Sweep: 0x11 Valid Sweep: 0x12
TG_REF_LEVEL_OFFSET	Tracking Generator S21 Normalized reference level offset; +100 to -100dBm
See Also:	:TRACe:DATA

Trace Write State

:TRACe[1]|2|3:WRITe[:STATe] OFF|ON|0|1
:TRACe[1]|2|3:WRITe[:STATe]?

Specifies whether the specified trace state should be set to write or hold. TRACe1 corresponds to Trace A, TRACe2 corresponds to Trace B, and TRACe3 corresponds to Trace C.

Setting the state to ON or 1 will set the specified trace to write.

Setting the state to OFF or 0 will set the specified trace to hold.

Factory Preset/ *RST:	ON for Trace A OFF for Trace B OFF for Trace C
Front Panel Access:	Shift-5 (Trace), Write/Hold
Example:	To set Trace A to Hold :TRACe:WRITe:STATe OFF OR :TRACe:WRITe OFF OR :TRACe:WRITe 0
	To set Trace C to Write :TRACe3:WRITe ON OR :TRACe3:WRITe:STATe ON OR: :TRACe3:WRITe 1

Trigger Subsystem

This subsystem contains commands related to the triggering of instrument functions for the purposes of synchronization. Related commands appear in the ABORT and INITIate subsystems.

Trigger Source

:TRIGger[:SEquence]:SOURce IMMEDIATE|EXTERNAL|VIDEO
:TRIGger[:SEquence]:SOURce?

This command defines the trigger source.

IMMEDIATE triggering is the equivalent of free-run triggering.

EXTERNAL triggering is triggered when a TTL signal is applied to the External Trigger input connector. EXTERNAL triggering is always done on the rising edge of the signal. It is available only in zero span mode.

VIDEO triggering is triggered based on the measured signal level. It is available only in zero span mode.

Factory Preset / *RST:	Immediate
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Free Run External Video
See Also:	:TRIGger[:SEquence]:VIDeo:LEVel :TRIGger[:SEquence]:VIDeo:POStion

Video Trigger Level

:TRIGger[:SEquence]:VIDeo:LEVel <amplitude>
:TRIGger[:SEquence]:VIDeo:LEVel?

This command sets the video triggering level.

Factory Preset / *RST:	-65.0 dBm
Range:	30 dBm to -130 dBm
Default Unit:	Current amplitude unit
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Video

Video Trigger Position

:TRIGger[:SEquence]:VIDeo:POStion <percentage>
:TRIGger[:SEquence]:VIDeo:POStion?

This command sets the video triggering position as a percentage of the display.

When the sweep is triggered, the trigger point will be drawn at the location defined by the position. The graph appearing to the left of the trigger position is data acquired before the trigger. The graph appearing to the right of the trigger position is data acquired after the trigger.

Factory Preset / *RST:	1.00%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Shift-3 (Sweep), Trigger Type, Change Trigger Position

Unit Subsystem

The unit subsystem is used to modify the default units used for related parameters. These changes affect parameters in both commands and responses.

Measurement Units

:UNIT:POWer DBM|DBV|DBMV|DBUV|V|W
:UNIT:POWer?

Sets the default amplitude units for input, output and display.

Note that linear units are not operational with SPA V3.06. The set command is non-operational with SPA V3.06 as well.

Factory Preset / *RST:	dBm
Front Panel Access:	Amplitude, Units, dBm dBV dBmV dBuV Volt Watt

3.4 Vector Network Analyzer

This section contains the VNA remote commands. These commands are available in the MS2024A/MS2026A and MS2034A/MS2036A VNA Master.

CALCulate Subsystem

The commands in this subsystem process data that has been collected via the SENSE subsystem.

:CALCulate:LIMit Subsystem

This subsystem defines the limit lines and controls the limit check.

Limit Alarm

:CALCulate:LIMit:ALARm OFF | ON | 0 | 1

:CALCulate:LIMit:ALARm?

Enables/disables the currently active limit line alarm.

Setting the value to ON or 1 will turn on the limit alarm.

Setting the value to OFF or 0 will turn off the limit alarm.

The query version of the command returns a 1 if the currently selected limit line alarm is set to ON and returns 0 if OFF.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Limit Alarm
See Also:	:CALCulate:LIMit:TYPE
Example:	To turn off limit alarm :CALCulate:LIMit:ALARm OFF OR :CALCulate:LIMit:ALARm 0
	To turn on limit alarm :CALCulate:LIMit:ALARm ON OR :CALCulate:LIMit:ALARm 1

Clear Selected Limit

:CALCulate:LIMit:CLEAr

Deletes all limit points for the currently active limit line.

The current selected limit line can be modified by using the

:CALCulate:LIMit:TYPE command.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), Clear Limit
See Also:	:CALCulate:LIMit:TYPE

Number of Limit Points

:CALCulate:LIMit:POINT?

Returns the number of points currently in the selected limit line.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

See Also:	:CALCulate:LIMit:TYPE
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Add Limit Point

:CALCulate:LIMit:POINT:ADD

Adds a new limit point to the currently active limit line.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Add Point
See Also:	:CALCulate:LIMit:TYPE

Limit Point Frequency

:CALCulate:LIMit:POINT:FREQuency <freq>

:CALCulate:LIMit:POINT:FREQuency?

Sets the limit point frequency of the current selected limit.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Frequency
Default Unit:	Hz
See Also:	:CALCulate:LIMit:TYPE

Limit Point Value

:CALCulate:LIMit:POINT:VALue <value>

:CALCulate:LIMit:POINT:VALue?

Sets the limit point value of the current selected limit.

The <value> parameter is the limit point value in dB or time units for group delay.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Value
Default Unit:	Current active value unit.
See Also:	:CALCulate:LIMit:TYPE

Limit State

:CALCulate:LIMit[:STATe] OFF|ON|0|1

:CALCulate:LIMit[:STATe]?

Turns the currently selected limit line (upper or lower) ON or OFF.

If the value is set to ON or 1, the currently selected limit line is ON.

If the value is set to OFF or 0, the currently selected limit line is OFF.

The query version of the command returns a 1 if the currently selected limit line is ON and returns a 0 if OFF.

Use `:CALCulate:LIMit:TYPE` to set the currently active limit line.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-6 (Limit), On/Off
Example:	To turn on the currently selected limit line :CALCulate:LIMit ON OR :CALCulate:LIMit:STATe ON OR :CALCulate:LIMit:STATe 1
	To turn off the currently selected limit line :CALCulate:LIMit OFF OR :CALCulate:LIMit:STATe 0 OR :CALCulate:LIMit 0

Limit Type

`:CALCulate:LIMit:TYPE 0|1`

`:CALCulate:LIMit:TYPE?`

Sets the limit line segment type (upper or lower) to be edited.

Set the value to 1 for Lower limit segment and 0 for Upper limit line segment.

The query version of the command returns a 1 if the lower limit line is currently active for editing and returns 0 if the upper limit line is currently active for editing.

Factory Preset / *RST:	0
Front Panel Access:	Shift-6(Limit), Limit
Example:	To set upper limit line active for editing :CALCulate:LIMit:TYPE 0
	To set lower limit line active for editing :CALCulate:LIMit:TYPE 1

Move Limit**:CALCulate:LIMit:VALue <value>****:CALCulate:LIMit:VALue?**

Sets the currently active limit line value. This command moves an entire single or multi-segment limit line up or down by the given <value>.

Use **:CALCulate:LIMit:TYPE** to set the currently active limit line.

Front Panel Access:	Shift-6 (Limit), Limit Edit, Move Limit
Default Unit:	Current active value unit.
See Also:	:CALCulate:LIMit:TYPE

:CALCulate:MARKer Subsystem

This subsystem contains commands to manipulate data markers.

Turn All Markers Off**:CALCulate:MARKer:AOff**

Turns off all markers.

Front Panel Access:	VNA: Marker, All Markers Off SPA: Marker, More, All Markers Off WCDMA: Marker, All Markers Off
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Delta Marker State**:CALCulate:MARKer[1]|2|3|4|5|6:DELTA[:STATE] OFF|ON|0|1****:CALCulate:MARKer[1]|2|3|4|5|6:DELTA[:STATE]?**

Sets the specified delta marker on or off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, Delta
Example:	<p>To turn on delta marker #3</p> <pre>:CALCulate:MARKer3:DELTA ON OR :CALCulate:MARKer3:DELTA 1 OR :CALCulate:MARKer3:DELTA:STATE ON OR :CALCulate:MARKer3:DELTA:STATE 1</pre> <p>To turn off delta marker #6</p> <pre>:CALCulate:MARKer6:DELTA OFF OR :CALCulate:MARKer6:DELTA:STATE OFF OR :CALCulate:MARKer6:DELTA:STATE 0</pre>

Delta Marker X Value

:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:X <x-parameter>
:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:X?

Sets the location of the delta marker on the x-axis at the specified location <x-parameter> + the reference marker x-axis. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the delta marker on the x-axis.

Default Unit:	Current x-axis unit
Front Panel Access:	Marker, Delta
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:X

Delta Marker Read Y Value

:CALCulate:MARKer[1]|2|3|4|5|6:DELTA:Y?

Reads the current Y value for the specified delta marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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Marker (Maximum) Peak Search

:CALCulate:MARKer[1]|2|3|4|5|6:MAXimum

Puts the specified marker at the maximum value in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Peak Search
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:PEAK

Marker (Minimum) Valley Search

:CALCulate:MARKer[1]|2|3|4|5|6:MINimum

Puts the specified marker at the minimum value in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Valley Search
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:VALley

Marker Peak Search

:CALCulate:MARKer[1]|2|3|4|5|6:PEAK

Puts the specified marker at the maximum value in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Peak Search
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:MAXimum

Marker State

:CALCulate:MARKer[1]|2|3|4|5|6[:STATe] OFF|ON|0|1

:CALCulate:MARKer[1]|2|3|4|5|6[:STATe]?

Sets the specified marker on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, On/Off
Example:	To turn off reference marker #1 :CALCulate:MARKer1:STATe OFF

Marker Table Data

:CALCulate:MARKer:TABLE:DATA?

Reports marker information similar to the Marker table.

The response begins with an ASCII header. The header specifies the number of following bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes that follow the header.

Parameters are returned in comma-delimited ASCII format. Each parameter will be returned as "NAME=VALUE[UNITS]."

Front Panel Access:	Marker, Marker Table On
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Valid parameter names are:

Parameter Name	Description
MKR_REFx	Reference marker state (where x is the marker number 1-6).
MKR_DLTx	Delta marker state (where x is the marker number 1-6).
MKR_REF_FREQNx	Reference marker x frequency (where x is the marker number 1-6).
MKR_DLT_FREQNx	Delta marker x frequency (where x is the maker number 1-6).
MKR_REF_AMPLY	Reference marker y-axis (where y is the marker number 1-6).
MKR_DLT_AMPLY	Delta marker y magnitude (where y is the marker number 1-6).

Marker Table State

:CALCulate:MARKer:TABLE[:STATE] OFF|ON|0|1

:CALCulate:MARKer:TABLE[:STATE]?

Turns marker table on/off.

Factory Preset / *RST:	OFF
Front Panel Access:	Marker, Marker Table

Marker Valley Search

:CALCulate:MARKer[1]|2|3|4|5|6:VALley

Puts the specified marker at the minimum value in the trace.

Front Panel Access:	Marker, [Marker 1/2/3/4/5/6,] Valley Search
See Also:	:CALCulate:MARKer[1] 2 3 4 5 6:MINimum

Marker X Value

:CALCulate:MARKer[1]|2|3|4|5|6:X <x-parameter>

:CALCulate:MARKer[1]|2|3|4|5|6:X?

Sets the location of the marker on the x-axis at the specified location. <x-parameter> is defined in the current x-axis units.

The query version of the command returns the location of the marker on the x-axis.

Default Unit:	Current x-axis unit
Front Panel Access:	Marker, [Marker 1/2/3/4/5/6]

Marker Read Y Value

:CALCulate:MARKer[1]|2|3|4|5|6:Y?

Reads the current Y value for the specified marker. The units are the units of the y-axis.

Default Unit:	Current y-axis unit
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:CALCulate:MATH Subsystem

This subsystem contains functions for controlling math operations on the currently selected measurement and memory.

Trace Math Function

:CALCulate:MATH:FUNCTION NORMAl|ADD|SUBTRACT

:CALCulate:MATH:FUNCTION?

Sets math operations on the currently selected measurement and the trace stored in memory. Note that there MUST be a trace stored in Memory.

Setting the FUNCtion to NORMal is equivalent of setting the Trace Math to “No Trace Math” on the front panel.

Setting the FUNCtion to ADD is equivalent of setting the Trace Math to “Trace Plus Memory” on the front panel.

Setting the FUNCtion to SUBtract is equivalent to setting the Trace Math to “Trace Minus Memory” on the front panel.

The query version of the command returns the string “NORM” for no trace math, returns the string “ADD” for trace plus memory, and returns the string “SUBT” for trace minus memory.

Factory Preset / *RST:	NORMAL
Front Panel Access:	Shift-5 (Trace)
See Also:	:CALCulate:MATH:MEMorize

Trace To Memory

:CALCulate:MATH:MEMorize

Copies the current measurement trace into memory.

Front Panel Access:	Shift-5 (Trace), Copy Trace To Display Memory
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Smoothing

:CALCulate:SMOothing <integer>

:CALCulate:SMOothing?

Sets the smoothing percentage. The query form of the command returns the current smoothing percentage.

Factory Preset / *RST:	0
Range:	0 – 20
Front Panel Access:	Shift-3 (Sweep), Averaging/Smoothing, Smoothing %

:CALCulate:TRANSform Subsystem

Commands in this subsystem relate to the translation of data between the frequency and time domains.

Cable Loss Average

:CALCulate:TRANSform:CLAVerage?

Reports the cable loss average.

Factory Preset / *RST:	1 dB
Default Unit:	dB

Cable Loss

:CALCulate:TRANSform:DISTance:CABLoss

:CALCulate:TRANSform:DISTance:CABLoss?

Sets the cable loss for DTF measurements.

Factory Preset / *RST:	0.0
Range:	0.0 – 5
Front Panel Access:	Freq/Dist, Cable Loss

Distance Maximum

:CALCulate:TRANSform:DISTance:DMAX?

Reports the maximum horizontal distance that can be analyzed in DTF.

Note that the unit return is based on the current distance units.

Factory Preset / *RST:	MS2026: 11.0 m MS2024: 16.5 m
Range:	0.0 m – 1500 m
Default Unit:	Meters (m)

Fault Resolution

:CALCulate:TRANSform:DISTance:FRESolution?

Reports the system's ability to separate two closely spaced discontinuities in DTF measurements.

Note that the return value is based on the current distance units.

Factory Preset / *RST:	MS2026: 0.02 m MS2024: 0.03 m
Range:	0.0 m – 1500 m
Default Unit:	Meters (m)

Propagation Velocity

:CALCulate:TRANSform:DISTance:PVELocity

:CALCulate:TRANSform:DISTance:PVELocity?

Sets the propagation velocity of the cable for DTF measurements.

Factory Preset / *RST:	0.8
Range:	0.001 – 1.0
Front Panel Access:	Freq/Dist, Prop Velocity

Start Distance

:CALCulate:TRANSform:DISTance:START
:CALCulate:TRANSform:DISTance:START?

Sets the start distance for DTF measurements..

Factory Preset / *RST:	0.0 m
Range:	0.0 m – 1000.0 m
Default Unit:	Meters (m)
Front Panel Access:	Freq/Dist, Start Dist

Stop Distance

:CALCulate:TRANSform:DISTance:STOP
:CALCulate:TRANSform:DISTance:STOP?

Sets the stop distance for DTF measurements.

Factory Preset / *RST:	1000.0 m
Range:	0.0 m – 1000.0 m
Default Unit:	Meters (m)
Front Panel Access:	Freq/Dist, Stop Dist

Suggested Span

:CALCulate:TRANSform:DISTance:SUGSpan?

Reports the span needed to get the stop distance to equal the maximum for DTF measurement.

Factory Preset / *RST:	44 MHz
Range:	0.0 Hz - 5.998 GHz
Default Unit:	Hz

Distance Units

:CALCulate:TRANSform:DISTance:UNIT METers | FEET
:CALCulate:TRANSform:DISTance:UNIT?

Sets the units to be used for DTF measurements.

Factory Preset / *RST:	Meters
Front Panel Access:	Shift-8 (System), Application Options, Units

Windowing

:CALCulate:TRANSform:DISTance:WINDow **RECTangular|MSLobe|NSLobe|LSLobe**

:CALCulate:TRANSform:DISTance:WINDow?

Sets the windowing for DTF measurements. Available types are Rectangular, Nominal Side Lobe, Low Side Lobe and Minimum Side Lobe.

Factory Preset / *RST:	Rectangular
Front Panel Access:	Freq/Dist, Next, DTF Setup, Windowing

CALibration Subsystem

This subsystem controls the system calibration.

Calibration State

:CALibration:STATE?

Reports the calibrated state.

This command returns a 1 if the instrument has been calibrated with discrete Open, Short, and Load components and returns 0 if the instrument has not been calibrated.

Factory Preset / *RST:	OFF
See Also:	[[:SENSe]CORRection:COLL:LOAD, [:SENSe]CORRection:COLL:OPEN, [:SENSe]CORRection:COLL:SHORT, [:SENSe]CORRection:COLL:THRu;

Display Subsystem

This subsystem provides commands that modify the display of data for the user. They do not modify the way in which data is returned to the controller.

Display Trace from Memory

:DISPlay:WINDow:TRACe:MEMory[:STATE] **OFF|ON|0|1**

:DISPlay:WINDow:TRACe:MEMory[:STATE]?

Enables/disables displaying the memory trace.

Setting the value to ON or 1 will result in displaying the trace in memory.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-5(Trace), Show Memory

Dual Overlay

DISPlay:WINDow:TRACe:OVERlay[:STATe] OFF|ON|0|1

DISPlay:WINDow:TRACe:OVERlay[:STATe]?

Turns S21/S11 log magnitude dual overlay ON or OFF.

Factory Preset / *RST:	OFF
Range:	OFF, ON
Front Panel Access:	Shift-4(Measurement), Log Mag Dual Overlay

Autoscale

:DISPlay:WINDow:TRACe:Y[:SCALE]:AUToscale

Autoscales the active channel display so that the trace will be shown in the middle of the display.

Front Panel Access:	Scale, Autoscale
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Group Delay Aperture

:DISPlay:WINDow:TRACe:Y[:SCALE]:GDAPerture <percentage>

:DISPlay:WINDow:TRACe:Y[:SCALE]:GDAPerture?

Sets the group delay aperture value. The query version of this command outputs the group delay aperture setting for the active channel.

Factory Preset / *RST:	2 %
Range:	2 % - 20 %
Default Unit:	Percentage
Front Panel Access:	Scale, Aperture

Scale Resolution Per Division

:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision <value>

:DISPlay:WINDow:TRACe:Y[:SCALE]:PDIVision?

Sets the scale per division for the y-axis. For Group Delay, set the scale (time/division) for the y-axis. For Phase, set the scale (degree/division) for the y-axis. For all other measurement, set the scale (dB/division).

The resolution per division value is maintained separately for each measurement.

Factory Preset / *RST:	S11 Log Magnitude: 6 dB S11 Phase: 45° S11 VSWR: 9.1 S11 Log Magnitude Fault Location: 6 dB S11 VSWR Fault Location: 9.1 S11 Group Delay: 2 <i>us</i> S21 Log Magnitude: 22 dB S21 Phase: 45° S21 Group Delay: 2 <i>us</i>
Range:	S11 Log Magnitude: 0.1 dB – 10 dB S11 Phase: 0.1° – 90° S11 VSWR: 0.01 - 10 S11 Log Magnitude Fault Location: 0.1 dB – 10 dB S11 VSWR Fault Location: 0.01 – 10 S11 Group Delay: -100000 <i>ms</i> – 100000 <i>ms</i> S21 Log Magnitude: 0.1 dB – 25 dB S21 Phase: 0.1° - 90° S21 Group Delay: -100000 <i>ms</i> – 100000 <i>ms</i>
Default Unit:	Current active value unit
Front Panel Access:	Scale, Resolution Per Div

Scale Reference Level

:DISPlay:WINDow:TRACe:Y[:SCALe]:RLEVEL <value>

:DISPlay:WINDow:TRACe:Y[:SCALe]:RLEVEL?

Sets the reference level scale value for the y-axis.

The reference level is maintained separately for each measurement.

Factory Preset / *RST:	S11 Log Magnitude: 30 dB S11 VSWR: 33.268 S11 Phase: 0° S11 Log Magnitude Fault Location: 30 dB S11 VSWR Fault Location: 33.268 S11 Group Delay: 0 <i>us</i> S21 Log Magnitude: -10 dB S21 Phase: 0° S21 Group Delay: 0 <i>us</i>
Range:	S11 Log Magnitude: 0 dB – 100 dB S11 VSWR: 1 – 101 S11 Phase: -180° – 180° S11 Log Magnitude Fault Location: 0 dB – 100 dB S11 VSWR Fault Location: 1 – 101 S11 Group Delay: -100000 <i>ms</i> – 100000 <i>ms</i> S21 Log Magnitude: -120 dB – 100 dB S21 Phase: -180° – 180° S21 Group Delay: -100000 <i>ms</i> – 100000 <i>ms</i>
Default Unit:	Current active value unit
Front Panel Access:	Scale, Reference Level
See Also:	:DISPlay:WINDow:TRACe:Y[:SCALe]:RPOSITION

Scale Reference Line

:DISPlay:WINDow:TRACe:Y[:SCALe]:RPOSition <number>

:DISPlay:WINDow:TRACe:Y[:SCALe]:RPOSition?

Sets the reference line scale value for the y-axis.

Factory Preset / *RST:	S11 Log Magnitude: 5 S11 VSWR: 5 S11 Phase: 4 S11 Log Magnitude Fault Location: 5 S11 VSWR Fault Location: 5 S11 Group Delay: 5 S21 Log Magnitude: 5 S21 Phase: 4 S21 Group Delay: 5
Range:	S11 Log Magnitude: 0 – 10 S11 VSWR: 0 – 10 S11 Phase: 0 – 8 S11 Log Magnitude Fault Location: 0 – 10 S11 VSWR Fault Location: 0 – 10 S11 Group Delay: 0 – 10 S21 Log Magnitude: 0 – 10 S21 Phase: 0 – 8 S21 Group Delay: 0 – 10
Front Panel Access:	Scale, Reference Line
See Also:	:DISPlay:WINDow:TRACe:Y[:SCALe]:RLEVel

Smith Chart Scalable Type

:DISPlay:WINDow:TRACe:Y[:SCALe]:SMCHart 0|10|20|30|-3

:DISPlay:WINDow:TRACe:Y[:SCALe]:SMCHart?

Sets the Smith chart display scale type.

Setting the value to 0 is equivalent of setting the Smith Chart scale to “Normal” on the front panel.

Setting the value to 10 is equivalent of setting the Smith Chart scale to “Expand 10dB” on the front panel.

Setting the value to 20 is equivalent of setting the Smith Chart scale to “Expand 20dB” on the front panel.

Setting the value to 30 is equivalent of setting the Smith Chart scale to “Expand 30dB” on the front panel.

Setting the value to -3 is equivalent of setting the Smith Chart scale to “Compress 3dB” on the front panel.

Factory Preset / *RST:	Normal
Default Unit:	Current active amplitude unit
Front Panel Access:	Measurement, S11 Reflection, Smith Chart, Scale

Format Subsystem

This subsystem contains commands that determine the formatting of numeric data when it is transferred.

The format setting affects data in specific commands only. If a command is affected, it will be noted in the command description.

Numeric Data Format

:FORMat [:READings] [:DATA] ASCii | INTeger, 32 | REAL, 32

:FORMat [:READings] [:DATA] ?

This command specifies the format in which data is returned in certain commands.

ASCii format returns the data in comma-separated ASCII format. The units are the current instrument units. This format requires many more bytes so it will be the slowest format.

INTeger 32 values are signed 32-bit integers in little-endian byte order. This format returns the data in 4-byte blocks. The units are always mdBm. For example, if the measured result was -12.345 dBm, that value would be sent as -12345.

REAL,32 values are 32-bit floating point numbers conforming to the IEEE 754 standard in little-endian byte order. This format returns the data in 4-byte binary format. The units are the current instrument units.

Both INTeger,32 and REAL,32 formats return a definite block length. Each transfer begins with an ASCII header such as #42204. The first digit represents the number of following digits in the header (in this example, 4). The remainder of the header indicates the number of bytes that follow the header (in this example, 2204). You then divide the number of following bytes by the number of bytes in the data format you've chosen (4 for both INTeger,32 and REAL,32...so 2204/4) to get the number of data points (in this example, 551).

Factory Preset / *RST:	ASCii
See Also:	:TRACe [:DATA]

Data Points Data Format

:FORMat [:READings] [:DATA] :DPoints ON|OFF

:FORMat [:READings] [:DATA] :DPoints ?

This command specifies whether the total number of data points returns in the :TRACe [:DATA] ? is based on the sweep resolution.

If the value is set to ON then the number of data points return is determined by the `[:SENSe] :SWEEp:RESolution`.

If the value is set to OFF then the `:TRACe [:DATA] ?` returns 551 data points regardless of the data points setting. At 275 data points the values returned are paired and at 137 data points the values are in fours.

Factory Preset / *RST:	OFF
See Also:	:TRACe [:DATA] ?

INITiate Subsystem

This subsystem controls the triggering of measurements.

Continuous/Single Sweep

:INITiate:CONTInuous OFF|ON|0|1

:INITiate:CONTInuous?

Specifies whether the sweep/measurement is triggered continuously.

If the value is set to ON or 1, another sweep/measurement is triggered as soon as the current one completes.

If continuous is set to OFF or 0, the instrument enters the “idle” state and waits for the for the `:INITiate:CONTInuous ON` command.

The default value is ON. That is, sending `:INIT:CONT` is equivalent to sending `:INIT:CONT ON`

The query version of the command returns a 1 if the instrument is continuously sweeping/measuring and returns a 0 if the instrument is in single sweep/measurement mode.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	ON
Front Panel Access:	Shift-3 (Sweep), Sweep Type
See Also:	:INITiate:HOLD

Hold Sweep

:INITiate:HOLD OFF|ON|0|1

:INITiate:HOLD?

Stops a sweep at its current measurement point.

If the instrument is currently sweeping, setting a value of ON or 1, will pause the sweep.

If the instrument is currently not sweeping, setting a value of OFF or 0, will resume sweeping.

The query version of the command returns a 1 if the hold command is set and returns a 0 if a Run is set instead.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	ON
Front Panel Access:	Shift-3 (Sweep), Run/Hold

Trigger Sweep/Measurement

:INITiate[:IMMEDIATE]

Initiates a sweep/measurement.

If **:INITiate:CONTinuous** is set to ON, this command is ignored.

Use this command in combination with **:STATus:OPERation?** to synchronize the capture of one complete set of data. When this command is sent, the “sweep complete” bit of **:STATus:OPERation?** is set to 0, indicating that the measurement has not completed. The data collection is then triggered. The controlling program can poll **:STATus:OPERation?** to determine the status. When the “sweep complete” bit is set to 1, data is ready to be retrieved.

Note that the set command is available only if the instrument is in VNA mode.

See Also:	:INITiate:CONTinuous :STATus:OPERation?
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INPut Subsystem

This subsystem controls characteristics of the input port.

INPut:BIAS Subsystem

This subsystem controls parameters of the bias tee.

The following are valid voltage/current combinations:

Voltage	Valid Steady State Current(s)
+12 V	250 mA, 500 mA
+15 V	250 mA, 500 mA
+18 V	350 mA
+21 V	300 mA
+24 V	250 mA

Bias Tee Current

:INPut:BIAS:CURRent LOW|HIGH

:INPut:BIAS:CURRent?

Sets the surge current of the bias tee.

Note that for +12V and +15V settings, the current can be set to Low or High. For +18V, +21V, and +24V, the current must be set to Low.

Factory Preset / *RST:	LOW
Front Panel Access:	Shift-3 (Sweep), Bias Tee, Current

Bias Tee State

:INPut:BIAS:STATe OFF|ON|0|1

:INPut:BIAS:STATe?

Enables/disables the bias tee.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-3 (Sweep), Bias Tee, Bias Tee

Bias Tee Voltage

:INPut:BIAS:VOLTage <voltage>

:INPut:BIAS:VOLTage?

Sets the voltage of the bias tee.

Note that for +12V and +15V settings, the current can be set to Low or High. For +18V, +21V, and +24V, the current will be set to Low.

Factory Preset / *RST:	+12 V
Range:	+12V - +24 V
Default Unit:	Volts
Front Panel Access:	Shift-3 (Sweep), Bias Tee

INSTRUMENT Subsystem

One instrument may contain many logical instruments (“modes”). This subsystem controls the selection of the current instrument mode.

Query Available Modes

:INSTrument:CATalog:FULL?

Returns a comma-separated list of available modes. Mode names are enclosed in double quotes (“”). Immediately following the string name is the application number.

For example: “SPA”1, “WCDMA”5, “VNA”2, “WIMAX_D”18, “SCOPE”17

Front Panel Access:	Shift-9 (Mode)
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Select Mode by Number

:INSTRument:NSElect <integer>
:INSTRument:NSElect?

Sets the instrument mode based on the value of <integer>.

The query version returns the number associated with the current mode.

Use **:INSTRument:CATalog:FULL?** to get a list of available mode names and their integer representations.

Factory Preset / *RST:	MS2721A: 1 MS2717A: 1 MT8220A: 1 MS2012A: 2 MS2024A: 2 MS2026A: 2 MS2034A: 2 MS2036A: 2 MS2717B: 1 MS2718B: 1 MS2719B: 1
Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTRument:CATalog:FULL? :INSTRument[:SElect]

Select Mode by Name

:INSTRument[:SElect] <string>
:INSTRument[:SElect]?

Sets the instrument mode based on the mode name specified by <string>.

The query version returns the name of the current mode.

Use **:INSTRument:CATalog:FULL?** to get a list of available modes.

Factory Preset / *RST:	MS2721A: "SPA" MS2717A: "SPA" MT8220A: "SPA" MS2012A: "VNA" MS2024A: "VNA" MS2026A: "VNA" MS2034A: "VNA" MS2036A: "VNA" MS2717B: "SPA" MS2718B: "SPA" MS2719B: "SPA"
Front Panel Access:	Shift-9 (Mode)
See Also:	:INSTRument:CATalog:FULL? :INSTRument:NSElect

MMEMory Subsystem

The Mass MEMory subsystem contains functions that provide access to the instrument's setup and data storage.

Delete Setup/Measurement

:MMEMory:DELEte <file name>

Removes the measurement or setup file specified by <file name> from the current mass storage device.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".stp" for setup and ".vna" for measurement.

Use the command **MMEMory:MSIS** to set the current mass storage location.

Front Panel Access:	Shift-7 (File), Delete, Delete Selected File
See Also:	:MMEMory:STORE:STATE, :MMEMory:STORE:TRACE, :MMEMory:MSIS INTERNAL USB CFLash

Format Storage Device

:MMEMory:INITialize [CFLash]

Formats the compact flash. Issuing this command will erase all files on an installed Compact Flash module and create the /usr directory for storage of measurements, setups and jpg files.

Front Panel Access:	Shift-7 (File), Directory Management, Format Compact Flash
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Recall Setup

:MMEMory:LOAD:STATE <integer>,<file name>

Recalls a previously stored instrument setup in the current storage location. The setup file to be loaded is specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should contain a file extension ".stp".

Use the command **MMEMory:MSIS** to set the current storage location.

The <integer> parameter is not currently used, but it must be sent. Send a 1.

Front Panel Access:	Shift-7 (File), Recall, Recall Setup
See Also:	:MMEMory:STORE:STATE, :MMEMory:MSIS INTERNAL USB CFLash

Recall Measurement

:MMEMory:LOAD:TRACe <integer>, <file name>

Recalls a previously stored measurement trace from the current storage location. The saved measurement trace to be loaded is specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’) and should contain a file extension “.vna”. Note that the trace specified by <file name> should be available at the current mass storage location.

Use the command **MMEMory:MSIS** to set the current mass storage location.

The <integer> parameter is not currently in used, but it must be sent. Send a 1.

Front Panel Access:	Shift-7 (File), Recall, Recall Measurement
See Also:	:MMEMory:STORE:TRACe, :MMEMory:MSIS INTernal USB CFLash

Storage Location

MMEMory:MSIS INTernal|USB|CFLash

MMEMory:MSIS?

Sets the storage location.

Setting the storage location to **INTernal** will set the current storage location to be the internal memory.

Setting the storage location to **USB** will set the current storage location to be the USB Flash drive.

Setting the storage location to **CFLash** will set the current storage location to be the Compact Flash memory.

Note that changing the current location to save files causes the “Copy To Destination” on the front panel to be automatically changed if the selected storage location is the same as the selected current location.

Note that the storage location must be available in order for it to be set.

Front Panel Access:	Shift-7 (File), Directory Management, Current Location
See Also:	:MMEMory:MSIS:DESTination

Copy From Current Location To Destination

:MMEMory:MSIS:COpy

Copies all measurements, setups and jpg files stored in the current storage location to the “copy to destination” location.

Front Panel Access:	Shift-7 (File), Directory Management, Copy From Current Location To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:DESTination

Copy to Destination

:MMEMory:MSIS:DESTination INTernal|USB|CFLash

:MMEMory:MSIS:DESTination?

Sets the destination to where measurements and setups in the current storage location will be copied.

Setting the location to INTernal will result in copying the files that are stored at the current storage location to the internal memory when the command :MMEMory:MSIS:COpy is send.

Setting the location to USB will result in copying the files that are stored at the current storage location to the USB Flash drive when the command :MMEMory:MSIS:COpy is send..

Setting the location to CFLash will result in copying the files that are stored at the current storage location to the Compact Flash memory when the command :MMEMory:MSIS:COpy is send.

Note that changing the destination to which the instrument will copy files, will automatically changed the “Current Location” on the front panel if the current location is the same as the selected copy to destination.

Front Panel Access:	Shift-7 (File), Directory Management, Copy To Destination
See Also:	:MMEMory:MSIS :MMEMory:MSIS:COpy

Save Setup

:MMEMory:STORe:STATe <integer>,<file name>

Stores the current setup into the file specified by <file name>.

<file name> should be enclosed in either single quotes (‘’) or double quotes (‘‘’) and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a value of 0.

Front Panel Access:	Shift-7 (File), Save, Save Setup
See Also:	:MMEMory:LOAD:STATE

Save Measurement

:MMEMory:STORe:TRACe <integer>, <file name>

Stores the trace into the file specified by <file name>.

<file name> should be enclosed in either single quotes (') or double quotes (") and should not contain a file extension.

The <integer> parameter is not currently used, but it must be sent. Send a 0.

Front Panel Access:	Shift-7 (File), Save, Save Measurement
See Also:	:MMEMory:LOAD:TRACE

SENSe Subsystem

The commands in this subsystem relate to device-specific parameters, not signal-oriented parameters.

[:SENSe] :AVERage Subsystem

This subsystem contains commands related to the combination of the data from consecutive sweeps. Use commands in this subsystem to control sweep-to-sweep averaging and max hold functionality.

Restart Averaging

[:SENSe] :AVERage :CLEAr

Clears and restarts averaging of the measurement data. Note that averaging state must be ON for averaging to restart.

Front Panel Access:	Shift-3(Sweep), Averaging, Restart
See Also:	[:SENSe] :AVERage [:STATE]

Number of Traces to Average

[:SENSe] :AVERage :COUNT <integer>

[:SENSe] :AVERage :COUNT ?

Sets the number of traces to average.

Factory Preset / *RST:	10
Range:	2-65535
Front Panel Access:	Shift-3(Sweep), Averaging, Averaging Factor

Averaging State

[:SENSe] :AVERAge [:STATe] OFF | ON | 0 | 1

[:SENSe] :AVERAge [:STATe] ?

Turns trace averaging ON or OFF.

Setting the value to ON or 1 will result in turning trace averaging ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-3(Sweep), Averaging, Averaging

CORRection Subsystem

This subsystem provides commands for losses or gains external to the instrument.

[:SENSe] :CORRection :COLLect Subsystem

This subsystem controls the system calibration.

Calibration Abort

[:SENSe] :CORRection :COLLect :ABORT

Aborts the calibration measurement and restarts the current sweep and/or measurement.

See Also:	[:SENSe] :CORRection :COLLect :INITialize, [:SENSe] :CORRection :COLLect :OPEN, [:SENSe] :CORRection :COLLect :SHORT, [:SENSe] :CORRection :COLLect :THRU, [:SENSe] :CORRection :COLLect :LOAD
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[:SENSe] :CORRection :COLLect :DUT Subsystem

This subsystem provides commands that modify and configure the device-under-test.

DUT Connector Type

[:SENSe] :CORRection :COLLect :DUT :CONNector

NMAle | NFEMale | KMAle | KFEMale | 716Male | 716Female | TNCMale | TNCFemale | SMAMale | SMAFemale | USR1 | USR2

[:SENSe] :CORRection :COLLect :DUT :CONNector?

Sets the DUT Connector type.

The query version of the command returns the following connector type:

Return Value	Actual Name
NMALe	N Male
NFEMale	N Female
KMALe	K Male
KFEMale	K Female
716Male	7/16 Male
716Female	7/16 Female
TNCMale	TNC Male
TNCFemale	TNC Female
SMAMale	SMA or 3.5mm Male
SMAFemale	SMA or 3.55mm Female
USR1	User 1
USR2	User 2

Factory Preset / *RST:	N Male
Front Panel Access:	Shift-2 (Calibrate), DUT Connector

[[:SENSE]:CORRection:COLLect:DUT:USR Subsystem

This subsystem contains commands to configure the user device-under-test.

DUT User 1/ User 2 Capacitance Coefficient value

[[:SENSE]:CORRection:COLLect:DUT:USR[1]|2:C0|1|2|3

[[:SENSE]:CORRection:COLLect:DUT:USR[1]|2:C0|1|2|3?

Sets the DUT capacitance value for the specified coefficient and user.

The query version of the command returns the DUT capacitance coefficient value for the specified user.

Factory Preset / *RST:	0
Range:	-2000 – 2000
Front Panel Access:	Shift-2 (Calibrate), Configure DUT User, Short

DUT User 1/ User 2 Open value

[[:SENSE]:CORRection:COLLect:DUT:USR[1]|2:OPEN

[[:SENSE]:CORRection:COLLect:DUT:USR[1]|2:OPEN?

Sets the DUT open value for the specified user.

The query version of the command returns the DUT open value for the given user.

Factory Preset / *RST:	0
Range:	0 – 1000
Front Panel Access:	Shift-2 (Calibrate), Configure DUT User, Open

DUT User 1/ User 2 Short value

[:SENSe] :CORRection:COLLect:DUT:USR[1] | 2:SHORT

[:SENSe] :CORRection:COLLect:DUT:USR[1] | 2:SHORT?

Sets the DUT short value for the specified user.

The query version of the command returns the DUT short value for the given user.

Factory Preset / *RST:	0
Range:	0 – 1000
Front Panel Access:	Shift-2 (Calibrate), Configure DUT User,Short

Calibration Initialize

[:SENSe] :CORRection:COLLect:INITialize

Initiates the calibration process. This command must be issue before sending Open, Short, Load, or Thru commands.

Use the query command **[:SENSe] :CORRection:COLLect:STATus?** to check if initialization has completed and that the next calibrate step can be proceeded.

See Also:	[:SENSe] :CORRection:COLLect:STATus?, [:SENSe] :CORRection:COLLect:OPEN, [:SENSe] :CORRection:COLLect:SHORT, [:SENSe] :CORRection:COLLect:THRU, [:SENSe] :CORRection:COLLect:LOAD
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Calibration Load

[:SENSe] :CORRection:COLLect:LOAD

Starts the Load calibration measurement. This is the last calibration steps for 1-Port (OSL) and the third calibration steps for 2- Port (OSLT). Note that the Calibration Short process must be completed before calling this command. You must also connect the Load to the RF Out port (or to the end of the test port extension cable) prior to issuing this command.

Use the query command **[:SENSe] :CORRection:COLLect:STATus?** to check if the Load calibration measurement has completed and that the next calibrate step can be proceeded.

See Also:	[:SENSe] :CORRection:COLLect:STATus?, [:SENSe] :CORRection:COLLect:INITialize, [:SENSe] :CORRection:COLLect:OPEN, [:SENSe] :CORRection:COLLect:SHORT, [:SENSe] :CORRection:COLLect:THRU
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Calibrate Power

[:SENSe] :CORRection:COLLect:METhod:POWer LOW|HIGH

[:SENSe] :CORRection:COLLect:METhod:POWer?

Set the calibrate power.

Factory Preset / *RST	High
Front Panel Access:	Shift-2 (Calibrate), Cal Power

Calibrate Type

[:SENSe] :CORRection:COLLect:METhod:TYPe 0|1

[:SENSe] :CORRection:COLLect:METhod:TYPe?

Configures the calibrate type.

If 1 is set then Calibration procedures consist of Open-Short-Load-Thru (OSLT) for 2-port. If 0 is set then Calibration procedures consist of Open-Short-Load (OSL) for 1-port.

The query version of the command returns a 1 if the calibrate type is set to 2-Port and 0 if the calibrate type is set to 1-Port.

Factory Preset / *RST	2-Port
Front Panel Access:	Shift-2 (Calibrate), Cal Type

Calibration Open

[:SENSe] :CORRection:COLLect:OPEN

Starts the Open calibration measurement. This is the first calibration step for both the 1-Port (Open-Short-Load) and 2-Port (Open-Short-Load-Thru) calibration. Note that the initialize step `[:SENS] :CORR:COLL:INIT` must be completed before calling this command. Note that you must connect the Open to the RF Out port (or to the end of the test port extension cable) before issuing this command.

Use the query command `[:SENSe] :CORRection:COLLect:STATus?` to check if the Open calibration measurement has completed and that the next calibrate step can be proceeded.

See Also:	<code>[:SENSe] :CORRection:COLLect:STATus?,</code> <code>[:SENSe] :CORRection:COLLect:INITialize,</code> <code>[:SENSe] :CORRection:COLLect:SHORt,</code> <code>[:SENSe] :CORRection:COLLect:THRU,</code> <code>[:SENSe] :CORRection:COLLect:LOAD</code>
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Calibration Short

[:SENSe] :CORRection:COLLect:SHORT

Starts the Short calibration measurement. This is the second calibration step for both the 1-Port(Open-Short-Load) and 2-Port (Open-Short-Load-Thru) calibration. Note that the Calibration Open process must be completed before calling this command. You must also connect the Short to the RF Out port (or to the end of the test port extension cable) before issuing this command.

Use the query command `[:SENSe] :CORRection:COLLect:STATus?` to check if the Short calibration measurement has completed and that the next calibrate step can be proceeded.

See Also:	<code>[:SENSe] :CORRection:COLLect:STATus?,</code> <code>[:SENSe] :CORRection:COLLect:INITialize,</code> <code>[:SENSe] :CORRection:COLLect:OPEN,</code> <code>[:SENSe] :CORRection:COLLect:LOAD,</code> <code>[:SENSe] :CORRection:COLLect:THRU</code>
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Calibration Status

**[:SENSe] :CORRection:COLLect:STATus? [INITialize|
OPEN|SHORT|LOAD|THRU]**

This command requests information about the current calibration step or the specified calibration step.

If no calibration step is specified, it returns a 1 if the current calibration step has completed, otherwise it returns a 0.

If INITialized is specified, the command returns a 1 if the Initialize step has completed and returns a 0 if it has not been completed.

If OPEN is specified, the command returns a 1 if the Open step has completed and returns a 0 if it has not been completed.

If SHORT is specified, the command returns a 1 if the Short step has completed and returns a 0 if it has not been completed.

If LOAD is specified, the command returns a 1 if the Load step has completed and returns a 0 if it has not been completed.

If THRU is specified, the command returns a 1 if the Thru step has completed and returns a 0 if it has not been completed.

See Also:	<code>[:SENSe] :CORRection:COLLect:INITialize,</code> <code>[:SENSe] :CORRection:COLLect:OPEN,</code> <code>[:SENSe] :CORRection:COLLect:SHORT,</code> <code>[:SENSe] :CORRection:COLLect:THRU,</code> <code>[:SENSe] :CORRection:COLLect:LOAD</code>
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Calibration Thru

[:SENSe] :CORRection:COLLect:THRU

Starts the Thru Calibration measurement. This is the last calibration step for the 2-Port calibration type. Note that the Calibration Load process must be completed before calling this command. You must also connect the RF Out port to the RF In port, include any test port extension cables used in the Calibration Load step before issuing this command.

See Also:	[:SENSe] :CORRection:COLLect:INITialize, [:SENSe] :CORRection:COLLect:OPEN, [:SENSe] :CORRection:COLLect:SHORT, [:SENSe] :CORRection:COLLect:LOAD
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Smith Chart Reference Impedance

**[:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] :SMCHart
50 | 75**

[:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] :SMCHart?

Sets the Smith Chart reference impedance. The query form of the command returns the current smith chart reference impedance in Ohms.

Factory Preset / *RST:	50
Range:	50, 75
Front Panel Access:	Scale, Reference Impedance

Reference Plane Extension

[SENSe:]CORRection:REFPlane <length>

[SENSe:]CORRection:REFPlane?

Sets the reference plane extension length. The query form of the command returns the current reference plane extension in m.

Factory Preset / *RST:	0mm
Range:	0mm – 100m
Default Unit:	m
Front Panel Access:	Shift-4 (Measurement), Ref Plane
See Also:	[SENSe:]CORRection:REFPlane:AUTO

Automatic Reference Plane Extension

[SENSe:]CORRection:REFPlane:AUTO

Automatically adjusts reference plane extension.

Note: When using dual overlay, the auto reference plane extension will be based on the S21 data.

Front Panel Access:	Shift-4 (Measurement), Auto Reference Plane Extension
See Also:	[SENSe:]CORRection:REFPlane

[[:SENSe]:]FREQuency Subsystem

Commands in this subsystem pertain to the frequency settings of the instrument.

Cable Selection

[[:SENSe]:]FREQuency:CABLe <index>

Sets the cable selection to the <index> in the cable list for the DTF measurement.

Note that the command is available only if the instrument is in VNA mode.

Front Panel Access:	Freq/Dist, Cable
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Center Frequency

[[:SENSe]:]FREQuency:CENTer <freq>

[[:SENSe]:]FREQuency:CENTer?

Sets the center frequency.

Note that changing the value of the center frequency will change the value of the coupled parameters Start Frequency and Stop Frequency. It may also change the value of the span.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	3.001 GHz
Range:	2 mHz – 6 GHz
Default Unit:	Hz
Front Panel Access:	Freq/Dist, Center Freq

Channel Selection

[:SENSe] :FREQuency:CHANnel <number>

[:SENSe] :FREQuency:CHANnel?

Sets the channel number.

Note that the set command is available only if the instrument is in VNA mode.

Front Panel Access:	Freq/Dist, Channel
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Signal Standard

[:SENSe] :FREQuency:SIGStandard <index>

Sets the signal standard selection to the <index> in the signal standard list.

Note that the command is available only if the instrument is in VNA mode.

Front Panel Access:	Freq/Dist, Signal Standard
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Frequency Span

[:SENSe] :FREQuency:SPAN <freq>

[:SENSe] :FREQuency:SPAN?

Sets the frequency span. Setting the value of <freq> to 0 Hz is the equivalent of setting the span mode to zero span.

Note that changing the value of the frequency span will change the value of the coupled parameters Start Frequency and Stop Frequency and may change the Center Frequency.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	VNA: 5.998 GHz
Range:	VNA: 0 Hz – 6 GHz
Default Unit:	Hz
Front Panel Access:	Freq/Dist, Span

Start Frequency

[:SENSe] :FREQuency:START <freq>

[:SENSe] :FREQuency:START?

Sets the start frequency.

Note that in the spectrum analyzer, changing the value of the start frequency will change the value of the coupled parameters, Center Frequency and Span.

Note that changing the value of the start frequency may affect the DTF distance range.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	VNA, MS2012A: 2 MHz VNA, MS2024A: 2 MHz VNA, MS2026A: 2 MHz VNA, MS2034A: 2 MHz VNA, MS2036A: 2 MHz
Range:	VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A: 2 MHz – 6.0 GHz VNA, MS2034A: 2 MHz – 4.0 GHz VNA, MS2036A: 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Start Freq

Stop Frequency

[:SENSe] :FREQuency:STOP <freq>

[:SENSe] :FREQuency:STOP?

Sets the stop frequency.

Note that changing the value of the start frequency may affect the DTF distance range.

Note that the set command is available only if the instrument is in VNA mode.

Factory Preset / *RST:	VNA, MS2012A: 2.5 GHz VNA, MS2024A: 4.0 GHz VNA, MS2026A: 6.0 GHz VNA, MS2034A: 4.0 GHz VNA, MS2036A: 6.0 GHz
Range:	VNA, MS2012A: 2 MHz – 2.5 GHz VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A: 2 MHz – 6.0 GHz VNA, MS2034A: 2 MHz – 4.0 GHz VNA, MS2036A: 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Freq, Stop Freq

[:SENSe]:SWEep Subsystem

This subsystem includes commands that affect the sweep generator of the instrument.

Sweep Resolution

[:SENSe]:SWEep:RESolution LOW|MEDIum|HIGH

[:SENSe]:SWEep:RESolution?

Sets the resolution of the sweep. Set value to LOW for 137 data points, MEDIum for 275 data points, and HIGH for 551 data points.

The query version of this commands return 137 for low sweep resolution, 275 for medium sweep resolution, and 551 for high sweep resolution.

Note that a sweep with low resolution will complete in less time than a sweep with high resolution but will not contain as many data points.

Factory Preset / *RST:	HIGH
Front Panel Access:	Shift-3 (Sweep), Data Points

RF Immunity

[:SENSe]:SWEep:RFIMmunity 0|1

[:SENSe]:SWEep:RFIMmunity?

Sets RF Immunity. Set value to 1 for Normal RF Immunity and 0 for High RF Immunity.

Note that a sweep with RF immunity enabled will be slightly slower than a sweep with RF immunity disabled.

Factory Preset / *RST:	Normal
Front Panel Access:	Shift-3 (Sweep), RF Immunity

SOURce Subsystem

The commands in this subsystem controls the internal signal source.

Power Levels

SOURce:POWer LOW|HIGH

SOURce:POWer?

Sets the power levels for the 2-port measurements.

Factory Preset / *RST:	HIGH
Range:	HIGH: 0 dBm LOW: -35 dBm
Front Panel Access:	Shift-3(Sweep), Power

STATus Subsystem

The commands in this subsystem relate to the current operating state of the instrument.

Query Operation Status

:STATus:OPERation?

This command requests information about the current status of the instrument. Each bit of the return value represents some operation. Only a subset of the bits will be implemented for each application.

The number returned will be the decimal representation of the bit-wise OR of the enabled bits.

Bit	Decimal Value	Description
0	1	Not implemented
1	2	Not implemented
2	4	Not implemented
3	8	Not implemented
4	16	Not implemented
5	32	Not implemented
6	64	Not implemented
7	128	Not implemented
8	256	Sweep Complete – This bit will be set to 0 when the command <code>:INITiate[:IMMediate]</code> is sent to trigger a sweep. It will have a value of 1 when the sweep has completed.
9	512	Not implemented
10	1024	Not implemented
11	2048	Not implemented
12	4096	Not implemented
13	8192	Not implemented
14	16384	Not implemented
15	0	Will always be 0

SYSTEM Subsystem

This subsystem contains commands that affect instrument functionality that does not directly relate to data collection, display or transfer.

SYSTEM:FILE Subsystem

This subsystem provides commands that modify how file lists should be displayed on the instrument. They do not modify the way in which data is returned to the controller.

File Lists Sort Method

:SYSTem:FILE:SORT:METHOD NAME | TYPE | DATE

:SYSTem:FILE:SORT:METHOD?

Sets the file lists sort method.

Setting the sort method to NAME will result in file lists sorted by the name of the file.

Setting the sort method to TYPE will result in the file lists sorted by the type of file.

Setting the sort method to DATE will result in the file lists sorted by the date that the file was saved.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Method
See Also:	:SYSTem:FILE:SORT:ORDER

File Lists Sort Order

:SYSTem:FILE:SORT:ORDER ASCend | DESCend

:SYSTem:FILE:SORT:ORDER?

Sets the file lists sort order.

Setting the sort order to ASCend will result in file lists sorted from lowest to highest.

Setting the sort order to DESCend will result in the file lists sorted from highest to lowest.

When sorting by name, the sort will place file names that start with numbers before file names that start with letters.

Front Panel Access:	Shift-7 (File), Directory Management, Sort Order
See Also:	:SYSTem:FILE:SORT:METHOD

Query Installed Options

:SYSTem:OPTions?

Returns a string of the installed options. Options will be separated by a “/”.

The string will return “NONE” if no options are installed.

See Also:	*IDN?
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Preset

:SYSTem:PRESet

This command restores all application parameters to their factory preset values. This does not modify system parameters such as Ethernet configuration, language, volume or brightness.

Front Panel Access:	Shift-1 (Preset), Preset
See Also:	*RST

Trace Subsystem

This subsystem contains commands related to the transfer of trace data to and from the instrument.

Trace Data Query

:TRACe[:DATA]? [1]

Transfers the current active trace data from the instrument to the controller.

The format of the block data that is returned can be specified by the command `:FORMat:DATA`. The block data in the command form is always sent in ASCII format.

The response begins with an ASCII header that specifies the number of data bytes. It looks like `#AX`, where `A` is the number of digits in `X` and `X` is the number of bytes that follow the header. Each data point is separated by a comma delimiter. Except for the group delay, each data point consists of real and imaginary pair scaled by 10^6 . Thus for a 551 point trace there will be a total of 1102 points.

Trace setup information can be acquired using `:TRACe[:DATA]:PREamble?`.

By default this command will return a 551 data points regardless of the data point setting. At 275 data points the values returned are paired and at 137 data points the values are in fours. To get the same number of data points as the data points setting, use the command `:FORMat[:READings][:DATA]:DPoints` to set whether the data returned should be based on the data points setting.

When in dual overlay mode, a second set of data is returned when no parameter is passed in with the query. The response will begin with an ASCII header that is exactly like the one described above. The header will have the format `#AX` where `A` is the number of digits in `X` and `X` is the number of bytes that follow the header. When there are two sets of data, a second ASCII header will trail the first header. The second header will have the format `$AX` where `A` is the number of digits in `X` and `X` is the number of bytes in the first set of data. The starting point of the second set of data can be found by subtracting the total byte size of the first set of data from the byte size located in the first header. For example, if the first header is `#540000` and the second header is `$41000`, the beginning of the second set of data will be `40000(size of total packet size)-1000(size of first data set)`. Alternatively, the two headers can be skipped and after 551 points are read from the first set, the second set will begin.

See Also:

<pre>:FORMat[:READings][:DATA] :FORMat[:READings][:DATA]:DPoints :TRACe[:DATA]:PREamble?</pre>
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Trace Header Transfer

:TRACe:PREamble? [1]

Returns trace header information for the trace.

Use the commands in the MMEMory subsystem to store and recall traces from the instrument memory.

The response begins with an ASCII header. The header specifies the number of following bytes. It looks like #AX, where A is the number of digits in X and X is the number of bytes that follow the header.

Parameters are returned in comma-delimited ASCII format. Each parameter will be returned as “NAME=VALUE[UNITS],”

Note that currently only Trace A header is retrieved.

Valid parameter names are:

Parameter Name	Description
SN	Instrument serial #
UNIT_NAME	Instrument name
TYPE	The data type (Setup or Data).
DESCR	Trace name
DATE	Trace date/time
BASE_VER	Base FW version
APP_NAME	Application name
APP_VER	Application FW version
APP_MODE	Application Mode
CHECKSUM	Checksum

Parameter Name	Description
DIST_UNITS	Distance units
AMPL_UNITS	y-axis value units
MEASUREMENT	Measurement
1PORT_DOMAIN	1-Port Domain
FREQ_MS2012A	MS2012A Frequency
FREQ_MS2024A	MS2024A Frequency
FREQ_MS2026A	MS2026A Frequency
FREQ_TOKYO_GAS	Tokyo Gas Frequency
FREQ_START	Start Frequency
FREQ_STOP	Stop Frequency
DIST_START	Start distance
DIST_STOP	Stop distance

CAL_STATUS	Calibrate Status (On/Off)
SWEEP_TIME	Sweep time
SWEEP_TYPE	Sweep type (Single/Continuous)
FREQ_STEP	Frequency step size
MARKER_SELECTED	The selected marker
MARKER_TABLE	Marker table status(On/Off)
TRACE_VIEW	Trace View (View/Blank)
TRACE_STATE	Trace State (Write/Hold)
WINDOWING	Windowing Type (Rectangular/Nominal Side Lobe/Low Side Lobe/Minimum Side Lobe)
CABLE	Cable index from the cable list
PROP_VEL	Propagation velocity
CABLE_LOSS	Cable Loss
BIAS_TEE_STATE	Bias tee state (On/Off)
BIAS_TEE_VOLTAGE_SELECTION	Bias tee voltage selection (12V,15V,18V,21V,24V)
BIAS_TEE_VOLTAGE	Bias tee voltage
BIAS_TEE_CURRENT_SELECTION	Bias tee current selection (Low/High)
BIAS_TEE_CURRENT	Bias tee current
CW_STATUS	RF Immunity (On/Off)
OUTPUT_POWER_LEVEL	Power Level (High/Low)
IL_SENSITIVITY	Auto/Normal/High
CURRENT_SIGNAL_STD	Current signal standard
FULL_SCREEN	Full Screen
RESOLUTION	Sweep Resolution (137/275/551)
1PORT_DISP_FORMAT	1 Port Display Format
2PORT_DISP_FORMAT	2 Port Display Format
UI_DATA_POINTS	Number of display points (137/275/551)
REFERENCE_LEVEL	Reference level
SCALE	Y-axis scale
RF_SOURCE_POWER_LEVEL	Source Power Level
PM_RELATIVE	PM Relative

PM_OFFSET	PM Offset
CAL_TEMP_WINDOW	Cal Temp window
PM_UPPER_THRESHOLD_STATE	PM upper threshold state
PM_LOWER_THRESHOLD_STATE	PM lower threshold state
PM_UPPER_THRESHOLD	PM upper threshold
PM_LOWER_THRESHOLD	PM lower threshold
CENTER_FREQ	Center Frequency
SPAN	Span Frequency
CAL_COEFFICIENT_PTR	Calibrate coefficient
SMITH_CHART_TYPE	Smith chart type
DISPLAY_CHANNELS	Display Channels
ACTIVE_DISPLAY_CHANNEL	The current active display channel
NUM_OF_CHANNELS	Channel number
SEND_CAL_PROMPTS	Send Cal prompts
SET_SWEEP_DATA_TYPE	Set sweep data type
TUNE_MODE	Tune mode
AVERAGING	Averaging
SMITH_PHASE_SELECTION	Smith phase selection
10_MHZ_TCXO_DAC	10 MHZ TCXO DAC
PM_DBMUNITS	PM dBm units
PM_ZERO	PM Zero
PM_DBUNITS	PM dB units
PM_DATA	PM data
PM_STATUS	PM Status
DISP_CHANNELS	Display channels
ACTIVE_DISP_CHANNEL	Active display channel
DMAX	Dmax
FAULT_RESOLUTION	Fault Resolution
SUGGESTED_SPAN	Suggested span
START_FREQ_STATUS	Start frequency status
PM_ZERO_DATA	PM zero data

PM_REL_DATA	PM rel data
FIELD_MENU	VNA/Field
UI_DATA_POINTS	Number of display points
SET_SWEEP_TIME	Minimum sweep time setting
AVERAGING_FACTOR	Averaging Factor.
AVERAGE_COUNT	Averaging count.

Parameter Name	Description
SCALE_RESOLUTION_RL	S11 Log Magnitude scale resolution
REFERENCE_VALUE_RL	S11 Log Magnitude reference value
REFERENCE_LINE_RL	S11 Log Magnitude reference line
SCALE_RESOLUTION_RL_DIST	S11 Log Magnitude Fault Location scale resolution
REFERENCE_VALUE_RL_DIST	S11 Log Magnitude Fault Location reference value
REFERENCE_LINE_RL_DIST	S11 Log Magnitude Fault Location reference line
SCALE_RESOLUTION_SWR	S11 VSWR scale resolution
REFERENCE_VALUE_SWR	S11 VSWR reference value
REFERENCE_LINE_SWR	S11 VSWR reference line
SCALE_RESOLUTION_SWR_DIST	S11 VSWR Fault Location scale resolution
REFERENCE_VALUE_SWR_DIST	S11 VSWR Fault Location reference value
REFERENCE_LINE_SWR_DIST	S11 VSWR Fault Location reference line
SCALE_RESOLUTION_CL	Cable loss Scale resolution
REFERENCE_VALUE_CL	Cable loss reference value
REFERENCE_LINE_CL	Cable loss reference line
SCALE_RESOLUTION_IL	IL scale resolution
REFERENCE_VALUE_IL	IL reference value
REFERENCE_LINE_IL	IL reference line
SCALE_RESOLUTION_IG	S21 Log Magnitude scale resolution
REFERENCE_VALUE_IG	S21 Log Magnitude reference value

REFERENCE_LINE_IG	S21 Log Magnitude reference line
SCALE_RESOLUTION_PHASE_S11	S11 Phase scale resolution
REFERENCE_VALUE_PHASE_S11	S11 Phase reference value
REFERENCE_LINE_PHASE_S11	S11 Phase reference line
SCALE_RESOLUTION_PHASE_IL	S21 Phase scale resolution
REFERENCE_VALUE_PHASE_IL	S21 Phase reference value
REFERENCE_LINE_PHASE_IL	S21 Phase reference line
SCALE_RESOLUTION_PHASE_IG	Scale Resolution Phase IG
REFERENCE_VALUE_PHASE_IG	Reference value phase IG
REFERENCE_LINE_PHASE_IG	Reference line phase IG
RL_DIST_TOP	DTF Return Loss Top Value
RL_DIST_BOTTOM	DTF Return Loss Bottom Value
SWR_DIST_TOP	DTF VSWR Top Value
SWR_DIST_BOTTOM	DTF VSWR Bottom Value
RL_MAG_TOP	Return Loss Top Value
RL_MAG_BOTTOM	Return Loss Bottom Value
SWR_MAG_TOP	VSWR Top Value
SWR_MAG_BOTTOM	VSWR Bottom Value
CL_MAG_TOP	Cable Loss Top Value
CL_MAG_BOTTOM	Cable Loss Bottom Value
IL_MAG_TOP	IL Magnitude Top
IL_MAG_BOTTOM	IL Magnitude Bottom
IG_MAG_TOP	2-Port Gain Top Value
IG_MAG_BOTTOM	2-Port Gain Bottom Value
S11_PHASE_TOP	1-Port Phase Top Value
S11_PHASE_BOTTOM	1-Port Phase Bottom Value
IL_PHASE_TOP	IL Phase Top Value
IL_PHASE_BOTTOM	IL Phase Bottom Value
IG_PHASE_TOP	2-Port Phase Top Value
IG_PHASE_BOTTOM	2-Port Phase Bottom Value
GD_S11_MAG_TOP	S11 Group Delay Top

GD_S11_MAG_BOTTOM	S11 Group Delay Bottom
GD_S21_MAG_TOP	S21 Group Delay Top
GD_S21_MAG_BOTTOM	S21 Group Delay Bottom
SCALE_RESOLUTION_GD_S11	S11 Group Delay scale resolution
REFERENCE_VALUE_GD_S11	S11 Group Delay reference value
REFERENCE_LINE_GD_S11	S11 Group Delay reference line
SCALE_RESOLUTION_GD_S21	S21 Group Delay scale resolution
REFERENCE_VALUE_GD_S21	S21 Group Delay reference value
REFERENCE_LINE_GD_S21	S21 Group Delay reference line

Parameter Name	Description
CONNECTOR_TYPE	DUT Connector type
USER_CONNECTOR_x_OPEN	DUT connector open for x user (where x is the user number 1 or 2).
USER_CONNECTOR_x_SHORT	DUT connector short for x user (where x is the user number 1 or 2).
USER_CONNECTOR_x_Cy	DUT connector for x user of capacitance coefficient y. Where x is the user number (1-2) and y is the coefficient number (0-3).

Parameter Name	Description
VVM_MODE	Vector Volt Meter mode (Table or CW).
VVM_CW_FREQ	Vector Volt Meter CW frequency.
VVM_MEAS_TYPE	Vector Volt Meter measurement type (Return or Insertion).
VVM_RETURN_MEAS_FORMAT	Vector Volt Meter return measurement format (dB/VSWR/Impedance).
VVM_CABLE	Vector Volt Meter selected cable.
VVM_RF_OFF	Vector Volt Meter RF on/off.
VVM_RETURN_REF_AMP	Vector Volt Meter Return Ref Amp.
VVM_RETURN_REF_PHASE	Vector Volt Meter Return Ref. phase.
VVM_RETURN_REF_VSWR	Vector Volt Meter Return Ref VSWR.
VVM_RETURN_REF_REAL	Vector Volt Meter Return Ref Real.

VVM_RETURN_REF_IMAG	Vector Volt Meter Return Ref Imag.
VVM_INSERTION_REF_AMP	Vector Volt Meter Insertion Ref Amp.
VVM_INSERTION_REF_PHASE	Vector Volt Meter Insertion Ref Phase.
VVM_AMP_x	Vector Volt Meter amplitude x (where x is the cable number 1 to 5).
VVM_DELTA_AMP_x	Vector Volt Meter delta amplitude x (where x is the cable number 1 to 5).
VVM_PHASE_x	Vector Volt Meter phase x (where x is the cable number 1 to 5).
VVM_DELTA_PHASE_x	Vector Volt Meter delta phase x (where x is the cable number 1 to 5).
VVM_CW_AMP	Vector Volt Meter CW amplitude.
VVM_CW_PHASE	Vector Volt Meter delta phase.
VVM_CW_VSWR	Vector Volt Meter CW VSWR.
VVM_CW_REAL	Vector Volt Meter delta Real.
VVM_CW_IMAG	Vector Volt Meter delta Imag
SAVED_FREQ_START	Saved Start Frequency.
SAVED_FREQ_STOP	Saved Stop Frequency.
VVM_SAVED_REAL	Saved Real.
VVM_SAVED_IMAG	Saved Imag.
VVM_SAVE_REFERENCE	Saved reference.

Parameter Name	Description
MKR_REF_FREQx	Reference marker x frequency (where x is the marker number 0-5)
MKR_REF_FLAGSx	Reference marker x flags: MKR_FLAG_ON_OFF 0x00000001 MKR_FLAG_NOISE 0x00000002 MKR_FLAG_PHASE_NOISE 0x00000004 MKR_FLAG_AMP_TRACK 0x00000008 MKR_FLAG_DELTA_MKR

	0x00000020 MKR_FLAG_DATA_INVALID 0x00000040 MKR_FLAG_DATA_STALE 0x00000080 MKR_FLAG_SELECTED 0x00000100 MKR_FLAG_COUNTER 0x00000200 MKR_FLAG_DELT_DISPL_PER_HZ 0x00000800 MKR_FLAG_TRACE_A 0x00001000 MKR_FLAG_TRACE_B 0x00002000 MKR_FLAG_TRACE_C 0x00004000 MKR_FLAG_TRACE_MASK 0x00007000
MKR_DLT_FREQNx	Delta marker x frequency (where x is the marker number 0-5)
MKR_DLT_FLAGSx	Delta marker x flags:

Parameter Name	Description
LIM_LFLAGS_UP-1	Upper limit flags: LIMIT_FLAG_UPPER 0x00000001 LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002 LIMIT_FLAG_SEGMENTED 0x00000020 LIMIT_FLAG_ALARM_EVENT 0x00000040 LIMIT_FLAG_LEFT_OF_START_FREQ 0x00000080

	LIMIT_FLAG_RIGHT_OF_STOP_FREQ 0x00000100 LIMIT_FLAG_MASK 0x000007FF
LIM_NUMPTS_UP-1	Number of upper limit points
LIM_CURFRQ_UP-1	Upper limit current frequency
LIM_CURMAG_UP-1	Upper limit current magnitude
LIM_PFLAGS_UPx	Upper limit x flags (where x is the limit point number starting with 0)
LIM_FREQNC_UPx	Upper limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_UPx	Upper limit point x-parameter (where x is the limit point number starting with 0)
LIM_LFLAGS_LO-1	Lower limit flags: LIMIT_FLAG_UPPER 0x00000001 LIMIT_FLAG_ON 0x00000004 LIMIT_FLAG_ALARM_ON 0x00000002 LIMIT_FLAG_SEGMENTED 0x00000020 LIMIT_FLAG_ALARM_EVENT 0x00000040 LIMIT_FLAG_LEFT_OF_START_FREQ 0x00000080 LIMIT_FLAG_RIGHT_OF_STOP_FREQ 0x00000100 LIMIT_FLAG_MASK 0x000007FF
LIM_NUMPTS_LO-1	Number of lower limit points
LIM_CURFRQ_LO-1	Lower limit current frequency
LIM_CURMAG_LO-1	Lower limit current magnitude
LIM_PFLAGS_LOx	Lower limit x flags (where x is the limit point number starting with 0)
LIM_FREQNC_LOx	Lower limit point x freq (where x is the limit point number starting with 0)
LIM_MAGNTD_LOx	Lower limit point x (where x is the limit point number starting with 0)
See Also:	:TRACe:DATA

4 Measurement Commands

The measurement commands provide a high-level set of commands to access instrument specific measurements.

4.1 GPS System

FETCh Commands

This set of commands returns the most recent measured data.

Fetch GPS Fix Data

:FETCh:GPS?

Returns the most recent GPS fix information from the optional GPS receiver.

The results are returned as a set of comma-delimited values in this format: <fix status>, <date/time>, <latitude>, <longitude>. The <fix status> field will be either “GOOD FIX” or “NO FIX” depending on whether or not the GPS receiver is currently calculating position data. If “NO FIX” is the value of the <fix status> field then no data follows.

Both <latitude> and <longitude> fields are expressed in radians. A negative latitude corresponds to a “south” reading. A negative longitude value corresponds to a “west” reading.

Default Units:	Radians
Required Options:	Option 31

4.2 Spectrum Analyzer

This section contains the Spectrum Analyzer remote measurement commands. The Spectrum Analyzer measurement commands are only available for the MS2034A/MS2036A VNA Master.

CONFigure Commands

This set of commands prepares the instrument for the selected measurement. It disables any currently-enabled measurements and activates the specified measurement. It sets the instrument to single sweep mode, waiting for an :INITiate command. It will not initiate the taking of a measurement.

Current instrument settings may be changed to default values. These changes will be identified with their respective measurement commands.

The CONFigure? query returns the name of the current measurement.

Configure Adjacent Channel Power Ratio

:CONFigure:ACPower

Configures the default adjacent channel power ratio measurement.

Disables any other active one-button measurements, including channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the main channel bandwidth equal to the span.

Sets the adjacent channel bandwidth and channel spacing equal to the main channel bandwidth.

Sets the detection method to RMS.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:ACPower commands before initiating a sweep.

See Also:	<pre>[:SENSe]:ACPower:STATE [:SENSe]:ACPower:BANDwidth BWIDth:MAIN [:SENSe]:ACPower:BANDwidth BWIDth:ADJacent [:SENSe]:ACPower:BANDwidth BWIDth:SPACing</pre>
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Configure Channel Power

:CONFigure:CHPower

Configures the default channel power measurement.

Disables any other active one-button measurements, including ACPR, occupied bandwidth, AM/FM demodulation and C/I.

Sets the integration bandwidth equal to the span.

Sets the detection method to RMS.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:CHPower commands before initiating a sweep.

See Also:	<pre>:SENSe:CHPower:STATE :SENSe:CHPower:BANDwidth BWIDth:INTEgration</pre>
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Configure Field Strength

:CONFigure:FSTrength

Configures the default field strength measurement.

Disables any other active one-button measurements, including channel power, adjacent channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the antenna to the first antenna in the instrument's antenna list.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:FSTrength commands before initiating a sweep.

See Also:	[:SENSe]:FSTrength:ANTenna
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Configure Occupied Bandwidth

:CONFigure:OBWidth

Configures the default occupied bandwidth measurement.

Disables any other active one-button measurements, including channel power, ACPR, AM/FM demodulation and C/I.

Sets the method to %.

Sets the % of power to 99%.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:OBWidth commands before initiating a sweep.

See Also:	[:SENSe]:OBWidth:STATE [:SENSe]:OBWidth:METHod [:SENSe]:OBWidth:PERCent [:SENSe]:OBWidth:XDB
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Configure Tracking Generator Measurement

:CONFigure:TGENerator ABSStats|RELStats

This command configures the selected tracking generator statistic measurement. It disables any other active one-button measurements, including channel power, occupied bandwidth, AM/FM demodulation and C/I.

Sets the tracking generator measurement state to ON.

Sets the instrument to single sweep mode (:INITiate:CONTinuous OFF).

Measurement settings can be modified by using the [:SENSe]:TGENerator commands before initiating a sweep.

When the ABSStats option is selected, the measurement results are equivalent to the results that are displayed by choosing Shift-4(Measure), then Tracking Generator, then Abs Max, Min, Avg from the front panel.

When the RELStats option is selected, the Normalize state is set to ON and the measurement results are equivalent to the results that are displayed by choosing Shift-4(Measure), then Tracking Generator, then S21 Insertion Loss, then S21 Max, Min, Avg from the front panel.

Required Options:	20
See Also:	TGENERator:OUTput:POWer [SENSe:]TGENERator:S21[:SCALE]:RLEVel [SENSe:]TGENERator:S21[:SCALE]:RLEVel:OFFSet [SENSe:]TGENERator:S21[:SCALE]:PDIVision

FETCh Commands

This set of commands returns the most recent measurement data of the active measurement. They will not switch to another measurement.

To get new measurement data, use the READ command.

Fetch Adjacent Channel Power Ratio

:FETCh:ACPower?

Returns the most recent adjacent channel power ratio measurement results.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a *RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

Default Units:	Current amplitude units
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Fetch Channel Power/Density

:FETCh:CHPower?

Returns the most recent channel power measurement results: channel power and channel power density.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a *RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 2 comma-separated values: channel power, channel power density.

Default Units:	Current amplitude units
See Also:	:FETCh:CHPower:CHPower? :FETCh:CHPower:DENSity?

Fetch Channel Power

:FETCh:CHPower:CHPower?

Returns the most recent channel power measurement result. It returns only the channel power, not the channel power density. Use :FETCh:CHPower? to get both channel power and channel power density.

Default Units:	Current amplitude units
See Also:	:FETCh:CHPower? :FETCh:CHPower:DENSity?

Fetch Channel Power Density

:FETCh:CHPower:DENSity?

Returns the most recent channel power density measurement result. It returns only the channel power density, not the channel power. Use :FETCh:CHPower? to get both channel power and channel power density.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a *RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Default Units:	Current amplitude units
See Also:	:FETCh:CHPower? :FETCh:CHPower:CHPower?

Fetch Occupied Bandwidth

:FETCh:OBWidth?

Returns the most recent occupied bandwidth measurement results: occupied bandwidth, percent of power and dB down.

One of either percent of power or dB down will be measured and the other will be set. That will be determined by the value set using [:SENSe]:OBWidth:METhod.

If the instrument is sweeping, it will not return until the sweep is complete. If the instrument is not sweeping and the current data is not valid it will return error -230. This could occur if there was a *RST immediately before the :FETCh? or if a measurement parameter was changed without an :INITiate.

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
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Fetch Occupied Bandwidth Frequency

:FETCh:OBWidth:FREQuency?

Returns the most recent occupied bandwidth lower frequency and upper frequency.

Data is returned as 2 comma-separated values: lower frequency and upper frequency in Hz

Default Units:	Hz
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MEASure Commands

These command take the instrument from its current state, enable the specified measurement and put the instrument into single sweep mode. They correct any parameters that are invalid given the new measurement state such that a valid measurement can take place. Other settings may be changed; see the documentation of CONFigure for each measurement. They then initiate the measurement. When the measurement is complete, they return the result.

To make a measurement with settings other than the “default” measurement settings applied by CONFigure, do the following:

- Send the appropriate CONFigure command to set the desired measurement.
- Modify the settings as required.
- Send the appropriate READ command to measure and return the result.

To get the current measurement data, use the appropriate FETCh command.

Measure Adjacent Channel Power Ratio

:MEASure:ACPower?

Sets the active measurement to adjacent channel power ratio, sets the default measurement parameters, triggers a new measurement and returns the main channel power lower adjacent and upper adjacent channel power results.

It is a combination of the commands `:CONFigure:ACPower;` `:READ:ACPower?`

For a description of the default adjacent channel power ratio measurement parameters see `:CONFigure:ACPower`.

To make an adjacent channel power ratio measurement with settings other than the default values send

- `:CONFigure:ACPower`
- Commands to set desired settings
- `:READ:ACPower?`

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

Default Units:	Current amplitude units
See Also:	<code>:CONFigure:ACPower</code>

Measure Channel Power/Density

:MEASure:CHPower?

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power and channel power density results.

It is a combination of the commands `:CONFigure:CHPower;` `:READ:CHPower?`

For a description of the default channel power measurement parameters see `:CONFigure:CHPower`.

To make a channel power measurement with settings other than the default values send

- `:CONFigure:CHPower`
- Commands to set desired settings
- `:READ:CHPower?`

Data is returned as 2 comma-separated values: channel power, channel power density.

Default Units:	Current amplitude units
See Also:	<code>:MEASure:CHPower:CHPower?</code> <code>:MEASure:CHPower:DENSity?</code> <code>:CONFigure:CHPower</code>

Measure Channel Power

:MEASure:CHPower:CHPower?

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power result. To measure both channel power and channel power density use :MEASure:CHPower?

It is a combination of the commands

:CONFigure:CHPower; :READ:CHPower:CHPower?

For a description of the default channel power measurement parameters see

:CONFigure:CHPower.

To make a channel power measurement with settings other than the default values send

- :CONFigure:CHPower
- Commands to set desired settings
- :READ:CHPower:CHPower?

Default Units:	Current amplitude units
See Also:	:MEASure:CHPower? :MEASure:CHPower:DENSity? :CONFigure:CHPower

Measure Channel Power Density

:MEASure:CHPower:DENSity?

Sets the active measurement to channel power, sets the default measurement parameters, triggers a new measurement and returns the channel power density result. To measure both channel power and channel power density use :MEASure:CHPower?

It is a combination of the commands

:CONFigure:CHPower; :READ:CHPower:DENSity?

For a description of the default channel power measurement parameters see

:CONFigure:CHPower.

To make a channel power measurement with settings other than the default values send

- :CONFigure:CHPower
- Commands to set desired settings
- :READ:CHPower:DENSity?

Default Units:	Current amplitude units
See Also:	:MEASure:CHPower? :MEASure:CHPower:CHPower? :CONFigure:CHPower

Measure Occupied Bandwidth

:MEASure:OBWidth?

Sets the active measurement to occupied bandwidth, sets the default measurement parameters, triggers a new measurement and returns the occupied bandwidth, percent of power and dB down results.

It is a combination of the commands `:CONFigure:OBWidth;` `:READ:OBWidth?`

For a description of the default occupied bandwidth measurement parameters see `:CONFigure:OBWidth`.

To make an occupied bandwidth measurement with settings other than the default values send

- `:CONFigure:OBWidth`
- Commands to set desired settings
- `:READ:OBWidth?`

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
See Also:	<code>:CONFigure:OBWidth</code>

READ Commands

This set of commands combines the ABORt, INITiate and FETCh commands. It aborts any current triggering sequence and sets the trigger state to idle. It then initiates a new active measurement (i.e. begins the collection of new data). When the measurement is complete, it returns the result. These commands will not switch to another measurement.

To get the current measurement data, use the FETCh command.

Read Adjacent Channel Power Ratio

:READ:ACPower?

Triggers a new adjacent channel power ratio measurement and returns the results: main channel power, lower adjacent and upper adjacent channel power. It is a combination of the commands :ABORt; :INITiate; :FETCh:ACPower?

The channel power measurement must be the active measurement (specified by :CONFigure:ACPower). The current measurement can be queried using :CONFigure?

Data is returned as 3 comma-separated values: main channel power, lower adjacent channel power, upper adjacent channel power.

See Also:	:READ:ACPower? :CONFigure
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Read Channel Power/Density

:READ:CHPower?

Triggers a new channel power measurement and returns the results: channel power and channel power density. It is a combination of the commands :ABORt; :INITiate; :FETCh:CHPower?

The channel power measurement must be the active measurement (specified by :CONFigure:CHPower). The current measurement can be queried using :CONFigure?

Data is returned as 2 comma-separated values: channel power, channel power density.

See Also:	:READ:CHPower:CHPower? :READ:CHPower:DENSity? :CONFigure
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Read Channel Power

:READ:CHPower:CHPower?

Triggers a new channel power measurement and returns the channel power result.

It is a combination of the commands

:ABORT; :INITiate; :FETCh:CHPower:CHPower?

It returns only the channel power, not the channel power density. Use

:READ:CHPower? to get both channel power and channel power density.

The channel power measurement must be the active measurement (specified by

:CONFigure:CHPower). The current measurement can be queried using

:CONFigure?

Default Units:	Current amplitude units
See Also:	:READ:CHPower? :READ:CHPower:DENSity? :CONFigure

Read Channel Power Density

:READ:CHPower:DENSity?

Triggers a new channel power measurement and returns the channel power density result.

It is a combination of the commands

:ABORT; :INITiate; :FETCh:CHPower:DENSity?

It returns only the channel power density, not the channel power. Use

:READ:CHPower? to get both channel power and channel power density.

The channel power measurement must be the active measurement (specified by

:CONFigure:CHPower). The current measurement can be queried using

:CONFigure?

Default Units:	Current amplitude units
See Also:	:READ:CHPower? :READ:CHPower:CHPower? :CONFigure

Read Occupied Bandwidth

:READ:OBWidth?

Triggers a new occupied bandwidth measurement and returns the results: occupied bandwidth, percent of power and dB down. It is a combination of the commands

:ABORT; :INITiate; :FETCh:OBWidth?

The occupied bandwidth measurement must be the active measurement (specified by

:CONFigure:OBWidth). The current measurement can be queried using

:CONFigure?

Data is returned as 3 comma-separated values: occupied bandwidth, percent of power, dB down.

Default Units:	For OBW: Hz For Percent of Power: % For dB Down: dB
See Also:	:CONFigure

SENSe (Measurement Command) Subsystem

This subsystem contains commands related to preparing the instrument to make a particular measurement. These measurements are not defined in the SCPI standard so they are maintained separately here.

[[:SENSe]:ACPower Subsystem

This subsystem includes commands related to configuring the adjacent channel power ratio measurement.

ACPR Adjacent Channel Bandwidth

[[:SENSe]:ACPower:BANDwidth|BWIDth:ADJacent <freq>

[[:SENSe]:ACPower:BANDwidth|BWIDth:ADJacent?

Sets the adjacent channel bandwidth for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Adj Ch BW

ACPR Main Channel Bandwidth

[[:SENSe]:ACPower:BANDwidth|BWIDth:MAIN <freq>

[[:SENSe]:ACPower:BANDwidth|BWIDth:MAIN?

Sets the main channel bandwidth for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Main Ch BW

ACPR Channel Spacing

[:SENSe] :ACPower :BANDwidth | BWIDth :SPACing <freq>

[:SENSe] :ACPower :BANDwidth | BWIDth :SPACing?

Sets the channel spacing for the ACPR measurement.

Factory Preset / *RST:	10.35 MHz
Range:	1 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), ACPR, Ch Spacing

ACPR Measurement State

[:SENSe] :ACPower :STATE OFF | ON | 0 | 1

[:SENSe] :ACPower :STATE?

Sets the state of the adjacent channel power ratio measurement, ON or OFF.

When using **:CONFigure:ACPower**, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), ACPR, On/Off
See Also:	:CONFigure:ACPower

[:SENSe] :CHPower Subsystem

This subsystem includes commands related to configuring the channel power measurement.

Channel Power Integration Bandwidth

[:SENSe] :CHPower :BANDwidth | BWIDth :INTEgration <freq>

[:SENSe] :CHPower :BANDwidth | BWIDth :INTEgration?

Sets the integration bandwidth for the channel power measurement.

Integration bandwidth must be less than or equal to the frequency span.

Factory Preset / *RST:	10.35 MHz
Range:	10 Hz to 7.1 GHz
Default Unit:	Hz
Front Panel Access:	Shift-4 (Measure), Channel Power, Ch Pwr Width
See Also:	[:SENSe] :FREQuency :SPAN

Channel Power Measurement State

[:SENSe] :CHPower :STATe OFF | ON | 0 | 1

[:SENSe] :CHPower :STATe?

Sets the state of the channel power measurement, ON or OFF.

When using :CONFiGure:CHPower, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Channel Power, On/Off
See Also:	:CONFiGure:CHPower

[:SENSe] :FSTRength Subsystem

This subsystem includes commands related to configuring the field strength measurement.

Field Strength Antenna

[:SENSe] :FSTRength :ANTenna <antenna>

[:SENSe] :FSTRength :ANTenna?

Selects an antenna from the antenna list to use for field strength measurement result calculations.

The <antenna> argument is a 1-based index of the position of the desired antenna in the instrument's current antenna list. The list can be seen on the instrument by choosing the "Antenna" soft-key button in the "F Strength" menu. For example, if the desired antenna were the 3rd item on the antenna listing then the value of the <antenna> argument would be 3.

The query form of this command will return the index of the currently-selected antenna.

Factory Preset / *RST:	1
Front Panel Access:	Shift-4(Measure), Field Strength, Antenna
See Also:	:CONFiGure:FSTRength

Field Strength Measurement State

[:SENSe] :FSTRength :STATe OFF | ON | 0 | 1

[:SENSe] :FSTRength :STATe?

Sets the state of the field strength measurement, ON or OFF.

When using :CONFiGure:FSTRength, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), Field Strength, On/Off
See Also:	:CONFiGure:FSTRength

[[:SENSE]:OBWidth Subsystem

This subsystem includes commands related to configuring the occupied bandwidth measurement.

Occupied Bandwidth Measurement Method

[[:SENSE]:OBWidth:METHOD XDB|PERCent

[[:SENSE]:OBWidth:METHOD?

Sets the method for calculating occupied bandwidth.

XDB calculates the occupied bandwidth based on points a specified number of dB below the carrier. Issue command `[[:SENSE]:OBWidth:XDB` to set the number of dB to be used.

PERCent calculates the occupied bandwidth based on points a specified percentage of the carrier power below the carrier. Issue command `[[:SENSE]:OBWidth:PERCent` to set the percentage to be used.

Factory Preset / *RST:	PERCent
Front Panel Access:	Shift-4(Measure), OCC BW, % Down dBc Down
See Also:	[[:SENSE]:OBWidth:XDB [[:SENSE]:OBWidth:PERCent

Occupied Bandwidth Percent of Power

[[:SENSE]:OBWidth:PERCent <percentage>

[[:SENSE]:OBWidth:PERCent?

This command sets the percentage of carrier power used to measure the occupied bandwidth.

This value is used in the measurement if `:SENSE:OBWidth:METHOD` is set to PERCent.

Factory Preset / *RST:	99.00%
Range:	0% to 100%
Default Unit:	%
Front Panel Access:	Shift-4 (Measure), OCC BW, %
See Also:	:SENSE:OBWidth:METHOD

Occupied Bandwidth Measurement State

`[:SENSe] :OBWidth :STATE OFF | ON | 0 | 1`

`[:SENSe] :OBWidth :STATE?`

Sets the state of the occupied bandwidth measurement, ON or OFF.

When using `:CONFigure:OBWidth`, the state is automatically set to ON.

Factory Preset / *RST:	OFF
Front Panel Access:	Shift-4 (Measure), OCC BW, On/Off
See Also:	<code>:CONFigure:OBWidth</code>

Occupied Bandwidth dB Down

`[:SENSe] :OBWidth :XDB <rel ampl>`

`[:SENSe] :OBWidth :XDB?`

This command sets the number of dB below the carrier used to measure the occupied bandwidth.

This value is used in the measurement if `:SENSe:OBWidth:METHOD` is set to XDB.

Factory Preset / *RST:	3 dBc
Range:	0 to 100 dBc
Default Unit:	dBc
Front Panel Access:	Shift-4 (Measure), OCC BW, dBc
See Also:	<code>:SENSe:OBWidth:METHOD</code>

4.3 Vector Network Analyzer

This section contains the VNA remote measurement commands. These measurement commands are available in the MS2024A/MS2026A and MS2034A/MS2036A VNA Master.

CONFigure Commands

This set of commands prepares the instrument for the selected measurement. It disables any currently-enabled measurements and activates the specified measurement.

Current instrument settings will be the settings from the previous time that measurement was selected.

The `:CONFigure?` query returns the name of the current measurement.

CONFigure:MEASure Subsystem

This subsystem provides ways for displaying any of the various types of VNA display graphs.

The CONFigure:MEASure? query returns the name of the current measurement corresponding to the Field/VNA measure menu.

Configure Field/VNA measurement

:CONFigure:MEASure:MENU 0 | 1

:CONFigure:MEASure:MENU?

Changes to measurement menu to either field or VNA. Setting to 1 changes the measurement to VNA. Setting to 0 changes the measurement to field.

The query version of this command returns a 1 if VNA measure menu is set, otherwise a 0 for Field measurement.

Front Panel Access:	Shift-8 (System), Application Options, Meas Menu
---------------------	--

Configure S11 Group Delay

:CONFigure:MEASure:S11:GRPDelay

Changes the current measurement to 1-port group delay.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, Group Delay S11
See Also:	:CONFigure:MEASure:MENU

Configure S11 Log Magnitude Fault Location

:CONFigure:MEASure:S11:LFLocation

Changes the VNA measurement to S11 Log Magnitude Fault Location.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, Log Magnitude Fault Location
See Also:	:CONFigure:MEASure:MENU

Configure S11 Log Magnitude

:CONFigure:MEASure:S11:LMAG

Changes the current measurement to S11 Log Magnitude.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, Log Magnitude
See Also:	:CONFigure:MEASure:MENU

Configure 1-Port Phase Measurement**:CONFigure:MEASure:S11:PHASe**

Changes the current measurement to S11 Phase.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, Phase
See Also:	:CONFigure:MEASure:MENU

Configure Smith Chart**:CONFigure:MEASure:S11:SMCHart**

Changes the measurement to Smith Chart.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, Smith Chart
See Also:	:CONFigure:MEASure:MENU

Configure VSWR Fault Location**:CONFigure:MEASure:S11:VFLocation**

Changes the measurement to VSWR Fault Location.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, VSWR Fault Location
See Also:	:CONFigure:MEASure:MENU

Configure VSWR**:CONFigure:MEASure:S11:VSWR**

Changes the VNA measurement to VSWR.

Front Panel Access:	Shift-4 (Measure), S11 Reflection, VSWR Fault Location
See Also:	:CONFigure:MEASure:MENU

Configure S21 Group Delay**:CONFigure:MEASure:S21:GRPDelay**

Changes the measurement to 2-port group delay.

Front Panel Access:	Shift-4 (Measure), S21 Transmission, Group Delay S21
See Also:	:CONFigure:MEASure:MENU

Configure S21 Log Magnitude**:CONFigure:MEASure:S21:LMAG**

Changes the measurement to 2-port Log Magnitude.

Front Panel Access:	Shift-4 (Measure), S21 Transmission, Log Magnitude
See Also:	:CONFigure:MEASure:MENU

Configure S21 Phase**:CONFigure:MEASure:S21:PHASe**

Changes the measurement to 2-port phase.

Front Panel Access:	Shift-4 (Measure), S21 Transmission, Phase
See Also:	:CONFigure:MEASure:MENU

Configure Power Monitor**:CONFigure:PM**

Sets the instrument for Power Monitor mode.

Front Panel Access:	Shift-9(Mode), Power Monitor
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Configure Vector Network Analyzer Measurement**:CONFigure:VNA**

Sets the instrument for Vector Network Analyzer mode.

Front Panel Access:	Shift-9(Mode), Vector Network Analyzer
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Configure Vector Volt Meter**:CONFigure:VVM [CW] | TABLE**

Sets and configures the instrument for the Vector Volt Meter mode

When the CW option is selected, the measurement results are equivalent to the results that are displayed by choosing Vector Volt Meter mode, then CW from the front panel.

When the TABLE option is selected, the measurement results are equivalent to the results that are displayed by choosing Vector Volt Meter mode, then Table from the front panel.

Note that if no option is selected than will default to VVM CW.

Measurement settings can be modified by using the [:SENSe]:VVM commands.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter
Required Options:	Option 15

FETCh Commands

This set of commands returns the most recent measurement data of the active measurement. They will not switch to another measurement.

To get new measurement data, use the READ command.

Fetch Vector Volt Meter CW

:FETCh:VVM: CW?

Returns the most recent VVM CW measurement results.

Data is returned as 2 or 4 comma-separated values depending on the measurement type, measurement format and the save new reference setting. “-“ is returned for each data that is not valid at that instance.

If the measurement type is Insertion, data is returned as 4 comma-separated values: Amplitude, Phase, Reference Amplitude, Reference Phase.

If the measurement type is Insertion with save new reference set, data is returned as 4 comma-separated values: Relative Amplitude, Relative Phase, Reference Amplitude, Reference Phase.

If the measurement type is Return and format is set to dB, data is returned as 4 comma-delimited values: Amplitude, Phase, Reference Amplitude, Reference Phase.

If the measurement type is Return with save new reference set and format is set to dB, data is returned as 4 comma-delimited values: Relative Amplitude, Relative Phase, Reference Amplitude, Reference Phase.

If the measurement type is Return and format is set to VSWR, data is returned as 2 comma-delimited values: VSWR, Reference VSWR.

If the measurement type is Return with save new reference set and format is set to VSWR, data is returned as 2 comma-delimited values: Relative VSWR, Reference VSWR.

If the measurement type is Return and format is set to Impedance, data is returned as 4 comma-delimited values: Real, Imaginary, Reference Real, Reference Imaginary.

If the measurement type is Return with save new reference set and format is set to Impedance, data is returned as 4 comma-delimited values: Relative Real, Relative Imaginary, Reference Real, Reference Imaginary.

Fetch Vector Volt Meter Table

:FETCh:VVM: TABLE?

Returns the most recent VVM Table measurement results for the selected cable.

Data is returned as 4 comma-separated values: Amplitude, Phase, Relative Amplitude, Relative Phase. “-“ is returned for each data that is not valid at that instance.

SENSe (Measurement Command) Subsystem

This subsystem contains commands related to preparing the instrument to make a particular measurement. These measurements are not defined in the SCPI standard so they are maintained separately here.

[:SENSe] :VVM Subsystem

This subsystem includes commands used to set up parameters associated with Vector Volt Meter measurements.

Vector Volt Meter Active Cable

[:SENSe] :VVM :CABLe [1] | 2 | 3 | 4 | 5 :SELEct

[:SENSe] :VVM :CABLe :SELEct ?

Sets the selected Vector Volt Meter cable active.

The query version of this command returns the current active cable.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter, Table, Select Cable
Required Options:	Option 15

Vector Volt Meter Measurement Return Format

[:SENSe] :VVM :FORMat DB | VSWR | IMPedance

[:SENSe] :VVM :FORMat ?

Sets the Vector Volt Meter return format.

The query version of the command returns “DB” if the return measurement format is set to DB, “VSWR” if the return measurement format is set to VSWR, and “IMP” if the return measurement format is set to Impedance.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter, CW, Return Meas Format
Required Options:	Option 15

Vector Volt Meter CW Frequency

[:SENSe] :VVM:FREQuency [:CW] <freq>

[:SENSe] :VVM:FREQuency [:CW] ?

Sets the CW frequency.

Note that the set command is available only if the instrument is in VVM mode.

Factory Preset / *RST:	2 MHz
Range:	VNA, MS2024A: 2 MHz – 4.0 GHz VNA, MS2026A: 2 MHz – 6.0 GHz VNA, MS2034A: 2 MHz – 4.0 GHz VNA, MS2036A: 2 MHz – 6.0 GHz
Default Unit:	Hz
Front Panel Access:	Shift-9(Mode), Vector Volt Meter, CW, CW Frequency
Required Options:	Option 15

Clear VVM Reference

[:SENSe] :VVM:REFeRence:CLEAr

Clears the Vector Volt Meter reference value.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter, CW, Clear Reference Shift-9(Mode), Vector Volt Meter, Table, Clear Reference
See Also:	[:SENSe] :VVM:REFeRence:MEMorize
Required Options:	Option 15

Save VVM Reference

[:SENSe] :VVM:REFeRence:MEMorize

Saves the current measurement as the reference measurement. This will save the current measurement in a new reference window and convert the main measurement window to display the difference between the current measurement and the saved reference.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter, CW, Save New Reference Shift-9(Mode), Vector Volt Meter, Table, Save New Reference
Required Options:	Option 15

Vector Volt Meter Measurement Type

[:SENSe] :VVM:TYPE RETurn | INSertion

[:SENSe] :VVM:TYPE?

Sets the Vector Volt Meter Measurement type.

The query version of the command returns the string “RET” if the measurement type is set to Return and returns the string “INS” if the measurement type is set to insertion.

Front Panel Access:	Shift-9(Mode), Vector Volt Meter, CW, Measurement Type Shift-9(Mode), Vector Volt Meter, Table, Measurement Type
Required Options:	Option 15

A.1 Examples

C/C++, Visual Basic, and LabVIEW™

C/C++

This example is run on the command line. It sends the *IDN? query to the instrument and prints the response to the console.

```
// IdnExample.cpp : Microsoft Visual Studio-Generated Example
//      Based on Example 2-1 in the NI-VISA User Manual
//      Usage : IdnExample "TCPIP::xxx.xxx.xxx.xxx::inst0::INSTR"
//              where xxx.xxx.xxx.xxx is the IP address of the
//              instrument.
//      Output : The string identity string returned from the
//              instrument.
//      VISA Header : visa.h (must be included)
//      VISA Library : visa32.lib (must be linked with)

#include "stdafx.h"
#include "stdio.h"
#include "string.h"
#include "visa.h"

#define BUFFER_SIZE 255

int main(int argc, char* argv[])
{
    ViStatus status; /* For checking errors */
    ViSession defaultRM, instr; /* Communication channels */
    ViUInt32 retCount; /* Return count from string I/O */
    ViChar buffer[BUFFER_SIZE]; /* Buffer for string I/O */
    char tempDisplay[BUFFER_SIZE]; /* Display buffer for example */
    char *pAddress;

    /* Make sure we got our address. */
    if ( argc < 2 )
    {
        printf("Usage: IdnExample
\\TCPIP::xxx.xxx.xxx.xxx::inst0::INSTR\\n\\n");
        printf("\\t where xxx.xxx.xxx.xxx is the IP address of your
instrument.\\n");
        return -1;
    }

    /* Store the address. */
    pAddress = argv[1];

    /* Begin by initializing the system*/
    status = viOpenDefaultRM(&defaultRM);

    if (status < VI_SUCCESS)
    {
        /* Error Initializing VISA...exiting*/
        printf("Can't initialize VISA\\n");
        return -1;
    }
}
```



```
/* Open communication with TCP/IP device at xxx.xxx.xxx.xxx*/
/* NOTE: For simplicity, we will not show error checking*/
/* TODO: Add error handling. */
status = viOpen(defaultRM, pAddress, VI_NULL, VI_NULL, &instr);

/* Set the timeout for message-based communication*/
/* TODO: Add error handling. */
status = viSetAttribute(instr, VI_ATTR_TMO_VALUE, 5000);

/* Ask the device for identification */
sprintf(buffer, "*IDN?\n");
status = viWrite(instr, (unsigned char *)&buffer[0], 6,
&retCount);
status = viRead(instr, (unsigned char *)buffer, BUFFER_SIZE,
&retCount);

/* TODO: Add code to process data. */
strncpy(tempDisplay, buffer, retCount);
tempDisplay[retCount] = 0; /* Null-terminate display string. */
printf("*IDN? Returned %d bytes: %s\n", retCount, tempDisplay);

/* Close down the system */
/* TODO: Add error handling. */
status = viClose(instr);
status = viClose(defaultRM);

return 0;
}
```

Visual Basic

This function can be called in a Visual Basic program. It sends the *IDN? query to the instrument and returns the byte count and ASCII response string.

Rem This example is based on Example 2-1 from the NI-VISA User Manual.

```
Public Sub IdnMain(ByVal address As String, ByRef byteCount As String,
ByRef returnBytes As String)
    Const BUFFER_SIZE = 200
    Dim stat As ViStatus
    Dim dfltRM As ViSession
    Dim sesn As ViSession
    Dim retCount As Long
    Dim buffer As String * BUFFER_SIZE

    Rem ***Include visa32.dll as a reference in your project.***

    Rem Begin by initializing the system
    stat = viOpenDefaultRM(dfltRM)
    If (stat < VI_SUCCESS) Then
        Rem Error initializing VISA...exiting
        MsgBox "Can't initialize VISA"
        Exit Sub
    End If

    Rem Open communication with Device
    Rem NOTE: For simplicity, we will not show error checking
    Rem TODO: Add error handling.
    stat = viOpen(dfltRM, address, VI_NULL, VI_NULL, sesn)

    Rem Set the timeout for message-based communication
    Rem TODO: Add error handling.
    stat = viSetAttribute(sesn, VI_ATTR_TMO_VALUE, 5000)

    Rem Ask the device for identification
    Rem TODO: Add error handling.
    stat = viWrite(sesn, "*IDN?", 5, retCount)
    stat = viRead(sesn, buffer, BUFFER_SIZE, retCount)

    Rem TODO: Add code to process the data.
    byteCount = retCount
    returnBytes = Left(buffer, retCount)

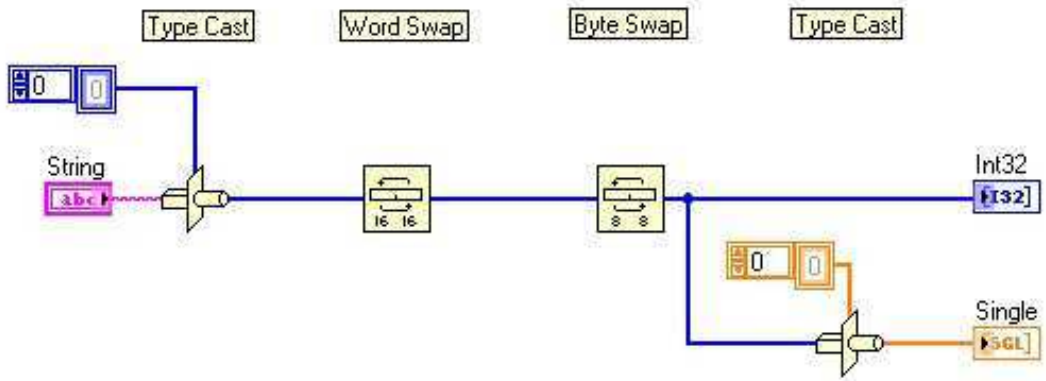
    Rem Close down the system
    Rem TODO: Add error handling.
    stat = viClose(sesn)
    stat = viClose(dfltRM)
End Sub
```

LabVIEW™

This example shows how to read the trace data from the instrument in 32-bit integer format. The output is an array of data point magnitudes. The first .vi pictured shows the data capture. The second .vi does the conversion.

Note that VISA resource name should be either an alias to an instrument defined in NI-MAX or in the form `TCP::xxx.xxx.xxx.xxx::inst0::INSTR` where `xxx.xxx.xxx.xxx` is the IP address of the instrument.

String To Number.vi



A.2 VNA How To

How to calibrate:

This section describes the typical sequence of remote commands to do a calibration.

1-Port Calibration Procedure (OSL)

1. Set calibration type to 1-Port using the command
:SENS:CORR:COLL:METH:TYP 0
2. Start the calibration by running the command:
:SENS:CORR:COLL:INIT
3. Check if the initialization had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
4. Connect the Open to the RF Out port and start the Open Calibration step by running the command: :SENS:CORR:COLL:OPEN
5. Check if the open step had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
6. Connect the Short to the RF Out port and start the Short Calibration step by running the command: :SENS:CORR:COLL:SHOR
7. Check if the short step had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
8. Connect the Load to the RF Out port and start the load Calibration step by running the command: :SENS:CORR:COLL:LOAD
9. Check if the load step had been completed and the calibration can be verified by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
10. Verify that the calibration has been performed properly by checking that the Cal status is set to ON using the command :CAL:STAT?

2-Port Calibration Procedure (OSLT)

1. Set calibration type to 2-Port using the command
:SENS:CORR:COLL:METH:TYP 1
2. Start the calibration by running the command:
:SENS:CORR:COLL:INIT
3. Check if the initialization had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
4. Connect the Open to the RF Out port and start the Open Calibration step by running the command: :SENS:CORR:COLL:OPEN
5. Check if the open step had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
6. Connect the Short to the RF Out port and start the Short Calibration step by running the command: :SENS:CORR:COLL:SHOR
7. Check if the short step had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
8. Connect the Load to the RF Out port and start the load Calibration step by running the command: :SENS:CORR:COLL:LOAD
9. Check if the load step had been completed and the next calibrate steps can be proceed by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
10. Connect the RF Out port to the RF In port and start the Thru Calibration step by running the command: :SENS:CORR:COLL:THR
11. Check if the thru step had been completed and the calibration can be verified by running the command: :SENS:CORR:COLL:STAT?
 - a. If the command returns a 1 then proceed to the next step, otherwise keep polling until the command returns a 1.
12. Verify that the calibration has been performed properly by checking that the Cal status is set to ON using the command :CAL:STAT?

Master Programming Manual Revision History

Date	Revision	Change Description
10/24/2006	Revision A (10580-00167A.pdf released)	Initial Release
----	Revision B (Not Used)	No Document Released
12/04/2007	Revision C	Document Update
March 2008	Revision D	Document Update
June 2008	Revision E	Document Update