

User's and Programmer's Reference N9060A Spectrum Analyzer Measurement Application

Agilent MXA and EXA Signal Analyzers

This manual provides documentation for the following X-Series Analyzers:

MXA Signal Analyzer N9020A

EXA Signal Analyzer N9010A



Manufacturing Part Number: N9060-90021

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[[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation? ..... 730
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHAPE GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSS-
ian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSS-
ian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSS-
ian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop,
GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop,
GAUSSian|FLATtop, GAUSSian|FLATtop, GAUSSian|FLATtop ..... 725
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHApe? ..... 725
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo <freq>, <freq>, <freq>, <freq>, <freq>, <freq>,
<freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>..
724
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1..... 724
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO? ..... 724
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo?. ..... 724
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] <freq>, <freq>, <freq>, <freq>, <freq>, <freq>,
<freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>..
722
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1..... 722
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO? ..... 722
[[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]? ..... 722
[[:SENSe]:SPURious[:RANGe][:LIST]:DETector[1][:FUNCTion] AVERage|NEGative|NORMal|POSitive|SAM-
ple|RMS, AVERage|NEGative|NORMal|POSitive|SAMPLE|RMS, AVERage|NEGative|NORMal|POSitive|SAM-
ple|RMS, AVERage|NEGative|NORMal|POSitive|SAMPLE|RMS,
AVERage|NEGative|NORMal|POSitive|SAMPLE|RMS, AVERage|NEGative|NORMal|POSitive|SAMPLE|RMS,
```

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List of Commands

[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts:AUTO?	735
[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts?	735
[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>	734
[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO OFF ON 0 1, OFF ON 0 1.	734
[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?	734
[[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?	734
[[:SENSe]:SWEep:EGATe:CONTRol EDGE LEVEL	1049
[[:SENSe]:SWEep:EGATe:CONTRol?	1049
[[:SENSe]:SWEep:EGATe:DELay <time>	1045
[[:SENSe]:SWEep:EGATe:DELay:COMPensation:TYPE OFF SETTled GDELay	1052
[[:SENSe]:SWEep:EGATe:DELay:COMPensation:TYPE?	1052
[[:SENSe]:SWEep:EGATe:DELay?	1045
[[:SENSe]:SWEep:EGATe:HOLDoff <time>	1050
[[:SENSe]:SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1	1050
[[:SENSe]:SWEep:EGATe:HOLDoff:AUTO?	1050
[[:SENSe]:SWEep:EGATe:HOLDoff?	1050
[[:SENSe]:SWEep:EGATe:LENGth <time>	1046
[[:SENSe]:SWEep:EGATe:LENGth?	1046
[[:SENSe]:SWEep:EGATe:METHod LO VIDEo FFT	1047
[[:SENSe]:SWEep:EGATe:METHod?	1047
[[:SENSe]:SWEep:EGATe:MINFast?	1053
[[:SENSe]:SWEep:EGATe:SOURce EXTeRnal1 EXTeRnal2 LINE FRAME RFBurst TV	1049
[[:SENSe]:SWEep:EGATe:SOURce?	1049
[[:SENSe]:SWEep:EGATe:TIME <time>	1044
[[:SENSe]:SWEep:EGATe:TIME?	1044
[[:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0.	1040
[[:SENSe]:SWEep:EGATe:VIEW?	1040
[[:SENSe]:SWEep:EGATe[:STATE] OFF ON 0 1	1039

List of Commands

[[:SENSe]:SWEep:EGATe[:STATe]?	1039
[[:SENSe]:SWEep:FFT:WIDTh <real>	386
[[:SENSe]:SWEep:FFT:WIDTh:AUTO OFF ON 0 1	386
[[:SENSe]:SWEep:FFT:WIDTh:AUTO?	386
[[:SENSe]:SWEep:FFT:WIDTh?	386
[[:SENSe]:SWEep:POINts <integer>	387
[[:SENSe]:SWEep:POINts?	387
[[:SENSe]:SWEep:TIME <time>	378
[[:SENSe]:SWEep:TIME:AUTO OFF ON 0 1	378
[[:SENSe]:SWEep:TIME:AUTO:RULes NORMAl ACCuRacy SRESponse	380
[[:SENSe]:SWEep:TIME:AUTO:RULes:AUTO[:STATe] ON OFF 1 0	381
[[:SENSe]:SWEep:TIME:AUTO:RULes:AUTO[:STATe]?	381
[[:SENSe]:SWEep:TIME:AUTO:RULes?	380
[[:SENSe]:SWEep:TIME:AUTO?	378
[[:SENSe]:SWEep:TIME?	378
[[:SENSe]:SWEep:TYPE FFT SWEep	382
[[:SENSe]:SWEep:TYPE:AUTO OFF ON 0 1	383
[[:SENSe]:SWEep:TYPE:AUTO:RULes SPEEd DRANge	384
[[:SENSe]:SWEep:TYPE:AUTO:RULes:AUTO[:STATe] OFF ON 0 1	384
[[:SENSe]:SWEep:TYPE:AUTO:RULes:AUTO[:STATe]?	384
[[:SENSe]:SWEep:TYPE:AUTO:RULes?	384
[[:SENSe]:SWEep:TYPE:AUTO?	383
[[:SENSe]:SWEep:TYPE?	382
[[:SENSe]:TXPower:AVERage:COUNt <integer>	667
[[:SENSe]:TXPower:AVERage:COUNt?	667
[[:SENSe]:TXPower:AVERage:TCONtrol EXPonential REPeat	668
[[:SENSe]:TXPower:AVERage:TCONtrol?	668
[[:SENSe]:TXPower:AVERage:TYPE LOG MAXimum MINimum RMS	669
[[:SENSe]:TXPower:AVERage:TYPE LOG RMS	669
[[:SENSe]:TXPower:AVERage:TYPE?	669
[[:SENSe]:TXPower:AVERage:TYPE?	669

List of Commands

[[:SENSe]:TXPower:AVERage[:STATe] OFF ON 0 1	667
[[:SENSe]:TXPower:AVERage[:STATe]?	667
[[:SENSe]:TXPower:BANDwidth:TYPE GAUSSian FLATtop	654
[[:SENSe]:TXPower:BANDwidth:TYPE?	654
[[:SENSe]:TXPower:BANDwidth[:RESolution] <bandwidth>	653
[[:SENSe]:TXPower:BANDwidth[:RESolution]?	653
[[:SENSe]:TXPower:BURSt:AUTO ON OFF 1 0	672
[[:SENSe]:TXPower:BURSt:AUTO?	672
[[:SENSe]:TXPower:BURSt:WIDTh <time>	672
[[:SENSe]:TXPower:BURSt:WIDTh?	672
[[:SENSe]:TXPower:IF:GAIN:AUTO[:STATe] OFF ON 0 1	673
[[:SENSe]:TXPower:IF:GAIN:AUTO[:STATe]?	673
[[:SENSe]:TXPower:IF:GAIN[:STATe] ON OFF 1 0	674
[[:SENSe]:TXPower:IF:GAIN[:STATe]?	674
[[:SENSe]:TXPower:METHod THReshold BWIDth SINGLe	671
[[:SENSe]:TXPower:METHod THReshold BWIDth	671
[[:SENSe]:TXPower:METHod?	671
[[:SENSe]:TXPower:METHod?	671
[[:SENSe]:TXPower:SWEep:TIME <integer>	675
[[:SENSe]:TXPower:SWEep:TIME <integer>	687
[[:SENSe]:TXPower:SWEep:TIME <time>	687
[[:SENSe]:TXPower:SWEep:TIME?	675
[[:SENSe]:TXPower:SWEep:TIME?	687
[[:SENSe]:TXPower:SWEep:TIME?	687
[[:SENSe]:TXPower:THReshold <real>	670
[[:SENSe]:TXPower:THReshold:TYPE ABSolute RELative	670
[[:SENSe]:TXPower:THReshold:TYPE?	670
[[:SENSe]:TXPower:THReshold?	670
[[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer] <voltage>	877
[[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer]?	877
[[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF ON 0 1	874

List of Commands

[[:SENSe]:VOLTage:IQ:RANGe:AUTO?	874
[[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer] <voltage>	875
[[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer]?	875
[[:SENSe]:VOLTage POWer:IQ:MIRRored OFF ON 0 1	876
[[:SENSe]:VOLTage POWer:IQ:MIRRored?	876
[[:SENSe]RECORDing:PLAYback:LOOP OFF ON 0 1	1037
[[:SENSe]RECORDing:PLAYback:LOOP?	1037
[[:SENSe]RECORDing:PLAYback:POSition <time>	1035
[[:SENSe]RECORDing:PLAYback:POSition?	1035
[[:SENSe]RECORDing:PLAYback:STARt <time>	1035
[[:SENSe]RECORDing:PLAYback:STARt:AUTO OFF ON 0 1	1035
[[:SENSe]RECORDing:PLAYback:STARt:AUTO?	1035
[[:SENSe]RECORDing:PLAYback:STARt?	1035
[[:SENSe]RECORDing:PLAYback:STOP <time>	1036
[[:SENSe]RECORDing:PLAYback:STOP:AUTO OFF ON 0 1	1036
[[:SENSe]RECORDing:PLAYback:STOP:AUTO?	1036
[[:SENSe]RECORDing:PLAYback:STOP?	1036
CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime:AUTO OFF ON 0 1	306
CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime:AUTO?	306
CONFigure:LIST	847
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0	689
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?	689
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0	689
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?	689
FETCh:LIST?	847
For most other measurements:	958
For Swept SA measurement:	958
INITiate:LIST	847
INPut:IMPedance:IQ U50 B50 U1M B1M	906
INPut:IMPedance:IQ?	906
MMEMory:LOAD:RECORDing <filename>	998

MMEMory:LOAD:TRACe:DATA D1|D2|D3|D4|D5|D6,<filename>[,CSV|TXT|SDF]

997

READ:LIST?

847

System, I/O Config.

221

Welcome to the X-Series Signal Analyzer Help system!

The online Help system is "context-sensitive". This means that the information displayed when you invoke the Help system depends on the selected Analyzer Mode, Measurement and key.

TIP

To view help for any Front-panel key or menu key, press that key with this Help Window open.

To scroll any page vertically (to see the whole of a long topic), press the **Down Arrow** key on the Front Panel to scroll down (or the **Up Arrow** key to scroll up). To locate these keys, see [“Front Panel Keys used by the Help System” on page 93](#).

See [“Navigating the Help Window Without a Mouse” on page 98](#) for complete information about **Using Help without an attached Mouse and Keyboard**. For specific details of how to navigate to topics, see [“Finding a Topic without a Mouse and Keyboard” on page 107](#).

See [“Navigating the Help Window with a Mouse” on page 96](#) to learn about **Using Help with an attached Mouse and Keyboard**, .

You can view Help on the Analyzer itself, or you can **View Help on Another Computer**, by copying the Help files and viewing Help there. For details, see the Section [“Viewing Help on a separate Computer” on page 87](#).

To locate **Other Available Help Resources**, see [“Locating Other Help Resources” on page 86](#).

Key Path

Help

Locating Other Help Resources

All available documentation is present on the Analyzer's hard disk, either as HTML Help or Acrobat PDF files.

In addition to the interactive Windows (HTML) Help system, the Analyzer's hard disk contains Application Notes, tutorial documents, etc.

This same documentation is also included on the Documentation CD shipped with your Analyzer.

To view a list of links to other documentation, click the item "Additional Documentation" in the Contents tab of the Help Window's Navigation Pane.

Many of the supporting documents use the Adobe Acrobat (PDF) file format. You can view PDF files using the pre-installed Adobe Reader software.

The Adobe Reader user interface differs from the Windows Help interface. For full details on how to navigate within Acrobat documents using Adobe Reader, see ["Navigating Acrobat \(PDF\) Files" on page 102](#).

Viewing Help on a separate Computer

You may want to view the help pages *without* having them appear on top of the Analyzer's screen.

There are two separate Help files for each Analyzer Mode, which contain all the same help pages in different formats:

1. A file in HTML Help (CHM) format,
2. A file in Acrobat (PDF) format.

You can copy any of the Help files to another computer, then open and view the help pages in the file on that computer.

Your choice of which file to copy and view may depend on what you want to do with the file (for example, whether you want to print it and read the paper copy, or view it on the computer). The table below compares the relative advantages of the two formats:

Format Type	HTML Help Format (CHM Files)	Acrobat Format (PDF Files)
File Extension	CHM	PDF
Software Required to view file	Microsoft Windows operating system only, with Microsoft Internet Explorer installed.	Free Adobe Reader software can be downloaded for many operating systems, including: Microsoft Windows, Macintosh, Linux, Solaris.
Full Text Search?	Yes	Yes
Printable?	Yes, but with limited control.	Yes. Full print control.
Printable Table of Contents?	No	Yes
Navigable without a Mouse and Keyboard?	Yes, but with some loss of functionality.	No
Has Page Numbers?	No	Yes
Context-Sensitive Display?	Yes, when viewed using the X-Series Analyzer application window.	No
Indexed?	Yes	No
Active Hyperlinks?	Yes	Yes

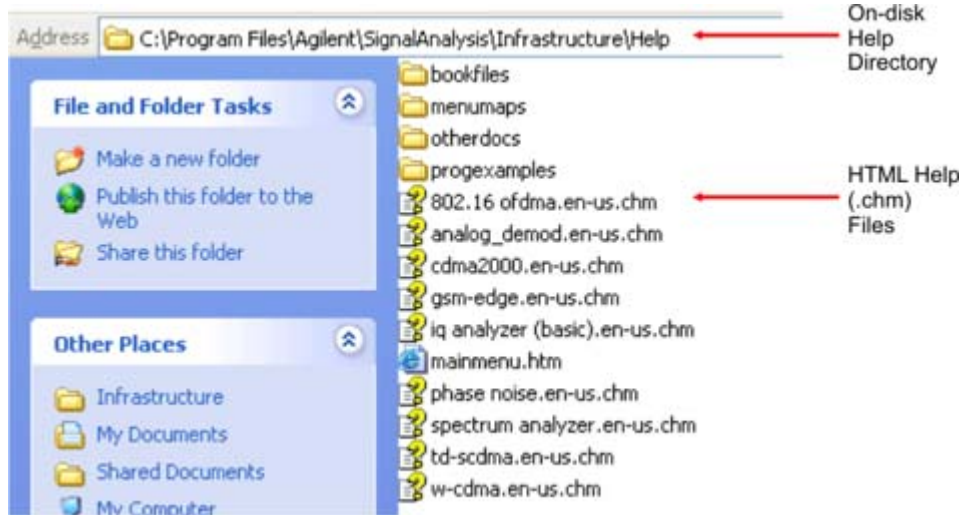
Copying the HTML Help (CHM) Files

You can copy the HTML Help file(s) you need to a separate computer running Microsoft Windows. Each HTML Help file has a .chm extension.

You can find the HTML Help (.chm) files:

- *Either*, on the documentation CD that came with the Analyzer,

- Or, in a special directory on the Analyzer's hard disk. The directory path is:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help
The illustration below shows an example listing of the HTML Help files in this directory, viewed using Windows Explorer.
Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.



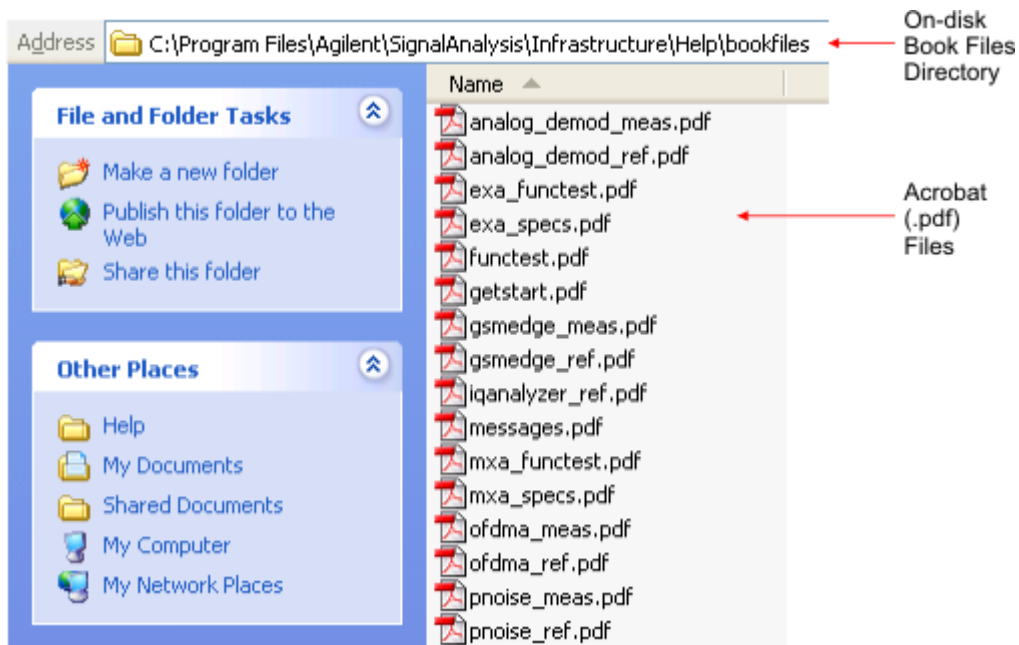
NOTE You can open and view the HTML Help files only on a PC that has Microsoft Windows and Microsoft Internet Explorer installed.

Copying the Acrobat (PDF) Files

You can copy the Acrobat file(s) you need to a separate computer running any of several different operating systems. Each Acrobat file has a .pdf extension.

You can find the Acrobat (.pdf) files:

- Either, on the documentation CD that came with the Analyzer,
- Or, in a special directory on the Analyzer's hard disk. The directory path is:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles
 - The illustration below shows an example listing of the Acrobat files in this directory, viewed using Windows Explorer.
 - The PDF versions of the help files are named <mode>_ref.pdf, where <mode> is the name of the Analyzer Mode. For example, the name of the PDF file for GSM/EDGE Mode is gsmedge_ref.pdf. (Note that the directory also contains other PDF documents.)
 - When you open any <mode>_ref.pdf document, the title page displays "<Mode> User's and Programmer's Reference", where <Mode> is the name of the Analyzer Mode described by the document.
 - Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.



How Help is Organized

This topic contains the following sections:

[Help Contents Listing](#)

[System Functions](#)

[Key Descriptions for Each Measurement](#)

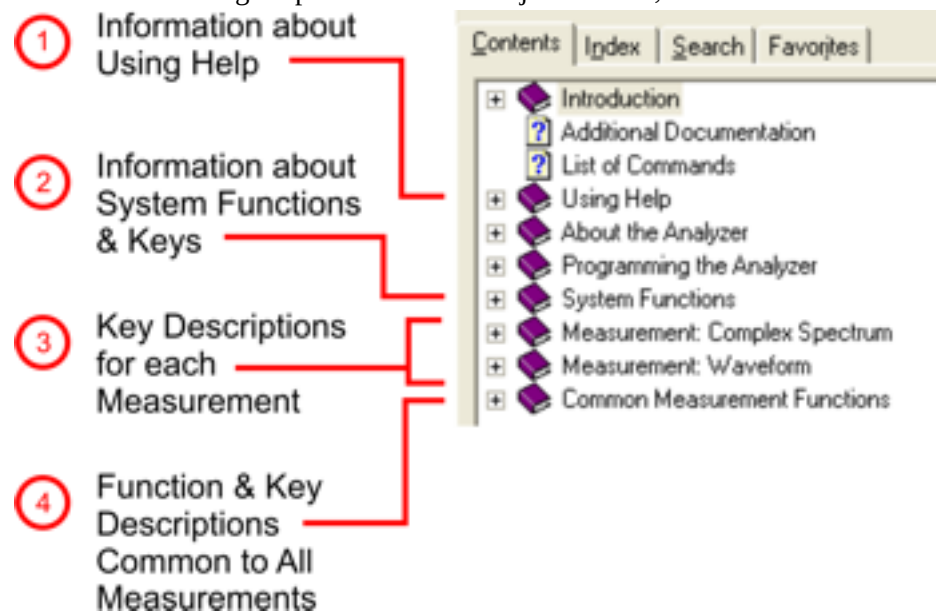
[Key Information for Softkeys](#)

[Common Measurement Functions](#)

Help Contents Listing

The listing under the Contents tab in the Help Window includes a topic for each Front-panel key and each softkey, for each available measurement.

The Contents listing is split into several major sections, as shown below:



Help information is split between these sections as follows:

1. Using Help: this section.
2. System Functions. See [“System Functions” on page 90](#) below.
3. Measurement Functions. See [“Key Descriptions for Each Measurement” on page 91](#) below.
4. Common Measurement Functions. See [“Common Measurement Functions” on page 92](#) below.

System Functions

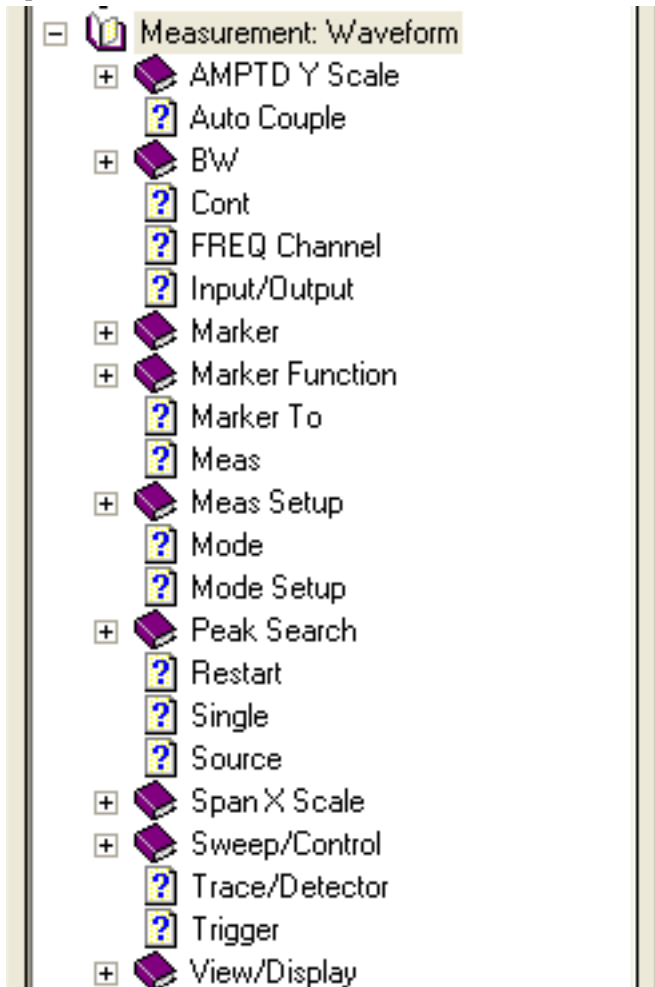
This section contains information for the following keys, which are listed in alphabetical order: **File**, **Preset**, **Print**, **Quick Save**, **Recall**, **Save**, **System**, **User Preset**.

The functions of these keys do not vary between measurements: they operate the same way, irrespective of which Analyzer measurement you have selected.

The sections for **Recall** and **Save** contain only cross-references to the respective sections in “[Common Measurement Functions](#)” on page 92, and are included here for convenience.

Key Descriptions for Each Measurement

The Contents section for each Measurement is sub-divided into topics for each Front-panel key, in alphabetical order, as shown below.



If you don't see a topic for a Front-panel key in the Measurement-specific section, then it is located in the section [System Functions](#).

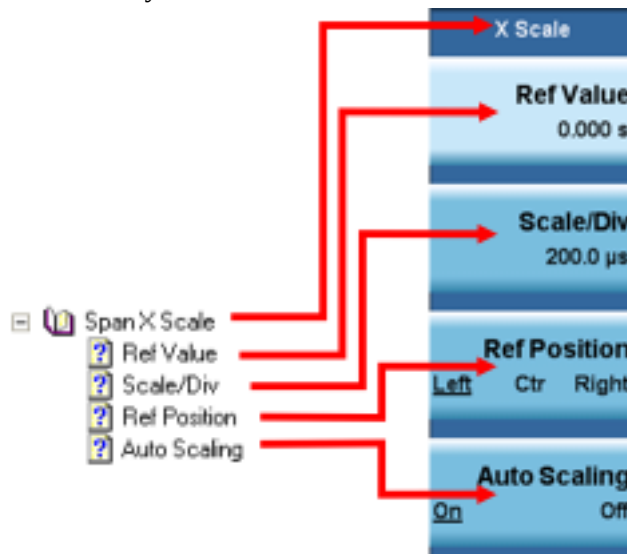
Key Information for Softkeys

Information for each softkey that appears when you press a Front-panel key (or a softkey with a submenu) is listed under the entry for that key in the Help Contents. The example below shows the submenu under the **SPAN X Scale** Front-panel key in the "Waveform" Measurement, alongside the

Using Help

How Help is Organized

actual softkeys for that menu.



In these subsections, all softkeys are listed in the order they appear in their menu (that is, *not* in alphabetical order).

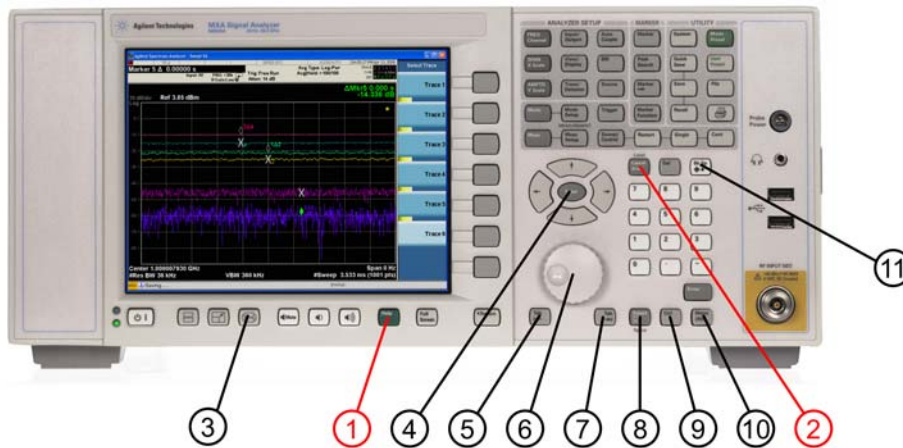
Common Measurement Functions

This section groups together function and key information that is shared between measurements. However, there is a listing for every Front-panel key and subkey in the section for each measurement, so you will generally not need to refer to this section.

The key subsections are listed alphabetically.

Front Panel Keys used by the Help System

The interactive Help system uses the Front-panel keys shown below.

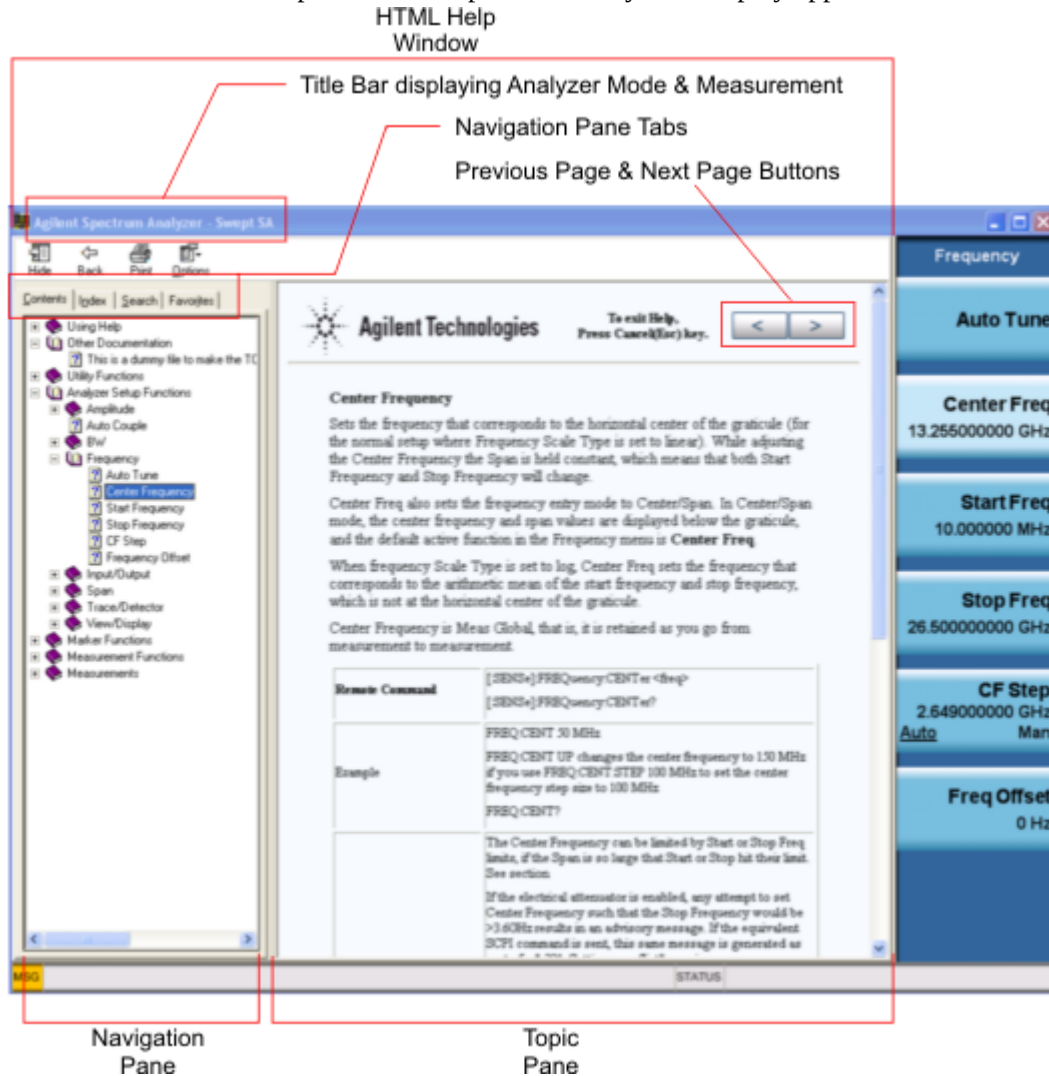


#	Item	
	Name	Description
1	Help Key	Opens Help (displaying the topic for the last key pressed).
2	Cancel (Esc) Key	Exits Help.
3	Next Window Key	Changes the current window pane selection. Use this key to: TBD.
4	Arrow / Enter Keys	A central Enter key, surrounded by four directional arrow keys. Navigates within the Help system.
5	Backward Tab Key	Moves between controls in the Help display.
6	Knob	For future use.
7	Forward Tab Key	Moves between controls in the Help display.
8	Select / Space Key	Navigates within the Help system, in conjunction with other keys.
9	Ctrl Key	Navigates within the Help system, in conjunction with other keys. See Navigating Windows HTML Help (CHM) Files .
10	Alt Key	Navigates within the Help system, in conjunction with other keys. See Navigating Windows HTML Help (CHM) Files .
11	Bk Sp (Backspace) Key	Acts as a "Back" key when navigating the pages of the Help system.

Navigating Windows HTML Help (CHM) Files

HTML Help Window Components

When the interactive Help Window is open, the Analyzer's display appears as below.



The HTML Help Window appears on top of, and to the left of, the measurement display. You can still see and use the current softkey menu when the HTML Help Window is open. However, pressing a softkey when the Help window is open displays Help for that softkey, but does *not* execute the softkey's function.

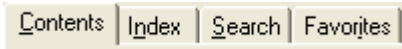
When the Help Window is open, the Analyzer retains its current Mode and Measurement, as shown in the Title Bar.

The HTML Help Window itself consists of two panes, as shown in the diagram above.

On the left is the Navigation Pane, and on the right is the Topic Pane.

The Help Window Navigation Pane

The Navigation Pane is further divided into four tabs: Contents, Index, Search and Favorites, as shown below.



For details of how to switch between these tabs, if you don't have a mouse attached to the Analyzer, see the Section [“To Switch the Active Tab within the Navigation Pane” on page 98](#).

The Help Window Topic Pane

This pane displays the text for the topic that you have selected. It also contains clickable **Previous Page** and **Next Page** buttons (as shown below), which can be used to move to the previous or next page in the Help file.



Basic Help Window Operations

This topic contains the following sections:

[Opening Help](#)

[Getting Help for a Specific Key](#)

[Closing the Help Window](#)

[Viewing Help on How to Use Help](#)

[Exiting Help on How to Use Help](#)

To locate the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 93](#).

Opening Help

To access the Help system, press the green **Help** key below the front panel display (shown below) while an Agilent application is running.



Note that the softkeys remain visible when the Help window is open.

Getting Help for a Specific Key

1. If the Help window *is* already open, press the desired key. The relevant Help topic appears.

Note that the function normally invoked by the key is *not* executed when the key is pressed with the Help window open. If you want to execute the key's function, first close Help by pressing the **Cancel (Esc)** key (as described in [“Closing the Help Window” on page 96](#)), then press the key, before opening Help again (if required).

2. If the Help window is *not* already open, press the desired key (which executes the key's function), then press the **Help** key to display the relevant Help page. Help is available for all softkeys, and for

all the Front-panel keys listed under the "System Functions" and "Measurement" sections.

For details of how to navigate within the panes of the Help window, see [Navigating Windows HTML Help \(CHM\) Files](#).

Closing the Help Window

To close the Help window, and return to the measurement application, press the **Cancel (Esc)** key (depicted below).



Viewing Help on How to Use Help

With the Help window open, press the green **Help** key again.

The "Using Help" page appears, as shown below.



Exiting Help on How to Use Help

See the Section [“To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane”](#) on page 100 for details of several methods to accomplish this.

Navigating the Help Window

The way you navigate around the HTML Help Window depends on whether you have a mouse and keyboard attached to your Analyzer:

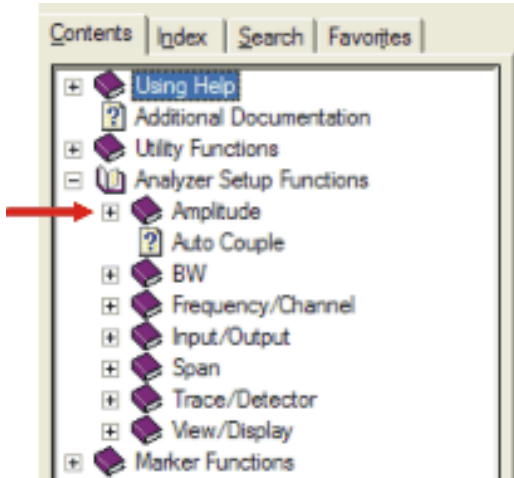
- If you have a mouse and keyboard attached, see the Section [Navigating the Help Window with a Mouse](#).
- If you don't have a mouse and keyboard attached, see the Section [Navigating the Help Window Without a Mouse](#).

Navigating the Help Window with a Mouse

When the HTML Help window is open, you can point-and-click to navigate, as you would when using Help for any Microsoft Windows computer application. The basic navigational features the Help systems of all X-Series Analyzers are as follows:

- If necessary, press the green **Help** key on the Front Panel, as described in [“Opening Help”](#) on page 95, to open the HTML Help window.

- Choose the desired topic from the list under the Contents Tab of the HTML Help Window's Navigation Pane, then click on the topic title to display the first page of the topic.
- To expand the listing of a topic, click on the + icon to the left of the topic's book icon, as shown below. A list of subtopics and pages appears.

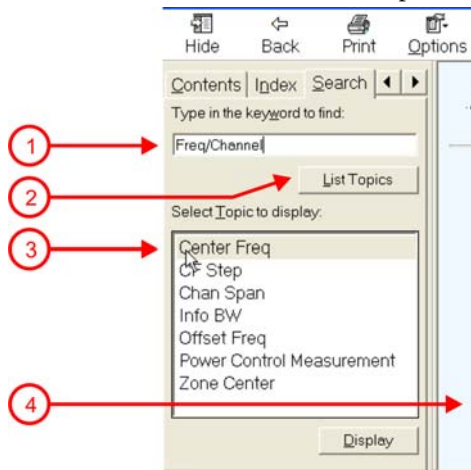


- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the *Topic* Pane), as shown below.



Searching for a Help Topic If you also have a keyboard attached to the Analyzer, you can use the Help system's full-text search feature to locate help for any topic, by typing in a key name, a topic name, or any other desired text.

Select the "Search" tab of the Help window's Navigation Pane, then use the following procedure:



1. Type the desired topic name into the Search window as shown in the diagram above. Note that the text search is *not* case-sensitive.
2. Click on the **List Topics** button.
3. *Either:*
Double-click on the desired topic in the list,

Or:

Click on the desired topic to select it, then click the **Display** button beneath the list.

4. The topic is then displayed in the Topic Pane (right-hand side of display).

Navigating the Help Window Without a Mouse

Most features of the Help system can be accessed and navigated without the necessity to attach a mouse or keyboard to the Analyzer. There are, however, a few exceptions to this rule, which are noted in the Section [“Functions that cannot be used without a Mouse and Keyboard” on page 101](#).

For information about how to perform common tasks in the Help system, click on one of the following links:

[To Toggle the Focus between the Navigation Pane and the Topic Pane](#)

[To Switch the Active Tab within the Navigation Pane](#)

[To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane](#)

[To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane](#)

[To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane](#)

[To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane](#)

[To Scroll up or down within a topic in the Topic Pane](#)

[To Go to the Next or Previous Page in the Topic Pane](#)

[To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane](#)

[To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane](#)

[To Print the topic currently displayed](#)

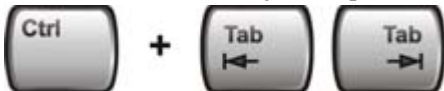
To locate all the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 93](#).

To Toggle the Focus between the Navigation Pane and the Topic Pane Press the **Next Window** key.



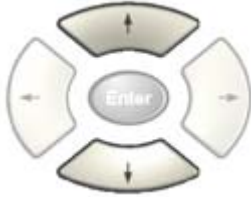
To Switch the Active Tab within the Navigation Pane Perform this procedure to display either the Contents, Index, Search or Favorites tab of the Help window's Navigation Pane.

Hold down the **Ctrl** key, then press either the **Forward Tab** key, or the **Backward Tab** key.



To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane

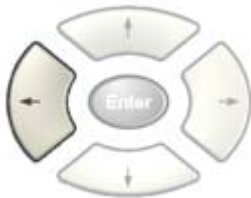
With the focus in the Navigation Pane, press the **Up Arrow** or **Down Arrow** keys.



To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane With the focus in the Navigation Pane, press the **Right Arrow** key to *expand* the selected topic:

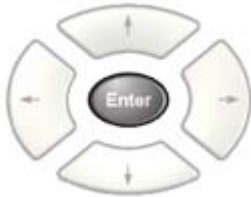


Or press the **Left Arrow** key to *collapse* the selected topic.



To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane

With the focus in the Contents Tab of the Navigation Pane, press the **Enter** key. If the selected topic was not already expanded, it expands in the Navigation Pane.

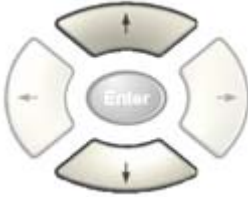


To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane With the focus in the Index Tab of the Navigation Pane, press the **Enter** key.



To Scroll up or down within a topic in the Topic Pane With the focus in the Topic Pane, press either

the **Up Arrow** key or **Down Arrow** key.



To Go to the Next or Previous Page in the Topic Pane With the focus in the Topic Pane, press either **Forward Tab** or **Backward Tab** keys



to select the > (**Next Page**) key at the top right of the Pane, if you want to go to the *next* page,



or select the < (**Previous Page**) key at the top right of the Pane, if you want to go to the *previous* page.



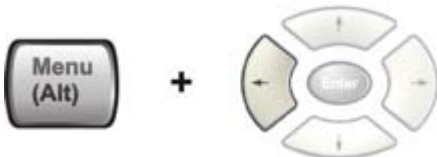
Press **Enter**.



To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane

To go *back*, either:

Hold down the **Alt** key, then press the **Left Arrow** key.

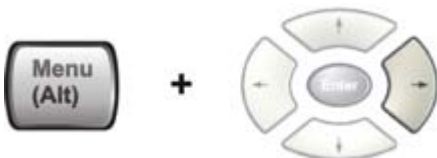


Or:

Press the **Bk Sp** key.

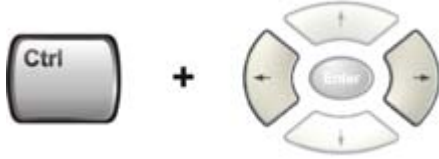


To go *forward*, hold down the **Alt** key, then press the **Right Arrow** key.

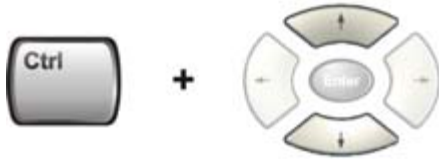


(The "Go Forward" operation has no effect unless there have been previous "Go Back" operations)

To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane To scroll *horizontally*: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Left Arrow** or **Right Arrow** keys.



To scroll *vertically*: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Up Arrow** or **Down Arrow** keys.



To Print the topic currently displayed Press the Front-panel **Print** key



Functions that cannot be used without a Mouse and Keyboard The following parts of the HTML Help System *cannot* easily be used without attaching a mouse and keyboard to the Analyzer.

- The menu options at the top of the Help Window, consisting of: **Hide**, **Back**, **Print** and **Options**.
- The functionality of the Search Tab of the Navigation Pane.
- The functionality of the Favorites Tab of the Navigation Pane.

Navigating Acrobat (PDF) Files

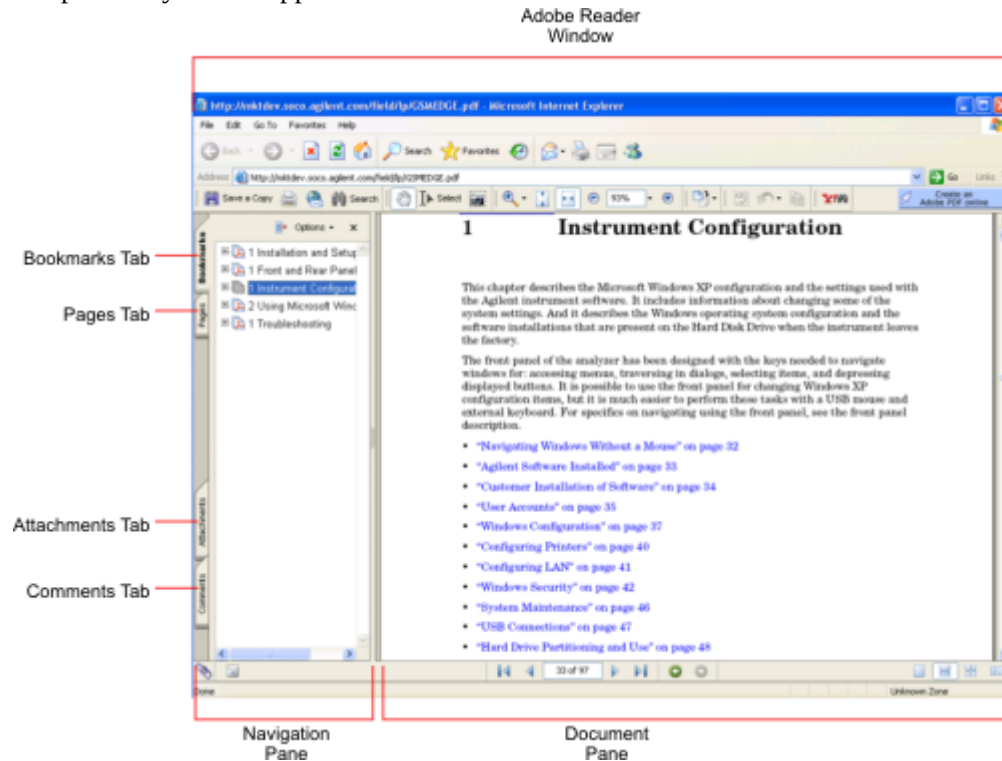
IMPORTANT To navigate PDF files effectively, you must attach a mouse and keyboard to the Analyzer.

If it is not possible to attach a mouse and keyboard to the Analyzer, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the Analyzer's hard disk can also be found on the Documentation CD shipped with the Analyzer. For details, see [“Copying the Acrobat \(PDF\) Files” on page 88](#).

Adobe Reader Window

When an Adobe Acrobat (PDF) file is open and being viewed, the Analyzer's display appears as below.

Note that, unlike the HTML Help Window, the Acrobat Reader Window is *not* embedded in the Analyzer's Application window. It is a separate window, which can be resized, moved and closed independently of the Application window.



The Adobe Reader Window itself consists of two panes, as shown in the diagram above.

On the left is the Navigation Pane (which may be hidden), and on the right is the Document Pane.

The Navigation Pane is further subdivided into four tabs: Bookmarks, Pages, Attachments and Comments. Typically, PDF files supplied with the Agilent X-Series Analyzers contain useful content only under the Bookmarks and Pages Tabs: the Attachments and Comments Tabs are not used.

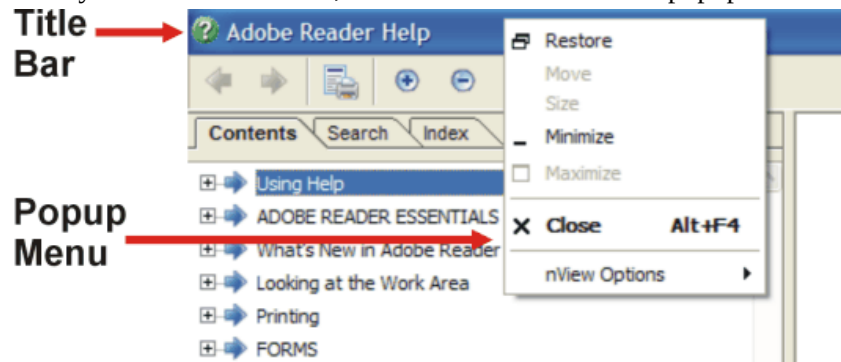
Navigating the Acrobat Reader Window

The online Help for Adobe Reader provides detailed information on how to use the Reader. To access the online Help, do the following:

- With the Adobe Reader window open, click **Help, Adobe Reader Help** in the menu at the top of the screen. This opens the Help window on top of the document window.
- To close the Help window, *either* click the Red **X** at the top right of the window, *or* right-click



anywhere in the title bar, then select **Close** from the popup menu.



Printing Acrobat Files

NOTE	The driver for the appropriate printer must be installed on the Analyzer's hard disk before any file can be printed.

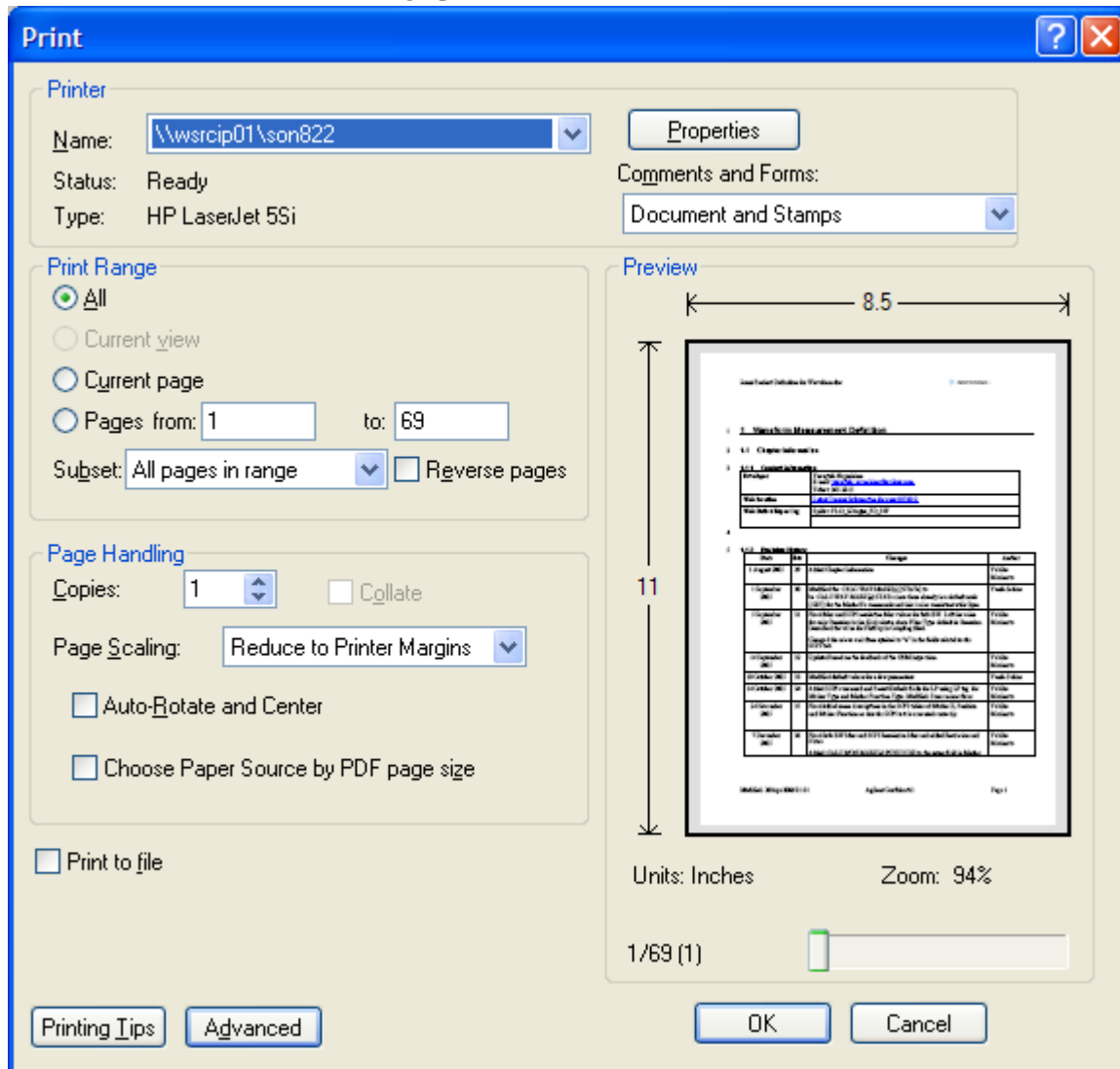
To print all or part of an open Acrobat file, do the following.

1. *Either*,
 - a. click on the Print icon in the Acrobat Reader toolbar,



- b. *or*, select File > Print from the menu.

2. The Acrobat Reader Print dialog opens, as shown below.



3. Choose the desired options within the Print dialog, then click OK to print (or click Cancel to cancel the printing).

NOTE Clicking the Properties button within the Print dialog opens a window containing controls that are specific to the printer model installed. Check the printer manufacturer's documentation for details of these capabilities.

Terms Used in This Documentation

Many special terms are used throughout this documentation. Please refer to the "Getting Started Guide" for detailed explanations of all these terms.

The Section below provides a brief description of special terms used in the Key parameter tables.

Terms used in Key Parameter Tables

The following terms are used in the parameter tables for each Front-panel key or softkey. However, a particular key description may not use all the terms listed.

Term	Meaning
Default Unit	The default measurement unit of the setting.
Default Terminator	Indicates the units that will be attached to the numeric value that you have entered. This default will be used from the front panel, when you terminate your entry by pressing the Enter key, rather than selecting a units key. This default will be used remotely when you send the command without specifying any units after your value(s).
Dependencies/ Couplings	Some commands may be unavailable when other parameters are set in certain ways. If applicable, any such limitations are described here.
Example	Provides command examples using the indicated remote command syntax.
Factory Preset	Describes the function settings after a Factory Preset .
Key Path	The sequence of Front-panel keys that accesses the function or setting.
Knob Increment/Decrement	The numeric value of the minimum increment or decrement that is applied when turning the thumb wheel knob.
Max	The Maximum numerical value that the setting can take.
Min	The Minimum numerical value that the setting can take.
Meas Global	The functionality described is the same in all measurements.
Meas Local	The functionality described is only true for the measurement selected.
Mode Global	The functionality described is the same for all modes.
Preset	In some cases, a Preset operation changes the status of a parameter. If the operation of the key specified is modified by a Preset operation, the effect is described here.
Range	Describes the range of the smallest to largest values to which the function can be set. If you try to set a value below the minimum value, the analyzer defaults to the minimum value. If you try to set a value above the maximum value, the analyzer defaults to the maximum value.
Remote Command	Shows the syntax requirements for each SCPI command.

Term	Meaning
Remote Command Notes	Additional notes regarding Remote Commands.
Resolution	Specifies the smallest change that can be made to the numeric value of a parameter.
SCPI Status Bits/OPC Dependencies	Pressing certain keys may affect one or more status bits. If applicable, details are given here.
State Saved	Indicates what happens to a particular function when the Analyzer state is saved (either to an external memory device or the internal D: drive). It also indicates whether the current settings of the function are maintained if the Analyzer is powered on or preset using Power On Last State or User Preset .

Context Sensitive Help not Available

You have been directed to this page because interactive help for the key you selected is not available.

The following information may help you to find related topics of interest:

- If your Analyzer has an attached Mouse and Keyboard, see the Section [“Searching for a Help Topic” on page 97](#).
- If your Analyzer does *not* have an attached Mouse and Keyboard, see the Section [Finding a Topic without a Mouse and Keyboard](#) below.
- If you want to learn how to select on-page links *without* a Mouse attached to your Analyzer, see the Section [Selecting a Hyperlink without a Mouse](#) below.

TIP If you want to understand the organization of Help, see the Section [“How Help is Organized” on page 90](#).

Finding a Topic without a Mouse and Keyboard

Follow this procedure when you want to display a different Help topic by selecting it from the Contents tab of the Help window’s Navigation Pane, but you do not have a mouse attached to the Analyzer.

Perform this action:	Using these keys:
1. If necessary, toggle the focus between the Contents tab of the Navigation Pane (left side of display) and the Topic Pane (right side of display) by pressing the Next Window key. Ensure that the focus is in the <i>Contents tab of the Navigation Pane</i> .	
2. Move up or down the Contents list, by pressing the Up Arrow or Down Arrow keys. Topics become highlighted upon selection.	
3. Display the selected topic, by pressing the Enter key.	

Selecting a Hyperlink without a Mouse

Follow this procedure when you want to select and follow a hyperlink on a Help page, but you do not have a mouse attached to the Analyzer.

Perform this action:	Using these keys:
1. If necessary, toggle the focus between the Contents tab of the Navigation Pane (left side of display) and the Topic Pane (right side of display) by pressing the Next Window key. Ensure that the focus is in the <i>Topic Pane</i>.	
2. Move from link to link in the Topic Pane (right side of display) by pressing the Forward Tab and Backward Tab keys. Links become highlighted upon selection. NOTE: When a Help page is first displayed, no link is selected. Clicking the Forward Tab key once selects the Previous Page key. Clicking the Forward Tab key a second time selects the Next Page key. Clicking the Forward Tab key for a third time selects the first hyperlink on the page. It is sometimes difficult to see the highlighting of the Previous and Next Page keys.	Use the Forward and Backward Tab keys  to select the Previous and Next Page keys 
3. When you have selected the desired link, activate it by pressing the Enter key.	

The X-Series signal analyzer measures and monitors complex RF and microwave signals. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The analyzer has Windows XP Pro® built in as an operating system, which expands the usability of the analyzer.

With a broad set of applications and demodulation capabilities, an intuitive user interface, outstanding connectivity and powerful one-button measurements, the analyzer is ideal for both R&D and manufacturing engineers working on cellular, emerging wireless communications, general purpose, aerospace and defense applications.

Innovative breakthroughs enable the following features:

Figure 2-1 Front-panel General Features

Identify signals quickly. Active functions and other instrument information are located the top and bottom of the screen, leaving the rest of the screen clear to display your measurement results.

Use 6 traces and 3 different detectors simultaneously.

Mark the frequency or position of a trace with up to 12 markers that enable easy viewing of measurement results.

Save files quickly and conveniently at the touch of a button with the quick-save feature.

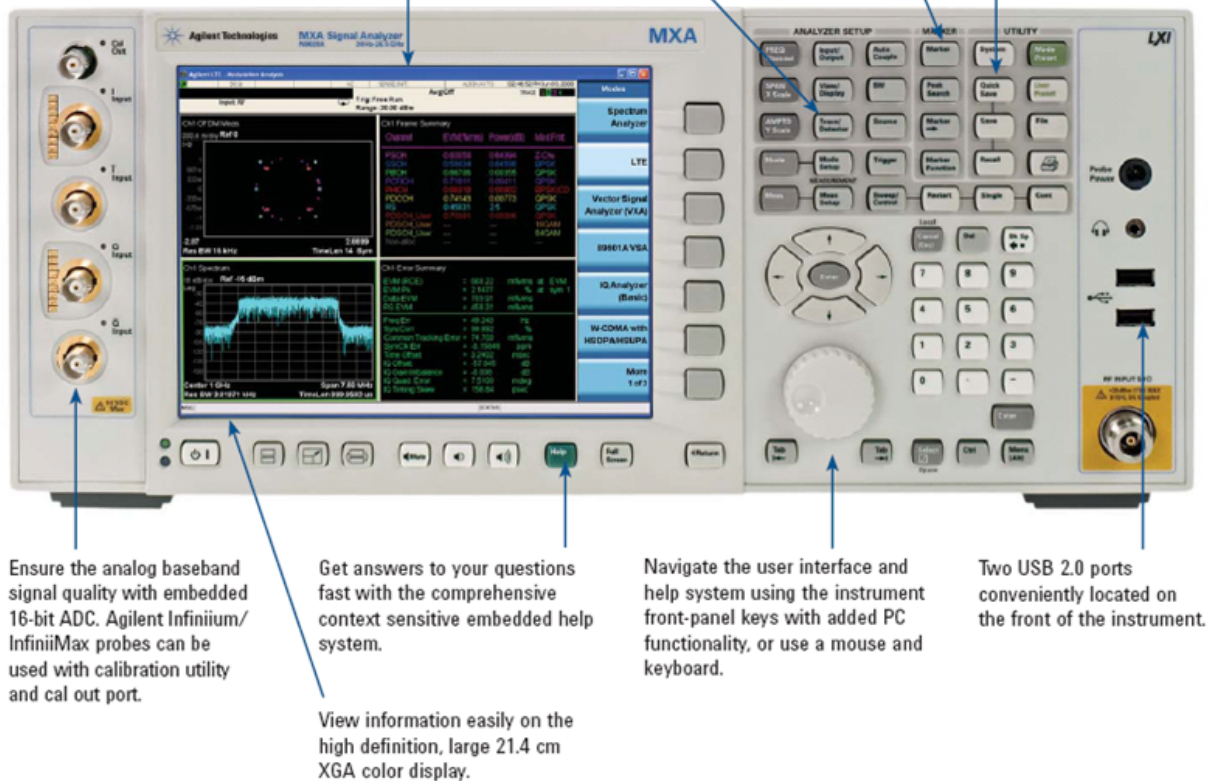
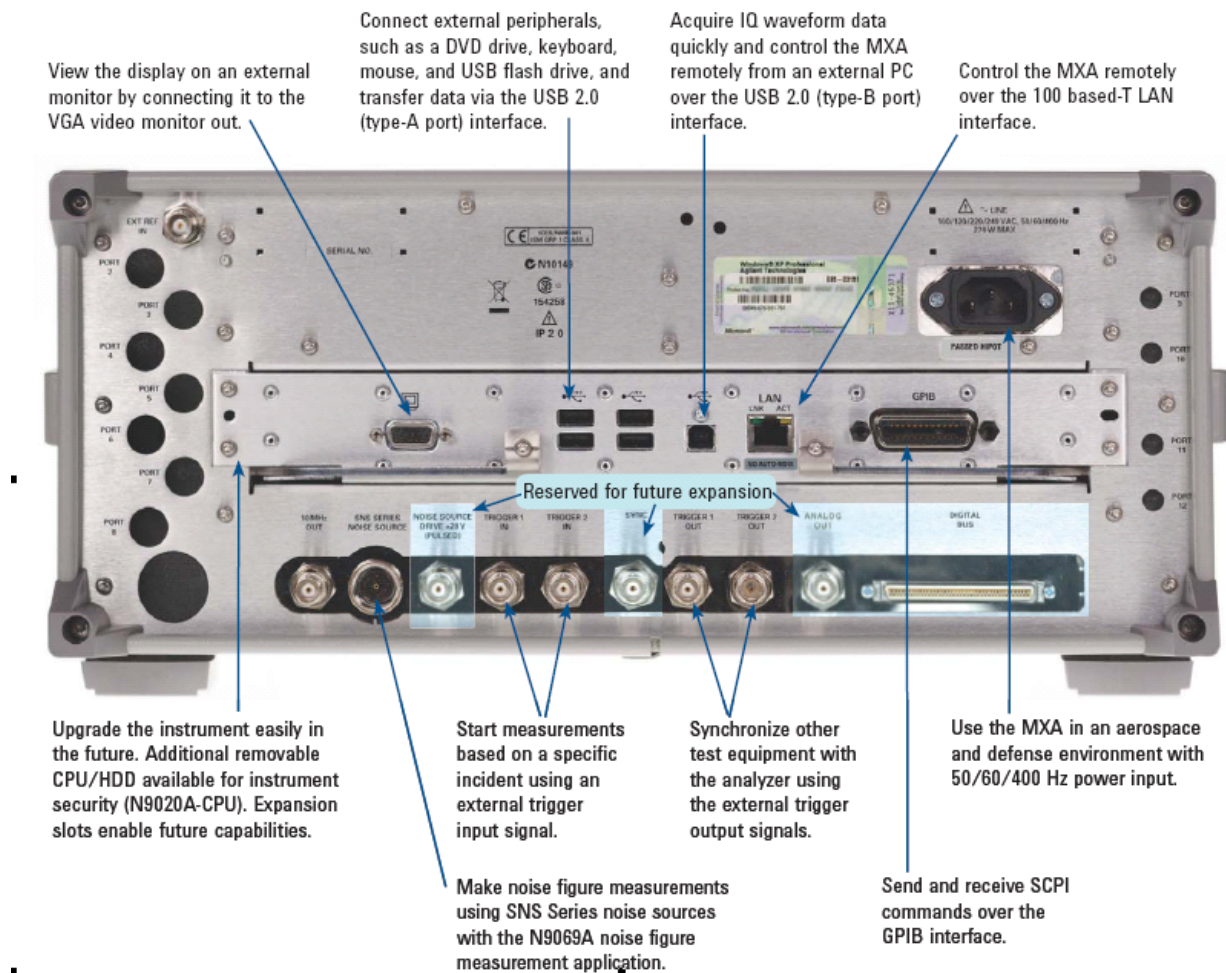


Figure 2-2 Rear-panel Features



Installing Application Software

When you want to install a measurement application after your initial hardware purchase, you actually only need to license it. All of the available applications are loaded in your analyzer at the time of purchase.

So when you purchase an application, you will receive an entitlement certificate that is used to obtain a license key for that particular measurement application. Enter the license key that you obtain into the N9020A Signal Analyzer to activate the new measurement application. See below for more information.

For the latest information on Agilent Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

http://www.agilent.com/find/sa_upgrades

Viewing a License Key

Measurement personalities purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a unique **License Key** for every measurement application purchased. The license key is a hexadecimal string that is specific to your measurement application, instrument model number and serial number. It enables you to install, or reactivate that particular application.

Press **System, Show, System** to display which measurement applications are currently licensed in your analyzer.

Go to the following location to view the license keys for the installed measurement applications:

C:\Programing Files\Agilent\Licensing

NOTE	You may want to keep a copy of your license key in a secure location. You can print out a copy of the display showing the license numbers to do this. If you should lose your license key, call your nearest Agilent Technologies service or sales office for assistance.

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an “Entitlement Certificate” which may be redeemed for a license key for one instrument. Follow the instructions that accompany the certificate to obtain your license key.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you would put the license file on the USB memory device at the root level. Follow the instructions that come with your software installation kit.

Installing a license key can also be done manually using the license management application in the instrument. It is found through the instrument front panel keys at **System, Licensing. . .**, or internally at C:\Programming Files\Agilent\Licensing.

NOTE You can also use these procedures to reinstall a license key that has been accidentally deleted, or lost due to a memory failure.

Missing and Old Measurement Application Software

All the software applications were loaded at the time of original instrument manufacture. It is a good idea to regularly update your software with the latest available version. This assures that you get any improvements and expanded functionality that is available.

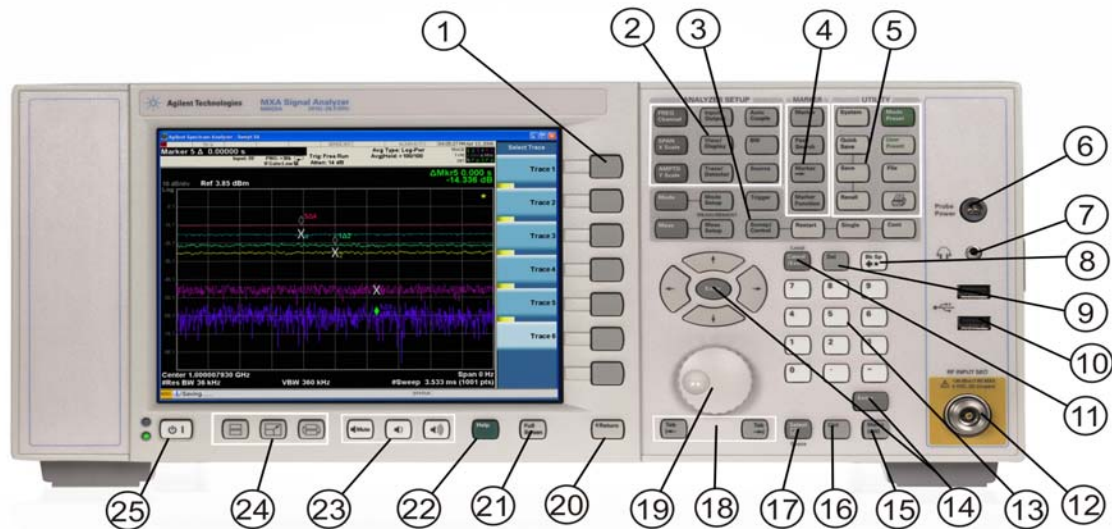
Because the software was loaded at the initial purchase, there may be additional measurement applications that are now available. If the application you are interested in licensing is not available, you will need to do a software update. (Press **System, Show, System.**)

Check the Agilent internet website for the latest software versions available for downloading:

http://www.agilent.com/find/mxa_software
http://www.agilent.com/find/exa_software

You must load the updated software package into the analyzer from a USB drive, or directly from the internet. An automatic loading program is included with the files.

Front-Panel Features



Item		Description
#	Name	
1	Menu Keys	Key labels appear to the left of the menu keys to identify the current function of each key. The displayed functions are dependent on the currently selected Mode and Measurement, and are directly related to the most recent key press.
2	Analyzer Setup Keys	These keys set the parameters used for making measurements in the current Mode and Measurement.
3	Measurement Keys	These keys select the Mode, and the Measurement within the mode. They also control the initiation and rate of recurrence of measurements.
4	Marker Keys	Markers are often available for a measurement, to measure a very specific point/segment of data within the range of the current measurement data.
5	Utility Keys	These keys control system-wide functionality like: - instrument configuration information and I/O setup, - printer setup and printing, - file management, save and recall, - instrument presets.
6	Probe Power	Supplies power for external high frequency probes and accessories.
7	Headphones Output	Headphones can be used to hear any available audio output.
8	Back Space Key	Press this key to delete the previous character when entering alphanumeric information. It also works as the Back key in Help and Explorer windows.
9	Delete Key	Press this key to delete files, or to perform other deletion tasks.
10	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive.

About the Analyzer

Front-Panel Features

Item		Description
#	Name	
11	Local/Cancel/(Esc) Key	If you are in remote operation, Local: • returns instrument control from remote back to local (the front panel). • turns the display on (if it was turned off for remote operation). • can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.) If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value. Esc works the same as it does on a pc keyboard. It: • exits Windows dialogs • clears errors • aborts printing • cancels operations.
12	RF Input	Connector for inputting an external signal. Make sure that the total power of all signals at the analyzer input does <i>not</i> exceed +30 dBm (1 watt).
13	Numeric Keypad	Enters a specific numeric value for the current function. Entries appear on the upper left of the display, in the measurement information area.
14	Enter and Arrow Keys	The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit. The arrow keys: • Increment and decrement the value of the current measurement selection. • Navigate help topics. • Navigate, or make selections, within Windows dialogs. • Navigate within forms used for setting up measurements. • Navigate within tables. NOTE: The arrow keys cannot be used to move a mouse pointer around on the display.
15	Menu/ (Alt) Key	Alt works the same as a pc keyboard. Use it to change control focus in Windows pull-down menus.
16	Ctrl Key	Ctrl works the same as a pc keyboard. Use it to navigate in Windows applications, or to select multiple items in lists.
17	Select / Space Key	Select is also the Space key and it has typical pc functionality. For example, in Windows dialogs, it selects files, checks and unchecks check boxes, and picks radio button choices. It opens a highlighted Help topic.
18	Tab Keys	Use these keys to move between fields in Windows dialogs.
19	Knob	Increments and decrements the value of the current active function.
20	Return Key	Exits the current menu and returns to the previous menu. Has typical pc functionality.
21	Full Screen Key	Pressing this key turns off the softkeys to maximize the graticule display area.

Item		Description
#	Name	
22	Help Key	Initiates a context-sensitive Help display for the current Mode. Once Help is accessed, pressing a front panel key brings up the help topic for that key function.
23	Speaker Control Keys	Enables you to increase or decrease the speaker volume, or mute it.
24	Window Control Keys	These keys select between single or multiple window displays. They zoom the current window to fill the data display, or change the currently selected window. They can be used to switch between the Help window navigation pane and the topic pane.
25	Power Standby/ On	Turns the analyzer on. A green light indicates power on. A yellow light indicates standby mode. NOTE: The front-panel switch is a standby switch, <i>not</i> a LINE switch (disconnecting device). The analyzer continues to draw power even when the line switch is in standby. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.
26	Q Input	Input port for the Q channel when in differential mode. ^a
27	Q Input	Input port for the Q channel for either single or differential mode. ^a
28	I Input	Input port for the I channel when in differential mode. ^a
29	I Input	Input port for the I channel for either single or differential mode. ^a
30	Cal Out	Output port for probe calibration data. ^a

a. Status of the LED indicates whether the current state of the port is active (green) or is not in use (dark).

Overview of key types

The keys labeled **FREQ Channel**, **System**, and **Marker Functions** are all examples of front-panel keys. Most of the dark or light gray keys access menus of functions that are displayed along the right side of the display. These displayed key labels are next to a column of keys called menu keys.

Menu keys list functions based on which front-panel key was pressed last. These functions are also dependant on the current selection of measurement application (**Mode**) and measurement (**Meas**).

If the numeric value of a menu key function can be changed, it is called an active function. The function label of the active function is highlighted after that key has been selected. For example, press **AMPTD Y Scale**. This calls up the menu of related amplitude functions. The function labeled **Ref Level** (the default selected key in the Amplitude menu) is highlighted. **Ref Level** also appears in the upper left of the display in the measurement information area. The displayed value indicates that the function is selected and its value can now be changed using any of the data entry controls.

Some menu keys have multiple choices on their label, such as **On/Off** or **Auto/Man**. The different choices are selected by pressing the key multiple times. Take an Auto/Man type of key as an example. To select the function, press the menu key and notice that Auto is underlined and the key becomes

highlighted. To change the function to manual, press the key again so that Man is underlined. If there are more than two settings on the key, keep pressing it until the desired selection is underlined.

When a menu first appears, one key label is highlighted to show which key is the default selection. If you press **Marker Function**, the **Marker Function Off** key is the menu default key, and is highlighted.

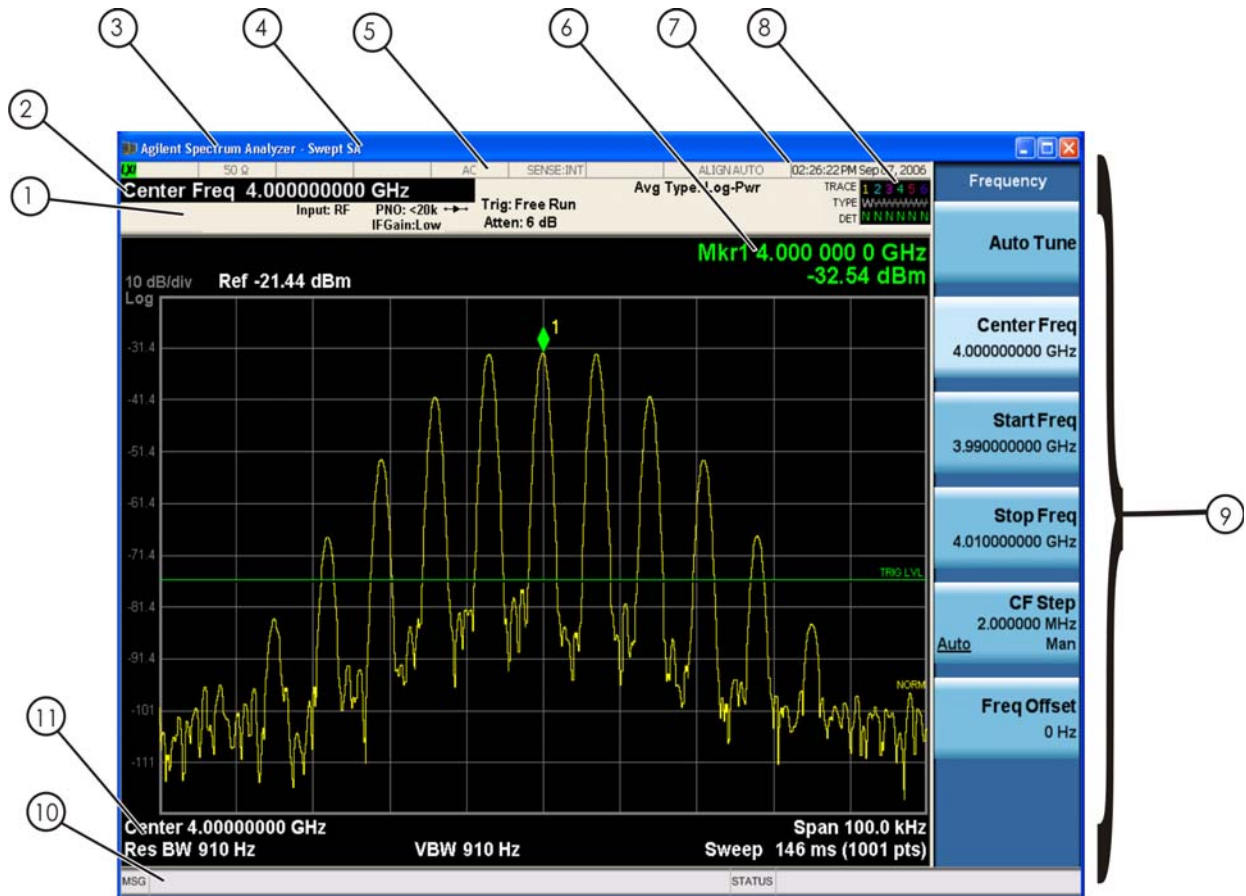
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are linked are related functions, and only one of them can be selected at any one time. For example, a marker can only have one marker function active on it. So if you select a different function it turns off the previous selection. If the current menu is two pages long, the yellow bar or border could include keys on the second page of keys.

In some key menus, a key label is highlighted to show which key has been selected from multiple available choices. And the menu is immediately exited when you press one of the other keys. For example, when you press the **Select Trace** key (in the **Trace/Detector** menu), it brings up its own menu of keys. The **Trace 1** key is highlighted. When you press the **Trace 2** key, the highlight moves to that key and the screen returns to the **Trace/Detector** menu.

If a displayed key label shows a small solid-black arrow tip pointing to the right, it indicates that additional key menus are available. If the arrow tip is not filled in solid then pressing the key the first time selects that function. Now the arrow is solid and pressing it again brings up an additional menu of settings.

Display Annotations

This section describes the display annotation as it is on the Spectrum Analyzer Measurement Application display. Other measurement application modes have some annotation differences.



Item	Description	Function Keys
1	Measurement bar - Shows general measurement settings and information.   Indicates single/continuous measurement. Some measurements include limits that the data is tested against. A Pass/Fail indication may be shown in the lower left of the measurement bar.	All the keys in the Analyzer Setup part of the front panel.
2	Active Function (measurement bar) - when the current active function has a settable numeric value, it is shown here.	Currently selected front panel key.
3	Banner - shows the name of the selected application that is currently running.	Mode
4	Measurement title - shows title information for the current measurement, or a title that you created for the measurement.	Meas View/Display, Display, Title

About the Analyzer
Display Annotations

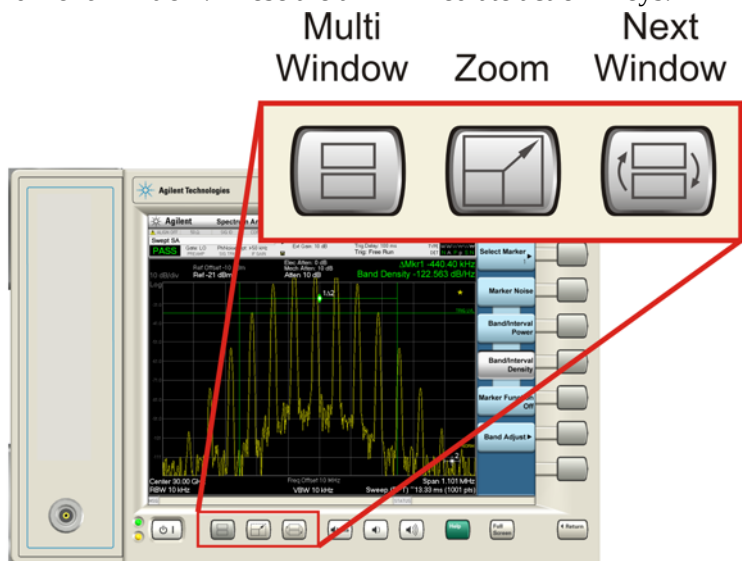
Item	Description	Function Keys
5	Settings panel - displays system information that is not specific to any one application. - Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ - Input impedance and coupling - Selection of external frequency reference - Setting of automatic internal alignment routine	Local and System , I/O Config Input/Output , Amplitude , System and others
6	Active marker frequency, amplitude or function value	Marker
7	Settings panel - time and date display.	System , Control Panel
8	Trace and detector information	Trace/Detector , Clear Write (W) Trace Average (A) Max Hold (M) Min Hold (m) Trace/Detector , More , Detector , Average (A) Normal (N) Peak (P) Sample (S) Negative Peak (p)
9	Key labels that change based on the most recent key press.	Softkeys
10	Displays information, warning and error messages. Message area - single events, Status area - conditions	
11	Measurement settings for the data currently being displayed in the graticule area. In the example above: center frequency, resolution bandwidth, video bandwidth, frequency span, sweep time and number of sweep points.	Keys in the Analyzer Setup part of the front panel.

About the Analyzer
Rear-Panel Features

Item		Description
#	Name	
11	TRIGGER 1 OUT	A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys.
12	Sync	Reserved for future use.
13	TRIGGER 2 IN	Allows external triggering of measurements.
14	TRIGGER 1 IN	Allows external triggering of measurements.
15	Noise Source Drive +28 V (Pulsed)	For use with Agilent 346A, 346B, and 346C Noise Sources
16	SNS Series Noise Source	For use with Agilent N4000A, N4001A, N4002A Smart Noise Sources (SNS).
17	10 MHz OUT	An output of the analyzer internal 10 MHz frequency reference signal. It is used to lock the frequency reference of other test equipment to the analyzer.

Window Control Keys

The instrument provides three front-panel keys for controlling windows. They are **Multi Window**, **Zoom**, and **Next Window**. These are all “immediate action” keys.



Multi-Window

The **Multi Window** front-panel key is not used at this time. It is there to support future functionality.

Key Path	Front-panel key

Zoom

Zoom is a toggle function. Pressing once Zooms the selected window; pressing again un-zooms.

When Zoom is on for a window, that window gets the entire primary display area. The zoomed window, since it is the selected window, is outlined in green.

Zoom is local to each Measurement. Each Measurement remembers its Zoom state. The Zoom state of each Measurement is part of the Mode’s state.

The state of zoom, and which window is zoomed, is saved in State.

Data acquisition and processing for the other windows continues while a window is zoomed, as does all SCPI communication with the other windows.

Remote Command	:DISPlay:WINDow:FORMat:TILE ZOOM

Example	:DISP:WIND:FORM:ZOOM sets zoomed
	:DISP:WIND:FORM:TILE sets un-zoomed

Preset	TILE

Next Window

This key selects the next window of the current view. When this key is selected in Help Mode, it toggles focus between the table of contents window and the topic pane window.

Remote Command	:DISPlay:WINDow[:SElect] <number> :DISPlay:WINDow[:SElect] ?
Example	:DISP:WIND 1
Preset	1
Min	1
Max	If <number> is greater than the number of windows, limit to <number of windows>

Selected Window

One and only one window is always selected.

If a window is not selected, its boundary is gray. The selected window has a green boundary.

If a window in a multi-window display is zoomed it is still outlined in green. If there is only one window, the green outline is not used. This allows you to distinguish between a zoomed window and a display with only one window.

The selected window is local to each Measurement. Each Measurement remembers which window is selected. The selected window for each Measurement is remembered in Mode state.

Navigating Windows

When the Next Window key is pressed, the next window in the order of precedence (see below) becomes selected. If the selected window was zoomed, the next window will also be zoomed.

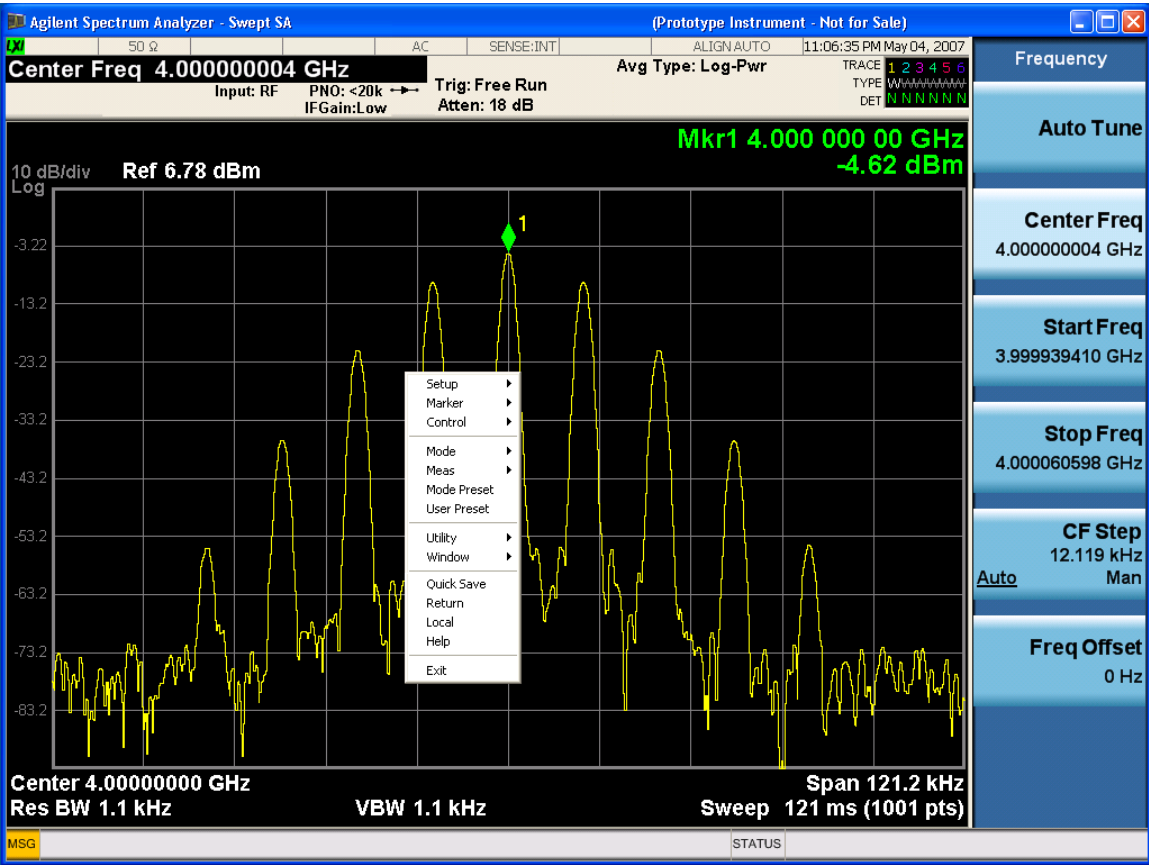
The window navigation does NOT use the arrow and select keys. Those are reserved for navigation within a window.

Mouse and Keyboard Control

If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front panel keys.

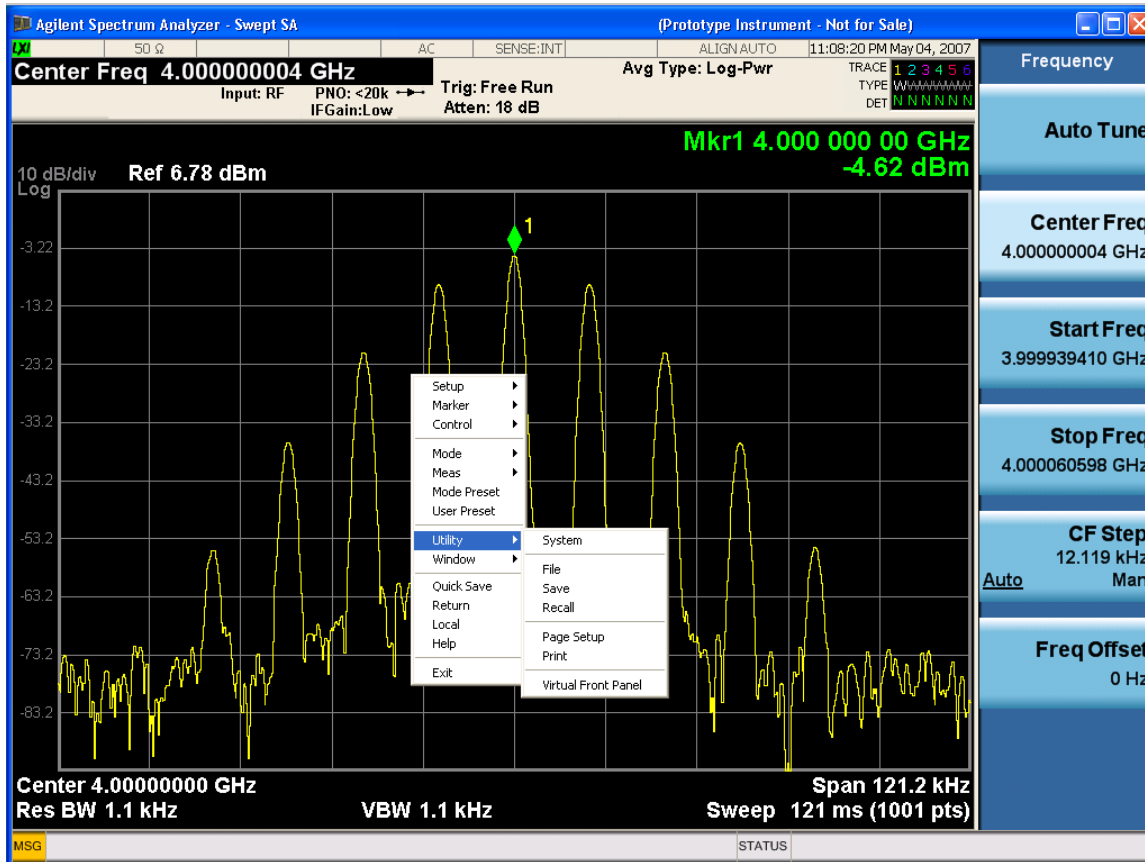
Right-Click

If you plug in a mouse and right-click on the analyzer screen, a menu appears as below:



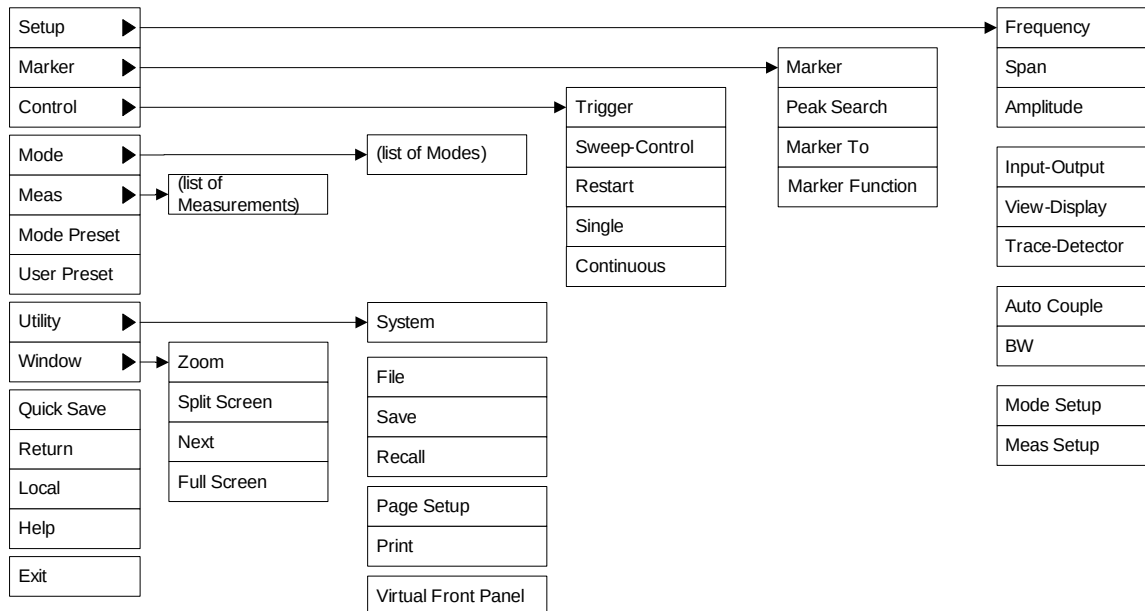
Placing the mouse on one of the rows marked with a right arrow symbol causes that row to expand, as for example below where the mouse is hovered over the “Utility” row:

About the Analyzer Mouse and Keyboard Control



This method can be used to access any of the front-panel keys by using a mouse; as for example if you are accessing the instrument through Remote Desktop.

The array of keys thus available is shown below:



PC Keyboard

If you have a PC keyboard plugged in (or via Remote Desktop), certain key codes on the PC keyboard map to front-panel keys on the GPSA front panel. These key codes are shown below:

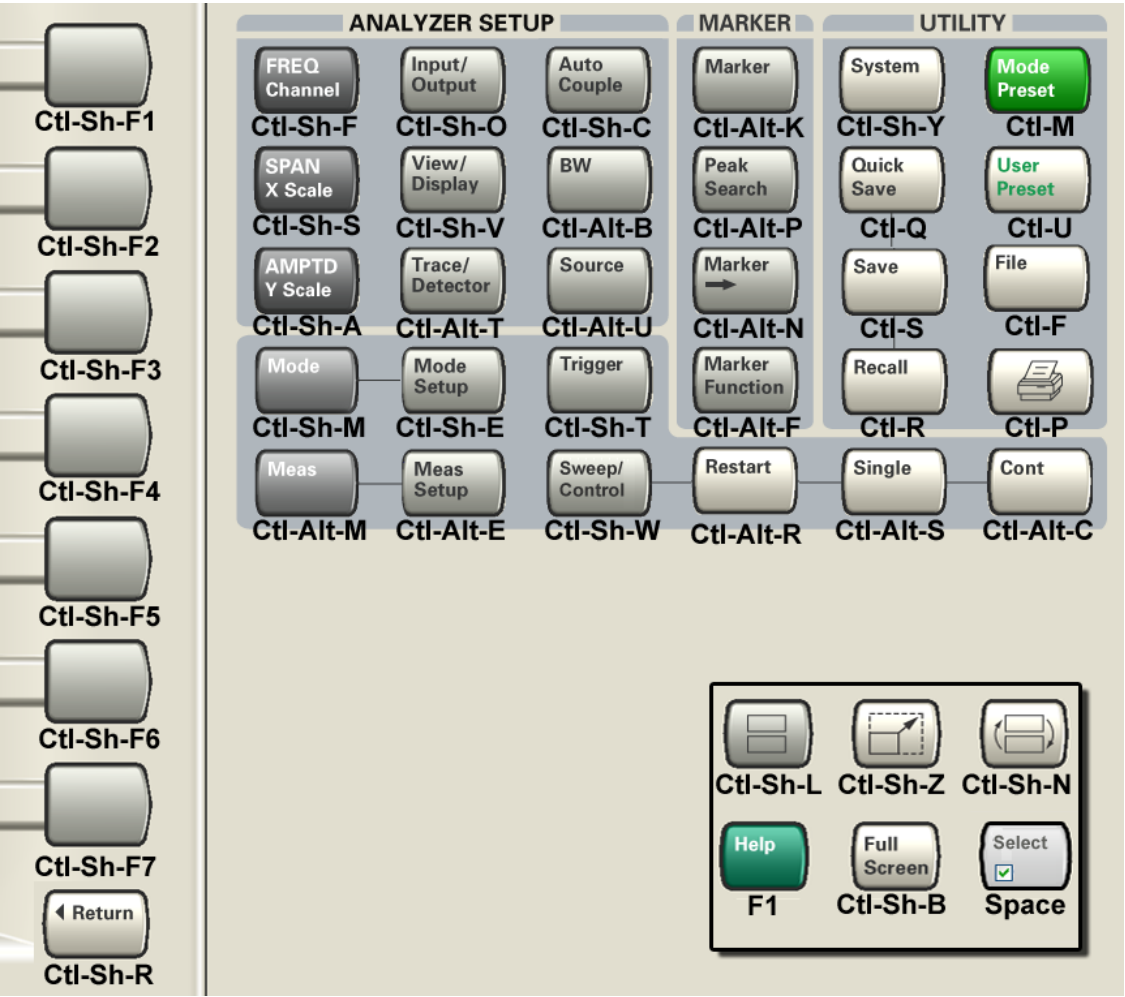
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+SHIFT+E
Marker	CTRL+SHIFT+K
Peak Search	CTRL+SHIFT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
QuickSave	CTRL+SHIFT+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+F
Mode	CTRL+SHIFT+M
Measure	CTRL+ALT+M
Mode Setup	CTRL+ALT+E
Meas Setup	CTRL+ALT+U
Trigger	CTRL+SHIFT+T
Sweep/Control	CTRL+SHIFT+W
Restart	CTRL+ALT+R
Single	CTRL+ALT+S

About the Analyzer
Mouse and Keyboard Control

Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
NextWindow	CTRL+SHIFT+N
SplitScreen	CTRL+SHIFT+L
FullScreen	CTRL+SHIFT+B
Return	CTRL+SHIFT+R
Mute	Mute
Inc Audio	Volume Up
Dec Audio	Volume Down
Help	F1
Control	CTRL
Alt	ALT
Enter	Return
Cancel	Esc
Del	Delete
Backspace	Backspace
Select	Space
Up Arrow	Up
Down Arrow	Down
Left Arrow	Left
Right Arrow	Right
Menu key1	CTRL+SHIFT+F1
Menu key2	CTRL+SHIFT+F2
Menu key3	CTRL+SHIFT+F3
Menu key4	CTRL+SHIFT+F4
Menu key5	CTRL+SHIFT+F5
Menu key6	CTRL+SHIFT+F6
Menu key7	CTRL+SHIFT+F7
Backspace	BACKSPACE
Enter	ENTER
Tab	Tab
1	1

2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

Here is a pictorial view of the table above:



About the Spectrum Analyzer Measurement Application

This document provides information on using the Spectrum Analyzer Mode in your Agilent Signal Analyzer.

What Does Spectrum Analyzer Mode Do?

This Mode includes three types of measurements.

1. The Swept SA measurement provides a general purpose spectrum analyzer measurement environment. It has a large breadth of flexible measurement functions like a traditional swept frequency spectrum analyzer and FFT analyzer. It lets you locate and measure all the different types of signals in your devices and systems.
2. The List Sweep measurement can only be used remotely. It is designed for fast measurement throughput. The available measurement setup functions are a limited subset of the functions available in Swept SA. This measurement lets you remotely extract amplitude values for multiple detectors at known frequencies. You configure the analyzer to make a list of single-point measurements. This list can then be run multiple times saving measurement setup time and reducing I/O overhead and traffic. The measurements in the list are all performed in zero-span.
3. Most of the rest of the measurements in the mode will set up measurement of a specific type of signal. These pre-configured measurements limit the available setup functions to a subset that is appropriate for each particular measurement. This saves you a lot of measurement setup time and complexity. These one-button measurements apply a measurement algorithm to the instrument functions themselves, coupling some settings for optimum measurement integrity. These one-button measurements include:
 - Adjacent Channel Power Ratio (ACPR or ACLR)
 - Channel Power
 - Occupied BW
 - Power Stat CCDF
 - Spectrum Emission Mask
 - Spurious Emissions

NOTE

LXI-B capability is available in the Spectrum Analyzer Mode. The LXI Standard (Lan eXtensions for Instruments) brings the connectivity of the internet to the Test and Measurement industry. LXI-B adds a number of tools that a system integrator may use to improve the efficiency of measurements and to improve the visibility into the system. Refer to the Programmer's Guide which can be viewed and printed from the Documentation Roadmap page in Help or in your instrument at:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\
Help\bookfiles\x_series_prog.pdf.

Installing Application Software

When you want to install a measurement application after your initial hardware purchase, you actually only need to license it. All of the available applications are loaded in your analyzer at the time of purchase.

So when you purchase an application, you will receive an entitlement certificate that is used to obtain a license key for that particular measurement application. Enter the license key that you obtain into the N9020A Signal Analyzer to activate the new measurement application. See below for more information.

For the latest information on Agilent Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

http://www.agilent.com/find/sa_upgrades

Viewing a License Key

Measurement personalities purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a unique **License Key** for every measurement application purchased. The license key is a hexadecimal string that is specific to your measurement application, instrument model number and serial number. It enables you to install, or reactivate that particular application.

Press **System, Show, System** to display which measurement applications are currently licensed in your analyzer.

Go to the following location to view the license keys for the installed measurement applications:

C:\Programing Files\Agilent\Licensing

NOTE	You may want to keep a copy of your license key in a secure location. You can print out a copy of the display showing the license numbers to do this. If you should lose your license key, call your nearest Agilent Technologies service or sales office for assistance.

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an “Entitlement Certificate” which may be redeemed for a license key for one instrument. Follow the instructions that accompany the certificate to obtain your license key.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you would put the license file on the USB memory device at the root level. Follow the instructions that come with your software installation kit.

Installing a license key can also be done manually using the license management application in the instrument. It is found through the instrument front panel keys at **System, Licensing. . .**, or internally at C:\Programming Files\Agilent\Licensing.

NOTE You can also use these procedures to reinstall a license key that has been accidentally deleted, or lost due to a memory failure.

Missing and Old Measurement Application Software

All the software applications were loaded at the time of original instrument manufacture. It is a good idea to regularly update your software with the latest available version. This assures that you get any improvements and expanded functionality that is available.

Because the software was loaded at the initial purchase, there may be additional measurement applications that are now available. If the application you are interested in licensing is not available, you will need to do a software update. (Press **System, Show, System.**)

Check the Agilent internet website for the latest software versions available for downloading:

http://www.agilent.com/find/mxa_software

http://www.agilent.com/find/exa_software

You must load the updated software package into the analyzer from a USB drive, or directly from the internet. An automatic loading program is included with the files.

This chapter provides introductory information about the programming documentation included with your product.

What Programming Information is Available?

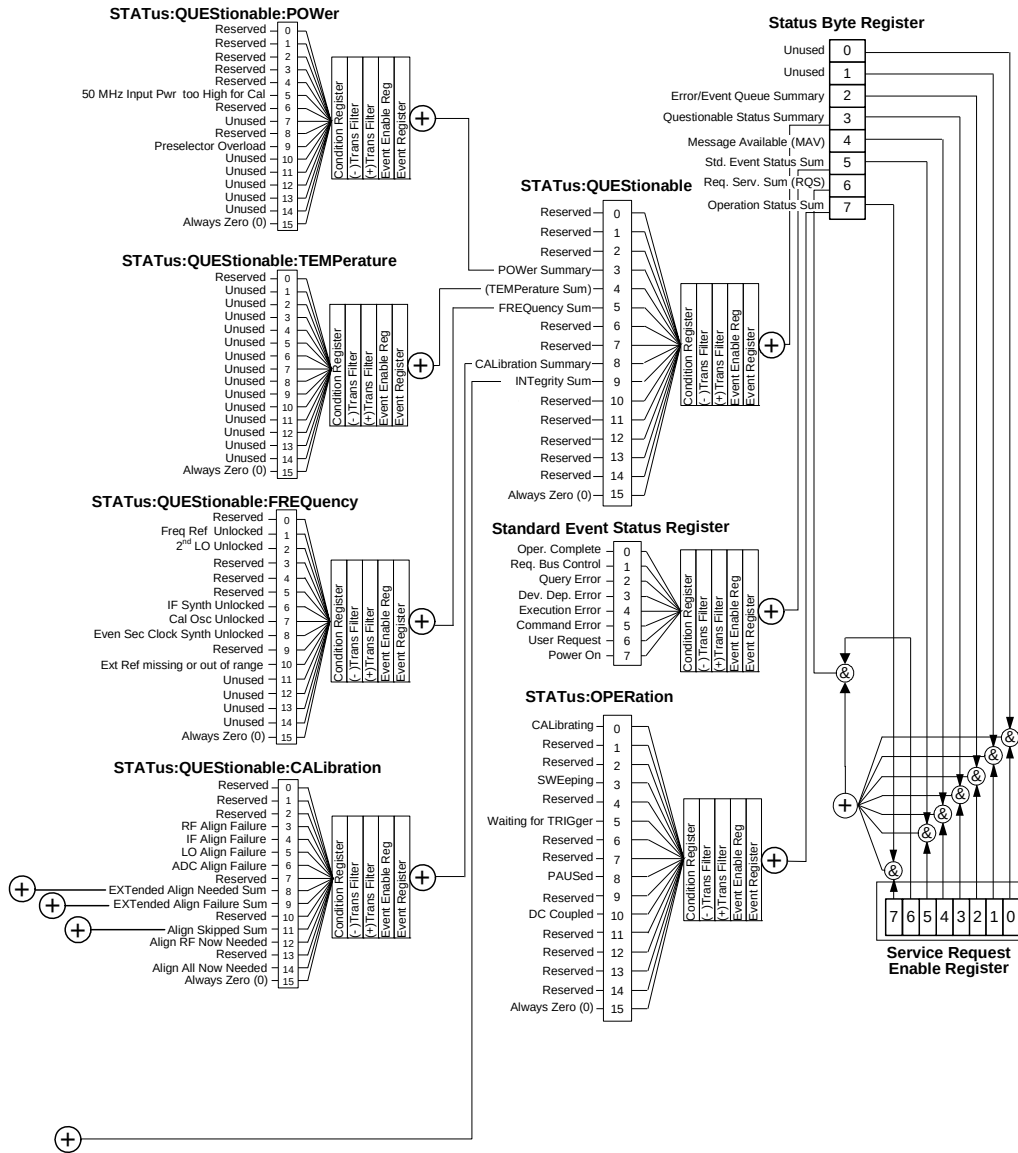
The following resources are available to help you create programs for automating your X-Series measurements:

- X-Series Programmer's Guide (N9020-90084):
 - Chapter 1, "Introduction to Programming X-Series Applications"
The Introduction includes sections on the following:
 - What Programming Information is Available? (Similar to this section.)
 - Using Embedded Help for Programming
 - Communicating SCPI Using Telnet
 - Chapter 2, "Programming Fundamentals"
Programming Fundamentals includes sections on the following:
 - SCPI Language Basics
 - Improving Measurement Speed
 - Programming in C Using the VTL
 - Chapter 3, "Measurement Synchronization with LXI-B"
 - Chapter 5, "Installing Application Software"
 - Chapter 4, "Programming Examples"
- Getting Started Guide (N9020-90074):
A copy of the Getting Started Guide is shipped with your analyzer, and is also available online:
<http://cp.literature.agilent.com/litweb/pdf/N9020-90074.pdf>
The Getting Started Guide has valuable sections related to programming including:
 - Configuring instrument LAN Hostname, IP Address, and Gateway
 - Using the Remote Desktop connection to operate the instrument front panel remotely
 - Using the Embedded Web Server Telnet connection to communicate SCPI
- Embedded Help in your Instrument - embedded Help provides SCPI command details associated with all front-panel and soft keys.
- User's Reference manuals - Printable PDF versions of User's References for all Measurement Applications are provided on the Documentation CD ROM, and in the instrument here:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles
- Application Notes- Printable PDF versions of many Application Notes are provided on the Documentation CD ROM, and in the instrument here:
C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\otherdocs

STATus Subsystem (No equivalent front panel keys)

The following graphics show the current MXA Status Register Subsystem implementation.

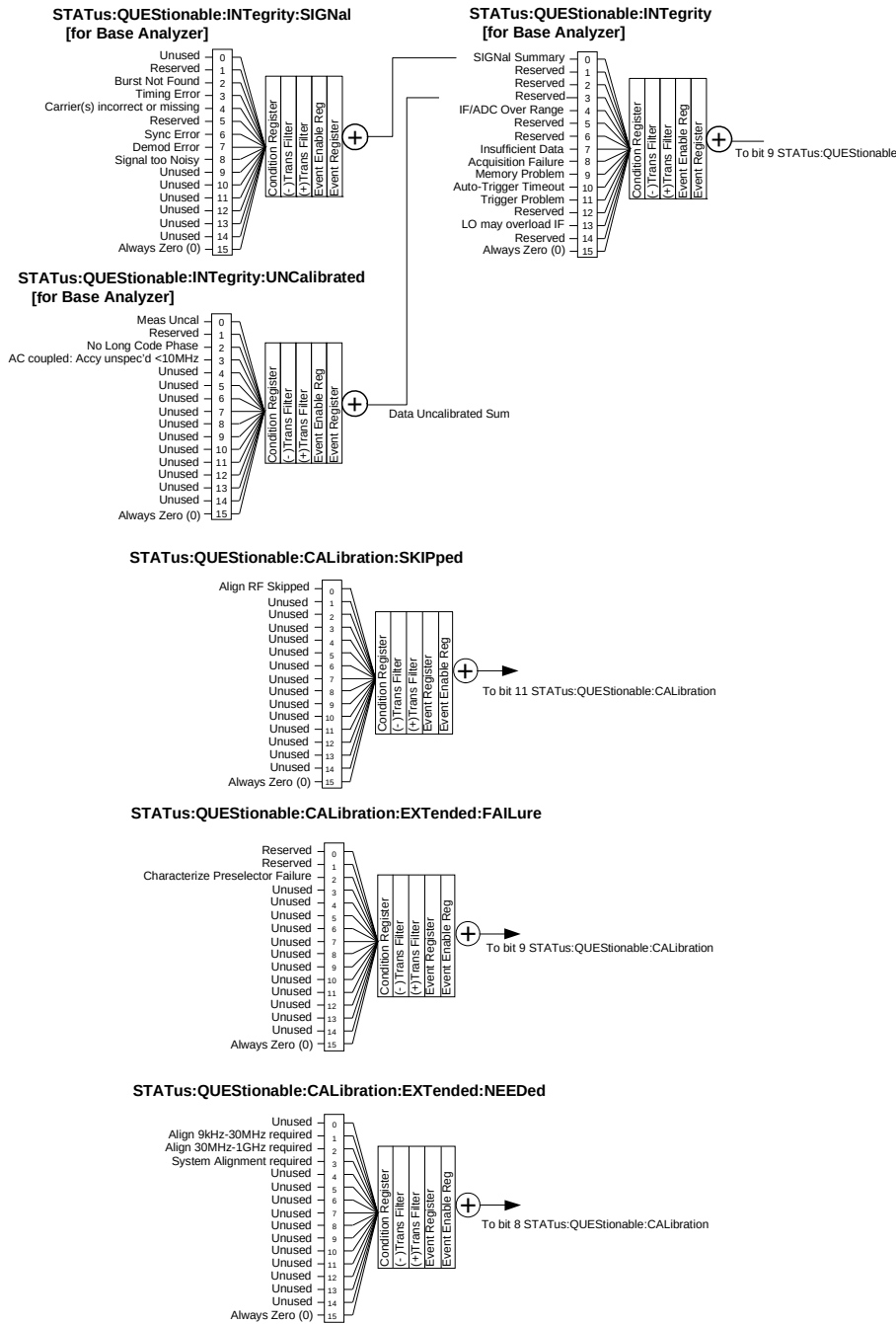
MXA Status Byte Register System



Programming the Analyzer

STATus Subsystem (No equivalent front panel keys)

Additional Registers:



Signal Analysis Division

Rev 4 June 17, 2007
Page 2

Detailed Description

The STATus subsystem remote commands set and query the status hardware registers. This system of registers monitors various events and conditions in the instrument. Software written to control the instrument may need to monitor some of these events and conditions.

All status register commands are sequential. Most commands can be started immediately and will overlap with any existing commands that are already running. This is not true of status commands. All the commands in the spectrum analyzer are assumed to be overlapped unless a command description specifically says that it is sequential.

What Are Status Registers

The status system contains multiple registers that are arranged in a hierarchical order. The lower-level status registers propagate their data to the higher-level registers in the data structures by means of summary bits. The status byte register is at the top of the hierarchy and contains general status information for the instrument's events and conditions. All other individual registers are used to determine the specific events or conditions. For a diagram of the registers and their interconnections, see above.

The operation and questionable status registers are sets of registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. Each register set is made up of five registers:

- **Condition Register** It reports the real-time state of the signals monitored by this register set. There is no latching or buffering for a condition register.
- **Positive Transition Register** This filter register controls which signals will set a bit in the event register when the signal makes a low to high transition (when the condition bit changes from 0 to 1).
- **Negative Transition Register** This filter register controls which signals will set a bit in the event register when the signal makes a high to low transition (when the condition bit changes from 1 to 0).
- **Event Register** It latches any signal state changes, in the way specified by the filter registers. Bits in the event register are never cleared by signal state changes. Event registers are cleared when read. They are also cleared by *CLS and by presetting the instrument.
- **Event Enable Register** It controls which of the bits, being set in the event register, will be summarized as a single output for the register set. Summary bits are then used by the next higher register.

The STATus:QUEStionable registers report abnormal operating conditions. The status register hierarchy is:

1. The summary outputs from the six STATus:QUEStionable:<keyword> detail registers are inputs to the STATus:QUEStionable register.
2. The summary output from the STATus:QUEStionable register is an input to the Status Byte Register.

The STATus:OPERation register set has no summarized inputs. The inputs to the STATus:OPERation:CONDition register indicate the real time state of the instrument. The STATus:OPERation:EVENT register summary output is an input to the Status Byte Register.

What Are Status Register SCPI Commands

Most monitoring of the instrument conditions is done at the highest level using the IEEE common commands indicated below. Complete command descriptions are available in the IEEE commands section at the beginning of the language reference. Individual status registers can be set and queried using the commands in the STATus subsystem of the language reference.

- *CLS (clear status) clears the status byte by emptying the error queue and clearing all the event

registers.

- *ESE, *ESE? (event status enable) sets and queries the bits in the enable register part of the standard event status register.
- *ESR? (event status register) queries and clears the event register part of the standard event status register.
- *OPC, *OPC? (operation complete) sets the standard event status register to monitor the completion of all commands. The query stops any new commands from being processed until the current processing is complete, then returns a '1'.
- *PSC, *PSC? (power-on state clear) sets the power-on state so that it clears the service request enable register and the event status enable register at power on.
- *SRE, *SRE? (service request enable) sets and queries the value of the service request enable register.
- *STB? (status byte) queries the value of the status byte register without erasing its contents.

How to Use the Status Registers

A program often needs to be able to detect and manage error conditions or changes in instrument status. There are two methods you can use to programmatically access the information in status registers:

- The polling method
- The service request (SRQ) method

In the polling method, the instrument has a passive role. It only tells the controller that conditions have changed when the controller asks the right question. In the SRQ method, the instrument takes a more active role. It tells the controller when there has been a condition change without the controller asking. Either method allows you to monitor one or more conditions.

The polling method works well if you do not need to know about changes the moment they occur. The SRQ method should be used if you must know immediately when a condition changes. To detect a change using the polling method, the program must repeatedly read the registers.

Use the SRQ method when:

- you need time-critical notification of changes
- you are monitoring more than one device which supports SRQs
- you need to have the controller do something else while waiting
- you can't afford the performance penalty inherent to polling

Use polling when:

- your programming language/development environment does not support SRQ interrupts
- you want to write a simple, single-purpose program and don't want the added complexity of setting up an SRQ handler
- To monitor a condition:

1. Determine which register contains the bit that reports the condition.

2. Send the unique SCPI query that reads that register.
3. Examine the bit to see if the condition has changed.

You can monitor conditions in different ways.

- Check the current instrument hardware and firmware status.

Do this by querying the condition registers which continuously monitor status. These registers represent the current state of the instrument. Bits in a condition register are updated in real time. When the condition monitored by a particular bit becomes true, the bit is set to 1. When the condition becomes false, the bit is reset to 0.

- Monitor a particular condition (bit).

You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it stays set until the event register is cleared. Querying the event register allows you to detect that this condition occurred even if the condition no longer exists. The event register can only be cleared by querying it or sending the *CLS command.

- Monitor a particular type of change in a condition (bit).
 - The transition registers are preset to register if the condition goes from 0 to 1 (false to true, or a positive transition).
 - This can be changed so the selected condition is detected if the bit goes from 1 to 0 (true to false, or a negative transition).
 - It can also be set for both types of transitions occurring.
 - Or it can be set for neither transition. If both transition registers are set to 0 for a particular bit position, that bit will not be set in the event register for either type of change.

Using a Status Register

Each bit in a register is represented by a numerical value based on its location. See figure below. This number is sent with the command to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you want to monitor.

Figure: Status Register Bit Values

Decimal Value	32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
Bit Number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

STATus:OPERation:ENABLE <num>
 STATus:OPERation:ENABLE?

Standard Operation Event Enable Register

ck730a

Bit 15 is not used to report status.

Example 1:

1. To enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 because $1 + 64 = 65$.
2. The results of a query are evaluated in a similar way. If the *STB? command returns a decimal value of 140, ($140 = 128 + 8 + 4$) then bit 7 is true, bit 3 is true and bit 2 is true.

Example 2:

1. Suppose you want to know if an Auto-trigger Timeout occurs, but you only cared about that specific condition. So you would want to know what was happening with bit 10 in the Status Questionable Integrity register, and not about any other bits.
2. It's usually a good idea to start by clearing all the status registers with *CLS.
3. Sending the STAT:QUES:INT:ENAB 1024 command lets you monitor only bit 10 events, instead of the default monitoring all the bits in the register. The register default is for positive transition events (0 to 1 transition). That is, when an auto-trigger timeout occurs. If instead, you wanted to know when the Auto-trigger timeout condition is cleared, then you would set the STAT:QUES:INT:PTR 0 and the STAT:QUES:INT:NTR 32767.
4. So now the only output from the Status Questionable Integrity register comes from a bit 10 positive transition. That output goes to the Integrity Sum bit 9 of the Status Questionable register.
5. You can do a similar thing with this register to only look at bit 9 using, STAT:QUES:ENAB 512.
6. The Status Questionable register output goes to the "Status Questionable Summary" bit 3 of the Status Byte Register. The output from this register can be enabled using the *SRE 8 command.
7. Finally, you would use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You could also use *STB? to poll the Status Byte Register.)

Using the Service Request (SRQ) Method

Your language, bus and programming environment must be able to support SRQ interrupts. (For example, BASIC used with VXI-11.3 (GPIB over LAN). When you monitor a condition with the SRQ method, you must:

1. Determine which bit monitors the condition.
2. Determine how that bit reports to the request service (RQS) bit of the status byte.
3. Send SCPI commands to enable the bit that monitors the condition and to enable the summary bits that report the condition to the RQS bit.
4. Enable the controller to respond to service requests.

When the condition changes, the instrument sets its RQS bit. The controller is informed of the change as soon as it occurs. As a result, the time the controller would otherwise have used to monitor the condition can be used to perform other tasks. Your program determines how the controller responds to the SRQ.

Generating a Service Request To use the SRQ method, you must understand how service requests are generated. Bit 6 of the status byte register is the request service (RQS) bit. The *SRE command is used

to configure the RQS bit to report changes in instrument status. When such a change occurs, the RQS bit is set. It is cleared when the status byte register is queried using *SRE? (with a serial poll.) It can be queried without erasing the contents with *STB?.

When a register set causes a summary bit in the status byte to change from 0 to 1, the instrument can initiate the service request (SRQ) process. However, the process is only initiated if both of the following conditions are true:

- The corresponding bit of the service request enable register is also set to 1.
- The instrument does not have a service request pending. (A service request is considered to be pending between the time the instrument's SRQ process is initiated and the time the controller reads the status byte register.)

The SRQ process sets the SRQ true. It also sets the status byte's request service (RQS) bit to 1. Both actions are necessary to inform the controller that the instrument requires service. Setting the SRQ line only informs the controller that some device on the bus requires service. Setting the RQS bit allows the controller to determine which instrument requires service.

If your program enables the controller to detect and respond to service requests, it should instruct the controller to perform a serial poll when the SRQ is set true. Each device on the bus returns the contents of its status byte register in response to this poll. The device whose RQS bit is set to 1 is the device that requested service.

When you read the instrument's status byte register with a serial poll, the RQS bit is reset to 0. Other bits in the register are not affected.

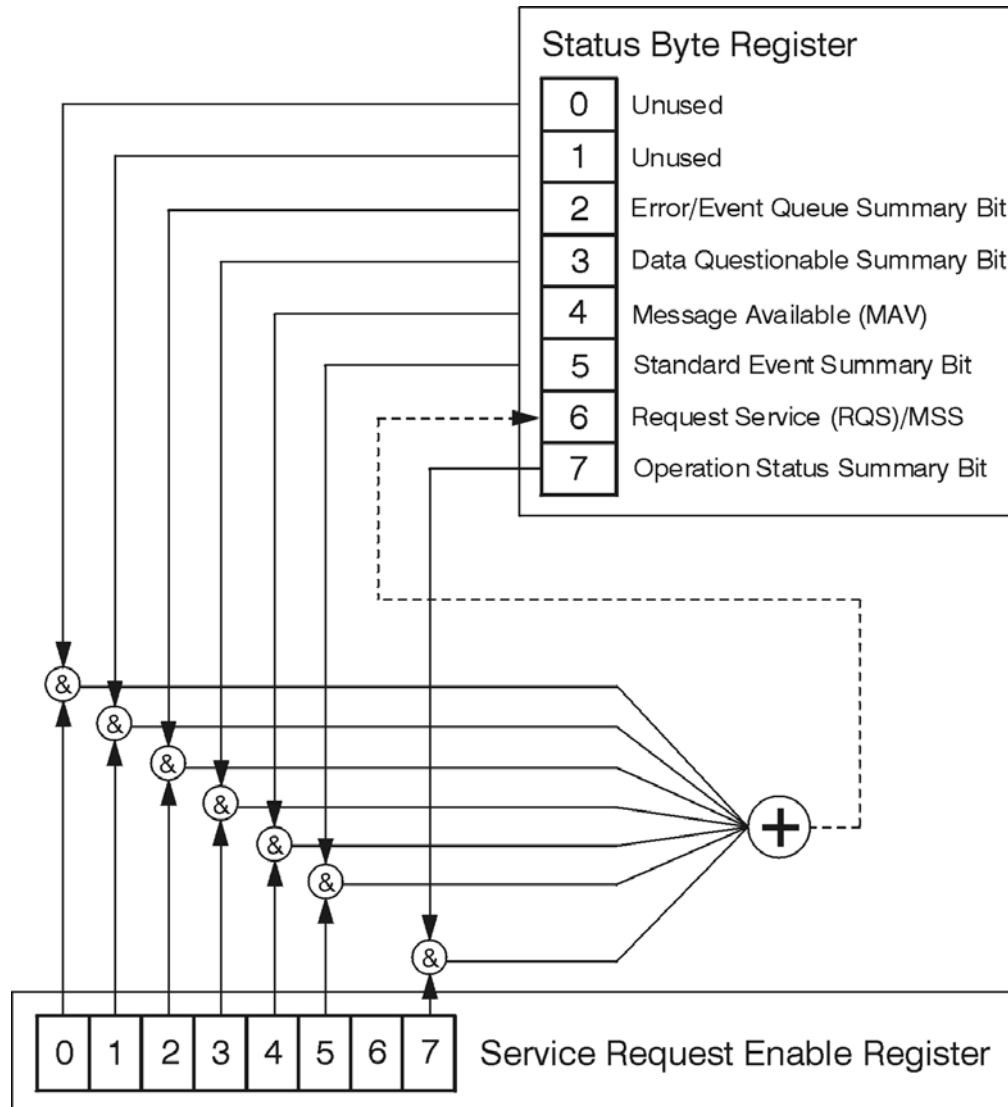
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

1. Set INITiate:CONTinuous off.
2. Set/enable the status registers.
3. Restart the measurement (send INIT).

Status Register System

The hardware status registers are combined to form the instrument status system. Specific status bits are assigned to monitor various aspects of the instrument operation and status. See the diagram of the status system above for information about the bit assignments and status register interconnections.

The Status Byte Register



ck776a

The RQS bit is read and reset by a serial poll. The same bit position (MSS) is read, non-destructively by the *STB? command. If you serial poll bit 6 it is read as RQS, but if you send *STB it reads bit 6 as MSS. For more information refer to IEEE 488.2 standards, section 11.

Description								
Standard Operation Status Summary Bit								
Request Service (RQS) Summary Bit								
Standard Event Status Summary Bit								
Message Available (MAV)								
Data Questionable Status Summary Bit								
Error/Event Queue Summary Bit								
Unused								
Unused								
Bit Number	7	6	5	4	3	2	1	0

*STB?

Status Byte Register

ck725a

Bit	Description
0, 1	These bits are always set to 0.
2	A 1 in this bit position indicates that the SCPI error queue is not empty which means that it contains at least one error message.
3	A 1 in this bit position indicates that the data questionable summary bit has been set. The data questionable event register can then be read to determine the specific condition that caused this bit to be set.
4	A 1 in this bit position indicates that the instrument has data ready in the output queue. There are no lower status groups that provide input to this bit.
5	A 1 in this bit position indicates that the standard event summary bit has been set. The standard event status register can then be read to determine the specific event that caused this bit to be set.
6	A 1 in this bit position indicates that the instrument has at least one reason to report a status change. This bit is also called the master summary status bit (MSS).
7	A 1 in this bit position indicates that the standard operation summary bit has been set. The standard operation event register can then be read to determine the specific condition that caused this bit to be set.

To query the status byte register, send the command *STB?. The response is the weighted decimal sum of the bits that are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the weighted decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does not clear the status register.

In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

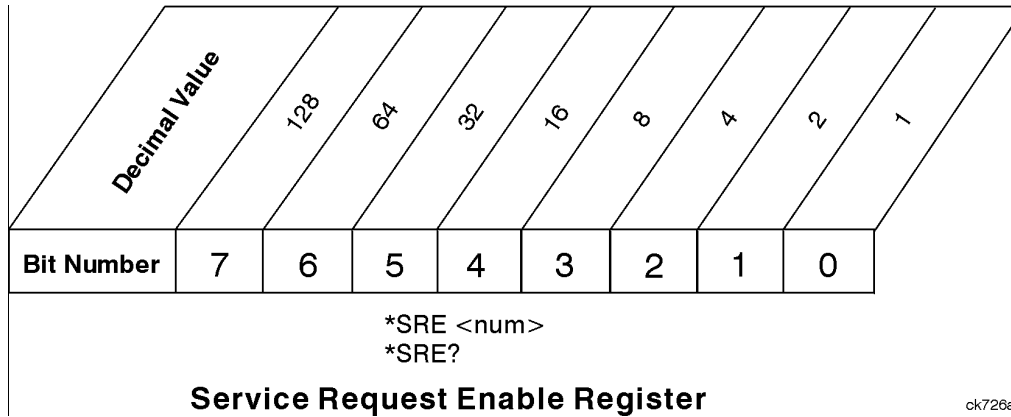
Send the *SRE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable plus the decimal value of bit 6. For example, assume that you want to enable bit 7 so that whenever the standard operation status register summary bit is set to 1 it will trigger a service request. Send the command *SRE 192 (because $192 = 128 + 64$). You must always add 64 (the numeric value of

Programming the Analyzer

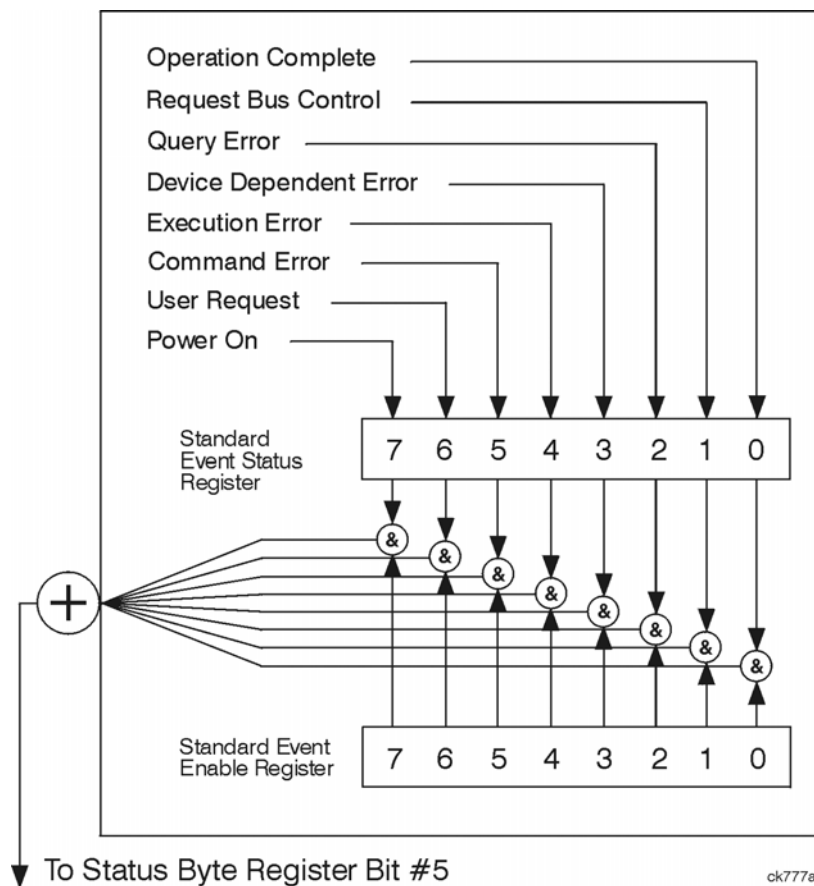
STATus Subsystem (No equivalent front panel keys)

RQS bit 6) to your numeric sum when you enable any bits for a service request. The command *SRE? returns the decimal value of the sum of the bits previously enabled with the *SRE <integer> command.

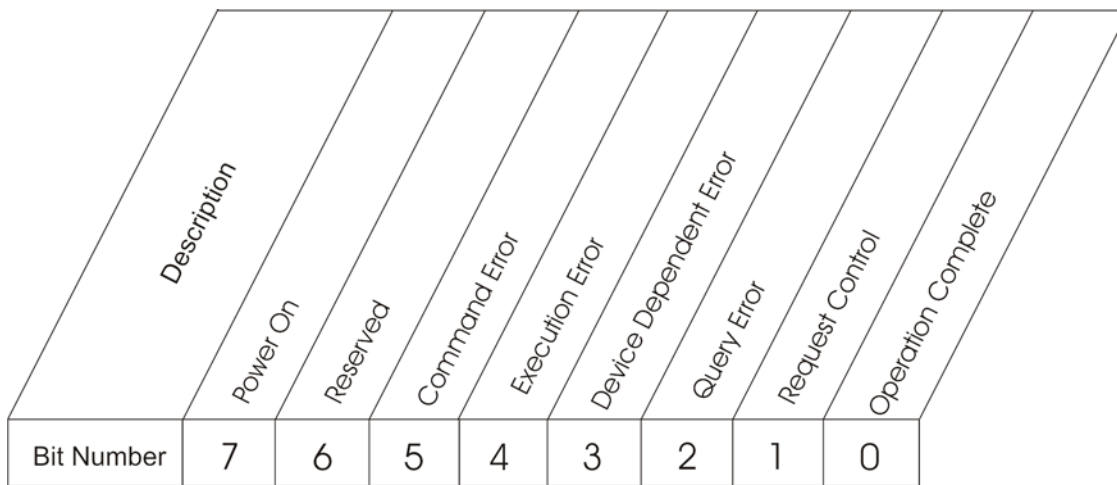
The service request enable register presets to zeros (0).



Standard Event Status Register



The standard event status register contains the following bits:



*ESR?

Standard Event Status Register

ck727a

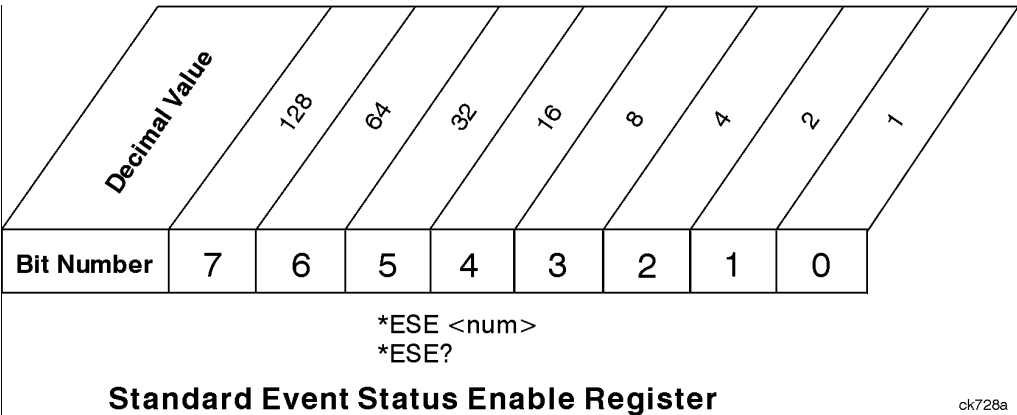
Bit	Description
0	A 1 in this bit position indicates that all pending operations were completed following execution of the *OPC command.
1	This bit is for GPIB handshaking to request control. Currently it is set to 0 because there are no implementations where the spectrum analyzer controls another instrument.
2	A 1 in this bit position indicates that a query error has occurred. Query errors have SCPI error numbers from -499 to -400.
3	A 1 in this bit position indicates that a device dependent error has occurred. Device dependent errors have SCPI error numbers from -399 to -300 and 1 to 32767.
4	A 1 in this bit position indicates that an execution error has occurred. Execution errors have SCPI error numbers from -299 to -200.
5	A 1 in this bit position indicates that a command error has occurred. Command errors have SCPI error numbers from -199 to -100.
6	A 1 in this bit position indicates that the LOCAL key has been pressed. This is true even if the instrument is in local lockout mode.
7	A 1 in this bit position indicates that the instrument has been turned off and then on.

The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command *ESR?. The response is the weighted decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the weighted decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned.

In addition to the standard event status register, the standard event status group also contains a standard

event status enable register. This register lets you choose which bits in the standard event status register will set the summary bit (bit 5 of the status byte register) to 1. Send the *ESE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable. For example, to enable bit 7 and bit 6 so that whenever either of those bits is set to 1, the standard event status summary bit of the status byte register will be set to 1, send the command *ESE 192 (128 + 64). The command *ESE? returns the decimal value of the sum of the bits previously enabled with the *ESE <integer> command.

The standard event status enable register presets to zeros (0).



Operation and Questionable Status Registers

The operation and questionable status registers are registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem

Operation Status Register The operation status register monitors the current instrument measurement state. It checks to see if the instrument is calibrating, sweeping, or waiting for a trigger. For more information see the *OPC? command located in the IEEE Common Commands section.

Bit	Condition	Operation
0	Calibrating	The instrument is busy executing its Align Now process
3	Sweeping	The instrument is busy taking a sweep.
4	Measuring	The instrument is busy making a measurement. Measurements often require multiple sweeps. They are initiated by keys under the MEASURE key or with the MEASure group of commands. The bit is currently only valid for Modes: ESA/PSA: Spectrum Analysis, Phase Noise, and ESA: Bluetooth, cdmaOne, GSM
5	Waiting for trigger	The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement.
8	Paused	The instrument is paused (waiting) because you have pressed the Pause Meas Control key or send the INITiate:PAUSE command. Bit is currently only valid for Modes: ESA/PSA: Spectrum Analysis, Phase Noise, and ESA: Bluetooth, cdmaOne, GSM

Questionable Status Register

The questionable status register monitors the instrument's condition to see if anything questionable has happened to it. It is looking for anything that might cause an error or a bad measurement like a hardware problem, an out of calibration situation, or a unusual signal. All the bits are summary bits from lower-level event registers.

Bit	Condition	Operation
3	Power summary	The instrument hardware has detected a power unlevelled condition.
4	Temperature summary	The instrument is still warming up.
5	Frequency summary	The instrument hardware has detected an unlocked condition or a problem with the external frequency reference.
8	Calibration summary	The instrument has detected a hardware problem while doing the automatic internal alignment process.
9	Integrity summary	The instrument has detected a questionable measurement condition such as: bad timing, bad signal/data, timeout problem, signal overload, or "meas uncal".

STATus Subsystem Command Descriptions

The STATus subsystem controls the SCPI-defined instrument status reporting structures. Each status register has a set of five commands used for querying or masking that particular register.

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF. It is also equal to all ones, 11111111111111) See the SCPI Basics information about using bit patterns for variable parameters.

Operation Register

Operation Condition Query This query returns the decimal value of the sum of the bits in the Status Operation Condition register.

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:OPERation:CONDition?
Example	STAT:OPER:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Operation Enable This command determines which bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <integer> is the sum of the

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STATus Subsystem (No equivalent front panel keys)

decimal values of the bits you want to enable.

The preset condition is to have all bits in this enable register set to 0. To have any Operation Events reported to the Status Byte Register, one or more bits need to be set to 1.

R&D: There is little reason to have any bits enabled for typical manufacturing tests. Enabling bits in this register would be of more value during test development.

Mode	All
Remote Command	:STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle?
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Operation Event Query This query returns the decimal value of the sum of the bits in the Operation Event register.

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:OPERation[:EVENT]?
Example	STAT:OPER?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Operation Negative Transition This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:OPERation:NTRansition <integer> :STATus:OPERation:NTRansition?

Example	STAT:OPER:NTR 1 Align Now operation complete is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Operation Positive Transition This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:OPERation:PTRansition <integer> :STATus:OPERation:PTRansition?
Example	STAT:OPER:PTR 1 Align Now operation beginning is reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Preset the Status Byte

Sets bits in most of the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEUE, IEEE 488.2 ESE, and SRE Registers as described in IEEE Standard 488.2–1992, IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1–1987. New York, NY, 1992.

Remote Command	:STATus:PRESet
Example	STAT:PRES

Questionable Register

Questionable Condition This query returns the decimal value of the sum of the bits in the Questionable Condition register.

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The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:CONDition?
Example	STAT:QUES:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Enable This command determines which bits in the Questionable Event register will set the Questionable Status Summary bit (bit3) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

The preset condition is all bits in this enable register set to 0. To have any Questionable Events reported to the Status Byte Register, one or more bits need to be set to 1. The Status Byte Event Register should be queried after each measurement to check the Questionable Status Summary (bit 3). If it is equal to 1, a condition during the test may have made the test results invalid. If it is equal to 0, this indicates that no hardware problem or measurement problem was detected by the analyzer.

Mode	All
Remote Command	:STATus:QUEStionable:ENABLE 16 Sets the register so that temperature summary is reported to the Status Byte Register :STATus:QUEStionable:ENABLE?
Example	STAT:OPER:PTR 1 Align Now operation beginning is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Event Query This query returns the decimal value of the sum of the bits in the Questionable Event register.

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable[:EVENT]?
Example	STAT:QUES?
Preset	0

SCPI Status Bits/OPC Sequential command
 Dependencies

Questionable Negative Transition This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:NTRansition 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register. :STATus:QUEStionable:NTRansition?
Example	STAT:QUES:NTR 16 Temperature summary 'questionable cleared' is reported to the Status Byte Register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Positive Transition This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:PTRansition <integer> :STATus:QUEStionable:PTRansition?
Example	STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Register

Questionable Calibration Condition This query returns the decimal value of the sum of the bits in the Questionable Calibration Condition register.

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STATus Subsystem (No equivalent front panel keys)

The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:CONDition?
Example	STAT:QUES:CAL:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Enable This command determines which bits in the Questionable Calibration Condition Register will set bits in the Questionable Calibration Event register, which also sets the Calibration Summary bit (bit 8) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:ENABLE <integer> :STATus:QUESTionable:CALibration:ENABLE?
Example	STAT:QUES:CAL:ENAB 16384 Can be used to query if an alignment is needed, if you have turned off the automatic alignment process.
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Event Query This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE: The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration[:EVENT]?
Example	STAT:QUES:CAL?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Negative Transition This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a negative transition (1 to 0). The variable

<integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:NTRansition <integer> :STATus:QUESTionable:CALibration:NTRansition?
Example	STAT:QUES:CAL:NTR 16384 Alignment is not required.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Positive Transition This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:PTRansition <integer> :STATus:QUESTionable:CALibration:PTRansition?
Example	STAT:QUES:CAL:PTR 16384 Alignment is required.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Skipped Register

Questionable Calibration Skipped Condition This query returns the decimal value of the sum of the bits in the Questionable Calibration Skipped Condition register.

NOTE	The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:CONDition?
Example	STAT:QUES:CAL:SKIP:COND?

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Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Skipped Enable This command determines which bits in the Questionable Calibration Skipped Condition Register will set bits in the Questionable Calibration Skipped Event register, which also sets bit 11 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:ENABle <integer> :STATus:QUESTionable:CALibration:SKIPped:ENABle?
Example	STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Skipped Event Query This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE	The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped[:EVENT]?
Example	STAT:QUES:CAL:SKIP?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Skipped Negative Transition This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a negative transition (1 to 0). The

variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:NTRansition <integer> :STATus:QUESTionable:CALibration:SKIPped:NTRansition?
Example	STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Skipped Positive Transition This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:SKIPped:PTRansition <integer> :STATus:QUESTionable:CALibration:SKIPped:PTRansition?
Example	STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Failure Register

Questionable Calibration Extended Failure Condition This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All

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STATus Subsystem (No equivalent front panel keys)

Remote Command :STATus:QUESTionable:CALibration:EXTended:FAILure:CONDition?

Example STAT:QUES:CAL:EXT:FAIL:COND?

Preset 0

SCPI Status Sequential command

Bits/OPC

Dependencies

Questionable Calibration Extended Failure Enable This command determines which bits in the Questionable Calibration Extended Failure Condition Register will set bits in the Questionable Calibration Extended Failure Event register, which also sets bit 9 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode All

Remote Command :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle
 <integer>
 :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle?

Example STAT:QUES:CAL:EXT:FAIL:ENAB 1 Can be used to query if an EMI conducted alignment is needed.

Preset 32767

Min 0

Max 32767

SCPI Status Bits/OPC Sequential command

Dependencies

Questionable Calibration Extended Failure Event Query This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode All

Remote Command :STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]?

Example STAT:QUES:CAL:EXT:FAIL?

Preset 0

SCPI Status Sequential command

Bits/OPC

Dependencies

Questionable Calibration Extended Failure Negative Transition This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition?
Example	STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Failure Positive Transition This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition?
Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Needed Register

Questionable Calibration Extended Needed Condition This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Condition register.

NOTE	The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:NEEDed:CONDition?
Example	STAT:QUES:CAL:EXT:NEED:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Extended Needed Enable This command determines which bits in the Questionable Calibration Extended Needed Condition Register will set bits in the Questionable Calibration Extended Needed Event register, which also sets bit 14 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle <integer> :STATus:QUEStionable:CALibration:EXTended:NEEDed:ENABle?
Example	STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Calibration Extended Needed Event Query This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Event register.

NOTE	The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable:CALibration:EXTended:NEEDed[:EVENT]?

Example	STAT:QUES:CAL:EXT:NEED?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Needed Negative Transition This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:NTRansition?
Example	STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Calibration Extended Needed Positive Transition This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition?
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Register

Questionable Frequency Condition This query returns the decimal value of the sum of the bits in the Questionable Frequency Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency:CONDition?
Example	STAT:QUES:FREQ:COND?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Enable This command determines which bits in the Questionable Frequency Condition Register will set bits in the Questionable Frequency Event register, which also sets the Frequency Summary bit (bit 5) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency:ENABle <integer> :STATus:QUESTionable:FREQuency:ENABle?
Example	STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked is reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Event Query This query returns the decimal value of the sum of the bits in the Questionable Frequency Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency[:EVENT]?

Example	STAT:QUES:FREQ?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Negative Transition This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency:NTRansition <integer> :STATus:QUESTionable:FREQuency:NTRansition?
Example	STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Frequency Positive Transition This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:FREQuency:PTRansition <integer> :STATus:QUESTionable:FREQuency:PTRansition?
Example	STAT:QUES:FREQ:PTR 2 Frequency Reference 'became unlocked' will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Integrity Register

Questionable Integrity Condition This query returns the decimal value of the sum of the bits in the Questionable Integrity Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:CONDition?
Example	STAT:QUES:INT:COND?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Integrity Enable This command determines which bits in the Questionable Integrity Condition Register will set bits in the Questionable Integrity Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:INTEgrity:ENABle <integer> :STATus:QUEStionable:INTEgrity:ENABle?
Example	STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Integrity Event Query This query returns the decimal value of the sum of the bits in the Questionable Integrity Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All

Remote Command	:STATus:QUESTionable:INTEgrity[:EVENT]?
Example	STAT:QUES:INT?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Negative Transition This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:NTRansition <integer> :STATus:QUESTionable:INTEgrity:NTRansition?
Example	STAT:QUES:INT:NTR 8 Measurement 'regained calibration' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Positive Transition This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:PTRansition <integer> :STATus:QUESTionable:INTEgrity:PTRansition?
Example	STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767

Sequential command

Questionable Integrity Signal Register

Questionable Integrity Signal Condition This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNal:CONDition?
Example	STAT:QUES:INT:SIGN:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Signal Enable This command determines which bits in the Questionable Integrity Signal Condition Register will set bits in the Questionable Integrity Signal Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	<code>:STATUS:QUESTIONable:INTEgrity:SIGNal:ENABLE</code> <code><integer></code> <code>:STATUS:QUESTIONable:INTEgrity:SIGNal:ENABLE?</code>
Example	STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Signal Event Query This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Event register.

NOTE	The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is

latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNAL[:EVENT]?
Example	STAT:QUES:INT:SIGN?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Signal Negative Transition This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNAL:NTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNAL:NTRansition?
Example	STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Signal Positive Transition This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:SIGNAL:PTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNAL:PTRansition?
Example	STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0

Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Uncalibrated Register

Questionable Integrity Uncalibrated Condition This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:CONDition?
Example	STAT:QUES:INT:UNC:COND?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Uncalibrated Enable This command determines which bits in the Questionable Integrity Uncalibrated Condition Register will set bits in the Questionable Integrity Uncalibrated Event register, which also sets the Data Uncalibrated Summary bit (bit 3) in the Questionable Integrity Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle :STATus:QUESTionable:INTEgrity:UNCalibrated:ENABle ?
Example	STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Uncalibrated Event Query This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a

condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated[:EVENT]?
Example	STAT:QUES:INT:UNC?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Uncalibrated Negative Transition This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:NTRansition <integer> :STATus:QUESTionable:INTEgrity:UNCalibrated:NTRansition?
Example	STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Integrity Uncalibrated Positive Transition This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:INTEgrity:UNCalibrated:PTRansition <integer> :STATus:QUESTionable:INTEgrity:UNCalibrated:PTRansition?
Example	STAT:QUES:INT:UNC:PTR 1 Oversweep (Meas Uncal) occurred will be reported to the Integrity Summary of the Status Questionable register.

Programming the Analyzer
STATus Subsystem (No equivalent front panel keys)

Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Power Register

Questionable Power Condition This query returns the decimal value of the sum of the bits in the Questionable Power Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:CONDition?
Example	STAT:QUES:POW:COND?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Power Enable This command determines which bits in the Questionable Power Condition Register will set bits in the Questionable Power Event register, which also sets the Power Summary bit (bit 3) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:ENABle <integer> :STATus:QUESTionable:POWer:ENABle?
Example	STAT:QUES:POW:ENAB 32 50 MHz Input Pwr too High for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Power Event Query This query returns the decimal value of the sum of the bits in the Questionable Power Event register.

NOTE	he register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUESTionable:POWer[:EVENT]?
Example	STAT:QUES:POW?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Power Negative Transition This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:NTRansition <integer> :STATus:QUESTionable:POWer:NTRansition?
Example	STAT:QUES:POW:NTR 32 50 MHz Input Power became OK for Cal will be reported to the Power Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Power Positive Transition This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:POWer:PTRansition <integer> :STATus:QUESTionable:POWer:PTRansition?>
Example	STAT:QUES:POW:PTR 32 50 MHz Input Power became too high for Cal will be reported to the Power Summary of the Status Questionable register.

Programming the Analyzer
STATus Subsystem (No equivalent front panel keys)

Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Temperature Register

Questionable Temperature Condition This query returns the decimal value of the sum of the bits in the Questionable Temperature Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Mode	All
Remote Command	:STATus:QUESTionable:TEMPerature:CONDition?
Example	STAT:QUES:TEMP:COND?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Temperature Enable This command determines which bits in the Questionable Temperature Condition Register will set bits in the Questionable Temperature Event register, which also sets the Temperature Summary bit (bit 4) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:TEMPerature:ENABle <integer> :STATus:QUESTionable:TEMPerature:ENABle?
Example	STAT:QUES:TEMP:ENAB 1 Reference Oscillator Oven Cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

Questionable Temperature Event Query This query returns the decimal value of the sum of the bits in the Questionable Temperature Event register.

NOTE	The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature[:EVENT]?
Example	STAT:QUES:TEMP?
Preset	0
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Temperature Negative Transition This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:NTRansition <integer> :STATus:QUEStionable:TEMPerature:NTRansition?
Example	STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	0
Min	0
Max	32767
SCPI Status Bits/OPC	Sequential command
Dependencies	

Questionable Temperature Positive Transition This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

Mode	All
Remote Command	:STATus:QUEStionable:TEMPerature:PTRansition <integer> :STATus:QUEStionable:TEMPerature:PTRansition?

Programming the Analyzer
STATus Subsystem (No equivalent front panel keys)

Example	STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the Temperature Summary of the Status Questionable register.
Preset	32767
Min	0
Max	32767
SCPI Status Bits/OPC Dependencies	Sequential command

IEEE Common GPIB Commands

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF).

Calibration Query

*CAL? Performs a full alignment and returns a number indicating the success of the alignment. A zero is returned if the alignment is successful. A one is returned if any part of the alignment fails. The equivalent SCPI command is CALibrate[:ALL]?

See the Section [“Alignments” on page 199](#) for details of *CAL?.

Clear Status

Clears the status byte register. It does this by emptying the error queue and clearing all bits in all of the event registers. The status byte register summarizes the states of the other registers. It is also responsible for generating service requests.

Remote Command	*CLS
Example	*CLS Clears the error queue and the Status Byte Register.
Remote Command Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
SCPI Status Bits/OPC Dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.

Standard Event Status Enable

Selects the desired bits from the standard event status enable register. This register monitors I/O errors and synchronization conditions such as operation complete, request control, query error, device dependent error, status execution error, command error and power on. The selected bits are OR'd to become a summary bit (bit 5) in the byte register which can be queried.

The query returns the state of the standard event status enable register.

Remote Command	*ESE <integer> *ESE?
Example	*ESE 36 Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5). *ESE? Returns a 36 indicating that the query and command status bits are enabled.

Remote Command Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
State Saved	Not saved in state.
Min	0
Max	255
Key Path	No equivalent key. Related key System, Show Errors, Clear Error Queue
SCPI Status Bits/OPC Dependencies	Event Enable Register of the Standard Event Status Register.

Standard Event Status Register Query

Queries and clears the standard event status event register. (This is a destructive read.) The value returned is a hexadecimal number that reflects the current state (0/1) of all the bits in the register.

Remote Command	*ESR?
Example	*ESR? Returns a 1 if there is either a query or command error, otherwise it returns a zero.
SCPI Status Bits/OPC Dependencies	Standard Event Status Register (bits 0 – 7).
Remote Command Notes	For related commands, see the STATus subsystem commands.
Preset	0
Min	0
Max	255

Identification Query

Returns a string of instrument identification information. The string contains the model number, serial number and firmware revision.

The response is organized into four fields separated by commas. The field definitions are as follows:

- Manufacturer
- Model
- Serial number
- Firmware version

Remote Command	*IDN?

Example	*IDN? Returns instrument identification information, such as: Agilent Technologies,N9020A,US01020004,A.01.02
Key Path	No equivalent key. See related key: System, Show System.

Operation Complete

The *OPC command sets bit 0 in the standard event status register (SER) to “1” when pending operations have finished, that is when all overlapped commands are complete. It does not hold off subsequent operations. You can determine when the overlapped commands have completed either by polling the OPC bit in SER, or by setting up the status system such that a service request (SRQ) is asserted when the OPC bit is set.

The *OPC? query returns a “1” after all the current overlapped commands are complete. So it holds off subsequent commands until the “1” is returned, then the program continues. This query can be used to synchronize events of other instruments on the external bus.

Remote Command	*OPC *OPC?
Example	INIT:CONT 0 Selects single sweeping. INIT:IMM Initiates a sweep. *OPC? Holds off any further commands until the sweep is complete.
SCPI Status Bits/OPC Dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. *OPC is an overlapped command, but *OPC? is sequential.

Query Instrument Options

Returns a string of all the installed instrument options. It is a comma separated list with quotes, such as: “503,P03,PFR”.

Remote Command	*OPT?

Recall Instrument State

This command recalls the instrument state from the specified instrument memory register.

- If the state being loaded has a newer firmware revision than the revision of the instrument, no state is recalled and an error is reported.
- If the state being loaded has an equal firmware revision than the revision of the instrument, the state is loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the

instrument only loads the parts of the state that apply to the older revision.

Remote Command	*RCL <register #>
Example	*RCL 7 Recalls the instrument state that is currently stored in register 7.
Restriction and Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
SCPI Status Bits/OPC Dependencies	The command is sequential.
Min	0
Max	127

Save Instrument State

This command saves the current instrument state and mode to the specified instrument memory register.

Remote Command	*SAV <register #>
Example	*SAV 9 Saves the instrument state in register 9.
Restriction and Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
SCPI Status Bits/OPC Dependencies	The command is sequential.
Min	0
Max	127

Service Request Enable

This command enables the desired bits of the service request enable register.

The query returns the value of the register, indicating which bits are currently enabled.

Remote Command	*SRE <integer> *SRE?
Example	*SRE 22 Enables bits 1, 2, and 4 in the service request enable register.
SCPI Status Bits/OPC Dependencies	Service Request Enable Register (all bits, 0 – 7).
Remote Command Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
Min	0

Max 255

Status Byte Query

Returns the value of the status byte register without erasing its contents.

Remote Command	*STB?
Example	*STB? Returns a decimal value for the bits in the status byte register. For example, if a 16 is returned, it indicates that bit 5 is set and one of the conditions monitored in the standard event status register is set.
SCPI Status Bits/OPC Dependencies	Status Byte Register (all bits, 0 – 7).
Remote Command Notes	See related command *CLS, in the Section “Clear Status” on page 173 .

Trigger

This command triggers the instrument. Use the :TRIGger[:SEquence]:SOURce command to select the trigger source.

Remote Command	*TRG
Example	*TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.
Remote Command Notes	See related command :INITiate:IMMediate, in the Section “Restart” on page 1003 .
Key Path	No equivalent key. See related keys Single and Restart .

Self Test Query

This query performs the internal self-test routines and returns a number indicating the success of the testing. A zero is returned if the test is successful, 1 if it fails.

Remote Command	*TST?
Example	*TST? Runs the self-test routines and returns 0=passed, 1=some part failed.

Wait-to-Continue

This command causes the instrument to wait until all overlapped commands are completed before executing any additional commands. There is no query form for the command.

Remote Command	*WAI

Example	INIT:CONT OFF; INIT;*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion.
SCPI Status Bits/OPC Dependencies	Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from.

File

Opens a menu of keys which access various standard and custom Windows dialogs. Pressing any other front-panel key exits any of these dialogs.

File Explorer

Opens the standard Windows File Explorer. Pressing any front panel key closes the Explorer application. File Explorer opens up in My Documents.

Page Setup

Refer to your Microsoft Windows Operating System manual.

Print Theme – Remote Command

The graphical user interface contains a selection for choosing the Theme to use when printing. An equivalent remote command is provided. Refer to the View/Display section for more detail on Themes.

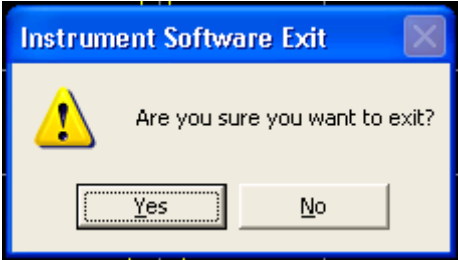
Mode	All
Remote Command	:SYSTem:PRINT:THEMe TDColor TDMonochrome FCOLor FMONochrome :SYSTem:PRINT:THEMe?
Example	:SYST:PRIN:THEM FCOL
Preset	FCOL; not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes
State Saved	No

Print

Refer to your Microsoft Windows Operating System manual.

Exit

This key, when pressed, will exit the Instrument Application. A dialog box will be used to confirm that the user intended to exit the application:



Mode	All
Key Path	File, Exit

Preset

Mode Preset

The Mode preset is the most common way to get the active mode back to a known state. It will keep you in the currently active mode and reset the mode settings to their mode preset state. It will never cause a mode switch. It does a partial preset. It does not affect any mode persistent settings or any system settings.

The **Mode Preset** does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets Measurement settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Dependencies/Couplings	A Mode Preset will cause the currently running measurement to be aborted and cause the default measurement to be active. Mode Preset gets the mode to a consistent state with all of the default couplings set.
Remote Command Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset as done by the :SYST:PRES command and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput.
Key Path	Front-panel key

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front panel access. Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurement in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

The Auto Couple front panel key is a Meas local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to the other measurements in the mode will not be affected by Auto Couple.

The Meas Preset key is a Meas local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

The Mode Preset (front-panel key on front panel) resets all the current mode's Meas local and Meas global variables except the persistent ones.

The Restore Mode Defaults key resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

Type Of Preset	SCPI Command	Front Panel Access
Auto Couple	:COUPLe ALL	Auto Couple front-panel key
Meas Preset	:CONFigure:<Measurement>	Meas Setup Menu
Mode Preset	:SYSTem:PRESet	Mode Preset (green key)
Restore Mode Defaults	:INSTrument:DEFault	Mode Setup Menu
Restore All Mode Defaults	:SYSTem:DEFault MODes	System Menu; Restore System Default Menu
*RST	*RST	not possible (Mode Preset with Single)
Restore Input/Output Defaults	:SYSTem:DEFault INPut	System Menu; Restore System Default Menu
Restore Power On Defaults	:SYSTem:DEFault PON	System Menu; Restore System Default Menu
Restore Alignment Defaults	:SYSTem:DEFault ALIGn	System Menu; Restore System Default Menu
Restore Miscellaneous Defaults	:SYSTem:DEFault MISC	System Menu; Restore System Default Menu
Restore All System Defaults	:SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent	System Menu; Restore System Default Menu
User Preset	:SYSTem:PRESet:USER	User Preset Menu
User Preset All Modes	:SYSTem:PRESet:USER:ALL	User Preset Menu
Power On Mode Preset	:SYSTem:PON:TYPE MODE	System Menu
Power On User Preset	:SYSTem:PON:TYPE USER	System Menu
Power On Last State	:SYSTem:PON:TYPE LAST	System Menu

Restore Mode Defaults

Restore Mode Defaults resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset. This function will never cause a mode switch. This function performs a full preset for the currently active mode; whereas, Mode Preset performs a partial preset. Restore Mode Defaults does not affect any system settings. System settings are reset by Restore System Defaults. This function does reset mode

data; as well as settings.

Remote Command	:INSTrument:DEFault
Example	:INST:DEF
Restriction and Notes	A pop-up message comes up saying: "If you are sure, press key again".
Dependencies/Couplings	A Restore Mode Defaults will cause the currently running measurement to be aborted and causes the default measurement to be active. It gets the mode to a consistent state with all of the default couplings set.
Remote Command Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Key Path	Mode Setup

***RST (Remote Command Only)**

*RST is equivalent to :SYST:PRES;;INIT:CONT OFF which is a Mode Preset in Single measurement state. This remote command is preferred over Mode Preset remote command - :SYST:PRES, as optimal remote programming occurs with the instrument in single measurement state.

Remote Command	*RST
Example	*RST
Restriction and Notes	Clears all pending OPC bits and the Status Byte is set to 0.
Dependencies/Couplings	A *RST will cause the currently running measurement to be aborted and cause the default measurement to be active. *RST gets the mode to a consistent state with all of the default couplings set.
Remote Command Notes	Sequential

Print

The Print front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the current printer.

Key Path	Front-panel key

Quick Save

The Quick Save front panel key repeats the most recent save which was performed from the Save menu, with some qualifications.

Quick Save pays no attention to register saves. Register saves are not remembered as Saves for the purpose of Quick Save

If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”.

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. For details on the suffix for each file type, see the documentation for the front panel key “[Save](#)” on page 1005. A default prefix exists for each of the available file types:

Type	Default Prefix	Menu
State	State_	(Save/Recall)
Trace + State	State_	(Save/Recall)
Screen	Screen_	(Save/Recall)
Amplitude Corrections	Ampcor_	(Import/Export)
Traces	Trace_	(Import/Export)
Limit Lines	LLine_	(Import/Export)
Measurement Result	MeasR_	(Import/Export)
Capture Buffer	CapBuf_	(Import/Export)

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and works its way up to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent runnings of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. This is because the whole point of Auto File Name is to relieve the user from having to pick a file name. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes; i.e. no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current

directory, we advance the counter to State_0011.state to ensure that no conflict will exist (and then we verify that State_0011.state also doesn't exist in the current directory and advance again if it does, etc.).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a Meas Results file as "fred.csv", then the next auto file name chosen for a Meas Results save will be fred_0000.csv.

NOTE	Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if the user had not entered their own file name. If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Remote Command Notes	No remote command for this key specifically.
Key Path	Quick Save

Recall

See the Section [“Recall” on page 985](#) in the Chapter "Common Measurement Functions".

Save

See the Section “[Save](#)” on page [1005](#) in the Chapter "Common Measurement Functions".

System

Opens a menu of keys that access various configuration menus and dialogs.

Key Path	Front-panel key

Show

Opens a menu of choices that enable you to select the information window you want to view.

Mode	All
Remote Command	:SYSTem:SHOW OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware :SYSTem:SHOW?
Example	:SYST:SHOW SYST
Remote Command Notes	This command displays (or exits) the various System information screens.
Preset	OFF
State Saved	No
Range	OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware
Key Path	System

Errors

There are two modes for the Errors selection, History and Status.

The list of errors displayed in the Errors screen does not automatically refresh; you must press the Refresh button or leave the screen and return to it to refresh it.

History brings up a screen displaying the event log in chronological order, with the newest event at the top. The history queue can hold up to 100 messages (if a message has a repeat count greater than 1 it only counts once against this number of 100). Note that this count bears no relation to the size of the SCPI queue. If the queue extends onto a second page, a scroll bar appears to allow scrolling with a mouse. Time is displayed to the second.

Status brings up a screen summarizing the status conditions currently in effect. Note that time is displayed to the second.

The fields on the Errors display are:

Type (unlabeled) - Displays the icon identifying the event or condition as an error or warning.

ID - Displays the error number.

Message - Displays the message text.

Repeat (RPT) - This field shows the number of consecutive instances of the event, uninterrupted by other events. In other words, if an event occurs 5 times with no other intervening event, the value of repeat will be 5.

If the value of Repeat is 1 the field does not display. If the value of Repeat is >1, the time and date shown are those of the most recent occurrence. If the value of repeat reaches 999,999 it stops there.

Time - Shows the most recent time (including the date) at which the event occurred.

Mode	All
Remote Command	:SYSTem:ERRor[:NEXT]?
Example	:SYST:ERR?
Restriction and Notes	The return string has the format: “<Error Number>,<Error>” Where <Error Number> and <Error> are defined in the Master Error Messages document.
State Saved	No
Key Path	System, Show

Next Page Next Page and Previous Page menu keys move the user between pages of the log, if it fills more than one page. These keys are grayed out in some cases:

If on the last page of the log, the Next Page key is grayed out

If on the first page of the log, the Previous Page key is grayed out.

If there is only one page, both keys are grayed out.

Key Path	System, Show, Show Errors

Previous Page See [“Next Page” on page 191](#).

History The History and Status keys select the Errors view. The Status key has a second line which shows a number in [square brackets]. This is the number of currently open status items.

Key Path	System, Show, Show Errors

Status See [“History” on page 191](#).

Verbose SCPI On/Off This is a capability that will allow the SCPI data stream to be displayed when a SCPI error is detected, showing the characters which stimulated the error and several of the characters preceding the error.

Mode	All
Remote Command	:SYSTem:ERRor:VERBoSe OFF ON 0 1 :SYSTem:ERRor:VERBoSe?

System Functions
System

Example	:SYST:ERR:VERB ON
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Key Path	System, Show, Show Errors

Refresh When pressed, refreshes the Show Errors display.

Key Path	System, Show, Show Errors

Clear Error Queue This clears all errors in all error queues.

Clear Error Queue does not affect the current status conditions.

Mode Preset does not clear the error queue.

Restore System Defaults will clear all error queues.

*CLS only clears the queue if it is sent remotely and *RST does not affect any error queue.

Switching modes does not affect any error queues.

Key Path	System, Show, Show Errors

System The System screen is formatted into three groupings: product descriptive information, options tied to the hardware, and software products:

<Product Name> <Product Description>		
Product Number: N9020A		
Serial Number: US46220924		
Firmware Revision: A.01.01		
Computer Name: <hostname>		
Host ID: N9020A,US44220924		
N9020A-503	Frequency Range to 3.6 GHz	
N9020A-PFR	Precision Frequency Reference	
N9020A-P03	Preamp 3.6 GHz	
N9060A-2FP	Spectrum Analysis Measurement Suite	1.0.0.0
N9073A-1FP	WCDMA	1.0.0.0
N9073A-2FP	WCDMA with HSDPA	1.0.0.0

The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page

menu key is grayed-out if the last page is information is presently displayed.

Mode	All
Example	SYST:SHOW SYST
Key Path	System, Show

Hardware The show hardware screen is used to view details of the installed hardware. This information can be used to determine versions of hardware assemblies and field programmable devices, in the advent of future upgrades or potential repair needs.

The screen is formatted into two groupings: product descriptive information and hardware information. The hardware information is listed in a table format:

[illegible]

The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu key is grayed-out if the last page is information is presently displayed.

Mode	All
Example	SYST:SHOW HARD
Key Path	System, Show

LXI This key shows you the product number, serial number, firmware revision, computer name, IP address, Host ID, LXI Class, LXI Version, MAC Address, and the Auto-MDIX Capability.

TIP For information about setting up measurements using LXI, refer to the *Programmer's Guide* located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the "Additional Documentation" page of the Help.

Key Path	System, Show
SCPI Example	SYST:SHOW LXI

LXI Event Log The event log records all of the LXI LAN event activity. As LXI LAN events are sent or received, the activity is noted in the Event Log with an IEEE 1588 timestamp. When the event log is selected, the current contents of the event log are displayed in the system information screen.

The fields recorded in the Event Log are:

- The date the event occurred (GMT)
- The time the event occurred (GMT)
- The type of event: LAN Input, LAN Output, Status, Alarm, Trigger Alarm, Trigger LAN
- The name of the event
- The edge associated with the event
- The event's identifier: This is the string that appears on the LAN.
- The source event: This is only valid for LAN Output, Trigger LAN, and Trigger Alarm event types.
- The source address: This is only valid for LAN Input event types. It is the address from which the message originated.
- The destination address: This is only valid for LAN Output event types. It is the address (or addresses) that the message will be sent to. For UDP messages, this field reads "ALL."

Key Path	System, Show, LXI

Circular Sets the behavior for entries that occur while the LXI Event Log is full.

- If Circular is set to 1, incoming events overwrite the oldest events in the log.
- If Circular is set to 0, incoming events are discarded.

Remote Command	:LXI:EVENT:LOG:CIRCULAR[:ENABLE] ON OFF 1 0 :LXI:EVENT:LOG:CIRCULAR[:ENABLE]?
Example	:LXI:EVEN:LOG:CIRC 1
Preset	ON

State Saved	Saved in instrument state.
Range	OFF ON 0 1
Key Path	System, Show, LXI, LXI Event Log

Clear Clears the event log of all entries.

Remote Command	:LXI:EVENT:LOG:CLear
Example	:LXI:EVEN:LOG:CLE
Key Path	System, Show, LXI, LXI Event Log

Size Sets the maximum number of entries the LXI Event Log can hold.

Remote Command	:LXI:EVENT:LOG:SIZE <size> :LXI:EVENT:LOG:SIZE?
Example	:LXI:EVEN:LOG:SIZE 256
Preset	64
State Saved	Saved in instrument state.
Range	>= 0
Key Path	System, Show, LXI, LXI Event Log

Enable Enables and disables the logging of LXI Events.

Remote Command	:LXI:EVENT:LOG:ENABle ON OFF 1 0 :LXI:EVENT:LOG:ENABle?
Example	:LXI:EVEN:LOG:ENAB ON
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF 0 1
Key Path	System, Show, LXI, LXI Event Log

Count (Remote Only) Returns the number of entries currently in the LXI Event Log.

Remote Command	:LXI:EVENT:LOG:COUNt?
Example	:LXI:EVEN:LOG:COUN?
Range	0 – Size

Next Entry (Remote Only) Returns the oldest entry from the LXI Event Log and removes it from the log. If the

log is empty, an empty string is returned.

Remote Command : LXI : EVENT : LOG [: NEXT] ?
Example : LXI : EVENT : LOG ?

All (Remote Only) Non-destructively retrieves the entire contents of the event log. Entries are returned as separate strings, surrounded by double quote marks, and separated by a comma. Fields within each entry are also comma delimited.

Remote Command : LXI : EVENT : LOG : ALL ?
Example : LXI : EVENT : LOG : ALL ? Returns the entire event log contents.

An example may look like the following:

"11/12/2007,18:14:10.770385,Error,LogOverwrite,Rise,,,,", "11/12/2007,18:14:10.592105,Status,Measuring,Rise,,,,", "11/12/2007,18:14:10.597758,Status,Measuring,Fall,,,,", "11/12/2007,18:14:10.597786,Status,Sweeping,Fall,,,,", "11/12/2007,18:14:10.599030,Status,WaitingForTrigger,Rise,,,,"

The contents of the Event Log vary, based on the operation of the instrument.

Specific Entry (Remote Only) Non-destructively retrieves a specifically indexed entry from the event log. Fields within an entry are comma delimited.

Remote Command : LXI : EVENT : LOG : ENTRY ? <int Index>
Example : LXI : CLOC : SALG : LOG ? 0 Returns the oldest entry in the Servo Log.
Example of result:
"1,1208978798,139644871,0.000000000,3.393600e+038,0.000000000,0.00000000,0.000000000"

Beginning Entry (Remote Only) Sets or freezes the beginning entry of the log when in circular mode to the most recently added entry at the time of the command. This is so that the : LXI : EVENT : LOG : ENTtry ? command has a reference entry for indexing individual entries in the log.

Remote Command : LXI : EVENT : LOG : CIRCULAR : FBENTry
Example LXI : CLOCK : SALG : LOG : CIRC : FBEN

Power On

The Power On menu key enables you to select how the instrument should power on. The options are: Mode and Input/Output Defaults, User Preset and Last State.

Mode All
Remote Command : SYSTem : PON : TYPE MODE | USER | LAST | PRESet
: SYSTem : PON : TYPE ?
Example : SYST : PON : TYPE MODE

Preset	This is unaffected by Preset but is set to Mode on a “Restore System Defaults->All”
State Saved	No
Key Path	System

Mode and Input/Output Defaults

When the analyzer is powered on in Mode and Input/Output Defaults, it will perform a Restore Mode Defaults to all modes in the instrument and a Restore Input/Output Defaults as well.

Mode	All
Example	SYST:PON:TYPE MODE
Key Path	System, Power On

User Preset

Sets **Power On** to **User Preset**. When the analyzer is powered on in User Preset, it will User Preset each mode and switch to the power-on mode. Power On User Preset will not affect any settings beyond what a normal User Preset affects.

NOTE An instrument could never power up for the first time in User Preset.

Mode	All
Example	SYST:PON:TYPE USER
Key Path	System, Power On

Last State

Sets **Power On** to **Last**. When the analyzer is powered on, it will put all modes in the last state they were in prior to when the analyzer was put into Power Standby and it will wake up in the mode it was last in prior to powering off the instrument. The saving of the active mode prior to shutdown happens behind the scenes when a controlled shutdown is requested by using the front panel power **Standby** key or by using the remote command SYSTem:PDOWn. The non-active modes are saved as they are deactivated and recalled by Power On Last State.

NOTE An instrument could never power up for the first time in Last.

If line power to the analyzer is interrupted, for example by pulling the line cord plug or by switching off power to a test rack, Power On Last State will not work properly. For more information see Power Standby (Instrument Shutdown).

Mode	All

Example	SYST:PON:TYPE LAST
Restriction and Notes	Power on Last State only works if the user has done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the :SYSTem:PDOWn command.
Key Path	System, Power On

Power On Mode

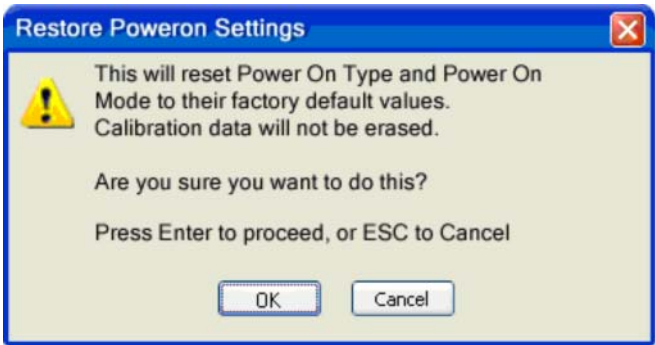
This menu key brings up a Mode Menu that lists the available modes and lets you select which Mode is to be the power-on mode.

This Mode is used for Power On Mode and Input/Output Defaults and Restore System Defaults All.

Mode	All
Remote Command	:SYSTem: PON: MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA :SYSTem: PON: MODE?
Example	SYST:PON:MODE SA
Restriction and Notes	The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument.
Preset	This is unaffected by Preset but is set on a "Restore System Defaults->All" to SA unless Spectrum Analysis mode is not installed in the instrument in which case the factory will load the default power-on mode.
State Saved	No
Key Path	System, Power On

Restore Power On Defaults

This selection causes the Power On Type and Power On Mode settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On menu key under the Restore System Defaults menu causes the same action.



If you press any key other than OK or Enter, it is construed as a Cancel, because the only path that will actually cause the reset to be executed is through OK or Enter.

Example	:SYST:DEF PON
Key Path	System, Power On

Alignments

The Alignments Menu controls and displays the automatic alignment of the instrument, and provides the ability to restore the default alignment values.

The current setting of the alignment system is displayed in the system Settings Panel along the top of the display, including a warning icon for conditions that may cause specs to be impacted, for example:



Key Path	System

Auto Align

Configures the method for which the automatic background alignment is run.

Automatic background alignments are run periodically between measurement acquisitions. The instrument’s software determines when alignments are to be performed to maintain warranted operation. The recommended setting for **Auto Align** is **Normal**.

An Auto Align execution cannot be aborted with the Cancel (ESC) key. To interrupt an Auto Align execution, select **Auto Align Off**.

Mode	All
Remote Command	:CALibration:AUTO ON PARTial OFF ALERT :CALibration:AUTO?
Example	:CAL:AUTO ON
Restriction and Notes	While Auto Align is executing, bit 0 of Status Operation register is set.
Dependencies/Couplings	Auto Align is set to Off if Restore Align Data is invoked.

System Functions

System

Preset	This is unaffected by Preset but is set to ON upon a “Restore System Defaults->Align”.
State Saved	No
Key Path	System, Alignments
SCPI Status Bits/OPC Dependencies	When Auto Align is executing Bit 0 in the Status Operational register is set.

Normal Auto Align, Normal turns on the automatic alignment of all measurement systems. **Auto Align, Normal** maintains the instrument in warranted operation across varying temperature and over time.

If the condition “Align Now, All required” is set, transition to **Auto Align, Normal** will perform the required alignments and clear the “Align Now, All required” condition and then continue with further alignments as required to maintain the instrument adequately aligned for warranted operation.

When **Auto Align, Normal** is selected the Auto Align Off time is set to zero.

When **Auto Align, Normal** is selected the Settings Panel indicates ALIGN AUTO.

Mode	All
Example	:CAL:AUTO ON
Restriction and Notes	Alignment processing as a result of the transition to Normal will be executed sequentially. Thus, *OPC? or *WAI following CAL:AUTO ON will return when the alignment processing is complete. The presence of an external signal may interfere with the RF portion of the alignment. If so, the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, and bit 11 is set in the Status Questionable Calibration register. After the interfering signal is removed, subsequent alignment of the RF will clear the condition, and clear bit 11 in the Status Questionable Calibration register.
Key Path	System, Alignments, Auto Align
SCPI Status Bits/OPC Dependencies	An interfering user signal may prevent automatic alignment of the RF subsystem. If this occurs, the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, the Status Questionable Calibration bit 11 is set, and the alignment proceeds. When a subsequent alignment of the RF subsystem succeeds, either by the next cycle of automatic alignment or from an Align Now, RF , the Error Condition and Status Questionable Calibration bit 11 are cleared.

Partial Auto Align, Partial disables the full automatic alignment and the maintenance of warranted operation for the benefit of improved measurement throughput. Accuracy is retained for the Resolution Bandwidth filters and the IF Passband which is critical to FFT accuracy, demodulation, and many measurement applications. With Auto Align set to **Partial**, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The **Auto Align, Alert** mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the **Align All, Now** operation. Another is to return the **Auto Align** selection to **Normal**.

Auto Align, Partial is recommended for measurements where the throughput is so important that a few percent improvement is more valued than an increase in the accuracy errors of a few tenths of a decibel. One good application of **Auto Align, Partial** would be an automated environment where the alignments can be called during overhead time when the device-under-test is exchanged.

When **Auto Align, Partial** is selected the elapsed time counter begins for Auto Align Off time.

When **Auto Align, Partial** is selected the Settings Panel indicates ALIGN PARTIAL with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

Mode	All
Example	:CAL:AUTO PART
Restriction and Notes	Auto Align Partial begins the elapsed time counter for Auto Align Off time.
Key Path	System, Alignments, Auto Align

Off Auto Align, Off disables automatic alignment and the maintenance of warranted operation, for the benefit of maximum measurement throughput. With Auto Align set to **Off**, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The **Auto Align, Alert** mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the **Align All, Now** operation. Another is to return the **Auto Align** selection to **Normal**.

The **Auto Align, Off** setting is rarely the best choice, because **Partial** gives almost the same improvement in throughput while maintaining the warranted performance for a much longer time. The **Off** choice is intended for unusual circumstances such as the measurement of radar pulses where you might like the revisit time to be as consistent as possible.

When **Auto Align, Off** is selected the Auto Align Off time is initialized and the elapsed time counter begins.

When **Auto Align, Off** is selected the Settings Panel indicates ALIGN OFF with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument:

Mode	All
Example	:CAL:AUTO OFF
Restriction and Notes	Auto Align Off begins the elapsed time counter for Auto Align Off time.
Dependencies/Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Key Path	System, Alignments, Auto Align

All but RF Auto Align, All but RF, configures automatic alignment to include or exclude the RF subsystem. (Eliminating the automatic alignment of the RF subsystem prevents the input impedance from changing. The normal input impedance of 50 ohms can change to an open circuit when alignments are being used. Some devices under test do not behave acceptably under such circumstances, for example by showing instability.) When **Auto Align, All but RF ON** is selected, the operator is responsible for performing an **Align Now, RF** when RF-related alignments expire. The **Auto Align, Alert** mechanism will notify the operator to perform an **Align Now, All** when the combination of time

and temperature variation is exceeded.

When **Auto Align, All but RF ON** is selected the Settings Panel indicates ALIGN AUTO/NO RF with a warning icon (warning icon is intended to inform the operator they are responsible for the maintaining the RF alignment of the instrument):

Mode	All
Remote Command	:CALibration:AUTO:MODE ALL NRF :CALibration:AUTO:MODE?
Example	:CAL:AUTO:MODE NRF
Preset	This is unaffected by Preset but is set to ALL on a “Restore System Defaults->Align”.
State Saved	No
Key Path	System, Alignments, Auto Align

Alert The instrument will signal an Alert when conditions exist such that you will need to perform a full alignment (for example, **Align Now, All**). The Alert can be configured in one of four settings; **Time & Temperature, 24 hours, 7 days, or None**. A confirmation is required when a selection other than **Time & Temperature** is chosen. This prevents accidental deactivation of alerts.

With **Auto Align** set to **Normal**, the configuration of **Alert** is not relevant because the instrument’s software maintains the instrument in warranted operation.

Mode	All
Remote Command	:CALibration:AUTO:ALERT TTEMPerature DAY WEEK NONE :CALibration:AUTO:ALERT?
Example	:CAL:AUTO:ALERT TTEM
Remote Command Notes	The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register.
Preset	This is unaffected by Preset but is set to TTEMPerature on a “Restore System Defaults->Align”.
State Saved	No
Key Path	System, Alignments, Auto Align
SCPI Status Bits/OPC Dependencies	The alert is the Error Condition “Align Now, All required” and bit 14 is set in the Status Questionable Calibration register.

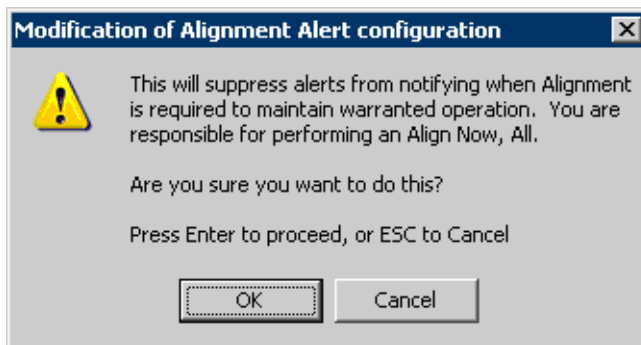
Time & Temperature With Auto Align Alert set to **Time & Temperature** the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition “Align Now, All required”. If this choice for Alert is selected, the absence of an alert means that the analyzer alignment is sufficiently up-to-date to maintain warranted accuracy.

Mode	All

Example	:CAL:AUTO:ALER TTEM
Key Path	System, Alignments, Auto Align, Alert
SCPI Status Bits/OPC	Bit 14 is set in the Status Questionable Calibration register.
Dependencies	

24 hours With Auto Align Alert set to **24 Hours** the instrument will signal an alert after a time span of 24 hours since the last successful full alignment (for example, **Align Now, All** or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a daily basis at a small risk of accuracy errors in excess of the warranted specifications. The alert is the Error Condition “Align Now, All required”.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



No confirmation is required when Alert is configured through a remote command.

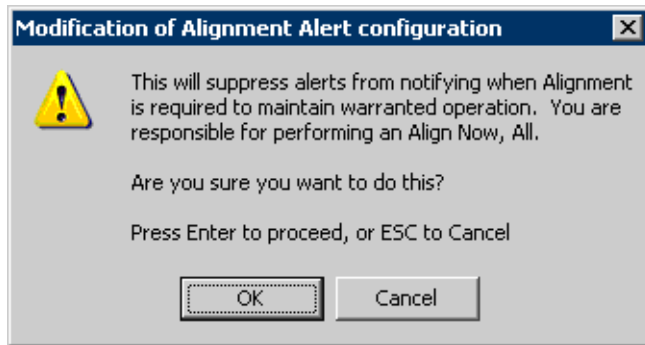
Mode	All
Example	:CAL:AUTO:ALER DAY
Key Path	System, Alignments, Auto Align, Alert
SCPI Status Bits/OPC	Bit 14 is set in the Status Questionable Calibration register.
Dependencies	

7 days With Auto Align Alert is set to **7 days** the instrument will signal an alert after a time span of 168 hours since the last successful full alignment (for example, **Align Now, All** or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a weekly basis, at a modest risk of accuracy degradations in excess of warranted performance. The alert is the Error Condition “Align Now, All required”.

For front panel operation, confirmation is required for the customer to transition into this setting of Alert. The confirmation dialog is:

System Functions

System

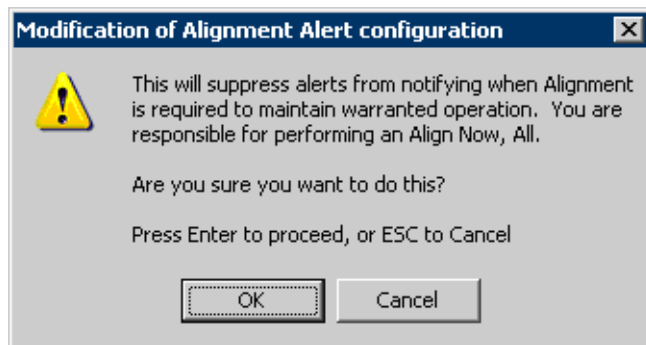


No confirmation is required when Alert is configured through a remote command.

Mode	All
Example	:CAL:AUTO:ALER WEEK
Key Path	System, Alignments, Auto Align, Alert
SCPI Status Bits/OPC	Bit 14 is set in the Status Questionable Calibration register.
Dependencies	

None With Auto Align Alert set to **None** the instrument will not signal an alert. This is provided for rare occasions where you are making a long measurement which cannot tolerate Auto Align interruptions, and must have the ability to capture a screen image at the end of the measurement without an alert posted to the display. Agilent does not recommends using this selection in any other circumstances, because of the risk of accuracy performance drifting well beyond expected levels without the operator being informed.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



No confirmation is required when Alert is configured through a remote command.

Mode	All
Example	:CAL:AUTO:ALER NONE
Key Path	System, Alignments, Auto Align, Alert

Align Now

Accesses alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

Key Path	System, Alignments
All Immediately executes an alignment of all subsystems. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key). If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is set. In addition the Error Condition “Align Now, RF required” is set, and bits 11 and 12 are set in the Status Questionable Calibration register. The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value. Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature. If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8 GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register Align Now, All can be interrupted by pressing the Cancel (ESC) front panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition “Align Now, All required” is set, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems. In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.	
Mode	All
Remote Command	:CALibration[:ALL] :CALibration[:ALL]?
Example	:CAL
Restriction and Notes	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.

System Functions

System

Dependencies/Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Remote Command Notes	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required.
Key Path	System, Alignments, Align Now
SCPI Status Bits/OPC Dependencies	Bits 11, 12 or 14 may be set in the Status Questionable Calibration register.
Mode	All
Remote Command	*CAL?
Example	*CAL?
Restriction and Notes	Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Remote Command Notes	*CAL? returns 0 if successful *CAL? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? See additional remarks described with :CALibration[:ALL]?

All but RF Immediately executes an alignment of all subsystems except the RF subsystem. The instrument will stop any measurement currently underway, perform the alignment, then restart the measurement from the beginning (similar to pressing the **Restart** key). This can be used to align portions of the instrument that are not impacted by an interfering user input signal.

This operation might be chosen instead of **All** if you do not want the device under test to experience a large change in input impedance, such as a temporary open circuit at the analyzer input.

The query form of the remote commands (:CALibration:NRF?) will invoke the alignment and return a success or failure value.

Successful completion of **Align Now, All but RF** will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. If “Align Now, All required” was in effect prior to executing the All but RF, the Error Condition “Align Now, RF required” is asserted and bit 12 in the Status Questionable Calibration register is set. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

Align Now, All but RF can be interrupted by pressing the Cancel (ESC) front panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition “Align Now, All required” is set, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be used for an individual subsystem, but not a full new set of data for all subsystems.

Mode	All
Remote Command	:CALibration:NRF :CALibration:NRF?
Example	:CAL:NRF
Dependencies/Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature.
Remote Command Notes	:CALibration:NRF? returns 0 if successful :CALibration:NRF? returns 1 if failed While Align Now, All but RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register and set bit 12 if invoked with “Align Now, All required”.
Key Path	System, Alignments, Align Now
SCPI Status Bits/OPC	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Dependencies	

RF Immediately executes an alignment of the RF subsystem. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the **Restart** key).

This operation might be desirable if the alignments had been set to not include RF alignments, or if previous RF alignments could not complete because of interference which has since been removed.

If an interfering user signal is present at the RF Input, the alignment will terminate and raise the Error Condition “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference”, and Error Condition “Align Now, RF required”. In addition, bits 11 and 12 will be set in the Status Questionable

Calibration register.

The query form of the remote commands (:CALibration:RF?) will invoke the alignment of the RF subsystem and return a success or failure value. An interfering user signal is grounds for failure.

A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register.

Successful completion of **Align Now, RF** clears the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4800 MHz interference” and the Error Conditions “Align RF failed” and “Align Now, RF required”, and clears bits 3, 11, and 12 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, RF Time, and capture the Last Align Now, RF Temperature.

Align Now, RF can be interrupted by pressing the Cancel (ESC) front panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition “Align Now, RF required” is set, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

Mode	All
Remote Command	:CALibration:RF :CALibration:RF?
Example	:CAL:RF
Restriction and Notes	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Dependencies/Couplings	Initializes the time for the Last Align Now, RF Time. Records the temperature for the Last Align Now, RF Temperature.
Remote Command Notes	:CALibration:RF? returns 0 if successful :CALibration:RF? returns 1 if failed (including interfering user signal) While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bits 3, 11, and 12 in the Status Questionable Calibration register. A failure encountered during alignment will set the Error Condition “Align RF failed” and set bit 3 in the Status Questionable Calibration register. An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required.
Key Path	System, Alignments, Align Now
SCPI Status Bits/OPC Dependencies	Bits 11, 12 or 14 may be set in the Status Questionable Calibration register.

Advanced

Advanced accesses alignment processes that are immediate action operations that perform operations that run until complete. Advanced alignments are performed on an irregular basis, or require additional operator interaction

Key Path

System, Alignments

Characterize Preselector (Only with Option 507, 508, 513, or 526) The Preselector tuning curve drifts over temperature and time. Recognize that the **Amplitude, Presel Center** function adjusts the preselector for accurate amplitude measurements at an individual frequency. **Characterize Preselector** improves the amplitude accuracy by ensuring the Preselector is approximately centered at all frequencies without the use of the **Amplitude, Presel Center** function. **Characterize Preselector** can be useful in situations where absolute amplitude accuracy is not of utmost importance, and the throughput savings or convenience of not performing a **Presel Center** is desired. **Presel Center** is required prior to any measurement for best (and warranted) amplitude accuracy.

Agilent recommends that the **Characterize Preselector** operation be performed yearly as part of any calibration, but performing this operation every three months can be worthwhile.

Characterize Preselector immediately executes a characterization of the Preselector, which is a YIG-tuned filter (YTF). The instrument stops any measurement currently underway, performs the characterization, then restarts the measurement from the beginning (similar to pressing the **Restart** key).

The query form of the remote commands (:CALibration:YTF?) will invoke the alignment of the YTF subsystem and return a success or failure value.

A failure encountered during alignment will set the Error Condition “Characterize YTF failed” and set bit 9 in the Status Questionable Calibration register.

Successful completion of **Advanced, Characterize Preselector** will clear the Error Condition “Characterize YTF failed”, and clear bit 9 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Characterize Preselector Time, and capture the Last Characterize Preselector Temperature.

The last Characterize Preselector Time and Temperature must survive across the power cycle as this operation is performed infrequently.

Advanced, Characterize Preselector can be interrupted by pressing the Cancel (ESC) front panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used.

Mode	All
Remote Command	:CALibration:YTF :CALibration:YTF?
Example	:CAL:YTF
Restriction and Notes	For Option 507, 508, 513, and 526 only.
Dependencies/Couplings	Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature.

System Functions

System

Remote Command Notes

:CALibration:YTF? returns 0 if successful

:CALibration:YTF? returns 1 if failed (including interfering user signal)

While Advanced, Characterize Preselector is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.

This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.

Successful completion will clear bit 9 in the Status Questionable Calibration register.

A failure encountered during alignment will set the Error Condition "Characterize Preselector failed" and set bit 9 in the Status Questionable Calibration register.

Key Path

System, Alignments, Align Now

Show Alignment Statistics

Shows alignment information you can use to ensure that the instrument is operating in a specific manner. The Show Alignment Statistics screen is where you can view time and temperature information.

Values which are displayed are only updated when the Show Alignment Statistics screen is invoked, they are not updated while the Show Alignment Statistics screen is being displayed. The remote commands which access this information obtain current values.

An example of the Show Alignment Statistics screen would be similar to:

Std Header	Product Number: N9020A Serial Number: US46340924 Firmware Revision: A.01.01	
Instrument Info	Time since start-up: 300 hrs Current Temperature: +28 degC	
Auto Align Info	Time while Auto Align off: 90 min	
Std Align Now	Time since last Align Now All: 12.5 hrs Temperature since last Align Now All: -1.3 degC Time since last Align Now RF: 5 min Temperature since last Align Now RF: +0.1 degC	Times & Temperature delta. Shown as "..." if none since start-up.
If TG Option (Not Zorro1)	Time since last Align TG: 2.5 hrs Temperature since last Align TG: +0.2 degC	
Opts 508,513 526	Last Characterize Preselector: Jun 1, 2006 15:00:00 Last Characterize Preselector Temperature: +32.1 degC	Time & Temperature 'stamp'

A successful Align Now, RF will set the Last Align RF temperature to the current temperature, and reset the Last Align RF time. A successful Align Now, All or Align Now, All but RF will set the Last Align Now All temperature to the current temperature, and reset the Last Align Now All time. A successful

Align Now, All will also reset the Last Align RF items if the RF portion of the Align Now succeeded.

Mode	All
Restriction and Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Key Path	System, Alignments
Mode	All
Remote Command	:SYSTem:PON:TIME?
Example	:SYST:PON:TIME?
Restriction and Notes	Value is the time since the most recent start-up in seconds.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:CURRent?
Example	:CAL:TEMP:CURR?
Restriction and Notes	Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required)
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LALL?
Example	:CAL:TIME:LALL?
Restriction and Notes	Value is the elapsed time, in seconds, since the last successful Align Now, All or Align Now, All but RF was executed.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:LALL?
Example	:CAL:TEMP:LALL?
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF was executed.

State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LRF?
Example	:CAL:TIME:LRF?
Restriction and Notes	Value is the elapsed time, in seconds, since the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:LRF?
Example	:CAL:TEMP:LRF?
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, RF was executed, either individually or as a component of Align Now, All.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LPreselector?
Example	:CAL:TIME:LPR?
Restriction and Notes	Value is date and time the last successful Characterize Preselector was executed. The date is separated from the time by a space character. Returns "" if no Characterize Preselector has ever been performed on the instrument.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:LPreselector?
Example	:CAL:TEMP:LPR?
Restriction and Notes	Value is in degrees Centigrade at which the last successful Characterize Preselector was executed.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen

Mode	All
Remote Command	:CALibration:AUTO:TIME:OFF?
Example	:CAL:AUTO:TIME:OFF?
Restriction and Notes	Value is the elapsed time, in seconds, since Auto Align has been set to Off or Off with Alert. The value is 0 if Auto Align is ALL or NORF.
State Saved	No
Key Path	Visual annotation in the Show Alignment Statistics screen

Timebase DAC

Allows control of the internal 10 MHz reference oscillator timebase. This may be used to adjust for minor frequency alignment between the signal and the internal frequency reference. This adjustment has no effect if the instrument is operating with an External Frequency Reference.

If the value of the Timebase DAC changes (by switching to Calibrated from User with User set to a different value, or in User with a new value entered) an alignment may be necessary. The alignment system will take appropriate action; which will either invoke an alignment or cause an Alert.

Mode	All
Remote Command	:CALibration:FREQuency:REFeRence:MODE CALibrated USER :CALibration:FREQuency:REFeRence:MODE?
Example	:CAL:FREQ:REF:MODE CAL
Restriction and Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Remote Command Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Preset	This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”.
State Saved	No
Key Path	System, Alignments

Calibrated Sets the Timebase DAC to the value established during factory or field calibration. The value displayed on the menu key is the calibrated value.

Mode	All
Example	:CAL:FREQ:REF:MODE CAL
Key Path	System, Alignments, Timebase DAC

User Allows setting the Timebase DAC to a value other than the value established during the factory or

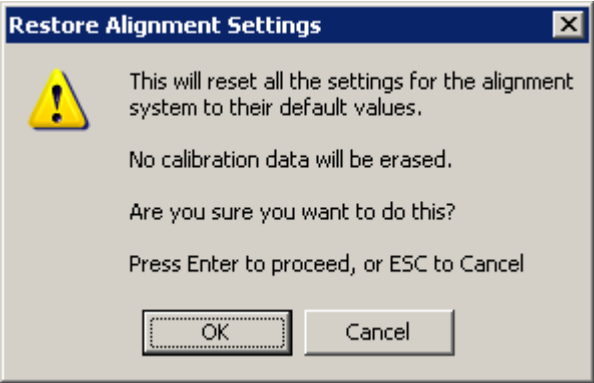
field calibration. The value displayed on the menu key is the calibrated value.

Mode	All
Example	:CAL:FREQ:REF:MODE USER
Key Path	System, Alignments, Timebase DAC
Mode	All
Remote Command	:CALibration:FREQuency:REFeRence:FINE <integer> :CALibration:FREQuency:REFeRence:FINE?
Example	:CAL:FREQ:REF:FINE 8191
Restriction and Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Dependencies/Couplings	Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER
Preset	This is unaffected by Preset but is set to the factory setting on a “Restore System Defaults->Align”.
State Saved	No
Min	0
Max	16383
Key Path	System, Alignments, Timebase DAC
Remote Command	:CALibration:FREQuency:REFeRence:COARSe <integer> :CALibration:FREQuency:REFeRence:COARSe?
Example	:CAL:FREQ:REF:COAR 8191
Dependencies/Couplings	Setting :CAL:FREQ:REF:COAR sets :CAL:FREQ:REF:MODE USER
Remote Command Notes	This is an alias for CAL:FREQ:REF:FINE any change to COARSe is reflected in FINE and vice-versa. See CAL:FREQ:REF:FINE for description of functionality.

Restore Align Defaults

Initializes the alignment user interface settings, not alignment data, to the factory default values. Align Now, All must be executed if the value of the Timebase DAC results in a change.

For front panel operation, you are prompted to confirm action before setting the alignment parameters to factory defaults:



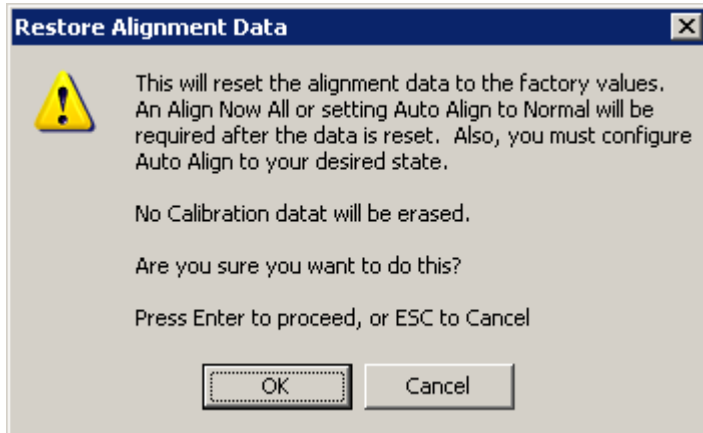
The parameters affected are:

Parameter	Setting
Timebase DAC	Calibrated
Timebase DAC setting	Calibrated value
Auto Align State	Normal (if the instrument is not operating with default alignment data, Off otherwise)
Auto Align All but RF	Off
Auto Align Alert	Time & Temperature
Mode	All
Example	:SYST:DEF ALIG
Restriction and Notes	Alignment processing that results as the transition to Auto Alignment Normal will be executed sequentially; thus *OPC? or *WAI will wait until the alignment processing is complete.
Key Path	System, Alignments

Restore Align Data

Initializes the alignment data to the factory default values. This action is normally not necessary. It is recommended if alignment errors occur. If alignment errors continue to occur after Restore Align Data, the instrument is in need of repair. Align Now, All must be executed to regain warranted operation, and the user is responsible for configuring Auto Align thereafter.

For front panel operation, confirmation is required before setting the alignment data to factory defaults. The confirmation dialog is:



The Error Condition “Align Now, All required” is set, and bit 14 in the Status Questionable Calibration register is set. Auto Align is set to Off.

Mode	All
Remote Command	:CALibration:DATA:Default
Example	:CAL:DATA:DEF
Dependencies/Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition “Align Now, All required” is set.
Key Path	System, Alignments

I/O Config

Activates a menu for identifying and changing the I/O configuration for remote control.

Key Path	System

GPIO Address

Select the GPIO remote address.

Mode	All
Remote Command	:SYSTem:COMMunicate:GPIO[1] [:SELF] :ADDRESS <integer> :SYSTem:COMMunicate:GPIO[1] [:SELF] :ADDRESS?
Example	:SYST:COMM:GPIO:ADDR 17
Remote Command Notes	NOTE: Changing the Address on the GPIO port requires all further communication to use the new address.
Preset	This is unaffected by Preset but is set to 18 on a “Restore System Defaults->Misc”
State Saved	No

Range	0 to 30
Key Path	System, I/O Config

SCPI LAN Menu

Activates a menu for identifying and changing the SCPI over LAN configuration. There are a number of different ways to send SCPI remote commands to the instrument over LAN. It can be a problem to have multiple users simultaneously accessing the instrument over the LAN. These keys limit that somewhat by disabling the telnet, socket, and/or SICL capability.

Key Path	System, I/O Config

SCPI Telnet Turns the SCPI LAN telnet capability On or Off allowing you to limit SCPI access over LAN through telnet.

Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?
Example	:SYST:COMM:LAN:SCPI:TELN:ENAB OFF
Preset	This is unaffected by Preset but is set to ON on a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Key Path	System, I/O Config, SCPI LAN

SCPI Socket Turns the capability of establishing Socket LAN sessions On or Off. This allows you to limit SCPI access over LAN through socket sessions.

Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?
Example	:SYST:COMM:LAN:SCPI:SOCK:ENAB OFF
Preset	This is unaffected by Preset but is set to ON on a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Key Path	System, I/O Config, SCPI LAN

SCPI Socket Control Port (remote command only) Returns the TCP/IP port number of the control socket associated with the SCPI socket session. This query enables you to obtain the unique port number

System Functions System

to open when a device clear is to be sent to the instrument. Every time a connection is made to the SCPI socket, the instrument creates a peer control socket. The port number for this socket is random. The user must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string “DCL ” to the instrument.

If this SCPI command is sent to a non SCPI Socket interface, then 0 is returned.

Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTRol?
Example	:SYST:COMM:LAN:SCPI:SOCK:CONT?
Preset	This is unaffected by Preset or “Restore System Defaults->Misc”.
State Saved	No
Range	0 to 65534

SICL Server Turns the SICL server capability On or Off, enabling you to limit SCPI access over LAN through the SICL server. (SICL IEEE 488.2 protocol.)

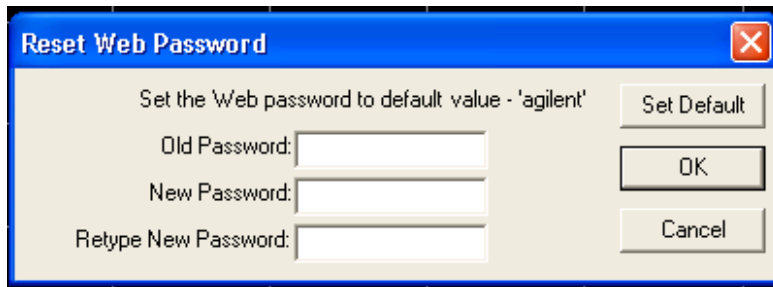
Parameter	Description	Setting
Maximum Connections	The maximum number of connections that can be accessed simultaneously	5
Instrument Name	The name (same as the remote SICL address) of your analyzer	inst0
Instrument Logical Unit	The unique integer assigned to your analyzer when using SICL LAN	8
Emulated GPIB Name	The name (same as the remote SICL address) of the device used when communicating with your analyzer	gpib7
Emulated GPIB Logical Unit	The unique integer assigned to your device when it is being controlled using SICL LAN	8
Emulated GPIB Address	The emulated GPIB address assigned to your transmitter tester when it is a SICL server (the same as your GPIB address)	18
Mode	All	
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle?	
Example	:SYST:COMM:LAN:SCPI:SICL:ENAB OFF	
Preset	This is unaffected by Preset, but is set to ON on a “Restore System Defaults->Misc”	
State Saved	No	
Range	On Off	

System, I/O Config, SCPI LAN

Reset Web Password

The embedded webserver contains certain capability which are password protected; modifying the LAN configuration of the instrument, and access to web pages that can change the settings of the instrument. The default password from the factory is 'agilent' (without the quotes). The control provided here is the means to set the web password as the user desires, or to reset the password to the factory default.

Selecting Reset web password brings up a control for resetting the password as the user desires, or to the factory default. An external keyboard is required to change the password from the factory default of 'agilent' or to set a new password that contains alphabetic characters. The control is:



If this control is entered without an external keyboard or mouse connected, you can cancel the control by pressing the Cancel (ESC) hardkey.

All

System, I/O Config

Query USB Connection (Remote Command Only)

Enables you to determine the speed of USB connection.

All

:SYSTem:COMMunicate:USB:CONNection?

:SYST:COMM:USB:CONN?

NONE – Indicates no USB connection has been made.

LSpeed – Indicates a USB low speed connection (1.5 Mbps). Note: this is reserved for future use, the T+M488 protocol is not supported on low speed connections.

HSPEED – Indicates that a USB high speed connection (480 Mbps) has been negotiated.

FSpeed – Indicates that a USB full speed connection (12 Mbps) has been negotiated.

No

NONE|LSPeed|HSPeed|FSPeed

USB Connection Status (Remote Command Only)

Enables you to determine the current status of the USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:STATus?
Example	:SYST:COMM:USB:STAT?
Remote Command Notes	SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when: The bus is not connected to any controller The controller is currently powered off The controller has explicitly placed the USB device into the suspended state. When in the suspended state, no USB activity, including start of frame packets are received. ACTive – Indicates that the USB device is in the active state. When the device is in the active state, it is receiving periodic start of frames but it isn't necessarily receiving or transmitting data.
State Saved	No
Range	SUSPended ACTive

USB Packet Count (Remote Command Only)

Enables you to determine the number of packets received and transmitted on the USB bus.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:PACKets?
Example	:SYST:COMM:USB:PACK?
Remote Command Notes	Two integers are returned. The first is the number of packets received since application invocation, the second is the number of packets transmitted since application invocation. If no packets have been received or transmitted the response is 0,0. The packet count is initialized to 0,0 when the instrument application is started.
State Saved	No

LXI Configuration

Pressing this key opens a menu that allows you to access the various LXI configuration properties.

TIP	For information about setting up measurements using LXI, refer to the <i>Programmer's Guide</i> located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the

"Additional Documentation" page of the Help.

[illegible]

LAN Reset This key resets the LAN connection.

Key Path	System, I/O Config, LXI

LXI Domain The instrument only receives LXI LAN Events sent by members of the same LXI Domain. Conversely, LXI Output LAN Events sent by the instrument can only be received by members of the same LXI Domain. This is not the same as the IEEE 1588 domain (see “[Domain \(Remote Only\)](#)” on page 233).

```
Remote Command      :LXI:EVENT:DOMain <intDomain>
                   :LXI:EVENT:DOMain?
```

Example	:LXI:EVER:DOM 128
	:LXI:EVER:DOM?

Preset	Not affected by a Preset. The default value of "0" can be restored by pressing Restore Defs, Input/Output Settings

State Saved Saved in instrument state.

Range	0–255

Key Path	System, I/O Config, LXI

LXI Output LAN Events The device can be configured to send LXI LAN Events as the instrument's state changes. Specifically, it can notify other devices as the status signals WaitingForTrigger, Sweeping, Measuring, OperationComplete, and Recalling transition. Additionally, Output LAN Events can be sent in response to the receipt of any of the Input LAN Events.

This is the entry point for the LXI Output LAN Event system. This key branches to a list of events that can be sent out on the LAN in response to instrument events.

Key Path	System, I/O Config

Disable All This command causes the Enable property of all members of the LXI Output LAN Event List to be set to OFF.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:DISable:ALL

Example :LXI:EVER:LAN:DIS:ALL

Key Path **System, I/O Config, LXI, LXI Output LAN Events**

Output LAN Event List This is the list of LXI Output LAN events that can be sent in response to an instrument

System Functions

System

event such as sweeping or waiting for a trigger. Each member of this list has a key in the LXI Output LAN Events panel. The list can grow and shrink in response to Add and Remove commands respectively. New pages must be added and removed automatically as the list size changes. Only the first 14 characters of an LXI Output LAN Event name are displayed on the key.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:LIST?
Example	:LXI:EVEN:LAN:LIST? Returns the complete list of Output LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"
State Saved	Saved in instrument state.
Key Path	System, I/O Config, LXI, LXI Output LAN Events

Add (Remote Only) Adds the provided string to the list of possible LAN events to output as a response to instrument events. As new LAN events are added, keys are generated in the LXI Output LAN Events menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:ADD "LANEVENT"
Example	:LXI:EVEN:LAN:ADD "LANEVENT"
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and added to the LXI Output LAN Event list. No event is added if the LAN Event already exists.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon

Remove (Remote Only) Removes the provided string from the list of possible LAN events to output as a response to instrument events. As new LAN events are removed, keys are removed from the LXI Output LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu. Events from the default list cannot be removed.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:REMOve[:EVENT] "LANEVENT"
Example	:LXI:EVEN:LAN:REM "LANEVENT"

Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and the resulting LAN Event is removed from the LXI Output LAN Event list. Nothing happens if the LAN event was not introduced using the Add command.
State Saved	
Range	Uppercase, Lowercase, Numeric, Symbol

Remove All (Remote Only) Clears the list of custom LAN events (those introduced using the Add command) that are available to output as a response to instrument events. As new LAN events are removed, keys are removed from the LXI Output LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Output LAN Events menu.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:REMOve:ALL
Example	:LXI:EVEN:LAN:REM:ALL
Restriction and Notes	Only LAN Events added with the Add command are removed. Default events cannot be removed.

Source Sets the instrument event that this LXI Output LAN event is tied to.

The possible instrument events are “WaitingForTrigger”, “Sweeping”, “Measuring”, “OperationComplete”, and “Recalling”.

The key is labeled with the value of the selected source.

For the instrument event specific LXI Output LAN Events “WaitingForTrigger,” “Sweeping,” “Measuring,” “OperationComplete,” and “Recalling,” this parameter is set to the corresponding source value and cannot be changed. For these events, the Source key does not appear.

WaitingForTrigger, Measuring, and Sweeping correspond to the standard trigger state machine activities for which they are named.

OperationComplete is low when a measurement operation is underway. For example, OperationComplete is low throughout a list sweep measurement, even though Sweeping, Measuring, and WaitingForTrigger will undergo a number of transitions. In this case, OperationComplete goes high when the entire list sweep is finished.

Recalling is high while the instrument is actively recalling a state.

Additionally, the Source parameter can be set to the name of any Input LAN Event. This causes the Output LAN Event to be sent upon receipt of the named Input LAN Event. There is no front panel support for these events.

The default list of available Input LAN Events is:

- “LAN0”
- “LAN1”
- “LAN2”
- “LAN3”
- “LAN4”
- “LAN5”
- “LAN6”

- “LAN7”

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE "LANEVENT", "SourceEvent"
Example	:LXI:EVEN:LAN:SOUR "LANEVENT", "WaitingForTrigger"
Restriction and Notes	The maximum length of the string is 45 characters.
Preset	"Sweeping" (The Output LAN Events "WaitingForTrigger", "Sweeping", "Measuring", "OperationComplete", and "Recalling" all have default source parameters that match their names)
State Saved	Saved in instrument state.
Range	"WaitingForTrigger" "Sweeping" "Measuring" "OperationComplete" "Recall ing" "LAN0" "LAN1" "LAN2" "LAN3" "LAN4" "LAN5" "LAN6" "LAN7" any user-added Input LAN Event
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Destination (Remote Only) Outgoing LAN events are sent to the hosts enumerated in the destination expression. This expression takes the form of “host1:port1, host2:port2,...” where port numbers are optional, and default to the IANA assigned TCP port (5044). To designate a UDP broadcast at the default port, set the destination string to “” or “ALL”. To designate a UDP broadcast at a specific port, set the destination string to “:port” or “ALL:port”.

Examples:

- “192.168.0.1:23”
- “agilent.com, soco.agilent.com”
- “agilent.com:80, 192.168.0.1”

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination "LANEVENT", "destinationExpression" :LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination? "LANEVENT"
Example	:LXI:EVEN:LAN:DEST "LANEVENT", "host1, 192.168.0.1:80"
Restriction and Notes	The maximum length of the string is 45 characters.
Preset	“ALL”
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol

Drive Determines the behavior of an output event.

- Normal designates typical operation, where both edges of the instrument event are transmitted,
- Off disables the LAN event.

- Wired-OR causes only one edge to be transmitted.

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE "LANEVENT", OFF NORmal WOR
Example	:LXI:EVEN:LAN:DRIV "LANEVENT",WOR
Preset	NORmal
State Saved	Saved in instrument state.
Range	OFF NORmal WOR
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Slope Slope determines which instrument event transition results in a LAN packet being sent and whether or not that edge is inverted.

When the Drive parameter is set to Normal, a Slope of Negative causes both edges to be inverted before they are transmitted. A Positive Slope transmits the edges unaltered.

When the Drive parameter is set to WOR, only Positive edges are transmitted. When the Slope is Negative, a falling edge is inverted and sent as a rising edge. When the Slope is Positive, a rising edge is sent normally.

The following table illustrates the effects of the Slope and Drive parameters.

Instrument Event Edge	Slope Parameter	Drive Parameter	Action
0	Negative	Off	Not sent
0	Positive	Off	Not sent
1	Negative	Off	Not sent
1	Positive	Off	Not sent
0	Negative	Normal	1
0	Positive	Normal	0
1	Negative	Normal	0
1	Positive	Normal	1
0	Negative	Wired OR	1
0	Positive	Wired OR	Not sent
1	Negative	Wired OR	Not sent
1	Positive	Wired OR	0

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe "LANEVENT", POSitive NEGative
Example	:LXI:EVEN:LAN:SLOP "LANEVENT",POS
Preset	POSitive

State Saved	Saved in instrument state.
Range	POSitive NEGative
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Timestamp Delta This parameter represents a time in seconds to add to the timestamp of the Output LAN Event. This timestamp delta allows the receiving instrument to delay its response until the time specified in the timestamp.

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta "LANEVENT", <seconds>
Example	:LXI:EVEN:LAN:TSD "LANEVENT",10.5 s
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 s(Max Double)
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Enable If this parameter is set to ON, this LAN Event is sent when the selected Source instrument event occurs. Otherwise, this LAN Event is never output.

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:ENABLE "LANEVENT", ON OFF 1 0
Example	:LXI:EVEN:LAN:ENAB "LAN0",ON
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]

Count (Remote Only) Returns the number of items in the LXI Output LAN Event List.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:COUNT?
Example	:LXI:EVEN:LAN:COUN?

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:CONFigure "lanEvent", <enable>, <source>, <slope>, <drive>, <destination>
Example	:LXI:EVEN:LAN:CONF "LAN0",1,"WaitingForTrigger",POS,NOR,"ALL"

Send (Remote Only) Forces the instrument to send the requested LAN Event. The LAN Event must be enabled,

otherwise this command is ignored.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:SEND "LANEVENT", RISE FALL
Example	:LXI:EVEN:LAN:SEND "LANEVENT", FALL

IEEE 1588 Time (Remote Only)

Topic provides remote commands to set and query the analyzer internal clock and network clock settings, as defined by IEEE 1588.

Time Topic provides remote commands to set and query the analyzer internal clock settings, as defined by IEEE 1588.

Epoch Time (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the clock using the number of seconds elapsed since January, 1 1970 at 00:00:00 in International Atomic Time (TAI). Epoch time is time zone invariant. Otherwise, this allows the user to query the epoch time.

Remote Command	:LXI:CLOCK[:TIME][:VALue] <seconds>,<fractionalSeconds>
Example	:LXI:CLOC 10020304.0 s,0.123456 s

Restriction and Notes	The seconds argument must only contain values representing whole seconds. For example 1243.0 s is acceptable, but 1243.01 results in an error. Ignored when the device is not selected as the IEEE 1588 master clock. The fractional portion is only accurate to the microseconds position. Error generated if the seconds argument contains a fractional portion.

Preset	System time

State Saved	No

Range	Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double) Fraction: 0.0 s – 0.999999 s

Remote Command	:LXI:CLOCK[:TIME][:VALue] ?

Example	:LXI:CLOC?

Restriction and Notes	The seconds argument must only contain values representing whole seconds. For example 1243.0 s is acceptable, but 1243.01 results in an error. Ignored when the device is not selected as the IEEE 1588 master clock. The fractional portion is only accurate to the microseconds position. Error generated if the seconds argument contains a fractional portion.

Preset	System time

State Saved	No

Range	Seconds: 0.0 – 1.7976931348623157 x 10308 s (Max Double) Fraction: 0.0 s – 0.999999 s

Seconds (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the seconds portion of the clock. Otherwise, this allows the user to query the seconds portion of the epoch time. Valid values are in discrete increments of whole seconds.

Remote Command	:LXI:CLOCK[:TIME]:SECONDS <seconds> :LXI:CLOCK[:TIME]:SECONDS?
Example	:LXI:CLOC:SEC 10020304.0
Restriction and Notes	Ignored when the device is not selected as the IEEE 1588 master clock. Error generated if the argument contains a fractional portion. For example 1243.0 s is acceptable, but 1243.01 results in an error.
Preset	System time
State Saved	No
Range	0.0 – 1.7976931348623157 x 10308 s (Max Double)

Fraction (Remote Only) If the device is selected as the IEEE 1588 master clock, this sets the sub-second value of the clock. Otherwise, this allows the user to query the sub-second value of the epoch time.

Remote Command	:LXI:CLOCK[:TIME]:FRACTION <fraction> :LXI:CLOCK[:TIME]:FRACTION?
Example	:LXI:CLOC:FRAC 10 ms
Restriction and Notes	Ignored when the device is not selected as the IEEE 1588 master clock. Only accurate to the microseconds position.
Preset	Sub-second value of system time
State Saved	No
Range	[0.0,1.0)

Local Time (Remote Only) Returns the current local time formatted as a date time string.

Remote Command	:LXI:CLOCK[:TIME]:LOCAL?
Example	:LXI:CLOC:LOC? Returns “5/15/2007 6:23:34.123456”
Remote Command Notes	LXI:CLOCK[:TIME]:LOCAL? Returns Any string constituting a valid date and time

Leap Second Offset (Remote Only) Enables you to set the leap second offset between the UTC and TAI time standards.

Remote Command	:LXI:CLOCK[:TIME]:LSOFFSET <time> :LXI:CLOCK[:TIME]:LSOFFSET?
Example	:LXI:CLOC:LSOF 55s

Range 0.0 – 1.7976931348623157 x 10308 s (Max Double)

International Atomic Time (Remote Only) Retrieves the current time using the TAI format.

Remote Command	:LXI:CLOCK[:TIME]:TAI?
Example	:LXI:CLOC:TAI? "5/15/2007 6:23:34.123456"
Remote Command Notes	:LXI:CLOCK[:TIME]:TAI? Returns Any string constituting a valid date and time

Time Zone (Remote Only) Retrieves the current local time zone as an offset in hours, minutes, and seconds from Greenwich Mean Time.

Remote Command	:LXI:CLOCK[:TIME]:TZON?
Example	:LXI:CLOC:TZON?
Remote Command Notes	:LXI:CLOC:TZON? returns "01:00:00" if the current local time zone is 1hour ahead from Greenwich Mean Time

Daylight Savings (Remote Only) Determines whether or not daylight savings time is in effect. The value of this parameter influences the value of the time zone parameter.

Remote Command	:LXI:CLOCK[:TIME]:DLSavings ON OFF 0 1 :LXI:CLOCK[:TIME]:DLSavings?
Example	:LXI:CLOC:DLS ON
Preset/Default	The Windows system Daylight Savings setting.
Remote Command Notes	:LXI:CLOC:DLS? Returns 1 when Daylight Savings Time is On and 0 if the when Daylight Savings Time is Off

Coordinated Universal Time (Remote Only) Retrieves the current time using the UTC format.

Remote Command	:LXI:CLOCK[:TIME]:UTC?
Example	:LXI:CLOC:UTC? "5/15/2007 6:23:34.123456"
Remote Command Notes	:LXI:CLOC:UTC? Returns Any string constituting a valid date and time

Time Marker (Remote Only) Records the PTP time as a marker that can later be measured against the current PTP time. Typical use is to time the length of a sequence of instrument operations. There are 9 available markers with indices 1 – 9.

Remote Command	:LXI:CLOCK[:TIME]:MARKer[1] 2 3 4 5 6 7 8 9[:SET]

Example

```
:LXI:CLOC:MARK1
:LXI:CLOC:MARK2
:LXI:CLOC:MARK3
:LXI:CLOC:MARK4
:LXI:CLOC:MARK5
:LXI:CLOC:MARK6
:LXI:CLOC:MARK7
:LXI:CLOC:MARK8
:LXI:CLOC:MARK9
:LXI:CLOC:MARK
```

Time Marker Clear (Remote Only) Clears the recorded PTP time marker used to measure against the current PTP time. There are 9 available markers with indices 1 – 9.

Remote Command : LXI :CLOCK [: TIME] :MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 :CLEAR

Example

```
:LXI:CLOC:MARK1:CLEA
:LXI:CLOC:MARK2:CLEA
:LXI:CLOC:MARK3:CLEA
:LXI:CLOC:MARK4:CLEA
:LXI:CLOC:MARK5:CLEA
:LXI:CLOC:MARK6:CLEA
:LXI:CLOC:MARK7:CLEA
:LXI:CLOC:MARK8:CLEA
:LXI:CLOC:MARK9:CLEA
:LXI:CLOC:MARK:CLEA
```

Time Marker Delta (Remote Only) Calculates and returns the delta time from the marker to the present PTP time. Also returns the seconds and sub-seconds portions of the start and end times. There are 9 available markers with indices 1 – 9.

Remote Command : LXI :CLOCK [: TIME] :MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 :DELTA?

Example	<pre>:LXI:CLOC:MARK1:DELT? Returns <deltaTime>,<startSeconds>,<startFractionalSeconds>,<endSeconds>,<endFractionalSeconds> :LXI:CLOC:MARK2:DELT? :LXI:CLOC:MARK3:DELT? :LXI:CLOC:MARK4:DELT? :LXI:CLOC:MARK5:DELT? :LXI:CLOC:MARK6:DELT? :LXI:CLOC:MARK7:DELT? :LXI:CLOC:MARK8:DELT? :LXI:CLOC:MARK9:DELT? :LXI:CLOC:MARK:DELT?</pre>
Remote Command Notes	:LXI:CLOCK[:TIME]:MARKer[1] 2 3 4 5 6 7 8 9:DELTA? Returns a value between 0.0 - 1.7976931348623157 x 10308 s (Max Double)

Measurement Data Timestamp (Remote Only) Returns the beginning and ending times of the last measurement cycle. This command also returns the duration of the measurement cycle. These values correspond to the last rising and falling transition of the Measuring instrument event.

Remote Command	:LXI:CLOCK[:TIME]:MEASURE[:DELTA]?
Example	:LXI:CLOC:MEAS? Returns 2.0,1145902.0,0.123456,1145904.0,0.123456

Clear Measurement Data Timestamp (Remote Only) Forces the return values of the Measurement Data Timestamp to zero until the next measurement cycle occurs. This command need not be issued for the Measurement Data Timestamp to be refreshed.

Remote Command	:LXI:CLOCK[:TIME]:MEASURE:CLEAR
Example	:LXI:CLOC:MEAS:CLEAR

Precision Time Protocol Precision Time Protocol, as defined by IEEE 1588, is a method for synchronizing the time across a network. Instruments participating in the PTP network can coordinate activities using this common time base.

Accuracy (Remote Only) Sets the typical offset from the correct time that a user can expect from the instrument PTP clock. This parameter is used when the instrument is selected as the Master clock. It should be set along with the time when configuring a master clock.

The value should be chosen by judging how precisely the clock can be set to the exact TAI time and the accuracy and drift of the clock's underlying oscillator.

System Functions

System

This is an input to the IEEE 1588 Best Master Clock algorithm.

Remote Command	:LXI:CLOCK:PTP:ACCuracy NS25 NS100 NS250 NS1000 NS2500 US10 US25 US100 US250 US 1000 US2500 MS10 MS25 MS100 MS1000 S10 GT10S UNKNowN :LXI:CLOCK:PTP:ACCuracy?
Example	:LXI:CLOC:PTP:ACC US25
Preset	GT10S
Range	NS25 NS100 NS250 NS1000 NS2500 US10 US25 US100 US250 US1000 US 2500 MS10 MS25 MS100 MS1000 S10 GT10S UNKNowN

Announce Interval (Remote Only) Sets the time in seconds between PTP announce packets. A shorter interval makes the system more responsive to changes in the master clock at the cost of network bandwidth and packet processing time. The announce interval should be constant across all the instruments in the network. The announce interval will be rounded to the nearest non-negative integer power of two, with a maximum value of 16.

Remote Command	:LXI:CLOCK:PTP:ANNounce:INTerval <interval> :LXI:CLOCK:PTP:ANNounce:INTerval?
Example	:LXI:CLOC:PTP:ANN:INT 1
Preset	4
Range	1 2 4 8 16

Announce Receipt Time Out (Remote Only) Sets the number of announce intervals that the instrument waits to receive an announce packet while in the Slave or Listening. After this number of announce intervals, the instrument will transition to the Master state.

Remote Command	:LXI:CLOCK:PTP:ANNounce:RTOut <numberOfIntervals> :LXI:CLOCK:PTP:ANNounce:RTOut?
Example	:LXI:CLOC:PTP:ANN:RTO 5
Preset	3
Min	2
Max	10

Clock Class (Remote Only) Returns a ranking of master clock suitability relative to other clocks on the network. A lower value represents a more suitable clock.

Suitability is defined by the IEEE 1588 standard section 7.6.2.4

Remote Command	:LXI:CLOCK:PTP:CCLass?
Example	:LXI:CLOC:PTP:CCL?
Preset	248

Min	6
Max	248

Deviation (Remote Only) Returns the standard deviation of the instrument's PTP time from the Grandmaster's PTP time.

Remote Command	:LXI:CLOCK:PTP:DEVIation?
Example	:LXI:CLOC:PTP:DEV?

Domain (Remote Only) The instrument synchronizes its clock only with other clocks in the same domain.

Remote Command	:LXI:CLOCK:PTP:DOMain <domainNumber> :LXI:CLOCK:PTP:DOMain?
Example	:LXI:CLOC:PTP:DOM 0
Preset	0
Min	0
Max	127

Offset (Remote Only) Returns the difference between the instrument clock's PTP time and the Master clock's PTP time.

Remote Command	:LXI:CLOCK:PTP:OFFSet?
Example	:LXI:CLOC:PTP:OFFS?
Range	0.0 to $-1.7976931348623157 \times 10^{308}$ s (Min Double)

First Priority (Remote Only) Setting this parameter overrides the IEEE 1588 Best Master Clock algorithm. If an instrument's First Priority parameter is smaller than all other clocks in its domain, it is chosen as the Master clock.

Remote Command	:LXI:CLOCK:PTP:PRIority:FIRSt <priority> :LXI:CLOCK:PTP:PRIority:FIRSt?
Example	:LXI:CLOC:PTP:PRI:FIRS 50
Preset	128
Min	0
Max	255

Second Priority (Remote Only) When two or more clocks are determined to be equally good by the Best Master Clock algorithm, the clock with the lowest Second Priority value is chosen to be the Master Clock.

Remote Command	:LXI:CLOCK:PTP:PRIority:SECond <priority> :LXI:CLOCK:PTP:PRIority:SECond?

System Functions

System

Example	:LXI:CLOC:PTP:PRI:SEC 50
Preset	128
Min	0
Max	255

State (Remote Only) Returns the current state of the instrument's PTP clock as defined in the IEEE 1588 standard.

Remote Command	:LXI:CLOCK:PTP:STATe?
Example	:LXI:CLOC:PTP:STAT?
Range	INITializing FAULty DISabled LISTening PREMaster MASTER PASSive UNCalibrated SLAVE

Traceability (Remote Only) Returns the quality of the instrument's PTP clock source of time when chosen as the Grand Master clock.

This parameter is used by the Best Master Clock algorithm.

Remote Command	:LXI:CLOCK:PTP:TRACeability?
Example	:LXI:CLOC:PTP:TRAC?
Range	ATOMic GPS RADIO PTP NTP HANDset OTHer OSCillator

Variance (Remote Only) Returns the variance of the instrument's PTP clock time relative to the Master's PTP clock time.

Remote Command	:LXI:CLOCK:PTP:VARiance?
Example	:LXI:CLOC:PTP:VAR?
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Sync Interval (Remote Only) Sets the rate at which PTP sync packets are transmitted when this instrument is acting as a Master PTP clock. The values must be integer powers of 2.

Remote Command	:LXI:CLOCK:PTP:SINTerval <seconds>
Example	:LXI:CLOC:PTP:SINT 0.25 s
Preset	1
Range	0.0625s 0.125s 0.25s 0.5s 1s 2s
Remote Command	:LXI:CLOCK:PTP:SINTerval?
Example	:LXI:CLOC:PTP:SINT?
Preset	1

Range 0.0625s|0.125s|0.25s|0.5s|1s|2s

Delay Request Interval (Remote Only) This property is used by the master clock to specify the interval between delay request packets sent from the slave to the master clock. Slaves use a randomly-chosen interval, with mean equal to this property.

The value for this parameter must be an integer power of two.

Remote Command :LXI:CLOCK:PTP:DRInterval <seconds>

Example :LXI:CLOC:PTP:DRIN 32 s

Preset 8 s

Range 1 s | 2 s | 4 s | 8 s | 16 s | 32 s

Remote Command :LXI:CLOCK:PTP:DRInterval?

Example :LXI:CLOC:PTP:DRIN?

Preset 8 s

Min 0.0 s

Max $2^{32} = 4294967296$ s

Grand Master Accuracy (Remote Only) Returns the relative accuracy of the Grand Master clock.

Remote Command :LXI:CLOCK:PTP:GMASter:ACCuracy?

Example :LXI:CLOC:PTP:GMAS:ACC? For example, this might return GT10S.

Range 25NS|100NS|250NS|1US|2.5US|10US|25US|100US|250US|1MS|2.5MS|10MS|25MS|100MS|1S|10S|GT10S|UNKNown

MAC Address (Remote Only) Returns the Grand Master's MAC Address.

Remote Command :LXI:CLOCK:PTP:GMASter:MADdress?

Example :LXI:CLOC:PTP:GMAS:MADD? For example, this might return "00-00-50-1e-ca-ad".

Range Uppercase, Lowercase, Numeric, Symbol

Traceability (Remote Only) Describes the quality of the Grand Master PTP clock's source of time.

Remote Command :LXI:CLOCK:PTP:GMASter:TRACeability?

Example :LXI:CLOC:PTP:GMAS:TRAC? For example, this might return OSC.

Range ATOMic|GPS|RADio|PTP|NTP|HANDset|OTHer|OSCillator

Master MAC Address (Remote Only) Returns the Master's MAC Address.

Remote Command	:LXI:CLOCK:PTP:MASTer:MADdress?
Example	:LXI:CLOC:PTP:MAST:MADD?
Range	Uppercase, Lowercase, Numeric, Symbol

Servo Algorithm (Remote Only) The Servo Algorithm parameters are considered advanced settings for tweaking IEEE 1588 performance.

Log (Remote Only) The Servo Log records measurements of the offset between the instrument's PTP clock and the Master's PTP clock. It also records the packet travel time for Master-to-Slave and Slave-to-Master transactions.

Next (Remote Only) Retrieves and removes the oldest entry from the Servo Log. The format for a servo log entry is as follows

Sample Index:	integer representing entry order
Time Seconds:	seconds portion of the entry timestamp
Time Fraction:	sub-second portion of the entry timestamp
Offset Seconds:	offset between the instrument's PTP clock and the Master's PTP clock
Average Delay Seconds:	the average measured transmission delay
Master Delay Seconds:	Master-to-Slave packet travel time
Slave Delay Seconds:	Slave-to-Master packet travel time

Remote Command	:LXI:CLOCK:SALGorithm:LOG[:NEXT]?
Example	:LXI:CLOC:SALG:LOG?
Range	Uppercase, Lowercase, Numeric, Symbol

Circular (Remote Only) Sets the behavior for entries occurring while the Servo Log is full.

- If Circular is set to 1, incoming events overwrite the oldest events in the log.
- If Circular is set to 0, incoming events are discarded.

Remote Command	:LXI:CLOCK:SALGorithm:LOG:CIRCular[:ENABle] ON OFF 0 1 :LXI:CLOCK:SALGorithm:LOG:CIRCular[:ENABle]?
Example	:LXI:CLOC:SALG:LOG:CIRC 1
Preset	1
Range	ON OFF 0 1

Beginning Entry (Remote Only) Sets or freezes the beginning entry of the log when in circular mode to the most recently added entry at the time of the command. This is so that the :LXI:EVENT:LOG:ENTry? command has a

reference entry for indexing individual entries in the log.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:CIRCular:FBEntry :LXI:CLOCK:SALgorithm:LOG:CIRCular:FBEntry?
Example	:LXI:CLOC:SALG:LOG:CIRC:FBEN

Clear (Remote Only) Clears all entries from the Servo Log.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:CLEar
Example	:LXI:CLOC:SALG:LOG:CLE

Count (Remote Only) Returns the number of unread entries in the Servo Log.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:COUNt?
Example	:LXI:CLOC:SALG:LOG:COUN?
Range	0 - IEEE 1588 Servo Log Size

Enable (Remote Only) •When the Servo Log is disabled, no events are recorded.

- When it is enabled, the Servo Log is active.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:ENABLE ON OFF 0 1 :LXI:CLOCK:SALgorithm:LOG:ENABLE?
Example	:LXI:CLOC:SALG:LOG:ENAB 1
Preset	0
Range	ON OFF 0 1

Size (Remote Only) Sets the maximum number of entries to store in the Servo Log.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:SIZE <maxLogEntries> :LXI:CLOCK:SALgorithm:LOG:SIZE?
Example	:LXI:CLOC:SALG:LOG:SIZE 100
Preset	256
Min	0
Max	1024

All (Remote Only) Non-destructively returns the entire contents of the Servo Log.

Remote Command	:LXI:CLOCK:SALgorithm:LOG:ALL?
Example	:LXI:CLOC:SALG:LOG?

Range	Uppercase, Lowercase, Numeric, Symbol

Specific Entry (Remote Only) Non-destructively returns a specifically indexed entry from within the Servo Log.

Remote Command	:LXI:CLOCK:SALGorithm:LOG:ENTRy? <intIndex>

Example :LXI:CLOC:SALG:LOG? 0 Returns the oldest entry in the Servo Log.
Example of result:
"1,1208978798,139644871,0.000000000,3.393600e+038,0.000000000,0.000000000,0.000000000"

Range	Uppercase, Lowercase, Numeric, Symbol
1-255	Uppercase, Lowercase, Numeric, Symbol

Statistics (Remote Only) Returns the long-term statistics of the servo log that characterizes the performance of the instrument PTP clock's offset from the master PTP clock. The statistics include the following values:

- Number of samples (an integer)
- Mean offset (a double)
- Standard deviation of the offset (a double)
- Maximum offset (a double)
- Minimum offset (a double)

Remote Command	:LXI:CLOCK:SALGorithm:LOG:STATistics[:DATA]?

Example	:LXI:CLOC:SALG:LOG:STAT? Example of result: "3643,0.000000000,0.000000000,0.000000000,0.000000000"

Clear Statistics (Remote Only) Resets the long-term servo performance statistics.

Remote Command	:LXI:CLOCK:SALGORITHM:LOG:STATISTICS:CLEAR

Example :LXI:CLOC:SALG:LOG:STAT:CLE

Asymmetry (Remote Only) Sets the difference in seconds between the Master-to-Slave packet travel time and the Slave-to-Master packet travel time.

```
Remote Command      :LXI:CLOCK:SALGorithm[:SET]:ASYMmetry <seconds>
                   :LXI:CLOCK:SALGorithm[:SET]:ASYMmetry?
```

Example :LXI:CLOC:SALG:ASYM 15 ns

Preset 0.0 s

Min -1

Max 1

Coarse/Fine Threshold (Remote Only) Determines when the PTP clock Servo algorithm uses the ‘Fine’ or ‘Coarse’ parameters for adjusting the instrument’s PTP clock time. The threshold is measured against a running estimate of the servo variance.

Coarse mode causes a slave clock to converge with the master clock more quickly, but it is more sensitive to noise, while Fine mode filters out noise more effectively, but takes longer to converge.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:CFThreshold <secondsSquared> :LXI:CLOCK:SALGorithm[:SET]:CFThreshold?
Example	:LXI:CLOC:SALG:CFTH 0.25
Preset	1.0e-11
Min	0
Max	1

Coarse Proportional Constant (Remote Only) This constant is used by the servo when above the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:CPConstant <servoConstant> :LXI:CLOCK:SALGorithm[:SET]:CPConstant?
Example	:LXI:CLOC:SALG:CPC 0.5
Preset	0.4
Min	0
Max	1

Coarse Integral Constant (Remote Only) This constant is used by the servo when above the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:CIConstant <servoConstant> :LXI:CLOCK:SALGorithm[:SET]:CIConstant?
Example	:LXI:CLOC:SALG:CIC 0.5
Preset	0.2
Min	0
Max	1

Fine Proportional Constant (Remote Only) This constant is used by the servo when below the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more

energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:FPConstant <servoConstant> :LXI:CLOCK:SALGorithm[:SET]:FPConstant?
Example	:LXI:CLOC:SALG:FPC 1
Preset	0.35
Min	0
Max	1

Fine Integral Constant (Remote Only) This constant is used by the servo when below the Coarse/Fine Threshold variance. Decreasing this constant causes the servo to become less responsive to both noise in the system and changes in the Master Clock's rate. Conversely, increasing this constant causes the servo to respond more energetically to both system noise and changes in the Master Clock's rate.

The ratio between the Proportional and Integral constants should remain roughly constant.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:FIConstant <servoConstant> :LXI:CLOCK:SALGorithm[:SET]:FIConstant?
Example	:LXI:CLOC:SALG:FIC 0.6
Preset	0.05
Min	0
Max	1

Maximum Outlier Discard Count (Remote Only) Sets the maximum number of outlier packets to ignore. After this maximum is exceeded, the next packet is accepted, regardless of whether or not it is flagged as an outlier.

Remote Command	:LXI:CLOCK:SALGorithm[:SET]:OMAXimum <consecutiveSamples> :LXI:CLOCK:SALGorithm[:SET]:OMAXimum?
Example	:LXI:CLOC:SALG:OMAX 3
Preset	5
Min	0
Max	25

Outlier Threshold (Remote Only) Defines the threshold for determining whether a packet is considered a statistical outlier. If a sync or delay request is held up in a switch for a significant amount of time, the quality of synchronization will be perturbed. The servo ignores anything outside the outlier threshold. This parameter is expressed as a number of standard deviations from the currently measured average packet latency. Note that the

value can be set to fractional standard deviations.

Remote Command	:LXI:CLOCK:SALgorithm[:SET]:OTHReshold <standardDeviations> :LXI:CLOCK:SALgorithm[:SET]:OTHReshold?
Example	:LXI:CLOC:SALG:OTHR 1.0
Preset	5.0
Min	0.25
Max	6.0

Outlier Threshold Enable (Remote Only) Enables the outlier threshold to determine whether or not outliers are discarded.

Remote Command	:LXI:CLOCK:SALgorithm[:SET]:OTENable ON OFF 1 0 :LXI:CLOCK:SALgorithm[:SET]:OTENable?
Example	:LXI:CLOC:SALG:OTENable OFF
Preset	Off, 0

Set/Steer Threshold (Remote Only) If the instrument's clock deviates from the master by an amount equal to or greater than this threshold, it is reset to match the master rather than being gradually steered toward it.

Remote Command	:LXI:CLOCK:SALgorithm[:SET]:STHReshold <seconds> :LXI:CLOCK:SALgorithm[:SET]:STHReshold?
Example	:LXI:CLOC:SALG:STHR 15 ms
Preset	0.1 s
Min	0.0001
Max	10.0

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command	:LXI:CLOCK:SALgorithm[:SET]:CONFigure <asymmetry>, <coarse fine threshold>, <cpc>, <cic>, <fpc>, <fic>, <maximum outlier discard>, <outlier threshold>, <set/steer threshold>
Example	:LXI:CLOC:SALG:CONF 0.0, 2.0E-13, 0.4, 0.2, 0.35, 0.05, 5, 2.0E-4, 0.1s

Synchronization (Remote Only) Master (Remote Only) Reports whether or not the device has been selected as the PTP master clock.

Remote Command	:LXI:CLOCK:SYNC:MASTer?

Example	:LXI:CLOC:SYNC:MAST?
Range	ON OFF 0 1

Local Enable (Remote Only) Enable steering of the local clock with the PTP IEEE 1588 clock.

Remote Command	:LXI:CLOCK:SYNC:LOCAL:ENABLE ON OFF 0 1 :LXI:CLOCK:SYNC:LOCAL:ENABLE?
Example	:LXI:CLOC:SYNC:LOC:ENAB ON
Preset	ON
Range	ON OFF 0 1

Local Interval (Remote Only) The local clock is updated after the time set in the Local Interval elapses.

Remote Command	:LXI:CLOCK:SYNC:LOCAL:INTERVAL :LXI:CLOCK:SYNC:LOCAL:INTERVAL?
Example	:LXI:CLOC:SYNC:LOC:INT 60
Preset	60
Min	0
Max	3600

Instrument Status Events

Instrument status events represent internal state changes that are important for synchronization. The recognized Status Events are:

WaitingForTrigger:	Transitions high when the measurement is awaiting a trigger event. Transitions low when the trigger event occurs or the measurement is aborted.
Sweeping:	Transitions high when the instrument begins sweeping. Transitions low when the sweep is completed.
Measuring:	Transitions high when measurement data is being recorded. Transitions low when measurement data is no longer being recorded.
OperationComplete:	Transitions low when a measurement operation is in progress. In some cases (e.g. ListSweep), multiple sweeps are taken during a single measurement operation. Transitions high when the measurement operation is finished or aborted.
Recalling:	Transitions high while the instrument is recalling a previous state. Transitions low when a recall is not in progress.

Enable (Remote Only) Setting the enable parameter to ON allows the selected instrument event to be used as a source for Output LAN Events. Enabling an Instrument Status Event also causes the event to

appear in the Event Log.

Remote Command	:LXI:EVENT:STATUS[:ENABLE] "STATUSEVENT",ON OFF 1 0
Example	:LXI:EVEN:STAT "WaitingForTrigger",1
Preset	On
State Saved	Saved in instrument state.
Range	1 0 ON OFF

Remote Command	:LXI:EVENT:STATUS[:ENABLE]? "STATUSEVENT"
Example	:LXI:EVEN:STAT:LAN? "WaitingForTrigger" Returns 1 if previously enable. Otherwise, returns 0.
Preset	On
State Saved	Saved in instrument state.
Range	1 0 ON OFF

LXI State Recall

Location (Remote Only) This parameter is used to store the file paths of the state files to be recalled when each Input LAN Event is received. Since each LAN Event has its own Location entry, a given state is capable of branching to at least 8 different states. If custom Input events are added, an even greater branching factor is possible.

When setting up state transitions, it is important to set the location of the next state before saving. This way, when the saved state is recalled, the next state locations are also automatically recalled.

Remote Command	:LXI:EVENT:INPUT:LAN:LOCATION "LANEVENT", "path"
Example	:LXI:EVEN:LAN:INP:LOC "LANEVENT","c:\states\state01.state"
Restriction and Notes	The maximum length of the string is 512 characters.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol

Remote Command	:LXI:EVENT:INPUT:LAN:LOCATION? "LANEVENT"
Example	:LXI:EVEN:LAN:INP:LOC? "LANEVENT" Returns "c:\states\state01.state" if that value was previously entered
Restriction and Notes	The maximum length of the string is 512 characters.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol

Disable All (Remote Only) Causes all LXI Input LAN Events to go into the disabled state (Enable =

OFF).

Remote Command	:LXI:EVENT:INPut:LAN:DISable:ALL
Example	:LXI:EVEN:INP:LAN:DIS:ALL

Add (Remote Only) Adds the provided string to the list of possible LAN events to Input as a response to instrument events. As new LAN events are added, keys are generated in the LXI Input LAN Events menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu.

Remote Command	:LXI:EVENT:INPut:LAN:ADD "LANEVENT"
Example	:LXI:EVEN:INP:LAN:ADD "LANEVENT"
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and added to the LXI Input LAN Event list. No event is added if the LAN Event already exists.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon

Remove (Remote Only) Removes the provided string from the list of LXI Input LAN Events. As new LAN events are removed, keys are removed from the LXI Input LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu. Events from the default list cannot be removed.

Remote Command	:LXI:EVENT:INPut:LAN:REMove[:EVENT] "LANEVENT"
Example	:LXI:EVEN:INP:LAN:REM "LANEVENT"
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and the resulting LAN Event is removed from the LXI Input LAN Event list. Nothing happens if the LAN event was not introduced using the Add command.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol

Remove All (Remote Only) Clears the list of custom LAN events (those introduced using the Add command). As new LAN events are removed, keys are removed from the LXI Input LAN Events menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the “More” keys are updated to reflect the new number of key panels in the LXI Input LAN Events menu.

Remote Command	:LXI:EVENT:INPut:LAN:REMove:ALL

Example	:LXI:EVENT:INP:LAN:REM:ALL
Restriction and Notes	Only LAN Events added with the Add command are removed. Default events cannot be removed.

Filter (Remote Only) Only LXI Input LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

Filter == ([host[:port]] | [ALL[:port]]) [,Filter]

Specifying an empty string means that LXI trigger packets are accepted as an Input from any port on any host on the network via either TCP or UDP.

Specifying only the port means that any host communicating over that port can send events.

Specifying ALL indicates that UDP multicast packets are accepted if they are directed to the IANA assigned multicast address on the IANA assigned default port, or the designated port if specified.

Examples:

- “192.168.0.1:23”
- “agilent.com, soco.agilent.com”
- “agilent.com:80, 192.168.0.1”

Remote Command	:LXI:EVENT:INP:LAN:FILTER "LANEVENT", "filterString" :LXI:EVENT:INP:LAN:FILTER?
Example	:LXI:EVENT:INP:LAN:FILT “LAN0”, “agilent.com” :LXI:EVENT:INP:LAN:FILT?
Restriction and Notes	The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol

Identifier (Remote Only) Sets the string that is expected to arrive over the LAN for a given Input LAN Event to occur. The Identifier is variable to allow for easier system debugging.

Remote Command	:LXI:EVENT:INP:LAN:IDENTifier "LANEVENT", "identifier" :LXI:EVENT:INP:LAN:IDENTifier? "LANEVENT"
Example	:LXI:EVENT:INP:LAN:IDEN “LAN0”, “debugstring”
Restriction and Notes	The maximum length of the string is 16 characters. Nothing happens if the LAN event does not exist. The default value is that the identifier is equivalent to the name of the LAN Event.

State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol

Detection (Remote Only) Pressing this button brings up the Detection menu.

- Selecting “Rise” causes the instrument to trigger on the receipt of a signal low LAN Event followed by a signal high LAN Event.
- Selecting “Fall” causes the instrument to trigger on the receipt of a signal high LAN Event followed by a signal low LAN Event.
- Selecting “High” causes the instrument to trigger on every signal high LAN Event.
- Selecting “Low” causes the instrument to trigger on every signal low LAN Event.

Remote Command	:LXI:EVENT:INPut:LAN[:SET]:DETection "LANEVENT", HIGH LOW RISE FALL
Example	:LXI:EVENT:INP:LAN:DET "LANEVENT",HIGH
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Remote Command	:LXI:EVENT:INPut:LAN[:SET]:DETection? "LANEVENT"
Example	:LXI:EVENT:INP:LAN:DET? "LANEVENT"
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Enable (Remote Only) When the Enable parameter is set to ON, receiving the given LAN Event causes the instrument to transition to the state held in the Next State Slot.

When the Enable parameter is OFF, the Input LAN Event is ignored.

Remote Command	:LXI:EVENT:INPut:LAN[:SET]:ENABle "LANEVENT",ON OFF 1 0
Example	:LXI:EVEN:INP:LAN:ENAB "LAN0",1
Preset	OFF
State Saved	Saved in instrument state.
Range	1 0

Remote Command	:LXI:EVENT:INPut:LAN[:SET]:ENABle? "LANEVENT"
Example	:LXI:EVEN:INP:LAN:ENAB? "LAN0"
Preset	OFF
State Saved	Saved in instrument state.
Range	1 0

Count (Remote Only) Returns the number of items in the LXI Input LAN Event List.

Remote Command	:LXI:EVENT:INPut:LAN:COUNt?
Example	:LXI:EVEN:INP:LAN:COUN?

List (Remote Only) Returns a list of all of the valid LXI Input LAN Event names.

Remote Command	:LXI:EVENT:INPut:LAN:LIST?
Example	:LXI:EVEN:INP:LAN:LIST? Returns "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
State Saved	Saved in instrument state.

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Remote Command	:LXI:EVENT:INPut:LAN[:SET]:CONFigure "lanEvent" , <enab>, <detection>, <filter>, <identifier>
Example	:LXI:EVEN:INP:LAN:CONF "LAN0",1,FALL,"FILTER","DEBUG"

Restore Defaults

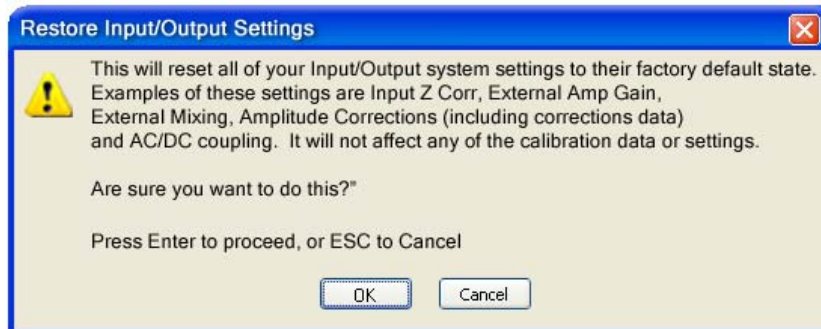
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back to their default values.

Mode	All
Remote Command	:SYSTem:DEFault [ALL] ALIGn INPut MISC MODes PON
Example	SYST:DEF
State Saved	No
Key Path	System

Restore Input/Output Defaults

Causes the group of settings and data associated with Input/Output front panel key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

Confirmation is required to restore the Input/Output setting. The confirmation dialog is:



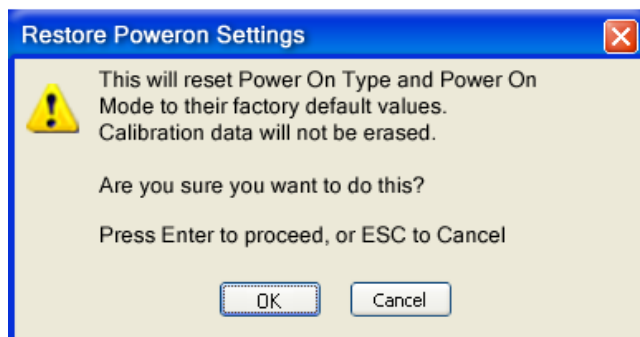
Example :SYST:DEF INP

Key Path **System, Restore System Defaults**

Restore Power On Defaults

This selection causes the Power On settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On settings and their default values are Power On Type reset to Mode and Input/Output Defaults and Power On Mode reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



Example :SYST:DEF PON

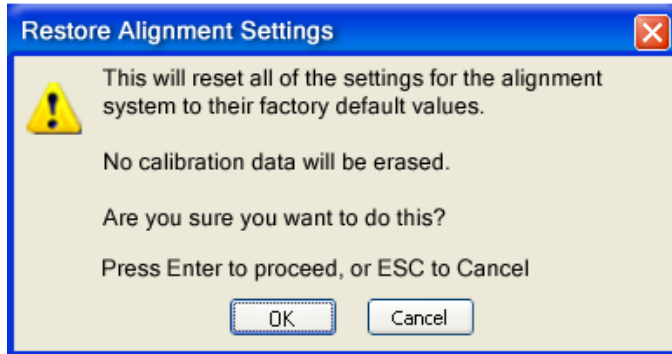
Key Path **System, Restore System Defaults**

Restore Align Defaults

This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

Confirmation is required to restore the factory default values. The confirmation dialog is:



Example :SYST:DEF ALIG

Key Path **System, Restore System Defaults**

Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

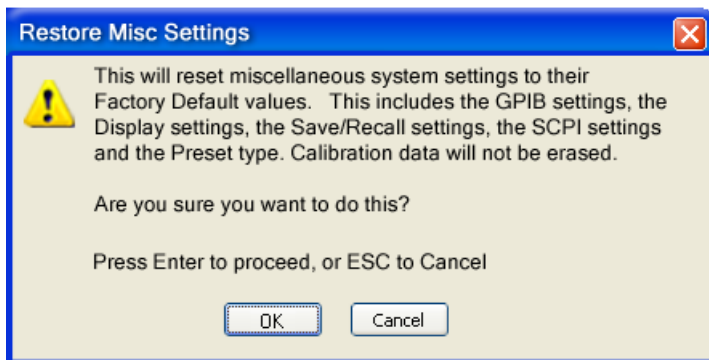
Miscellaneous Setting	Default Value
Verbose SCPI	Off
GPIB Address	18
Auto File Name Number	000
Save Type	State
State Save To	Register 1
Screen Save To	SCREEN000.png
DISP:ENABLE	ON
Full Screen	Off
SCPI Telnet	ON

System Functions

System

SCPI Socket	ON
SICL Server	ON
Display Intensity	100
Display Backlight	ON
Display Theme	TDColor
System Annotation	ON
The SYST:PRES:TYPE	MODE

Confirmation is required to restore the factory default values. The confirmation dialog is:

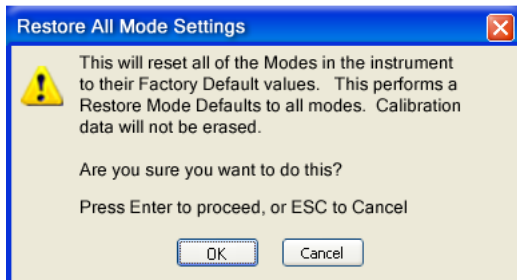


Example :SYST:DEF MISC

Key Path **System, Restore System Defaults**

Restore Mode Defaults (All Modes)

This selection resets all of the modes in the instrument back to their default state just as a Restore Mode Defaults does and it switches the instrument to the power-on mode and causes the default measurement for the power-on mode to be active. This level of Restore System Defaults does not affect any system settings, but it does affect the state of all modes and does cause a mode switch unless the instrument was already in the power-on mode. Confirmation is required to restore the factory default values. The confirmation dialog is:



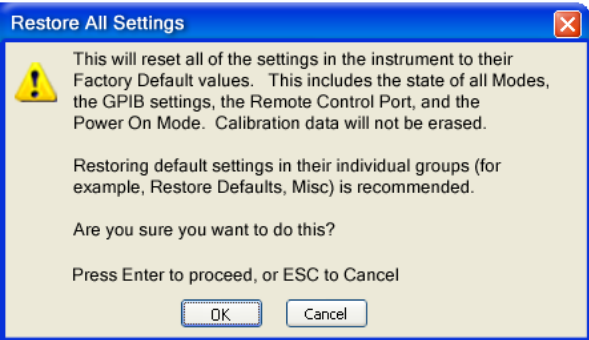
Example :SYST:DEF MOD

Dependencies/Couplings	An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode. It gets the mode to a consistent state with all of the default couplings set.
Key Path	System, Restore System Defaults

All

This is the catastrophic function that does a comprehensive reset of ALL analyzer settings to their factory default values. It resets all of the system setting groups, causes a Restore Mode Defaults for all modes in the instrument and switches back to the power-on mode. It does not affect the User Preset file or any user saved files.

Confirmation is required to restore the factory default values. The confirmation dialog is:



Example	:SYST:DEF ALL
Dependencies/Couplings	An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings.
Key Path	System, Restore System Defaults

Control Panel...

Opens the Windows Control Panel.
Pressing any key will cause the Control Panel to exit.

Remote Command Notes	No remote command for this key.
Key Path	System

Licensing...

Opens the license explorer.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

Remote Command Notes No equivalent remote command for this key.

Key Path **System**

There are five remote commands available for licensing.

Remote Command :SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">

Example SYST:LKEY
"N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1
017638211AC9F60D9C639FE539735909C551DE0A91"

Remote Command Notes The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, since the system knows which version is supported for each feature.

The <"LicenseInfo"> contains the signature, the expiration date, and serial number for transport if transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the serial number, the system regards it as non-transportable. As a result, this supports backward compatibility.

Remote Command :SYSTem:LKEY:DELeTe <"OptionInfo">,<"LicenseInfo">

Example SYST:LKEY:DEL
"N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1
017638211AC9F60D9C639FE539735909C551DE0A91"

Remote Command Notes The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, if more than one version is installed.

The <"LicenseInfo"> contains the signature, the expiration date, and whether or not be transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the transportability, the system regards it as non-transportable. As a result, this supports backward compatibility.

Remote Command :SYSTem:LKEY:LIST?

Remote Command Notes	Return Value: An <arbitrary block data> of all the installed instrument licenses. The format of each license is as follows. <Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport> Return Value Example: #3136 N9073A-1FP,1.000,B043920A51CA N9060A-2FP,1.000,4D1D1164BE64 N9020A-508,1.000,389BC042F920 N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005<arbitrary block data> is: #NMMM<data> Where: N is the number of digits that describes the number of MMM characters. For example if the data was 55 bytes, N would be 2. MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55. <data> ASCII contents of the data
Remote Command	:SYSTem:LKEY? <"OptionInfo">
Example	SYST:LKEY? "N9073A-1FP"
Remote Command Notes	The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one. Return Value: <"LicenseInfo"> if the license is valid, null otherwise. <"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable. Return Value Example: "B043920A51CA"
Remote Command	:SYSTem:HID?
Remote Command Notes	Return value is the host ID as a string

Service

Accesses capabilities performed in the factory or under instructions from repair procedures. This menu key is only visible when the logged-in user is "advanceduser" or "saservice". The first access to the

Service Menu after invoking the instrument application requires an authentication Service Code.

Key Path

System

Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

Key Path

System

Show Hardware Statistics

Provides a display of various hardware statistics. The statistics include the following:

- Mechanical relay cycles
- High and Low temperature extremes
- Elapsed time that the instrument has been powered-on (odometer)

The display should appear listing the statistics, product number, serial number, and firmware revision.

Std Header	Product Number: N9020A	
	Serial Number: US46340924	
	Firmware Revision: A.01.01	
Mechanical relays	Calibrator Switch Cycles:	1800
	AC/DC Switch Cycles:	60
	2 dB #1 Mechanical Atten Cycles	23489
	2 dB #2 Mechanical Atten Cycles	23400
	6 dB Mechanical Atten Cycles	500000
	10 dB Mechanical Atten Cycles	1000000
	20 dB Mechanical Atten Cycles	2500
	30 dB Mechanical Atten Cycles	60000
		4339
	High operating temperature extreme:	+37.2degC
	Low operating temperature extreme	+18.1degC
Odometer	Elapsed Time (on time) (hours):	1600

The data is updated only when the Show Hardware Statistics menu key is pressed. It is not updated while the screen is displayed.

The tabular data should be directly printable.

Mode	All
Restriction and Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Key Path	System, Diagnostics

Each of the hardware statistic items can be queried via SCPI.

Query the Mechanical Relay Cycle Count Returns the count of mechanical relay cycles.

Remote Command	:SYSTem:MRELAY:COUNT?
Example	:SYST:MREL:COUN?
Restriction and Notes	The return value is a comma separated list of the individual counts for each mechanical relay. The position of the relays in the list is: “<Cal Signal>,<AC/DC>,<2dB #1 Atten>,<2dB #2 Atten>,<6dB Atten>,<10dB Atten>,<20dB Atten>,<30dB Atten>”
Remote Command Notes	Query Only

Query the Operating Temperature Extremes Returns the low operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

Mode	All
Remote Command	:SYSTem:TEMPerature:LEXTreme?
Example	:SYST:TEMP:LEXT?
Restriction and Notes	Value is in degrees Celsius at which the lowest operating temperature has been recorded since 1st power-up.
State Saved	No

Returns the high operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

Mode	All
Remote Command	:SYSTem:TEMPerature:HEXTreme?
Example	:SYST:TEMP:HEXT?
Restriction and Notes	Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up.
State Saved	No

Query the Elapsed Time since 1st power on Returns the elapsed on-time in minutes since 1st power-on.

Remote Command	:SYSTem:PON:ETIMe?
Example	:SYST:PON:ETIM?
Remote Command Notes	Query Only

Advanced

Accesses advanced diagnostic capabilities performed in the factory or under instructions from repair procedures. This menu key is only visible when the logged-in user is “saservice”. The first access to the Advanced Diagnostic Menu after invoking the instrument application will require an authentication, which is to enter the Service Code. Subsequent accesses to the Advanced Diagnostic Menu are unimpeded. The Authentication dialog looks like:



“OK” is the default key thus the Enter key is used to complete the entry. If invalid Service Code is entered authentication is not granted and the user is provided the following dialog:



Restriction and Notes	Password is required to access this menu.
Key Path	System, Diagnostics

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer).

Mode	All
Remote Command	:SYSTem:OPTions?
Example	:SYST:OPT?

Restriction and Notes	The return string is a comma separated list of the installed options. For example: “503,P03,PFR” :SYSTem:OPTions? and *OPT? are the same.
State Saved	No

Lock the Front Panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a “K” for ‘Klock’ (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel ‘Local’ key (Cancel/Esc) has no effect if Klock is ON.

Mode	All
Remote Command	:SYSTem:KLOCK OFF ON 0 1 :SYSTem:KLOCK?
Example	:SYST:KLOC ON
Remote Command Notes	Keyboard lock remains in effect until turned-off or the instrument is power-cycled
Preset	Initialized to OFF at startup, unaffected by Preset
State Saved	No

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

Remote Command	:SYSTem:HELP:HEADers?
Example	:SYST:HELP:HEAD?
Remote Command Notes	The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A)

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were

defined.

Remote Command	:SYSTem:VERSion?
Example	:SYST:VERS?

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

Mode	All
Remote Command	:SYSTem:DATE "<year>,<month>,<day>" :SYSTem:DATE?
Example	:SYST:DATE "2006,05,26"
Remote Command Notes	<year> is the four digit representation of year. (for example, 2006) <month> is the two digit representation of year. (for example. 01 to 12) <day> is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31) depending on the month and year

Time (Remote Command Only)

Sets or queries the time in the instrument.

Mode	All
Remote Command	:SYSTem:TIME "<hour>,<minute>,<second>" :SYSTem:TIME?
Example	:SYST:TIME "13,05,26"
Remote Command Notes	<hour> is the two digit representation of the hour in 24 hour format <minute> is the two digit representation of minute <second> is the two digit representation of second

User Preset

The User Preset key opens up a menu that gives you three choices – execute the **User Preset** by pressing the **User Preset** softkey, User Preset all of the modes in the analyzer by pressing the **User Preset All Modes** softkey, and save the current state for the current mode by pressing the **Save User Preset** softkey.

User Preset

User Preset behaves similarly to **Recall State** in that it recalls a hidden Save State file. However, since each Mode has its own **User Preset** file, **User Preset** will never cause a mode switch, whereas recalling a Save State file may cause a mode switch, if the Save State file was saved while in a different mode.

The User Preset file is a Save State file. **User Preset** sets the state of the currently active mode back to the state that was previously saved for this mode using the **Save User Preset** menu key or the SCPI command, SYST:PRES:USER:SAV. So for any given Mode, the only way to perform a User Preset is from that Mode, not from any other Mode. The user has no control over the user preset filename and has no direct access to the user preset file.

User Preset recalls a mode's state which includes all of the variables affected by doing a Mode Preset. It not only recalls Mode Preset settings, but it also recalls all of the mode persistent settings. User Preset also recalls all of the Input/Output system settings that existed at the time **Save User Preset** was executed.

If a **Save User Preset** has not been done at any time, **User Preset** recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file, so there will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a **Save User Preset** is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

User Preset does the following:

- Aborts the currently running measurement.
- Sets the mode state to the values defined by **Save User Preset**.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Remote Command	:SYSTem:PRESet:USER
Example	:SYST:PRES:USER:SAVE :SYST:PRES:USER
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.

Dependencies/Couplings	A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Remote Command Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Key Path	User Preset

User Preset All Modes

User Preset All Modes behaves similarly to Power On User Preset, since it recalls all of the User Preset files for each mode, switches to the power-on mode and activates the saved measurement from the power-on mode User Preset file.

NOTE	When the instrument is secured, all of the user preset files are converted back to their default user preset files.

User Preset does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE :SYST:PRES:USER:ALL
Restriction and Notes	Clears all pending OPC bits. The Status Byte is set to 0.
Dependencies/Couplings	A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved.
Remote Command Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
Key Path	User Preset

Save User Preset

Save User Preset saves the currently active mode and its state. The way the user recalls this User Preset file is by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Restriction and Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Key Path	User Preset

The Swept SA measurement uses both swept and FFT analysis, and the frequency and time domains. For more details, see [“Swept SA Measurement Description” on page 265](#) below.

Measurement Commands and their Results for Swept SA

The INIT and CONF syntax, as well as the data returned to a FETCh (and therefore a MEASure and READ) is described in this section.

Note that the data returned to a FETCh? (and therefore to a MEAS? and a READ?) uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32 it returns REAL,32 data.

See also the section [“Remote Measurement Functions” on page 947](#).

The table below lists the measurement commands and their responses for the SANalyzer measurement (note that the marker values are x,y pairs):

Command	N	Return Value
INITiate:SANalyzer	n/a	n/a
CONFigure?	n/a	long form name of current measurement, for example, "SANalyzer"
CONFigure:SANalyzer	n/a	n/a (selects SAN measurement with Meas Setup settings in preset state – same as Meas Preset)
CONFigure:SANalyzer:NDEFault	n/a	n/a (selects SAN measurement without affecting settings)

FETCh:SANalyzer[n]?	0	Returns the following comma-separated results:
MEASure:SANalyzer[n]?		1 if there is any margin or limit failure, otherwise 0
READ:SANalyzer[n]?		0 (future).
		0 (future).
		0 (future).
		N dB points result (not a number if off)
		Current average count k (the current number of data measurements that have already been combined, in the averaging calculation).
		Number of points in the sweep
		0 (future).
		0 (future).
		0 (future).
		Marker 1 value (x,y)
		Marker 2 value (x,y)
		Marker 3 value (x,y)
		Marker 4 value (x,y)
		Marker 5 value (x,y)
		Marker 6 value (x,y)
		Marker 7 value (x,y)
		Marker 8 value (x,y)
		Marker 9 value (x,y)
		Marker 10 value (x,y)
		Marker 11 value (x,y)
		Marker 12 value (x,y)
not specif ied or n=1		This query returns Trace 1 data as a list of x,y pairs. The y-values are in the current Y Axis Unit of the analyzer. The x-axis values are the values of the trace, in the x-axis scale units of the trace (Hz for frequency domain traces, seconds for time domain traces). When querying trace data, it is best if the analyzer is not sweeping during the query. Therefore, it is good to be in Single Sweep, or Update=Off when querying trace data from the analyzer.
	2	Returns Trace 2 data as a series of x,y pairs
	3	Returns Trace 3 data as a series of x,y pairs
	4	Returns Trace 4 data as a series of x,y pairs

5	Returns Trace 5 data as a series of x,y pairs
6	Returns Trace 6 data as a series of x,y pairs
7 & above	Future use

Swept SA Measurement Description

Swept Spectrum Analysis (Freq Domain): The analyzer sweeps the LO to generate an IF signal that can be detected to analyze the signal content of a range of frequencies. The x-axis of the display is frequency, the Y Axis is amplitude.

Swept FFT Analysis (Freq Domain): In some cases there is an advantage to not actually sweeping the LO, but instead analyzing the signal by taking a time record and performing FFT analysis. This is what is done in swept FFT analysis, but the data is still presented as though it were a sweeping spectrum analyzer. The x-axis of the display is frequency, the Y Axis is amplitude.

Zero Span Analysis (Time Domain): In Zero Span analysis, the analyzer stops sweeping the LO, placing it at the center frequency, and then takes time data from the detector while stopped at that frequency. Because the LO is not moving, the frequency span is zero. The time data is presented left to right across the screen just like on an oscilloscope. The x-axis of the display is time, and the Y Axis is amplitude.

All of the tools such as markers, peak tables, limit lines, trace math, N dB points, and marker functions are available in Zero Span measurement analysis, although some work differently in the time and frequency domains.

Key Path	Meas
Help Map ID	3201
Instrument S/W Revision	A.01.06 or later

AMPTD Y Scale

Reference Level

The reference level specifies the amplitude of a signal which would be displayed on the top graticule line.

Changing the reference level does not restart a measurement, and instead ‘pans’ all displayed traces and markers to the new value. If a change to the reference level changes an auto-coupled attenuation value, the measurement will be restarted.

Remote Command:	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real></code> <code>:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?</code>
Example:	<code>DISP:WIND:TRAC:Y:RLEV 20 dBm</code> Sets the reference level to 20 dBm, which displays in the current Y axis unit. For example, if the Y axis unit is dBμV, then 126.99 dBμV will be displayed.
Dependencies/Couplings:	Reference level is affected by the variables listed in the “Max Ref Level” section above. The value is constrained within the MAX and MIN values, but is otherwise generally not adjusted. If you reduce the attenuation setting, the analyzer may have to lower the reference level to maintain the proper level at the top of the screen. If you then increase attenuation, the reference level does not increase to its previous value.
Preset:	0 dBm
State Saved:	Saved in State
Min:	$\text{RefLevelMin} = -170 \text{ dBm} + \text{RefLevelOffset} - \text{ExtGain}$.
Key Path:	AMPTD Y Scale
Default Unit:	depends on the current selected Y axis unit
Help Map ID:	3002
Instrument S/W Revision:	A.01.06 or later

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings. This key has read-back text that describes the total attenuator value.

See “[Attenuation](#)” on page 867 for more information.

Key Path	AMPTD Y Scale

Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Scale / Div

Sets the units per vertical graticule division on the display. This function is only available when Scale Type (Log) is selected and the vertical scale is power. When Scale Type (Lin) is selected, Scale/Div is grayed out.

Remote Command:	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
Example:	DISP:WIND:TRAC:Y:PDIV 5 DB
Dependencies/Couplings:	Scale/Div is grayed out in linear Y scale. Sending the equivalent SCPI command does change the Scale/Div, though it has no affect while in Lin.
Preset:	10.00 dB / Div
State Saved:	Saved in State
Min:	0.10 dB
Max:	20 dB
Key Path:	AMPTD Y Scale
Help Map ID:	3015
Instrument S/W Revision:	A.01.06 or later

Scale Type

Chooses a linear or logarithmic vertical scale for the display and for remote data readout.

When Scale Type (Log) is selected, the vertical graticule divisions are scaled in logarithmic units. The top line of the graticule is the Reference Level and uses the scaling per division Scale/Div to assign values to the other locations on the graticule.

When Scale Type (Lin) is selected, the vertical graticule divisions are linearly scaled with the reference level value at the top of the display and zero volts at the bottom. Each vertical division of the graticule represents one-tenth of the Reference Level.

NOTE	The Y Axis Unit used for each type of display is set by pressing Y Axis Unit. The analyzer remembers separate Y Axis Unit settings for both Log and Lin.

Remote Command:	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing LINear LOGarithmic :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing?

Example:	DISP:WIND:TRAC:Y:SPAC LOG DISP:WIND:TRAC:Y:SPAC?
Dependencies/Couplings:	If Normalize is on, Scale Type forced to Log and is grayed out. Changing the Scale Type always sets the Y Axis unit to the last unit specified for the current amplitude scale. In other words, we restore the Y Axis unit setting appropriate per log/lin.
Preset:	LOG
State Saved:	Saved in State
Key Path:	AMPTD Y Scale
Help Map ID:	3016
Instrument S/W Revision:	A.01.06 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

See [“Presel Center” on page 878](#) for more information.

Key Path	AMPTD/Y Scale
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when Presel Center is available.

See [“Preselector Adjust” on page 880](#) for more information.

Key Path	AMPTD/Y Scale
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE:

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

Remote Command:	:UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBUVM DBUAM DBPT DBG :UNIT:POWer?
Example:	UNIT:POW dBmV UNIT:POW?
Dependencies/Couplings:	The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types (see above)
Remote Command Notes:	The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50.
Preset:	dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic.
State Saved:	Saved in State
Key Path:	AMPTD Y Scale
Help Map ID:	3021
Instrument S/W Revision:	A.01.06 or later

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

Remote Command Example: UNIT:POW DBM

Key Path: **AMPTD Y Scale, Y Axis Unit**
Help Map ID: 3022
Instrument S/W Revision: A.01.06 or later

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

Remote Command Example: UNIT:POW DBMV
Key Path: **AMPTD Y Scale, Y Axis Unit**
Help Map ID: 3023
Instrument S/W Revision: A.01.06 or later

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

Remote Command Example: UNIT:POW DBMA
Key Path: **AMPTD Y Scale, Y Axis Unit**
Help Map ID: 3024
Instrument S/W Revision: A.01.06 or later

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

Remote Command Example: UNIT:POW W
Key Path: **AMPTD Y Scale, Y Axis Unit**
Help Map ID: 3025
Instrument S/W Revision: A.01.06 or later

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

Remote Command Example: UNIT:POW V
Key Path: **AMPTD Y Scale, Y Axis Unit**
Help Map ID: 3026
Instrument S/W Revision: A.01.06 or later

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

Remote Command Example:	UNIT:POW A
Key Path:	AMPTD Y Scale, Y Axis Unit
Help Map ID:	3027
Instrument S/W Revision:	A.01.06 or later

dBμV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBμV.

Remote Command Example:	UNIT:POW DBUV
Key Path:	AMPTD Y Scale, Y Axis Unit
Help Map ID:	3028
Instrument S/W Revision:	A.01.06 or later

dBμA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBμA.

Remote Command Example:	UNIT:POW DBUA
Key Path:	AMPTD Y Scale, Y Axis Unit
Help Map ID:	3029
Instrument S/W Revision:	A.01.06 or later

Reference Level Offset

Adds an offset value to the displayed reference level. The reference level is the absolute amplitude represented by the top graticule line on the display.

See [“More Information” on page 272](#)

Remote Command:	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_ampl> :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?
Example:	DISP:WIND:TRAC:Y:RLEV:OFFS 12.7 Sets the Ref Level Offset to 12.7 dB. The only valid suffix is dB. If no suffix is sent, dB will be assumed.
Preset:	0 dBm
State Saved:	Saved in State

Swept SA AMPTD Y Scale

Min:	The range for Ref Lvl Offset is variable. It is limited to values that keep the reference level within the range of –327.6 dB to 327.6 dB.
Max:	327.6 dB
Key Path:	AMPTD Y Scale
Help Map ID:	3034
Instrument S/W Revision:	A.01.06 or later

More Information

Offsets are used when gain or loss occurs between a device under test and the analyzer input. Thus, the signal level measured by the analyzer may be thought of as the level at the input of an external amplitude conversion device. Entering an offset does not affect the trace position or attenuation value, just the value of the top line of the display and the values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc, are all affected by Ref Level Offset.

NOTE	Changing the offset causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep, but the data will not change until the trace data updates, because the offset is applied to the data as it is taken. If a trace is exported with a nonzero Ref Level Offset, the exported data will contain the trace data with the offset applied.

The maximum reference level available is dependent on the reference level offset. That is, Ref Level - Ref Level Offset must be in the range –170 to +30 dBm. For example, the reference level value range can be initially set to values from –170 dBm to 30 dBm with no reference level offset. If the reference level is first set to –20 dBm, then the reference level offset can be set to values of –150 to +50 dB.

If the reference level offset is first set to –30 dB, then the reference level can be set to values of –200 dBm to 0 dBm. In this case, the reference level is “clamped” at 0 dBm because the maximum limit of +30 dBm is reached with a reference level setting of 0 dBm with an offset of –30 dB. If instead, the reference level offset is first set to 30 dB, then the reference level can be set to values of –140 to +60 dBm.

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See [“Internal Preamp” on page 881](#) for more information.

Key Path	AMPTD Y Scale
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Auto Couple

Pressing Auto Couple in the Swept SA measurement sets the Auto/Man coupling to Auto for the following parameters:

Center Frequency Step
Attenuation
Sweep Time
Detector
Resolution BW
Video BW
VBW/RBW Ratio
Average Type
Span/RBW Ratio
Phase Noise Optimization
ADC Dither
Sweep Type
Swept IF Gain
FFT IF Gain
Marker Count Gate Time
Sweep Time Rules
Sweep Type
Sweep Type Rules
FFT Width

Refer to “Auto Couple” in the Section called, “Common Measurement Functions” for more information about this key.

BW

The BW key opens the BW menu, which contains keys to control the Resolution Bandwidth and Video Bandwidth functions of the instrument.

The Res BW functions control filter bandwidth and filter type. There are two filter types, Gaussian and Flattop. The Gaussian filters have a response curve that is parabolic on a log scale. The Flattop filter shape is a close approximation of a rectangular filter.

NOTE The AVERAGE functions, which appeared in the BW menu in earlier analyzers, can now be found in the Trace menu and the Meas Setup menu. In the Trace menu, you may turn Trace Averaging on or off for the desired traces (rather than globally as in the past); and in the Meas Setup menu you may configure Averaging, by setting the Average Number and the Average Type.

Key Path	Front-panel key
Help Map ID	3042
Instrument S/W Revision	A.01.06 or later

Res BW

Activates the **Res BW** active function, which allows you to manually set the resolution bandwidth (RBW) of the analyzer. Normally, **Res BW** (Auto) selects automatic coupling of the Res BW to **Span** using the ratio set by the Span:3 dB RBW key. To decouple the resolution bandwidth, press Res BW until Man is underlined, or simply enter a different value for **Res BW**.

See [“More Information” on page 275](#)

Remote Command:	<code>[[:SENSe]:BANDwidth BWIDth[:RESolution] <freq></code> <code>[[:SENSe]:BANDwidth BWIDth[:RESolution]?</code> <code>[[:SENSe]:BANDwidth BWIDth[:RESolution]:AUTO OFF ON 0 1</code> <code>[[:SENSe]:BANDwidth BWIDth[:RESolution]:AUTO?</code>
Example:	<code>BAND 1 KHZ</code> <code>BAND?</code> <code>BWID:AUTO ON</code> <code>BWID:AUTO?</code>

Dependencies/Couplings:	When in Zero Span , there is no Auto setting for Res BW. The Auto/Man line on the Res BW softkey disappears in this case, and if the SCPI command [:SENSe] :BWID[:RESolution] :AUTO ON is sent, it generates an error. Res BW is normally coupled to Span; if Res BW is set to Auto, as the Span decreases, so will the Res BW. Normally, in Zero Span, this coupling is turned off and Res BW has no Auto setting. Sweep time is coupled to RBW when in a non-zero span. If Sweep Time is set to Auto, then the sweep time is changed as the RBW changes, to maintain amplitude calibration. Video bandwidth (VBW) is normally coupled to RBW. If VBW is set to Auto, then the VBW is changed as the RBW changes, to maintain the ratio set by VBW:3 dB RBW. See the ““VBW:3dB RBW ” on page 277” key description.
Remote Command Notes:	The setting and querying of values depends on the current bandwidth type.
Preset:	3 MHz ON
State Saved:	Saved in Instrument State
Min:	1 Hz
Max:	8 MHz is the max equivalent –3 dB RBW, which means that the named RBW (the one shown on the key etc) can actually exceed 8 MHz if using a filter other than –3 dB Gaussian
Key Path:	BW
Default Unit:	Hz
Help Map ID:	3043
Instrument S/W Revision:	A.01.06 or later

More Information

When the **Res BW** is manually selected, it may be returned to the coupled state by pressing the **Res BW** key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

When **Res BW** is set to **Auto**, the bandwidth selected depends on the Filter Type (see “Filter Type” below).

Only certain discrete resolution bandwidths are available. The available bandwidths are dependent on the **Filter Type**. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

The zero-span case deserves some mention, because RBW is coupled to Span when in a swept (non-zero) span and in zero span there is no meaningful RBW coupling.

The annotation under RBW in the bottom left of the screen shows the type of filter or bandwidth that is being used. The following examples illustrate this:

–3 dB (Normal) filter BW: Res BW 300 Hz

-6 dB filter BW: Res BW (-6 dB) 422 Hz
Noise filter BW: Res BW (Noise) 317 Hz
Impulse filter BW: Res BW (Impulse) 444 Hz
Flattop filter type:Res BW (Flattop) 300 Hz

Video BW

Lets you change the analyzer post-detection filter (VBW) from 1 Hz to 8 MHz in approximately 10% steps. In addition, a wide-open video filter bandwidth may be chosen by selecting 50 MHz.

Normally, Video BW (Auto) selects automatic coupling of the Video BW filter to the resolution bandwidth filter using the ratio set by the VBW:3 dB RBW key. To decouple the video bandwidth, press Video BW until Man is underlined, or simply enter a new value.

When the **Video BW** is manually selected, it may be returned to the coupled state by pressing the **Video BW** key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

Remote Command:	<pre>[:SENSe]:BANDwidth BWIDth:VIDeo <freq> [:SENSe]:BANDwidth BWIDth:VIDeo? [:SENSe]:BANDwidth BWIDth:VIDeo:AUTO OFF ON 0 1 [:SENSe]:BANDwidth BWIDth:VIDeo:AUTO?</pre>
Example:	<pre>BAND:VID 1 KHZ BAND:VID? BWID:VID:AUTO ON BWID:VID:AUTO?</pre>
Dependencies/Couplings:	Sometimes the displayed Video BW is not actually used to process the trace data: • When the Average Detector is selected and Sweep Type is set to Swept, the video bandwidth filter cannot be used, because it uses the same hardware as the Average Detector. • When this is the case, the VBW still acts to change the Sweep Time, if Sweep Time is in Auto, and still affects the data on other traces for which this is not the case.
Remote Command Notes:	The values shown in this table reflect the conditions after a Mode Preset.
Preset:	3 MHz ON
State Saved:	Saved in Instrument State
Min:	1 Hz
Max:	50 MHz

Key Path:	BW
Default Unit:	Hz
Help Map ID:	3044
Instrument S/W Revision:	A.01.06 or later

VBW:3dB RBW

Selects the ratio between the video bandwidth and the equivalent 3 dB resolution bandwidth to be used for setting VBW when VBW is in Auto.

Normally, VBW:3dB RBW (Auto) selects automatic coupling of the VBW:3 dB RBW ratio to **Detector**. To decouple the ratio, press VBW:3 dB RBW until Man is underlined, or simply enter a new value.

When the VBW:3dB RBW is manually selected, it may be returned to the coupled state by pressing the VBW:3 dB RBW key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

Remote Command:	[:SENSe] :BANDwidth BWIDth:VIDeo:RATio <real>
	[:SENSe] :BANDwidth BWIDth:VIDeo:RATio?
	[:SENSe] :BANDwidth BWIDth:VIDeo:RATio:AUTO OFF ON 0 1
	[:SENSe] :BANDwidth BWIDth:VIDeo:RATio:AUTO?

Example:	BAND:VID:RAT 2
	BAND:VID:RAT?
	BAND:VID:RAT:AUTO 0
	BAND:VID:RAT:AUTO?

Dependencies/Couplings:	See “Coupling Auto Rules”, below
Remote Command Notes:	The values shown in this table reflect the conditions after a Mode Preset.
Preset:	1
	ON
State Saved:	Saved in Instrument State
Min:	0.00001
Max:	3000000
Key Path:	BW
Help Map ID:	3045
Instrument S/W Revision:	A.01.06 or later

Coupling Auto Rules:

The Auto Rules for the **VBW:3dB RBW** function follow.

First, we go through the following list and find the lowest numbered detector being used on any active traces (traces for which Update is On):

Peak

Normal

Average

Sample

Negative Peak

Use that detector to pick the ratio based on the following criteria:

2. If the detector is **Negative Peak**, use 1.0
3. Otherwise, if the detector is **Normal**, use 1.0.
4. Otherwise, if the detector is **Average**, and the span is nonzero, use 0.1. The use of a small ratio in Average detection is desirable because of its effect on the sweep time equations. The VBW filter is not actually in-circuit when the average detector is on. If the detector is Average, and the span is zero, use 10.0, which gives optimal behavior for Interval Markers in zero span.
6. Otherwise, the detector is simply **Peak** or **Sample**. These two detectors can use the same rules. In these cases:

If all active traces have Averaging on, use 0.1. This is because when doing trace averaging, reducing the VBW reduces the variance. You may have chosen the peak detector to get very accurate averaged CW measurements, and a narrow VBW helps with that.

Otherwise, if any active trace is in max hold or min hold, use 10.0, because Max and Min Hold operations will usually be intended to capture peaks and pits without smoothing from the VBW filter.

Otherwise, if any marker function is on, choose 0.1, because Marker functions are all designed for power averaging, so we will often want a narrow VBW for better repeatability.

Otherwise, use 1.0 as a compromise; because you have not set the analyzer in a way that implies that you are measuring noise, pulsed-RF or CW signals.

Note that because the above couplings depend on which traces are active, they are re-examined whenever any trace goes active or inactive, except when this leaves no traces active. Transitioning to the state where no traces are active should not affect the couplings; in that way, the annotation will always reflect the state of the last trace which was active.

Span:3dB RBW

Selects the ratio between span and resolution bandwidth.

Normally, Span:3dB RBW (Auto) selects a Span:3 dB RBW ratio of 106:1. If you manually enter the ratio, Man will become underlined, which enables you to manually select ratios more suitable for certain measurements.

When the Span:3dB RBW is manually selected, it may be returned to the coupled state by pressing the Span:3dB RBW key until **Auto** is underlined. This may also be done by pressing Auto Couple or by

performing a **Preset**.

Remote Command:	<pre>[:SENSe] :FREQuency:SPAN:BANDwidth[:RESolution]:RATio <integer> [:SENSe] :FREQuency:SPAN:BANDwidth[:RESolution]:RATio? [:SENSe] :FREQuency:SPAN:BANDwidth[:RESolution]:RATio:AUTO OFF ON 0 1 [:SENSe] :FREQuency:SPAN:BANDwidth[:RESolution]:RATio:AUTO?</pre>
Example:	FREQ:SPAN:BAND:RAT 200 sets a ratio of 200:1, and turns off the auto coupling. FREQ:SPAN:BAND:RAT:AUTO ON FREQ:SPAN:BAND:RAT?
Dependencies/Couplings:	If the grayed out key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, the command is acted upon, but it doesn't affect the current measurement.
Remote Command Notes:	The values shown in this table reflect the conditions after a Mode Preset.
Preset:	106 ON
State Saved:	Saved in Instrument State
Min:	2
Max:	10000
Key Path:	BW
Help Map ID:	3046
Instrument S/W Revision:	A.01.06 or later

RBW Control

Selects the type/shape for the resolution bandwidth filters. Historically, the Res BW filters in Agilent spectrum analyzers were Gaussian filters, specified using the –3 dB bandwidth of the filter. That is, a 10 MHz Res BW filter was a Gaussian shape with its –3 dB points 10 MHz apart. In the X-Series you can, using the **Filter BW** key, specify bandwidths other than the –3 dB bandwidth (–6 dB, Noise, Impulse) for the width of the Gaussian filters. Furthermore, the **Filter BW** menu lets you choose between a Gaussian and Flat Top filter shape, for varying measurement conditions.

Key Path	BW
Help Map ID	3047
Instrument S/W Revision	A.01.06 or later

Filter Type

Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions. The **Filter Type** menu gives you control over these types.

See [“More Information” on page 280](#)

Remote Command:	<code>[:SENSe] :BANDwidth BWIDth:SHAPE GAUSSian FLATtop</code> <code>[:SENSe] :BANDwidth BWIDth:SHAPE?</code>
Example:	BAND:SHAP GAUS
Preset:	Auto Couple chooses the preset value
State Saved:	Saved in State
Key Path:	BW, RBW Control
Help Map ID:	3048
Instrument S/W Revision:	A.01.06 or later

More Information

Gaussian filters

When the Gaussian filter type is chosen, a set of 160 RBW filters are available whose shape is approximately Gaussian. The actual bandwidths used to realize MXA's Gaussian filters are chosen to come as close as possible to a 24 step per decade series, within the limitations of the digital IF.

For Gaussian filters, the annotation at the bottom of the screen shows the filter bandwidth type (unless it is Normal). This will be shown parenthetically between the words “Res BW” and the value, for example

Res BW 10.0 Hz (Normal bandwidth)

Res BW (Impulse) 14.8 Hz (Impulse bandwidth)

Flattop filters

When the Flattop filter type is chosen, a new set of 134 RBW hardware settings are available. These settings realize filters that are approximately rectangular in shape. When this shape is chosen the filter bandwidth options are irrelevant and therefore unavailable.

The annotation at the bottom of the screen will show that the Flattop shape is being used, for example:

Res BW (Flattop) 10 Hz

Gaussian Selects the Gaussian filter type. There are 160 of these RBWs. They are arranged in a 24-per-decade sequence from 1 Hz through 3 MHz, plus the 4, 5, 6 and 8 MHz settings.

Remote Command Notes:	Parameter is GAUSSian.
Example:	BAND:SHAP GAUS
Key Path:	BW, RBW Control, Filter Type
Help Map ID:	3049

Instrument S/W Revision: A.01.06 or later

Flattop Selects the flat top filter type

Example: BAND:SHAP FLAT
 Key Path: **BW, RBW Control, Filter Type**
 Help Map ID: 3050
 Instrument S/W Revision: A.01.06 or later

Filter BW

When using the Gaussian filters for certain types of applications it can be useful to be able to specify the filter width using points other than the -3 dB points. The Filter BW function allows you to pick the filter based on its -3 dB (Normal) bandwidth, its -6 dB bandwidth, its Noise bandwidth, or its Impulse bandwidth. Note that in all four cases the -3 dB bandwidth is the same. The filter does not change, but the way you specify it changes.

See [“More Information” on page 281](#)

Remote Command: [:SENSe] :BANDwidth|BWIDth:TYPE DB3|DB6|IMPulse|NOISe
 [:SENSe] :BANDwidth|BWIDth:TYPE?
 Example: BAND:TYPE NOIS
 Dependencies/Couplings: Grayed out if the Flattop filter type is selected.
 Preset: Auto Couple chooses the preset value
 State Saved: Saved in State
 Key Path: **BW, RBW Control**
 Help Map ID: 3052
 Instrument S/W Revision: A.01.06 or later

More Information

The analyzer provides four ways of specifying the bandwidth of a Gaussian filter:

The -3 dB bandwidth of the filter

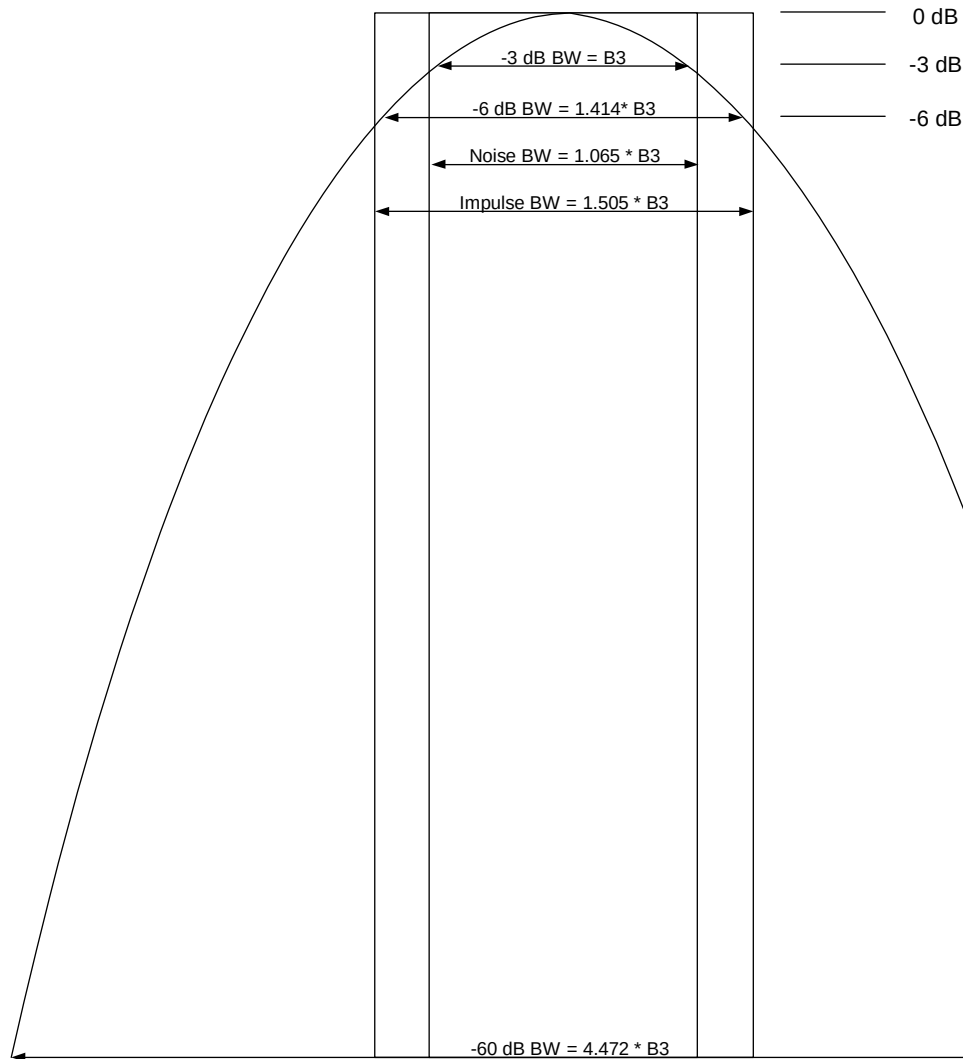
The -6 dB bandwidth of the filter

The equivalent Noise bandwidth of the filter, which is defined as the bandwidth of a rectangular filter with the same peak gain which would pass the same power for noise signals.

The equivalent Impulse bandwidth of the filter, which is defined as the bandwidth of a rectangular filter with the same peak gain which would pass the same power for impulsive (narrow pulsed) signals.

Swept SA BW

The figure below shows the relationships of the various filter bandwidths for filters with the X-Series' shape factor (shape factor is defined as the ratio of the –60 dB bandwidth to the – 3 dB bandwidth):



The Filter Type menu lets you choose the filter bandwidth (–3 dB, –6 dB, Noise or Impulse) that will be used when specifying the width of the filter. Note that for a given Gaussian filter, changing the filter bandwidth specification does not affect the filter width at all but only the means of specifying it. For example, the filter whose –3 dB bandwidth is 1.0 kHz is the same as the filter whose –6 dB bandwidth is 1.41 kHz, whose Noise bandwidth is 1.06 kHz, and whose Impulse bandwidth is 1.48 kHz. As you cycle through these various filter bandwidths the filter does not change, but the way the filter is annotated and the value which appears in the active function area and on the softkey does.

–3 dB (Normal) Selects the normal gaussian-shaped bandwidths that are defined by their –3 dB bandwidths.

Example: BAND:TYPE DB3

Key Path: BW, RBW Control, Filter BW

Help Map ID: 3053
Instrument S/W Revision: A.01.06 or later

–6 dB Selects the filter bandwidths where the bandwidth is defined at the –6 dB points. This uses the normal RBW filters, but the value displayed on the key, active function line and screen annotation changes to reflect the –6 dB bandwidth instead of the –3 dB bandwidth.

Example: BAND:TYPE DB6
Key Path: **BW, RBW Control, Filter BW**
Help Map ID: 3054
Instrument S/W Revision: A.01.06 or later

Noise Selects the noise filter bandwidths. This uses the normal RBW filters, but the value displayed on the key, active function line and screen annotation changes to reflect the equivalent noise bandwidth, instead of the –3 dB bandwidth.

Example: BAND:TYPE NOIS
Key Path: **BW, RBW Control, Filter BW**
Help Map ID: 3055
Instrument S/W Revision: A.01.06 or later

Impulse Selects the impulse bandwidths. This uses the normal RBW filters, but the value displayed on the key, active function line and screen annotation changes to reflect the equivalent impulse bandwidth instead of the –3 dB bandwidth.

Example: BAND:TYPE IMP
Key Path: **BW, RBW Control, Filter BW**
Help Map ID: 3056
Instrument S/W Revision: A.01.06 or later

Cont

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889.

Frequency

Operation of this key is identical across several measurements. For details about this key, see [“FREQ Channel” on page 891](#).

Auto Tune

Auto Tune is an immediate action key. When it is pressed, it causes the analyzer to change Center Frequency to the strongest signal in the tunable span of the analyzer, excluding the LO. It is designed to quickly get you to the most likely signal(s) of interest, with no signal analysis knowledge required. As such, there are no configurable parameters for this feature. There are only pre-selected values that work in most real world situations.

NOTE	You may see a slight pause before the signal of interest is presented at midscreen.

Remote Command:	[:SENSe] :FREQuency:TUNE:IMMediate
Help Map ID:	3058
Instrument S/W Revision:	A.01.06 or later

Center Frequency

Operation of this key is identical across several measurements. For details about this key, see [“Center Frequency” on page 891](#).

Start Frequency

Sets the frequency at the left side of the graticule. While adjusting the Start Frequency the Stop Frequency is held constant, which means that both Center Frequency and Span will change.

Start Freq also sets the frequency entry mode to Start/Stop. In Start/Stop mode, the start frequency and stop frequency values are displayed below the graticule, and the default active function in the Frequency menu is **Start Freq**.

Remote Command:	[:SENSe] :FREQuency:STARt <freq> [:SENSe] :FREQuency:STARt?
Example:	FREQ:STAR 200 MHz FREQ:STAR?

Dependencies/Couplings:	By direct entry: You cannot set Start frequency > Stop frequency. You cannot set Start frequency = Stop frequency. You cannot select zero span by setting Start = Stop. You cannot set Start Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, Stop Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop. With the knob or step keys: Cannot increment Start Freq to a value greater than Stop Freq – 10 Hz. If already in zero span, cannot increment at all, and the first decrement will be forced to at least 10 Hz. The Start Frequency can be limited by Span limits, if the Stop Frequency is below its preset value. If the electrical attenuator is enabled, any attempt to set Start Frequency such that the Stop Frequency would be >3.6 GHz results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning. See details under Center Freq for more information about span couplings.
Remote Command Notes:	Max values depends on Hardware Options (503, 507, 508, 513, 526)
Preset:	Start Freq does not preset. On Mode Preset, Span & CF preset, and Start Freq is derived. On a Meas Preset only Span presets, CF does not, so Start Freq will vary depending on CF.
State Saved:	Saved in State
Min:	–80 MHz
	If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Max:	Depends on the instrument maximum frequency – 10 Hz minimum span. If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Key Path:	FREQUENCY, Start Freq
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Help Map ID:	3060
Instrument S/W Revision:	A.01.06 or later

Stop Frequency

Sets the frequency at the right side of the graticule. While adjusting the Stop Frequency the Start Frequency is held constant, which means that both Center Frequency and Span will change.

Stop Freq also sets the frequency entry mode to Start/Stop. In Start/Stop mode, the start frequency and stop frequency values are displayed below the graticule, and the default active function in the Frequency

menu is **Start Freq.**

Remote Command:	<pre>[:SENSe] :FREQuency:STOP <freq></pre> <pre>[:SENSe] :FREQuency:STOP?</pre>
Example:	<pre>FREQ:STOP 220 MHz</pre> <pre>FREQ:STOP?</pre>
Dependencies/Couplings:	By direct entry: You cannot set Stop frequency < Start frequency. You cannot set Start frequency = Stop frequency. You cannot select zero span by setting Start = Stop. You cannot set Stop Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, Start Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop. With the knob or step keys: Cannot decrement Stop Freq to a value less than Start Freq + 10 Hz. If already in zero span, cannot decrement at all, and the first increment will be forced to at least 10 Hz. The Stop Frequency can be limited by Span limits, if the Start Frequency is above its preset value. If the electrical attenuator is enabled, any attempt to set Stop Frequency >3.6 GHz results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning. See details under Center Freq for more information about span couplings. You cannot set Start frequency = Stop frequency. You cannot select zero span by setting Start = Stop. The instrument will alter the value of the last setting to maintain a minimum value of 10 Hz for the difference between Start and Stop.
Remote Command Notes:	Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526)
Preset:	Stop Freq does not preset. On Mode Preset, Span & CF preset, and Stop Freq is derived. On a Meas Preset only Span presets, CF does not, so Stop Freq will vary depending on CF.
State Saved:	Saved in State
Min:	–79.999999999 MHz If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Max:	Depends on instrument maximum frequency. If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Key Path:	FREQUENCY, Stop Freq
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Help Map ID:	3061

Instrument S/W Revision: A.01.06 or later

CF Step

Operation of this key is identical across several measurements. For details about this key, see [“CF Step” on page 894](#).

Frequency Offset

Frequency Offset enables you to set a frequency offset value to account for frequency conversions outside of the analyzer. This value is added to the display readout of the marker frequency, center frequency, start frequency, stop frequency, and all other absolute frequency settings in the analyzer including frequency count. When a frequency offset is entered, the value appears below the center of the graticule. To eliminate an offset, perform a Mode Preset or set the frequency offset to 0 Hz.

See [“More Information” on page 288](#).

Remote Command:	[:SENSe] :FREQuency:OFFSet <freq> [:SENSe] :FREQuency:OFFSet?
Example:	FREQ:OFFS 10 MHz
Dependencies/Couplings:	Frequency Offset is not available when the frequency scale is set to Log
Remote Command Notes:	Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526)
Preset:	See the table ““N9020A Frequency Ranges and Preset Values ” on page 289” .
State Saved:	Saved in State
Min:	–500 GHz
Max:	500 GHz
Key Path:	FREQUENCY, Freq Offset
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Help Map ID:	3064
Instrument S/W Revision:	A.01.06 or later

More Information

This command does not affect any bandwidths or the settings of relative frequency parameters such as delta markers or span. It does not affect the current hardware settings of the analyzer, but only the displayed frequency values. Entering an offset does not affect the trace position or display, just the value of the Start and Stop Frequency and the values represented by the trace data. Thus, the frequency values of exported trace data, queried trace data, markers, trace data used in calculations such as N dB points, trace math, etc., are all affected by Freq Offset. Changing the offset, even on a trace which is not

updating, will immediately change all of the above, without new data needing to be taken.

NOTE	If a trace is exported with a nonzero Freq Offset, the exported data will contain the trace data with the offset applied. Therefore, if that trace were to be imported back into the analyzer, you would want Freq Offset to be 0, or the offset would be applied again to data which is already offset. No such care need be taken when saving a State+Trace file because the data and state are saved together.

N9020A Frequency Ranges and Preset Values

Here are the frequency ranges and Mode Preset values for each frequency Option:

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503	1.805 GHz	3.6 GHz	3.7 GHz
507	3.505 GHz	7.0 GHz	7.1 GHz
508	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526	13.255 GHz	26.5 GHz	27.0 GHz

Operation of this key is identical across several measurements. For details about this key, see [“Input/Output” on page 897](#).

Marker

See “Marker Control Mode” on page 290.

See “Setting the Marker X Axis Value” on page 291.

See “Setting the Marker X Position in Trace Points” on page 291.

See “Setting the Marker Y Axis Value” on page 292.

The Marker key accesses the Marker menu. A marker can be placed on a trace to allow the value of the trace at the marker point to be determined precisely. The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules.

Markers may also be used in pairs to read the difference (or delta) between two data points. They can be used in Marker Functions to do advanced data processing, or to specify operating points in functions like Signal Track and N dB Points.

The SCPI command in the table below selects the marker and sets the marker control mode as described under **Normal**, **Delta**, **Fixed** and **Off**, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MODE POSition DELTa FIXed OFF :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MODE?
Preset:	OFF (all markers)
State Saved:	The marker control mode is saved in instrument state
Help Map ID:	3149
Instrument S/W Revision:	A.01.06 or later

Marker Control Mode

There are four control modes for markers:

Normal (POSition) - A marker that can be moved to any point on the X Axis by specifying its X Axis value, and whose absolute Y Axis value is then the value of the trace point at that X Axis value.

Delta (DELTa) - A marker that can be moved to any point on the X Axis by specifying its X Axis offset from a reference marker, and whose absolute Y Axis value is then the value of the trace point at that X Axis value.

Fixed (FIXed) - A marker whose X Axis and Y Axis values may be directly or indirectly specified by you, but whose Y Axis value remains fixed, once specified, and does not follow the trace. Fixed markers are useful as reference markers for Delta markers, as operands in a Peak Search operation, and as arbitrary reference points settable by you. These markers are represented on the display by an “X” rather than a diamond.

Off (OFF) - A marker which is not in use.

In the Swept SA measurement, the Preset control mode is **Off** for all markers.

Setting the Marker X Axis Value

The command below sets the marker X Axis value in the current marker X Axis Scale unit. In each case the marker that is addressed becomes the selected marker. It has no effect (other than to cause the marker to become selected) if the control mode is **Off**, **but** it is the SCPI equivalent of entering an X value if the control mode is **Normal**, **Delta**, or **Fixed**.

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X <freq> :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X?
Remote Command Notes:	If no suffix is sent it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an invalid suffix error will be generated. See error –131 in Master Error Messages: Next Gen document for the exact error text. If the specified marker is Fixed and a Marker Function is on, a message is generated. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning. The query returns the marker’s absolute X Axis value if the control mode is Normal or Fixed. It returns the offset from the marker’s reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number.
Preset:	After a preset, if X is queried with no value sent first, the center of screen value will be returned. This will depend on the frequency range of the instrument. 13.255 GHz is correct for the 26 GHz instruments only (Option 526).
Min:	– ∞ (minus infinity)
Max:	+ ∞ (plus infinity)
Default Unit:	determined by X Axis Scale
Help Map ID:	3150
Instrument S/W Revision:	A.01.06 or later

Setting the Marker X Position in Trace Points

The command below sets the marker X position in trace points. It has no effect if the marker control mode is **Off**. **But** it is the SCPI equivalent of entering a value if the control mode is **Normal** or **Delta** or **Fixed** – except the setting is in trace points rather than X Axis Scale units.

NOTE The entered value in Trace Points is immediately translated into the current X Axis Scale units for setting the value of the marker. The marker’s value in X Axis

Scale Units, NOT trace points, will be preserved if a change is made to the X Axis scale settings. Thus, if you use this command to place a marker on bucket 500, which happens at that time to correspond to 13 GHz, and then you change the Start Frequency so that bucket 500 is no longer 13 GHz, the marker will stay at 13 GHz, NOT at bucket 500! This is important to realize as it differs from the behavior of past Agilent analyzers.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X:POSitio n <real> :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X:POSitio n?
Remote Command Notes:	If the specified marker is Fixed and a Marker Function is on, a message is generated. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. The query returns the marker’s absolute X Axis value in trace points if the control mode is Normal or Fixed . It returns the offset from the marker’s reference marker in trace points if the control mode is Delta . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points
Preset:	After a preset, if X is queried with no value sent first, the center of screen value will be returned. So if per default, the number of Trace points is 1001, the center value will be 500.
Min:	0
Max:	Number of trace points – 1
Default Unit:	unitless
Help Map ID:	3151
Instrument S/W Revision:	A.01.06 or later

Setting the Marker Y Axis Value

The command below selects the marker and sets the marker Y Axis value; the default unit is the current Y Axis unit. It has no effect (other than selecting the marker) unless the marker control mode is **Fixed**.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y <real> :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y?
Example:	CALC:MARK2:MODE POS turns on marker 2 as a normal marker. CALC:MARK2:X 20 GHZ moves marker 2 to 20 GHz if X Axis Scale is Frequency. If X Axis Scale is Time, the -131 invalid suffix error is generated.

Preset:	Trace value at center of screen. There is no way to predict what this will be after a preset.
Min:	$-\infty$ (minus infinity)
Max:	$+\infty$ (plus infinity)
Help Map ID:	3152
Instrument S/W Revision:	A.01.06 or later

Select Marker

Specifies the selected marker. The term “selected marker” is used throughout this document to specify which marker will be affected by the functions.

Key Path	Marker
Preset	Marker 1
State Saved	The number of the selected marker is saved in instrument state.
Help Map ID	3153
Instrument S/W Revision	A.01.06 or later

Normal

Sets the control mode for the selected marker to **Normal** and turns on the active function for setting its value. If the selected marker was **Off**, it is placed at the center of the screen on the trace specified by the marker’s Trace attribute.

A Normal mode (POSITION type) marker can be moved to any point on the X Axis by specifying its X Axis value. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

Example:	:CALC:MARK:MODE POS sets Marker 1 to Normal.
Dependencies/Couplings:	the marker addressed by this command becomes the selected marker on the front panel
Remote Command Notes:	See the description under the “Marker” key, above.
State Saved:	The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state.
Key Path:	Marker
Help Map ID:	3154
Instrument S/W Revision:	A.01.06 or later

Delta

Sets the control mode for the selected marker to Delta and turns on the active function for setting its delta value. If the selected marker was **Off**, it is placed at the center of the screen on the trace specified by the

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marker's Trace attribute.

In Delta mode the marker result shows the relative result between the selected (Delta) marker and its reference marker. A delta marker can be moved to any point on the X Axis by specifying its X Axis offset from a reference marker. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

Example:	:CALC:MARK:MODE DELT sets marker 1 to Delta.
Remote Command Notes:	See the description under the “ Marker” key, above.
State Saved:	The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state
Key Path:	Marker
Help Map ID:	3155
Instrument S/W Revision:	A.01.06 or later

Fixed

See [“Fixed Marker X Axis Value” on page 295](#).

See [“Fixed Marker Y Axis Value” on page 295](#).

Sets the control mode for the selected marker to Fixed. A fixed marker is fixed in the sense that it stays where you place it. It can be directly moved in both X and Y. It can be moved with a Peak Search. It can also be indirectly moved by re-zeroing the delta if it is a relative marker. If it is moved, it again becomes fixed at the X Axis point it moved to and it has a Y-axis result that it took on when it moved there. If a Normal or Delta marker is changed to Fixed it becomes fixed at the X Axis point it was at, and with the Y-axis result it had when it was set to Fixed.

In Fixed mode the marker result shows:

- If no Marker Function is on, the absolute X Axis and Y axis value of the marker
- If a Marker Function is on, the X Axis value and the Y-axis function result the marker had when it became fixed.

Fixed Marker X Axis Value

Example:	:CALC:MARK:MODE FIX sets Marker 1 to Fixed.
Dependencies/Couplings:	You cannot directly set the X or Y value of a Fixed marker which has a marker function turned on. If an attempt is made to actually adjust it while a Marker Function is on, a message is generated. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning. you cannot directly set the Y value of a Fixed marker while Normalize is turned on. If an attempt is made to do so while Normalize is on, a message is generated. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.
Remote Command Notes:	See the description under the “Marker” key, above.
State Saved:	The marker control mode (Normal, Delta, Fixed, Off) and X and Y Axis values are saved in instrument state
Key Path:	Marker, Fixed
Help Map ID:	3489
Instrument S/W Revision:	A.01.06 or later

Fixed Marker Y Axis Value

Example:	:CALC:MARK:MODE FIX sets Marker 1 to Fixed.
Dependencies/Couplings:	you cannot directly set the X or Y value of a Fixed marker which has a marker function turned on. If an attempt is made to actually adjust it while a Marker Function is on, , a message is generated. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.
Remote Command Notes:	See the description under the Marker key, above.
State Saved:	The marker control mode (Normal, Delta, Fixed, Off) and X and Y Axis values are saved in instrument state
Key Path:	Marker, Fixed
Resolution:	The settable resolution of the function is .001 dB, even when the Y Axis Unit is linear. In Linear Y Axis Unit (for example, Volts) this requires 6 significant digits to display in the AF area and on the softkey.
Default Unit:	depends on the current selected Y axis unit
Help Map ID:	3157
Instrument S/W Revision:	A.01.06 or later

Off

Turns off the selected marker and its marker function setting, if any. However, Off does not affect which marker is selected.

Example:	:CALC:MARK:MODE OFF sets Marker 1 to Off.
Remote Command Notes:	See the description under the “ Marker” key, above.
State Saved:	The marker control mode (Normal, Delta, Fixed, Off) is saved in instrument state
Key Path:	Marker
Help Map ID:	3158
Instrument S/W Revision:	A.01.06 or later

Properties

Opens a menu used to set certain properties of the selected marker.

Key Path	Marker
Help Map ID	3159
Instrument S/W Revision	A.01.06 or later

Select Marker

Duplicate of the Select Marker key under Marker. Selecting a marker here causes the same marker to be selected under Marker. (That is, there is only one "selected marker".)

For details about this key, see [“Select Marker ” on page 293](#).

Relative To

Selects the marker that the selected marker will be relative to (its reference marker).

Every marker has another marker to which it is relative. This marker is referred to as the “reference marker” for that marker. This attribute is set by the **Marker, Properties, Relative To** key. The marker must be a **Delta** marker to make this attribute relevant. If it is a **Delta** marker, the reference marker determines how the marker is controlled and how its value is displayed. A marker cannot be relative to itself.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :REFerence <integer> :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :REFerence ?
Example:	CALC:MARK1:REF 2 sets the marker 1 reference marker to 2 and turns marker 1 on as a delta marker.

Dependencies/Couplings:	The act of specifying the selected marker's reference marker makes the selected marker a Delta marker. If the reference marker is off it is turned on in Fixed mode at the delta marker location.
Remote Command Notes:	This command causes the marker specified with the subopcode to become selected. Range (for SCPI command): 1 to 12. If the range is exceeded the value is clipped.
Preset:	The preset default "Relative To" marker (reference marker) is the next higher numbered marker (current marker +1). For example, if marker 2 is selected, then it's default reference marker is marker 3. The exception is marker 12, which has a default reference of marker 1. Set to the defaults by using Restore Mode Defaults . This is not reset by Marker Off , All Markers Off , or Preset .
State Saved:	Saved in instrument state. Not affected by Marker Off and hence not affected by Preset or power cycle.
Min:	1
Max:	12
Key Path:	Marker, Properties
SCPI Status Bits/OPC Dependencies:	none Default (selected when Restore Mode Defaults is pressed): next higher numbered marker or 1 if marker 12.
Help Map ID:	3160
Instrument S/W Revision:	A.01.06 or later

X Axis Scale (formerly Readout)

Accesses a menu that enables you to affect how the X Axis information for the selected marker is displayed in the marker area (top-right of display) and the active function area of the display and how the marker is controlled. The available settings for the X Axis Scale are Frequency, Period, Time, and Inverse Time.

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X:READout FREQuency TIME ITIME PERiod :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X:READout ? :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X:READout :AUTO ON OFF 1 0 :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X:READout :AUTO?
Example:	CALC:MARK3:X:READ TIME sets the marker 3 X Axis Scale to Time.

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Remote Command Notes:	This command causes the specified marker to become selected. This command causes the specified marker to become selected.
Preset:	AUTO Marker Preset (selected when a marker is turned Off): Auto (see below). In most measurements the Auto settings results in Frequency being the preset readout.
State Saved:	Saved in instrument state
Key Path:	Marker, Properties
Help Map ID:	3161
Instrument S/W Revision:	A.01.06 or later

Auto When in Auto, the X-Axis Scale is **Frequency** if the Marker Trace is a frequency domain trace, **Time** if the Marker Trace is a time domain trace. When in Auto, if the marker changes traces, or the domain of the trace the marker is on changes, the auto result is re-evaluated. If the X Axis Scale is chosen manually, that Scale is used regardless of the domain of the trace.

Example:	CALC:MARK2:X:READ:AUTO ON sets the marker 2 X-axis scaling to automatically select the most appropriate units.
Key Path:	Marker, Properties, X Axis Scale
Help Map ID:	3066
Instrument S/W Revision:	A.01.06 or later

Frequency Sets the marker X Axis scale to Frequency, displaying the absolute frequency of a normal marker or the frequency of the delta marker relative to the reference marker. Frequency is the auto setting for frequency domain traces.

If Frequency is selected for a time domain trace, all of the points in the trace will show the same value. Attempting to use the knob or step keys to adjust the X Axis value of the marker or entering an X Axis value from the numeric keypad or remotely will have no effect but will generate no error.

Example:	CALC:MARK2:X:READ FREQ sets the marker 2 X Axis scale to Frequency.
Remote Command Notes:	see description of X Axis Scale, above
State Saved:	The X Axis Scale setting is saved in instrument state
Key Path:	Marker, Properties, X Axis Scale
Help Map ID:	3162
Instrument S/W Revision:	A.01.06 or later

Period Sets the marker X Axis scale to Period, displaying the reciprocal of the frequency of the marker, or the reciprocal of the frequency separation of the two markers in a delta-marker mode. The units are those of time (sec, msec, etc). If the markers are at the same frequency in a delta marker mode, the result will be the reciprocal of 0, which is infinitely large. The display will show “---” and a SCPI query will

return infinity.

If Period is selected for a time domain trace, all of the points in the trace will show the same value. Attempting to use the knob or step keys to adjust the X Axis value of the marker or entering an X Axis value from the numeric keypad or remotely will have no effect but will generate no error.

Example:	CALC:MARK2:X:READ PER sets the marker 2 X Axis scale to Period.
Remote Command Notes:	see description of X Axis Scale, above
State Saved:	The X Axis Scale setting is saved in instrument state
Key Path:	Marker, Properties, X Axis Scale
Help Map ID:	3163
Instrument S/W Revision:	A.01.06 or later

Time Sets the marker X Axis scale to Time, displaying the time interval between a normal marker and the start of a sweep or the time of the delta marker relative to the reference marker. Time is the auto setting for time domain traces. In a delta-marker mode it is the (sweep) time interval between the two markers.

Example:	CALC:MARK2:X:READ TIME sets the marker 2 X Axis Scale to Time..
Dependencies/Couplings:	Frequency domain traces taken in FFT mode have no valid time data. Therefore when Time is selected for markers on such traces, the X Axis value is taken as the appropriate percentage of the displayed sweep time, which is a calculated estimate.
Remote Command Notes:	see description of X Axis Scale, above
State Saved:	The X Axis Scale setting is saved in instrument state
Key Path:	Marker, Properties, X Axis Scale
Help Map ID:	3164
Instrument S/W Revision:	A.01.06 or later

Inverse Time Sets the marker X Axis scale to Inverse Time, displaying the reciprocal time. It is useful in a delta mode to show the reciprocal of (sweep) time between two markers. This function is only meaningful when on a time domain trace and in the **Delta** control mode. If the markers are at the same X Axis value, the time between them is 0, so the reciprocal of sweep time is infinitely large. The display will show “---” and a SCPI query will return infinity.

Example:	:CALC:MARK2:X:READ ITIM sets the marker 2 X Axis scale to Inverse Time.
Dependencies/Couplings:	Frequency domain traces taken in FFT mode have no valid time data. Therefore when Inverse Time is selected for markers on such traces, the X Axis value is undefined, shows as “---” and returns not a number to a query.
Remote Command Notes:	see description of X Axis Scale, above

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State Saved:	The X Axis Scale setting is saved in instrument state
Key Path:	Marker, Properties, X Axis Scale
Help Map ID:	3165
Instrument S/W Revision:	A.01.06 or later

Marker Trace

Selects the trace that you want your marker to be placed on. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even **Fixed** markers; it is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

See [“Auto Init On” on page 300](#).

See [“Auto Init Rules Flowchart” on page 301](#).

See [“Auto Init OFF” on page 301](#).

Remote Command:	<code>:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :TRACe 1 2 3 4 5 6 :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :TRACe?</code>
Example:	CALC:MARK1:TRAC 2 places marker 1 on trace 2.
Dependencies/Couplings:	The state of Marker Trace is not affected by the Auto Couple key. If a Marker Trace is chosen manually, Auto Init goes to Off for that marker. Sending the remote command causes the addressed marker to become selected.
Preset:	Presets on Preset or All Markers Off
State Saved:	The Marker Trace and state of Auto Init for each marker is saved in instrument state.
Min:	1
Max:	6
Key Path:	Marker, Properties
Help Map ID:	3166
Instrument S/W Revision:	A.01.06 or later

Auto Init On

When **Auto Init** is true, the marker's trace attribute is re-determined automatically by the analyzer whenever the marker turns on (Normal, Delta or Fixed) from an Off state. (The trace attribute is also determined for all markers that are on, whenever **Auto Init** is turned on).

When the marker moves between traces the marker's X position in trace points is retained as it moves. For moving between active traces this generally means the x-axis value of the marker will not change.

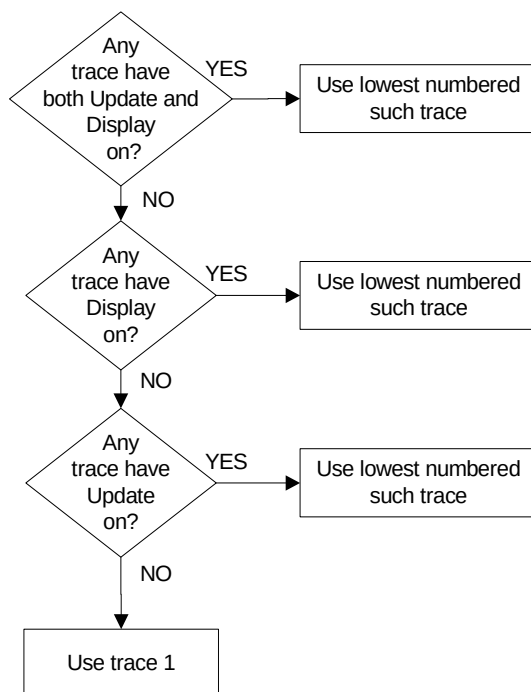
But for moving to or from an inactive trace, the x-axis value will take on that of the new trace at the bucket the marker was on the old trace (and is still on, on the new trace, since the bucket doesn't change).

Note this is true even if the marker is off screen. Thus, a marker that is at the center of the screen on the old trace stays at the center of the screen on the new trace. A marker that is off screen one whole screen to the left on the old trace remains off screen one whole screen to the left on the new trace – even if this means it will be at negative time!

Marker Trace is set to 1, and Auto Init is set to On, on a Preset or All Markers Off.

Auto Init Rules Flowchart

The following flowchart depicts the Auto Init rules:



This flowchart makes it clear that putting all lower-numbered traces in View is the simplest way to specify which trace you want the markers to go to when they turn on. For example, if you want all Markers to go to trace 2 when they turn on, put trace 1 in View.

Auto Init OFF

This command associates the marker with the specified trace and turns Marker Trace, Auto Init OFF for that marker. If the marker is not **Off** it moves the marker from the trace it was on to the new trace. If the marker is **Off** it stays off but is now associated with the specified trace.

The query returns the number of the trace on which the marker is currently placed, even if that marker is

in Auto mode.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :TRACe:AUTO OFF ON 0 1 :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :TRACe:AUTO ?
Remote Command Notes:	Turning Marker Trace Auto Init off has no effect on the trace on which the marker is currently placed. The response to the query will be 0 if OFF, 1 if ON.
Preset:	ON
Dependencies/Couplings:	The state of Auto Init is not affected by the Auto Couple key. Auto Init is set to True on a Preset or All Markers Off. If Auto Init is set to On for a marker and that marker is on, that marker's Marker Trace is immediately set according to the above flowchart. Sending the remote command causes the addressed marker to become selected.
Help Map ID:	3167
Instrument S/W Revision:	A.01.06 or later

Lines

When on, displays a vertical line of graticule height and a horizontal line of graticule width, intersecting at the indicator point of the marker (that is, the center of the X or the bottom tip of the diamond. The lines are blue in color.

If the marker is off screen the lines should be extended from the marker so that they go thru the screen area if possible. This is really useful for off screen Fixed markers as it lets you see their amplitude even though they are off the X Axis.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :LINes [:STATe] OFF ON 0 1 :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :LINes [:STATe] ?
Example:	:CALC:MARK2:LIN:ON turns Lines on for marker 2.
Dependencies/Couplings:	none Sending the remote command causes the addressed marker to become selected.
Preset:	OFF
State Saved:	Saved in State
Key Path:	Marker, Properties
Help Map ID:	3168

Instrument S/W Revision: A.01.06 or later

Marker Table

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

Example: CALC:MARK:TABL ON turns on the marker table.

Preset: OFF

State Saved: Whether the marker table is on is saved in instrument state

Key Path: **Marker**

Help Map ID: 3169

Instrument S/W Revision: A.01.06 or later

Marker Count

Accesses the marker count menu.

Key Path **Marker**

Help Map ID 3170

Instrument S/W Revision A.01.06 or later

Counter On/Off

Turns the marker frequency counter on and off. The selected marker is counted, and if the selected marker is a delta marker and its reference marker is not fixed, the reference marker is counted as well.

See [“Understanding the Marker Counter” on page 304.](#)

See [“Query Count Value” on page 306.](#)

Remote Command: :CALCulate:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:FCount[:STATE] OFF|ON|0|1
:CALCulate:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:FCount[:STATE] ?

Example: CALC:MARK2:FCO ON selects marker 2, turns it on, and turns on the counter
CALC:MARK2:FCO:X? returns the counted frequency.

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Dependencies/Couplings:	Marker Count is unavailable (grayed out and Off) if the Gate function is on. If the selected marker is Off when the counter is turned on, the selected marker is set to Normal and placed at center of screen on the trace determined by the Marker Trace rules. If a marker which is OFF is selected while the counter is on, the counter remains on, but since the marker is off, the count is undefined. In this case the analyzer will return not a number to a SCPI count query. The counter is turned OFF when the selected marker is turned OFF.
Remote Command Notes:	This command causes the specified marker to become selected.
Preset:	OFF
State Saved:	The state of the counter (on/off) is saved in instrument state. In the case of Fixed markers, the count stored in the marker is saved in instrument state.
Key Path:	Marker Fctn, Marker Count
Help Map ID:	3171
Instrument S/W Revision:	A.01.06 or later

Understanding the Marker Counter

See [“Counting Off-screen Markers”](#) on page 304.

See [“Delta Marker”](#) on page 305.

See [“Fixed Markers”](#) on page 305.

See [“More Information on "Counter"”](#) on page 305.

Using the internal counter we can count the frequency of a marker, but we cannot count while we are actually sweeping. So, once we are done with a sweep, we move to the selected marker frequency and count that frequency. Then, if the marker is a Delta marker, the count is also taken for its reference marker. The count is actually performed by moving the LO to the frequency (or frequencies in the case of a delta marker) we wish to count. The count is executed on a marker by marker basis and no further count is taken until after the next sweep (even if the marker moves before another sweep has completed).

The Marker Count is taken by tuning the instrument to the frequency of the marker and counting the IF, with the instrument not sweeping. The count is adjusted for display by adding or subtracting it (as appropriate) from the LO frequency, so that you see a count that represents the signal frequency. This is true even if External Mixing is on. Since all this happens between sweeps, you never see the instrument retuning to do the counts.

If you wish to see the entered frequency of a counted marker it will appear in the active function area when that marker is selected (for Fixed markers, you have to use the hollow point function to view or adjust the x or y marker values).

Counting Off-screen Markers

If the selected marker is off the X-axis the instrument can still be tuned to the marker (unless it is outside the range of the instrument), so the count can still be displayed. This means you can see a count for an

off-screen marker even though there may be no valid Y-value for the marker. If the marker frequency is outside the range of the instrument, the display will show three dashes in the count block (---), and not a number is returned to a SCPI count query.

Delta Marker

When a Delta Marker is selected while Marker Count is on:

If the reference marker is not a fixed marker, the display shows the difference between the count of the selected marker and the count of the reference marker

If the reference marker is a fixed marker and there is a count stored in the marker (because Marker Count was on when the marker became a fixed marker), the display shows the difference between the count at the marker and the count stored in the reference marker.

Marker Count works in zero span as well as in Swept SA. The instrument tunes to the frequency of the selected marker, which, for active zero span traces, is simply the center frequency of the analyzer.

Fixed Markers

Fixed markers have a count stored in them that is generally kept fixed and not updated. If a fixed marker is selected, or used as a reference, the signal at the marker frequency is not counted; rather the stored count is seen or used as the reference. The count is stored, if Count is on, when the marker becomes fixed or when, while fixed, the marker is moved by re-zeroing the reference (if it is the reference marker) or via a peak search (since both of these, by definition, use valid trace data). The count stored in a Fixed marker is lost if the counter is turned off, if the marker is moved to an inactive trace, or if the marker is moved by adjusting its x-value.

More Information on "Counter"

When the counter is on, the count (or the delta count) for the selected marker is displayed.

The invalid data indicator (*) will turn on until the completion of the first count.

Marker Count frequency readings are corrected using the **Freq Offset** function (in some previous analyzers, they were not). Note however that Marker Delta readings are not corrected, as any offset would be applied to both.

In zero span on active traces the counter continues to function, counting any signal near the center frequency of the analyzer.

NOTE	No signal farther from the marker frequency than the Res BW will be seen by the counter.

The above command turns on or off the frequency counter. If the specified marker number in the command is not the selected marker, it becomes the selected marker. If the specified marker number is not on, FCOunt ON sets it to Normal and places it at center of screen on the trace determined by the Marker Trace rules. Once the marker count is on, it is on for any selected marker, not just for the one used in the command. A 1 is returned to the state query only if marker count is on and the specified number is the selected marker. The invalid data indicator (*) will turn on until the completion of the first count but this does not keep a value from being returned.

Query Count Value

Queries the frequency count. The query returns the absolute count unless the specified marker is in Delta mode, then it returns the relative count. If the marker is off, or the marker is on but the counter is off, the analyzer will return not a number to a SCPI count query. A marker with no stored count, or a non-**Fixed** marker on a stored trace, will also return not a number to a SCPI count query. Note this result may simply mean that the first sweep after the counter turned on has not yet completed.

Remote Command: `:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :FCOunt :X?`

Remote Command Notes: This query does NOT cause the specified marker to become selected.

Help Map ID: 0

Instrument S/W Revision: A.01.06 or later

Gate Time Auto/Man

Controls the length of time during which the frequency counter measures the signal frequency. Longer gate times allow for greater averaging of signals whose frequency is “noisy”, though the measurement takes longer. If the gate time is an integer multiple of the length of a power-line cycle (20 ms for 50 Hz power, 16.67 ms for 60 Hz power), the counter rejects incidental modulation at the power line rate. The shortest gate time that rejects both 50 and 60 Hz modulation is 100 ms, which is the value chosen in Auto, or on Preset or when Auto Couple is pressed.

The start time of the Gate Time of the counter must be controlled by the same trigger parameters as controls the sweep. Thus, if the Trigger is not in Free Run, the counter gate must not start until after the trigger is received and delayed.

Remote Command: `:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :FCOunt :GATetime <time>`

`:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :FCOunt :GATetime?`

`CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :FCOunt :GATetime:AUTO OFF | ON | 0 | 1`

`CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :FCOunt :GATetime:AUTO?`

Example: `CALC:MARK2:FCO:GAT 1e-2` sets the gate time for Marker 2 to 10^{-2} s = 10 ms.

Remote Command Notes: This command causes the specified marker to become selected.

Preset: 100 ms

ON

State Saved: Saved in instrument state.

Min: 1 us

Max: 500 ms

Key Path: **Marker Function, Marker Count**

Help Map ID: 3173
Instrument S/W Revision: A.01.06 or later

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Fixed or Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

Note that Fixed markers do not couple. They stay where they were while all the other markers move. Of course, if a Fixed marker is being moved, all the non-fixed markers do move with it.

This may result in markers going off screen.

Remote Command: :CALCulate:MARKer:COUPle[:STATe] OFF|ON|0|1
:CALCulate:MARKer:COUPle[:STATe] ?

Example: :CALC:MARK:COUP ON sets Couple Markers on.

Preset: Off, presets on Mode Preset and All Markers Off

State Saved: Saved in State

Key Path: **Marker**

Help Map ID: 3174

Instrument S/W Revision: A.01.06 or later

All Markers Off

Turns off all markers. See Marker, [“Off ” on page 296](#).

Remote Command: :CALCulate:MARKer:AOff

Example: CALC:MARK:AOff turns off all markers.

Dependencies/Couplings: sets the selected marker to 1.

Preset: n/a.

Key Path: **Marker**

Help Map ID: 3175

Instrument S/W Revision: A.01.06 or later

Marker Fctn

The Marker Function key opens up a menu of softkeys that allow you to control the Marker Functions of the instrument. Marker Functions perform post-processing operations on marker data. Band Functions are Marker Functions that allow you to define a band of frequencies around the marker. The band defines the region of data used for the numerical calculations. These marker functions also allow you to perform mathematical calculations on trace and marker data and report the results of these calculations in place of the normal marker result.

NOTE Unlike regular markers, marker function markers are not placed directly on the trace. They are placed at a location which is relative to the result of the function calculation.

See [“More Information” on page 308](#).
See [“Fixed marker functions” on page 309](#).
See [“Interval Markers” on page 309](#).

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION NOISe BPOWer BDENsity OFF :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION?
Dependencies/Couplings:	Fixed markers: It is not possible to change the Band Function for a Fixed marker; so all of the Band Function keys are grayed out for a Fixed marker. If a marker function was already on when the marker became Fixed then the selected Band Function is shown but cannot be changed. Therefore, you cannot directly set the X or Y value of a Fixed marker which has a marker function turned on. To turn off the function, turn off the marker.
Remote Command Notes:	Sending this command selects the subopcoded marker The marker function result is queried in the same fashion as the Marker Result, as outlined in the Marker section, with the CALC:MARK:Y? command.
Preset:	OFF
State Saved:	The band function for each marker is saved in Instrument State
Help Map ID:	3180
Instrument S/W Revision:	A.01.06 or later

More Information

The units to be used for displaying Marker Function results in Delta mode vary depending on what is the reference marker and what it is referenced to.

Marker Functions are different from Measurements, which automatically perform complex sequences of setup, data acquisition, and display operations in order to measure specified signal characteristics.

Marker Functions are specified for each individual marker and may be turned on individually for each marker.

The **Marker Fctn** menu controls which marker functions are turned on and allows you to adjust setup parameters for each function. The Marker Functions are **Marker Noise**, **Band/Interval Power**, and **Band/Interval Density**, only one of which can be on for a given marker.

If the selected marker is off, pressing Marker Fctn sets it to Normal and places it at the center of the display on the trace determined by the Marker Trace rules. However, if the selected marker was **Off**, **Marker Function Off** had to be the selected function, and it remains so even after the marker is thus turned on, although you may then change it.

Fixed marker functions

In the case of a fixed marker, it is not possible to turn on or change a band function. This is because a Fixed marker holds the value it had when it became fixed; the trace it was on may keep on changing, so the function value, which depends on trace data, could not be calculated on an ongoing basis.

It is possible to have a Marker Function on for a Fixed marker, in the case where a function was already on when the marker became Fixed. In this case the function value will be retained in the marker. It is also possible to have a Marker Function on for a Fixed marker in the case when the marker was off and was turned on as **Fixed** because **Delta** was pressed to create a reference marker - in which case the marker function, marker function width, Y Axis value and marker function result that the **Delta** marker had when **Delta** was pressed are copied into the Fixed marker. If **Delta** is pressed again, causing the fixed reference marker to move to the delta marker's position, the marker function, marker function width, Y Axis value and marker function result that the **Delta** marker had when **Delta** was pressed are again copied into the fixed reference marker.

If a Marker Function is on for a Fixed marker, the marker's reported value is derived by the function. Therefore you cannot directly set the X or Y value of a Fixed marker which has a marker function turned on. Indirect setting as detailed above or when a Peak Search is performed is allowed, as the Fixed marker is always placed on a trace and can derive its function value from the trace at the moment when it is placed.

Interval Markers

What is an interval marker? The band power marker computes the total power within a span in a nonzero span. The results computation must include the RBW. The interval power marker measures the average power across some time interval in zero span.

Interval Density is defined to be Interval Power divided by Bn. Bn is the noise bandwidth of the RBW filter, as noted and used within the Band Power computation.

Select Marker

See [“Select Marker ” on page 293](#).

Marker Noise

Turns on the Marker Noise function for the selected marker, making it a noise marker. If the selected marker is off, it is turned on in **Normal** mode and located at the center of the screen.

When **Marker Noise** is selected while in the **Marker Function Off** state, the **Band Span** or **Interval**

Span is initialized to 5% of the screen width.

When **Marker Noise** is on, the marker's Y Axis Result is the average noise level, normalized to a 1 Hz noise power bandwidth, in the band specified under the **Band Adjust** key.

See [“More Information” on page 310](#).

See [“Off-trace Markers” on page 310](#).

Example:	CALC:MARK:FUNC NOIS turns on marker 1 as a noise marker. CALC:MARK:FUNC? returns the current marker function for the marker specified. In this case it returns the string: NOIS. CALC:MARK:Y? returns the y-axis value of the Marker Noise function for marker 1 (if Marker Noise is ON for marker 1). Note that the delta value when the Y axis unit is Watt is the square of the delta value when the Y axis unit is Volt. For example, when the percent ratio with Y axis unit in Volt is 0.2, the percent ratio with Y axis unit in Watt will be $0.22 = 0.04$. When you read the value out remotely you have to know whether your Y Axis Unit is log (dB), linear (V or A), or power (W).
Dependencies/Couplings:	Fixed markers: It is not possible to change the Band Function for a Fixed marker; so all of the Band Function keys are grayed out for a Fixed marker. Average detector and Power Averaging auto selected when Marker Noise on. If the selected (specified) marker is off, selecting Marker Noise via front panel or SCPI will turn the marker on.
Remote Command Notes:	See the description under the “Marker Fctn” on page 308 key, above.
Key Path:	Marker Fctn
Help Map ID:	3181
Instrument S/W Revision:	A.01.06 or later

More Information

To guarantee accurate data for noise-like signals, a correction for equivalent noise bandwidth is made by the analyzer. The **Marker Noise** function accuracy is best when the detector is set to Average or Sample, because neither of these detectors will peak-bias the noise. The trade off between sweep time and variance of the result is best when Average Type is set to Power Averaging. Therefore, Auto coupling chooses the Average detector and Power Averaging when Marker Noise is on. Though the Marker Noise function works with all settings of detector and Average Type, using the positive or negative peak detector gives less accurate measurement results.

Off-trace Markers

If a **Normal** or **Delta** noise marker is so near to the left or right edge of the trace that some of the band is off the trace, then it uses only that subset of the Band Width that is on-trace. If the marker itself is off-trace, its value becomes undefined.

Neither band/interval power nor band/interval density markers are defined if any part of the band is off-trace (unless they are Fixed with a stored function value in them), except that when the edges of the bandwidth are trivially off-screen, due to mathematical limitations in the analyzer or in the controlling

computer, the result will still be considered valid.

Band/Interval Power

Turns on the Band/Interval Power function for the selected marker. If the selected marker is off it is turned on in **Normal** marker and located at the center of the screen.

When **Band/Interval Power** is selected while in the **Marker Function Off** state, the **Band Span** or **Interval Span** is initialized to 5% of the screen width.

If the detector mode for the detector on the marker's trace is set to Auto, the average detector is selected. If the Average type is set to Auto, Power Averaging is selected. Other choices for the detector or Average type will usually cause measurement inaccuracy.

Example:	<code>CALC:MARK:FUNC BPOW</code> turns on marker 1 as a band power marker. <code>CALC:MARK2:FUNC?</code> returns the current setting of marker function for marker 2. In this case it returns the string: BPOW. <code>CALC:MARK:Y?</code> returns the y-axis value of the Band Power function for marker 1. Note that the delta value when the Y axis unit is Watt is the square of the delta value when the Y axis unit is Volt. For example, when the percent ratio with Y axis unit in Volt is 0.2, the percent ratio with Y axis unit in Watt will be $0.2^2 = 0.04$. When you read the value out remotely you have to know whether your Y Axis Unit is log (dB), linear (V or A), or power (W).
Dependencies/Couplings:	Fixed markers: It is not possible to change the Band Function for a Fixed marker; so all of the Band Function keys are grayed out for a Fixed marker. If the detector mode for the detector on the marker's trace is set to Auto, the average detector is selected. If the Average type is set to Auto, Power Averaging is selected. If the selected (specified) marker is off, selecting Band Power via front panel or SCPI will turn the marker on.
Remote Command Notes:	See the description under the “Marker Fctn” on page 308 key, above.
Key Path:	Marker Fctn
Help Map ID:	3182
Instrument S/W Revision:	A.01.06 or later

Band/Interval Density

Turns on the Band/Interval Density function for the selected marker. If the selected marker is off it is turned on in **Normal** marker mode and located at the center of the screen.

When **Band/Interval Density** is selected while in the **Marker Function Off** state, the **Band Span** or **Interval Span** is initialized to 5% of the screen width.

See [“More Information” on page 312](#).

See [“What is band/interval density?” on page 312](#)

Example:	CALC:MARK:FUNC BDEN turns on marker 1 as a band density marker. CALC:MARK:FUNC? returns the current setting of band function for the marker specified. In this case it returns the string: BDEN. CALC:MARK:Y? returns the y-axis value of the Band Density function for marker 1. Note that the delta value when the Y axis unit is Watt is the square of the delta value when the Y axis unit is Volt. For example, when the percent ratio with Y axis unit in Volt is 0.2, the percent ratio with Y axis unit in Watt will be $0.22 = 0.04$. When you read the value out remotely you have to know whether your Y Axis Unit is log (dB), linear (V or A), or power (W).
Dependencies/Couplings:	Fixed markers: It is not possible to change the Band Function for a Fixed marker; so all of the Band Function keys are grayed out for a Fixed marker. If the detector mode for the detector on the marker's trace is set to Auto, the average detector is selected. If the Average type is set to Auto, Power Averaging is selected. If the selected (specified) marker is off, selecting Band Density via front panel or SCPI will turn the marker on.
Remote Command Notes:	See the description under the “Marker Fctn” on page 308 key, above.
State Saved:	n/a.
Key Path:	Marker Fctn
Help Map ID:	3183
Instrument S/W Revision:	A.01.06 or later

More Information

It may seem like the band density marker function is exactly like a function of a noise marker with variable width. But they are somewhat different. The Noise markers assume that the signal to be measured is noise-like. Based on this assumption, we can actually make reasonable measurements under very nonideal conditions: any detector may be used, any averaging type, any VBW. In contrast, the Band Power and Band Density markers make no assumption about the statistics of the signal.

If the detector mode for the detector on the marker's trace is set to Auto, the average detector is selected. If the Average type is set to Auto, Power Averaging is selected. Other choices for the detector or Average type will usually cause measurement inaccuracy.

What is band/interval density?

On frequency domain traces, the average density across a band is the total band power divided by the bandwidth over which it is measured.

On time domain traces, interval density is the average power in the interval divided by the noise bandwidth of the RBW of the trace.

Off

Turns off band functions for the selected marker.

Example:	:CALC:MARK:FUNC OFF turns off marker functions for marker 1
Dependencies/Couplings:	Fixed markers: It is not possible to change the Band Function for a Fixed marker; so all of the Band Function keys are grayed out for a Fixed marker, including Off Turning off the marker function has no effect on the band span nor does it turn the marker off.
Remote Command Notes:	See the description under the Marker key, above.
Key Path:	Marker, Marker Fctn
Help Map ID:	3184
Instrument S/W Revision:	A.01.06 or later

Band Adjust

Opens a menu that lets you set the width or left or right edges of the band.

It is legal to change the width of the band even if there is no marker function on. Generally this can only happen by sending the SCPI command since access to the menu is restricted if no marker function is on.

Dependencies/Couplings:	If the marker is Fixed, Band Adjust is grayed out. If the marker function is Off, Band Adjust is grayed out. If any of the Band Adjust functions are the active function, the wings and arms of the selected marker display in green; otherwise they display in white.
Key Path:	Marker Function
Help Map ID:	3185
Instrument S/W Revision:	A.01.06 or later

Band/Interval Span

Sets the width of the span for the selected marker.

It is legal to change the width of the band even if there is no marker function on. Generally this can only happen by sending the SCPI command since access to the menu is restricted if no marker function is on.

In the table below, $\text{sweep\_width} = \max(1, \text{sweep\_points} - 1)$ and sweep_points is the number of sweep points, set in the **Sweep** menu.

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FUNCTION: BAND:SPAN <freq> :CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :FUNCTION: BAND:SPAN?

Example:	:CALC:MARK12:FUNC:BAND:SPAN 20 MHz sets the band span of marker 12 to 20 MHz :CALC:MARK:FUNC:BAND:SPAN? queries the band span of Marker 1
Dependencies/Couplings:	Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values Band/Interval Span is set to 0 when the marker is turned off Band/Interval Span is set to 5% of span when any marker function is turned on if and only if it is zero at that time
Remote Command Notes:	Sending this command selects the subopcoded marker The unit of the parameter must match the current domain of the trace the selected marker is on, or an invalid suffix error will be generated. If no unit is sent the fundamental unit for the trace domain will be used (Hz for freq domain traces, s for time domain traces). Note that all the values provided in this table are only valid for frequency domain traces. If the current domain of the trace is time domain, values and unit will be different. In frequency domain, the Preset value is dependant on the frequency range of the instrument. The default value 1.3245 GHz is appropriate only if the instrument is a 26.5 GHz instrument (Option 526). In a 26.5 GHz Instrument, the default span is 26.49 GHz, so 5% of the span corresponds to 1.3245 GHz.
Preset:	If 0, set to 5% of span, when a marker function is turned on
State Saved:	Saved in Instrument State
Min:	0 Hz
Max:	Infinity
Key Path:	Marker Fctn, Band Adjust
Help Map ID:	3186
Instrument S/W Revision:	A.01.06 or later

Band/Interval Left

Sets the left edge frequency or time for the band of the selected marker. The right edge is unaffected.

It is legal to change the width of the band even if there is no marker function on. Generally this can only happen by sending the SCPI command since access to the menu is restricted if no marker function is on.

In the table below, $\text{sweep\_width} = \max(1, \text{sweep\_points} - 1)$ and sweep_points is the number of sweep points, set in the **Sweep** menu.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FUNCTION: BAND:LEFT <freq> :CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :FUNCTION: BAND:LEFT?

Example:	:CALC:MARK12:FUNC:BAND:LEFT 20 GHz sets the left edge of the band span of marker 12 to 20 GHz :CALC:MARK:FUNC:BAND:LEFT? queries the band span of Marker 1
Dependencies/Couplings:	Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Center values Band/Interval Span is set to 0 when the marker is turned off so that means Band/Interval Left is set to the center value at this time Band/Interval Span is set to 5% of span when any marker function is turned on if and only if it is zero at that time
Remote Command Notes:	Sending this command selects the subopcoded marker The unit of the parameter must match the current domain of the trace the selected marker is on, or an invalid suffix error will be generated. If no unit is sent the fundamental unit for the trace domain will be used (Hz for freq domain traces, s for time domain traces). Note that all the values provided in this table are only valid for frequency domain traces. If the current domain of the trace is time domain, values and unit will be different. In frequency domain, the Preset value is dependant on the frequency range of the instrument. The default value 1.3245 GHz is appropriate only if the instrument is a 26.5 GHz instrument (Option 526). In a 26.5 GHz Instrument, the default span is 26.49 GHz, so 5% of the span corresponds to 1.3245 GHz.
Preset:	If 0, Band/Interval Span is set to 5% of span, when a marker function is turned on, which affects Band/Interval Left
State Saved:	Saved in Instrument State
Min:	0 Hz
Max:	Infinity
Key Path:	Marker Fctn, Band Adjust
Help Map ID:	3188
Instrument S/W Revision:	A.01.06 or later

Band/Interval Right

Sets the right edge frequency or time for the band of the selected marker. The left edge is unaffected

In the table below, $\text{sweep\_width} = \max(1, \text{sweep\_points} - 1)$ and sweep_points is the number of sweep points, set in the **Sweep** menu.

It is legal to change the width of the band even if there is no marker function on. Generally this can only

happen by sending the SCPI command since access to the menu is restricted if no marker function is on.

Remote Command:	<pre>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION: BAND:RIGHT <freq></pre> <pre>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION: BAND:RIGHT?</pre>
Example:	<pre>:CALC:MARK12:FUNC:BAND:RIGHT 20 GHz</pre> sets the right edge of the band span of marker 12 to 20 GHz <pre>:CALC:MARK:FUNC:BAND:RIGHT?</pre> queries the band span of Marker 1
Dependencies/Couplings:	Changing the Band/Interval Right necessarily changes the Band/Interval Span and Band/Interval Center values Band/Interval Span is set to 5% of span when any marker function is turned on if and only if it is zero at that time
Remote Command Notes:	Sending this command selects the subopcoded marker The unit of the parameter must match the current domain of the trace the selected marker is on, or an invalid suffix error will be generated. If no unit is sent the fundamental unit for the trace domain will be used (Hz for freq domain traces, s for time domain traces). Note that all the values provided in this table are only valid for frequency domain traces. If the current domain of the trace is time domain, values and unit will be different. In frequency domain, the Preset value is dependant on the frequency range of the instrument. The default value 1.3245 GHz is appropriate only if the instrument is a 26.5 GHz instrument (Option 526). In a 26.5 GHz Instrument, the default span is 26.49 GHz, so 5% of the span corresponds to 1.3245 GHz.
Preset:	If 0, Band/Interval Span is set to 5% of span, when a marker function is turned on, which affects Band/Interval Right
State Saved:	Saved in Instrument State
Min:	0 Hz
Max:	Infinity
Key Path:	Marker Fctn, Band Adjust
Help Map ID:	3190
Instrument S/W Revision:	A.01.06 or later

Marker To

The Marker -> key accesses menu keys that can copy the current marker value into other instrument parameters (for example, Center Freq). The currently selected marker is made the active function on entry to this menu (if the currently selected marker is not on when you press this front panel key, it will be turned on at the center of the screen as a normal type marker and then made the active function).

The **Marker ->** (or Marker To) feature is used to quickly assign a marker's x- or y-axis value to another parameter. For example, if a marker's x-axis value is 500 MHz and y-axis value is -20 dBm, pressing **Mkr -> CF** would assign 500 MHz to **Center Freq** and pressing **Mkr ->Ref Lvl** would assign -20 dBm to **Ref Level**.

Help Map ID	3192
Instrument S/W Revision	A.01.06 or later

Mkr->CF

Sets the center frequency of the analyzer to the frequency of the selected marker. The marker stays at this frequency, so it moves to the center of the display. In delta marker mode, this function sets the center frequency to the x-axis value of the delta marker. When the frequency scale is in log mode, the center frequency is not at the center of the display.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 [:SET] :CENTer
Example:	CALC:MARK2:CENT sets the CF of the analyzer to the value of marker 2.
Dependencies/Couplings:	This function is not available (key is grayed out) when x-axis is the time domain All the usual couplings associated with setting Center Frequency apply (see the Frequency Section).
Remote Command Notes:	Sending this command selects the subopcoded marker If specified marker is off, this command will turn it on at the center of the screen as a normal type marker.
Key Path:	Marker ->
Help Map ID:	3193
Instrument S/W Revision:	A.01.06 or later

Mkr->CF Step

Sets the center frequency (CF) step size of the analyzer to the marker frequency, or in a delta-marker mode, to the frequency difference between the delta and reference markers.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:SET] :STEP
Example:	CALC:MARK1:STEP sets the CF step to the value (or delta value) of marker 1.
Dependencies/Couplings:	This function is not available (key is grayed out) when x-axis is the time domain All the usual couplings associated with setting CF Step apply (see the Frequency Section).
Remote Command Notes:	Sending this command selects the subopcoded marker If specified marker is off, this command will turn it on at the center of the screen as a normal type marker.
Key Path:	Marker ->
Help Map ID:	3194
Instrument S/W Revision:	A.01.06 or later

Mkr->Start

Changes the start frequency to the frequency of the selected marker. The marker stays at this frequency, so it moves to the left edge of the display. In delta marker mode, this function sets the start frequency to the x-axis value of the delta marker.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:SET] :START
Example:	CALC:MARK1:STAR sets the start frequency to the value (or delta value) of marker 1.
Dependencies/Couplings:	This function is not available (key is grayed out) when x-axis is the time domain All the usual couplings associated with setting Start Frequency apply (see the Frequency Section).
Remote Command Notes:	Sending this command selects the subopcoded marker If specified marker is off, this command will turn it on at the center of the screen as a normal type marker.
Key Path:	Marker ->
Help Map ID:	3195
Instrument S/W Revision:	A.01.06 or later

Mkr->Stop

Changes the stop frequency to the frequency of the selected marker. The marker stays at this frequency, so it moves to the right edge of the display. In delta marker mode, this function sets the stop frequency to the x-axis value of the delta marker.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:SET] :STOP
Example:	CALC:MARK3:STOP sets the stop frequency to the value (or delta value) of marker 3.
Dependencies/Couplings:	This function is not available (key is grayed out) when x-axis is the time domain All the usual couplings associated with setting Stop Frequency apply (see the Frequency Section).
Remote Command Notes:	Sending this command selects the subopcoded marker If specified marker is off, this command will turn it on at the center of the screen as a normal type marker.
Key Path:	Marker ->
Help Map ID:	3196
Instrument S/W Revision:	A.01.06 or later

MkrΔ->Span

Sets the start and stop frequencies to the values of the delta markers. That is, it moves the lower of the two marker frequencies to the start frequency and the higher of the two marker frequencies to the stop frequency. The marker mode is unchanged and the two markers (delta and reference) end up on opposite edges of the display.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 [:SET] :DEL Ta:SPAN
Example:	CALC:MARK2:DELT:SPAN sets the start and stop frequencies to the values of marker 2 and its reference marker.
Dependencies/Couplings:	This function is only available when the selected marker is a delta marker. Otherwise the key is grayed out. In addition, this function is not available when x-axis is the time domain All the usual couplings associated with setting Span apply (see the Section “Span” on page 368).
Remote Command Notes:	Sending this command selects the subopcoded marker
Key Path:	Marker ->

Help Map ID: 3197
Instrument S/W Revision: A.01.06 or later

MkrΔ->CF

Sets the center frequency to the frequency difference between the selected marker and its reference marker. The marker is then changed to a Normal marker and placed at the center of span.

Remote Command: :CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 [:SET] :DEL
Ta:CENTer

Example: CALC:MARK2:CENT sets the CF of the analyzer to the value of marker 2.

Dependencies/Couplings: This function is only available when the selected marker is a delta marker. Otherwise the key is grayed out.
In addition, this function is not available when x-axis is the time domain

Remote Command Notes: Sending this command selects the subopcoded marker

Key Path: **Marker ->**

Help Map ID: 3198
Instrument S/W Revision: A.01.06 or later

Mkr->Ref Lvl

Sets the reference level to the amplitude value of the selected marker, moving the marked point to the reference level (top line of the graticule). The marker's mode (Normal, Delta, Fixed) doesn't matter in this case. For example, given a delta marker, if the delta marker is the selected marker, its amplitude is applied to the reference level. If the reference marker is selected, its amplitude is applied to the reference level.

If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the screen as a normal type marker, and its amplitude applied to the reference level.

Remote Command: :CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 [:SET] :RLE
Vel

Example: CALC:MARK2:RLEV sets the reference level of the analyzer to the amplitude of marker 2.

Dependencies/Couplings: All the usual couplings associated with setting Reference Level apply (see the Section [“AMPTD Y Scale” on page 266](#)).

Remote Command Notes: Sending this command selects the subopcoded marker
If specified marker is off, this command will turn it on at the center of the screen as a normal type marker.

Key Path: **Marker ->**

Help Map ID: 3199

Instrument S/W Revision: A.01.06 or later

Meas

Operation of this key is identical across several measurements. For details about this key, see [“Meas” on page 947](#).

Meas Setup

The Meas Setup key opens up a menu of softkeys that allow you to control the most important parameters for the current measurement.

NOTE	In the Meas Setup menu you may configure Averaging, by setting the Average Number and the Average Type.

Key Path	Front-panel key
Help Map ID	3202
Instrument S/W Revision	A.01.06 or later

Average/Hold Number

Sets the terminal count number N for **Average**, **Max Hold** and **Min Hold** trace types. This number is an integral part of how the average trace is calculated. Basically, increasing N results in a smoother average trace.

See [“More Information” on page 324](#).

See [“AVER:CLE command” on page 324](#).

Remote Command:	<code>[:SENSe] :AVERage:COUNT <integer></code> <code>[:SENSe] :AVERage:COUNT?</code>
Dependencies/Couplings:	The table in the Section “Sweep/Control” shows how changing the Average/Hold Number (and the Single/Cont setting) affects the state of the Average , Max Hold and Min Hold functions. Remember that restarting any of these functions restarts all of them, as there is only one count.
Preset:	100
State Saved:	Saved in Instrument State
Min:	1
Max:	10000
Key Path:	Meas Setup
SCPI Status Bits/OPC Dependencies:	See the Section ““Sweep/Control” on page 378 ” for a discussion of the Sweeping, Measuring, Settling and OPC bits, and the Hi Sweep line. All are affected when a sequence is reset.
Help Map ID:	3203
Instrument S/W Revision:	A.01.06 or later

More Information

When in **Single**, the sweep stops when N is reached. If you want to add one more Average, or one more trace to Max Hold or Min Hold, simply press the Up key while Average/Hold Number is the active function.

In **Cont** (continuous), averaging and holding continues even after N is reached. Therefore, using doing trace holding in **Cont**, the value of N is irrelevant. But for averaging, each new sweep is exponentially averaged in with a weighting equal to N.

For details of how the average trace is calculated and how this depends on the **Average/Hold Number**, see [“Average Type” on page 324](#), below. For details on how the various control functions in the instrument start and restart averaging, see [“Sweep/Control” on page 378](#).

The Average/Hold Number is not affected by Auto Couple.

AVER:CLE command

The AVER:CLE command (below) resets the average/hold count and does an INIT:IMM, which begins another set of sweeps when trigger conditions are satisfied. It only does this if an active trace is in Average or Hold type.

Remote Command:	[:SENSe] :AVERage:CLEar
Example:	AVER:COUN 100 AVER:CLE sets the current count (k and K) to 1 and restarts the averaging process.
Remote Command Notes:	When the instrument receives this command it performs an INIT:IMM, if and only if there is an active trace in Max Hold, Min Hold, or Average type.
Default Unit:	Enter
Help Map ID:	3204
Instrument S/W Revision:	A.01.06 or later

Average Type

Lets you choose one of the following averaging scales: log-power (video), power (RMS), or voltage averaging. Also lets you choose Auto Average Type (default).

See [“More Information” on page 325](#).

Remote Command:	[:SENSe] :AVERage:TYPE:AUTO OFF ON 0 1 [:SENSe] :AVERage:TYPE:AUTO?
Preset:	ON
State Saved:	Saved in Instrument State
Key Path:	Meas Setup
Help Map ID:	3205

Instrument S/W Revision:	A.01.06 or later
Remote Command:	[:SENSe] :AVERAge:TYPE RMS LOG SCALar [:SENSe] :AVERAge:TYPE?
Remote Command Notes:	Parameters map to avg types as: RMS = Pwr (RMS) Avg LOG = Log-Pwr (Video) Avg SCALar = Voltage Avg
Preset:	LOG
Help Map ID:	3206
Instrument S/W Revision:	A.01.06 or later

More Information

When you select log-power averaging, the measurement results are the average of the signal level in logarithmic units (decibels). When you select power average (RMS), all measured results are converted into power units before averaging and filtering operations, and converted back to decibels for displaying. Remember: there can be significant differences between the average of the log of power and the log of the average power.

These are the averaging processes within a spectrum analyzer and all of them are affected by this setting:

Trace averaging (see Section “[Trace/Detector](#)” on page 389) averages signal amplitudes on a trace-to-trace basis. The average type applies to all traces in Trace Average (it is not set on a trace-by-trace basis).

Average detector (see Section “[Trace/Detector](#)” on page 389) averages signal amplitudes during the time or frequency interval represented by a particular measurement point.

Noise Marker (see Section “[Marker Fctn](#)” on page 308) averages signal amplitudes across measurement points to reduce variations for noisy signals.

VBW filtering (see Section “[BW](#)” on page 274) adds video filtering which is a form of averaging of the video signal.

When **Auto** is selected, the analyzer chooses the type of averaging (see below). When one of the average types is selected manually, the analyzer uses that type regardless of other analyzer settings, and shows Man on the **Average Type** softkey.

Auto

Chooses the optimum type of averaging for the current instrument measurement settings.

Example:	AVER:TYPE:AUTO ON
Dependencies/Couplings:	See flowchart below.
Remote Command Notes:	See Average Type , above

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State Saved:	Saved in Instrument State
Key Path:	Meas setup, Average Type
Help Map ID:	3207
Instrument S/W Revision:	A.01.06 or later

Here are the auto-select rules for **Average Type**:

: **Auto** selects **Power (RMS)** Averaging if a **Marker Function (Marker Noise, Band/Intvl Power)** is on, or **Detector** is set to **Man** and **Average**; otherwise if **Amplitude, Scale Type** is set to **Lin** it selects **Voltage** Averaging; otherwise, **Auto** selects **Log-Power** Average.

Note that these rules are only applied to active traces. For example, the test “Any Marker Function on?” should be read “Any Marker Function on for any active trace?” Traces which are not updating do not impact the auto-selection of Average Type.

Log-Pwr Avg (Video)

Selects the logarithmic (decibel) scale for all filtering and averaging processes. This scale is sometimes called “Video” because it is the most common display and analysis scale for the video signal within a spectrum analyzer. This scale is excellent for finding CW signals near noise, but its response to noise-like signals is 2.506 dB lower than the average power of those noise signals. This is compensated for in the Marker Noise function.

The equation for trace averaging on the log-pwr scale is shown below, where K is the number of averages accumulated. (In continuous sweep mode, once K has reached the Average Number, K stays at that value, providing a continuous running average.)

$$\text{New avg} = ((K-1)\text{Old avg} + \text{New data})/K$$

Assumes all values in decibel scale.

Remote Command Notes:	See ““Average Type” on page 324”, above
Example:	AVER:TYPE LOG
Dependencies/Couplings:	See ““Auto” on page 325”, above
Key Path:	Meas setup, Average Type
Help Map ID:	3208
Instrument S/W Revision:	A.01.06 or later

Pwr Avg (RMS)

In this average type, all filtering and averaging processes work on the power (the square of the magnitude) of the signal, instead of its log or envelope voltage. This scale is best for measuring the true time average power of complex signals. This scale is sometimes called RMS because the resulting voltage is proportional to the square root of the mean of the square of the voltage.

In the equation for averaging on this scale (below), K is the number of averages accumulated. (In continuous sweep mode, once K has reached the Average Number, K stays at that value, providing a running average.)

$$\text{New avg} = 10 \log \left(\left(\frac{1}{K} \right) \left((K-1)(10 \text{Old avg}/10) + 10 \text{New data}/10 \right) \right)$$

Equation assumes all values are in the decibel scale.

Example:	AVER:TYPE RMS
Dependencies/Couplings:	See “Auto” on page 325 , above
Remote Command Notes:	See “Average Type” on page 324 , above
Key Path:	Meas setup, Average Type
Help Map ID:	3209
Instrument S/W Revision:	A.01.06 or later

Voltage Avg

In this Average type, all filtering and averaging processes work on the voltage of the envelope of the signal. This scale is good for observing rise and fall behavior of AM or pulse-modulated signals such as radar and TDMA transmitters, but its response to noise-like signals is 1.049 dB lower than the average power of those noise signals. This is compensated for in the **Marker Noise** function.

In the equation for averaging on this scale (below), K is the number of averages accumulated. (In continuous sweep mode, once K has reached the Average Number, K stays at that value.)

$$\text{New avg} = 20 \log \left(\left(\frac{1}{K} \right) \left((K-1)(10 \text{Old avg}/20) + 10 \text{New data}/20 \right) \right)$$

Equation assumes all values are in the decibel scale.

Example:	AVER:TYPE SCAL
Dependencies/Couplings:	See “Auto” on page 325 , above.
Remote Command Notes:	See “Average Type” on page 324 , above
Key Path:	Meas setup, Average Type
Help Map ID:	3210
Instrument S/W Revision:	A.01.06 or later

N dB Points

Turns N dB points on and off and allows you to set the N dB value. N dB uses the selected marker. If the selected marker is not on when N dB is turned on, the selected marker turns on, as a Normal marker, at center screen, and is used by N dB.

See [“N dB Points Results Query” on page 328](#).

See More Information.

Remote Command:	:CALCulate:BWIDth BANDwidth:NDB <rel_ampl> :CALCulate:BWIDth BANDwidth:NDB? :CALCulate:BWIDth BANDwidth[:STATe] OFF ON 0 1 :CALCulate:BWIDth BANDwidth[:STATe]?
Preset:	Off, 3.01 dB OFF
Preset:	Off, 3.01 dB OFF
State Saved:	The on/off status and the offset value are both saved in instrument state.
Min:	-140 dB
Max:	-0.01 dB
Key Path:	Meas Setup
Help Map ID:	3211
Instrument S/W Revision:	A.01.06 or later

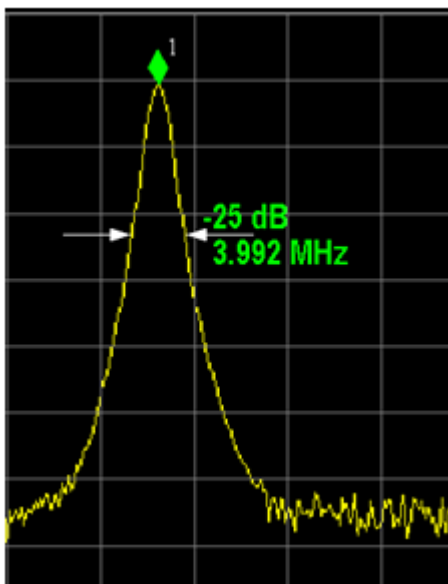
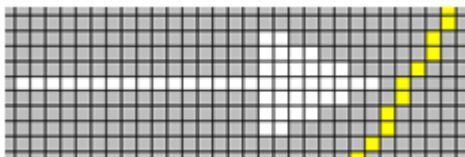
N dB Points Results Query

Remote Command:	:CALCulate:BWIDth BANDwidth:RESult?
Example:	:CALC:MARK:AOff set selected marker to 1 :CALC:MARK:MAX put marker 1 on peak :CALC:BWID ON turn on N dB for the selected marker (1) :CALC:BWID:NDB-3.01 set the offset to -3.01 dB :CALC:BWID:RES? Query the result
Remote Command Notes:	-100 returned if invalid reading
Help Map ID:	3212
Instrument S/W Revision:	A.01.06 or later

More Information

A marker should be placed on the peak of interest before turning on N dB points. The N dB points function looks for the two points on the marker's trace closest to the marker's X Axis value that are N dB below the marker's amplitude, one above and the other below the marker's X Axis value. (That is, one point is to the right and one is to the left of the selected marker.) The selected N dB value is called the offset. The function reports the frequency difference (for frequency domain traces) or time difference (for time domain traces) between those two points.

Each point is identified by a horizontal arrow pointing towards the marker, next to the trace. The arrows used by the N dB Points function will be as shown in the figure below (where each square represents one pixel). They point in, horizontally, at the trace below a peak, on either side of its skirts. There is one pixel between the arrow and the trace



N dB Points can be used to measure the bandwidth of a signal; it is commonly used in conjunction with a tracking generator to measure filter bandwidths.

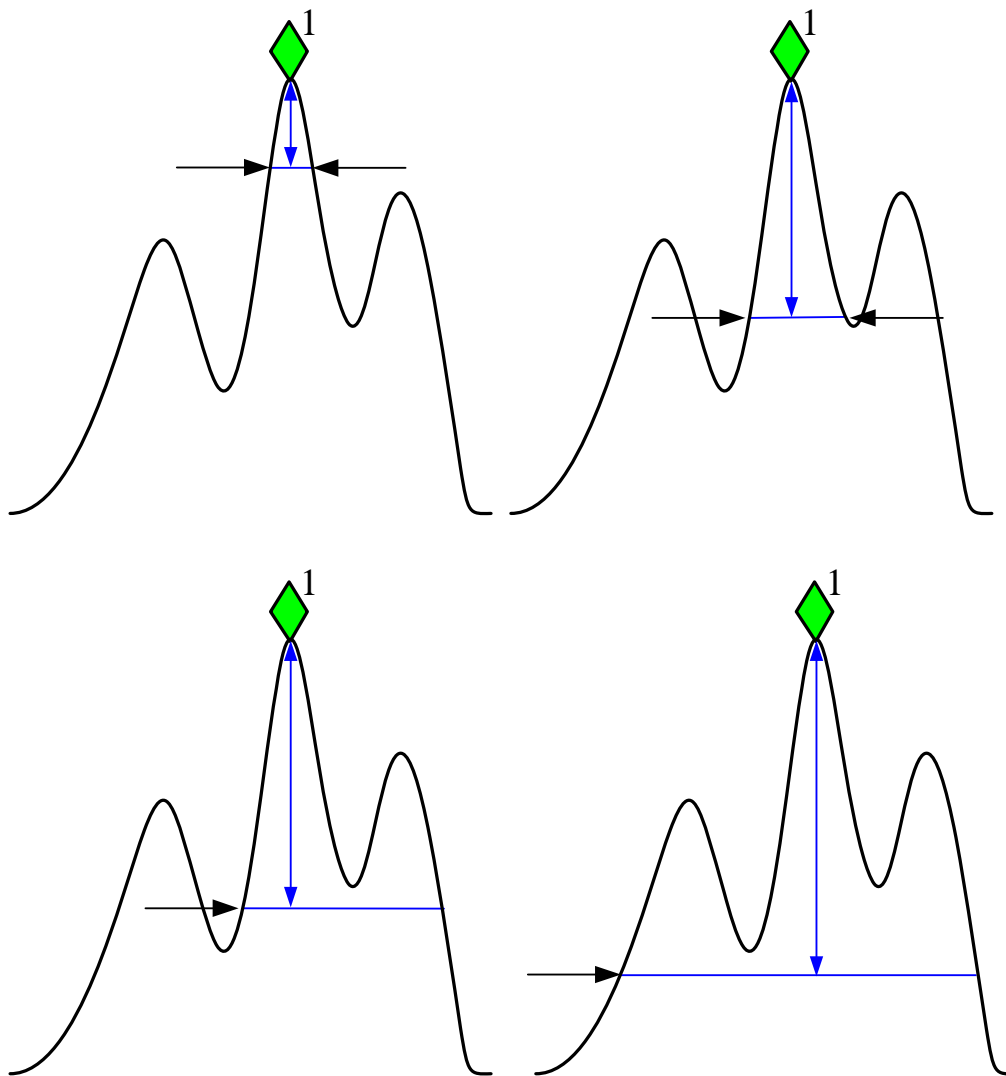
In one of the common use cases, the marker is placed on a peak, and the arrows are displayed N dB down the skirt from the marker on either side of the peak. The N dB value and the frequency difference between the two arrows is displayed around the arrow as shown in the figure above. Normally this displays on the right hand arrow, but if this would place any part of the text offscreen to the right then it displays on the left arrow.

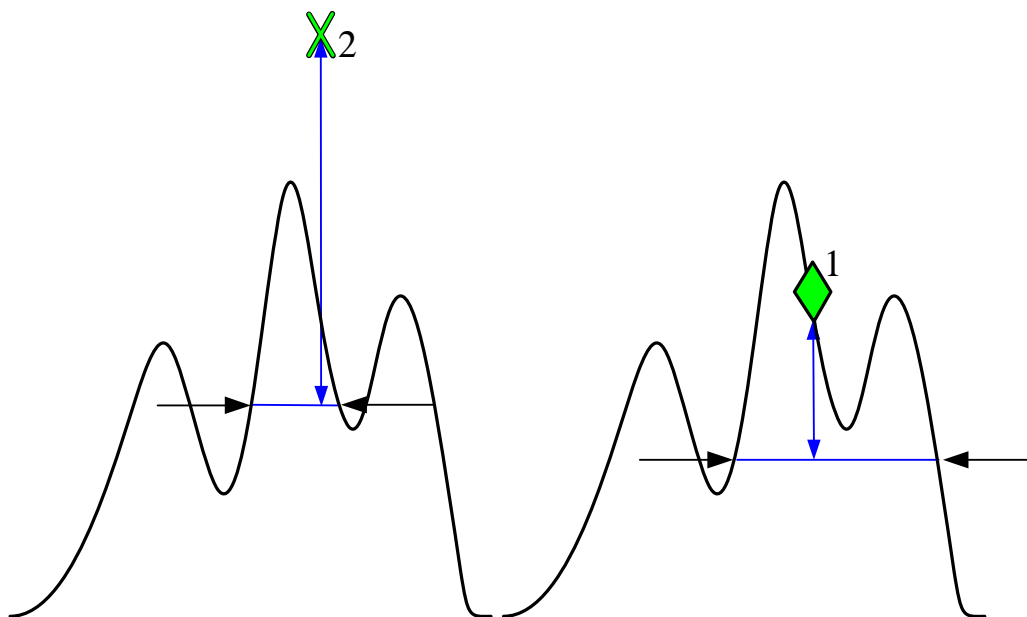
If the analyzer is unable to find data that is N dB below the marker on either side of the marker, the arrows are displayed at the indicator point of the marker, no value (---) will be displayed as the result and -100 Hz returned remotely (see figure below):



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Some sample N dB scenarios are shown below, to illustrate how the function works in various cases. In each case, the two-headed blue arrow represents N dB of amplitude.





PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

Remote Command: `[ :SENSe ] :FREQuency:SYNTHeSis:AUTO[:STATe] OFF|ON|0|1`
`[ :SENSe ] :FREQuency:SYNTHeSis:AUTO[:STATe] ?`

Preset: ON

State Saved: Saved in instrument state Preset: Auto

Key Path: **Meas Setup**

Help Map ID: 3213

Instrument S/W Revision: A.01.06 or later

Remote Command: `[ :SENSe ] :FREQuency:SYNTHeSis[:STATe] 1|2`
`[ :SENSe ] :FREQuency:SYNTHeSis[:STATe] ?`

Example: `FREQ:SYNT:AUTO OFF` turns off Auto and goes to Manual in whatever setting is current

`FREQ:SYNT 2` selects optimization for best phase noise above 30 kHz offsets.

Remote Command Notes: Parameter key:

1 - optimizes phase noise for frequencies offset <20 kHz from the carrier.

2 - optimizes phase noise for frequencies offset >30 kHz from the carrier.

(In units that do not contain option 3, option 3 will be mapped to option 1, because option 1 is faster than option 2)

Preset:	Because this function is in Auto after preset, and because Span after preset > 314.16 kHz (see Auto rules, next section) the state of this function after Preset will be 2 (until the Auto rules change)
Help Map ID:	3214
Instrument S/W Revision:	A.01.06 or later

Auto

Selects the LO phase noise behavior to optimize dynamic range for various instrument operating conditions.

Auto will choose:

Fast Tuning whenever Span > 12.34 MHz or RBW > 250 kHz

otherwise, if center frequency is < 25 kHz OR ALL of the following are true:

CF >= 1 MHz AND Span <= 141.4 kHz AND RBW <= 5 kHz

then **Best Phase Noise at Offset < 20 kHz**;

otherwise, **Best Phase Noise at Offset > 30 kHz**.

These rules apply whether in swept spans, zero span, or FFT spans.

Example:	FREQ:SYNT:AUTO ON
State Saved:	Saved in instrument state
Key Path:	Meas Setup, PhNoise Opt
Help Map ID:	3215
Instrument S/W Revision:	A.01.06 or later

Best Phase Noise at Offset < 20 kHz

The LO phase noise is optimized for offsets less than 20 kHz from the carrier, at the expense of phase noise beyond 30 kHz offset.

Example:	FREQ:SYNT 1
Key Path:	Meas Setup, PhNoise Opt
Help Map ID:	3216
Instrument S/W Revision:	A.01.06 or later

Best Phase Noise at Offset > 30 kHz

The LO phase noise is optimized for offsets greater than 30 kHz from the carrier, especially those from 70 kHz to 300 kHz. Closer offsets are compromised and the throughput of measurements (especially

remote measurements where the center frequency is changing rapidly), is reduced.

Example: `FREQ:SYNT 2`
 Key Path: **Meas Setup, PhNoise Opt**
 Help Map ID: 3217
 Instrument S/W Revision: A.01.06 or later

Fast Tuning

In this mode, the LO behavior compromises phase noise at all offsets from the carrier above a certain offset in order to allow rapid measurement throughput when changing the center frequency or span.

Example: `FREQ:SYNT 3`
 State Saved: Saved in instrument state
 Key Path: **Meas Setup, PhNoise Opt**
 Help Map ID: 3218
 Instrument S/W Revision: A.01.06 or later

ADC Dither

Access the menu to set ADC Dither to On, Off, or Auto. The dither function enhances linearity for low level signals at the expense of reduced clipping-to-noise ratio. The reduced clipping-to-noise ratio results in higher noise, because we work to ensure that the clipping level of the ADC relative to the front terminals remains unchanged with the introduction of dither. The enhanced linearity is mostly improved scale fidelity.

With dither on, the third-order distortions are usually invisible for mixer levels below -35 dBm. With dither off, these distortions can be visible, with typical power levels of -110 dBm referred to the mixer. Detection nonlinearity can reach 1 dB for dither off at mixer levels around -70 dBm and lower, while the specified nonlinearity is many times smaller with dither on.

Remote Command: `[ :SENSe] :ADC:DITHer [:STATe] OFF|ON`
 `[ :SENSe] :ADC:DITHer [:STATe] ?`
 Preset: AUTO
 Key Path: **Meas Setup**
 Help Map ID: 3219
 Instrument S/W Revision: A.01.06 or later

Auto

Remote Command: [:SENSe]:ADC:DITHer:AUTO[:STATe] OFF|ON|0|1
[:SENSe]:ADC:DITHer:AUTO[:STATe] ?

Example: ADC:DITH:AUTO ON

Turns the ADC dither to automatic. It then chooses on or off according to which is most likely to be the best selection, based on the rules below.

Preset: ON

State Saved: Saved in instrument state

Key Path: Meas Setup, ADC Dither

Help Map ID: 3220

Instrument S/W Revision: A.01.06 or later

On (Best Log Accy)

When ADC Dither is On, the linearity of low-level signals is improved. The ADC dynamic range is reduced to make room for the dither. As a result, the noise floor of the analyzer is somewhat compromised. So making measurements with ADC dither on gives you better amplitude linearity, but turning ADC dither off gives you a lower noise floor (better sensitivity).

Dithering is accomplished with a dither signal that interferes with spectrum analysis in the wideband FFT path. The wideband FFT path is only used when the Sweep Type is FFT and the FFT width is greater than 8 MHz, and even in this case, narrow RBWs will cause the analysis path to go back to the narrowband path.

The linearity improvements of dither are most significant for RBWs of 3.9 kHz and less in swept mode, and FFT widths of 4 kHz and less in FFT mode. Without dither, the non-linearities of the measured amplitude of low level signals (below about 70 dBm at the input mixer) can be as much as ten times the specified scale accuracy.

The increased noise due to turning dither on is most significant in low band (0 to 3.6 GHz) with IF Gain set to Low, where it can be about 0.4 dB.

Key Path Meas setup, ADC Dither
Help Map ID 3221
Instrument S/W Revision A.01.06 or later

Off (Best Noise)

When ADC Dither is Off, the instrument noise floor is improved. If ADC dither is on the ADC dynamic range is reduced to make room for the dither. As a result, the noise floor of the analyzer is somewhat compromised. So making measurements with ADC dither on gives you improved amplitude linearity. but turning ADC dither off gives you a lower noise floor (better sensitivity).

Key Path Meas setup, ADC Dither

Help Map ID	3222
Instrument S/W Revision	A.01.06 or later

Swept IF Gain

In order to take full advantage of the RF dynamic range of the analyzer, there is an added switched IF amplifier with approximately 10 dB of gain. When you can turn it on without overloading analyzer, the dynamic range is always better with it on than off. The **Swept IF Gain** key can be used to set the IF Gain function to Auto, or to High Gain (the extra 10 dB), or to Low Gain. These settings affect sensitivity and IF overloads.

This function is only active when in Swept sweeps. In FFT sweeps, the FFT IF Gain function is used instead.

Remote Command: `[ :SENSe] :IF:GAIN:SWEpt [:STATe] OFF|ON|0|1`
`[ :SENSe] :IF:GAIN:SWEpt [:STATe] ?`

Example: `IF:GAIN:SWEP ON`

Dependencies/Couplings: The 'auto' rules for Swept IF Gain depend on attenuation, preamp state, start and stop frequency and the setting of FFT IF Gain. Set the Swept IF Gain to High (On) when the total input attenuation is 0 dB, the preamp is off, the start frequency is 10 MHz or more, and the FFT IF Gain is autocoupled, or manually set to Autorange, or manually set to High. Also set the Swept IF Gain to High (On) when the total input attenuation is 2 dB or less, the preamp is on, the start frequency is 10 MHz or more, and the stop frequency is 3.6 GHz or less and the FFT IF Gain is autocoupled, or manually set to Autorange, or manually set to High. Under all other circumstances, set the Swept IF Gain to Low (Off).

If the sweep type is Swept, the start frequency of the instrument is less than 10 MHz, and you put Swept IF Gain in Manual On, a warning condition is generated and remains in effect as long as this condition exists. The warning message is about a possible IF overload.

As with most parameters with an AUTO state, AUTO COUPLE sets it to Auto, and setting any specific value (for example on or off) will set the AUTO state to false.

Remote Command Notes: where ON = high gain
OFF = low gain

Preset: Auto after Preset which yields Off unless the Preamp is on
Auto and Off after Meas Preset

State Saved: Saved in State

Key Path: **Meas Setup**

Help Map ID: 3223

Instrument S/W Revision: A.01.06 or later

Auto

Activates the auto rules for Swept IF Gain

Remote Command:	[:SENSe] :IF:GAIN:SWEpt:AUTO[:STATe] OFF ON 0 1 [:SENSe] :IF:GAIN:SWEpt:AUTO[:STATe] ?
Example:	IF:GAIN:SWEP:AUTO ON
Preset:	ON
Key Path:	Meas setup
Help Map ID:	3224
Instrument S/W Revision:	A.01.06 or later

Low Gain (Best for Large Signals)

Forces Swept IF Gain to be off.

Example:	IF:GAIN:SWEP OFF
State Saved:	Saved in Instrument State
Key Path:	Meas setup, ADC Ranging
Help Map ID:	3225
Instrument S/W Revision:	A.01.06 or later

High Gain (Best Noise Level)

Forces Swept IF Gain to be on.

Example:	IF:GAIN:SWEP ON
Dependencies/Couplings:	The High setting for Swept IF Gain is grayed out when FFT IF Gain is manually set to Low (not when Low is chosen by the auto-rules).
State Saved:	Saved in Instrument State
Key Path:	Meas setup, ADC Ranging
Help Map ID:	3226
Instrument S/W Revision:	A.01.06 or later

FFT IF Gain

Accesses the keys to set the ranging in the digital IF when doing FFT sweeps. When in Autorange mode, the IF checks its range once for every FFT chunk, to provide the best signal to noise ratio. You can specify the range for the best FFT speed, and optimize for noise or for large signals.

When the sweep type is FFT and this function is in Autorange, the IF Gain is set ON initially for each chunk of data. The data is then acquired. If the IF overloads, then the IF Gain is set OFF and it

re-acquires the data. Because of this operation, the Auto setting uses more measurement time as the instrument checks/resets its range. You can get faster measurement speed by forcing the range to either the high or low gain setting. But you must know that your measurement conditions will not overload the IF (in the high gain range) and that your signals are well above the noise floor (for the low gain range), and that the signals are not changing.

Remote Command:	[:SENSe] :IF:GAIN:FFT [:STATe] AUTOrange LOW HIGH [:SENSe] :IF:GAIN:FFT [:STATe] ?
Dependencies/Couplings:	As with most parameters with an AUTO state, AUTO COUPLE sets it to Auto, which then picks AUTOrange, and setting any specific value (AUTOrange, LOW or HIGH) will set the AUTO state to false.
Preset:	AUTOrange
State Saved:	Saved in State
Key Path:	Meas Setup
Help Map ID:	3227
Instrument S/W Revision:	A.01.06 or later

Auto

Allows the instrument to pick the FFT IF Gain method as appropriate. This “Auto” state is set by the Auto Couple key, and it puts it in Autorange.

Remote Command:	[:SENSe] :IF:GAIN:FFT:AUTO [:STATe] OFF ON 0 1 [:SENSe] :IF:GAIN:FFT:AUTO [:STATe] ?
Example:	IF:GAIN:FFT:AUTO ON
Preset:	ON
State Saved:	Saved in Instrument State
Key Path:	Meas setup
Help Map ID:	3228
Instrument S/W Revision:	A.01.06 or later

Autorange (Slower – Follows Signals)

Turns the ADC ranging to automatic which provides the best signal to noise ratio. Autorange is usually preferred over the manual range choices.

Example:	IF:GAIN:FFT AUTOrange
State Saved:	Saved in Instrument State
Key Path:	Meas setup, FFT IF Gain
Help Map ID:	3229

Instrument S/W Revision: A.01.06 or later

Low Gain (Best for Large Signals)

Forces FFT IF Gain to be off.

Example: IF:GAIN:FFT LOW
State Saved: Saved in Instrument State
Key Path: **Meas setup, FFT IF Gain**
Help Map ID: 3230
Instrument S/W Revision: A.01.06 or later

High Gain (Best Noise Level)

Forces FFT IF Gain to be on.

Example: IF:GAIN:FFT HIGH
Dependencies/Couplings: The High setting for **FFT IF Gain** is grayed out when **Swept IF Gain** is manually set to Low (not when Low is chosen by the auto-rules).
State Saved: Saved in Instrument State
Key Path: **Meas setup, FFT IF Gain**
Help Map ID: 3231
Instrument S/W Revision: A.01.06 or later

Analog Demod Tune & Listen

The Analog Demod Tune & Listen key opens the Analog Demod menu which contains keys to turn the demod function on and off and select modulation type.

When the function is on (set to AM, FM, or FM), the demodulated signal is fed to the analyzer's speaker. Muting and volume control functions are done through the standard Windows speaker volume control interface.

Remote Command: [:SENSe]:DEMod AM|FM|PM|OFF
[:SENSe]:DEMod?
Example: DEM AM turns amplitude demodulation function ON
Preset: OFF
State Saved: Saved in Instrument State
Key Path: **Meas Setup**
Help Map ID: 3800

Instrument S/W Revision: A.01.06 or later

AM

Pressing this key, when it is not selected, selects and activates the AM demodulation function. Pressing it a second time branches to the AM Demod menu where AM demodulation settings can be adjusted.

Key Path	Meas Setup, Analog Demod Tune&Listen
State Saved	Saved in Instrument State
Help Map ID	3801
Instrument S/W Revision	A.01.06 or later

Channel BW (AM Demod)

Sets the RBW setting used by the hardware during the demodulation period in nonzero spans. Note that this is a separate parameter only for the demodulation function and does not affect the RBW setting in the BW menu which is used during the normal sweep. The flat top filter type must be used during the demodulation period. A 5 kHz Video Bandwidth filter is used.

In Zero Span, the instrument's RBW & VBW filters are used for the demodulation; thus, the Channel BW (and RBW filter type) will match those of the instrument. This allows gap-free listening. The Channel BW key is grayed out and the value displayed on the key matches the current RBW of the instrument. Upon leaving zero span, the non-zero-span setting of Channel BW is restored as well as the flattop filter type.

Remote Command:	[:SENSe] :DEMod:AM:BANDwidth:CHANnel <freq> [:SENSe] :DEMod:AM:BANDwidth:CHANnel?

Example:	DEM:AM:BAND:CHAN 200 kHz

Dependencies/Couplings:	Unavailable in zero span. In zero span only, the value is set equal to the instrument's current RBW value and it displays that value on the softkey, but the softkey is grayed out.

Preset:	30 kHz
State Saved:	Saved in Instrument State
Min:	390 Hz
Max:	8 MHz
Key Path:	Meas Setup, Analog Demod Tune&Listen, AM
Default Unit:	Hz
Help Map ID:	3802
Instrument S/W Revision:	A.01.06 or later

FM

Pressing this key, when it is not selected, selects and activates the FM demodulation function. Pressing it a second time branches to the FM Demod menu where FM demodulation settings can be adjusted.

Example:	DEM FM turns frequency demodulation function ON
State Saved:	Saved in Instrument State
Key Path:	Meas Setup, Analog Demod Tune&Listen
Help Map ID:	3803
Instrument S/W Revision:	A.01.06 or later

Channel BW (FM Demod)

Sets the RBW setting used by the hardware during the demodulation period in nonzero spans. Note that this is a separate parameter only for the demodulation function and does not affect the RBW setting in the BW menu which is used during the normal sweep. The flat top filter type must be used during the demodulation period. A 5 kHz Video Bandwidth filter is used.

In Zero Span, the instrument's RBW & VBW filters are used for the demodulation; thus, the Channel BW (and RBW filter type) will match those of the instrument. This allows gap-free listening. The Channel BW key is grayed out and the value displayed on the key matches the current RBW of the instrument. Upon leaving zero span, the previous setting of Channel BW and the flattop filter type are restored.

Remote Command:	[:SENSe] :DEMod:FM:BANDwidth:CHANnel <freq> [:SENSe] :DEMod:FM:BANDwidth:CHANnel?

Example:	DEM:FM:BAND:CHAN 200 MHz

Dependencies/Couplings:	Unavailable in zero span. In zero span only, the value is set equal to the instrument's current RBW value and it displays that value on the softkey, but the softkey is grayed out.

Preset:	150 kHz
State Saved:	Saved in Instrument State
Min:	390 Hz
Max:	8 MHz
Key Path:	Meas Setup, Analog Demod Tune&Listen, FM
Default Unit:	Hz
Help Map ID:	3804
Instrument S/W Revision:	A.01.06 or later

De-emphasis (FM Demod only)

The De-emphasis setting controls a single-pole filter (6 dB/octave roll off), usually to counter intentional pre-emphasis in the transmitter. When De-emphasis state is OFF the hardware digital filter is bypassed, otherwise the setting is applied

The De-emphasis softkey is only available when FM is the demod selected. It is grayed out for AM and PM.

Remote Command:	[:SENSe] :DEMod:FM:DEEMphasis OFF US25 US50 US75 US750 [:SENSe] :DEMod:FM:DEEMphasis?
Example:	DEM:FM:DEEM US75 DEM:FM:DEEM?
Dependencies/Couplings:	Only available in FM. Grayed out for AM and PM.
Preset:	US75 (recommended for US commercial FM 75 μ s pre-emphasis)
State Saved:	Saved in Instrument State
Key Path:	Meas Setup, Analog Demod Tune & Listen, FM
Help Map ID:	3805
Instrument S/W Revision:	A.01.06 or later

Off This setting bypasses the De-emphasis filter.

Example:	DEM:FM:DEEM OFF
Key Path:	Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis
Help Map ID:	3858
Instrument S/W Revision:	A.01.06 or later

25 μ s Sets the De-emphasis time constant to 25 μ s.

Example:	DEM:FM:DEEM US25
Key Path:	Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis
Help Map ID:	3859
Instrument S/W Revision:	A.01.06 or later

50 μ s Sets the De-emphasis time constant to 50 μ s.

Example:	DEM:FM:DEEM US50
Key Path:	Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis
Help Map ID:	3860

Swept SA Meas Setup

Instrument S/W Revision: A.01.06 or later

75 μ s Sets the De-emphasis time constant to 75 μ s.

Example: DEM:FM:DEEM US75

Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**

Help Map ID: 3861

Instrument S/W Revision: A.01.06 or later

750 μ s Sets the De-emphasis time constant to 750 μ sec.

Example: DEM:FM:DEEM US750

Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**

Help Map ID: 3862

Instrument S/W Revision: A.01.06 or later

PM

Pressing this key, when it is not selected, selects and activates the PM demodulation function. Pressing it a second time branches to the PM Demod menu where PM demodulation settings can be adjusted.

Example: DEM PM turns Phase demodulation function ON

State Saved: Saved in Instrument State

Key Path: **Meas Setup, Analog Demod Tune&Listen**

Help Map ID: 3806

Instrument S/W Revision: A.01.06 or later

Channel BW (PM Demod)

Sets the RBW setting used by the hardware during the demodulation period in nonzero spans. Note that this is a separate parameter only for the demodulation function and does not affect the RBW setting in the BW menu which is used during the normal sweep. The flat top filter type must be used during the demodulation period. A 5 kHz Video Bandwidth filter is used.

In Zero Span, the instrument's RBW & VBW filters are used for the demodulation; thus, the Channel BW (and RBW filter type) will match those of the instrument. This allows gap-free listening. The Channel BW key is grayed out and the value displayed on the key matches the current RBW of the instrument. Upon leaving zero span, the previous setting of Channel BW and the flattop filter type are restored.

Remote Command: [:SENSe]:DEMod:PM:BANDwidth:CHANnel <freq>

[:SENSe]:DEMod:PM:BANDwidth:CHANnel?

Example:	DEM:PM:BAND:CHAN 200 MHz
Dependencies/Couplings:	Unavailable in zero span. In zero span only, the value is set equal to the instrument's current RBW value and it displays that value on the softkey, but the softkey is grayed out.
Preset:	100 kHz
State Saved:	Saved in Instrument State
Min:	390 Hz
Max:	8 MHz
Key Path:	Meas Setup, Analog Demod Tune&Listen, M
Default Unit:	Hz
Help Map ID:	3807
Instrument S/W Revision:	A.01.06 or later

Off

Pressing this key, turns the demodulation function off.

Example:	DEM OFF turns the demodulation function OFF
State Saved:	Saved in Instrument State
Key Path:	Meas Setup, Analog Demod Tune&Listen
Help Map ID:	3808
Instrument S/W Revision:	A.01.06 or later

Demod Time

Sets the amount of time the instrument demodulates the signal after each sweep. The demodulated signal can be heard through the speaker during demodulation. In zero span, demodulation can be performed continuously, making this parameter not applicable, hence it is grayed out in zero span.

Remote Command:	[:SENSe] :DEMod:TIME <time> [:SENSe] :DEMod:TIME?
Example:	DEM:TIME 500 ms DEM:TIME?
Dependencies/Couplings:	Unavailable in zero span.
Preset:	500 ms
State Saved:	Saved in Instrument State
Min:	2 ms

Swept SA Meas Setup

Max:	100 s
Key Path:	Meas Setup, Analog Demod Tune&Listen
Help Map ID:	3809
Instrument S/W Revision:	A.01.06 or later

Demod State command

Sets or queries the state of the Analog Demod Tune and Listen function. Setting the state to ON with this command will select AM demodulation by default and activate it (turn it on).

The response to the query is determined by the current setting of [:SENSE]:DEMod AM|FM|PM|OFF. The response will be 1 if AM, FM, PM are selected, or 0 if OFF is selected..

Remote Command:	[:SENSe]:DEMod:STATe OFF ON 0 1 [:SENSe]:DEMod:STATe?
Preset:	OFF
Help Map ID:	0
Instrument S/W Revision:	A.01.06 or later

Noise Source

This menu allows you to turn the noise source power on or off when making manual noise figure measurements. It is included in the Spectrum Analyzer Mode as an adjunct to the full controls that are available in the Noise Figure Mode. It is only available in the Swept SA measurement of the Spectrum Analyzer Mode.

See [“More Information” on page 345](#).

Remote Command:	:SOURce:NOISe:TYPE NORMal SNS :SOURce:NOISe:TYPE?
Example:	SOUR:NOIS:TYPE NORM
Preset:	Normal
Range:	Normal SNS
Dependencies/Couplings:	None If no SNS is connected, this parameter will be set to “Normal” When Type is set to “SNS” and the SNS is disconnected, this parameter gets bumped to “Normal” When an SNS is not connected, the SNS type will be grayed (disabled).
State Saved:	Saved in State
Key Path:	Meas Setup

Help Map ID: 3811
Instrument S/W Revision: A.01.06 or later

More Information

There are 2 types of noise sources: a Smart Noise Source (SNS), and a "Normal" noise source - e.g. 346 series. This menu allows the user to control both. The SNS has its own connector on the rear of the analyzer and when it is connected the user can then select it from the "Type" 1 of N, allowing the State parameter to then control the SNS. The "Normal" source is controlled by a BNC connector that supplies 28V. If SNS is NOT connected then the "state" parameter controls the "Normal" noise source 28V BNC port. If both are connected the "Type" parameter will determine which source the "State" parameter will control. Two sources can never be controlled together. The "SNS attached" SCPI query detailed below can be used remotely to determine if an SNS is connected. SNS functionality is limited to turning on and off only. The SNS ENR data and temperature cannot be queried, unless the Noise Figure application is installed. The SNS ENR data is issued in printed form when an SNS is purchased or can be read from the analyzer's Noise Figure application if installed, or other Agilent noise figure instruments that support the SNS (NFA and ESA with option 219).

When first entering the Swept SA measurement the "State" will be set to OFF and the 28v BNC drive and SNS turned off to ensure the two are in sync. When the Swept SA measurement is exited, the "State" parameter will be set to OFF and the 28v BNC and SNS drive turned off.

For making manual noise figure measurements the following setup is recommended:

Set the SPAN to Zero

Set attenuation to 0 dB

Set the PRE-AMP ON

Set the RBW to 4MHz

Set the Detector to AVERAGE

Set the sweep time to 16ms - sets the variance correctly for good results.

Set a Band/Interval Power Marker function and set the interval over the full width of trace i.e. Left to 0s and Right to 16ms

State

This key turns the Noise Source on and off.

Remote Command: :SOURce:NOISe[:STATe] ON|OFF|1|0
:SOURce:NOISe[:STATe] ?

Example: SOUR:NOIS OFF

Preset: OFF

Swept SA Meas Setup

Dependencies/Couplings:	None
	1. If an SNS is connected, and the Type is set to SNS, this parameter turns the SNS on and off. 2. When an SNS is not connected this parameter turns the BNC 28V output on and off. 3. When the SA mode is first entered this parameter is set to OFF and the 28v drive turned OFF. When the SA mode is exited this parameter is set to OFF and the 28v drive turned OFF.
State Saved:	Saved in State
Key Path:	Meas Setup
Help Map ID:	3812
Instrument S/W Revision:	A.01.06 or later

SNS Attached (SCPI only)

If an Smart Noise Source (SNS) is present this command will return 1 otherwise it will return 0.

Remote Command:	:SOURce:NOISe:SNS:ATTached?
Example:	SOUR:NOIS:SNS:ATT?
Preset:	OFF
State Saved:	No
Help Map ID:	3813
Instrument S/W Revision:	A.01.06 or later

Meas Preset

This key returns the Meas Local variables in the Swept SA measurement to their preset values. This is the same as sending the SCPI command CONF:SAN

The only exception is Limits On/Off, which is a persistent Meas Local variable. It will be set to Off by Mode Preset but not by Meas Preset.

Key Path	Meas Setup
Help Map ID	3815
Instrument S/W Revision	A.01.06 or later

Mode

Operation of this key is identical across several measurements. For details about this key, see [“Mode” on page 965](#).

Mode Setup

Operation of this key is identical across several measurements. For details about this key, see [“Mode Setup” on page 977](#).

Peak Search

Pressing the Peak Search key displays the Peak Search menu and places the selected marker on the trace point with the maximum y-axis value for that marker's trace. The Peak Search features allow you to define specific search criteria to determine which signals can be considered peaks, excluding unwanted signals from the search.

See [“More Information” on page 349](#).

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum
Example:	CALC:MARK2:MAX performs a peak search using marker 2. CALC:MARK2:Y? queries the marker amplitude (Y-axis) value for marker 2. CALC:MARK2:X? queries the marker frequency or time (X-axis) value for marker 2. SYST:ERR? can be used to query the errors to determine if a peak is found. The error -200 will be returned after an unsuccessful search.
Remote Command Notes:	Sending this command selects the subopcoded marker
Help Map ID:	3233
Instrument S/W Revision:	A.01.06 or later

More Information

If **Same as “Next Peak” Criteria** is selected, and either **Pk Excursion** or **Pk Threshold** are on, a signal must meet those criteria. If no valid peak is found, a message is generated. And then the marker is not moved. When **Highest Peak** is on, or both **Pk Excursion** and **Pk Threshold** are off, the marker is always placed at the point on the trace with the maximum y-axis value, even if that point is on the very edge of the trace (exception: negative frequencies and signals close to the LO are not searched at all).

Pressing Peak Search with the selected marker off causes the selected marker to be set to **Normal** at the center of the screen, then a peak search is immediately performed.

Pressing the front panel Peak Search key always does a peak search. Occasionally, you may need to get to the Peak Search menu key functions without doing a peak search. You can do this by first accessing the Peak Search menu. Then go to the other menus that you need to access. Finally, you can get back to the Peak Search key menu by using the front panel Return key and pressing it as many times as required to navigate back through the previously accessed menus until you get back to the Peak Search menu.

Next Peak

Pressing Next Peak moves the selected marker to the peak that has the next highest amplitude less than the marker's current value. Only peaks which meet all enabled peak criteria are considered. If there is no valid peak lower than the current marker position, an error is generated and the marker is not moved.

If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:NEXT
Example:	CALC:MARK2:MAX:NEXT selects marker 2 and moves it to the peak that is closest in amplitude to the current peak, but the next lower value.
Remote Command Notes:	Sending this command selects the subopcoded marker
State Saved:	Not part of saved state
Key Path:	Peak Search
Help Map ID:	3234
Instrument S/W Revision:	A.01.06 or later

Next Pk Right

Pressing Next Pk Right moves the selected marker to the nearest peak right of the current marker which meets all enabled peak criteria. If there is no valid peak to the right of the current marker position, an error is generated and the marker is not moved.

If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:RIGHT
Example:	CALC:MARK2:MAX:RIGHT selects marker 2 and moves it to the next peak to the right of the current marker position.
Remote Command Notes:	Sending this command selects the subopcoded marker
State Saved:	Not part of saved state
Key Path:	Peak Search
Help Map ID:	3235
Instrument S/W Revision:	A.01.06 or later

Next Pk Left

Pressing Next Pk Left moves the selected marker to the nearest peak left of the current marker which meets all enabled peak criteria. If there is no valid peak to the left of the current marker position, an error is generated and the marker is not moved.

If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

Remote Command:	:CALCulate:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:LEFT
Example:	CALC:MARK2:MAX:LEFT selects marker 2 and moves it to the next peak to the left of the current marker position.

State Saved:	Not part of saved state
Key Path:	Peak Search
Help Map ID:	3236
Instrument S/W Revision:	A.01.06 or later

Marker Delta

Performs the same function as the Delta 1-of-N selection key in the Marker menu. Basically this sets the control mode for the selected marker to Delta mode. See the Section [“Marker ” on page 290](#) for the complete description of this function. The key is duplicated here in the Peak Search Menu to allow you to conveniently perform a peak search and change the marker’s control mode to Delta without having to access two separate menus.

Key Path	Peak Search or Marker
Help Map ID	3237
Instrument S/W Revision	A.01.06 or later

Mkr->CF

Assigns the selected marker’s frequency to the Center Frequency setting. See the Section [“Marker To” on page 317](#) for the description of this function. The key is duplicated here in the Peak Search Menu to allow you to conveniently perform a peak search and marker to CF without having to access two separate menus.

Dependencies/Couplings:	Same as specified under Marker To
Key Path:	Peak Search or Marker ->
Help Map ID:	3238
Instrument S/W Revision:	A.01.06 or later

Mkr->Ref Lvl

Assigns the selected marker’s level to the Reference Level setting. See the Section [“Marker To” on page 317](#) for the description of this function. The key is duplicated here in the Peak Search Menu to allow you to conveniently perform a peak search and marker to RL without having to access two separate menus.

Dependencies/Couplings:	Same as specified under Marker To
Key Path:	Peak Search or Marker ->
Help Map ID:	3239
Instrument S/W Revision:	A.01.06 or later

Peak Criteria

Pressing this key opens the Peak Criteria menu and allows you to adjust the Pk Threshold and Pk Excursion parameters used for peak search functions.

For a signal to be identified as a peak it must meet certain criteria. Signals in the negative frequency range and signals very close to 0 Hz are ignored. If either the peak excursion or peak threshold functions are on, then the signal must satisfy those criteria before being identified as a peak.

When peak excursion and peak threshold are both off:

Peak Search, **Continuous Peak Search**, and maximum part of **Pk-Pk Search** will search the trace for the point with the highest y-axis value which does not violate the LO feedthrough rules. A rising and falling slope are not required for these three peak search functions.

The remaining search functions **Next Peak**, **Next Pk Right**, etc. will only consider trace points which have a rising and falling slope on the left and right respectively.

Key Path	Peak Search
Help Map ID	3240
Instrument S/W Revision	A.01.06 or later

“Peak Search” Criteria

This menu lets you decide what kind of search you want to do when the Peak Search key is pressed (or the equivalent SCPI command sent).

Note that there are two “types” of peak search functions. One type is the “Peak Search” type, the other type is the “Next Peak” type. “Next Peak” searches (for example, Next Peak, Next Pk Left, Next Pk Right) are always checked using the Excursion and Threshold criteria as long as these criteria are On. The “Peak Search” type of search, simply finds the highest point on the trace. However you can change the “Peak Search” type of search so that it also uses the Excursion and Threshold criteria. This allows you to find the Maximum point on the trace that also obeys the Excursion and/or Threshold criteria.

When **Highest Peak** is selected, pressing **Peak Search** simply finds the highest peak on the marker’s trace. If **Same as “Next Peak” Criteria** is selected, then the search is also forced to consider the Excursion and Threshold found under the “**Next Peak**” **Criteria** menu.

Remote Command:	:CALCulate:MARKer:PEAK:SEARCH:MODE MAXimum PARAMeter :CALCulate:MARKer:PEAK:SEARCH:MODE?
Remote Command Notes:	MAXimum corresponds to the Highest Peak setting PARAMeter corresponds to the Same as “Next Peak” Criteria setting
Preset:	MAXimum
State Saved:	Saved in state
Key Path:	Peak Search, Peak Criteria

Help Map ID: 3241
Instrument S/W Revision: A.01.06 or later

Highest Peak When this key is selected, pressing the Peak Search key or issuing the equivalent SCPI command finds the maximum point on the trace, subject to the peak-search qualifications. This also affects the Peak Search half of Pk-Pk search and the Continuous Peak Search.

Example: CALC:MARK:PEAK:SEAR:MODE MAX
Key Path: **Peak Search, Peak Criteria, “Peak Search” Criteria**
Help Map ID: 3242
Instrument S/W Revision: A.01.06 or later

Same as “Next Peak” Criteria When this key is selected, pressing the Peak Search key or issuing the equivalent SCPI command finds the maximum point on the trace, but subject to the Excursion and Threshold set under the Next Peak Criteria menu. The search is, of course, also subject to the peak-search qualifications. This also affects the Peak Search half of Pk-Pk search and the Continuous Peak Search.

Example: CALC:MARK:PEAK:SEAR:MODE PAR
Key Path: **Peak Search, Peak Criteria, “Peak Search” Criteria**
Help Map ID: 3243
Instrument S/W Revision: A.01.06 or later

“Next Peak” Criteria

This key opens up a menu which allows you to independently set the Peak Excursion and Peak Threshold and turn them on and off.

Key Path **Peak Search, Peak Criteria**
Help Map ID 3244
Instrument S/W Revision A.01.06 or later

Pk Excursion On/Off Turns the peak excursion requirement on/off and sets the excursion value. The value defines the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. For example, if a value of 6 dB is selected, peak search functions like the marker Next Pk Right function move only to peaks that rise and fall 6 dB or more.

When both Pk Excursion and Pk Threshold are on, a signal must rise above the Pk Threshold value by at least the **Peak Excursion** value and then fall back from its local maximum by at least the **Peak Excursion** value to be considered a peak.

NOTE In the event that a sequence of trace points with precisely the same values represents the maximum, the leftmost point is found.

Remote Command:	:CALCulate:MARKer:PEAK:EXCursion <rel_ampl> :CALCulate:MARKer:PEAK:EXCursion? :CALCulate:MARKer:PEAK:EXCursion:STATe OFF ON 0 1 :CALCulate:MARKer:PEAK:EXCursion:STATe?
Example:	:CALC:MARK:PEAK:EXC:STAT ON :CALC:MARK:PEAK:EXC 30 DB sets the minimum peak excursion requirement to 30 dB
Dependencies/Couplings:	Available only when Y axis unit is amplitude units, otherwise grayed out. Whenever you adjust the value of Pk Excursion (with the knob, step keys, or by completing a numeric entry), and Peak Threshold is turned ON, the Peak Threshold Line and the Peak Excursion Region are displayed.
Preset:	6.0 dB ON
Preset:	6.0 dB ON
State Saved:	Saved in State
Min:	0.0 dB
Max:	100.0 dB
Key Path:	Peak Search, Peak Criteria, "Next Peak" Criteria
Help Map ID:	3245
Instrument S/W Revision:	A.01.06 or later

If two signals are very close together and the peak excursion and threshold criteria are met at the outside edges of the combined signals, this function finds the highest of these two signals as a peak (or next peak). However, if a signal appears near the edge of the screen such that the full extent of either the rising or falling edge cannot be determined, and the portion that is on screen does not meet the excursion criteria, then the signal cannot be identified as a peak.

When measuring signals near the noise floor, you can reduce the excursion value even further to make these signals recognizable. To prevent the marker from identifying noise as signals, reduce the noise floor variations to a value less than the peak-excursion value by reducing the video bandwidth or by using trace averaging.

Pk Threshold On/Off Turns the peak threshold requirement on/off and sets the threshold value. The peak threshold value defines the minimum signal level (or min threshold) that the peak identification

algorithm uses to recognize a peak.

When both Pk Excursion and Pk Threshold are on, a signal must rise above the Pk Threshold value by at least the **Peak Excursion** value and then fall back from its local maximum by at least the **Peak Excursion** value to be considered a peak.

For example, if a threshold value of –90 dBm is selected, the peak search algorithm will only consider signals with amplitude greater than the –90 dBm threshold. If a threshold value of –90 dBm is selected, and **Peak Excursion** is **On** and set to 6 dB, the peak search algorithm will only consider signals with amplitude greater than the –90 dBm threshold which rise 6 dB above the threshold and then fall back to the threshold.

Remote Command:	:CALCulate:MARKer:PEAK:THReshold <ampl> :CALCulate:MARKer:PEAK:THReshold? :CALCulate:MARKer:PEAK:THReshold:STATe OFF ON 0 1 :CALCulate:MARKer:PEAK:THReshold:STATe?
Example:	CALC:MARK:PEAK:THR:STAT ON turns on the threshold criterion. CALC:MARK:PEAK:THR –60 dBm sets the threshold to –60 dBm.
Dependencies/Couplings:	When Ref Level Offset changes, Peak Threshold must change by the same amount.
Preset:	–90.0 dBm ON
State Saved:	Saved in State
Min:	The current displayed Ref Level – 200 dB. The current displayed Ref Level is the current Ref Level, offset by the Ref Level Offset.
Max:	The current displayed Ref Level. This means the current Ref Level, offset by the Ref Level Offset.
Key Path:	Peak Search, Peak Criteria, “Next Peak Criteria”
Default Unit:	depends on the current selected Y axis unit
Help Map ID:	3246
Instrument S/W Revision:	A.01.06 or later

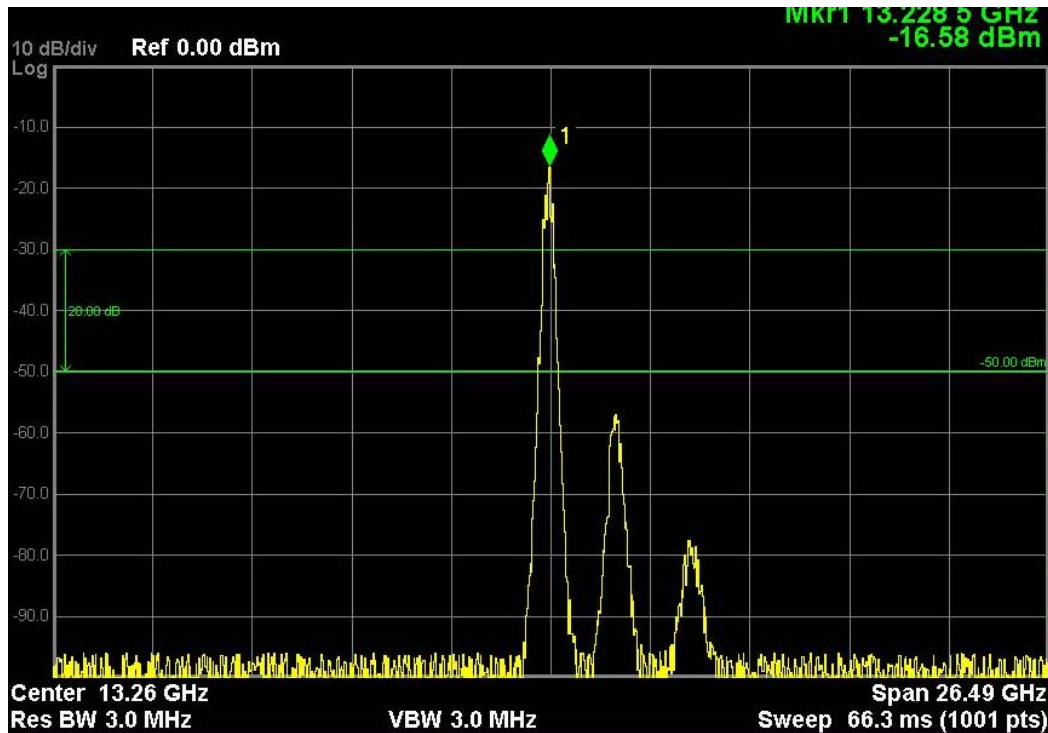
Pk Threshold Line On/Off Turns the peak threshold line on or off. Preset state is off. No equivalent SCPI command.

See [“More Information” on page 356](#).

Dependencies/Couplings:	If Peak Threshold is Off and the Peak Threshold line is turned on, it should turn on Peak Threshold.
Help Map ID:	3814
Instrument S/W Revision:	A.01.06 or later

More Information

The Peak Threshold line is green and has the value of the peak threshold (for example, “–20.3 dBm”) written above its right side, above the line itself. If Peak Excursion is ON it shows on the left side as a region above the Peak Threshold line. As with all such lines (Display Line, Trigger Level line, etc) it is drawn on top of all traces.



This function is automatically set to ON (thus turning on the Peak Threshold line) whenever the value of Peak Threshold or Peak Excursion becomes the active function, unless Peak Threshold is OFF. It is automatically set to OFF whenever Peak Threshold is set to OFF. Manually turning it ON automatically turns on Pk Threshold.

The Peak Excursion part is on whenever the Pk Threshold part is on, unless Peak Excursion is OFF.

Peak Table

Opens the Peak Table menu.

The Peak Table provides a displayed list of up to 20 signal peaks from the selected trace. If more than one trace window is displayed, the selected trace in the selected window is used. If there are more than 20 signals which meet the peak search criteria, only the 20 highest peaks are listed.

The Peak Table is updated after each sweep. The list of peaks in the Peak Table can be ordered either by ascending frequency or by descending amplitude. In either case, the entire trace is first evaluated and the 20 highest peaks are selected for inclusion in the list. After the peaks are selected, they are then sorted and displayed according to the Peak Sort setting.

Key Path

Peak Search

Help Map ID	3247
Instrument S/W Revision	A.01.06 or later

Peak Table On/Off

Turns Peak Table on/off. When turned on, the display is split into a measurement window and a peak table display window.

Turning the Peak Table on turns the Marker Table off and vice versa.

Remote Command:	:CALCulate:MARKer:PEAK:TABLE:STATe OFF ON 0 1 :CALCulate:MARKer:PEAK:TABLE:STATe?
Example:	CALC:MARK:PEAK:TABL:STAT ON Turns on and displays the peak table.
Dependencies/Couplings:	When the Peak Table turns on, if Peak Threshold is On then it becomes the active function.
Preset:	OFF
State Saved:	Saved in State
Key Path:	Peak Search, Peak Table
Help Map ID:	3248
Instrument S/W Revision:	A.01.06 or later

Peak Sort

Sets the peak table sorting routine to list the peaks in order of descending amplitude or ascending frequency. The remote command can also be used to sort the peaks found using the :CALCulate:DATA:PEAKs command.

Remote Command:	:CALCulate:MARKer:PEAK:SORT FREQuency AMPLitude :CALCulate:MARKer:PEAK:SORT?
Example:	CALC:MARK:PEAK:SORT AMPL Sets sorting routine to list peaks in order of descending amplitude. CALC:MARK:PEAK:SORT?
Preset:	AMPLitude
Preset:	AMPLitude
State Saved:	Saved in State
Key Path:	Peak Search, Peak Table
Help Map ID:	3249
Instrument S/W Revision:	A.01.06 or later

Peak Readout

Shows up to twenty signal peaks as defined by the setting:

All (ALL) - lists all the peaks defined by the peak criteria, in the current sort setting.

Above Display Line (GTDLine) - lists the peaks that are greater than the defined display line, and that meet the peak criteria. They are listed in the current sort order.

Below Display Line (LTDLine) - lists the peaks that are less than the defined display line, and that meet the peak criteria. They are listed in the current sort order.

If the peak threshold is defined and turned on, then the peaks must meet this peak criteria in addition to the display line requirements.

Remote Command:	:CALCulate:MARKer:PEAK:TABLE:READout ALL GTDLine LTDLine :CALCulate:MARKer:PEAK:TABLE:READout?
Example:	CALC:MARK:PEAK:TABL:READ GTDL
Dependencies/Couplings:	Turning Display Line off forces Readout to ALL
Preset:	All
Preset:	All
State Saved:	Saved in State
Key Path:	Peak Search, Peak Table
Help Map ID:	3250
Instrument S/W Revision:	A.01.06 or later

If the Display Line (see the Section “View/Display”) is turned on, the Peak Table can be selected to include all peaks, only those above the Display Line, or only those below the Display Line. See Figures 1–2 and 1–3 to understand what happens if both Display Line and Pk Threshold are turned on.

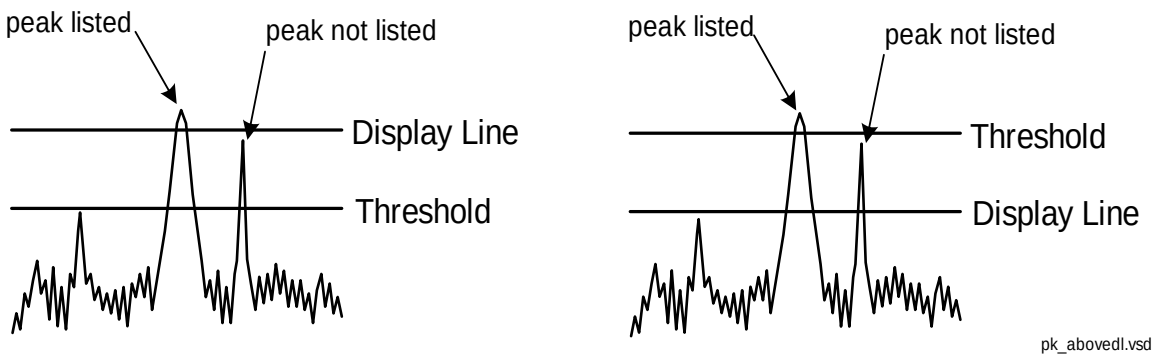


Figure 1- 2Above Display Line Peak Identification

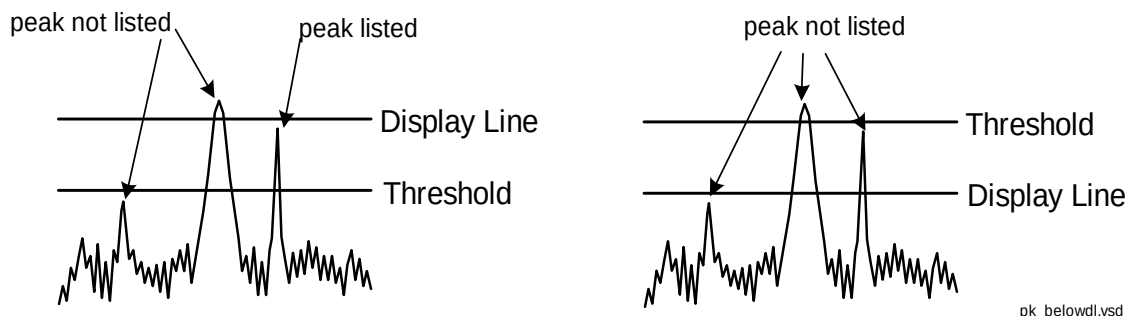


Figure 1- 3Below Display Line Peak Identification

All Sets the peak table to display the 20 highest peaks in the order specified by the current Peak Sort setting. If the Peak Criteria are turned on, then only peaks that meet the defined Pk Excursion and Pk Threshold values will be found.

Example: CALC:MARK:PEAK:TABL:READ ALL

Key Path: **Peak Search, Peak Table, Peak Readout**

Help Map ID: 3251

Instrument S/W Revision: A.01.06 or later

Above Display Line Sets the peak table to display only the 20 highest peaks above the display line in the order specified by the current Sort setting. If the Peak Criteria are turned on, then only peaks that meet the defined criteria will be found. If the display line is not already on, it is turned on (it has to be on or it cannot be used to exclude peaks).

Example: CALC:MARK:PEAK:TABL:READ GTDL

Dependencies/Couplings: When Above Display Line is selected, Display Line is turned on and becomes the active function.

Key Path: **Peak Search, Peak Table, Peak Readout**

Help Map ID: 3252

Instrument S/W Revision: A.01.06 or later

Below Display Line Sets the peak table to display only the 20 highest peaks below the display line as defined by the peak in the order specified by the current Sort setting. If the Peak Criteria are turned on, then only peaks that meet the defined criteria will be found. If the display line is not already on, it is turned on (it has to be on or it cannot be used to exclude peaks).

Example: CALC:MARK:PEAK:TABL:READ LTDL

Dependencies/Couplings: When Below Display Line is selected, Display Line is turned on and becomes the active function.

Key Path: **Peak Search, Peak Table, Peak Readout**

Help Map ID: 3253

Instrument S/W Revision: A.01.06 or later

Continuous Peak Search On/Off

Turns Continuous Peak Search on or off. When Continuous Peak Search is on, a peak search is automatically performed for the selected marker after each sweep. The rules for finding the peak are exactly the same as for **Peak Search**, including the use of the peak criteria rules. If no valid peak is found, a warning is generated after each sweep.

See [“More Information” on page 360](#).

Remote Command: :CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :CPSearch [:STATE] ON | OFF | 1 | 0

:CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :CPSearch [:STATE] ?

Example: CALC:MARK:CPS ON Turns on Continuous Peak Search.

Dependencies/Couplings: The Continuous Peak Search key is grayed out when the selected marker is a **Fixed** marker. Also, if Continuous Peak Search is on and the selected marker becomes a fixed marker, then Continuous Peak Search is turned off and the key grayed out.

Signal Track and **Continuous Peak Search** are mutually exclusive so if **Signal Track** is on, **Continuous Peak Search** will be grayed out and vice versa.

Remote Command Notes: Sending this command selects the subopcoded marker

Preset: Mode Preset

State Saved: Saved in State

Key Path: **Peak Search**

SCPI Status Bits/OPC Dependencies: The Measuring bit should remain set while this command is operating and should not go false until the marker position has been updated.

Help Map ID: 3254

Instrument S/W Revision: A.01.06 or later

More Information

When Continuous Peak Search is turned on a peak search is immediately performed and then is repeated after each sweep. If Continuous Peak Search is turned on with the selected marker off, the selected marker is set to **Normal** at the center of the screen, and then a peak search is immediately performed and subsequently repeated after each sweep.

When in Continuous Peak Search, *OPC will not return true, nor will READ or MEASure return any data, until the sweep is complete and the marker has been re-peaked. Note further that if the analyzer is

in a measurement such as averaging, and Continuous Peak Search is on, the entire measurement will be allowed to complete (i.e., all the averages taken up to the average number) before the repeak takes place, and only THEN will *OPC go true and READ or MEASure return data.

Note that this function is not the “Continuous Peak” function found in some other instruments. That function was designed to track the signal; this function simply does a Peak Search after each sweep.

When Continuous Peak Search is turned on for a marker, a little “hat” is placed above the marker.

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value. It places the selected marker on the minimum value on its selected trace. And it places that marker’s reference marker on the peak of its selected trace. This function turns on the reference marker and sets its mode to **Fixed** if it is not already on. (These markers may be on two different traces.)

The rules for finding the maximum peak are exactly the same as for **Peak Search**, including the use of the peak criteria rules. However, the minimum trace value is not required to meet any criteria other than being the minimum y-axis value in the trace.

When Pk-Pk Search is successful, a message is displayed on the message line.

If the selected marker is off, a delta type marker is turned on and the peak-to-peak search is done. If the selected marker is on, but it is not a delta marker, then it is changed to delta which turns on the reference marker if needed, and then it performs the peak-to-peak function.

Remote Command:	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:PTPeak
Example:	CALC:MARK:PTP CALC:MARK:Y? queries the delta amplitude value for marker 1.
Dependencies/Couplings:	Pk-Pk Search is not available (key is grayed out) when Coupled Markers is on. Selected marker becomes a delta marker if not already in delta mode.
Remote Command Notes:	Sending this command selects the subopcoded marker
State Saved:	Not part of saved state
Key Path:	Peak Search
Help Map ID:	3255
Instrument S/W Revision:	A.01.06 or later

Min Search

Moves the selected marker to the minimum y-axis value on the current trace. Minimum (negative) peak searches do not have to meet the peak search criteria. It just looks for the lowest y-axis value. If the

selected marker is Off, it is turned on before the minimum search is performed.

Remote Command: :CALCulate:MARKer [1] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 :MINimum

Example: CALC:MARK:MIN selects marker 1 and moves it to the minimum amplitude value.

Remote Command Notes: Sending this command selects the subopcoded marker

State Saved: Not part of saved state

Key Path: **Peak Search**

Help Map ID: 3256

Instrument S/W Revision: A.01.06 or later

Peak Data Query (SCPI Command Only)

Operation of this key is identical across several measurements. For details about this key, see [“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 957](#).

Recall

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 985](#).

Restart

Operation of this key is identical across several measurements. For details about this key, see [“Restart” on page 1003](#).

Save

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1005](#).

Single

Operation of this key is identical across several measurements. For details about this key, see [“Single \(Single Measurement/Sweep\)”](#) on page 1027.

Source

Operation of this key is identical across several measurements. For details about this key, see [“Source” on page 1029](#).

Span

The Span key activates the Span function and displays the menu of span functions.

Help Map ID	3260
Instrument S/W Revision	A.01.06 or later

Span

Changes the displayed frequency range symmetrically about the center frequency. While adjusting the Span the Center Frequency is held constant, which means that both Start Frequency and Stop Frequency will change.

Span also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is **Center Freq.**

While discussing the Span function we make the distinction between “swept spans” and “zero span”. We use the term “swept spans” to mean spans other than zero; recognizing that, because of this terminology, the user can be in what we call a “swept span” even while performing an FFT “sweep”.

While in swept spans, setting the span to 0 Hz through SCPI or the front panel numeric key pad puts the analyzer into zero span. However, using the Step keys and the RPG in swept spans, the Span can only go as far down as 10 Hz and cannot be set to zero.

While in zero span, setting the Span to a non-zero value through SCPI or Front Panel puts the analyzer in swept spans.

If the Span is set to a value greater than the maximum allowable span of the instrument, an error is generated indicating the data is out of range and was clipped to upper limit.

Remote Command	<code>[:SENSe] :FREQuency:SPAN <freq></code> <code>[:SENSe] :FREQuency:SPAN?</code>
Example	<code>FREQ:SPAN 2GHz</code> sets the span to 2GHz <code>FREQ:SPAN 0 Hz</code> sets the span to 0 Hz and puts the instrument in Zero Span

Dependencies/Couplings	If the electrical attenuator is enabled, any attempt to set Span such that the Stop Frequency would be >3.6 GHz results in an error. If the key is pressed, an advisory message is generated. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning. Span affects RBW, sweep time, FFT & Sweep choice (including FFT Width, Phase Noise Optimization and ADC Dither auto couplings.) When operating in “swept span”: - Any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range - When using the knob or the step up/down keys or the UP DOWN keywords in SCPI, the value that is being changed i.e. the Center Frequency or Span, is limited so that the other parameter is not forced to a new value The Span cannot be set to Zero by setting Start Frequency = Stop Frequency. The value of the last setting will be changed to maintain a minimum value of 10 Hz for the difference between start and stop frequencies.
Remote Command Notes	Preset and Max values depend on the Hardware Options (503, 507, 508, 513, 526)
Default Unit	Hz
SCPI Status Bits/OPC Dependencies	Overlapped if Signal Track is on (OPC shouldn’t return or clear until the zooming has completed for the new span)
Key Path	Span X Scale
Preset	SA Mode: Depends on instrument maximum frequency (see the table “N9020A Frequency Ranges and Preset Values ” on page 289 in the Section ““Frequency” on page 285”).) Option 503: 3.59 GHz Option 507: 6.99 GHz Option 508: 8.39 GHz Option 513: 13.59 GHz Option 526: 26.49 GHz
State Saved	Saved in State
Min	10 Hz unless entered directly, then 0 Hz is allowed, but nothing between 0 and 10 is ever allowed.

Swept SA Span

Max	Option 503: 3.7 GHz Option 507: 7.1 GHz Option 508: 8.5 GHz Option 513: 13.8 GHz Option 526: 27.0 GHz If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Help Map ID	3261
Instrument S/W Revision	A.01.06 or later

Full Span

Changes the frequency span of the analyzer to the Preset frequency span of the analyzer and sets the Frequency entry mode to Center/Span.

The span is dependent on the currently selected Input (see the Section “Input/Output”).

Pressing this key while in zero span puts the analyzer back in swept span.

Remote Command:	[:SENSe] :FREQuency:SPAN:FULL
Example:	FREQ:SPAN:FULL sets the span to full frequency range of the analyzer
Dependencies/Couplings:	n/a Turns off signal tracking (span zoom). It does NOT turn off the markers, nor the current active function.
Key Path:	Span X Scale
Help Map ID:	3263
Instrument S/W Revision:	A.01.06 or later

Zero Span

Changes the displayed frequency span to 0 Hz. The horizontal axis changes to time rather than frequency. The amplitude displayed is the input signal level at the current center frequency. This is a time-domain mode that changes several measurement functions and couplings. The instrument behavior is similar to an oscilloscope with a frequency selective detector installed in front of the oscilloscope. See Application Note 150 for more information on how to use zero span.

You can enter Zero Span in several ways:

Press the Zero Span key in Span

Set Span=0 Hz

Press last Span if the last span was 0

You cannot go to Zero Span by setting start freq = stop freq, or rolling span down with the RPG, that will

limit you to 10 Hz

You can go back to Swept Span by setting Span to a nonzero value or pressing Last Span, assuming the last span was not also zero span.

Pressing Zero Span places the analyzer in Center/Span frequency entry mode.

The following table summarizes the differences between Zero Span and Swept Spans:

Zero Span	Swept Spans
X axis is time	X axis is frequency
There is no auto-RBW selection	RBW coupled to Span when RBW in auto
There is no auto sweep time	Sweep time coupled to RBW when sweep time in auto
Interval Power calculated in Mkr Function	Band Power calculated in Mkr Function
Can only define time limits when in zero span	Can only define frequency limits when in swept SA
Marker Count counts at the center frequency	Marker Count counts at the marker frequency
CF Step Size set to RBW value	CF Step autocouples to 10% of Span
Some “Marker ->” commands not available.	Other “Marker ->” commands not available
Freq entry mode always Center/Span	Freq entry mode can be Center/Span or Start/Stop
N dB points reports a time difference.	N dB points reports a frequency difference.
Example:	FREQ:SPAN 0 Hz sets the span to zero, switches to Zero Span Sending FREQ:SPAN 1 MHz while in Zero Span, switches to Swept span
Dependencies/Couplings:	Zero Span key is unavailable (grayed out) if the following is true: Frequency scale type is LOG (for example, Log Sweep is On) Pressing Zero Span key (switching to Zero Span): Turns off signal track function (span zoom). Turns off the auto-coupling of RBW and sweep time.
Remote Command Notes:	Setting the Span to 0 Hz will change to Zero Span and setting the span to a non-zero value will select a swept span
Key Path:	Span X Scale
Help Map ID:	3264
Instrument S/W Revision:	A.01.06 or later

Last Span

Changes the displayed frequency span to the previous span setting. If it is pressed immediately after Signal Track is turned off, then the span setting returns to the span that was in effect before Signal Track was turned on.

Swept SA Span

If this key is pressed while in a nonzero span, and the previous value of span was 0, it will put the analyzer back in Zero Span. And if it is pressed while in zero span, it will set the analyzer back to its last nonzero span.

Pressing Last Span places the analyzer in Center/Span frequency entry mode.

Remote Command:	[:SENSe] :FREQuency:SPAN:PREVious
Example:	FREQ:SPAN:PREV sets the span to the previous value
Key Path:	Span X Scale
Help Map ID:	3265
Instrument S/W Revision:	A.01.06 or later

Zone On/Off

Turning Zone ON will put the analyzer in the dual domain “Zone Span” view. If you are in Zone Span, turning Zone Off will put the analyzer in Swept or Zero Span depending on whether the bottom window is Swept or Zero Span.

In Zone Span the top window will display the trace with two vertical lines (Zone Markers) displayed at center frequency plus and minus 5% of the current span. (You can change the default zone frequency and zone span values using the Zone Center and Zone Span keys.) The top window will be inactive.

The bottom window will display the section of the trace in the top window that is between the Zone Markers. The span of the bottom window is 10% of the span of the top window. (You can change the default zone frequency and zone span values using the Zone Center and Zone Span keys.) When first activated, both windows have the same center frequency. The bottom window is active and the sweep time, resolution bandwidth, and video bandwidth have been coupled to the bottom window span.

There are separate annotations for frequency, res bandwidth, video bandwidth, sweep time, reference level, amplitude scale and scale/div for each window. The values for these parameters can be changed for each window independently.

To activate the top window, press the Next Window key located below the display. The active window is distinguished by a green border. Only the active window will have a sweep taken and updated to the display. When the active window is toggled, the state for the active window is saved, and the last state of the inactive window is recalled. When the window becomes inactive, its data invalid indicator will appear on the display. The data invalid indicator will remain until the window becomes the active window and a complete sweep has been executed.

Pressing Zoom will change to a one-window display showing only the active window. Pressing Zoom again will return you to the two-window display. (Pressing Zoom will set Zone (On), if it is off.)

Pressing Zone (Off) will return you to a one-window display of the active window.

Key Path	Span X Scale, Zone
Preset	Off
State Saved	Saved in State
Help Map ID	3267

Instrument S/W Revision

A.01.06 or later

Zone Center

Allows you to change the frequency of the zone markers without changing the zone span. The zone markers are vertical lines marking the zone in the upper window. They determine the frequency range displayed in the lower window. As the zone markers in the upper window are moved, the center frequency of the lower window is changed but the lower window will not be updated to reflect the change unless it is selected as the active window. (See [“Zone On/Off” on page 372](#).) The center frequency for the lower window is not limited by the selected start and stop frequencies in the upper window. However, if the frequency span of the lower window is outside of the span for the upper window, the vertical span markers will be displayed at the edge of the graticule. When the lower window is active, the FREQUENCY Channel key will allow you to change Zone Center. Any change to the lower window while it is active will change the center frequency.

Unless Zone is on, only the Zone On/Off key is available and the rest of the Zone menu is grayed out.

Dependencies/Couplings:	Unavailable (grayed out) when segmented sweep is on. Center Frequency of lower window changes so that it is always the same as Zone Center, and vice-versa
Remote Command Notes:	Min and Max values depend on the Hardware Options (503, 507, 508, 513, 526)
Preset:	1.5 GHz
State Saved:	Saved in State
Min:	Zone Center cannot go so low as to force Zone Left to be <0
Max:	Zone Center can not go so high as to force Zone Right above the max freq of the instrument
Key Path:	Span X Scale, Zone
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Help Map ID:	3268
Instrument S/W Revision:	A.01.06 or later

Zone Span

Allows the span of the zone markers to be changed without changing the center frequency. The zone markers are vertical lines marking the zone in the upper window. They determine the frequency range displayed in the lower window. As the zone markers are moved, the span of the lower window is changed but the lower window will not be updated to reflect the change unless it is selected as the active window. (See [“Zone On/Off” on page 372](#).) The span limit of the lower window is the same as the span limit of the analyzer. The span for the lower window is not limited to the selected span of the upper window. However, if the frequency span of the lower window is outside of the span of the upper window, the vertical span markers will not be displayed. When the lower window is active, the SPAN X Scale key

will change Zone Span, and any change to Zone Span while the lower window is active, will change the span.

Unless Zone is on, only the Zone On/Off key is available and the rest of the Zone menu is grayed out.

Dependencies/Couplings:	Unavailable (grayed out) when segmented sweep is on. Span of lower window changes so that it is always the same as Zone Span, and vice-versa
Remote Command Notes:	Min and Max values depend on the Hardware Options (503, 507, 508, 513, 526)
Preset:	2 GHz
State Saved:	Saved in State
Min:	Zone Span cannot go so low as to force Zone Left to be <0
Max:	Zone Span can not go so high as to force Zone Right above the max freq of the instrument
Key Path:	Span X Scale, Zone
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
SCPI Status Bits/OPC Dependencies:	Overlapped if Signal Track is on (OPC shouldn't return or clear until the zooming has completed for the new span)
Help Map ID:	3269
Instrument S/W Revision:	A.01.06 or later

Zone Pk Right

Finds the next peak to the right of the zone center frequency on the upper window trace and then moves the zone so that it is centered around the new peak. The zone span is not changed. The center frequency of the lower window changes to reflect the new zone center frequency. The lower window will not be updated until it is made active. If no peak is found, the zone will not be moved. A signal must obey the parameters defined in Search, Search Param to be identified as a peak signal. Pressing Zone Pk Right will have no effect if the upper window is not the active window or if it is in zero span.

Unless Zone is on, only the Zone On/Off key is available and the rest of the Zone menu is grayed out.

Remote Command:	:CALCulate:ZONE:MAXimum:RIGHT
Example:	CALC:ZONE:MAX:RIGH
State Saved:	Not part of saved state
Key Path:	Span X Scale, Zone
Help Map ID:	3270
Instrument S/W Revision:	A.01.06 or later

Zone Pk Left

Finds the next peak to the left of the zone center frequency on the upper window trace and then moves the zone so that it is centered around the new peak. The zone span is not changed. The center frequency of the lower window changes to reflect the new zone center frequency. The lower window will not be updated until it is made active. If no peak is found, the zone will not be moved. A signal must obey the parameters defined in Search, Search Param to be identified as a peak signal. Pressing Zone Pk Left will have no effect if the upper window is not the active window or if it is in zero span.

Unless Zone is on, only the Zone On/Off key is available and the rest of the Zone menu is grayed out.

Remote Command: :CALCulate:ZONE:MAXimum:LEFT

Example: CALC:ZONE:MAX:LEFT

State Saved: Not part of saved state

Key Path: **Span X Scale, Zone**

Help Map ID: 3271

Instrument S/W Revision: A.01.06 or later

Signal Track (Span Zoom)

When Marker 1 is placed on a signal and Signal Track is pressed, the marker remains on the signal while the analyzer retunes the center frequency to the marker frequency. The analyzer keeps the signal at the center of the display, as long as the amplitude of the signal does not change by more than ± 3 dB from one sweep to another. If Marker 1 is not in Normal or Delta, turning on Signal Track sets it to Normal, perform a peak search, and center the marker on the display.

Remote Command: :CALCulate:MARKer:TRCKing[:STATe] OFF|ON|0|1

:CALCulate:MARKer:TRCKing[:STATe] ?

Example: CALC:MARK:TRCK ON turns on Signal Track using Marker 1.

CALC:MARK:TRCK?.

Swept SA Span

Dependencies/Couplings:	Signal Track is associated with Marker 1. When marker 1 is turned off or set to Fixed, signal track is turned off as well. Signal Track is not available (grayed out) when any of the following is true: Signal ID = on, Frequency scale type = Log Signal Track and Continuous Pk cannot be used with each other. If one is on, the other is grayed out. . Signal Track is grayed out if in Zero Span. But if Zero Span is entered while in Signal Track, Signal Track is turned off. Signal Track can only function properly if the trace Marker 1 is on is updating. Therefore if Signal Track is on and the trace Marker 1 is on is put into View, Signal Track is turned off and the Signal Track key grayed out. Whenever the trace Marker 1 is on is not updating, the Signal Track key is grayed out. Signal Track is only available in SA measurement . It should be grayed out in other Measurements in the Spectrum Analyzer mode. Signal Track can only function properly if the trace Marker 1 is on, is in Trace Update = Active. Therefore if the trace Marker 1 is on is in Update Off when Signal Track is turned on, it is changed to Update On. If the trace Marker 1 is on is set to Update Off while Signal Track is on, it turns off Signal Track.
Preset:	OFF
State Saved:	Saved in State
Key Path:	FREQUENCY, Signal Track
SCPI Status Bits/OPC Dependencies:	Overlapped until target span is achieved. The Measuring bit remains set until all signal track actions are complete (any reacquisition or zooming required). See details above this table.
Help Map ID:	3063
Instrument S/W Revision:	A.01.06 or later

If marker 1 is off when Signal Track is turned on, marker 1 is turned on in the center of the screen and a peak search is performed. If marker 1 is already on, it stays on and is used where it is. If it is Fixed, it is set to Normal.

If you move the marker during Signal Track, a Mkr-> CF is performed and the signal track function starts over.

If the signal is lost, an attempt will be made to find it again and continue tracking. If there are other signals on screen that are near the same amplitude, one of them may be found instead since the algorithm is seeking a signal with amplitude similar to the amplitude of the original signal.

Signals near 0 Hz cannot be tracked effectively as they cannot be distinguished from the LO feed-through, which is excluded by intent from the search algorithm.

As a speed optimization, the center frequency is only changed if it differs from the marker position by 1% or more of the span.

If the analyzer is in Single Sweep and Signal Track is turned on, then nothing happens until a sweep is actually initiated (i.e. by an INIT:IMM or Single keypress, and a trigger). Once the sweep is initiated, the

entire set of sweeps necessary to complete a pass through the signal track algorithm ensues before the analyzer returns *OPC true, returns results to a READ or MEASure, or returns to the idle state.

If the span is changed while in Signal Track, either by you or because moving the instrument to the signal's frequency results in Span Limiting, an "auto-zoom" algorithm is executed to get to the new span without losing the signal. In "auto zoom", the span is reduced in stages, with a sweep between each stage. You will see this zooming occur as each sweep is performed, and the new span is set.

When auto-zooming, the set of steps necessary to achieve the target span is to be considered a "measurement," thus the entire process executes even if the analyzer is in single sweep. *OPC will not return true until the process is complete nor will results be returned to a READ or MEASure command. Note further that if the analyzer is in a measurement such as averaging when this happens, the act of changing the span restarts averaging but the first average trace is the last trace of the auto zoom.

When you increase the span, we go directly to the new span. No zooming is required.

This function is intended to track signals with a frequency that is changing (drifting), and an amplitude that is not changing. It keeps tracking if you are in continuous-sweep mode. If in single-sweep mode, as described above, the analyzer only does one center frequency adjustment as necessary.

Sweep/Control

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Note that additional overhead time is required by the analyzer. It impacts the sweep rate, but is not calculated as part of the sweep time.

Reducing the sweep time increases the rate of sweeps.

In FFT spans, you cannot control the sweep time, it is set by the analyzer based on an estimate of the time required to make FFT measurements.

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points. So changing those parameters may change the sweep time.

Because there is no “Auto Sweep Time” when in zero span (for more detail, see table below), the Auto/Man line on this key disappears when in Zero Span.

The Auto/Man line also disappears when in an FFT sweep. In this case the key is grayed out as shown below. The approximate sweep time is calculated and displayed on the key.

Remote Command: [:SENSe]:SWEp:TIME <time>
 [:SENSe]:SWEp:TIME?
 [:SENSe]:SWEp:TIME:AUTO OFF|ON|0|1
 [:SENSe]:SWEp:TIME:AUTO?

Example: SWE:TIME 500 ms
 SWE:TIME:AUTO OFF

Dependencies/Couplings:	The third line of the softkey (Auto/Man) disappears in Zero Span. The SCPI command <code>SWEep:TIME:AUTO ON</code> if sent in Zero Span it generates an error message. Softkey grayed out and third line of the softkey (Auto/Man) disappears in FFT sweeps. Pressing the key or sending the SCPI for sweep time while the instrument is in FFT sweep generates a –221, “Settings Conflict,” error. The SCPI command <code>:SWEep:TIME:AUTO ON</code> if sent in FFT sweeps generates an error. Grayed out while in Gate View, to avoid confusing the user who wants to set Gate View Sweep Time. Key is grayed out in Measurements that don’t support swept mode. Key is blanked in Modes that don’t support swept mode. Set to Auto when Auto Couple is pressed or sent remotely The Sweep Time used upon entry to Zero Span is simply the same as the Sweep Time which was in effect before entering Zero Span. The Sweep Time can be changed while in Zero Span. Upon leaving Zero Span, the Auto/Man state of Sweep Time which existed before entering Zero Span is restored. If Sweep Time was in Auto before entering Zero Span, or if it is set to Auto while in zero span (which can happen via remote command or if Auto Couple is pressed) it returns to Auto and recouples when returning to non-zero spans. If Sweep Time was in Man before entering Zero Span, it returns to Man when returning to non-zero spans, and any changes to Sweep Time which were made while in Zero Span are retained in the non-zero span (except where constrained by minimum limits, which are different in and out of zero span).
Remote Command Notes:	The values shown in this table reflect the “swept spans” conditions which are the default settings after a preset. See “Couplings” for values in the zero span domain.
Preset:	The preset Sweep Time value is hardware dependent since Sweep Time presets to “Auto”.
State Saved:	Saved in State
Min:	in zero span: 1 μs in swept spans: 1 ms
Max:	in zero span: 6000 s in swept spans: 4000 s
Key Path:	Sweep/Control
SCPI Status Bits/OPC Dependencies:	Meas Uncal is Bit 0 in the <code>STATus:QUEStionable:INTegrity:UNCalibrated</code> register
Help Map ID:	3274
Instrument S/W Revision:	A.01.06 or later

Sweep Setup

Lets you set the sweep functions that control features such as sweep type and time.

Dependencies/Couplings:	The whole Sweep Setup menu is grayed out in Zero Span, however, the settings in the menus under Sweep Setup can be changed remotely with no error indication. Grayed out in measurements that don't support swept mode. Blanked in modes that don't support swept mode
Key Path:	Sweep/Control
Help Map ID:	3275
Instrument S/W Revision:	A.01.06 or later

Sweep Time Rules

Allows the choice of three distinct sets of sweep time rules. These are the rules that are used to set the sweep time when **Sweep Time** is in **Auto**. Note that these rules only apply when in the Swept **Sweep Type** (either manually or automatically chosen) and not when in FFT sweeps.

See [“More Information” on page 380](#).

Remote Command:	<pre>[:SENSe] :SWEep:TIME:AUTO:RULes NORMal ACCuracy SRESponse [:SENSe] :SWEep:TIME:AUTO:RULes?</pre>
Example:	SWE:TIME:AUTO:RUL ACC
Dependencies/Couplings:	In Zero Span, this key is irrelevant and cannot be accessed (because the whole Sweep Setup menu is grayed out in Zero Span), however its settings can be changed remotely with no error indication. Grayed out in FFT sweeps. Pressing the key while the instrument is in FFT sweep generates an advisory message. The SCPI is acted upon if sent, but of course has no effect other than to change the readout on the key, as long as the analyzer is in an FFT sweep. Set to Auto on Auto Couple
Preset:	AUTO
State Saved:	Saved in instrument state
Key Path:	Sweep/Control, Sweep Setup
Help Map ID:	3276
Instrument S/W Revision:	A.01.06 or later

More Information

The first set of rules is called **SA – Normal. Sweep Time Rules** is set to **SA-Normal** on a **Preset** or **Auto Couple**. These rules give optimal sweep times at the cost of a bit of accuracy. Note that this means

that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

Setting **Sweep Time Rules** to **SA-Accuracy** will result in slower sweep times than **SA-Normal**, usually about three times as long, but better amplitude accuracy for CW signals. The instrument absolute amplitude accuracy specifications only apply when **Sweep Time** is set to **Auto**, and **Sweep Time Rules** are set to **SA-Accuracy**. Additional amplitude errors which occur when **Sweep Time Rules** are set to **SA-Normal** are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, **SA-Normal** is the preferred setting of **Sweep Time Rules**.

The third set of sweep times rules is called **Stimulus/Response** and is automatically selected when an integrated source is turned on, such as a Tracking Generator or a synchronized external source. The sweep times for this set of rules are usually much faster for swept-response measurements. Stimulus-response auto-coupled sweep times are typically valid in stimulus-response measurements when the system's frequency span is less than 20 times the bandwidth of the device under test. You can select these rules manually (even if not making Stimulus-Response measurements) to get faster sweeps without the "Meas Uncal" warning, but you are then not protected from the oversweep condition and may end up with uncalibrated results. However, it is commonplace in measuring non-CW signals such as noise to be able to get excellent measurement accuracy at sweep rates higher than those required for CW signal accuracy, so this is a valid measurement technique.

Auto Sets analyzer to automatically choose sweep time rules according to description above.

Remote Command:	[:SENSe] :SWEep:TIME:AUTO:RULEs:AUTO[:STATe] ON OFF 1 0 [:SENSe] :SWEep:TIME:AUTO:RULEs:AUTO[:STATe] ?
Example:	:SWE:TIME:AUTO:RUL:AUTO ON
Dependencies/Couplings:	Set on Preset or Auto Couple
Preset:	ON
Key Path:	Sweep/Control, Sweep Setup, Sweep Time Rules
Help Map ID:	3277
Instrument S/W Revision:	A.01.06 or later

SA - Normal Chooses Sweep Time Auto Rules for optimal speed and generally sufficient accuracy.

Example:	:SWE:TIME:AUTO:RUL NORM
Dependencies/Couplings:	Automatically selected unless Source is on If directly selected sets AUTO to Off
Key Path:	Sweep/Control, Sweep Setup, Sweep Time Rules
Help Map ID:	3278
Instrument S/W Revision:	A.01.06 or later

SA - Accuracy Chooses Sweep Time Auto Rules for specified absolute amplitude accuracy.

Example:	:SWE:TIME:AUTO:RUL ACC

Dependencies/Couplings:	If directly selected sets AUTO to Off Also, regardless of these rules, do not allow sweep time to fall below 20 ms when in SA - Accuracy
Key Path:	Sweep/Control, Sweep Setup, Sweep Time Rules
Help Map ID:	3279
Instrument S/W Revision:	A.01.06 or later

Stimulus/Response Chooses Sweep Time Auto Rules for use with a source.

Example:	:SWE:TIME:AUTO:RUL SRES
Dependencies/Couplings:	Automatically selected when Source is on If directly selected sets AUTO to Off
Key Path:	Sweep/Control, Sweep Setup, Sweep Time Rules
Help Map ID:	3280
Instrument S/W Revision:	A.01.06 or later

Sweep Type

Chooses between the FFT and Sweep types of sweep.

Sweep Type refers to whether or not the instrument is in Swept or FFT analysis. When in Auto, the selection of sweep type is governed by two different sets of rules, depending on whether you want to optimize for dynamic range or for speed.

Remote Command:	[:SENSe] :SWEep:TYPE FFT SWEep [:SENSe] :SWEep:TYPE?
Dependencies/Couplings:	In Zero Span, this key is irrelevant and cannot be accessed (because the whole Sweep Setup menu is grayed out in Zero Span), however its settings can be changed remotely with no error indication. When Gate is on, Gate Method selection affects Sweep Type: Method FFT&Sweep menu FFT Swept grayed out and rules choose FFT Video FFT grayed out and rules choose Swept LO FFT grayed out and rules choose Swept
Remote Command Notes:	For a backward compatibility, the following remote parameters AUTO SWP will be supported by the [:SENSe]:SWEep:TYPE command.
Preset:	AUTO

Key Path: **Sweep/Control, Sweep Setup**
 Help Map ID: 3281
 Instrument S/W Revision: A.01.06 or later

Auto When in Auto, the selection of sweep type is governed by two different sets of rules, depending on whether you want to optimize for dynamic range or for speed. These rules are chosen under the **Sweep Type Rules** key.

Remote Command: [:SENSe] :SWEep:TYPE:AUTO OFF|ON|0|1
 [:SENSe] :SWEep:TYPE:AUTO?
Example: :SWE:TYPE:AUTO ON
Dependencies/Couplings: Pressing Auto Couple always sets Sweep Type to Auto.
Preset: ON
State Saved: Saved in instrument state
Key Path: **Sweep/Control, Sweep Setup, Sweep Type**
Help Map ID: 3282
Instrument S/W Revision: A.01.06 or later

Swept Manually selects swept analysis, so it cannot change automatically to FFT.

Example: SWE:TYPE SWE
Dependencies/Couplings: Grayed out while in Gated FFT (meaning Gate is ON and Gate Method is FFT).
 If this key is selected, the gate method Gated FFT is grayed out
State Saved: Saved in instrument state
Key Path: **Sweep/Control, Sweep Setup, Sweep Type**
Help Map ID: 3283
Instrument S/W Revision: A.01.06 or later

FFT Manually selects FFT analysis, so it cannot change automatically to Swept.

Example: SWE:TYPE FFT

Dependencies/Couplings:	Grayed out while in Gated LO (meaning Gate is ON and Gate Method is LO). Grayed out while in Gated Video (meaning Gate is ON and Gate Method is Video). If this key is selected, all the gate Methods except Gated FFT are grayed out. If Manual FFT is selected, the Signal ID key is grayed out. When Signal ID is on, Manual FFT is grayed out . For both the dynamic range case and the speed case, swept is chosen whenever any form of Signal ID is on.
State Saved:	Saved in instrument state
Key Path:	Sweep/Control, Sweep Setup, Sweep Type
Help Map ID:	3284
Instrument S/W Revision:	A.01.06 or later

Sweep Type Rules

Selects which set of rules will be used for automatically choosing the Sweep Type when Sweep Type is in Auto.

Remote Command:	<pre>[:SENSe] :SWEep:TYPE:AUTO:RULes SPEed DRANge</pre> <pre>[:SENSe] :SWEep:TYPE:AUTO:RULes?</pre>
Dependencies/Couplings:	In Zero Span, this key is irrelevant and cannot be accessed (because the whole Sweep Setup menu is grayed out in Zero Span), however its settings can be changed remotely with no error indication.
Preset:	DRANge
State Saved:	Saved in instrument state
Key Path:	Sweep/Control, Sweep Setup
Help Map ID:	3285
Instrument S/W Revision:	A.01.06 or later

Auto This selection is automatically chosen when Auto Couple is pressed. When in Auto, the Sweep Type Rules are simply set to Best Dynamic Range. It seems like a very simple Auto function but the use of this construct allows a consistent statement about what the Auto Couple key does.

Remote Command:	<pre>[:SENSe] :SWEep:TYPE:AUTO:RULes:AUTO[:STATe] OFF ON 0 1</pre> <pre>[:SENSe] :SWEep:TYPE:AUTO:RULes:AUTO[:STATe] ?</pre>
Example:	:SWE:TYPE:AUTO:RUL:AUTO ON
Dependencies/Couplings:	Pressing Auto Couple always sets Sweep Type Rules to Auto.
Preset:	ON

State Saved:	Saved in instrument state
Key Path:	Sweep/Control, Sweep Setup, Sweep Type Rules
Help Map ID:	3286
Instrument S/W Revision:	A.01.06 or later

Best Dynamic Range This selection tells the analyzer to choose between swept and FFT analysis with the primary goal of optimizing dynamic range. If the dynamic range is very close between swept and FFT, then it chooses the faster one. This auto selection also depends on RBW Type.

In determining the Swept/FFT setting the auto rules use the following approach:

If the RBW Filter Type is Gaussian use the RBW for the Normal Filter BW and if that $RBW > 210$ Hz, use swept; for $RBW \leq 210$ Hz, use FFT

If the RBW Filter Type is Flat Top, use the same algorithm but use 420 Hz instead of 210 Hz for the transition point between Swept and FFT

Example:	SWE:TYPE:AUTO:RUL DRAN sets the auto rules to dynamic range.
Dependencies/Couplings:	Directly selecting this setting sets AUTO to OFF.
Key Path:	Sweep/Control, Sweep Setup, Sweep Type Rules
Help Map ID:	3287
Instrument S/W Revision:	A.01.06 or later

Best Speed Selecting Best Speed tells the analyzer to choose between FFT or swept analysis based on the fastest analyzer speed.

Example:	SWE:TYPE:AUTO:RUL SPE sets the rules for the auto mode to speed
Dependencies/Couplings:	Directly selecting this setting sets AUTO to OFF.
Key Path:	Sweep/Control, Sweep Setup, Sweep Type Rules
Help Map ID:	3288
Instrument S/W Revision:	A.01.06 or later

FFT Width

This menu displays and controls the width of the FFT's performed while in FFT mode.

An FFT can only be performed over a limited span or segment known as the "FFT chunk" or "FFT width". Several FFT widths may need to be combined to measure the entire span. For advanced FFT control in the X-Series, you have direct control over the chunk width. Note that the setting will have no effect unless in an FFT sweep.

FFT measurements require that the signal level driving the A/D converter in the IF be small enough to avoid overloading, and that the gain that controls that signal level remain fixed during the measurement of an entire FFT segment. This constraint can allow higher dynamic ranges in swept mode in some cases, but narrowing the chunk width at the expense of losing some of the speed advantages of the FFT.

The X-Series does not have autoranging in swept mode (although the Auto setting of FFT IF Gain autoranges), but the manual ADC ranging using the "IF Gain" control can be set to a higher gain when the FFT segments are reduced in width.

Remote Command:	<code>[:SENSe] :SWEep:FFT:WIDTh <real></code> <code>[:SENSe] :SWEep:FFT:WIDTh?</code>
Example:	<code>SWE:FFT:WIDTh 167 kHz</code> sets this function to "<167.4 kHz"
Dependencies/Couplings:	In Zero Span, this key is irrelevant and cannot be accessed (because the whole Sweep Setup menu is grayed out in Zero Span). However, its settings can be changed remotely with no error indication.
Remote Command Notes:	The parameter is in units of frequency; the setting is chosen that is closest to the sent parameter. For example, "8 MHz" would select ~7.99 MHz whereas "5 kHz" would select <4.01 kHz. The readback is the number that was chosen not the number that was sent; for example, 4.01 E+3 or 25 E+6. For the last key, ~Maximum, the value that will get used is option dependant. Normally it will be equivalent to ~10 MHz but with the wide bandwidth option installed it will be equivalent to ~25 MHz. Any value sent from SCPI 10 MHz or greater will select ~Maximum. For example, if 11 MHz is sent it will select ~Maximum even though 8 MHz is closer to 11 MHz than 25 MHz. (An alternative would be to use an enum but the SCPI for that is ugly and doesn't allow easily for insertion of other values. It is acceptable, however, if this is too hard.)
Preset:	The Preset is Auto, but Preset will also pick Best Dynamic Range and hence this function will be set to ~Maximum
State Saved:	Saved in Instrument State
Key Path:	Sweep/Control, Sweep Setup
Help Map ID:	3289
Instrument S/W Revision:	A.01.06 or later
Remote Command:	<code>[:SENSe] :SWEep:FFT:WIDTh:AUTO OFF ON 0 1</code> <code>[:SENSe] :SWEep:FFT:WIDTh:AUTO?</code>
Example:	<code>:SWE:FFT:WIDTh:AUTO ON</code>
Dependencies/Couplings:	Pressing Auto Couple always sets FFT Width to Auto.
Preset:	ON
State Saved:	Saved in instrument state
Key Path:	Sweep/Control, Sweep Setup
Help Map ID:	0
Instrument S/W Revision:	A.01.06 or later

Gate

Accesses a menu that enables you to control the gating function .The Gate functionality is used to view signals best viewed by qualifying them with other events.

See “Gate” on page 387 in “common Measurement Functions” for more details.

Key Path	Sweep/Control
Help Map ID	0
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep, from 1 to 20001.

By selecting a number of sweep points greater than 1001 you are optimizing frequency resolution and accuracy while accepting a reduced measurement speed. In addition to sweep points, the span, resolution bandwidth, video bandwidth, average detection and center frequency will also affect measurement speed.

When in a split screen display each window may have its own value for points.

Remote Command:	[:SENSe] :SWEep:POINts <integer> [:SENSe] :SWEep:POINts?
Example:	SWE:POIN 501 SWE:POIN?
Dependencies/Couplings:	Grayed out in measurements that don't support swept Blanked in modes that don't support swept. Will be affected by: log sweep Whenever the number of sweep points change: All trace data is erased Any traces with Update Off will also go to Display Off (like going from View to Blank in the older analyzers) Sweep time is re-quantized Any limit lines that are on will be updated If averaging/hold is on, averaging/hold starts over
Preset:	1001
State Saved:	Saved in instrument state
Min:	1
Max:	20001
Key Path:	Sweep

Swept SA
Sweep/Control

Help Map ID: 3306
Instrument S/W Revision: A.01.06 or later

Trace/Detector

The **Trace/Detector** menu lets you control the acquisition, display, storage, detection and manipulation of trace data for the six available traces. The first page of this menu contains a selection of the trace type (**Clear Write, Trace Average, Max Hold, Min Hold**) for the selected trace. Those choices are described here.

A trace is a series of data points, each having an x and a y value. The x value is usually frequency (or time) and the y value is amplitude. Each data point is referred to as a trace point. In any given trace, trace point 0 is the first point, and trace point (sweep_points – 1) is the last. For example, in a 1001 point trace, the first point is 0 and the last is 1000. Another term sometimes used to describe traces is bucket. A bucket is the frequency span before and after the trace point equal to the point spacing. The y value is measured across (during) this bucket.

Remote Command: :TRACe [1] | 2 | 3 | 4 | 5 | 6 :TYPE WRITe | AVERAge | MAXHold | MINHold

:TRACe [1] | 2 | 3 | 4 | 5 | 6 :TYPE?

Remote Command Notes: WRITe = Clear Write

AVERAge = Trace Average

MAXHold = Maximum Hold

MINHold = Minimum Hold

Dependencies/Couplings: Note: Sending a trace command does not cause the specified trace to become selected.

Selecting a trace type (pressing any of the four keys or sending a TRAC:TYPE command) puts **Update** in **On** and **Display** in **On**, even if that trace type was already selected.

Preset: Write.

During normal operation of the instrument (that is, other than at powerup), after a mode preset is performed, all active traces are cleared. This is so their domains and initial x values will match the current X Axis of the analyzer. Inactive traces are not cleared after a preset, so a trace which is in **Update=On** before a preset, and in **Update=Off** after the preset, will still have the data that it had before the preset.

State Saved: The type of each trace is saved in Instrument State

Key Path: **Trace/Detector**

Help Map ID: 3311

Instrument S/W Revision: A.01.06 or later

Trace Update Indicator

Trace updates can take one of two forms:

The trace is updated in a single operation that affects all of the points in the trace at once. This happens, for example, in the case of very fast (< 200 ms) sweeps, single-chunk FFT's, and the initial math

operation after a math function is set for a trace.

The trace is updated in a series of discrete steps, with measurement data being gathered between each step. This will be the case for slow sweeps, multi-chunk FFT's, etc.

In the first case, no update indicator is required. In the second case, however, a visual indicator exists on the trace where the new data is being written, a green “caret” or ^ symbol, which moves across the bottom of the graticule showing the current trace point.



Trace Annunciator Panel

The trace annunciator panel appears on the right hand side of the Meas Bar. Here is an explanation of the fields in this panel:



On the line labeled “TRACE”, each trace number is shown, in the trace color. A green box is drawn around the currently selected trace

Below each trace number, on the line labeled “TYPE”, is a letter signifying the trace type for that trace number, where

W=Clear Write
A=Trace Average
M=Max Hold
m=Min Hold

If the letter is white it means the trace is being updated (**Update = On**); if the letter is dimmed, it means the trace is not being updated (**Update = Off**). A strikethrough (e.g., W) indicates that the trace is blanked (**Display = Off**). Note that it is possible for a trace to be updating and blanked, which is useful if the trace is a trace math component.

The third line, labeled “DET”, shows the detector type for each trace, or, if trace math is on for that trace, it shows an “f” (for “math function”). It is not always possible to have a unique detector for each trace, but the analyzer hardware provides the maximum flexibility of detector selection in order to maintain the highest accuracy. The letters used for this readout are:

N=Normal
A=Average

P=peak
p=negative peak
S=Sample
f=math function

If the DET letter is green it means the detector is in Auto; if it is white it means the detector has been manually selected.

Trace Annotation

When Trace Annotation (see View/Display menu) is On, each non-blanked trace is labeled on the trace with the detector used to take it, unless a trace math function is on for that trace, in which case it is labeled with the math function.

The detector labels are:

NORMNormal

PEAKPeak

SAMPSample

NPEAKNegative Peak

RMSAverage detector with Power Average (RMS)

LG AVGAverage detector with Log-Pwr Average

VAVGAverage detector with Voltage Average

The trace math labels are:

PDIFPower Difference

PSUMPower Sum

LOFFLog Offset

LDIFLog Difference

Select Trace

Determines which trace the type control keys will affect. Press **Trace** until the number of the desired trace is underlined.

Key Path	Trace
Preset	Trace 1
State Saved	The number of the selected trace is saved in Instrument State
Help Map ID	3314
Instrument S/W Revision	A.01.06 or later

Clear Write

In **Clear Write** type each trace update replaces the old data in the trace with new data. Pressing the **Clear**

Write key for the selected trace, or sending the `TRAC:TYPE WRIT` command for the specified trace, sets the trace type to **Clear Write** and causes the trace to be cleared. Then a new sweep is initiated.

Because pressing **Clear Write** stops the current sweep and initiates a new one, **Trace Average**, **Max Hold** and **Min Hold** data may be interrupted in mid-sweep, and may not accurately reflect the displayed count. Therefore, when **Clear Write** is pressed for one trace, **Trace Average**, **Max Hold** and **Min Hold** must restart for all traces.

When in **Clear Write**, if a measurement-related instrument setting is changed, a new sweep is initiated but the trace is not cleared.

Example:	TRAC:TYPE WRIT
Dependencies/Couplings:	Whenever you press Clear Write or send the equivalent SCPI command, Update is set to On and Display is set to On . Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections
Remote Command Notes:	See “Trace/Detector” on page 389 .
Preset:	After a Preset, any trace that is in Clear Write is cleared (all trace points set to mintracevalue).
State Saved:	The type for each trace is saved in Instrument State
Key Path:	Trace/Detector
Help Map ID:	3315
Instrument S/W Revision:	A.01.06 or later

Trace Average

In **Trace Average** type the analyzer maintains and displays an average trace, which represents the cumulative average on a point-by-point basis of the new trace data and previous averaged trace data. Details of the averaging calculations may be found under [“Average/Hold Number” on page 323](#) and [“Average Type” on page 324](#) in the Meas Setup Section.

See [“More Information” on page 393](#).

Example:	TRAC2:TYPE AVER
Dependencies/Couplings:	Affected by Average Type and Average/Hold Number Whenever you press Trace Average or send the equivalent SCPI command, Update is set to On and Display is set to On . Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections.
Remote Command Notes:	See “Trace/Detector” on page 389 .
Preset:	after a Preset, any trace that is in Trace Average is cleared (all trace points set to mintracevalue).
State Saved:	the type for each trace is saved in Instrument State

Key Path:	Trace/Detector
Help Map ID:	3316
Instrument S/W Revision:	A.01.06 or later

More Information

Pressing the **Trace Average** key (for the selected trace), or sending the `TRAC:TYPE AVER` command (for the specified trace), sets the trace type to **Trace Average** and causes the average to be restarted.

When in **Trace Average**, if a measurement-related instrument setting is changed, the average restarts and a new sweep is initiated but the trace is not cleared.

Restarting the average means:

The average/hold count *k* is set to 1, so that the next time the average trace is displayed it simply represents one trace of new data

A new sweep is initiated.

Once the new sweep starts, the trace is overwritten with current trace data as the first trace of the new average

Remember that restarting averaging also restarts **Max Hold** and **Min Hold**, as there is only one count for Trace Average and Hold.

Max Hold

In **Max Hold** type the analyzer maintains and displays a max hold trace, which represents the maximum data value on a point-by-point basis of the new trace data and previous trace data.

Pressing the **Max Hold** key for the selected trace, or sending the `:TRAC:TYPE MAXH` command for the specified trace, sets the trace type to **Max Hold**, causes the trace to be cleared, and causes the **Max Hold** sequence to be restarted.

When in **Max Hold**, if a measurement-related instrument setting is changed, the **Max Hold** sequence restarts and a new sweep is initiated but the trace is not cleared.

Restarting the **Max Hold** sequence means:

- The average/hold count *k* is set to 1, so that the next time the max hold trace is displayed it simply represents one trace of new data
- A new sweep is initiated.

Remember that restarting **Max Hold** also restarts averaging and **Min Hold**, as there is only one count for Trace Average and Hold.

Example: `TRAC4:TYPE MAXH`

Dependencies/Couplings:	Affected by Average Type and Average/Hold Number Whenever you press Max Hold or send the equivalent SCPI command, Update is set to On and Display is set to On . Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections.
Remote Command Notes:	See “Trace/Detector” on page 389 .
Preset:	After a Preset, any trace that is in Max Hold is cleared (all trace points set to mintracevalue).
State Saved:	The type for each trace is saved in Instrument State
Key Path:	Trace/Detector
Help Map ID:	3317
Instrument S/W Revision:	A.01.06 or later

Min Hold

In **Min Hold** type the analyzer maintains and displays a min hold trace, which represents the minimum data value on a point-point basis of the new trace data and previous trace data. Details of the count limiting behavior may be found under [“Average/Hold Number” on page 323](#) in the Meas Setup Section.

Pressing the **Min Hold** key for the selected trace, or sending the TRAC:TYPE MINH command for the specified trace, sets the trace type to **Min Hold**, causes the trace to be cleared, and causes the **Min Hold** sequence to be restarted.

When in **Min Hold**, if a measurement-related instrument setting is changed, the **Min Hold** sequence restarts and a new sweep is initiated but the trace is not cleared.

Restarting the **Min Hold** sequence means:

- The average/hold count k is set to 1, so that the next time the min hold trace is displayed it simply represents one trace of new data
- A new sweep is initiated.

Remember that restarting **Min Hold** also restarts **Max Hold** and averaging, as there is only one count for Trace Average and Hold.

Example:	TRAC3:TYPE MINH
Dependencies/Couplings:	Affected by Average Type and Average/Hold Number . Whenever you press Min Hold or send the equivalent SCPI command, Update is set to On and Display is set to On . Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections.
Remote Command Notes:	See “Trace/Detector” on page 389 .
Preset:	After a Preset, any trace that is in Min Hold is cleared (all trace points set to maxtracevalue).

State Saved:	The type for each trace is saved in Instrument State
Key Path:	Trace/Detector
Help Map ID:	3318
Instrument S/W Revision:	A.01.06 or later

View/Blank

This key lets you set the state of the two trace variables, Update and Display. The four choices available in this 1-of-N menu are:

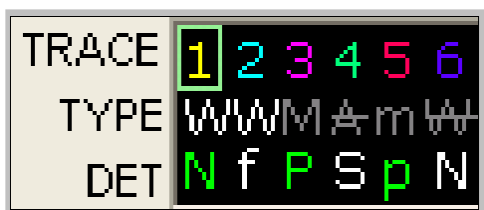
Trace On: Update and Display both On

View: Update Off and Display On

Blank: Update Off and Display Off

Background: Update On, Display Off (this allows a trace to be blanked and continue to update “in the background”, which was not possible in the past)

A trace with Display Off is indicated by a strikethrough thru the type letter in the trace annotation panel in the Measurement bar. A trace with Update Off is indicated by dimming the type letter in the trace annotation panel in the Measurement bar. So in the example below, Traces 3, 4, 5 and 6 have Update Off and Traces 4 and 6 have Display Off.



See [“Trace Update State On/Off” on page 397](#).

See [“Trace Display State On/Off” on page 397](#).

See [“More Information” on page 397](#).

Key Path	Trace/Detector

Swept SA Trace/Detector

Dependencies/Couplings	Selecting a trace type (Clear Write, Trace Average, Max Hold, Min Hold) for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (Update On and Display On), even if that trace type was already selected. Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts the trace in View (Update On and Display On), even if that detector was already selected. Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (Update On and Display On), even if that math mode was already selected. Loading a trace from a file puts that trace in View regardless of the state it was in when it was saved; as does being the target of a Copy or a participant in an Exchange.
Help Map ID	3319
Instrument S/W Revision	A.01.06 or later

Trace Update State On/Off

Remote Command:	:TRACe [1] 2 3 4 5 6 :UPDate [:STATe] ON OFF 0 1 :TRACe [1] 2 3 4 5 6 :UPDate [:STATe] ?
Example:	TRAC2:UPD 0 Makes trace 2 inactive (stops updating)
Dependencies/Couplings:	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset:	1 0 0 0 0 0 (On for Trace 1; Off for 2–6)
State Saved:	Saved in Instrument State
Key Path:	Trace/Detector
Help Map ID:	0
Instrument S/W Revision:	A.01.06 or later

Trace Display State On/Off

Remote Command:	:TRACe [1] 2 3 4 5 6 :DISPlay [:STATe] ON OFF 0 1 :TRACe [1] 2 3 4 5 6 :DISPlay [:STATe] ?
Example:	TRAC2:DISP,1 Makes trace 2 visible TRAC3:DISP,0 Blanks trace 3
Dependencies/Couplings:	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset:	1 0 0 0 0 0 (On for Trace 1; Off for 2–6)
State Saved:	Saved in Instrument State
Key Path:	Trace/Detector
Help Map ID:	0
Instrument S/W Revision:	A.01.06 or later

More Information

When a trace becomes inactive, the following things happen:

Any update from the SENSE system (detectors) immediately stops (does not wait for end of sweep)

the trace is displayed at half intensity (as long as it stays inactive)

Inactive traces display across the entire X Axis of the instrument. Their horizontal placement does not change even if X Axis settings subsequently are changed, although Y-axis settings will affect the vertical placement of data.

In most cases, inactive traces are static and unchanging; however, there are cases when an inactive trace will update, specifically:

- if data is written to that trace from remote
- if trace data is loaded from mass storage
- if the trace is the target of a Copy or participant in an Exchange
- if the trace is cleared using the Clear Trace function (below)

When a trace becomes active (Update=On), the trace is cleared, the average count is reset, and a new sweep is initiated.

Traces which are blanked (Display=off) do not display nor appear on printouts but are otherwise unaffected. They may be queried and markers may be placed on them.

Note that the action of putting a trace in Display=Off and/or Update=Off does not restart the sweep and does not restart Averaging or Hold functions for any traces.

Note also that whenever you set **Update** to **On** for any trace, **Display** is set to **On** for that trace.

Detector

Selects a detector. The detector selected is then applied to the selected trace.

For the SCPI UI, two commands are provided. One is a legacy command, which affects all traces. There is also a new command, which uses a subopcode to specify to which trace the specified detector is to be applied.

See [“More Information” on page 399](#)

Remote Command:

```
[ :SENSe ] :DETEctor:TRACe [1] | 2 | 3 | 4 | 5 | 6
AVERage | NEGative | NORMal | POSitive | SAMPlE

[ :SENSe ] :DETEctor:TRACe [1] | 2 | 3 | 4 | 5 | 6 ?
```

Example:

```
DET:TRAC AVER -- Sets trace 1's detector to average
DET:TRAC1 AVER -- Sets trace 1's detector to average
DET:TRAC2 SAMP -- Sets trace 2's detector to sample
```

Dependencies/Couplings:

The auto detector rules depend upon marker type, averaging state and type, trace state writing mode, and trace active state.

Remote Command Notes:

The query returns a name that corresponds to the detector type as shown below, and indicates the setting for Trace 1.

String ReturnedDefinition

NORMNormal

AVERAverage / RMS

POSPositive peak

SAMPSample

NEGNegative peak

Preset: Preset returns all traces to “auto”, which will result in Normal (Rosenfell) detection for all traces.

State Saved: Saved in State

Key Path: **Trace/Detector, Detector**

Help Map ID: 3321

Instrument S/W Revision: A.01.06 or later

Remote Command: [:SENSe]:DETEctor[:FUNction]
 NORMal|AVERage|POSitive|SAMPle|NEGative|QPEak|EAVerage|
 EPOSitive|MPOSitive|RMS
 [:SENSe]:DETEctor[:FUNction]?

Example: DET AVER Sets detector to average for all traces

DET:FUNC? Returns trace 1’s detector setting

Remote Command Notes: The query returns a name that corresponds to the detector type as shown below, and indicates the setting for Trace 1.

The RMS selection sets the detector type to AVERage and the Average Type to RMS. Therefore if RMS has been selected, the query will return the “AVER” string.

.
 String ReturnedDefinition
 NORMNormal
 AVERAverage / RMS
 POSPositive peak
 SAMPsample
 NEGNegative peak

Preset: NORMal

State Saved: Saved in State

Help Map ID: 3322

Instrument S/W Revision: A.01.06 or later

More Information

The available detectors are:

The Sample detector indicates the instantaneous level of the signal at the center of the bucket represented by each display point.

The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.

The Average detector determines the average of the signal within the bucket. The averaging method

depends upon Average Type selection (voltage, power or log scales).

The Peak detector determines the maximum of the signal within the bucket.

The Negative Peak detector determines the minimum of the signal within the bucket.

[

Because they may not find a spectral component's true peak, neither average nor sample detectors measure amplitudes of CW signals as accurately as peak or normal, but they do measure noise without the biases of peak detection.

When the Detector choice is Auto, the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.

When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.

Multiple Detectors

The analyzer always provides the requested detector on the specified trace. Depending on the detectors requested the analyzer can provide up to three different detectors simultaneously within the constraints of its digital processing algorithms.

Auto

This sets the detector for the currently selected trace to Auto. (For SCPI, the trace number is specified as a sub-opcode.) This will immediately apply the auto rules to determine a new detector value.

Remote Command: [:SENSe]:DETECTOR:TRACe [1] | 2 | 3 | 4 | 5 | 6 :AUTO ON | OFF | 1 | 0

[:SENSe]:DETECTOR:TRACe [1] | 2 | 3 | 4 | 5 | 6 :AUTO?

Example: DET:TRACE2:AUTO ON sets trace 2 detection to automatic.

Dependencies/Couplings: The auto detector rules depend upon marker type, averaging state and type, trace state writing mode, and trace active state.

Selecting AUTO, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace.

Preset: Auto (On) for all detectors.

State Saved: Saved in state

Key Path: Trace/Det, Detector

Help Map ID: 3323

Instrument S/W Revision: A.01.06 or later

Remote Command: [:SENSe]:DETECTOR:AUTO ON | OFF | 1 | 0

[:SENSe]:DETECTOR:AUTO?

Example: DET:AUTO ON

Remote Command Notes:	The query returns the Auto state of Trace 1.
Help Map ID:	0
Instrument S/W Revision:	A.01.06 or later

Normal

This sets the detector for the current selected trace to Normal (Rosenfell).

When the signal is CW-like, it displays the peak-detected level in the interval (bucket) being displayed. If the signal is noise-like (within a bucket the signal both rose and fell), it alternates displaying the max/min values. That is, an even bucket shows the peak (maximum) within a two-bucket wide interval centered on the even bucket. And an odd bucket will show the negative peak (minimum) within a two-bucket wide interval. For example, for an even bucket the two-bucket wide interval is a combination of one-half bucket to the left of the even bucket, the even bucket itself, and one-half bucket to the right of the even bucket, so the peak found will be displayed in the correct relative location on screen. The odd buckets are similar.

Example:	DET:TRAC3 NORM sets the detector to normal for trace 3.
Dependencies/Couplings:	Selecting any detector (even the currently selected detector) for a given trace turns Update and Display on for that trace. Normal detector is grayed out when the X scale is Log. Selecting a specific detector type turns “Auto” to false for this trace (manual). Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts Update On and Display On for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior. Selecting a detector, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace.
Key Path:	Trace/Det, Detector
Help Map ID:	3324
Instrument S/W Revision:	A.01.06 or later

Average (Log/RMS/V)

For each bucket (interval) in the trace, Average detection displays the average of the amplitude within the bucket using one of the following averaging methods:

Log power (also known as video)

Power (also known as RMS)

Voltage envelope

To explicitly set the averaging method, use the **Meas Setup, Average Type** key. When you are using average detection with the Power method is equivalent to what is sometimes referred to as “RMS detection”. The detailed information about the different types of averaging is found in **Average Type** in

the **Meas Setup** key menu.

Example:	DET:TRAC3 AVER sets the detector to average for trace 3.
Dependencies/Couplings:	Selecting any detector (even the currently selected detector) for a given trace turns Update and Display on for that trace. Selecting a specific detector type turns “Auto” to false for this trace (manual). Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts Update On and Display On for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior. Selecting a detector, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace. The VBW filter is not used for this detector, so varying the VBW will have no effect for any traces for which this detector is selected (other than to slow down the sweep, because of the coupling to Sweep Time of VBW). Use of the Average detector affects the VBW setting because of its effect on the VBW/RBW coupling. See the BW section under the key ““Video BW ” on page 276””.
Remote Command Notes:	For the specific case of a customer wanting RMS detection, they need to set the averaging type to RMS, and also select average detection for the trace: <pre>AVER:TYPE RMS DET:TRAC AVER</pre>
Key Path:	Trace/Det, Detector
Help Map ID:	3325
Instrument S/W Revision:	A.01.06 or later

Peak

For each bucket (interval) in the trace, Peak detection displays the highest amplitude within the bucket.

Peak detection is used for CW measurements and some pulsed-RF measurements. For FFT analysis, the highest amplitude across the frequency width of a bucket is displayed, even if that peak amplitude falls between samples of the spectrum computed in the FFT process.

Example:	DET:TRAC2 POS sets the detector to peak for trace 2.
Dependencies/Couplings:	Selecting a specific detector type turns “Auto” to false for this trace (manual). Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts Update On and Display On for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior. Selecting a detector, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace.
Key Path:	Trace/Det, Detector

Help Map ID: 3326
Instrument S/W Revision: A.01.06 or later

Sample

The sample detector displays the instantaneous level of the signal at the center of the bucket (interval) represented by each trace point.

Sample detection is good for displaying noise or noise-like signals.

Sample detection is not the best for making amplitude measurements of CW-like signals for two reasons. First, the peak response to a signal can occur between samples. So unless the Span to RBW ratio is lower than usual, then the highest sample can be well below the peak signal amplitude. Second, for the high sweep rates normally used, the peak response of the RBW filters is up to -0.5 dB. This sweeping error is compensated when using the peak and normal detectors by changing the overall gain. But the gain is not changed when in the sample detector, because doing so would cause errors in the response to noise. Instead, the auto-couple rules for sweep time are modified to give slower sweeps.

Example: DET:TRAC SAMP selects the Sample detector for trace 1.

Dependencies/Couplings: Selecting a specific detector type turns “Auto” to false for this trace (manual).
Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts **Update On** and **Display On** for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior.
Selecting a detector, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace.

Key Path: **Trace/Det, Detector**

Help Map ID: 3327
Instrument S/W Revision: A.01.06 or later

Negative Peak

For each bucket (interval) in the trace, Negative Peak detection displays the lowest sample within the bucket. Negative peak detection is similar to peak detection, but selects the minimum video signal.

Example: DET:TRAC2 NEG selects the negative peak detector for trace 2.

Dependencies/Couplings: Selecting a specific detector type turns “Auto” to false for this trace (manual).
Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts **Update On** and **Display On** for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior.
Selecting a detector, whether by pressing the softkey or sending the equivalent SCPI command, will turn trace math to Off for the selected/specified trace.

Key Path: **Trace/Det, Detector**

Help Map ID: 3328
Instrument S/W Revision: A.01.06 or later

Preset Detectors

The keys in this menu provide a quick way of setting a number of traces to convenient common detector settings. It is important to point out that these are not toggles or ‘modes’, and do not keep any detectors in a particular configuration. The effect is identical to just setting the traces’ detectors individually. These are simply one-time settings that are quicker than making many individual changes.

Preset: No interaction with preset
State Saved: Not saved in state
Help Map ID: 3333
Instrument S/W Revision: A.01.06 or later

All Traces Auto

This is designed to quickly return the selected set of detectors to the “preset” state, which is auto-selected.

Dependencies/Couplings: Sets all traces’ Detector Auto to true.
Help Map ID: 3334
Instrument S/W Revision: A.01.06 or later

Peak / Average / NPeak

This is a setting for making a measurement of the average power and the signal envelope.

Dependencies/Couplings: Trace 1: Set to peak detection, and Clear-Write.
Trace 2: Set to average detection, and Clear-Write.
Trace 3: Set to negative peak detection, and Clear-Write.
Help Map ID: 3335
Instrument S/W Revision: A.01.06 or later

Peak / Sample / NPeak

This is a setting for making a measurement that displays a power sample and the signal envelope.

Dependencies/Couplings: Trace 1: Set to peak detection, and Clear-Write.
Trace 2: Set to sample detection, and Clear-Write.
Trace 3: Set to negative peak detection, and Clear-Write.
Help Map ID: 3336

Instrument S/W Revision: A.01.06 or later

Clear Trace

Clears the selected trace (from the front panel) or the specified trace (from SCPI). Does not affect the state of any function or variable in the instrument. Loads mintracevalue into all of the points in the selected trace, unless the trace is in Min Hold in which case it loads maxtracevalue. It does this even if Update=Off.

Remote Command: :TRACe:CLEAr TRACE1 | TRACE2 | TRACE3 | TRACE4 | TRACE5 | TRACE6

Example: TRAC:CLE TRACE1 clears trace 1

Key Path: **Trace/Detector**

Help Map ID: 3339

Instrument S/W Revision: A.01.06 or later

Clear All Traces

Clears all traces. Does not affect the state of any function or variable in the instrument. Loads mintracevalue into all of the points all traces, except traces in Min Hold in which case it loads maxtracevalue. Does so even if Update=Off.

Remote Command: :TRACe:CLEAr:ALL

Example: TRAC:CLE:ALL clears all traces

Key Path: **Trace/Detector**

Help Map ID: 3340

Instrument S/W Revision: A.01.06 or later

Math

This menu lets you turn on trace math functions. Trace math functions perform mathematical operations between traces and, in some cases, user-specified offsets. When in a trace math function, the indicated function is performed during the sweep with the math function used in place of a detector. The trace operands for the math function are set using the **Trace Operands** key.

See “More Information” on page 407

Remote Command:	<pre>:CALCulate:MATH TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, PDifference PSUM LOFFset LDifference OFF, TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <real>, <real> :CALCulate:MATH? TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6</pre>
Dependencies/Couplings:	Trace Math is not available if Normalize is on. None of the trace operands can be the destination trace. If any of the three trace math commands is sent with a destination trace number matching one of the operands a warning is generated and the function does not turn on. Whenever a math function is turned on for a trace, that trace is set to Display=On and Update=On.
Remote Command Notes:	The Trace Math Function command has 6 main set of parameters: - Set 1 defines the “result trace”: <pre>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6</pre> -Set 2 defines the “function”: <pre>PDifference PSUM LOFFset LDifference OFF</pre> - Set 3 is a “trace operand” (1): <pre>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6</pre> - Set 4 is a “trace operand” (2): <pre>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6</pre> - Set 5 defines the “Log Offset” (in dB). - Set 6 defines the “Log Difference Reference” (in dBm). Note that the trace math mode is an enumeration; that is, when a math function is set for a trace it turns off any math function that is on for that trace and sets the new math function. The parameters sent in the command are reflected in the values in the softkey menu. There is no default for any parameter; all 6 parameters must be sent to satisfy the parser. Failure to specify a parameter will result in a missing parameter error. Note that for some of the math modes some of the parameters are not relevant. For those modes, the parameters are ignored, and sending “,” is sufficient for those parameters. The query returns the math mode, the operand traces, the offset and the reference for the specified trace, all separated by commas. The return value of irrelevant parameters is undefined; empty fields (“,”) would be desirable. Remote command examples are included in each section below.

Preset:	OFF,TRACE5,TRACE6,0,0 OFF,TRACE6,TRACE1,0,0 OFF,TRACE1,TRACE2,0,0 OFF,TRACE2,TRACE3,0,0 OFF,TRACE3,TRACE4,0,0 OFF,TRACE4,TRACE5,0,0
State Saved:	The trace math function for each trace is saved in Instrument State.
Key Path:	Trace/Detector
SCPI Status Bits/OPC Dependencies:	*OPC can be used to detect the completion of a sweep, which will also correspond to the completion of the math operation, since all math takes place during the sweep
Help Map ID:	3341
Instrument S/W Revision:	A.01.06 or later

More Information

IMPORTANT: to generate a trace math result, you must take a sweep. The trace math engine, described below, operates in concert with the sweep engine in the analyzer. Until a sweep has been taken, even if the constituent traces are not in Update mode, no result is generated. Note that certain events can affect the trace in ways that affects all points at once. This can happen in any number of ways, including:

A trace clear taking place

A trace being loaded from the file system

Trace data being sent in from the remote interface

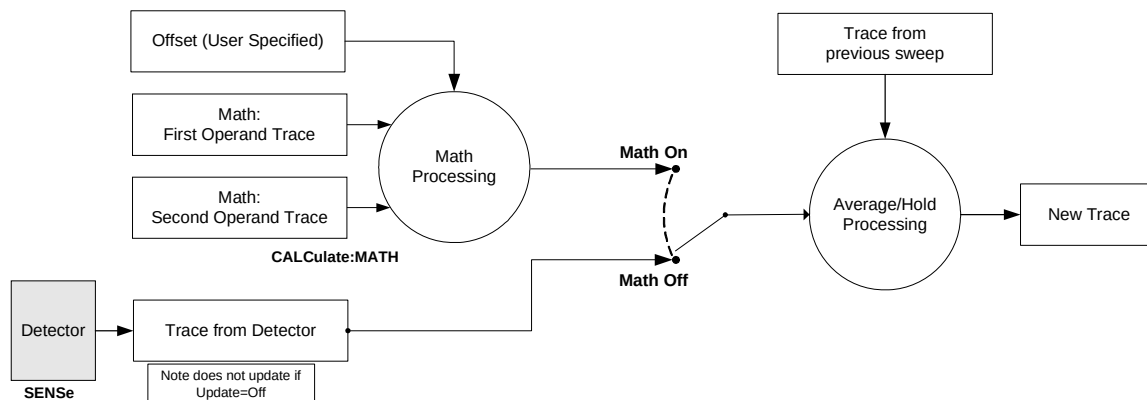
A copy or exchange of trace data

You should try to avoid these occurrences during a sweep, as they will tend to invalidate the math result being accumulated.

How trace math is processed:

Whenever a trace math function is turned on, or the parameters and/or operands of an existing trace math function are changed, the destination trace is cleared. After the trace is cleared, all x-axis values in the trace, and the domain of the trace, are set to match the X Axis settings of the first trace operand. When this is complete, a new sweep is initiated.

The process of acquiring data, processing it using the math and average/hold functions, and presenting it to the user as trace data, consists of several functional blocks, as shown below:



For each active trace, the current trace point is processed for Trace 1, then Trace 2, then Trace 3, etc. Trace data is taken from either the detector for that trace, or from the mathematical result of up to two other traces and an offset, depending on whether trace math is on or not. The resultant data is then fed to the Average/Hold processing block, where (if the trace type is Average, Max Hold, or Min Hold) it is processed with previous trace data. The new trace data resulting from this process is then available for display, storage or remote output.

When the processing is complete for Trace 1, Trace 2 is processed, and so on until all six traces have been processed. This allows a downstream trace to use as one of its math components a fully processed upstream trace. In other words, if math is on for Trace 4, and its operand traces are Trace 2 and Trace 3, all detector, math, average and hold processing for traces 2 and 3 is complete before the math is performed for trace 4. When the current trace point is completed for all traces, the analyzer moves on to the next trace point.

Select Trace

Duplicate of the Select Trace key under Trace. Selecting a trace here causes the same trace to be selected on the higher level key. (That is, there is only one "selected trace".) Here it determines the destination trace to be used while setting up the math functions. Press Trace until the number of the desired trace is underlined.

For details about this key, see Section 22.3.1, Select Trace.

Power Diff (Op1-Op2)

Calculates a power difference between the **First Trace** operand and the **Second Trace** operand and puts the result in the destination trace.

During the sweep, the following formula is executed for each point in the trace operands, and the corresponding point is generated for the destination trace:

$$\text{DestinationTrace} = 10 \log(10(1/10)(\text{FirstTrace}) - 10(1/10)(\text{SecondTrace}))$$

The values of the trace points are assumed to be in a decibel scale, as they are internally stored.

If a point in FirstTrace is equal to maxtracevalue, the resultant point is also maxtracevalue.

Otherwise, if the result of the subtraction is less than or equal to 0, the resultant point is mintracevalue.

Example: :CALC:MATH TRACE1, PDIF, TRACE4, TRACE5, ,
sets Trace 1 to **Power Diff** trace math function, and sets the **First Trace** operand (for Trace 1) to Trace 4 and the **Second Trace** operand (for Trace 1) to Trace 5.

Dependencies/Couplings: Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (**Update On and Display On**), even if that math mode was already selected.

Key Path: **Trace/Detector, Math**

Help Map ID: 3342

Instrument S/W Revision: A.01.06 or later

Power Sum (Op1+Op2)

Calculates a power sum between the **First Trace** operand and the **Second Trace** operand and puts the result in the destination trace.

During the sweep, the following formula is executed for each point in the trace operands, and the corresponding point is generated for the destination trace.:

$$\text{DestinationTrace} = 10 \log(10(1/10)(\text{FirstTrace}) + 10(1/10)(\text{SecondTrace}))$$

The values of the trace points are assumed to be in a decibel scale, as they are internally stored.

If a point in either trace operand is equal to maxtracevalue, the resultant point is also maxtracevalue.

Example:	:CALC:MATH TRACE1, PSUM, TRACE4, TRACE5, , sets Trace 1 to Power Sum trace math function and sets the First Trace operand (for Trace 1) to Trace 4 and the Second Trace operand (for Trace 1) to Trace 5.
Dependencies/Couplings:	Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (Update On and Display On), even if that math mode was already selected.
Key Path:	Trace/Detector, Math
Help Map ID:	3343
Instrument S/W Revision:	A.01.06 or later

Log Offset (Op1 + Offset)

Calculates a log offset from the **First Trace** operand and puts the result in the destination trace. This is like the B-DL function in some older analyzers. The offset is entered as the active function. Each destination trace has its own offset.

During the sweep, the following formula is executed for each point in the trace operand, and the corresponding point is generated for the destination trace.:

$$\text{DestinationTrace} = \text{FirstTrace} + \text{Offset}$$

The values of the trace points are assumed to be in dBm (as they are internally stored) and the offset is in dB.

If a point in the trace operand is equal to maxtracevalue, the resultant point is also maxtracevalue.

If a point in the trace operand is equal to mintracevalue, the resultant point is also mintracevalue.

Example: If offset is 25 dB, then our destination trace will be higher than the operand trace by 25 dB.

Note that the **Second Trace** operand is not used for this function.

Example:	:CALC:MATH TRACE1, LOFF, TRACE4, , -6.00, sets Trace 1 to Log Offset trace math function, sets the First Trace operand (for Trace 1) to Trace 4, leaves the Second Trace operand (for Trace 1) unchanged (it is irrelevant for this function) and sets the Log Offset (for Trace 1) to -6 dB.

Dependencies/Couplings:	Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (Update On and Display On), even if that math mode was already selected.
State Saved:	The Log Offset value for each trace is saved in Instrument State
Min:	–100 dB
Max:	100 dB
Key Path:	Trace/Detector, Math
Help Map ID:	3344
Instrument S/W Revision:	A.01.06 or later

Log Diff (Op1-Op2+Ref)

Offsets the difference between the **First Trace** operand and the **Second Trace** operand by a reference and puts the result in the destination trace. This is like the A-B+DL function in some older analyzers. The reference is entered as the active function. Each destination trace has its own reference.

During the sweep, the following formula is executed for each point in the trace operands, and the corresponding point is generated for the destination trace:

$$\text{DestinationTrace} = (\text{FirstTrace} - \text{SecondTrace}) + \text{Reference}$$

The values of the operand trace points are assumed to be in decibel units (as they are internally stored) and the reference is in dBm so the result is in dBm.

Example: If the first operand trace 1 is at 5 dBm, the second operand trace 2 is at –5 dBm, and the reference is –25 dBm, then the destination trace will be –15 dBm.

Example: If the first operand trace1 is at 60 dBuV, the second operand trace 2 is at 50 dBuV, and the reference is 35 dBuV, then the destination trace will be 45 dBuV.

See “[More Information](#)” on page 411.

Example:	:CALC:MATH TRACE1,LDIF,TRACE4,TRACE5,,–6.00 sets Trace 1 to Log Diff trace math function, sets the First Trace operand (for Trace 1) to Trace 4, sets the Second Trace operand (for Trace 1) to Trace 5, and sets the Log Difference reference for Trace 1 to –6 dBm.
Dependencies/Couplings:	Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in View (Update On and Display On), even if that math mode was already selected.
State Saved:	The Log Difference reference value for each trace is saved in Instrument State
Min:	Same as reference level
Max:	Same as reference level
Key Path:	Trace/Detector, Math
Default Unit:	depends on the current selected Y axis unit

Help Map ID: 3345
Instrument S/W Revision: A.01.06 or later

More Information

If a point in FirstTrace is equal to maxtracevalue, the resultant point is also maxtracevalue.

If a point in FirstTrace is equal to mintracevalue, the resultant point is also mintracevalue.

If neither of the above is true for a given point, then:

If that point in SecondTrace is equal to maxtracevalue, the resultant point is mintracevalue.

If that point in SecondTrace is equal to mintracevalue, the resultant point is maxtracevalue.

Off

Turns off Trace Math.

Example: CALC:MATH TRACE1 OFF turns off trace math for trace 1.
Remote Command Notes: See Trace “Math”.
State Saved: The current trace math function is saved in Instrument State
Key Path: **Trace/Detector, Math**
Help Map ID: 3346
Instrument S/W Revision: A.01.06 or later

Operands

Selects the trace operand(s) to be used for the trace math functions for the destination trace.

Dependencies/Couplings: The destination trace cannot be an operand.
Remote Command Notes: The operands of the trace math commands specify the trace operands. Since the operands are common to all math functions for a given trace, the most recently sent math function command sets the operands for each trace and are reflected on the trace operand keys.
Key Path: **Trace, Math**
Help Map ID: 3347
Instrument S/W Revision: A.01.06 or later

Operand 1 Selects the first trace operand to be used for the trace math functions for the destination trace.

Dependencies/Couplings: The First Trace cannot be the same as the destination trace. The destination trace number is gray on the key, and the underline skips that number when selecting the trace.

Preset:	Trace number – 2 (wraps at 1). For example, for Trace 1, the First Trace presets to Trace 5; for Trace 6, it presets to Trace 4.
State Saved:	The First Trace operand for each trace is stored in instrument state.
Key Path:	Trace, Math, Trace Operands
Help Map ID:	3348
Instrument S/W Revision:	A.01.06 or later

Operand 2 Selects the second trace operand to be used for the trace math functions for the destination trace.

Dependencies/Couplings:	The Second Trace cannot be the same as the destination trace. The destination trace number is gray on the key, and the underline skips that number when selecting the trace.
Preset:	Trace number – 1 (wraps at 1). For example, for Trace 1, the Second Trace presets to Trace 6; for Trace 6, it presets to Trace 5.
State Saved:	The Second Trace operand for each trace is stored in instrument state
Key Path:	Trace, Math, Trace Operands
Help Map ID:	3349
Instrument S/W Revision:	A.01.06 or later

Normalize

Displays menu keys that let you normalize trace data.

Key Path	Trace/Detector
Help Map ID	3350
Instrument S/W Revision	A.01.06 or later

Normalize On/Off

Normalize (On) activates the normalize function. On each sweep, the normalized trace (Trace 3) is subtracted from Trace 1 and the result is added to the normalized reference level. This arithmetic assumes all values are in decibel units, so we are actually taking a ratio.

See [“More Information” on page 413](#).

See [“Normalize Block Diagram” on page 414](#).

Remote Command:	:CALCulate:NTData[:STATE] OFF ON 0 1 :CALCulate:NTData[:STATE] ?

Example:	CALC:NTD ON CALC:NTD?

Dependencies/Couplings:	• If Normalize (On) is pressed before Store Ref (1 3), an error message is generated. Normalize remains off in this case. • Normalize is not available (grayed out) if any Trace Math function is on. • When Normalize is turned on, Trace 1 is placed in Clear/Write with Update = On and Display = On.
Preset:	OFF
State Saved:	Saved in Instrument State.
Key Path:	Trace/Detector, Normalize
Help Map ID:	3351
Instrument S/W Revision:	A.01.06 or later

More Information

First the following calculation is performed:

Trace 1 = (Trace 1D – Normalized Trace)

Where:

Trace 1D is the measured value of trace 1, as it comes from the SENSE subsystem.

Normalized Trace is Trace 3, in which you have previously stored a reference trace

All values are in decibel units.

This Trace 1 contains the values that will be returned from a trace query, or if the marker is placed on the trace.

For example, let's say bucket 1 on Trace 1 is at 0 dBm, and bucket 1 on Trace 3 is at 10 dBm. The resultant bucket is at $0 \text{ dBm} - 10 \text{ dBm} = -10 \text{ dB}$ (just like with a delta marker).

You are also given the ability to define what (dB) value to use for Ref Level, and to define where on the screen the Ref Lvl line will appear using Normalized Reference Position. This flexibility in displaying the result allows a wide range of devices, including amplifiers, to be tested using Normalize.

In the example above, bucket 1 has the value of -10 dB . Let us assume you have set Norm Ref Lvl to 5 dB. Thus bucket 1 will display 1.5 divisions below the Reference Level line (assuming 10 dB per division).

The Reference Level line is normally the top line of the graticule. If Norm Ref Posn is set to 10, this is the case. If it is set to 9, it is the next line down. If it is set to 5, it is the middle line of the graticule. If set to 0 it is the bottom line.

So in the example above, if Norm Ref Posn is set to 9, then bucket 1 will display 2.5 divisions below the top line of the graticule.

None of the manipulations of Norm Ref Posn and Norm Ref Lvl affect the data in the trace.

As Normalize displays a ratio between two traces (a difference, in dB) the Y-Axis Unit while in Normalize is dB in Log Amplitude and dimensionless in Linear. The Y Axis Unit chosen in the Y Axis Unit menu is unaffected by Normalize. When you leave Normalize the Y Axis Unit returns to the value set in the Y Axis Unit menu. While in Normalize, all amplitude functions, such as Marker Y and the

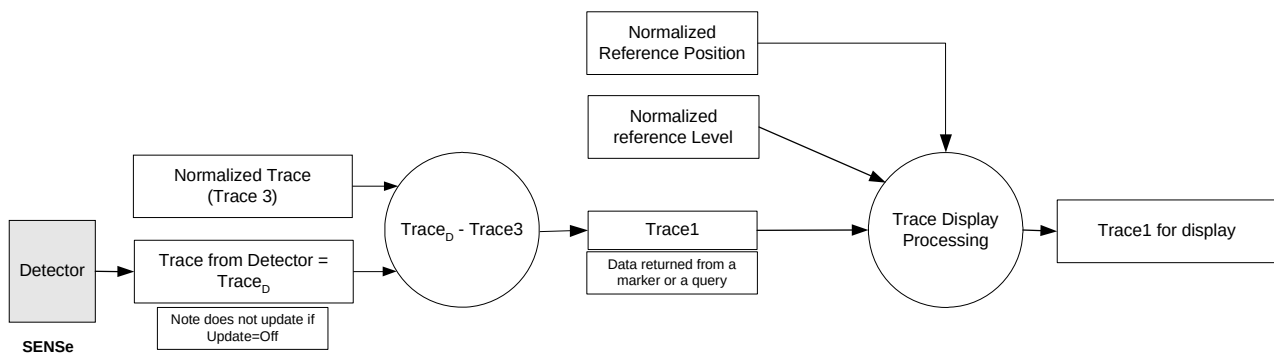
values in other traces, should be always in db unit, and so should the returned trace query results. In other words, both trace query result and marker Y become independent of the Y Axis Unit chosen in the Y Axis Unit menu when normalize is on.

(In Linear, the equivalent calculation is performed but it yields a dimensionless ratio, so the normalized ref level will be unitless, presetting to 1, just as in Log it presets to 0 dB).

Y Axis annotation is blanked while in Normalize. Any other traces on the display are plotted in dB, where the dB value used is equivalent to the dBm value of the trace. For example, if bucket 1 in trace 2 is at -40 dBm, that bucket is plotted at -40 dB. All traces use Norm Ref Lvl and Norm Ref Posn for positioning on the display. When Normalize exits, the normal Ref Lvl is restored. This normal Ref Level is unaffected by Normalize.

Normalize Block Diagram

A block diagram showing how Normalize works is presented below:



The normalize function is most useful for applying correction data to a trace while making a stimulus-response measurement with a tracking generator (or synchronized source). For example, connect the cables and a through line, in place of the device to be measured, between the tracking generator and the analyzer input. Notice that the frequency response is not perfectly flat, showing the response of the cables, as well as the flatness of both the tracking generator and the analyzer. Now press Store Ref (1 3), Normalize On. Notice that the displayed trace is now flat, or normalized. The position of the normalized trace can now be moved to a different position on the display by changing the normalized reference position. This may be useful if the device to be tested has positive gain, such as an amplifier. Now replace the through line with the device under test, and an accurate measurement of the gain or loss can be made.

Store Ref (1 -> 3)

Copies trace 1 into trace 3. Store Ref (1 3) must be pressed before pressing Normalize (On). Note that this puts Trace 3 in Update=Off (not updating) and Display=On (visible).

Dependencies/Couplings:	If Normalize (On) is pressed before Store Ref (1 3), an error message is generated. Normalize remains off in this case.
Remote Command Notes:	There is no remote command for this function, however the trace copy command can be used for this purpose.
Key Path:	Trace/Detector, Normalize

Help Map ID: 3352
Instrument S/W Revision: A.01.06 or later

Show Ref Trace (Trace 3)

Views or blanks the reference trace on the display. The reference trace is trace 3, so this is the same as setting Trace 3's "Display" attribute.

Example: TRAC3:DISP 1 shows the reference trace.
Remote Command Notes: Use the TRAC3:DISP command to show or blank the reference trace
Trace 3 is always the reference trace by definition.
State Saved: Saved in Instrument State.
Key Path: **Trace/Detector, Normalize**
Help Map ID: 3353
Instrument S/W Revision: A.01.06 or later

Norm Ref Lvl

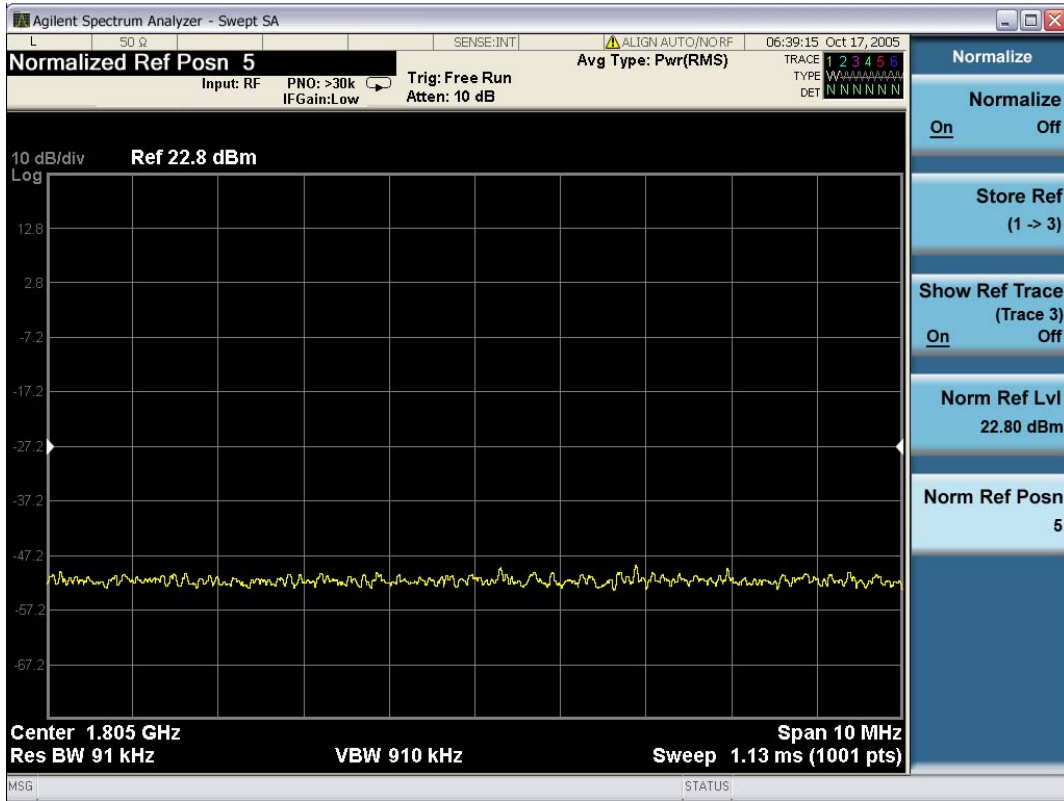
Sets the level (in dB) of the normalized reference.

Remote Command: :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:NRLevel <rel_ampl>
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:NRLevel?
Example: DISP:WIND:TRAC:Y:NRL .10 dB
DISP:WIND:TRAC:Y:NRL?
Preset: 0 dB
State Saved: Saved in Instrument State.
Min: -327.6 dB
Max: 327.6 dB
Key Path: **Trace/Detector, Normalize**
Help Map ID: 3354
Instrument S/W Revision: A.01.06 or later

Norm Ref Posn

Offsets the displayed trace without affecting the instrument gain or attenuation settings. This allows the displayed trace to be moved without decreasing measurement accuracy. The normalized reference position is indicated with a right arrow on the left side of the display and a left arrow on the right side of the display, just inside the graticule. See picture below:

Swept SA
Trace/Detector



Remote Command: :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:NRPosition <integer>
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:NRPosition?

Example: DISP:WIND:TRAC:Y:NRP 5
 DISP:WIND:TRAC:Y:NRP?

Remote Command Notes: The top and bottom graticule lines correspond to 10 and 0, respectively.

Preset: 10

State Saved: Saved in Instrument State.

Min: 0

Max: 10

Key Path: **Trace/Detector, Normalize**

Help Map ID: 3355

Instrument S/W Revision: A.01.06 or later

Copy/Exchange

This menu lets you copy any trace to any other trace, or exchange any trace with any other trace. The action is performed once, it is not an “every sweep” type of thing.

The X Axis settings and domain of a trace go with it when it is copied or exchanged.

Remote Command: :TRACe:COPIY TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6,
TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6
:TRACe:COPIY?

Remote Command Notes: The TRACe:COPIY command is of the form:
:TRACe:COPIY <source_trace>,<dest_trace>

Example: TRAC:COPIY TRACE1,TRACE3 copies Trace 1 to Trace 3 and puts Trace 3 in **Update=Off, Display=On**

Preset: TRACE1, TRACE2

Key Path: **Trace/Detector**

Help Map ID: 3356

Instrument S/W Revision: A.01.06 or later

Remote Command: :TRACe:EXCHange
TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6,
TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6
:TRACe:EXCHange?

Remote Command Notes: The TRACe:EXCHange command is of the form:
:TRACe:EXCHange <trace_1>,<trace_2>

Example: TRAC:EXCH TRACE1,TRACE2 exchanges Trace 1 and Trace 2 and puts both traces in **Update=Off, Display=On**.

Preset: TRACE1, TRACE2

Help Map ID: 3357

Instrument S/W Revision: A.01.06 or later

From Trace

Selects the trace to be copied to or exchanged with the **To Trace**

Remote Command Notes: See “Copy/Exchange”.

Preset: 1

Key Path: **Trace/Detector, Copy/Exchange**

Help Map ID: 3358

Instrument S/W Revision: A.01.06 or later

To Trace

Selects the trace to be copied from or exchanged with the **From Trace**

Remote Command Notes:	See “Copy/Exchange”.
Preset:	2
Key Path:	Trace/Detector, Copy/Exchange
Help Map ID:	3359
Instrument S/W Revision:	A.01.06 or later

Copy Now

Executes the Copy operation and puts the destination trace in **Update=Off, Display=On**.

Remote Command Notes:	See “Copy/Exchange”.
Key Path:	Trace/Detector, Copy/Exchange
Help Map ID:	3360
Instrument S/W Revision:	A.01.06 or later

Exchange Now

Executes the Exchange operation and puts both traces in **Update=Off, Display=On**.

Remote Command Notes:	See “Copy/Exchange”.
Key Path:	Trace/Detector, Copy/Exchange
Help Map ID:	3361
Instrument S/W Revision:	A.01.06 or later

Send/Query Trace Data (SCPI Command Only)

This command allows trace data to be sent to the analyzer or queried from the analyzer. The response to the query is a list of the amplitude points which comprise the requested trace in the current Y Axis Unit of the analyzer. The X Axis Unit is that of the destination trace (for send) or the source trace (for query).

See [“Query Trace Data” on page 419](#).

See [“More Information” on page 419](#).

Remote Command:	<code>:TRACe[:DATA] TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <data></code>

Dependencies/Couplings:	Sweep points will affect the amount of data The FORMat:DATA command describes the different types of data formats that can be used with trace data. Use the FORMat:BORDER command to set the byte order.
Remote Command Notes:	The TRACe[:DATA] command is of the form: <pre>:TRACe:DATA <trace>,<data></pre> where <trace> can be one of the following parameters: TRACE1 , TRACE2 , TRACE3 , TRACE4 , TRACE5 , TRACE6 and where <data> can be - ASCII data, which consists of a string of values separated by comma - or - REAL or INTEger sent as a definite length block, with a header describing the data to follow.
Help Map ID:	3362
Instrument S/W Revision:	A.01.06 or later

Query Trace Data

Remote Command:	:TRACe[:DATA]? TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6
Example:	TRAC TRACE1,-1,-2,-3,-4,-5 sends five points to Trace 1. Assuming that FORMat:DATA is set to ASCII, Y Axis Unit is set to dBm, and sweep points is set to 5, this will result in Trace 1 consisting of the five points -1 dBm, -2 dBm, -3 dBm, -4 dBm, and -5 dBm. TRAC? TRACE2 queries the analyzer for the contents of trace 2.
Help Map ID:	3363
Instrument S/W Revision:	A.01.06 or later

More Information

The format and byte-ordering of the sent or received data will be dependent on the FORMat:DATA and FORMat:BORDER commands. ASCII data consists of a string of comma separated values. REAL or INTEger data is sent as a definite length block, with a header describing the data to follow.

For example, a four point trace might look like this if in ASCII (FORMat:DATA ASCII):

```
-5.87350E+01, -5.89110E+01, -5.87205E+01, -5.12345E+01<NL><END>
```

and like this if in INTEger with 4 bytes per point (FORMat:DATA INT, 32):

```
#216<16 bytes of data><NL><END>
```

where the 2 in the #216 means “2 digits of numeric data to follow”, and the 16 is the 2 digits and means “16 binary bytes to follow” (this is the definite length block format).

Note that the data is terminated with <NL><END>. (For GPIB this is newline, or linefeed, followed by EOI set true. For LAN, this is newline only.)

The data format set by `FORMat:DATA` and `FORMat:BORDER` is used both for sending data to the instrument and receiving data from the instrument.

When sending data to the instrument, the data block must contain exactly the number of points currently specified in **Sweep, Points** or error will be generated and there will be no change to the target trace.

No units terminator (for example, dB or V) is used when sending data; the data is taken as being in the current Y Axis Unit of the analyzer.

When a trace is sent to the instrument, it immediately overwrites all of the data in the target trace, even if that trace is inactive, or even if it is active and in the middle of a sweep. If in the middle of a set of **Trace Average** or **Max/Min Hold** operations, it can totally mess up the result, so you must be careful. Similarly, when querying trace data, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in **Single Sweep, or Update=Off** when sending trace data to the analyzer or querying trace data from the analyzer.

Format Data: Numeric Data (SCPI Command Only)

The `:FORMat:DATA` command is used to tell the analyzer how the data should look on output.

Operation of this key is identical across several measurements. For details about this key, see [“Format Data: Numeric Data \(Remote Command Only\)” on page 959](#).

Format Data: Byte Order (SCPI Command Only)

Operation of this key is identical across several measurements. For details about this key, see [“Format Data: Byte Order \(Remote Command Only\)” on page 961](#).

Smooth Trace Data (Remote Command Only)

Not recommended for new designs. Use the `CALCulate:DATA:COMPRESS` command instead.

Smooths the trace according to the number of points specified in `:TRACe:MATH:SMOoth:POINts`. There is no equivalent front panel function.

The purpose of this function is to perform a spatial video averaging, as compared to the temporal version supplied by the video-average command `[[:SENSe]:AVERage:TYPE VIDEO]`. The functions of `TRACe:MATH:SMOoth <trace>` and `[[:SENSe]:AVERage:TYPE VIDEO|POWER]` are not interchangeable.

Remote Command:	<code>:TRACe:MATH:SMOoth</code> <code>TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6</code>
Help Map ID:	3367
Instrument S/W Revision:	A.01.06 or later

Number of Points for Smoothing (Remote Command Only)

Not recommended for new designs. (Will not be supported in future designs.) Use the CALCulate:DATA:COMPress command instead.

Specifies the number of points that will be smoothed. Increasing the number of points increases smoothing at the cost of decreasing resolution. If the number of points is an even number, then the number of points is increased by one. If the number of points is larger than the number of sweep points, then the number of sweep points is used, unless the number of sweep points is even, in which case the number of points will be the sweep points minus one. The number of points smoothed is always an odd number.

Remote Command:	:TRACe:MATH:SMOoth:POINts <integer> :TRACe:MATH:SMOoth:POINts?
Example:	TRAC:MATH:SMO:POIN 501
Remote Command Notes:	Only odd values allowed; if <integer> even, add 1 unless <integer> = number of sweep points, in which case subtract 1 Used with the TRACe:MATH:SMOoth command.
Preset:	11
Min:	3
Max:	Number of sweep points
Help Map ID:	3368
Instrument S/W Revision:	A.01.06 or later

Mean Trace Data (Remote Command Only)

Not recommended for new designs. Use the CALCulate:DATA:COMPress command instead.

Returns the mean of the amplitudes of the trace amplitude elements in measurement units.

Remote Command:	:TRACe:MATH:MEAN? TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6
Example:	TRAC:MATH:MEAN? TRACE2
Help Map ID:	3369
Instrument S/W Revision:	A.01.06 or later

Calculate/Compress Trace Data Query (SCPI Command Only)

Operation of this key is identical across several measurements. For details about this key, see [“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 952](#).

Calculate Data Query (SCPI Command Only)

Operation of this key is identical across several measurements. For details about this key, see [“Data Query \(Remote Command Only\)”](#) on page 952.

Trigger

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1057](#).

View/Display

Operation of this key is identical across several measurements. For details about this key, see [“View/Display” on page 600](#).

The Channel Power measurement is used to find the total power present in a specified bandwidth. The power spectral density (the power in the signal normalized to 1 Hz) is also reported. For measurement results and views, see [“View/Display” on page 471](#).

This topic contains the following sections:

[“Measurement Commands for Channel Power” on page 425](#)

[“Remote CommandResults for Channel Power Measurement” on page 425](#)

Measurement Commands for Channel Power

These commands are used to measure the total rms power in a specified integration bandwidth. You must be in the Spectrum Analysis, cdma2000, 1xEVDO, or W-CDMA mode to use these commands.

Use :INSTrument:SElect to set the mode.

```
:CONFigure:CHPower
:CONFigure:CHPower:NDEFault
:INITiate:CHPower
:FETCh:CHPower [n] ?
:MEASure:CHPower [n] ?
:READ:CHPower [n] ?
:FETCh:CHPower:CHPower?
:MEASure:CHPower:CHPower?
:READ:CHPower:CHPower?
:FETCh:CHPower:DENSity?
:MEASure:CHPower:DENSity?
:READ:CHPower:DENSity
```

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 947](#).

Remote CommandResults for Channel Power Measurement

Command	Return Value
FETCh:CHPower[n]?	Refer to the table below.
MEASure:CHPower[n]?	
READ:CHPower[n]?	

FETCh:CHPower:CHPower?	Returns the Channel Power (dBm)
MEASure:CHPower:CHPower?	(BW compatibility functionality)
READ:CHPower:CHPower?	
FETCh:CHPower:DENSity?	Returns the Power Spectral Density (dBm/Hz)
MEASure:CHPower:DENSity?	(BW compatibility functionality)
READ:CHPower:DENSity?	

n	Results Returned
n=1 (or not specified)	Returns scalar results: 1. Channel Power is a floating point number representing the total channel power in the specified integration bandwidth. 2. PSD (Power Spectral Density) is the power in the specified unit bandwidth. The unit bandwidth is selected by the PSD Unit parameter in either dBm/Hz or dBm/MHz.
2	Returns floating point numbers that are the captured trace data of the power (in dBm/resolution BW) of the signal. The frequency span of the captured trace data is specified by the Span key.

Key Path	Meas
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent, except all Attenuation values and the Internal Preamp selection, which are the same across all measurements.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the value for the absolute power reference. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Remote Command	<pre>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el <real></pre> <pre>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el?</pre>
Example	<pre>DISP:CHP:VIEW:WIND:TRAC:Y:RLEV 10 dBm</pre> <pre>DISP:CHP:VIEW:WIND:TRAC:Y:RLEV?</pre>
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	All except CDMA1xEVDO:10.00 dBm CDMA1xEVDO: -10.00dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings. This key has read-back

Channel Power Measurement

AMPTD Y Scale

text that describes the total attenuator value.

See AMPTD Y Scale, “[Attenuation](#)” on page 867 in the “Common Measurement Functions” section for more information.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Scale/Div

Sets the units per division of the vertical scale in the logarithmic display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	<code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIV ision <rel_ampl></code> <code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIV ision?</code>
Example	<code>DISP:CHP:VIEW:WIND:TRAC:Y:PDIV 2</code> <code>DISP:CHP:VIEW:WIND:TRAC:Y:PDIV?</code>
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

See “[Presel Center](#)” on page 878 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when Presel Center is available.

See “[Preselector Adjust](#)” on page 880 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, “[Internal Preamp](#)” on page 881 in the “Analyzer Setup Functions” section for more information.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Ref Position

Positions the reference level at the top, center, or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition TOP CENTer BOTTom :DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition?
Example	DISP:CHP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:CHP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.

Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le 0 1 OFF ON :DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le?
Example	DISP:CHP:VIEW:WIND:TRAC:Y:COUP OFF DISP:CHP:VIEW:WIND:TRAC:Y:COUP?
Dependencies/Couplings	When Auto Scaling is On, and the Restart front-panel key is pressed, this function automatically sets the scale per division to 10 dB and determines the reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	1
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

See “[AUTO COUPLE](#)” on page 885 in the section "Common Measurement Functions" for more information.

BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the value of the resolution bandwidth (RBW). If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Remote Command	<pre>[:SENSe] :CHPower:BANDwidth[:RESolution] <bandwidth> [:SENSe] :CHPower:BANDwidth[:RESolution]? [:SENSe] :CHPower:BANDwidth[:RESolution]:AUTO ON OFF 1 0 [:SENSe] :CHPower:BANDwidth[:RESolution]:AUTO?</pre>
Example	<pre>CHP:BAND 5 MHz CHP:BAND? CHP:BAND:AUTO ON CHP:BAND:AUTO?</pre>
Dependencies/Couplings	Sweep time is coupled to the RBW. As the RBW changes, the sweep time (if set to Auto) is changed to maintain amplitude calibration. Video bandwidth (VBW) is coupled to the RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio of VBW/RBW (10:1). When the Res BW is set to Auto, the resolution bandwidth is auto-coupled to the span. The ratio of Span/RBW is approximately 106:1 when auto coupled. When Res BW is set to Man, and the bandwidths are entered manually, these bandwidths are used regardless of other analyzer settings.
Instrument S/W Revision	A.01.60 or later
Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.

Preset	SA: Auto WCDMA: 240 kHz C2K: 24 kHz WIMAX OFDMA: 100kHz 1xEVDO: 30kHz WCDMA, C2K, 1xEVDO , WIMAX OFDMA: OFF SA: ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	Yes

Video BW

Changes the analyzer post-detection filter (VBW).

Remote Command	[:SENSe] :CHPower:BANDwidth:VIDeo <bandwidth> [:SENSe] :CHPower:BANDwidth:VIDeo? [:SENSe] :CHPower:BANDwidth:VIDeo:AUTO ON OFF 1 0 [:SENSe] :CHPower:BANDwidth:VIDeo:AUTO?
Example	CHP:BAND:VID 2.4 MHz CHP:BAND:VID? CHP:BAND:VID:AUTO OFF CHP:BAND:VID:AUTO?

Channel Power Measurement

BW

Dependencies/Couplings	See Couplings Video bandwidth (VBW) is coupled to the RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio set by VBW/RBW. Sweep Time is coupled to the Video Bandwidth (VBW). As the VBW is changed, the sweep time (when set to Auto) is changed to maintain amplitude calibration. This occurs because of common hardware between the two circuits, even though the Video BW filter is not actually “in-circuit” when the detector is set to Average. Because the purpose of the average detector and the VBW filter are the same, either can be used to reduce the variance of the result. Although the VBW filter is not “in-circuit” when using the average detector, the Video BW key can have an effect on (Auto) sweep time, and is not disabled. In this case, reducing the VBW setting increases the sweep time, which increases the averaging time, producing a lower-variance trace. When using the average detector with either Sweep Time set to Man, or in zero span, the VBW setting has no effect and is disabled (grayed out). When the video bandwidth is AUTO coupled, the video bandwidth value is set to: Resolution Bandwidth * Video Bandwidth to Resolution Bandwidth Ratio
Instrument S/W Revision	A.01.60 or later
Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: Auto WCDMA: 2.4MHz C2K: 240 kHz WIMAX OFDMA: Auto 1xEVDO: 300 kHz ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	Yes

Filter Type

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:BANDwidth:SHAPE GAUSSian FLATtop [:SENSe] :CHPower:BANDwidth:SHAPE?
Example	CHP:BAND:SHAP GAUS CHP:BAND:SHAP?
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flattop
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “[FREQ Channel](#)” on page 891 in the section "Common Measurement Functions" for more information.

Input/Output

See “[Input/Output](#)” on page 897 in the section "Common Measurement Functions" for more information.

Marker

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta**, **Fixed** or **Off**. All interactions and dependencies detailed under the key description are enforced when the remote command is sent. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the **Marker Trace** rules. At the same time, **Marker X Axis Value** appears on the Active Function area.

The default active function is the active function for the currently selected marker control mode. If the current control mode is Off, there is no active function and the active function is turned off.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MODE POSITION DELTA OFF :CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MODE?
Example	CALC:CHP:MARK3:MODE POS CALC:CHP:MARK3:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering an X value if the control mode is **Normal**, **Delta**, or **Fixed**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X <real> :CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X ?
Example	CALC:CHP:MARK3:X 0 CALC:CHP:MARK3:X?
Notes	The query returns the marker's absolute X Axis value if the control mode is Normal , or the offset from the marker's reference marker if the control mode is Delta . The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency .
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command only)

Sets the marker X Axis Scale position in trace points. This setting has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal** or **Delta**. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition <real> :CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition?
Example	CALC:CHP:MARK10:X:POS 0 CALC:CHP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points if the control mode is Delta .

Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : Y ?
Example	CALC:CHP:MARK11:Y?
Preset	Result dependent on Markers setup and signal source.
State Saved	No
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Properties

Accesses the marker properties menu.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Relative To

Selects the desired marker. The selected marker is relative to its reference marker.

Key Path	Marker, Properties

Channel Power Measurement Marker

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence <integer> :CALCulate:CHPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence?
Example	CALC:CHP:MARK:REF 5 CALC:CHP:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error –221: “Settings conflict; marker cannot be relative to itself.” When queried, a single value is returned (the specified marker numbers relative marker). You must be in the Spectrum Analysis or WCDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer:AOff
Example	CALC:CHP:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no 'Marker Functions' supported in Channel Power, so this front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

There is no ‘Marker To’ functionality supported in Channel Power, so this front-panel key displays a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 947 in the section "Common Measurement Functions" for more information.

Meas Setup

Displays the setup menu for the currently selected measurement. The parameters included in the measurement setup include the following:

- Averaging
- IF Gain
- Channel Power Span
- Integrated Bandwidth
- Filter Bandwidth
- Root Raised Cosine (RRC) Filter

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Avg/Hold Num

Specifies the number of measurement averages used to calculate the measurement result. The average is displayed at the end of each sweep. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :CHPower:AVERage:COUNT <integer> [:SENSe] :CHPower:AVERage:COUNT? [:SENSe] :CHPower:AVERage [:STATe] ON OFF 1 0 [:SENSe] :CHPower:AVERage [:STATe] ?</pre>
Example	<pre>CHP:AVER:COUN 15 CHP:AVER:COUN? CHP:AVER ON CHP:AVER?</pre>
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.

Preset	SA: 10 WCDMA: 200 WIMAX OFDMA: 200 1xEVDO: 20 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Avg Mode

Allows you to select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each exponentially-weighted averaged value. The average is displayed at the end of each sweep.

When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:AVERage:TCONtrol EXPonential REPeat [:SENSe] :CHPower:AVERage:TCONtrol?
Example	CHP:AVER:TCON EXP CHP:AVER:TCON?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	EXP
State Saved	Saved in instrument state.
Range	Exp Repeat
Instrument S/W Revision	A.01.60 or later

Integ BW

Specifies the range of integration used in calculating the power in the channel. The integration

Channel Power Measurement

Meas Setup

bandwidth (IBW) is displayed on the trace as two markers connected by an arrow.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	<code>[:SENSe] :CHPower:BANDwidth:INTEgration <bandwidth></code> <code>[:SENSe] :CHPower:BANDwidth:INTEgration?</code>
Example	CHP:BAND:INT 10MHz CHP:BAND:INT?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	The minimum value of the span is coupled with the integration bandwidth.
Preset	SA: 2 MHz WCDMA: 5 MHz C2K: 1.23 MHz WIMAX OFDMA: 10 MHz 1xEVDO: 1.23 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	1 GHz
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

IF Gain

Sets the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

IF Gain Auto

Activates the auto rules for IF Gain. When Auto is active, the IF Gain is set to High Gain under any of the following conditions:

- The input attenuator is set to 0 dB
- The preamp is turned On and the frequency range is under 3.6 GHz

For other settings, Auto sets the IF Gain to Low Gain.

Key Path	Meas Setup, IF Gain
Remote Command	[:SENSe] :CHPower:IF:GAIN:AUTO[:STATe] ON OFF 1 0 [:SENSe] :CHPower:IF:GAIN:AUTO[:STATe] ?
Example	CHP:IF:GAIN:AUTO ON CHP:IF:GAIN:AUTO?
Dependencies/Couplings	When the auto attenuation exists (for example, with an electrical attenuator), the IF Gain setting is changed using the following rule. Auto sets IF Gain to High Gain under any of the following conditions: the input attenuator is set to 0 dB, or the preamp is turned on and the frequency range is under 3.6 GHz. For other settings, Auto sets IF Gain to Low Gain.
Preset	OFF
State Saved	Saved in instrument state.
Range	Off On
Instrument S/W Revision	A.01.60 or later

IF Gain State

Selects the range of the IF Gain.

Key Path	Meas Setup, IF Gain
Remote Command	[:SENSe] :CHPower:IF:GAIN[:STATe] ON OFF 1 0 [:SENSe] :CHPower:IF:GAIN[:STATe] ?
Example	CHP:IF:GAIN ON CHP:IF:GAIN?
Notes	ON = high gain OFF = low gain
Dependencies/Couplings	When the auto attenuation exists (for example, with an electrical attenuator), the IF Gain setting is changed as following rule. Auto sets IF Gain to High Gain under any of the following conditions: the input attenuator is set to 0 dB, or the preamp is turned on and the frequency range is under 3.6 GHz. For other settings, Auto sets IF Gain to Low Gain.
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain High Gain
Instrument S/W Revision	A.01.60 or later

RRC Filter

Turns the Root Raised Cosine (RRC) filter On or Off. The α value (roll off) for the filter is set to the value of the Filter Alpha parameter, and the RRC filter bandwidth is set to the Filter BW parameter.

Key Path	Meas Setup
Mode	SA, WCDMA
Remote Command	[:SENSe] :CHPower:FILTer [:RRC] [:STATe] OFF ON 0 1 [:SENSe] :CHPower:FILTer [:RRC] [:STATe] ?
Example	CHP:FILT OFF CHP:FILT?
Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode or W-CDMA mode to use this command. Use :INSTRument:SELEct to set the mode.
Dependencies/Couplings	For CDMA2K mode, this key is blank. For 1xEVDO mode, this key is blank.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Filter BW

Inputs the Root Raised Cosine (RRC) filter bandwidth. Normally, the filter bandwidth is the same as the symbol rate of the signal.

Remote Command	[:SENSe] :CHPower:FILTer [:RRC] :BANDwidth <real> [:SENSe] :CHPower:FILTer [:RRC] :BANDwidth?
Example	CHP:FILT:BAND 10MHz CHP:FILT:BAND?
Dependencies/Couplings	For CDMA2K mode, this key is blank. For 1xEVDO mode, this key is blank.
Instrument S/W Revision	A.01.60 or later
Key Path	Meas Setup
Mode	SA, WCDMA, WIMAX OFDMA

Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode or W-CDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 3.84MHz WCDMA: 3.84MHz WIMAX OFDMA: 10MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	100 MHz
Test MIN/MAX/DEF	Yes

Filter Alpha

Inputs the alpha value for the Root Raised Cosine (RRC) filter.

Key Path	Meas Setup
Mode	SA, WCDMA
Remote Command	[:SENSe] :CHPower:FILTer [:RRC] :ALPHa <real> [:SENSe] :CHPower:FILTer [:RRC] :ALPHa?
Example	CHP:FILT:ALPH 0.5 CHP:FILT:ALPH?
Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode or W-CDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	For CDMA2K mode, this key is blank.
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Test MIN/MAX/DEF	Yes
Test UP/DOWN	0.10
Instrument S/W Revision	A.01.60 or later

PSD Unit

Sets the unit bandwidth for Power Spectral Density. The available units are dBm/Hz and dBm/MHz.

Key Path	Meas Setup, More
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:UNIT:CHPower:POWer:PSD DBMHZ DBMMHZ :UNIT:CHPower:POWer:PSD?
Example	UNIT:CHP:POW:PSD DBMMHZ UNIT:CHP:POW:PSD?
Dependencies/Couplings	When the PSD unit is changed, the PSD result of the “MEAS READ FETCH:CHP1?” is also changed by the PSD unit basis (in either dBm/Hz or dBm/MHz).
Preset	DBMHZ
State Saved	Saved in instrument state.
Range	dBm/Hz dBm/MHz
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CONFIgure:CHPower
Example	CONF:CHP
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 965 in the section "Common Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page 977 in the section "Common Measurement Functions" for more information.

Peak Search

Places the selected marker on the trace point with the maximum y-axis value. Pressing Peak Search with the selected marker Off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front panel key
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum
Example	CALC:CHP:MARK2:MAX
Instrument S/W Revision	A.01.60 or later

Recall

See “[Recall](#)” on page 985 in the section "Common Measurement Functions" for more information.

Restart

See [“Restart” on page 1003](#) in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 1005 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 1027 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 1029 in the section "Common Measurement Functions" for more information.

Span X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Span

Changes the frequency range symmetrically about the center frequency.

The default (and minimum) Span is calculated using the number of carriers and the carrier width where;

$$\text{Span} = (\text{Upper Carrier Freq} + (\text{max offset IBW} * (1 + \alpha)) / 2) - (\text{Lower Carrier Freq} - (\text{max offset IBW} * (1 + \alpha)) / 2)$$

The span is increased by a factor of 1 + Filter Alpha if the RRC Filter is on.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:FREQuency:SPAN <freq> [:SENSe] :CHPower:FREQuency:SPAN?
Example	CHP:FREQ:SPAN 10 MHz CHP:FREQ:SPAN?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When Res BW is set to Auto, the resolution bandwidth is auto-coupled to span. The ratio of span /RBW is approximately 106:1. When the Res BW is set to Man, bandwidths are entered by the user, and these bandwidths are used regardless of other analyzer settings. Since Span is coupled to Integ BW in the factory default condition, if you change the integration bandwidth setting, the span setting changes by a proportional amount until a limit value is reached. However, the span can be individually set. The minimum value of the span is coupled with the integration bandwidth.
Preset	SA: 3 MHz WCDMA: 7.5 MHz C2K: 1.845 MHz WIMAX OFDMA: 20 MHz 1xEVDO: 2.0MHz

Channel Power Measurement

Span X Scale

State Saved	Saved in instrument state.
Min	100 Hz
Max	1 GHz
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Full Span

Changes the span to show the full frequency range of the spectrum analyzer.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:FREQuency:SPAN:FULL
Example	CHP:FREQ:SPAN:FULL
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting full span changes the measurement span value.
Instrument S/W Revision	A.01.60 or later

Last Span

Changes the span to the previous span setting. If no previous span value exists, then the span remains unchanged.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:FREQuency:SPAN:PREVious
Example	CHP:FREQ:SPAN:PREV
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting last span changes the measurement span value.
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep time and source for the current measurement. See [“Sweep / Control” on page 1033](#) in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep Time

Selects the length of time that the spectrum analyzer sweeps the displayed frequency span. Additional overhead time, which impacts the sweep rate, is not calculated as part of the sweep time. In fact:

sweep rate = span/sweep time

update rate = 1/(sweep time + overhead)

sweep cycle time = sweep time + overhead

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points, so changing those parameters may change the sweep time.

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	<code>[:SENSe] :CHPower:SWEep:TIME <time></code> <code>[:SENSe] :CHPower:SWEep:TIME?</code> <code>[:SENSe] :CHPower:SWEep:TIME:AUTO OFF ON 0 1</code> <code>[:SENSe] :CHPower:SWEep:TIME:AUTO?</code>
Example	<code>CHP:SWE:TIME 25ms</code> <code>CHP:SWE:TIME?</code> <code>CHP:SWE:TIME:AUTO OFF</code> <code>CHP:SWE:TIME:AUTO?</code>
Dependencies/Couplings	When the user manually changes the Sweep Time, this state automatically goes to 'Man'.
Preset	SA, WIMAX OFDMA: Automatically Calculated WCDMA: 1.0 ms CDMA2K: 9.4ms 1xEVDO: 2.66ms
State Saved	Saved in instrument state.

Channel Power Measurement Sweep/Control

Min	1 ms
Max	4000 s
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Sweep Setup

Accesses a menu that enables you to set the sweep state for the current measurement.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

Setting **Auto Sweep Time** to **Accy** results in slower sweep times, usually about three times as long, but yields better amplitude accuracy for CW signals. The instrument amplitude accuracy specifications only apply when **Auto Sweep Time** is set to **Accy**.

Additional amplitude errors which occur when **Auto Sweep Time** is set to **Norm** are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, **Norm** is the preferred setting of **Auto Sweep Time**. **Auto Sweep Time** is set to **Norm** on a **Preset** or **Auto Couple**. This means that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

Key Path	Sweep/Control, Sweep Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:SWEep:TIME:AUTO:RULEs NORMal ACCuracy [:SENSe] :CHPower:SWEep:TIME:AUTO:RULEs?
Example	CHP:SWE:TIME:AUTO:RUL NORM CHP:SWE:TIME:AUTO:RUL?
Notes	In Zero Span, this key is irrelevant and inaccessible (because the whole Sweep Setup menu is grayed out in Zero Span), however its settings can be changed remotely with no error indication. Set to Norm when Auto Couple is pressed or sent remotely
Preset	NORMal
State Saved	Saved in instrument state.
Range	Norm Accy
Instrument S/W Revision	A.01.60 or later

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point it was at when paused. See [“Pause/Resume” on page 1034](#) in “Common Measurement Functions” section for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate

Accesses a menu that enables you to control the gating function. See [“Gate” on page 591](#) in "Common Measurement Functions" section for more details.

The Gate functionality is used to view signals best viewed by qualifying them with other events.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. If Preset is selected, the number of points per sweep defaults to 1001. The current value of points is displayed parenthetically, next to the sweep time in the lower-right corner of the display.

Changing the number of points has several effects on the analyzer. Since markers are read at the point location, the marker reading may change. All trace data is cleared.

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:SWEep:POINts <integer> [:SENSe] :CHPower:SWEep:POINts?
Example	CHP:SWE:POIN 501 CHP:SWE:POIN?
Notes	Whenever the number of sweep points change: All trace data is erased Any traces with Update Off also go to Display Off (like going from View to Blank in the older analyzers) Sweep time is re-quantized Any limit lines that are on are updated If averaging/hold is on, averaging/hold starts over

Channel Power Measurement Sweep/Control

Dependencies/Couplings	Whenever the number of sweep points change, the sweep time is re-quantized.
Preset	1001
State Saved	Saved in instrument state.
Min	101
Max	20001
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trace Type

Allows you to select the type of trace you want to use for the current measurement. The first page of this menu contains a 1-of-N selection of the trace type (**Clear Write**, **Average**, **Max Hold**, **Min Hold**) for the selected trace.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:TRACe:CHPower:TYPE WRITe AVERAge MAXHold MINHold :TRACe:CHPower:TYPE?
Example	TRAC:CHP:TYPE WRIT TRAC:CHP:TYPE?
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Dependencies/Couplings	When Detector setting is “Auto” ([[:SENSe]:CHPower:DETECTOR:AUTO?]), Detector ([[:SENSe]:CHPower:DETECTOR[:FUNCTION]?]) switches aligning with the switch of this parameter: “NORMAl” with WRITe (Clear Write), “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	ClearWrite Average MaxHold MinHold
Instrument S/W Revision	A.01.60 or later

Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement. The following choices are available:

- Auto- the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.

Channel Power Measurement Trace/Detector

- Normal-the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average-the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak-the detector determines the maximum of the signal within the sweep points.
- Sample-the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak-the detector determines the minimum of the signal within the sweep points.
-

Key Path	Detector
Instrument S/W Revision	A.01.60 or later

Detector Selection

Selects a detector to be used by the analyzer for the current measurement.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSE]:CHPower:DETECTOR[:FUNCTION] NORMal AVERage POSitive SAMPLE NEGative [:SENSe]:CHPower:DETECTOR[:FUNCTION]?
Example	CHP:DET NORM CHP:DET?
Notes	When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This method of detection is also referred to as Rosenfell detection. The Average detector determines the average of the signal within the sweep points. The averaging method is Power Average (RMS). The Peak detector determines the maximum of the signal within the sweep points. The Sample detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point. The Negative Peak detector determines the minimum of the signal within the sweep points.

Dependencies/Couplings	When Detector setting is “Auto” ([:SENSe]:CHPower:DETECTOR:AUTO?), Detector ([:SENSe]:CHPower:DETECTOR[:FUNCTION]?) switches aligning with the switch of this parameter: “NORMAl” with Clear Write, “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	A.01.60 or later

Auto

Sets the detector for the currently selected trace to Auto.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :CHPower:DETECTOR:AUTO ON OFF 1 0 [:SENSe] :CHPower:DETECTOR:AUTO?
Example	CHP:DET:AUTO ON CHP:DET:AUTO?
Dependencies/Couplings	When Detector setting is “Auto” ([:SENSe]:CHPower:DETECTOR:AUTO?), Detector ([:SENSe]:CHPower:DETECTOR[:FUNCTION]?) switches aligning with the switch of this parameter: “NORMAl” with Clear Write, “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Trigger

Accesses a menu of functions that enable you to select and control the trigger source for the current measurement. See [“Trigger” on page 1057](#) in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

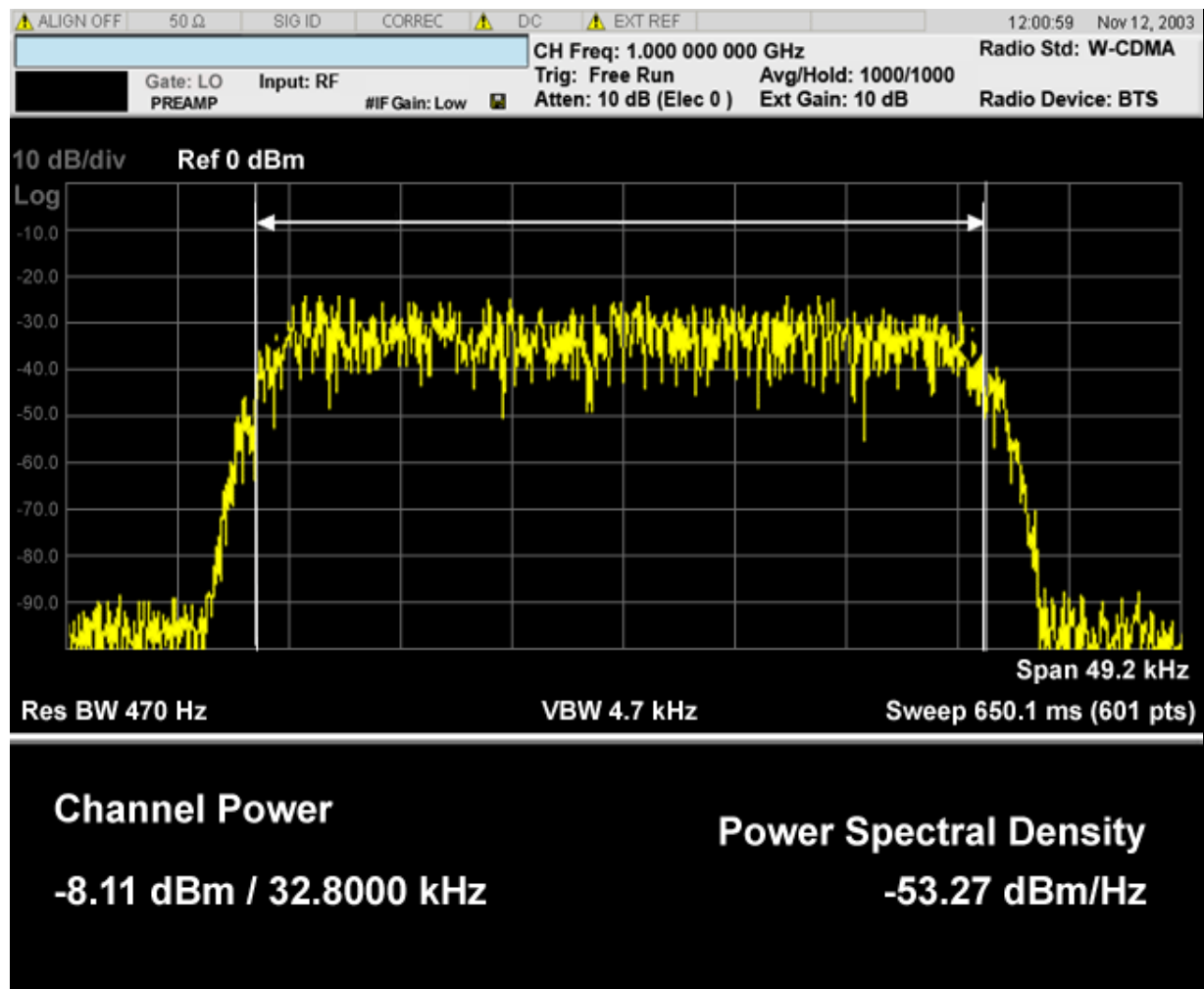
View/Display

Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

The front panel views contain one view: Spectrum View. It can be displayed as a single spectrum trace view or displayed with a Bar Graph trace on the spectrum trace

The results of the measurement can be displayed as a single spectrum trace view or displayed with a Bar Graph trace on the spectrum trace.

Spectrum View with Bar Graph off

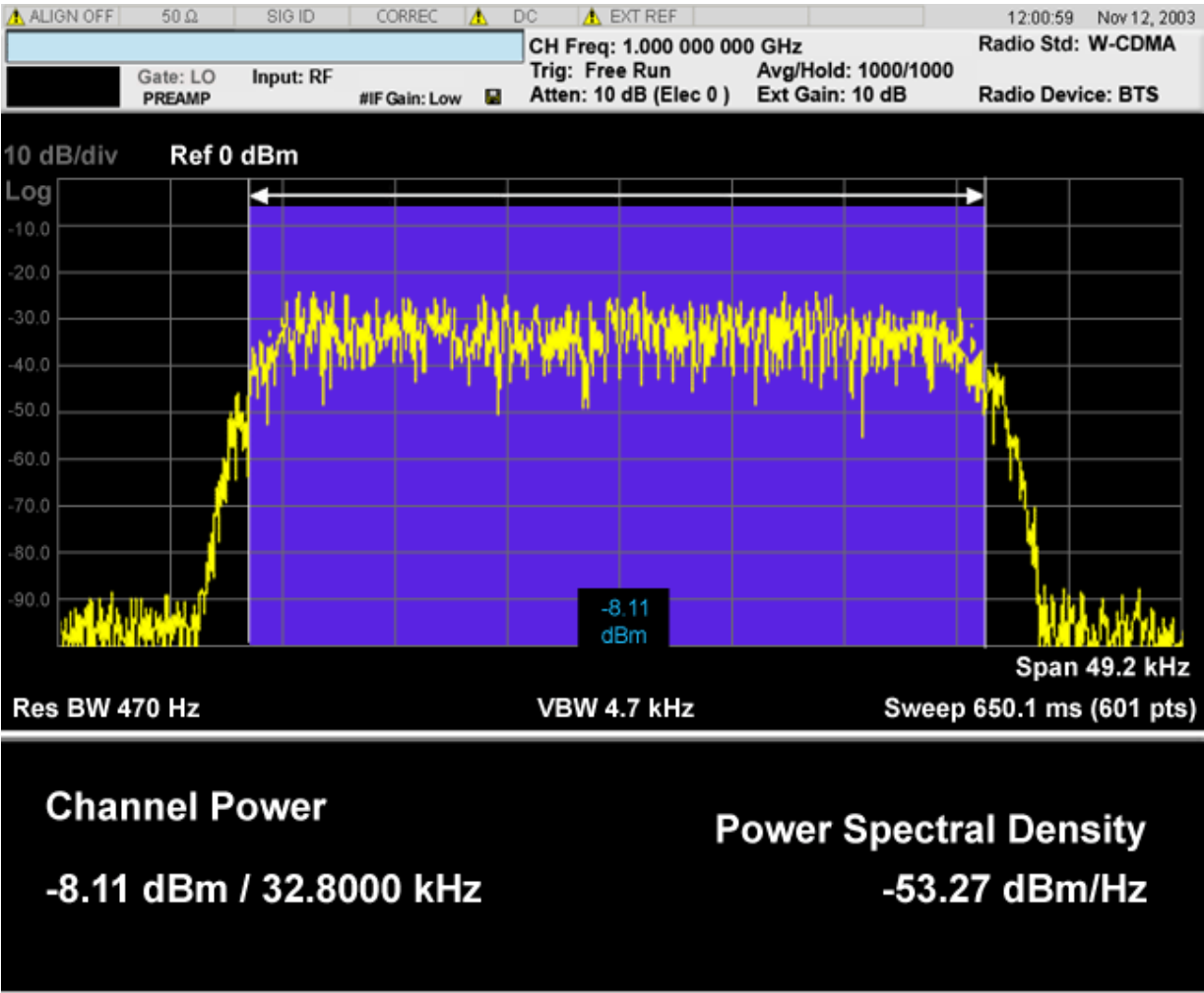


Spectrum View with Bar Graph on

This View is the same as the 'Spectrum' view, but has a blue bar between the markers that indicates the measured output power level. The bar graph is activated when the "Bar Graph" Soft Key is set to ON under the View/Display menu. The actual measured output power level is displayed on the display at the

Channel Power Measurement
View/Display

bottom of the bar.



Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.
See “Display” on page 1109 in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

Bar Graph

Turns the Bar Graph On and Off.

Key Path	View/Display
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	:DISPlay:CHPower:VIEW[1]:WINDow[1]:BGRaph ON OFF 1 0 :DISPlay:CHPower:VIEW[1]:WINDow[1]:BGRaph?
Example	DISP:CHP:VIEW:WIND:BGR ON DISP:CHP:VIEW:WIND:BGR?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

The Occupied Bandwidth measurement computes and displays the bandwidth occupied by a given percentage of the total mean power of a signal.

This topic contains the following sections:

Remote Commands for Occupied Bandwidth

Remote Command Results for Occupied Bandwidth Measurement

Remote Commands for Occupied Bandwidth

```
:CONFigure:OBWidth
:CONFigure:OBWidth:NDEFault
:INITiate:OBWidth
:FETCh:OBWidth [n]?
:MEASure:OBWidth [n]?
:READ:OBWidth [n]?
:FETCh:OBWidth:OBWidth?
:MEASure:OBWidth:OBWidth?
:READ:OBWidth:OBWidth?
:FETCh:OBWidth:FERRor?
:MEASure:OBWidth:FERRor?
:READ:OBWidth:FERRor?
:FETCh:OBWidth:XDB?
:MEASure:OBWidth:XDB?
:READ:OBWidth:XDB?
```

See also the section, [“Remote Measurement Functions” on page 947](#).

Remote Command Results for Occupied Bandwidth Measurement

For descriptions of the results, see Measurement Results.

n	Results Returned

Occupied Bandwidth

n=1 (or not specified)	Returns 6 scalar results, in the following order: 1. Occupied bandwidth – Hz 2. Total Power – dBm (Total Power will be obsolete in TD-SCDMA mode, this place will be replaced by NaN) 3. Span - Hz 4. Spectrum Trace Points - points 5. Res BW – Hz 6. Transmit Frequency Error Hz 7. x DB Bandwidth - Hz
2	Returns the frequency-domain spectrum trace (data array) for the entire frequency range being measured.

Key Path	Meas
Instrument S/W Revision	A.01.60 or later

Measurement Results

Measurement results are described in this section. Views are described under the Section View/Display, View/Display key.

The following result descriptions are available:

Occupied Bandwidth

Total Power

Transmit Freq Error

x dB Bandwidth

Occupied Bandwidth

The occupied bandwidth result is $f_2 - f_1$, where f_1 and f_2 are calculated .

Total Power

The total power is the power integrated in the specified span setting.

Transmit Freq Error

The transmit freq error (transmit frequency error) result is calculated as the difference between $(f_2 + f_1)/2$ and the tuned center frequency of the signal, where f_1 and f_2 are calculated.

x dB Bandwidth

The x dB result is a bandwidth measured between two points on the signal which are a certain number of dBs down from the highest signal point within the OBW Span. For example, If the 'x dB' parameter is set to -26dB, and the 'Occupied BW Span' is set to 10 MHz, then the maximum signal power level is first determined from the 10MHz wide trace sweep. Next, the two furthest frequencies below (xdb_f1) and above (xdb_f2) the frequency of the maximum level occurrence are found where the signal level is 26dB below the peak level. This calculation also uses linear interpolation to find the lower and upper carrier boundary point within the width of a sweep point (the span divided by the number of sweep points).

The x dB bandwidth is calculated to be $xdb\_f2 - xdb\_f1$.

AMPTD Y Scale (Amplitude/Y Scale)

Activates the Reference Value function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis. See “[AMPTD Y Scale \(Amplitude Y Scale\)](#)” on page 867 for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the absolute power reference value. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el <real> :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el?
Example	DISP:OBW:VIEW:WIND:TRAC:Y:RLEV 125 DISP:OBW:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTRument:SElect to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dBm
State Saved	Saved in instrument state.
Min	–250.00 dBm
Max	250.00 dBm
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings. This key has read-back

text that describes the total attenuator value.

See [“Attenuation” on page 867](#) for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Scale/Div

Sets the logarithmic units per vertical graticule division on the display. When the Auto Scaling is On, the Scale/Div is automatically determined by the measurement result. When you set a value manually, Auto Scaling is automatically toggled to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision <rel_ampl> :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision?
Example	DISP:OBW:VIEW:WIND:TRAC:Y:PDIV 5 DISP:OBW:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTRument:SELEct to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

Occupied Bandwidth AMPTD Y Scale (Amplitude/Y Scale)

See “[Presel Center](#)” on page 878 for more information.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when Presel Center is available.

See “[Preselector Adjust](#)” on page 880 for more information.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See “[Internal Preamp](#)” on page 881 for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition TOP CENTer BOTTom :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition?
Example	DISP:OBW:VIEW:WIND:TRAC:Y:RPOS BOTT DISP:OBW:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SELEct to set the mode.
Preset	TOP
State Saved	Saved in instrument state.

Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le 0 1 OFF ON :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le?
Example	DISP:OBW:VIEW:WIND:TRAC:Y:COUP ON DISP:OBW:VIEW:WIND:TRAC:Y:COUP?
Dependencies/Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically sets the scale per division to 10 dB and determines reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	1
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

Operation of this key is identical across several measurements. For details about this key, see “[AUTO COUPLE](#)” on page 885.

BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :OBWidth:BANDwidth[:RESolution] <bandwidth> [:SENSe] :OBWidth:BANDwidth[:RESolution]? [:SENSe] :OBWidth:BANDwidth[:RESolution] :AUTO ON OFF 1 0 [:SENSe] :OBWidth:BANDwidth[:RESolution] :AUTO?</pre>
Example	<pre>OBW:BAND 250000 OBW:BAND? OBW:BAND:AUTO OFF OBW:BAND:AUTO?</pre>
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode.
Dependencies/Couplings	Sweep time is coupled to RBW. As the RBW changes, the sweep time (if set to Auto) is changed to maintain amplitude calibration. Video bandwidth (VBW) is coupled to RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio of VBW/RBW (10:1). When Res BW is set to Auto, the resolution bandwidth is auto-coupled to span. The ratio of Span/RBW is approximately 106:1 when auto coupled. When Res BW is set to Man, bandwidths are entered manually, and these bandwidths are used regardless of other analyzer settings. Refer to epsg1024075 for AUTO coupling rules for the resolution bandwidth.

Occupied Bandwidth
BW

Preset	SA: Auto WCDMA: 30 kHz CDMA2K: 12 kHz WIMAX OFDMA: 100kHz TD-SCDMA: 30kHz 1xEVDO: 30kHz SA: ON WCDMA, C2K,TD-SCDMA,WIMAX OFDMA, 1xEVDO: OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Video BW

Changes the analyzer post-detection filter.

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<code>[:SENSe] :OBWidth:BANdwidth:VIDeo <bandwidth></code> <code>[:SENSe] :OBWidth:BANdwidth:VIDeo?</code> <code>[:SENSe] :OBWidth:BANdwidth:VIDeo:AUTO ON OFF 1 0</code> <code>[:SENSe] :OBWidth:BANdwidth:VIDeo:AUTO?</code>
Example	OBW:BAND:VID 5 MHz OBW:BAND:VID? OBW:BAND:VID:AUTO ON OBW:BAND:VID:AUTO?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SELEct to set the mode.

Dependencies/Couplings	When using the average detector with either Sweep Time set to Man, or in zero span, the VBW setting has no effect and is disabled (grayed out). Video bandwidth (VBW) is coupled to RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio set by VBW/RBW. Sweep Time is coupled to Video Bandwidth (VBW). As the VBW is changed, the sweep time (when set to Auto) is changed to maintain amplitude calibration. This occurs because of common hardware between the two circuits, even though the Video BW filter is not actually “in-circuit” when the detector is set to Average. Because the purpose of the average detector and the VBW filter are the same, either can be used to reduce the variance of the result. Although the VBW filter is not “in-circuit” when using the average detector, the Video BW key can have an effect on (Auto) sweep time, and is not disabled. In this case, reducing the VBW setting increases the sweep time, which increases the averaging time, producing a lower-variance trace. When the video bandwidth is AUTO coupled, the video bandwidth value is set to: Resolution Bandwidth * Video Bandwidth to Resolution Bandwidth Ratio
Preset	SA: Auto WCDMA: 300 kHz CDMA2K:120 kHz WIMAX OFDMA: 1MHz TD-SCDMA: 300kHz 1xEVDO: 300kHz ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Filter Type

Allows you to select the type of filter to be used for the current measurement. Besides the Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Occupied Bandwidth
BW

Remote Command	<code>[:SENSe] :OBWidth:BANDwidth:SHApe GAUSSian FLATtop</code> <code>[:SENSe] :OBWidth:BANDwidth:SHApe?</code>
Example	<code>OBW:BAND:SHAP GAUS</code> <code>OBW:BAND:SHAP?</code>
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flattop
Instrument S/W Revision	A.01.60 or later

Cont (Continuous)

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889.

FREQ/Channel (Frequency or Channel)

Operation of this key is identical across several measurements. For details about this key, see “[FREQ Channel](#)” on page 891.

Input/Output

Operation of this key is identical across several measurements. For details about this key, see “Input/Output” on page 897.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. For more information, see [“Marker” on page 941](#).

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is **Off**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X <real> :CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X ?
Example	CALC:OBW:MARK3:X 0 CALC:OBW:MARK3:X?
Notes	The query returns the marker’s absolute X Axis value if the control mode is Normal , or the offset from the marker’s reference marker if the control mode is Delta . The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency .
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	–9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition <real> :CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition?
Example	CALC:OBW:MARK10:X:POS 0 CALC:OBW:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points if the control mode is Delta .
Preset	After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :Y ?
Example	CALC:OBW:MARK11:Y?
Preset	Result dependent on Markers setup and signal source.
State Saved	No
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta** or **Off**. If the selected marker is Off, pressing Marker sets it to Normal and places a single marker at the center of the display. At the same time, **Marker X Axis**

Occupied Bandwidth Marker

Value appears on the Active Function area.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :M ODE POSition DELTa OFF :CALCulate:OBWidth:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :M ODE?
Example	CALC:OBW:MARK:MODE POS CALC:OBW:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	A.01.60 or later

Properties

Accesses the marker properties menu.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker, Properties
Instrument S/W Revision	A.01.60 or later

Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

Key Path	Marker, Properties

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence <integer> :CALCulate:OBWidth:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence?
Example	CALC:OBW:MARK:REF 2 CALC:OBW:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error –221: “Settings conflict; marker cannot be relative to itself.” When queried a single value is returned (the specified marker numbers relative marker). You must be in the Spectrum Analysis mode, WCDMA mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer:AOff
Example	CALC:OBW:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no ‘Marker Functions’ supported in Occupied Bandwidth so this front-panel key displays a blank key menu when pressed.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Marker To

There is no 'Marker To' functionality supported in Occupied Bandwidth so this front-panel key displays a blank key menu when pressed.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Meas

Operation of this key is identical across several measurements. For details about this key, see “[Meas](#)” on [page 947](#).

Mode

Operation of this key is identical across several measurements. For details about this key, see [“Mode” on page 965](#).

Mode Setup

Operation of this key is identical across several measurements. For details about this key, see [“Mode Setup” on page 977](#).

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Front panel key
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum
Example	CALC:OBW:MARK2:MAX
Instrument S/W Revision	A.01.60 or later

Recall

Operation of this key is identical across several measurements. For details about this key, see “[Recall](#)” on page 985.

Restart

Operation of this key is identical across several measurements. For details about this key, see “[Restart](#)” on page 1003.

Save

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1005](#).

Single

Operation of this key is identical across several measurements. For details about this key, see “[Single \(Single Measurement/Sweep\)](#)” on page 1027.

Source

Operation of this key is identical across several measurements. For details about this key, see “[Source](#)” on page 1029.

Span X Scale

Activates the Span function and displays the menu of span functions. The parameter values are measurement independent.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Span

Set the frequency of the occupied bandwidth span for the current measurement.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :OBWidth:FREQuency:SPAN <freq> [:SENSe] :OBWidth:FREQuency:SPAN?
Example	OBW:FREQ:SPAN 2.4 MHz OBW:FREQ:SPAN?
Dependencies/Couplings	When changing the Occupied Bandwidth Span, the Resolution Bandwidth and Video Bandwidth are set to AUTO to prevent the span from clipping.
Preset	SA: 3 MHz WCDMA: 10 MHz WIMAX OFDMA: 20MHz CDMA2K:2MHz TD-SCDMA: 4.8MHz 1xEVDO: 3.75MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	1GHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	HW DEPENDENT
Instrument S/W Revision	A.01.60 or later

Full Span

Changes the Occupied Bandwidth Span to show the full frequency range of the analyzer. When using external mixing, it changes the displayed frequency span to the frequency range specified for the

selected external mixing band.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA
Remote Command	[:SENSe] :OBWidth:FREQuency:SPAN:FULL
Example	OBW:FREQ:SPAN:FULL
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting full span changes the measurement span value.
Instrument S/W Revision	A.01.60 or later

Last Span

Changes the measurement frequency span to previous measurement span setting. If there is no existing previous span value then the span remains unchanged.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA
Remote Command	[:SENSe] :OBWidth:FREQuency:SPAN:PREVious
Example	OBW:FREQ:SPAN:PREV
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting last span changes the measurement span value.
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Displays a menu of functions that enable you to set up and control the sweep time and source for the current measurement.

For details about this key, see [“Sweep / Control” on page 1033](#).

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Additional overhead time, which impacts the sweep rate, is not calculated as part of the sweep time. In fact:

$$\text{sweep rate} = \text{span} / \text{sweep time}$$
$$\text{update rate} = 1 / (\text{sweep time} + \text{overhead})$$
$$\text{sweep cycle time} = \text{sweep time} + \text{overhead}$$

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points, so changing those parameters may change the sweep time.

This is not available when the selected input is I/Q.

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<code>[:SENSe] :OBWidth:SWEp:TIME <time></code> <code>[:SENSe] :OBWidth:SWEp:TIME?</code> <code>[:SENSe] :OBWidth:SWEp:TIME:AUTO OFF ON 0 1</code> <code>[:SENSe] :OBWidth:SWEp:TIME:AUTO?</code>
Example	<code>OBW:SWE:TIME 50 ms</code> <code>OBW:SWE:TIME?</code> <code>OBW:SWE:TIME:AUTO ON</code> <code>OBW:SWE:TIME:AUTO?</code>
Dependencies/Couplings	When you manually change the Sweep Time, this state automatically goes to ‘Man’.

Occupied Bandwidth Sweep/Control

Preset	SA,WIMAX OFDMA, C2K, TD-SCDMA, 1xEVDO: Automatically Calculated WCDMA: 32.6 ms SA, WIMAX OFDMA, C2K, TD-SCDMA, 1xEVDO: ON WCDMA: OFF
State Saved	Saved in instrument state.
Min	1 ms
Max	4000 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	TBD
Instrument S/W Revision	A.01.60 or later

Sweep Setup

Accesses the sweep setup settings for the current measurement.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

Setting Auto Sweep Time to Accy results in slower sweep times, usually about three times as long, but better amplitude accuracy for CW signals. The instrument amplitude accuracy specifications only apply when Auto Sweep Time is set to Accy.

Additional amplitude errors which occur when Auto Sweep Time is set to Norm are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, Norm is the preferred setting of Auto Sweep Time. Auto Sweep Time is set to Norm on a Preset or Auto Couple. This means that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

Key Path	Sweep/Control, Sweep Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[[:SENSe]:OBwidth:SWEep:TIME:AUTO:RULEs NORMal ACCuracy [:SENSe]:OBwidth:SWEep:TIME:AUTO:RULEs?
Example	OBW:SWE:TIME:AUTO:RUL NORM OBW:SWE:TIME:AUTO:RUL?
Notes	Set to Norm when Auto Couple is pressed or sent remotely.
Preset	NORMal

State Saved	Saved in instrument state.
Range	Norm Accy
Instrument S/W Revision	A.01.60 or later

Pause

Pauses the measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point where it had been paused.

See [“Pause/Resume” on page 1034](#) for more information.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate

Accesses a menu that enables you to control the gating function .

The Gate functionality is used to view signals best viewed by qualifying them with other events.

This function is not available when the selected input is I/Q.

.For details about this key, see [“Gate” on page 591](#).

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. The current value of points is displayed parenthetically, next to the sweep time in the lower-right corner of the display.

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :OBWidth:SWEep:POINts <integer> [:SENSe] :OBWidth:SWEep:POINts?
Example	OBW:SWE:POIN 1500 OBW:SWE:POIN?

Occupied Bandwidth Sweep/Control

Notes	This function is not available when signal identification is set to On (external mixing). Affected by: log sweep, segmented sweep Grayed out in measurements that don't support swept Blanked in modes that do not support swept. Whenever the number of sweep points change: - All trace data is erased - Any traces with Update Off also go to Display Off (like going from View to Blank in the older analyzers) - Sweep time is re-quantized - Any limit lines that are on are updated - If averaging/hold is on, averaging/hold starts over
Dependencies/Couplings	Whenever the number of sweep points change, the sweep time is re-quantized.
Preset	1001
State Saved	Saved in instrument state.
Min	101
Max	20001
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trace Type

Allows you to select the type of trace you want to you use for the current measurement.

The first page of this menu contains a 1-of-N selection of the trace type (Clear Write, Average, Max Hold, Min Hold) for the selected trace.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:TRACe:OBWidth:TYPE WRITe AVERAge MAXHold MINHold :TRACe:OBWidth:TYPE?
Example	TRAC:OBW:TYPE MINH TRAC:OBW:TYPE?
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Dependencies/Couplings	When Detector setting is “Auto” ([[:SENSe]:OBWidth:DETEctor:AUTO?]), Detector ([[:SENSe]:OBWidth:DETEctor[:FUNCTioN]?]) switches aligning with the switch of this parameter: “NORMal” with WRITe (Clear Write), “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	WRITe AVERAge MAXHold MINHold
Instrument S/W Revision	A.01.60 or later

Detector

Accesses a menu of functions that enables you to control the detectors for the current measurement. The following choices are available:

— Auto- the detector selected depends on marker functions, trace functions, average type, and the trace

averaging function.

- Normal-the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average-the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak (Positive)-the detector determines the maximum of the signal within the sweep points.
- Sample-the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak-the detector determines the minimum of the signal within the sweep points.

Key Path	Detector
Instrument S/W Revision	A.01.60 or later

Detector Selection

Allows you to select a specific detector for the current measurement. When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:OBWidth:DETEctor[:FUNction] NORMal AVERage POSitive SAMPLE NEGative [:SENSe]:OBWidth:DETEctor[:FUNction]?
Example	OBW:DET NORM OBW:DET?
Notes	When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. The detector choices are: The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection. The Average detector determines the average of the signal within the sweep points. The averaging method is Power Average (RMS). The Peak detector determines the maximum of the signal within the sweep points. The Sample detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point. The Negative Peak detector determines the minimum of the signal within the sweep points.

Dependencies/Couplings	When Detector setting is “Auto” (:SENSe):OBWidth:DETECTOR:AUTO?), Detector (:SENSe):OBWidth:DETECTOR[:FUNCTION?]) switches aligning with the switch of this parameter: “NORMAl” with Clear Write, “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	A.01.60 or later

Auto

When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO mode
Remote Command	<code>[:SENSe] :OBWidth:DETECTOR:AUTO ON OFF 1 0</code> <code>[:SENSe] :OBWidth:DETECTOR:AUTO?</code>
Example	OBW:DET:AUTO ON OBW:DET:AUTO?
Dependencies/Couplings	When Detector setting is “Auto” (:SENSe):OBWidth:DETECTOR:AUTO?), Detector (:SENSe):OBWidth:DETECTOR[:FUNCTION?]) switches aligning with the switch of this parameter: “NORMAl” with Clear Write, “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	A.01.60 or later

Trigger

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1057](#).

View/Display

Accesses a menu of functions that enable you to set the view and display parameters for the current measurement.

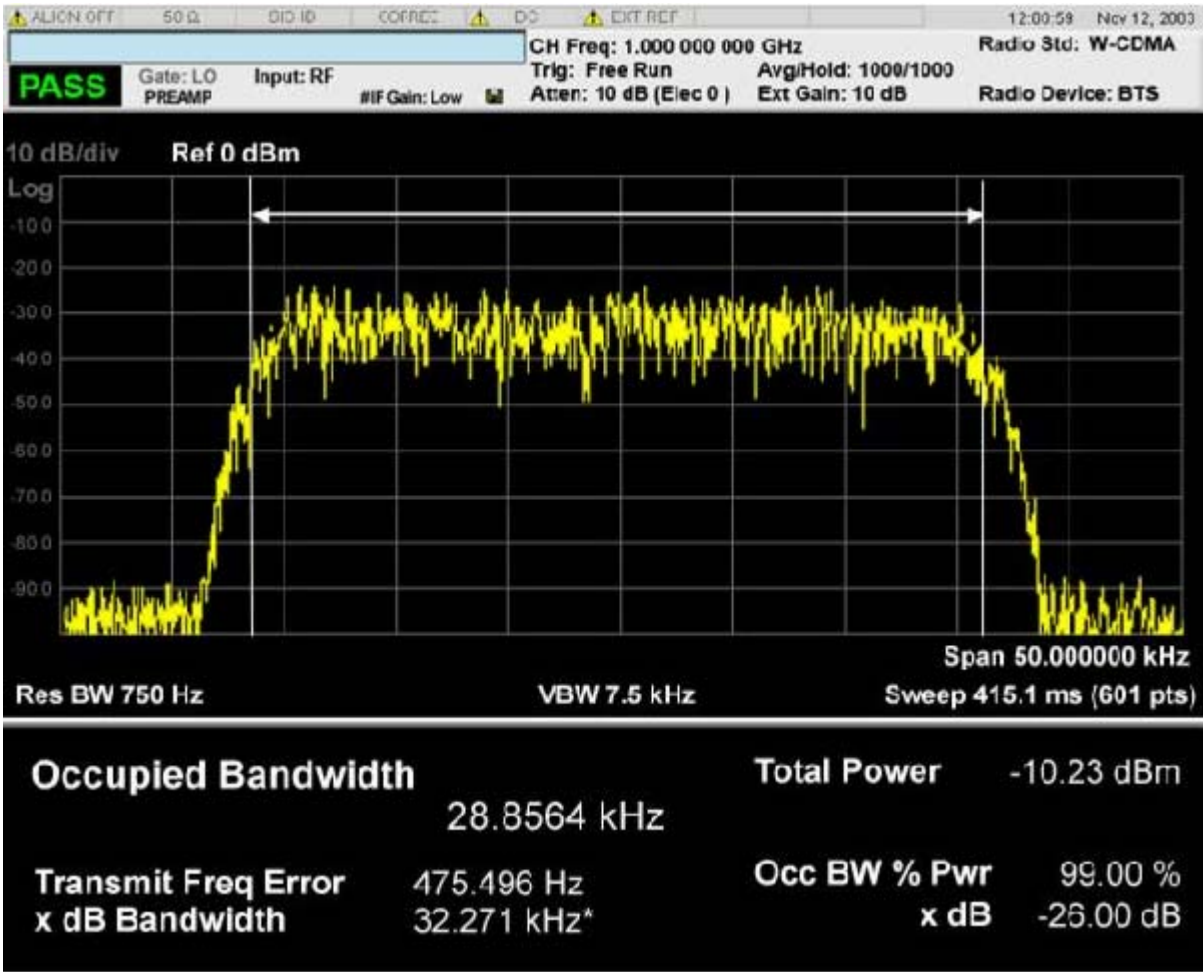
View

There is a single results view available for this measurement.

Spectrum View

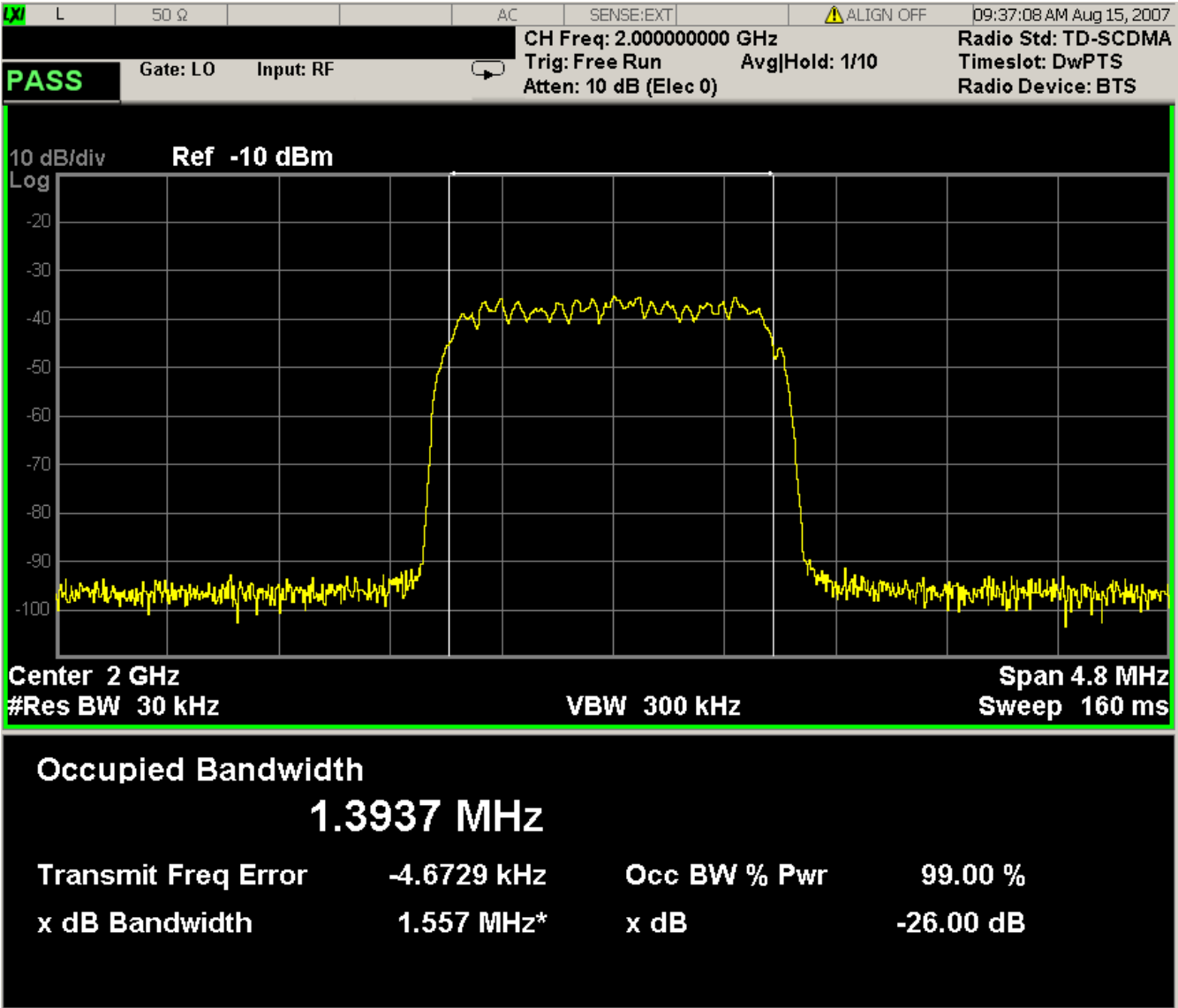
NOTE An asterisk next to the x dB bandwidth value indicates the results may not have been determined with optimal analyzer settings. If this result (emission bandwidth) is your primary interest, select Meas Setup, Max Hold, On. Then change the detector mode to peak. Acquiring peak data ensures accuracy of the result.

For SA, WCDMA, C2K, 1xEVDO, WIMAX OFDMA mode:



Occupied Bandwidth
View/Display

For TD-SCDMA mode only:



Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.

Operation of this key is identical across several measurements. For details about this key, see “Display” on page 1109.

Key Path	View/Display

Instrument S/W Revision A.01.60 or later

Occupied Bandwidth
View/Display

ACP is a measurement of the amount of interference, or power, in an adjacent frequency channel. The results are displayed as a bar graph or as spectrum data, with measurement data at specified offsets.

This topic contains the following sections:

[“Measurement Commands for ACP” on page 519](#)

[“Remote Command Results for ACP Measurement” on page 519](#)

Measurement Commands for ACP

The following commands are used to retrieve the measurement results:

:CONFigure:ACP

:CONFigure:ACP:NDEFault

:INITiate:ACP

:FETCh:ACP [n] ?

:READ:ACP [n] ?

:MEASure:ACP [n] ?

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 947](#).

Remote Command Results for ACP Measurement

Condition	N	Results Returned
Mode = SA mode, Radio Std = None, Number of carriers = 1 and only offset A is on	Not specified or n=1	Returns 3 comma-separated values that correspond to: Reference carrier power, lower-adjacent channel power (dBc), and upper-adjacent channel power (dBc).

Meas Type = Total power reference	Not specified or n=1	Returns 28 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm) 3. 0.0 4. Reference carrier power (dBm) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm) If the results are not available, -999.0 is returned.

Meas Type = Power spectral density reference	not specified or n=1	Returns 28 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm/Hz or dBm/MHz) 3. 0.0 4. Reference carrier power (dBm/Hz or dBm/MHz) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm/Hz or dBm/MHz) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm/Hz or dBm/MHz) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm/Hz or dBm/MHz) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm/Hz or dBm/MHz) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm/Hz or dBm/MHz) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm/Hz or dBm/MHz) If the results are not available, -999.0 is returned.
Meas Method = FAST	not specified or n=1	Returns 5 comma-separated results, in the following order: 1. Reference carrier - absolute power (dBm) 2. Lower offset A - absolute power (dBm) 3. Upper offset A - absolute power (dBm) 4. Lower offset B - absolute power (dBm) 5. Upper offset B - absolute power (dBm)

Meas Type = 2
Total power
reference

Returns 48 scalar results, in the following order:

1. Channel (1) - relative power (dB)
2. Channel (1) - absolute power (dBm)
3. Channel (2) - relative power (dB)
4. Channel (2) - absolute power (dBm)
- ...
23. Channel (12) - relative power (dB)
24. Channel (12) - absolute power (dBm)
25. Lower offset A - relative power (dB)
26. Lower offset A - absolute power (dBm)
27. Upper offset A - relative power (dB)
28. Upper offset A - absolute power (dBm)
29. Lower offset B - relative power (dB)
30. Lower offset B - absolute power (dBm)
31. Upper offset B - relative power (dB)
32. Upper offset B - absolute power (dBm)
- ...
45. Lower offset F - relative power (dB)
46. Lower offset F - absolute power (dBm)
47. Upper offset F - relative power (dB)
48. Upper offset F - absolute power (dBm)

If the results are not available, -999.0 is returned.

Meas Type = 2
Power spectral
density
reference

Returns 48 scalar results, in the following order:

1. Channel (1) - relative power (dB)
2. Channel (1) - absolute power (dBm/Hz or dBm/MHz)
3. Channel (2) - relative power (dB)
4. Channel (2) - absolute power (dBm/Hz or dBm/MHz)
- ...
23. Channel (12) - relative power (dB)
24. Channel (12) - absolute power (dBm/Hz or dBm/MHz)
25. Lower offset A - relative power (dB)
26. Lower offset A - absolute power (dBm/Hz or dBm/MHz)
27. Upper offset A - relative power (dB)
28. Upper offset A - absolute power (dBm/Hz or dBm/MHz)
29. Lower offset B - relative power (dB)
30. Lower offset B - absolute power (dBm/Hz or dBm/MHz)
31. Upper offset B - relative power (dB)
32. Upper offset B - absolute power (dBm/Hz or dBm/MHz)
- ...
45. Lower offset F - relative power (dB)
46. Lower offset F - absolute power (dBm/Hz or dBm/MHz)
47. Upper offset F - relative power (dB)
48. Upper offset F - absolute power (dBm/Hz or dBm/MHz)

If the results are not available, -999.0 is returned.

Meas Type = Total power reference	3	Returns 24 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as total power in dB): 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result ... 21 Lower offset F - relative limit result 22 Lower offset F - absolute limit result 23 Upper offset F - relative limit result 24 Upper offset F - absolute limit result
Meas Type = Power spectral density reference	3	Returns 24 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as power spectral density in dB): 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result ... 21 Lower offset F - relative limit result 22 Lower offset F - absolute limit result 23 Upper offset F - relative limit result 24 Upper offset F - absolute limit result
	4	Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 1

- 5 Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 2
- 6 Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 3

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent, except all Attenuation values and the Internal Preamp selections, which are the same across all measurements.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the value for the absolute power reference. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el <real> :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el?
Example	DISP:ACP:VIEW:WIND:TRAC:Y:RLEV 100 DISP:ACP:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	All Except CDMA1xEVDO:10.00 dBm CDMA1xEVDO: -10dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	UP/DOWN Parameters supported. Step value is same as Scale/Div
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change attenuation settings. This key has read-back text that describes the total attenuator value.

See AMPTD Y Scale, “[Attenuation](#)” on page 867 in the “Common Measurement Functions” section for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Scale/Div

Sets the units-per-division of the vertical scale in the logarithmic display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision <rel_ampl> :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision?
Example	DISP:ACP:VIEW:WIND:TRAC:Y:PDIV 5 DISP:ACP:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELection to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1, 2, 5, 10...
Instrument S/W Revision	A.01.60 or later

Presel Center

See AMPTD Y Scale, “[Presel Center](#)” on page 878 in the “Common Measurement Functions” section

for more information.

Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 880 in the “Common Measurement Functions” section for more information.

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, “[Internal Preamp](#)” on page 881 in the “Common Measurement Functions” section for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Ref Position

Positions the reference level at the top, center, or bottom of the Y- scale display. Changing the reference position does not change the reference level value.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION TOP CENTer BOTTom :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION?
Example	DISP:ACP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:ACP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le 0 1 OFF ON</pre> <pre>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le?</pre>
Example	<pre>DISP:ACP:VIEW:WIND:TRAC:Y:COUP ON</pre> <pre>DISP:ACP:VIEW:WIND:TRAC:Y:COUP?</pre>
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

See “[AUTO COUPLE](#)” on page 885 in the section "Common Measurement Functions" for more information.

BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

Key Path **Front-panel key**

Instrument S/W Revision A.01.60 or later

Res BW

Sets the value of the resolution bandwidth. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Key Path **BW**

Mode SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Remote Command

```
[ :SENSe] :ACPower:BANDwidth[:RESolution] <bandwidth>
[ :SENSe] :ACPower:BANDwidth[:RESolution]?
[ :SENSe] :ACPower:BANDwidth[:RESolution] :AUTO ON|OFF|1|0
[ :SENSe] :ACPower:BANDwidth[:RESolution] :AUTO?
```

Example

```
ACP:BAND 25kHz
ACP:BAND?
ACP:BAND:AUTO ON
ACP:BAND:AUTO?
```

Notes

This key is available only in IBW mode.

This parameter is preset by the Meas Method selection. Preset values are as follows:

IBW: 100 kHz

IBWR: 27 kHz

FAST (WCDMA): 390 kHz

You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

Dependencies/Couplings

The resolution bandwidth is coupled to the video bandwidth based on the video to resolution bandwidth ratio setting if AUTO is selected.

ACP Measurement BW

Preset	SA: 220 kHz WCDMA: 100 kHz WIMAX OFDMA: 100 kHz C2K: Method RBW: grayed out(1.2MHz) Method IBW: 15kHz TD-SCDMA: 30 kHz 1xEVDO: 30 kHz 0
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	See GPSA PD for details.
Instrument S/W Revision	A.01.60 or later

Video BW

Changes the analyzer post-detection filter (VBW).

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[[:SENSE]:ACPower:BANDwidth:VIDeo <freq> [[:SENSE]:ACPower:BANDwidth:VIDeo? [[:SENSE]:ACPower:BANDwidth:VIDeo:AUTO OFF ON 0 1 [[:SENSE]:ACPower:BANDwidth:VIDeo:AUTO?
Example	ACP:BAND:VID 1kHz ACP:BAND:VID? ACP:BWID:VID:AUTO ON ACP:BWID:VID:AUTO?
Notes	The values shown in this table reflect the conditions after a Mode Preset.

Preset	SA: 22 kHz WCDMA, WIMAX OFDMA: 1MHz C2K: Method RBW: grayed out(1.2MHz) Method IBW: 150 kHz TD-SCDMA: 300 kHz 1xEVDO: 300kHz SA: ON WCDMA:OFF WIMAX OFDMA: OFF TD-SCDMA: OFF CDMA1xEVDO: OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test UP/DOWN	1, 3, 10...
Instrument S/W Revision	A.01.60 or later

RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

Key Path	BW
Instrument S/W Revision	A.01.60 or later

Filter Type

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

Key Path	BW, RBW Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:BANDwidth:SHApe GAUSSian FLATtop [:SENSe] :ACPower:BANDwidth:SHApe?
Example	ACP:BAND:SHAP GAUS ACP:BAND:SHAP?
Preset	GAUSSian
State Saved	Saved in instrument state.

ACP Measurement
BW

Range	Gaussian (Normal) Flattop
Instrument S/W Revision	A.01.60 or later

Filter BW

Selects a Gaussian filter based on its –3 dB (Normal) bandwidth or its –6 dB bandwidth.

Key Path	BW, RBW Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:BANDwidth:TYPE DB3 DB6 [:SENSe] :ACPower:BANDwidth:TYPE?
Example	ACP:BAND:TYPE DB3 ACP:BAND:TYPE?
Dependencies/Couplings	Grayed out when Meas Method is RBW.
Preset	DB3
State Saved	Saved in instrument state.
Range	–3 dB (Normal) –6 dB
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “[FREQ Channel](#)” on page 891 in the section "Common Measurement Functions" for more information.

Input/Output

See “[Input/Output](#)” on page 897 in the section "Common Measurement Functions" for more information.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta**, **Fixed** or **Off**. All interactions and dependencies detailed under the key description are enforced when the remote command is sent. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the **Marker Trace** rules. At the same time, **Marker X Axis Value** appears on the Active Function area.

The default active function is the active function for the currently selected marker control mode. If the current control mode is Off, there is no active function and the active function is turned off.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSition DELTA OFF :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE?
Example	CALC:ACP:MARK2:MODE DELT CALC:ACP:MARK2:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

Preset	OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the marker X axis value in the current marker X Axis Scale unit. This value has no effect if the control mode is **Off**, but is the SCPI equivalent of entering an X value if the control mode is **Normal**, **Delta** or **Fixed**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X <freq> :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X ?
Example	CALC:ACP:MARK3:X 0 CALC:ACP:MARK3:X?
Notes	The query returns the marker's absolute X Axis value if the control mode is Normal , or the offset from the marker's reference marker if the control mode is Delta . If the marker is Off the response is not a number.
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
MIN/MAX/DEF Support	Yes
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal**, **Delta** or **Fixed**. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition <real> :CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition?
Example	CALC:ACP:MARK10:X:POS 0 CALC:ACP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points if the control mode is Delta . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points (see "Fractional Trace Points"). If the marker is Off the response is not a number. When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on instrument condition, although the Preset/Default is defined as 500 (this value might be expected value when all offset is on).
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NaN).
State Saved	No
MIN/MAX/DEF Support	Yes
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command only)

Returns the marker Y axis value in the current marker Y axis unit.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y ?
Example	CALC:ACP:MARK11:Y?
Notes	Since the result value is always calculated from acquisition data, the default value is arbitrary. Although the Preset/Default values are defined.
Preset	Result dependent on markers setup and signal source.
State Saved	No
Test MIN/MAX/DEF	No

Instrument S/W Revision A.01.60 or later

Properties

Accesses the marker properties menu.

Key Path **Marker**
Instrument S/W Revision A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path **Marker**
Instrument S/W Revision A.01.60 or later

Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

Key Path	Marker, Properties
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence <integer> :CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence?
Example	CALC:ACP:MARK2:REF 6 CALC:ACP:MARK2:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error –221: “Settings conflict; marker cannot be relative to itself.” When queried a single value will be returned (the specified marker numbers relative marker). You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1

Instrument S/W Revision A.01.60 or later

Marker Trace

Selects the trace that you want your marker to be placed on. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even **Fixed** markers; it is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

Key Path	Marker, Properties
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :T RACe 1 2 3 :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :T RACe?
Example	CALC:ACP:MARK2:TRAC 2 CALC:ACP:MARK2:TRAC?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.
Dependencies/Couplings	This is not affected by Auto Coupling. Sending the remote command causes the addressed marker to become selected.
Preset	All Markers Off
State Saved	Saved in instrument state.
Range	1 2 3
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is On, moving any marker causes an equal X axis movement of every other marker which is not **Off**. By "equal X axis movement" we mean that we preserve the difference between each marker's X axis value (in the fundamental x-axis units of the trace that marker is on) and the X axis value of the marker being moved (in the same fundamental x-axis units).

Key Path	Marker

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:ACPower:MARKer:COUPle[:STATe] ?
Example	CALC:ACP:MARK:COUP ON
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker All Off

Turns all active markers off.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer:AOff
Example	CALC:ACP:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no ‘Marker Functions’ supported in ACP. The front-panel key will display a blank menu key when pressed.

Key Path	Front Panel
Instrument S/W Revision	A.01.60 or later

Marker To

There is no 'Marker To' functionality supported in ACP. The front-panel key will display a blank menu key when pressed.

Key Path	Front Panel
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 947 in the section "Common Measurement Functions" for more information.

Meas Setup

Displays the setup menu for the currently selected measurement. The functions included in the measurement setup menu include setting the parameters for the carriers, offsets, bandwidths, measurement methods and types. This menu also allows you to turn noise correction on and off.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Average/Hold Number

Specifies the number of measurement averages used to calculate the measurement result. The average will be displayed at the end of each sweep. After the specified number of average counts, the average mode (termination control) setting determines the average action.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<code>[:SENSe] :ACPower:AVERage:COUNT <integer></code> <code>[:SENSe] :ACPower:AVERage:COUNT?</code> <code>[:SENSe] :ACPower:AVERage [:STATe] OFF ON 0 1</code> <code>[:SENSe] :ACPower:AVERage [:STATe] ?</code>
Example	ACP:AVER:COUN 250 ACP:AVER:COUN? ACP:AVER OFF ACP:AVER?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	10 ON
State Saved	Saved in instrument state.
Min	1
Max	1000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	10
Instrument S/W Revision	A.01.60 or later

Avg Mode

Enables you to set the averaging mode. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep.

When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:AVERage:TCONtrol EXPonential REPEAT [:SENSe] :ACPower:AVERage:TCONtrol?
Example	ACP:AVER:TCON EXP ACP:AVER:TCON?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat
Instrument S/W Revision	A.01.60 or later

Carrier Setup

Accesses a menu that contains Carriers, Ref Carrier, Ref Car Freq, Ref Car Pwr and Configure Carriers.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Carriers

Specifies the number of carriers to be measured.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Remote Command	[:SENSe] :ACPower:CARRier[1] 2:COUNT <integer> [:SENSe] :ACPower:CARRier[1] 2:COUNT?
Example	ACP:CARR:COUN 1 ACP:CARR:COUN?

Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When Number of Carriers is 1, Ref Carrier is grayed out. Changing this parameter might affect to the Span..
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1

Ref Carrier

Sets the reference carrier. Relative power measurements are made from the reference carrier.

If set to Auto, the measurement selects the carrier with the highest power as the reference carrier and the Ref Carrier parameter is updated. If a value is entered when Ref Carrier Mode is set to Auto, the mode changes to Man.

If set to Man, the value that you enter for the Ref Carrier is used as the reference carrier.

Key Path	Meas Setup, Carrier Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Remote Command	[:SENSe] :ACPower:CARRier[1] 2:RCARrier <integer> [:SENSe] :ACPower:CARRier[1] 2:RCARrier? [:SENSe] :ACPower:CARRier[1] 2:RCARrier:AUTO OFF ON 0 1 [:SENSe] :ACPower:CARRier[1] 2:RCARrier:AUTO?
Example	ACP:CARR:RCAR 1 ACP:CARR:RCAR? ACP:CARR:RCAR:AUTO OFF ACP:CARR:RCAR:AUTO?
Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	If there is only one carrier, this key will be grayed out. If you enter a carrier value that is currently configured as having no power present, that carrier will be changed to having power present. If you enter a ref carrier this parameter will be set to manual.

ACP Measurement
Meas Setup

Preset	Auto determined
State Saved	Saved in instrument state.
Min	1
Max	Number of available carriers
Test MIN/MAX/DEF	No
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Ref Car Freq

Sets the reference carrier frequency.

Key Path	Meas Setup, Carrier Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Remote Command	<code>[:SENSe] :ACPower:CARRier [1] 2 :RCFrequency <freq></code> <code>[:SENSe] :ACPower:CARRier [1] 2 :RCFrequency?</code> <code>[:SENSe] :ACPower:CARRier [1] 2 :RCFrequency:AUTO</code> <code>OFF ON 0 1</code> <code>[:SENSe] :ACPower:CARRier [1] 2 :RCFrequency:AUTO?</code>
Example	ACP:CARR:RCFR 250 MHz ACP:CARR:RCFR? ACP:CARR:RCFR:AUTO OFF ACP:CARR:RCFR:AUTO?
Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode.

Dependencies/Couplings	Coupled to the Center Frequency. If the center frequency changes, the Ref Carrier Frequency is calculated using the following three steps; $\text{Ref Freq1} = \text{Ctr Freq} - (\text{Total of all Carrier Widths} / 2)$ $\text{Ref Freq2} = \text{Ref Freq1} + (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ref Freq} = \text{Ref Freq2} + (0.5 * \text{Carrier Width of Ref Carrier})$ If reference carrier frequency changes the Center Frequency is calculated using the following three steps; $\text{Ctr Freq1} = \text{Ref Freq} - (0.5 * \text{Carrier Width of Ref Carrier})$ $\text{Ctr Freq2} = \text{Ctr Freq1} - (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ctr Freq} = \text{Ctr Freq2} + (\text{Total of all Carrier Widths} / 2)$ This ensures that the carriers are always centered on the screen. If there is only one carrier present the Reference Carrier Frequency will be the same as the Center Frequency.
Preset	Calculated based on the current Center Frequency
State Saved	Saved in instrument state.
Min	-79.999995 MHz
Max	Hardware Dependent: Option 503 = 3.699999995 GHz Option 508 = 8.499999995 GHz Option 513 = 13.799999995 GHz Option 526 = 26.999999995 GHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Same as CF Step
Instrument S/W Revision	A.01.60 or later

Power Ref

Sets the multi-carrier power reference.

When set to Auto, the carrier power result reflects the measured power value in the selected reference carrier.

When set to Man, the result is referenced to the last measured value, or you may specify the reference for the multi-carrier power measurement. Relative values are displayed, referenced to the “Power Reference” value.

Key Path	Meas Setup, Carrier Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA

ACP Measurement Meas Setup

Remote Command	<pre>[:SENSe] :ACPower:CARRier[1] 2[:POWER] <real> [:SENSe] :ACPower:CARRier[1] 2[:POWER]? [:SENSe] :ACPower:CARRier[1] 2:AUTO[:STATe] OFF ON 0 1 [:SENSe] :ACPower:CARRier[1] 2:AUTO[:STATe]?</pre>
Example	<pre>ACP:CARR 10 ACP:CARR? ACP:CARR:AUTO OFF ACP:CARR:AUTO?</pre>
Notes	Although the default value is defined, the value is recalculated by the measurement result just after measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode. This key is available only when the Meas Type is TPRef.
Dependencies/Couplings	See Notes
Preset	0.0 ON
State Saved	Saved in instrument state.
Min	-200 dBm
Max	200 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Same as current Scale/Div
Instrument S/W Revision	A.01.60 or later

PSD Ref

Sets the power spectral density in the carrier (main channel) that is used to compute the relative power spectral density values for the offsets when Meas Type is set to PSD Ref. When the PSD Ref state is set to Auto, this will be set to the measured carrier power spectral density.

Key Path	Meas Setup, Carrier Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA
Remote Command	<pre>[:SENSe] :ACPower:CARRier[1] 2:CPSD <real> [:SENSe] :ACPower:CARRier[1] 2:CPSD?</pre>
Example	<pre>ACP:CARR:CPSD 25 ACP:CARR:CPSD?</pre>

Notes	Although the default value is defined, the value is recalculated by the measurement result just after measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	This key is available only when the Meas Type is PSDRef. The value of PSD Ref is automatically converted when PSD Unit is changed.
Preset	0.0
State Saved	Saved in instrument state.
Min	–999
Max	999
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Scale/Div
Instrument S/W Revision	A.01.60 or later

Configure Carriers

Accesses a menu that contains Carrier, Carrier Pwr Present, Carrier Width and Carrier Integ BW parameters.

Key Path	Meas Setup, Carrier Setup
Instrument S/W Revision	A.01.60 or later

Carrier Selects the carrier to configure for the current measurement.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Dependencies/Couplings	Max value is the number of available carriers, so this value might change when the number of carriers is changed.
Preset	1
State Saved	No
Min	1
Max	Number of available carriers
Instrument S/W Revision	A.01.60 or later

Carrier Coupling Couples carrier settings to carrier #1. The coupled parameters are Carrier Power Present,

ACP Measurement Meas Setup

Carrier Spacing, Measurement Noise Bandwidth, Method and Filter Alpha.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Remote Command	<code>[:SENSe] :ACPower:CARRier[1] 2:LIST:COUPle OFF ON 0 1, ...</code> <code>[:SENSe] :ACPower:CARRier[1] 2:LIST:COUPle?</code>
Example	ACP:CARR:LIST:COUP OFF ACP:CARR:LIST:COUP?
Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Spacing, Measurement Noise Bandwidth, Method and Filter Alpha. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1.
Preset	ON
State Saved	Saved in instrument state.
Range	Couple Man
Instrument S/W Revision	A.01.60 or later

Carrier Pwr Present Configures the carriers for this measurement. It allows spaces to be inserted between carriers. Carriers with the power present parameter set to Yes are carriers, and those with the power present parameter set to No are spaces. Each carrier power present is set to Yes or No. The individual carriers can be set by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or numeric keypad, then toggling the carrier power present using the carrier power present menu key.

The query for this parameter returns the current values for all of the carriers. If a carrier is defined as having no power present, the power displayed will be relative to the reference carrier, otherwise the absolute power will be displayed.

If you change the carrier power present to no and that carrier is currently configured as the reference carrier, the next carrier to the left (or the right if there are no carriers to the left) will be assigned as the reference carrier. This also applies to the scenario where there are only two carriers configured as having power present and you configure only one carrier to have no power present.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA

Remote Command	[:SENSe] :ACPower:CARRier[1] 2:LIST:PPresent YES NO, ... [:SENSe] :ACPower:CARRier[1] 2:LIST:PPresent?
Example	ACP:CARR2:LIST:PPR YES ACP:CARR2:LIST:PPR?
Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Dependencies/Couplings	If there are only one or two carriers, this key will be greyed out as they both need to have power present. Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Preset	YES
State Saved	Saved in instrument state.
Range	Yes No
Instrument S/W Revision	A.01.60 or later

Carrier Spacing Sets the width of the carrier spacing. This will be the value applied to all the current slots, whether they are carriers or spaces.

Enter each carrier spacing value individually by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or the numeric keypad, then enter the carrier width using the carrier spacing menu key.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA
Remote Command	[:SENSe] :ACPower:CARRier[1] 2:LIST:WIDTh <bandwidth>, ... [:SENSe] :ACPower:CARRier[1] 2:LIST:WIDTh?
Example	ACP:CARR2:LIST:WIDT 25kHz ACP:CARR2:LIST:WIDT?
Notes	Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

ACP Measurement Meas Setup

Dependencies/Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list. Changing Carrier Spacing might affect the Span.
Preset	SA, WCDMA: 5 MHz WIMAX OFDMA: 10MHz C2K: 1.25MHz 1xEVDO: 1.25MHz TD-SCDMA: 1.6MHz
State Saved	Saved in instrument state.
Min	0 Hz
Max	1 GHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. UP/DOWN Parameters supported. The series is: 1, 1.5, 2, 3, 5, 7.5, 10,...
Instrument S/W Revision	A.01.60 or later

Measurement Noise Bandwidth Specifies the Measurement Noise Bandwidth used to calculate the power in the carriers.

Each Measurement Noise Bandwidth value is entered individually by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or the numeric keypad. Then enter the measurement noise bandwidth using the measurement noise bandwidth softkey.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:CARRier[1] 2:LIST:BANDwidth[:INTEgrati on] <freq>, ... [:SENSe] :ACPower:CARRier[1] 2:LIST:BANDwidth[:INTEgrati on] ?
Example	ACP:CARR2:LIST:BAND 25kHz ACP:CARR2:LIST:BAND?

Notes	In the WCDMA mode, the preset/default value is defined as 3.84 MHz. But internally, 4.6848 MHz is used as the default value. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers is set to the number of entries in the parameter list.
Preset	SA: 2 MHz WCDMA: 3.84 MHz WIMAX OFDMA: 10MHz C2K: 1.23MHz TD-SCDMA: 1.28MHz 1xEVDO: 1.23MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	1 GHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. UP/DOWN parameters supported. The series is: 1, 1.5, 2, 3, 5, 7.5, 10,...
Instrument S/W Revision	A.01.60 or later

Method Accesses the carrier configuration method settings.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, TD-SCDMA
Remote Command	<pre>[:SENSe] :ACPower:CARRier [1] 2:LIST:METHod IBW RRC, ... [:SENSe] :ACPower:CARRier [1] 2:LIST:METHod?</pre>
Example	ACP:CARR2:LIST:METH RRC ACP:CARR2:LIST:METH?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

ACP Measurement Meas Setup

Preset	SA: IBW WCDMA: RRC WIMAX OFDMA: IBW TD-SCDMA: RRC
State Saved	Saved in instrument state.
Range	IntegBW RRC Weight
Instrument S/W Revision	A.01.60 or later

Filter Alpha Inputs the alpha value for the filter used in the current carrier configuration.

Key Path	Meas Setup, Carrier Setup, Configure Carriers
Mode	SA, WCDMA, TD-SCDMA
Remote Command	<code>[:SENSE] :ACPower:CARRIER[1] 2:LIST:FILT:ALPHA <real>, ...</code> <code>[:SENSE] :ACPower:CARRIER[1] 2:LIST:FILT:ALPHA?</code>
Example	ACP:CARR2:LIST:FILT:ALPH 0.5 ACP:CARR2:LIST:FILT:ALPH?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	0.22 C2K: No
State Saved	Saved in instrument state.
Min	0.01
Max	1.0
Test UP/DOWN	Not supported in Zorro-1. 0.1
Instrument S/W Revision	A.01.60 or later

Offset/Limits

Accesses a menu of functions that contains Offset, Offset Freq/Offset To Edge, Offset Integ BW, Upper Offset Limit and Lower Offset parameters.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Offset

Selects the offset to configure.

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Preset	A
State Saved	Saved in instrument state.
Range	A B C D E F
Instrument S/W Revision	A.01.60 or later

Offset Freq

This parameter determines the frequency difference between the center of the main channel and the center of the carrier.

Each Offset Freq state value is entered individually by selecting the desired carrier on the carrier menu key using the up down arrows, RPG or numeric keypad. Then enter the Offset Freq State using the Offset Frequency softkey.

The list contains up to six (6) entries, depending on the mode selected, for offset frequencies. Each offset frequency in the list corresponds to a reference bandwidth in the bandwidth list.

An offset frequency of zero turns the display of the measurement for that offset off, but the measurement is still made and reported. You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet:LIST:STATe command

Turning the offset off has the same effect as setting the frequency of the offset to 0 Hz and will cause it to be removed from the results screen.

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :ACPower:OFFSet [1] 2:LIST[:FREQuency] <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :ACPower:OFFSet [1] 2:LIST[:FREQuency] ? [:SENSe] :ACPower:OFFSet [1] 2:LIST:STATe OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe] :ACPower:OFFSet [1] 2:LIST:STATe?</pre>
Example	<pre>ACP:OFFS1:LIST 0,0,0,0,0,0 ACP:OFFS1:LIST? ACP:OFFS2:LIST:STAT 1,1,0,0,0,0 ACP:OFFS2:LIST:STAT?</pre>

ACP Measurement Meas Setup

Notes	The label for this menu key will change depending on the currently selected radio standard or mode. For cdma2000 the label for the menu key will be Offset to Edge. For all other supported standards the label will be Offset Freq. When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	Changing Offset Frequency might affect the Span. See the Span key section for details.
Preset	SA: 3 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 3 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz, 0 Hz WCDMA: 5.0 MHz, 10.0 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 5.0 MHz, 10.0 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz WIMAX OFDMA: 10MHz, 20MHz, 0Hz, 0Hz, 0Hz, 0Hz 10MHz, 20MHz, 0Hz, 0Hz, 0Hz, 0Hz C2K:765KHz, 1.995MHz, 0Hz, 0Hz, 0Hz, 0Hz 900KHz, 1.995MHz, 0Hz, 0Hz, 0Hz, 0Hz TD-SCDMA: 1.6 MHz, 3.2 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 1.6 MHz, 3.2 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 1xEVDO: 765KHz, 1.995MHz, 3.125MHz, 4.000MHz, 7.500MHz, 7.500MHz 765KHz, 1.995MHz, 3.125MHz, 4.000MHz, 7.500MHz, 7.500MHz SA: ON, OFF, OFF, OFF, OFF, OFF ON, OFF, OFF, OFF, OFF, OFF WCDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF WIMAX OFDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF TD-SCDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF CDMA1xEVDO: ON,ON,OFF,OFF,OFF,OFF ON,ON,OFF,OFF,OFF,OFF
State Saved	Saved in instrument state.
Min	0 Hz
Max	500 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1.
Instrument S/W Revision	A.01.60 or later

Offset Integ BW

Sets the Integration Bandwidth for the offsets. If there is more than one bandwidth, the list must contain six (6) entries. Each resolution bandwidth in the list corresponds to an offset frequency in the list defined by [:SENSe]:ACP:OFFSet[n]:LIST[:FREQuency].

Enter each value individually by selecting the desired offset on the offset menu key using the up down arrows, the knob, or the numeric keypad, then enter the Offset Integration Bandwidth using the Offset Integration Bandwidth menu key.

You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet[n]:LIST:STATe command."

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth[:INTEgratio n] <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth> [:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth[:INTEgratio n] ?
Example	ACP:OFFS2:LIST:BAND 2MHz,2MHz,2MHz,2MHz,2MHz,2MHz ACP:OFFS2:LIST:BAND?
Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 you must send all values up to 2. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Changing Offset Integ BW might affect to the Span. See Span section for details.
Preset	SA: 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz WCDMA: 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz WIMAX OFDMA: 10MHz, 10MHz, 10MHz, 10MHz, 10MHz, 10MHz 10MHz, 10MHz, 10MHz, 10MHz, 10MHz, 10MHz C2K: 30KHz, 30KHz, 30KHz, 30KHz, 30KHz, 30KHz 30KHz, 30KHz, 30KHz, 30KHz, 30KHz TD-SCDMA: 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz 1xEVDO: C2K: 30KHz, 30KHz, 30KHz, 30KHz, 30KHz, 30KHz 30KHz, 30KHz, 30KHz, 30KHz, 30KHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	1 GHz
Test MIN/MAX/DEF	MIN MAX

ACP Measurement Meas Setup

Test UP/DOWN	Not supported in Zorro-1. UP/DOWN Parameters supported. The series is: 1, 1.5, 2, 3, 5, 7.5, 10,...
Instrument S/W Revision	A.01.60 or later

Offset BW

Accesses the offset bandwidth menu.

Key Path	Meas Setup, Offset/Limit
Instrument S/W Revision	A.01.60 or later

Res BW Sets the resolution bandwidth. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :ACPower:OFFSet [1] 2:LIST:BANDwidth:RESolution <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth> [:SENSe] :ACPower:OFFSet [1] 2:LIST:BANDwidth:RESolution? [:SENSe] :ACPower:OFFSet [1] 2:LIST:BANDwidth:RESolution: AUTO ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0 [:SENSe] :ACPower:OFFSet [1] 2:LIST:BANDwidth:RESolution: AUTO?</pre>
Example	<pre>ACP:OFFS2:LIST:BAND:RES 220kHz,220kHz,220kHz,220kHz,220kHz,220kHz ACP:OFFS2:LIST:BAND:RES? ACP:OFFS2:LIST:BAND:RES:AUTO 1,1,1,1,1,1 ACP:OFFS2:LIST:BAND:RES:AUTO?</pre>
Notes	This key is available only in the IBW mode. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	When Res BW Mode is AUTO, this value is exactly same as Res BW under BW key. And when this value is changed by user, Res BW Mode is also changed to Man.

Preset	SA: 220 kHz, 220 kHz, 220 kHz, 220 kHz, 220 kHz, 220 kHz WCDMA: 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz WIMAX OFDMA: 100KHz, 100KHz, 100KHz, 100KHz, 100KHz, 100KHz C2K: Method:RBW 30K Method: IBW C2K: 15KHz, 15KHz, 15KHz, 15KHz,15KHz, 15KHz 15KHz, 15KHz, 15KHz, 15KHz,15KHz, 15KHz TD-SCDMA: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz 1xEVDO: 3KHz, 30KHz, 30KHz, 30KHz,30KHz, 30KHz 3KHz, 30KHz, 30KHz, 30KHz,30KHz, 30KHz 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1.
Instrument S/W Revision	A.01.60 or later

Video BW Enables you to change the analyzer post-detection filter (VBW).

Key Path	Meas Setup, Offset/Limit, Offset BW
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:VIDeo <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:VIDeo? [:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:VIDeo:AUTO OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:VIDeo:AUTO?
Example	ACP:OFFS2:LIST:BAND:VID 5MHz,5MHz,5MHz,5MHz,5MHz,5MHz ACP:OFFS2:LIST:BAND:VID? ACP:OFFS2:LIST:BAND:VID:AUTO 0,0,0,0,1,1 ACP:OFFS2:LIST:BAND:VID:AUTO?

ACP Measurement Meas Setup

Notes	The values shown in this table reflect the conditions after a Mode Preset. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. .
Preset	SA: 22kHz, 22kHz, 22kHz, 22kHz, 22kHz, 22kHz WCDMA, WIMAX OFDMA: 1MHz, 1MHz, 1MHz, 1MHz, 1MHz, 1MHz C2K: 150KHz, 150KHz, 150KHz, 150KHz, 150KHz, 150KHz 150KHz, 150KHz, 150KHz, 150KHz, 150KHz TD-SCDMA: 300kHz, 300kHz, 300kHz, 300kHz, 300kHz, 300kHz 1xEVDO: 30KHz, 300KHz, 300KHz, 300KHz, 300KHz, 300KHz 30KHz, 300KHz, 300KHz, 300KHz, 300KHz ON, ON, ON, ON, ON, ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	MIN MAX
Instrument S/W Revision	A.01.60 or later

RBW Control Accesses the resolution bandwidth control menu.

Key Path	Meas Setup, Offset/Limit, Offset BW
Instrument S/W Revision	A.01.60 or later

Filter Type Selects the type of bandwidth filter that is used.

Key Path	Meas Setup, Offset/Limit, Offset BW, RBW Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSE] :ACPower:OFFSet [1] 2:LIST:BANDwidth:SHAPE GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop [:SENSE] :ACPower:OFFSet [1] 2:LIST:BANDwidth:SHAPE?</pre>
Example	<pre>ACP:OFFS2:LIST:BAND:SHAP FLAT,GAUS,GAUS,GAUS,GAUS,GAUS ACP:OFFS2:LIST:BAND:SHAP?</pre>
Notes	Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

Dependencies/Couplings	See the description above
Preset	GAUSSian, GAUSSian, GAUSSian, GAUSSian, GAUSSian, GAUSSian
State Saved	Saved in instrument state.
Range	GAUSSian FLATtop
Instrument S/W Revision	A.01.60 or later

Filter BW Selects a Gaussian filter based on its –3 dB (Normal) bandwidth or its –6 dB bandwidth.

Key Path	Meas Setup, Offset/Limit, Offset BW, RBW Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:TYPE DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6 [:SENSe]:ACPower:OFFSet [1] 2:LIST:BANDwidth:TYPE?
Example	ACP:OFFS2:LIST:BAND:TYPE DB3,DB3,DB3,DB3,DB3 ACP:OFFS2:LIST:BAND:TYPE?
Notes	Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Grayed out unless the Gaussian filter type is selected
Preset	DB3, DB3, DB3, DB3, DB3, DB3
State Saved	Saved in instrument state.
Range	–3 dB (Normal) –6 dB
Instrument S/W Revision	A.01.60 or later

Abs Limit

Enters an absolute limit value, which sets the absolute amplitude levels to test against for each of the custom offsets. The list must contain six (6) entries. If there is more than one offset, the offset closest to the carrier channel is the first one in the list. [:SENSe]:ACP:OFFSet[n]:LIST:TEST selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet[n]:LIST:STATe command.

The query returns the six (6) sets of real numbers that are the current absolute amplitude test limits.

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:ABSolute <real>, <real>, <real>, <real>, <real> [:SENSe]:ACPower:OFFSet [1] 2:LIST:ABSolute?

ACP Measurement Meas Setup

Example	ACP:OFFS2:LIST:ABS -10,-10,-10,-10,-10,-10 ACP:OFFS2:LIST:ABS?
Notes	Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 0dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm 0dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm WCDMA: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm C2K: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm WIMAX OFDMA: 50,50,50,50,50,50 TD-SCDMA: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 1xEVDO: -27dBm, -27dBm, -13dBm, -13dBm, -13dBm, -13dBm -27dBm, -27dBm, -13dBm, -13dBm, -13dBm, -13dBm
State Saved	Saved in instrument state.
Min	-200.0 dBm
Max	50.0 dBm
Test MIN/MAX/DEF	MIN MAX
Instrument S/W Revision	A.01.60 or later

Fail

Accesses a menu that enables you to select one of the logic keys for the fail conditions between the measurement results and the test limits. The setting defines the type of testing to be done at any custom offset frequencies. The measured powers are tested against the absolute values defined with [:SENSe]:ACP:OFFSet[n]:LIST:ABSolute, or the relative values defined with [:SENSe]:ACP:OFFSet:LIST:RPSDensity and [:SENSe]:ACP:OFFSet:LIST:RCARrier.

You can turn off (not use) specific offsets with the [:SENS]:ACP:OFFSet:LIST:STATe command.

- Absolute – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit.
- Relative – Fail is shown if one of the relative ACP measurement results is larger than the limit for Rel Lim (Car) or Rel Lim (PSD).
- AND – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit AND one of the relative ACPR measurement results is larger than the limit for Rel Lim (Car) or Rel Lim (PSD).
- OR – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit OR one of the relative ACP measurement results is larger than the limit for Rel Lim (Car) or

Rel Lim (PSD).

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:TEST ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative [:SENSe]:ACPower:OFFSet [1] 2:LIST:TEST?
Example	ACP:OFFS2:LIST:TEST ABS,ABS,ABS,ABS,ABS,ABS ACP:OFFS2:LIST:TEST?
Notes	Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA, WCDMA, C2K, TD-SCDMA: REL, REL, REL, REL, REL, REL REL, REL, REL, REL, REL, REL WIMAX OFDMA: REL, REL, REL, REL, REL, REL CDMA1xEVDO: REL, REL, ABS, REL, REL, REL REL, REL, ABS, REL, REL, REL
State Saved	Saved in instrument state.
Range	AND OR Absolute Relative
Instrument S/W Revision	A.01.60 or later

Rel Lim (Car)

Enters a relative limit value for the carrier level. This sets the amplitude levels to test against for the specified offsets. The

amplitude level is relative to the carrier amplitude. If multiple offsets are available, the list contains six (6) entries. The offset closest to the carrier channel is the first one in the list.

[:SENSe]:ACP:OFFSet:LIST:TEST selects the type of testing to be done at each offset.

[:SENSe]:ACP:OFFSet[n]:LIST[n]:TEST selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet[n]:LIST[n]:STATe command.

The query returns the six (6) sets of real numbers that are the current amplitude test limits, relative to the carrier, for each offset.

Offset[n] n=1 is base station and 2 is mobiles. The default is base station (1).

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Remote Command	[:SENSe]:ACPower:OFFSet[1] 2:LIST:RCARrier <real>, <real>, <real>, <real>, <real> [:SENSe]:ACPower:OFFSet[1] 2:LIST:RCARrier?
Example	ACP:OFFS2:LIST:RCAR 0,0,0,0,0 ACP:OFFS2:LIST:RCAR?
Notes	:CALCulate:ACPower:OFFSet[1] 2:LIST:LIMit:POSitive[:UPPer]:DATA and :CALCulate:ACPower:OFFSet[1] 2:LIST:LIMit:NEGative[:UPPer]:DATA are expanded to support subop code. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	None
Preset	SA: -45, -60, 0, 0, 0, 0 -45, -60, 0, 0, 0, 0 WCDMA: -44.2, -49.2, -49.2, -49.2, -49.2, -49.2 -32.2, -42.2, -42.2, -42.2, -42.2, -42.2 C2K: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WIMAX OFDMA: -50,-60,0,0,0,0 TD-SCDMA: -40, -45, -45, -45, -45, -45 -33, -43, -43, -43, -43, -43 1xEVDO: -45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55
State Saved	Saved in instrument state.
Min	-150
Max	50.0
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1. 5.0
Instrument S/W Revision	A.01.60 or later

Rel Lim (PSD)

Enters a relative limit value for the level of the power spectral density. This sets the amplitude levels to test against for any custom offsets. The amplitude level is relative to the power spectral density. If multiple offsets are available, the list contains six (6) entries. The offset closest to the carrier channel is the first one in the list.

[:SENSe]:ACP:OFFSet[n]:LIST[n]:TEST selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet[n]:LIST:STATe command.

The query returns the six (6) sets of real numbers that are the current amplitude test limits, relative to the power spectral density, for each offset.

Offset[n] n=1 is base station and 2 is mobiles. The default is base station (1).

Key Path	Meas Setup, Offset/Limit
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:OFFSet [1] 2:LIST:RPSDensity <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe]:ACPower:OFFSet [1] 2:LIST:RPSDensity?
Example	ACP:OFFS2:LIST:RPSD 10,10,10,10,10,10 ACP:OFFS2:LIST:RPSD?
Notes	Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: -28.87 dB, -43.87 dB, 0 dB, 0 dB, 0 dB, 0 dB -28.87 dB, -43.87 dB, 0 dB, 0 dB, 0 dB, 0 dB WCDMA: -44.2 dB, -49.2 dB, -49.2 dB, -49.2 dB, -49.2 dB, -49.2 dB -32.2 dB, -42.2 dB, -42.2 dB, -42.2 dB, -42.2 dB, -42.2 dB C2K: 0 dB, 0 dB, 0 dB, 0 dB, 0 dB, 0 dB 0 dB, 0 dB, 0 dB, 0 dB, 0 dB, 0 dB WIMAX OFDMA: -25,-35,0,0,0,0 TD-SCDMA: -40 dB, -45 dB, -45 dB, -45 dB, -45 dB, -45 dB -33 dB, -43 dB, -43 dB, -43 dB, -43 dB, -43 dB 1xEVDO: -45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55
State Saved	Saved in instrument state.
Min	-150.0 dB
Max	50.0 dB
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1. 5.0
Instrument S/W Revision	A.01.60 or later

Carrier Result

Allows you to view and scroll through the carrier power results.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA. 1xEVDO
Dependencies/Couplings	This key will be grayed out if there is only one carrier.
Preset	1

ACP Measurement Meas Setup

State Saved	No
Min	1
Max	Number of carriers.
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

PhNoise Opt Auto

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

Auto will choose:

Fast Tuning whenever Span > 12.34 MHz or RBW > 250 kHz

otherwise, if center frequency is < 25 kHz OR ALL of the following are true:

CF >= 1 MHz AND Span <= 141.4 kHz AND RBW <= 5 kHz

then **Best Phase Noise at Offset < 20 kHz**;

otherwise, **Best Phase Noise at Offset > 30 kHz**.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA. 1xEVDO
Remote Command	[:SENSe] :ACPower:FREQuency:SYNThesis:AUTO[:STATe] OFF ON 0 1 [:SENSe] :ACPower:FREQuency:SYNThesis:AUTO[:STATe] ?
Example	ACP:FREQ:SYNT:AUTO 1 ACP:FREQ:SYNT:AUTO?
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Instrument S/W Revision	A.01.60 or later

PhNoise Opt State

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA. 1xEVDO
Remote Command	[:SENSe] :ACPower:FREQuency:SYNThesis [:STATe] 1 2 3 [:SENSe] :ACPower:FREQuency:SYNThesis [:STATe] ?
Example	ACP:FREQ:SYNT 1 ACP:FREQ:SYNT?
Notes	Parameter key: 1 - optimizes phase noise for frequencies offset <20 kHz from the carrier. 2 - optimizes phase noise for frequencies offset >30 kHz from the carrier. 3 - optimizes LO for tuning speed.
Preset	Because this function is in Auto after preset, the state of this function after Preset will be automatically calculated.
State Saved	Saved in instrument state.
Range	BestPhase Noise at offset < 20 kHz BestPhase Noise at offset > 30 kHz Fast Tuning
Instrument S/W Revision	A.01.60 or later

Meas Method

Sets the desired method to measure ACP.

Integration BW — one sweep of the trace is taken, and the band power for each offset is computed. Depending on the status of the Meas Type parameter (Total Power Reference or PSD Reference), results are displayed relative to the total power or the power spectral density. The display reflects either the current trace or a bar graph view.

Filtered IBW (max dynamic range) — ACP Path is used to compute ACP when an ACP path is available. This method increases dynamic range, but increases measurement time as it limits the resolution bandwidth. This method is useful for improving dynamic range on W-CDMA signal because of a sharp cutoff band pass filter is used. The accuracy of the adjacent channel power ratio is not degraded by this method, but the absolute accuracy of both adjacent channel power and carrier power are degraded by up to about 0.5 dB.

RBW — the algorithm uses zero-span and an appropriate RBW setting to capture all of the power in the carrier channel and the offsets. The zero-span algorithm (RBW method) is slower than the IBW method, but greatly improves repeatability.

Fast (in WCDMA mode or SA mode with 3GPP WCDMA radio standard selected) — this provides the same method as the Integration BW method, but with optimized for speed to measure W-CDMA signal.

In the TD-SCDMA mode, only the Integration BW method is available. Therefore, the Meas Method

ACP Measurement Meas Setup

key is not displayed in the TD-SCDMA mode.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:METHod IBW IBWRange FAST RBW [:SENSe] :ACPower:METHod?
Example	ACP:METH IBW ACP:METH?
Dependencies/Couplings	IBW (Range) restricts the Res BW available for making this measurement to 30kHz. When selected the Res Bw will be clipped to this value if required and an error number displayed.
Preset	SA: IBW WCDMA: IBW C2K: RBW WIMAX OFDMA: IBW 1xEVDO: IBW
State Saved	Saved in instrument state.
Range	Integration BW Filtered IBW (max dynamic range) RBW Fast
Instrument S/W Revision	A.01.60 or later

Meas Type

Changes the reference used for the measurement. This allows you to make absolute and relative power measurements of either total power or the power normalized to the measurement bandwidth.

Total Pwr Ref (TPR) sets the reference to the total carrier power. PSD Ref (PSDR) sets the reference to the power spectral density of the carrier.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:TYPE TPRef PSDRRef [:SENSe] :ACPower:TYPE?
Example	ACP:TYPE PSDR ACP:TYPE?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	TPRef
State Saved	Saved in instrument state.

Range	Total Power Ref PSD Ref
Instrument S/W Revision	A.01.60 or later

PSD Ref

Sets the unit bandwidth for Power Spectral Density. The available units are dBm/Hz and dBm/MHz.

Key Path	Meas Setup
Mode	A, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:UNIT:ACPower:POWer:PSD DBMHZ DBMMHZ :UNIT:ACPower:POWer:PSD?
Example	UNIT:ACP:POW:PSD DBMMHZ UNIT:ACP:POW:PSD?
Dependencies/Couplings	When the PSD unit is changed, the PSD reference result of the “MEAS READ FETCH:ACP[n]?” is also changed by the PSD unit basis (in either dBm/Hz or dBm/MHz).
Preset	DBMHZ
State Saved	Saved in instrument state.
Range	dBm/Hz dBm/MHz
Instrument S/W Revision	A.01.60 or later

Limit Test

Turns limit checking for each offset On or Off. The limits may be specified within the Offset menu, for each offset, both sides of the carrier. For results that fail the limit, a red F is appended. In Combined view, the bar turns red.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:LIMit:STATe OFF ON 0 1 :CALCulate:ACPower:LIMit:STATe?
Example	CALC:ACP:LIM OFF CALC:ACP:LIM?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.

ACP Measurement Meas Setup

Preset	SA: OFF WCDMA: ON C2K: ON WIMAX OFDMA: OFF TD-SCDMA: ON 1xEVDO: ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Offset RRC Weighting

Allows you to turn RRC filtering of the carriers and all adjacent channels on or off. The α value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

Key Path	Meas Setup
Mode	SA, WCDMA, TD-SCDMA
Remote Command	[:SENSe] :ACPower:FILTeR [:RRC] [:STATe] OFF ON 0 1 [:SENSe] :ACPower:FILTeR [:RRC] [:STATe] ?
Example	ACP:FILT OFF ACP:FILT?
Notes	This parameter is not available for cdma2000 You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELection to set the mode.
Preset	SA: OFF WCDMA: ON C2K: NO WIMAX OFDMA: OFF TD-SCDMA: ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Offset Filter Alpha

Sets the alpha value for the RRC Filter.

Key Path	Meas Setup
Mode	SA, WCDMA, TD-SCDMA
Remote Command	[:SENSe] :ACPower:FILTer [:RRC] :ALPHa <real> [:SENSe] :ACPower:FILTer [:RRC] :ALPHa?
Example	ACP:FILT:ALPH 0.5 ACP:FILT:ALPH?
Notes	This parameter is not available for cdma2000 You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 0.22 WCDMA: 0.22 WIMAX OFDMA: 0.22 C2K: NO TD-SCDMA: 0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Test MIN/MAX/DEF	Yes
Test UP/DOWN	0.1
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CONFIgure:ACPower
Example	CONF:ACP
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting Meas Preset will restore all measurement parameters to their default values.

Instrument S/W Revision A.01.60 or later

Noise Correction

Sets the noise floor correction function to On or Off. On enables measurement noise correction when the measured power in the reference channel or any offset is close to the noise floor of the analyzer. Off turns these corrections off.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:CORRection:NOISe [:AUTO] OFF ON 0 1 [:SENSe] :ACPower:CORRection:NOISe [:AUTO] ?
Example	ACP:CORR:NOIS OFF ACP:CORR:NOIS?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.
Preset	0
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 965 in the section "Common Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page [977](#) in the section "Common Measurement Functions" for more information.

Peak Search

Accesses a menu that enables you to control the peak search function.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Peak Search

Places the selected marker on the trace point with the maximum y-axis value.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum
Example	CALC:ACP:MARK2:MAX
Instrument S/W Revision	A.01.60 or later

Next Peak

Moves the selected marker to the peak that has the next highest amplitude.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:NEXT
Example	CALC:ACP:MARK2:MAX:NEXT
Instrument S/W Revision	A.01.60 or later

Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker that meets all enabled peak criteria.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:RIGHT
Example	CALC:ACP:MARK2:MAX:RIGHT

Instrument S/W Revision A.01.60 or later

Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker that meets all enabled peak criteria.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MAXimum:LEFT
Example	CALC:ACP:MARK2:MAX:LEFT
Instrument S/W Revision	A.01.60 or later

Marker Delta

Sets the control mode for the selected marker to Delta mode.

See Marker Delta in the "Marker Functions" section for more information.

Key Path	Peak Search
Instrument S/W Revision	A.01.60 or later

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :PTPeak
Example	CALC:ACP:MARK:PTP
Notes	Turns on the Marker Δ active function.
Dependencies/Couplings	This key is not available (key is grayed out) when Coupled Markers is on.
Instrument S/W Revision	A.01.60 or later

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:ACPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :MINimum
Example	CALC:ACP:MARK:MIN
Instrument S/W Revision	A.01.60 or later

Recall

See “[Recall](#)” on page [985](#) in the section "Common Measurement Functions" for more information.

Restart

See “Restart” on page 1003 in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 1005 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 1027 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 1029 in the section "Common Measurement Functions" for more information.

SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Span

Changes the frequency range symmetrically about the center frequency.

The default (and minimum) span is calculated using the number of carriers and the carrier width where;

$$\text{Span} = (\text{Upper Carrier Freq} + (\text{max offset IBW} * (1 + \alpha)) / 2) - (\text{Lower Carrier Freq} - (\text{max offset IBW} * (1 + \alpha)) / 2)$$

The span is increased by a factor of 1 + Filter Alpha if the RRC Filter is on.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:FREQuency:SPAN <freq> [:SENSe] :ACPower:FREQuency:SPAN?
Example	ACP:FREQ:SPAN 25MHz ACP:FREQ:SPAN?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	The span value is clipped when the carrier settings and/or the offset settings are changed. The value is changed to satisfy following formula: Span = (Upper Carrier Freq + (max offset IBW * (1 + alpha)) / 2) - (Lower Carrier Freq - (max offset IBW * (1 + alpha)) / 2)
Preset	SA: 8 MHz WCDMA: 24.6848 MHz WIMAX OFDMA: 50MHz C2K: 4.5 MHz TD-SCDMA: 8MHz 1xEVDO: 4.05 MHz
State Saved	Saved in instrument state.
Min	10 Hz

ACP Measurement

SPAN X Scale

Max	Hardware Dependent: Option 503 = 3.7 GHz Option 507 = 7.1 GHz Option 508 = 8.5 GHz Option 513 = 13.8 GHz Option 526 = 27.0 GHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1, 2, 5, 10...
Instrument S/W Revision	A.01.60 or later

Full Span

Changes the span to show the full frequency range of the spectrum analyzer.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:FREQuency:SPAN:FULL
Example	ACP:FREQ:SPAN:FULL
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Instrument S/W Revision	A.01.60 or later

Last Span

Changes the span to the previous span setting. If no previous span value exists, then the span will remain unchanged.

Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:FREQuency:SPAN:PREVious
Example	ACP:FREQ:SPAN:PREV
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep time, and source.

See “Sweep / Control” on page 1033 in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. In swept spans, the sweep time varies from 1 millisecond to 2000 seconds. Additional overhead time, which impacts the sweep rate, is not calculated as part of the sweep time. In fact:

sweep rate = span/sweep time

update rate = 1/(sweep time + overhead)

sweep cycle time = sweep time + overhead

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points, so changing those parameters may change the sweep time.

If you increase the sweep time, you increase the length of the time data captured and the number of points measured. You might need to specify a specific sweep speed to accommodate a specific condition in your transmitter. For example, you may have a burst signal and need to measure an exact portion of the burst.

Selecting a specific sweep time may result in a long measurement time since the resulting number of data points may not be the optimum 2n. Use [:SENSe]:ACP:OFFSet:LIST:SWEep:TIME to set the number of points used for measuring the offset channels for Basic and cdmaOne.

For cdma2000 and W-CDMA, this command sets the sweep time when using the sweep mode. See [:SENSe]:ACP:SWEep:TYPE

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :ACPower:SWEep:TIME <time> [:SENSe] :ACPower:SWEep:TIME? [:SENSe] :ACPower:SWEep:TIME:AUTO OFF ON 0 1 [:SENSe] :ACPower:SWEep:TIME:AUTO?</pre>

ACP Measurement Sweep/Control

Example	ACP:SWE:TIME 50ms ACP:SWE:TIME? ACP:SWE:TIME:AUTO OFF ACP:SWE:TIME:AUTO?
Notes	This parameter is preset by Meas Method selection. Preset values are as follows: IBW: 29 ms IBWR: 108 ms FAST (WCDMA): 7.5 ms
Dependencies/Couplings	When you manually change the Sweep Time, this state automatically goes to 'Man'.
Preset	SA: Automatically calculated WCDMA: 29 ms WIMAX OFDMA: Automatically calculated C2K: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: Automatically calculated SA: ON WCDMA: OFF C2K: OFF(mehtod IBW) WIMAX OFDMA: ON TD-SCDMA: ON
State Saved	Saved in instrument state.
Min	1 ms
Max	4000 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,1.5,2,3,5,7.5,10 sequence
Instrument S/W Revision	A.01.60 or later

Sweep Setup

Accesses the sweep setup menu.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

Key Path	Sweep/Control, Sweep Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:SWEep:TIME:AUTO:RULes NORMal ACCuracy [:SENSe] :ACPower:SWEep:TIME:AUTO:RULes?
Example	ACP:SWE:TIME:AUTO:RUL NORM ACP:SWE:TIME:AUTO:RUL?
Notes	Set to Norm when Auto Couple is pressed or sent remotely.
Preset	SA, WCDMA, C2K, TD-SCDMA, 1xEVDO: ACCuracy WIMAX OFDMA: NORMal
State Saved	Saved in instrument state.
Range	Norm Accy
Instrument S/W Revision	A.01.60 or later

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point it was at when paused. See [“Pause/Resume” on page 1034](#) in “Common Measurement Functions” for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate

Accesses a menu that enables you to control the gating function .The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate Method that lets you choose one of the three different types of gating is not available in this measurement.

See [“Gate” on page 591](#) in “common Measurement Functions” for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep, from 1 to 20001. The sweep time resolution setting will depend on

ACP Measurement Sweep/Control

the number of points selected.

Key Path	Sweep/Control
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:SWEep:POINts <integer> [:SENSe] :ACPower:SWEep:POINts?
Example	ACP:SWE:POIN 500 ACP:SWE:POIN?
Notes	Whenever the number of sweep points changes: • All trace data is erased • Any traces with Update Off will also go to Display Off (like going from View to Blank in the older analyzers) • Sweep time is re-quantized • Any limit lines that are on will be updated • If averaging/hold is on, averaging/hold starts over
Dependencies/Couplings	Whenever the number of sweep points changes, the sweep time is re-quantized.
Preset	1001
State Saved	Saved in instrument state.
Min	1
Max	20001
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trace Type

Allows you to select the type of trace for the current measurement. The first page of this menu contains a selection of the trace type (Clear Write, Trace Average, Max Hold, Min Hold) for the selected trace.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:TRACe:ACPower[:TRACe1 2 3]:TYPE WRITE AVERAge MAXHold MINHold :TRACe[1] 2 3:ACPower:TYPE WRITE AVERAge MAXHold MINHold :TRACe:ACPower[:TRACe1 2 3]:TYPE? :TRACe[1] 2 3:ACPower:TYPE?
Example	TRAC:ACP:TYPE MINH TRAC:ACP:TYPE?
Notes	WRITE = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Dependencies/Couplings	When Detector setting is “Auto” ([[:SENSe]:ACPower:DETEctor:AUTO?]), Detector is set to what the Radio Standard defaults states (see detector section below) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERAge, MaxHold and MinHold will not function, since Averaging is required to be ‘on’ for them to operate.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	WRITE AVERAge MAXHold MINHold
Instrument S/W Revision	A.01.60 or later

Detector

Accesses a menu of functions that enables you to control the detectors for the current measurement. The following choices are available:

- Auto- the detector selected is set to AVERage, unless the Radio Standard defaults state otherwise e.g. it is set to Peak for Radio Standard = PDC when Device = both MS and BTS, and when Radio Standard = NADC and Device = MS .
- Normal-the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average-the detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).).
- Peak-the detector determines the maximum of the signal within the sweep points.
- Sample-the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak-the detector determines the minimum of the signal within the sweep points.

In swept analysis, the time interval of the data collection for the display sweep points also represents a frequency interval. In FFT analysis, the sweep points represents just a frequency interval. The detector determines the relationship between the spectrum computed by the FFT and the single data point displayed for the sweep points.

Key Path	Detector
Instrument S/W Revision	A.01.60 or later

Detector Selection

Selects a detector to be used by the analyzer for the current measurement. All traces will use the same detector type, similar to Monitor Spectrum measurement

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :ACPower:DETEctor [:FUNctIon] AVERage NEgative NORMal POSitive SAMPlE [:SENSe] :ACPower:DETEctor [:FUNctIon] ?
Example	ACP:DET NORM ACP:DET?

Notes	When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. The detector choices are: • The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection. • The Average detector determines the average of the signal within the data range. The averaging method method is Power (RMS). • The Peak detector determines the maximum of the signal within the data range. • The Sample detector indicates the instantaneous level of the signal at the center of the data represented by each display point. • The Negative Peak detector determines the minimum of the signal within the data range. Because they may not find a spectral component's true peak, neither average nor sample detectors measure amplitudes of CW signals as accurately as peak or normal, but they do measure noise without the biases of peak detection. When a detector selection is made, the menu returns to the previous menu.
Dependencies/Couplings	When Detector setting is “Auto” ([[:SENSe]:ACPower:DETECTOR:AUTO?]), Detector is set to what the Radio Standard defaults states (see detector section) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERage, MaxHold and MinHold will not function, since Averaging is required to be ‘on’ for them to operate. Only one detector type for all 3 traces is allowed.
Preset	AVERage
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Auto

Sets the detector for the currently selected trace to auto.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:ACPower:DETECTOR:AUTO ON OFF 1 0 [:SENSe]:ACPower:DETECTOR:AUTO?

ACP Measurement Trace/Detector

Example	ACP:DET:AUTO 1 ACP:DET?
Dependencies/Couplings	When Detector setting is “Auto” ([:SENSe]:ACPower:DETECTOR:AUTO?), Detector is set to what the Radio Standard defaults states (see detector section) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERage, MaxHold and MinHold will not function, since Averaging is required to be ‘on’ for them to operate.
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Select Trace (frontpanel only)

This key selects which trace the other parameters under the Trace/Detector menu will apply to.

Key Path	Trace/Detector
Mode	NF
Notes	No SCPI. Front panel only.
Preset	1
State Saved	Saved in instrument state.
Range	1 2 3
Instrument S/W Revision	A.01.60 or later

View / Blank

Key Path	Trace/Detector
Mode	SA
Notes	No SCPI. Front panel only.

Dependencies/Couplings	The four states of this 1-of-N actually set two variables, Update and Display, to their four possible combinations (only 2 will be implemented): Trace On: Update and Display both On View: Update Off and Display On (Not implemented) Blank: Update Off and Display Off Background: Update On, Display Off (Not implemented) See tables below for detail on the SCPI to control these two variables. Selecting a trace type (Clear Write, Trace Average, Max Hold, Min Hold) for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in 'Trace On' state (Update On and Display On), even if that trace type was already selected.
Preset	Trace On
State Saved	Saved in instrument state.
Range	Trace On Blank
Instrument S/W Revision	A.01.60 or later
Key Path	Trace/Detector
Remote Command	<pre>:TRACe [1] 2 3 :ACPower:UPDate [:STATe] ON OFF 0 1 :TRACe [1] 2 3 :ACPower:UPDate [:STATe] ?</pre>
Example	<pre>TRAC:ACP:UPD ON TRAC:ACP:UPD?</pre>
Dependencies/Couplings	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset	1 0 0 (On for Trace 1; Off for 2 &3)
State Saved	Saved in instrument state.
Range	0 1
Instrument S/W Revision	A.01.60 or later
Key Path	Trace/Detector
Remote Command	<pre>:TRACe [1] 2 3 :ACPower:DISPlay [:STATe] ON OFF 0 1 :TRACe [1] 2 3 :ACPower:DISPlay [:STATe] ?</pre>
Example	<pre>TRAC:ACP:DISP ON TRAC:ACP:DISP?</pre>
Dependencies/Couplings	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset	1 0 0 (On for Trace 1; Off for 2 &3)

ACP Measurement
Trace/Detector

State Saved	Saved in instrument state.
Range	0 1
Instrument S/W Revision	A.01.60 or later

Trigger

Accesses a menu functions that enable you to select and control the trigger source for the current measurement. See [“Trigger” on page 1057](#) in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

View/Display

Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

The view consists of the following two windows:

“Spectrum Window” on page 600

“Results Window” on page 601



Spectrum Window

When the Bar Graph is On and Limit Test is On, the color of each bar graph reflects the limit test result. When the limit test fails, the bar color is red, and when limit test passes, the bar color is blue.

When RBW is selected as the measurement method, the spectrum trace is not displayed, only the bar graph is displayed. In addition, the Bar Graph key (under the View/Display front panel key) is set to ON

and is grayed out.

The RRC Filter display item is only displayed when RRC filter is on.

Results Window

The text window displays the following results:

Total Carrier Power

This is the total power of all the carriers with carrier power present set to yes. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter for each carrier and then totaling the sums. The total integration bandwidth is shown as part of the result. This will be the total of the Carrier Integ Bw of the carriers used in calculating the total carrier power. If the RRC Filter is on, then the integration bandwidth used is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$ multiplied by the number of carriers with carrier power present set to yes.

Ref Carrier Power

This is the power in the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter for that carrier. The integration bandwidth is shown as part of the result. This is the value of the Carrier Integ Bw for that carrier unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$.

Carrier Power

This is the power in all the currently defined carriers. If the carrier has carrier power present, the power will be absolute. If the carrier is defined as not having power present, the power will be relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter. The integration bandwidth is shown as part of the result. This is the value of the Carrier Integ Bw for the carrier unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$.

As there are potentially more results than can be easily viewed on the display, a scrollable list is used to display all results. The Carrier Results menu key is used to index the carrier amplitude results. This key is grayed out unless the measurement is in single mode (as in continual measurement mode). The display is continuously updating and will not need to be accessed. The currently selected Carrier Result is displayed on the last line of the carrier power result list unless:

- The selected Carrier Result is 4 or less in normal multi carrier power results view. In this case the first 4 carrier power results will be displayed.
- The selected Carrier Result is 9 or greater in normal multi carrier power results view. In this case the last 4 carrier power results will be displayed.
- The zoom mode is selected. In this case all carrier power ranges can be displayed.

Offset Relative Power

This is the power in the offsets relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Offset Integ Bw parameter. The offset integration bandwidth is shown as part of the result. This is the value on the Offset Integ Bw menu key unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Offset Integ Bw})$.

Offset Absolute Power

This is the absolute power in the offsets. The power is calculated by integrating across the bandwidth declared by the Offset Integ Bw parameter. The offset integration bandwidth is shown as part of the result. This is the value on the Offset Integ Bw menu key unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Offset Integ Bw})$.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.

See “[Display](#)” on page 1109 in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

Bar Graph

Turns the Bar Graph On and Off.

Key Path	View/Display
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph OFF ON 0 1 :DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph?
Example	DISP:ACP:VIEW:WIND:BGR OFF DISP:ACP:VIEW:WIND:BGR?
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the method is RBW, this key is always set to On and grayed out.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Many of the digitally modulated signals now look noise-like in the time and frequency domain. This means that statistical measurements of the signals can be a useful characterization. Power Complementary Cumulative Distribution Function (CCDF) curves characterize the higher level power statistics of a digitally modulated signal. The curves can be useful in determining design parameters for digital communications systems. For more information, see [“Power Stat CCDF Measurement Description” on page 605](#). For measurement results and views, see [“View/Display” on page 640](#).

This topic contains the following sections:

[“Measurement Commands for Power Stat CCDF” on page 603](#)

[“Remote Command Results for Power Stat CCDF” on page 604](#)

Measurement Commands for Power Stat CCDF

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSE:PStat commands for more measurement related commands.

```
:CONFigure:PStatistic  
:CONFigure:PStatistic:NDEFault  
:INITiate:PStatistic  
:FETCh:PStatistic[n] ?  
:READ:PStatistic[n] ?  
:MEASure:PStatistic[n]?
```

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 947](#).

Remote Command Results for Power Stat CCDF

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values,
not specified or 1	Returns 10 scalar results: 1. Average input power (in dBm) 2. Probability at the average input power level (in %) 3. Power level that has 10% of the power 4. Power level that has 1% of the power 5. Power level that has 0.1% of the power 6. Power level that has 0.01% of the power 7. Power level that has 0.001% of the power 8. Power level that has 0.0001% of the power 9. Peak power (in dB) 10.Count
2	Returns a series of 5001 floating the current measured power stat trace. This is the probability at particular power levels (average power), in the following order: 1. Probability at 0.0 dB power 2. Probability at 0.01 dB power 3. Probability at 0.02 dB power ... 1. Probability at 49.9 dB power 2. Probability at 50.0 dB power
3	Returns a series of 5001 floating point numbers (in percent) that represent the Gaussian trace. This is the probability at particular power levels (average power), in the following order: 1. Probability at 0.0 dB power 2. Probability at 0.01 dB power 3. Probability at 0.02 dB power ... 1. Probability at 49.9 dB power 2. Probability at 50.0 dB power

- 4 Returns a series of 5001 floating point numbers (in percent) that represent the user-definable reference trace. This is the probability at particular power levels (average power), in the following order:
1. Probability at 0.0 dB power
 2. Probability at 0.01 dB power
 3. Probability at 0.02 dB power
 - ...
 1. Probability at 49.9 dB power
 2. Probability at 50.0 dB power

Power Stat CCDF Measurement Description

The power statistics CCDF measurement can be affected by many factors. For example, modulation filtering, modulation format, combining the multiple signals at different frequencies, number of active codes, and correlation between symbols on different codes with spread spectrum systems will all affect measurement results. These factors are all related to modulation and signal parameters. External factors such as signal compression and expansion by nonlinear components, group delay distortion from filtering, and power control within the observation interval also affect the measurement.

The power measured in power statistics CCDF curves is actually instantaneous envelope power defined by the equation:

$$P = (I^2 + Q^2) / Z_0$$

(Where I&Q are the quadrature voltage components of the waveform and Z_0 is the characteristic impedance).

A CCDF curve is defined by how much time the waveform spends at or above a given power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For capturing a lower probability down to 0.0001%, this measurement is made in the single mode by pressing Single. To make the power statistics CCDF measurement, the instrument uses digital signal processing (DSP) to sample the input signal in the channel bandwidth. The Gaussian distribution line as the band-limited Gaussian noise CCDF reference line, the user-definable reference trace, and the currently measured trace can be displayed on a semi-log graph. If the currently measured trace is above the user reference trace, it means that the higher peak power levels against the average power are included in the input signal.

Key Path	Meas
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent except all Attenuation values, and the Internal Preamp selection, which are the same across all measurements.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change the attenuation settings. This key has read-back text that describes the total attenuator value.

See AMPTD Y Scale, “[Attenuation](#)” on page 867 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Range

Accesses the Range menu to change baseband I/Q gain settings. This key has a readback text that describes gain range value. Refer to “[Range](#)” on page 873 in the “Common Measurement Functions” section for more information.

Key Path	AMPTD/Y Scale
Mode	OFDMA
Instrument S/W Revision	A.01.60 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker.

See AMPTD Y Scale, “[Presel Center](#)” on page 878 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Presel Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when Presel Center is available.

See AMPTD Y Scale, [“Preselector Adjust” on page 880](#) in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD/Y Scale
Instrument S/W Revision	A.01.60 or later

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, [“Internal Preamp” on page 881](#) in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Auto Couple

See “[AUTO COUPLE](#)” on page 885 in the section "Common Measurement Functions" for more information.

BW

Opens the BW menu, which contains keys to control the information bandwidth functions of the instrument.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Info BW

Allows you to enter a frequency value to set the channel bandwidth that will be used for data acquisition.

Key Path	BW
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<code>[:SENSe] :PStatistic:BANdwidth <freq></code> <code>[:SENSe] :PStatistic:BANdwidth?</code>
Example	PST:BAND 8 MHz PST:BAND?
Dependencies/Couplings	WiMAX OFDMA: The default value depends on the Radio Standard selection..
Preset	SA, WCDM: 5 MHz C2K:1.5 MHz 1xEV-DO:1.3 MHz WiMAX OFDMA: 25 MHz TD-SCDMA: 1.3 MHz
State Saved	Saved in instrument state.
Min	10.0 kHz
Max	Hardware Dependent: No Option = 10 MHz Option B25 = 25 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	same as RPG
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “[FREQ Channel](#)” on page 891 in the section "Common Measurement Functions" for more information.

Input/Output

See “[Input/Output](#)” on page 897 in the section "Common Measurement Functions" for more information.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. See the "Marker Functions" section for more information

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Accesses a menu that allows you to select one of 12 markers for control and function

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta**, **Fixed** or **Off**.

If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the **Marker Trace** rules. At the same time, **Marker X Axis Value** appears on the Active Function area.

The Active function for the selected marker's current control mode is the default active function. If the current control mode is Off, there is no active function and the active function is turned off. The active function display is the marker X axis value entered in the active function area will display the marker value to its full entered precision.

All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSITION DELTA OFF :CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE?
Example	CALC:PST:MARK:MODE POS CALC:PST:MARK:MODE?

Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value

Sets the marker X Axis value in the current marker X Axis Scale unit. This function has no effect if the control mode is **Off**, but is the remote command equivalent of entering an X value if the control mode is **Normal** or **Delta**.

Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>:CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X <rel_ampl></pre> <pre>:CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :X?</pre>
Example	<pre>CALC:PST:MARK3:X 0</pre> <pre>CALC:PST:MARK3:X?</pre>
Notes	If no suffix is sent, it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" will be generated. If the specified marker is Fixed and a Marker Function is on, error -221 "Settings conflict; cannot adjust Fixed marker while Marker Function is on" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number.
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	-9.9E+37

Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test but it is supported. The actual step is 0.1.
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value

Queries the marker Y Axis value in the current marker Y Axis unit.

Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:PSTatic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :Y?
Example	CALC:PST:MARK11:Y?
Notes	The query returns the marker Y-axis result, if the control mode is Normal , or Delta . If the marker is Off the response is not a number.
Preset	0
State Saved	No
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Properties

Accesses the marker properties menu.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Accesses a menu that allows you to select one of 12 markers for control and function

Key Path	Marker, Properties
Instrument S/W Revision	A.01.60 or later

Relative To

Sets the reference marker that the selected marker will be relative to.

Key Path	Marker, Properties
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO

Power Stat CCDF Measurement Marker

Remote Command	:CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence <integer> :CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence?
Example	CALC:PST:MARK:REF 3 CALC:PST:MARK:REF?
Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value will be returned (the specified marker numbers relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Marker Trace

Assigns the specified marker to the designated trace. The trace choices are: Measured, Gaussian, or Reference.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe MEASured GAUSSian REFerence :CALCulate:PSTatistic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?
Example	CALC:PST:MARK3:TRAC MEAS CALC:PST:MARK:TRACE?
Preset	MEASured
State Saved	Saved in instrument state.
Range	Measured Gaussian Reference
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is true, moving any marker causes an equal X axis movement of every other marker which is not **Off**. By “equal X axis movement” we mean that we preserve the difference between each marker’s X axis value (in the fundamental x-axis units of the trace that marker is on) and the X axis value of the marker being moved (in the same fundamental x-axis units).

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns off all markers.

Key Path	Marker, More
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:PStatistic:MARKer:AOff
Example	CALC:PST:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker To

There is no ‘Marker To’ functionality supported in Power Stat CCDF. The front-panel key will display a blank menu when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no ‘Marker Function’ supported in Power Stat CCDF. The front-panel key will display a blank menu when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 947 in the section "Common Measurement Functions" for more information.

Meas Setup

Accesses the functions that allow you to change the settings for your measurement requirements.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Counts

Sets the accumulated number of sampling points for data acquisition. The range is 1.000 kpt (k point) to 2.00000 Gpt (G point) with 1 kpt resolution. Counts couples to Meas Cycles. When the value for counts is changed, the Meas Cycles value will be $(\text{Counts} / \text{SamplingFrequency} * \text{MeasInterval})$.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<code>[:SENSE] :PSTatistic:COUNTs <integer></code> <code>[:SENSE] :PSTatistic:COUNTs?</code>
Example	PST:COUN 5001 PST:COUN?
Dependencies/Couplings	This value is coupled to Meas Cycles. When Counts is changed, the MeasCycles value will be $(\text{Counts} / \text{SamplingFrequency} * \text{MeasInterval})$. TD-SCDMA: When Counts is changed, the MeasCycles value will be $(\text{Counts} / (\text{Sampling Frequency} * \text{Time duration of measured time slots} / 5 \text{ msec}))$, Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval.
Preset	10000000
State Saved	Saved in instrument state.
Min	1000
Max	2000000000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1000
Default Unit	Kpt
Instrument S/W Revision	A.01.60 or later

Meas Cycles

Set the number of measurement cycles to calculate power statistic data. This number couples to Counts. The Counts value is $(\text{MeasCycles} * \text{Sampling Frequency} * \text{MeasInterval})$.

Power Stat CCDF Measurement Meas Setup

When the counts value cannot be divided by (Sampling Frequency * MeasInterval), this value is displayed as a decimal fraction.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<code>[[:SENSE]:PStatistic:SWEep:CYCLes <integer></code> <code>[[:SENSE]:PStatistic:SWEep:CYCLes?</code>
Example	PST:SWE:CYCL 1001 PST:SWE:CYCL?
Notes	.
Dependencies/Couplings	The Counts value will be (MeasCycles * Sampling Frequency * MeasInterval). TD-SCDMA: The Counts value will be (MeasCycles * Sampling Frequency * Time duration of measured time slots / 5 msec), Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval.
Preset	Depends on the sampling frequency.
Min	1
Max	Depends on the sampling frequency.
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Meas Interval (When the application is NOT CDMA1xEVDO)

Sets the number of data points to be used as the measurement interval. This value couples to Counts. The Counts value is (MeasCycles * Sampling Frequency * MeasInterval).

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<code>[[:SENSE]:PStatistic:SWEep:TIME <time></code> <code>[[:SENSE]:PStatistic:SWEep:TIME?</code>
Example	PST:SWE:TIME 2 ms PST:SWE:TIME?

Dependencies/Couplings	The Counts value will be (MeasCycles * Sampling Frequency * MeasInterval). WiMAX OFDMA: The default value depends on Radio Device status. TD-SCDMA: The Counts value will be (MeasCycles * Sampling Frequency * Time duration of measured time slots / 5 msec), Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval. When TriggerSource is RFBurst, this button is grayed.
Preset	Others: 1.0 ms TD-SCDMA: 1 slot
Min	Others: 100.0 us TD-SCDMA: 1 slot
Max	Others: 10.0 ms TD-SCDMA: 9 slot
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Others: 1 us TD-SCDMA: 1 slot
Instrument S/W Revision	A.01.60 or later

Meas Interval (CDMA1xEVDO Only)

Sets the value of time to be used as the measurement interval. This value couples to Counts. The Counts value is (MeasCycles * Sampling Frequency * MeasInterval).

Key Path	Meas Setup
Mode	1xEV-DO
Remote Command	[:SENSe] :PStatistic:SWEep:TIME <time> [:SENSe] :PStatistic:SWEep:TIME?
Example	PST:SWE:TIME 2 ms PST:SWE:TIME?
Dependencies/Couplings	The Counts value will be (MeasCycles * Sampling Frequency * MeasInterval).
Preset	182.29 us
State Saved	true
Min	1.0 us
Max	10.0 ms
Test MIN/MAX/DEF	Yes

Test UP/DOWN	1.0 us
Instrument S/W Revision	A.01.60 or later

Meas Offset (CDMA1xEVDO Only)

Sets the value of time to be used as the measurement interval start.

Key Path	Meas Setup
Mode	CDMA1xEVDO
Remote Command	<code>[[:SENSE]:PStatistic:SWEep:OFFSet <time></code> <code>[[:SENSE]:PStatistic:SWEep:OFFSet?</code>
Example	PST:SWE:OFFS 2 ms PST:SWE:OFFS?
Preset	325.52 us
State Saved	true
Min	1.0 us
Max	10.0 ms
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1.0 us
Instrument S/W Revision	A.01.60 or later

IF Gain

Sets the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

This only applies to the RF input. It does not apply to baseband I/Q input.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

IF Gain Auto

Activates the Auto Rules for IF Gain When Auto is active, the IF Gain is set to High Gain under any of the following conditions:

- the input attenuator is set to 0 dB
- the preamp is turned On
- the Max Mixer Level is –20 dBm or lower

For other settings, Auto sets IF Gain to Off.

Key Path	Meas Setup,More,IF Gain
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :PStatistic:IF:GAIN:AUTO[:STATe] ON OFF 1 0 [:SENSe] :PStatistic:IF:GAIN:AUTO[:STATe] ?
Example	PST:IF:GAIN:AUTO ON PST:IF:GAIN:AUTO?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input.
Dependencies/Couplings	When either the auto attenuation is active (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed using the following rule. The Auto selection sets IF Gain On under any of the following conditions: • the input attenuator is set to 0 dB • the preamp is turned on, • the Max Mixer Level is –20 dBm or lower. For other settings, Auto sets IF Gain to Off.
Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Instrument S/W Revision	A.01.60 or later

IF Gain State

Selects the range of IF gain. On sets the high gain option, which allows for better noise level measurements and Off sets low gain when measuring large signals.

Key Path	Meas Setup, More, IF Gain
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :PStatistic:IF:GAIN[:STATe] ON OFF 1 0 [:SENSe] :PStatistic:IF:GAIN[:STATe] ?
Example	PST:IF:GAIN ON PST:IF:GAIN?
Notes	IF Gain only applies to the RF input. It does not apply to baseband I/Q input. where ON = high gain OFF = low gain

Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all measurement settings to their default values.

Key Path	Meas Setup, More
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CONFigure:PSTatistic
Example	CONF:PST
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode or WIMAXOFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting Meas Preset will restore all measurement parameters to their default values.
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 965 in the section "Common Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page 977 in the section "Common Measurement Functions" for more information.

Peak Search

There is no ‘Peak Search’ functionality supported in Power Stat CCDF. The front-panel key will display a blank menu when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Recall

See “[Recall](#)” on page 985 in the section "Common Measurement Functions" for more information.

Restart

See “Restart” on page 1003 in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 1005 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 1027 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 1029 in the section "Common Measurement Functions" for more information.

Span X Scale

The SPAN X Scale key accesses the menu to set the desired horizontal scale.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Scale/Div

Enables you to enter a time value to change the horizontal scale.

Key Path	Power Statistic CCDF - Span X Scale
Key Path	Span X Scale
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALe]:PDI Vision <rel_ampl> :DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALe]:PDI Vision?
Example	DISP:PST:VIEW:WIND2:TRAC:X:PDIV 10 DISP:PST:VIEW:WIND2:TRAC:X:PDIV?
Notes	CCDF measurement has the trace display only at Window 2.
Dependencies/Couplings	See Notes
Preset	2.00
State Saved	Saved in instrument state.
Min	0.1
Max	20
Test MIN/MAX/DEF	Yes
Test UP/DOWN	0.10, 0.15, 0.20, 0.30, 0.50, 0.75, 1.00, 1.50, 2.00, 3.00, 5.00, 7.50, 10.00, 15.00, 20.00
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Enables you to pause the power statistics CCDF measurement after the current data acquisition is complete. When Paused, the label on the menu key changes to Resume. Press the Resume key to resume the measurement where it was when it was paused.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Pause/Resume

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Press the Resume key to resume the measurement where it was when it was paused. See [“Pause/Resume” on page 1034](#) in the “Common Measurement Functions” section for details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control the storage and manipulation of the reference trace, as well as controls the display of the trace data.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Store Ref Trace

Copies the currently measured curve as the user-definable reference trace. The captured data remains until the other mode is chosen. Pressing this key also refreshes the reference trace.

No query command is available.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:PSTatistic:STORe:REference
Example	CALC:PST:STOR:REF
Instrument S/W Revision	A.01.60 or later

Ref Trace

Toggles the reference trace display between On and Off.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :PSTatistic:RTRace [:STAtE] OFF ON 0 1 [:SENSe] :PSTatistic:RTRace [:STAtE] ?
Example	PST:RTR OFF PST:RTR?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Gaussian Line

Toggles the Gaussian trace display between On and Off.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :PStatistic:GAUSSian[:STATe] OFF ON 0 1 [:SENSe] :PStatistic:GAUSSian[:STATe] ?
Example	PST:GAUS OFF PST:GAUS?
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Trigger

Accesses a menu of functions that enable you to select and control the trigger source for the current measurement. .See [“Trigger” on page 1057](#) in the "Common Measurement Functions" section for more information.

View/Display

Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

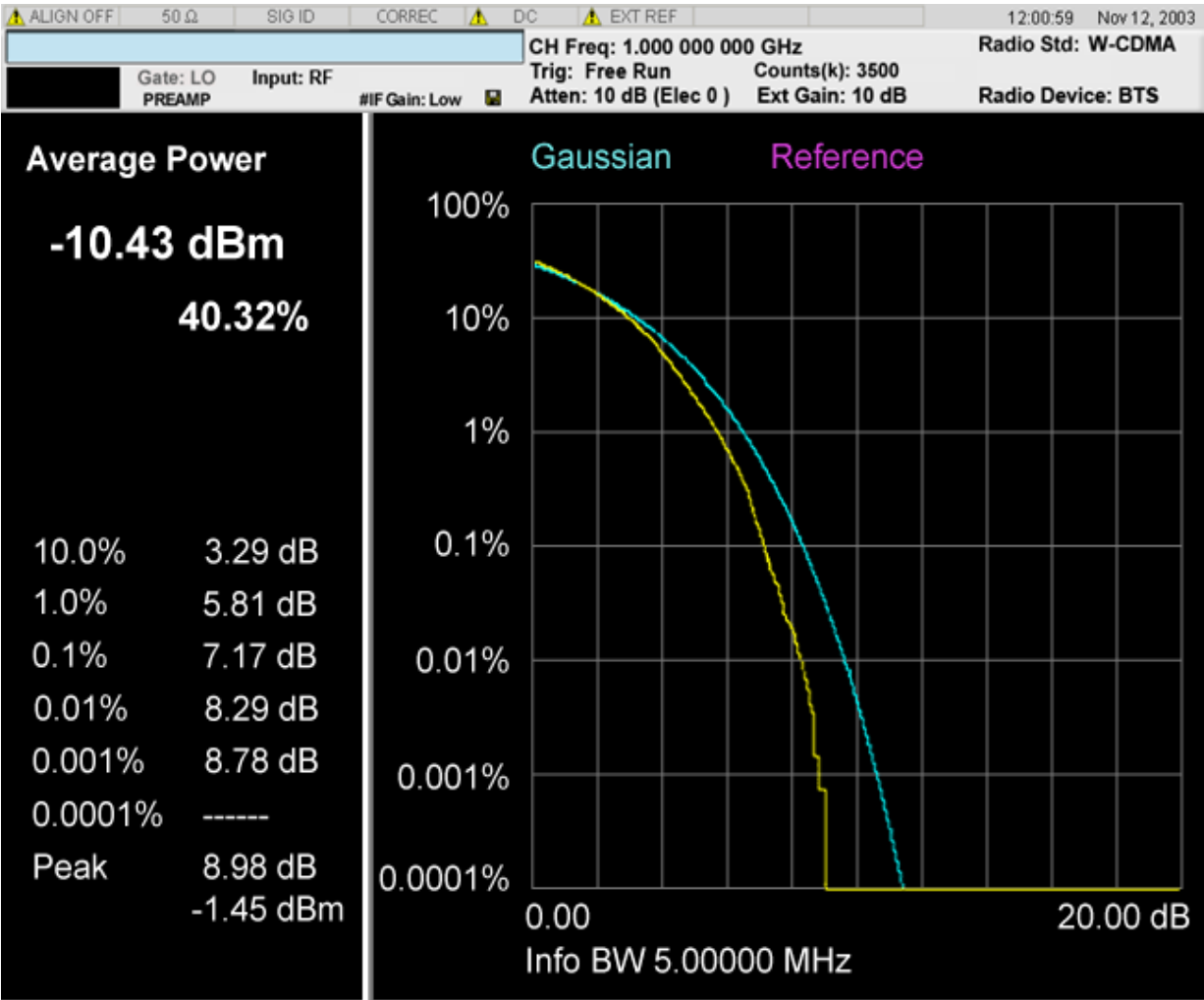
The Power Stat CCDF measurement consists of single view. This is common for both Uplink (MS) and Downlink (BTS). The view consists of the following windows: Metrics (left) and graph display (right).

“Metrics window” on page 642

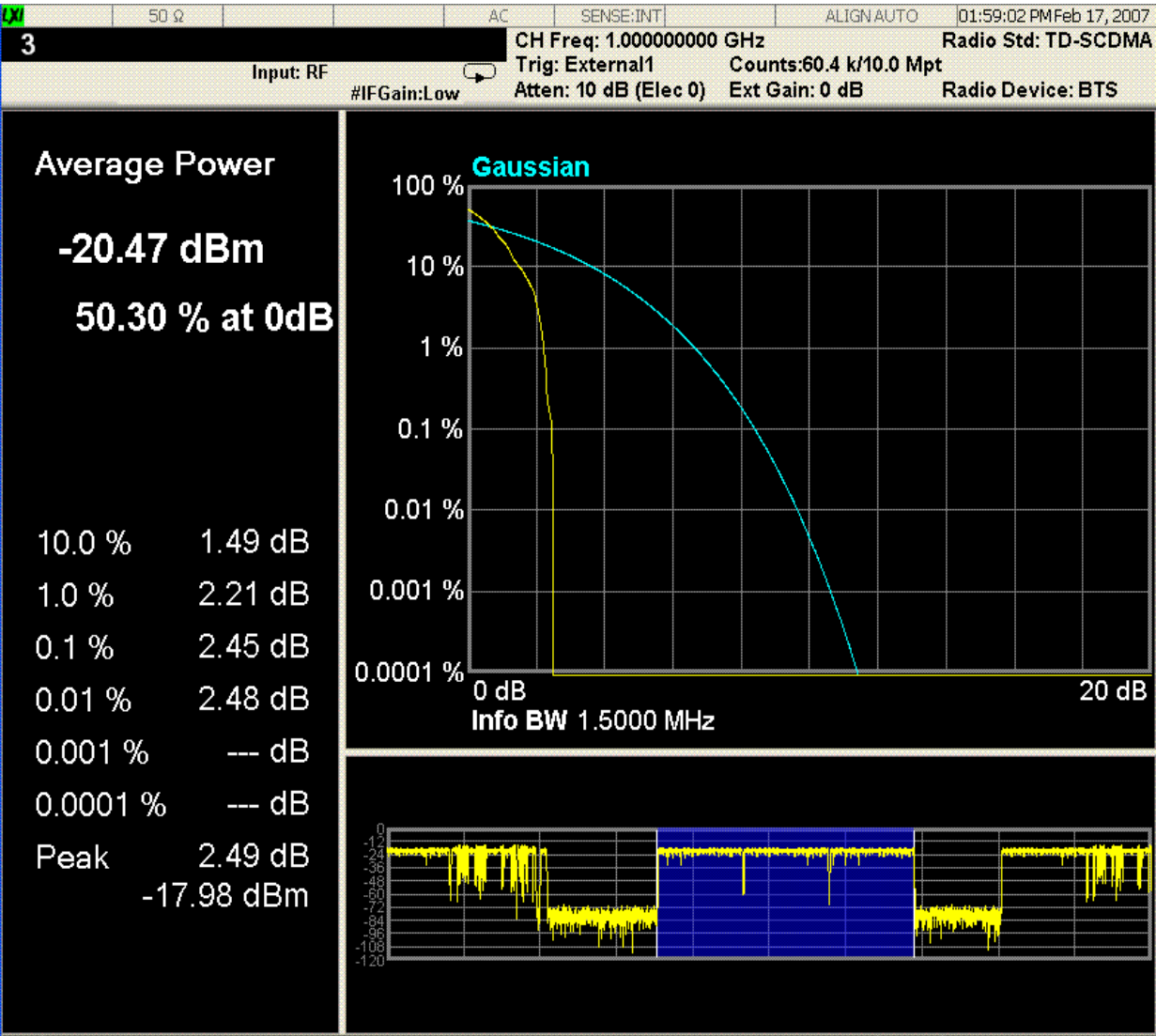
“Graph window” on page 642

“Wave window (TD-SCDMA only)” on page 642

View for Power Start CCDF Measurement



Slot View for Power Stat CCDF Measurement in TD-SCDMA mode



Metrics window

Name	Corresponding Results	Explanation
Average Power [dBm]	n=1 1st Average input power	99.99 dBm
Average Power [%]	n=1 2nd Probability at the average input power level	99.99 %
10.0% [dB]	n=1 3rd Power level that has 10% of the power	99.99 dB
1.0% [dB]	n=1 4th Power level that has 1% of the power	99.99 dB
0.1% [dB]	n=1 5th Power level that has 0.1% of the power	99.99 dB
0.01% [dB]	n=1 6th Power level that has 0.01% of the power	99.99 dB
0.001% [dB]	n=1 7th Power level that has 0.001% of the power	99.99 dB
0.0001% [dB]	n=1 8th Power level that has 0.0001% of the power	99.99 dB
Peak [dB]	n=1 9th Peak power	99.99 dB
Peak[dBm]	This is not available using remote commands.	99.99 dBm

Graph window

Marker Operation	Yes
Corresponding Trace	Yellow: Series of 5001 floating the current measured power stat trace. (n=2) Initially all markers refer this trace. Light Blue: Series of 5001 floating point numbers (in percent) that represent the Gaussian trace. (n=3) Violet: series of 5001 floating point numbers (in percent) that represent the user-definable reference trace. (n=4) The Gaussian and Reference trace/line can be removed using the features under the Trace/Detector key

Wave window (TD-SCDMA only)

This window is only available under TD-SCDMA mode, and by default this window is closed, it could

be turn of/off by soft key "SlotView", refer to section “Slot View (TD-SCDMA only)” on page 643.

Marker Operation	No
Corresponding Trace	Yellow: Wave form of entire TD-SCDMA frame. If measurement range specified by Analysis Time Slot and Measured Time Slot is out of the first frame, the display range will extend to two TD-SCDMA frames. Blue: Indicate current measurement range
Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters...
See “Display” on page 1109 in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

Slot View (TD-SCDMA only)

Switch between normal CCDF view and Slot view with additional wave window, this is available only under TD-SCDMA mode.

Key Path	View/Display
Mode	TD-SCDMA
Remote Command	[:SENSe]:PStatistic:SLTView[:STATe] OFF ON 0 1 [:SENSe]:PStatistic: SLTView[:STATe] ?
Example	PST:SLTV OFF PST:SLTV?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

The Burst Power (Transmit Power) measurement (at the base transceiver station) is used to determine the power delivered to the antenna system on the radio-frequency channel under test. The Burst Power measurement verifies the accuracy of the mean transmitted RF carrier power. This can be done across the frequency range and at each power step. For more information, see Transmit Power (Burst Power) Measurement Description. For measurement results and views, see View/Display.

This topic contains the following sections.

Measurement Commands for Burst Power (Transmit Power)

Remote Command Results for Burst Power (Transmit Power)

Measurement Commands for Burst Power (Transmit Power)

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSE:TXPower|BPOWer commands for more measurement related commands.

NOTE	The BPOWer form of the commands is included for backward compatibility only. They are not recommended for use in new designs. Use the TXPower keyword.

The following commands are used to retrieve the measurement results:

```
:CONFigure:TXPower|BPOWer
:CONFigure:TXPower|BPOWer:NDEFault
:INITiate:TXPower|BPOWer
:FETCh:TXPower|BPOWer [n] ?
:READ:TXPower|BPOWer [n] ?
:MEASure:TXPower|BPOWer [n] ?
```

For more remote command information, see the section, [“Remote Measurement Functions” on page 947](#).

Remote Command Results for Burst Power (Transmit Power)

n	Results Returned
0	Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.
not specified or n = 1	Returns the following comma-separated scalar results: Sample time is a floating point number representing the time between samples when using the trace queries (n=0, 2, etc). Power is the mean power (in dBm) of the power value that calculated by specified method: above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition. Power averaged is the power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of Power averaged is the same as the Power value. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0, 2, etc.). Threshold value is the absolute threshold level (in dBm) above which the power is calculated when Meas Method is set to Above Threshold. Threshold points is the number of points that were above the threshold and were used to calculate Mean Transmit Power when <XREF>Meas Method is set to Above Threshold. If <XREF>Meas Method is set to Measured Burst Width, Measured Pts is returned. Maximum value is the maximum peak level of the most recently acquired trace data (in dBm). Minimum value is the minimum peak level of the most recently acquired trace data (in dBm). Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is 0. Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is zero. Measured width is the time length that is used to calculate Mean Transmit Power when <XREF>Meas Method is set to Measured Burst Width. If <XREF>Meas Method is set to Above Threshold, this value is zero. Measured points is the number of points used to calculate Mean Transmit Power when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold, this value is 0.
2	Returns comma-separated trace points of the Measure Trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.

- 3

Returns comma-separated trace points of the Max Hold Trace data.

These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.

* This is not available in TD-SCDMA.
- 4

Returns comma-separated trace points of the Min Hold Trace data.

These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.

* This is not available in TD-SCDMA.

Transmit Power (Burst Power) Measurement Description

Mobile stations and base transceiver stations must transmit enough power, with sufficient modulation accuracy, to maintain a call of acceptable quality without leaking power into frequency channels or timeslots allocated for others. The Burst Power measurement determines the average power for an RF signal burst at or above a specified threshold value or during the detected burst width. The threshold value may be absolute, or relative to the peak value of the signal. Burst width can be set automatically or manually.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. Many of the parameter values are measurement dependent. Attenuation values, and the Internal Preamp selection are measurement global, so they are common across all measurements. Functions with operation unique to this measurement are described below. See “AMPTD Y Scale (Amplitude Y Scale)” on page 867 for more information.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Y Ref Value

Sets the absolute power reference.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el <real> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:RLEV 5dbm DISP:TXP:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off.
Preset	10.00
State Saved	Saved in instrument state.
Min	–250.0
Max	250.0
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Y Scale/Div value
Instrument S/W Revision	A.01.60 or later

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. The value read

back on the key in square brackets is the current Total (Elec + Mech) attenuation. In "Pre-Adjust for Min Clip" this value can change at the start of every measurement.

See [“Attenuation” on page 867](#) for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Scale/Division

Enables you to enter a numeric value to change the vertical display sensitivity.

Key Path	AMPTD Y Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision <rel_ampl> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIV ision?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:PDIV 10dB DISP:TXP:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	When the Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets a value manually, Y Auton Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.1 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Step follows the “1,2,5,10 ... Rule”
Instrument S/W Revision	A.01.60 or later

Presel Center (Measurement Global)

Operation of this key is identical across several measurements. For details about this key, see [“Presel Center” on page 878](#).

Presel Adjust (Measurement Global)

Operation of this key is identical across several measurements. For details about this key, see

“Preselector Adjust” on page 880.

Internal Preamp

Accesses keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a less desirable TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

See “Internal Preamp” on page 881 for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Ref Position

Enables you to set the display reference position to either, Top, Center or Bottom.

Key Path	AMPTD Y Scale, More
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition TOP CENTer BOTTom :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOS ition?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:TXP:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Allows you to toggle the Y axis auto scaling function between On and Off.

Key Path	AMPTD Y Scale, More
Mode	SA, GSM, TD-SCDMA

Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPl e 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPl e?
Example	DISP:TXP:VIEW:WIND:TRAC:Y:COUP 0 DISP:TXP:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SELEct to set the mode.
Dependencies/Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When the user sets a value either <XREF>Y Rel Value or <XREF>Y Scale/Div manually, this parameter automatically is set to 'Off'.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

Operation of this key is identical across several measurements. For details about this key, see “[AUTO COUPLE](#)” on page 885.

BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

NOTE If the mode is TD-SCDMA, this function will NOT be available.

Key Path	Front panel key
Mode	SA, GSM
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the resolution bandwidth. This is the bandwidth used for the power measurement. The bandwidth is ideally wide enough to pass all the power of the bursted signal, while not being so wide that it passes noise that reduces dynamic range and the accuracy of low level measurements.

Key Path	BW
Mode	SA, GSM
Remote Command	<code>[:SENSe] :TXPower:BANDwidth[:RESolution] <bandwidth></code> <code>[:SENSe] :TXPower:BANDwidth[:RESolution] ?</code>
Example	TXP:BAND 1000 TXP:BAND?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	GSM: 510 kHz SA: 3 MHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	Hardware Dependent: No Option = 10 MHz Option B25 = 25 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	TBD
Instrument S/W Revision	A.01.60 or later

RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

Filter Type

Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

Key Path	BW
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:BANDwidth:TYPE GAUSSian FLATtop [:SENSe] :TXPower:BANDwidth:TYPE?
Example	TXP:BAND:TYPE GAUS TXP:BAND:TYPE?
Notes	This chooses the type of filter, either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. We are not interested in trading off time domain accuracy vs. noise, just total power accuracy vs. noise level in this measurement. If you want to precisely examine just the useful part of the burst, choose Flat. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default, may cause invalid measurement results. FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy. GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response. You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Instrument S/W Revision	A.01.60 or later

Cont (Continuous)

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889.

FREQ/Channel (Frequency or Channel)

Operation of this key is identical across several measurements. For details about this key, see “[FREQ Channel](#)” on page 891.

Input/Output

Operation of this key is identical across several measurements. For details about this key, see “Input/Output” on page 897.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. For more information, see “Marker” on page 941.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Specifies the selected marker.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode as described under **Normal**, **Delta**, **Fixed** and **Off**, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :M ODE POSition DELTa OFF :CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :M ODE?
Example	CALC:TXP:MARK:MODE OFF CALC:TXP:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker’s current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.

Range	Normal Delta Off
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering an X value if the control mode is **Normal** or **Delta**.

Key Path	Marker, Normal
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X <real> :CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X ?
Example	CALC:TXP:MARK3:X 0 CALC:TXP:MARK3:X?
Notes	If no suffix is sent, it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error “Invalid suffix” will be generated. The query returns the marker’s absolute X Axis value if the control mode is Normal, or the offset from the marker’s reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	Max value would be changed by Sweep/Meas Time parameter value.
Preset	Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not Tested in SCPI test, although it is supported and the actual step is “0.1us”.
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI

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equivalent of entering a value if the control mode is **Normal** or **Delta** except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition <real> :CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :X :POSition?
Example	CALC:TXP:MARK10:X:POS 500 CALC:TXP:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points if the control mode is Delta . If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TDSCMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	Max value would be changed by Sweep/Meas Time parameter value.
Preset	Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test, although it is supported and the actual step is "1".
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The "result" of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer's Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

Absolute result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y Axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is **Delta**.

Relative result: if a marker's control mode is **Delta**, the relative result is displayed in the result block or

returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker. The ratio is expressed in dB.

Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :Y ?
Example	CALC:TXP:MARK11:Y?
Notes	The query returns the marker Y Axis result. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	0
State Saved	No
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Properties

Accesses a menu that enables you to set marker properties and to access the marker trace menu.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Specifies the selected marker.

Key Path	Marker, Properties
Mode	GSM, SA, TD-SCDMA
Instrument S/W Revision	A.01.60 or later

Relative To

Selects the marker that the selected marker will be relative to (its reference marker).

Key Path	Marker, Properties
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence <integer> :CALCulate:TXPower:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 :R EFerence?

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Example	CALC:TXP:MARK:REF 10 CALC:TXP:MARK:REF?
Notes	A marker cannot be relative to itself, so that choice is grayed out, and if sent from SCPI generates error –221: “Settings conflict; marker cannot be relative to itself.” You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. When queried a single value will be returned (the specified marker numbers relative marker).
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Marker Trace

Assigns the specified marker to the designated trace.

Key Path	Marker, Properties
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :T RACe RFENvelope MAXHold MINHold :CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :T RACe?
Example	CALC:TXP:MARK:TRAC MAXH CALC:TXP:MARK:TRAC?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	If Detector/Max Hold Trace is Off, Max Hold is grayed out and MAXHold parameter is not available. If Detector/Min Hold Trace is Off, Min Hold is grayed out and MINHold parameter is not available.
Preset	RFENvelope
State Saved	Saved in instrument state.
Range	RF Envelope Max Hold RF Envelope Min Hold RF Envelope

Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not **Off**. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

Key Path	Marker, More
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:TXPower:MARKer:COUPle[:STATe]?
Example	CALC:TXP:MARK:COUP ON CALC:TXP:MARK:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns off all markers.

Key Path	Marker, More
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer:AOff
Example	CALC:TXP:MARK:AOff
Notes	You must be in the Spectrum Analyzer mode, TDSDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Instrument S/W Revision	A.01.60 or later

Marker Function

There is no 'Marker Function' supported in Burst (Tx) Power so this front-panel key will display a blank menu key when pressed.

Key Path

Front panel key

Marker To

There is no 'Marker To' functionality supported in Burst (Tx) Power so this front-panel key will display a blank menu key when pressed.

Key Path

Front panel key

Meas

Operation of this key is identical across several measurements. For details about this key, see [“Meas” on page 947](#).

Meas Setup

Displays the setup menu for the currently selected measurement. Many of the lower-level menu keys operate the same in all measurements.. Unique functions are described below. For more information, refer to Analyzer Setup.

Key Path	Front panel key

Avg/Hold Num

Specifies the number of data acquisition that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

On - Sets measurement averaging on.

Off - Sets measurement averaging off.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	[:SENSe] :TXPower:AVERage:COUNT <integer> [:SENSe] :TXPower:AVERage:COUNT? [:SENSe] :TXPower:AVERage [:STATe] OFF ON 0 1 [:SENSe] :TXPower:AVERage [:STATe] ?
Example	TXP:AVER:COUN 100 TXP:AVER:COUN? TXP:AVER:0 TXP:AVER?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SELEct to set the mode.
Preset	50 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1

Avg Mode

Selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

KEY:Exponential SCPI:EXponential	After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.
KEY:Repeat SCPI:REpeat	After reaching the average count, the averaging is reset and a new average is started.

Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Remote Command	[[:SENSe]:TXPower:AVERage:TCONtrol EXPonential REpeat [:SENSe]:TXPower:AVERage:TCONtrol?
Example	TXP:AVER:TCON REP TXP:AVER:TCON?
Notes	You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat

Avg Type

Specifies the type of trace and result averaging to use.

KEY:Pwr Avg (RMS) SCPI:RMS	True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging.
KEY:Log-Pwr Avg (Video) SCPI:LOG	Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power.
KEY:None SCPI:MAXimum	The maximum values are retained during the averaging cycle.
KEY:None SCPI:MINimum	The minimum values are retained during the averaging cycle.

SA, GSM Mode

Key Path	Meas Setup

Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:AVERage:TYPE LOG MAXimum MINimum RMS [:SENSe] :TXPower:AVERage:TYPE?
Example	TXP:AVER:TYPE LOG TXP:AVER:TYPE?
Notes	Maximum Minimum are selected only via SCPI. You must be in the Spectrum Analyzer or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	Selecting MAXimum MINimum force to visible <XREF>Max Hold Trace or and <XREF>Min Hold Trace. Measure Trace stays in RMS or Video average state.
Preset	RMS
State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg(Video) Maximum Minimum

TD-SCDMA Mode

Key Path	Meas Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :TXPower:AVERage:TYPE LOG RMS [:SENSe] :TXPower:AVERage:TYPE?
Example	TXP:AVER:TYPE LOG TXP:AVER:TYPE?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.
Preset	RMS
State Saved	Saved in instrument state.
Range	Pwr Avg (RMS) Log-Pwr Avg(Video)

Threshold Lvl

When Meas Method is set to Above Threshold Lvl, the mean carrier power is calculated based on the trace above the threshold level. The threshold level is displayed in dB (relative to the measured carrier) or dBm (absolute).

A green line in the grid is displayed at the y-position associated with the current threshold level value. Its

Burst Power (Transmit Power) Meas Setup

state is controlled by the On/Off state of the 'Display Line' under the View/Display menu.

Remote Command	<pre>[:SENSe] :TXPower:THReshold <real> [:SENSe] :TXPower:THReshold? [:SENSe] :TXPower:THReshold:TYPE ABSolute RELative [:SENSe] :TXPower:THReshold:TYPE?</pre>
Example	<pre>TXP:THR 0 TXP:THR?</pre>
Example	<pre>TXP:THR:TYPE ABS TXP:THR:TYPE?</pre>
Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Notes	You must be in the TD-SCDMA mode, Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. BAF SCPI Command determines whether this command is setting an absolute or a relative power level. Suffix dB and dBm are allowed, but it does not change the state of Threshold Type. Suffix may not be send. If Threshold Type is set to Relative, the positive value of Threshold level was allowed to +100dB and it treated as a negative value. Now max value of Threshold level is changed to 0dB. To keep the backward compatibility, the input from SCPI command allows to +100dB.
Preset	<pre>GSM: -20.0 SA: -30.0 TD-SCDMA : -60.0 RELative</pre>
State Saved	Saved in instrument state.
Min	-100
Max	<pre>GSM, SA: Relative : 0dB Absolute : 100dBm TD-SCDMA: Relative : 0dB Absolute : 60dBm</pre>
Test MIN/MAX/DEF	Yes
Test UP/DOWN	<pre>GSM, SA: 10 TD-SCDMA: 6</pre>

Meas Method

There are two selections for this parameter; Above Threshold Level, and Measured Burst Width.

Above Threshold Level measurement algorithm is used to capture a time record, and average only those points in the time record that exceed the user-specified threshold level. No attempt is made to position the burst, or to calculate/display burst widths. This can be used to measure continuous signals, or bursted signals where the Measured Burst Width algorithm is too restrictive.

Measured Burst Width measurement algorithm uses the threshold level to calculate the burst center, and average those points that lie within a user-specified burst width that is centered upon the burst. The burst width parameter is described in more detail below.

If the mode is TD-SCDMA, there is a third selection.

Single Time Slot measurement algorithm is to capture a single time slot record, and calculate the start and stop position of the time slot in terms of the trigger position theoretically. No attempt is made to position the burst, or to calculate/display burst widths. The burst width drawn in the screen is considered to be the theoretical width of the slot. This method is recommended to measure the mean transmit power in a single slot when trigger source is External Front/Rear while the Measured Burst Width algorithm is too restrictive.

SA, GSM mode

Key Path	Meas Setup
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:METHod THReshold BWIDth [:SENSe] :TXPower:METHod?
Example	TXP:METH BWID TXP:METH?
Preset	THReshold
State Saved	Saved in instrument state.
Range	Above Threshold Lvl Measured Burst Width

TD-SCDMA mode

Key Path	Meas Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :TXPower:METHod THReshold BWIDth SINGLe [:SENSe] :TXPower:METHod?
Example	TXP:METH BWID TXP:METH?
Preset	SINGLe

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Meas Setup

State Saved	Saved in instrument state.
Range	Threshold Lvl Measured Burst Width Single TimeSlot

Burst Width

When Burst Width Mode is set to manual, the user may enter a fixed-time value in seconds, or alternatively specify the burst width as a percentage of the last measured burst width (result in bottom-left corner of second window).

Remote Command	<code>[:SENSe] :TXPower:BURSt:WIDTh <time></code> <code>[:SENSe] :TXPower:BURSt:WIDTh?</code> <code>[:SENSe] :TXPower:BURSt:AUTO ON OFF 1 0</code> <code>[:SENSe] :TXPower:BURSt:AUTO?</code>
Example	<code>TXP:BURS:WIDTh 10</code> <code>TXP:BURS:WIDTh?</code> <code>TXP:BURS:AUTO 1</code> <code>TXP:BURS:AUTO?</code>
Example	<code>TXP:BURS:AUTO 0</code> <code>TXP:BURS:AUTO?</code> <code>TXP:BURS:AUTO 1</code> <code>TXP:BURS:AUTO?</code>
Dependencies/Couplings	Burst Width will be grayed out if Meas Method is set to ‘Above Threshold Lvl’. SA, GSM Max value depends on Sweep Time, Res BW and RBW filter type. TD-SCDMA: If the measure method is not “Measured Burst Width”, this key will be grayed out. The default value is depending on the Burst type: If Burst Type = Traffic, Burst Width = 662.5us If Burst Type = Downlink Pilot, Burst Width = 50us If Burst Type = Uplink Pilot, Burst Width = 100us
Key Path	Meas Setup
Mode	SA, GSM, TD-SCDMA
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.

Preset	SA, GSM: 255.6 us TD-SCDMA: 662.5us ON
State Saved	Saved in instrument state.
Min	100.0 ns
Max	50 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	SA, GSM: TBD TD-SCDMA: If CF Step = AUTO, Step = Span/10 If CF Step = MANUAL, Step = CF Step

IF Gain

The **IF Gain** key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads.

If the mode is TD-SCDMA, this function will NOT be available.

The front-panel key will display a blank menu key when pressed.

Key Path	Meas Setup
Mode	SA

IF Gain Auto

Activates the auto rules for IF Gain.

Key Path	Meas Setup, More, IF Gain
Mode	SA, GSM
Remote Command	[:SENSe] :TXPower:IF:GAIN:AUTO[:STATe] OFF ON 0 1 [:SENSe] :TXPower:IF:GAIN:AUTO[:STATe] ?
Example	TXP:IF:GAIN:AUTO ON TXP:IF:GAIN:AUTO?
Notes	You must be in the Spectrum Analyzer mode, GSM mode to use this command. Use INSTRument:SElect to set the mode.

Burst Power (Transmit Power) Meas Setup

Dependencies/Couplings	IF Gain is not available when IQ Input is selected (the menu key is blank). When either the auto attenuation works (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed according to the following rule. ‘auto’ sets IF Gain High under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is 20 dBm or lower. For other settings, auto sets IF Gain to Low.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man

IF Gain State

Selects the range of the IF Gain.

Key Path	Meas Setup, More, IF Gain
Mode	SA, GSM
Remote Command	<pre>[:SENSe] :TXPower:IF:GAIN[:STATe] ON OFF 1 0</pre> <pre>[:SENSe] :TXPower:IF:GAIN[:STATe] ?</pre>
Example	<pre>TXP:IF:GAIN ON</pre> <pre>TXP:IF:GAIN?</pre>
Notes	You must be in the Spectrum Analyzer mode, GSM mode to use this command. Use INSTRument:SElect to set the mode. where ON = high gain OFF = low gain
Dependencies/Couplings	IF Gain is not available when IQ Input is selected (the menu key is blank) Sending this command forces <XREF>IF Gain Auto to OFF (Man).
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)

Meas Interval (for TD-SCDMA mode)

Sets the number of slots to be captured for each measurement. Uplink and downlink pilots each count as one slot, so setting the Meas Interval parameter to 9 will display one full subframe.

Key Path	Meas Setup, More
Mode	TD-SCDMA

Remote Command	[:SENSe] :TXPower:SWEep:TIME <integer> [:SENSe] :TXPower:SWEep:TIME?
Example	TXP:SWE:TIME 4 TXP:SWE:TIME?
Notes	In Single Time Slot method, Meas Interval is set to 1 and the key is disabled automatically. You must be in the TDSCDMA mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	When device in Radio menu changes: If device is BTS, Trigger Source: External Front, Method: Single Time Slot, Measure: Continuous, Measure Time: disabled (=1); If device is MS, Trigger Source: RF Burst, Method: Measured Burst Width, Measure: Single, Measure Time: enabled.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	18
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1

Meas Preset

Returns parameters for this measurement to those set by the factory.

Key Path	Meas Setup, More
Mode	SA, GSM, TD-SCDMA
Remote Command	:CONFigure:TXPower
Example	CONF:TXP
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.

Mode

Operation of this key is identical across several measurements. For details about this key, see [“Mode” on page 965](#).

Mode Setup

Operation of this key is identical across several measurements. For details about this key, see “[Mode Setup](#)” on page 977.

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

Key Path	Peak Search
Mode	GSM, SA, TD-SCDMA
Remote Command	:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum
Example	CALC:TXP:MARK2:MAX
Instrument S/W Revision	A.01.60 or later

Recall

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 985](#).

Restart

Operation of this key is identical across several measurements. For details about this key, see [“Restart” on page 1003](#).

Save

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1005](#).

Single

Operation of this key is identical across several measurements. For details about this key, see [“Single \(Single Measurement/Sweep\)”](#) on page 1027.

Source

Operation of this key is identical across several measurements. For details about this key, see “[Source](#)” on page 1029.

SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path **Front panel key**

Ref Value

Enables you to set the display X reference value.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEV el <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEV el?
Example	DISP:TXP:VIEW:WIND:TRAC:X:RLEV 1s DISP:TXP:VIEW:WIND:TRAC:X:RLEV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	If the <XREF>X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, <XREF>X Auto Scaling automatically changes to Off.
Preset	0 s
State Saved	Saved in instrument state.
Min	−10.0 s
Max	10.00 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	200.0 us

Scale/Div

Enables you to set the display X scale/division value.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA

Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIV ision <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIV ision?
Example	DISP:TXP:VIEW:WIND:TRAC:X:PDIV 1ms DISP:TXP:VIEW:WIND:TRAC:X:PDIV?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	If the <XREF>X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, <XREF>X Auto Scaling automatically changes to Off.
Preset	64.0 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Step follows the “1,2,5,10 ... Rule”

Ref Position

Enables you to set the display X reference position to Left, Center or Right.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOS ition LEFT CENTer RIGHT :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOS ition?
Example	DISP:TXP:VIEW:WIND:TRAC:X:RPOS LEFT DISP:TXP:VIEW:WIND:TRAC:X:RPOS?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left Ctr Right

Auto Scaling

Enables you to toggle the X auto scaling function between On and Off.

Key Path	SPAN X Scale
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUP le 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUP le?
Example	DISP:TXP:VIEW:WIND:TRAC:X:COUP OFF DISP:TXP:VIEW:WIND:TRAC:X:COUP?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either X Rel Value or <XREF>X Scale/Div manually, X Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep for the current measurement. For details about this key, see [“Sweep / Control” on page 1033](#).

Key Path	Front panel key
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	A.01.60 or later

Sweep Time (for SAmode)

Sets the sweep time to capture and show on screen.

Key Path	Sweep/Control
Mode	SA
Remote Command	[:SENSe] :TXPower:SWEep:TIME <time> [:SENSe] :TXPower:SWEep:TIME?
Example	TXP:SWE:TIME 10 TXP:SWE:TIME?
Notes	You must be in the Spectrum Analyzer mode to use this command. Use INSTRument:SElect to set the mode.
Preset	640 us
State Saved	Saved in instrument state.
Min	1.0e–6
Max	50
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Sweep Time (for GSM mode)

Sets the number of slots which are used in each data acquisition. Each slot is approximately to 600 s.

Key Path	Sweep/Control
Mode	GSM
Remote Command	[:SENSe] :TXPower:SWEep:TIME <integer> [:SENSe] :TXPower:SWEep:TIME?

Burst Power (Transmit Power) Sweep/Control

Example	TXP:SWE:TIME 4 TXP:SWE:TIME?
Notes	You must be in the GSM mode to use this command. Use INSTRUMENT:SELEct to set the mode.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	50
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement.

Since this functionality is mode global, see Mode functionality section or other section for details.

Key Path	Sweep/Control
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

Max Hold Trace

This key enables you to select visible/invisible Max Hold Trace.

Key Path	Trace/Detector
Mode	SA, GSM, TD-SCDMA
Remote Command	<code>DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0</code> <code>DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ?</code>
Example	<code>DISP:TXP:VIEW:WIND:TRAC:MAXH ON</code> <code>DISP:TXP:VIEW:WIND:TRAC:MAXH?</code>
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use <code>INSTrument:SElect</code> to set the mode.
Dependencies/Couplings	Selecting <code>[:SENSe]:TXPower:AVERage:TYPE MAXimum</code> forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Min Hold Trace

This key enables you to select visible/invisible Min Hold Trace.

Key Path	Trace/Detector
Mode	SA, GSM, TD-SCDMA
Remote Command	<code>DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0</code> <code>DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ?</code>

Burst Power (Transmit Power) Trace/Detector

Example	DISP:TXP:VIEW:WIND:TRAC:MINH ON DISP:TXP:VIEW:WIND:TRAC:MINH?
Notes	You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies/Couplings	Selecting [:SENSe]:TXPower:AVERage:TYPE MINimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Trigger

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1057](#).

View/Display

The View/Display key opens up the View menu for the current measurement. The views that are available are specific to the current measurement selected under the **Meas** key. Many of the lower-level menu keys are also the same across all measurements. Unique functions are described below.

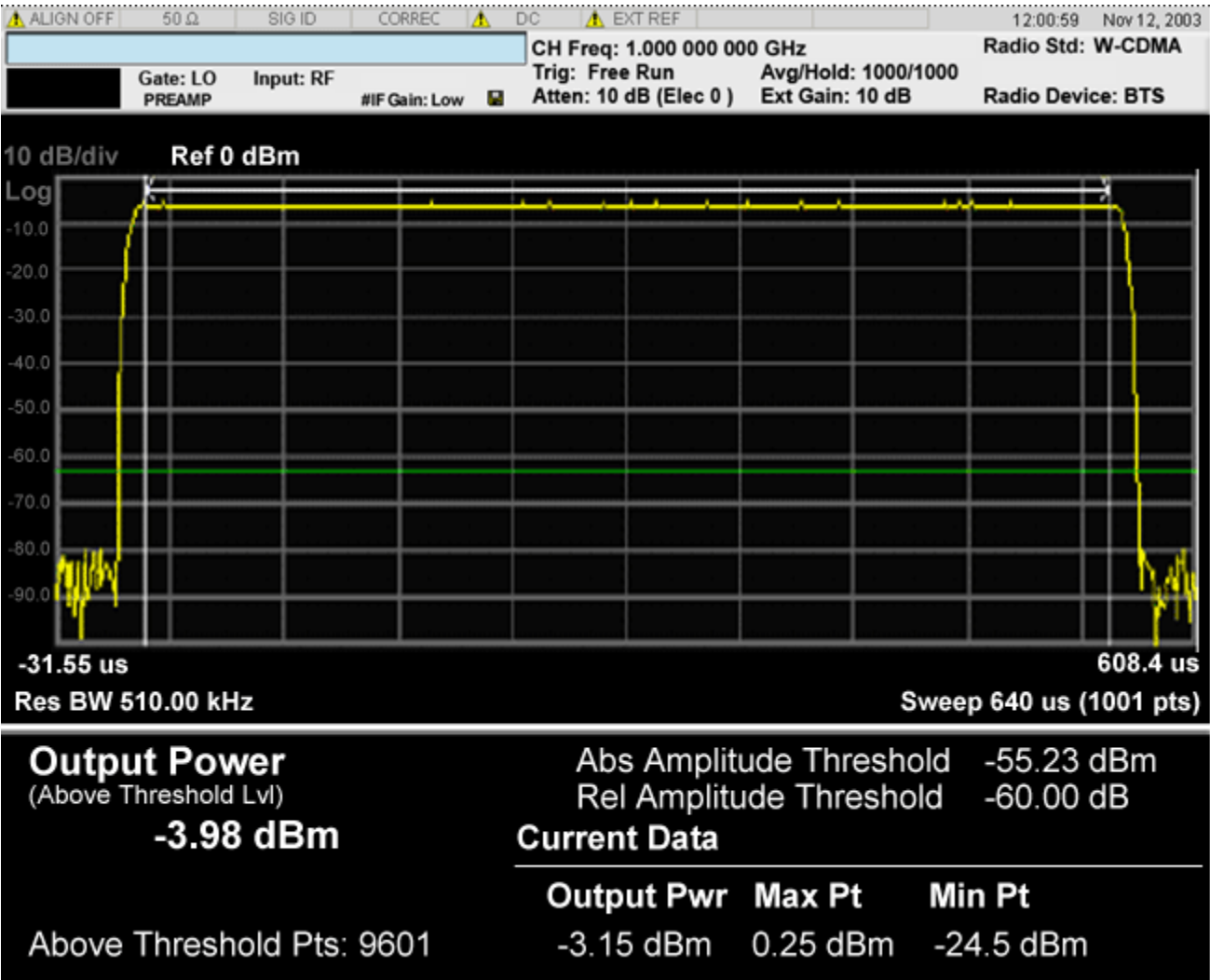
This measurement consists of one view, which consists of two windows.

RF Envelope view for TX Power Measurement(Above Threshold)

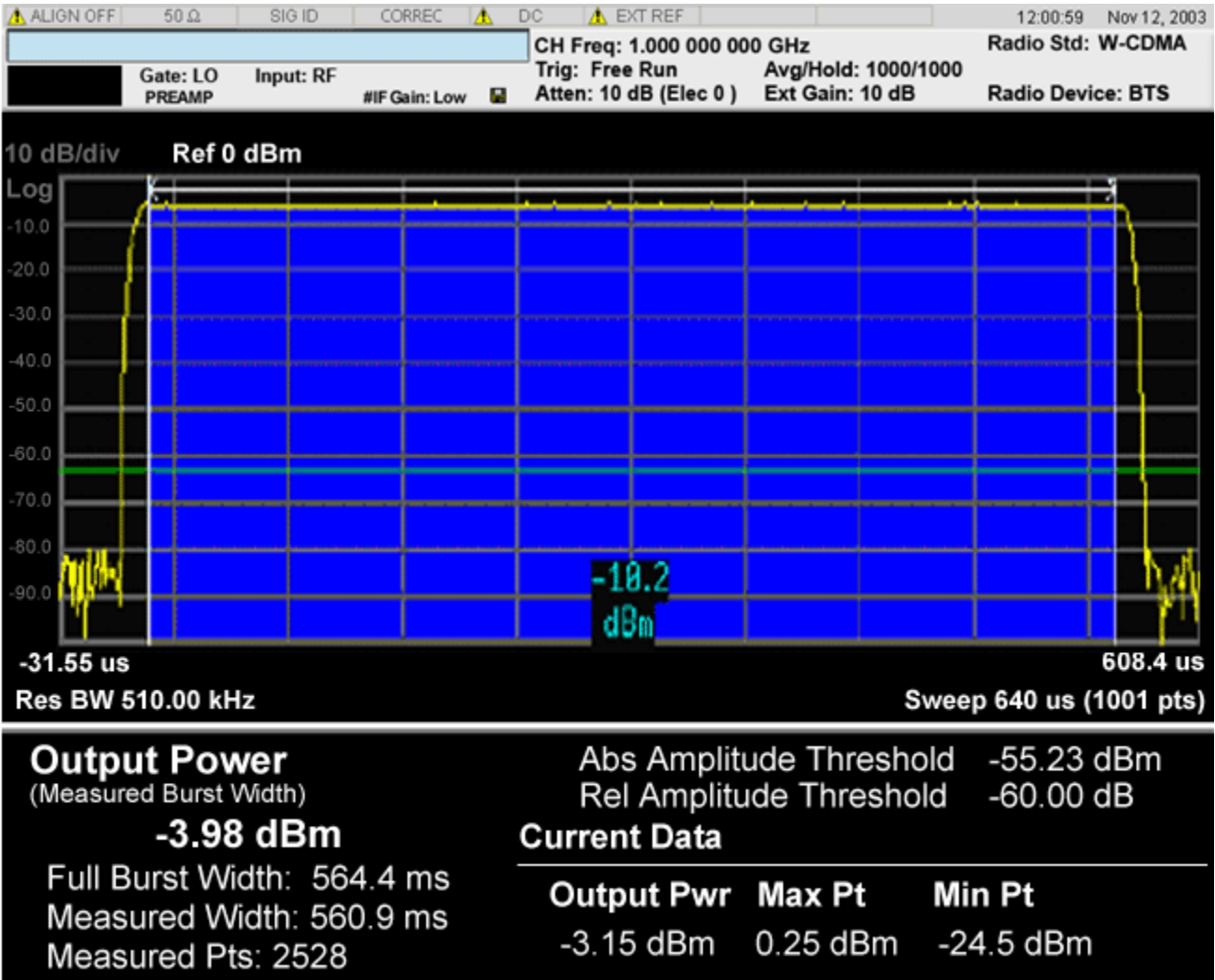
RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)

RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)

RF Envelope view for TX Power Measurement(Above Threshold)

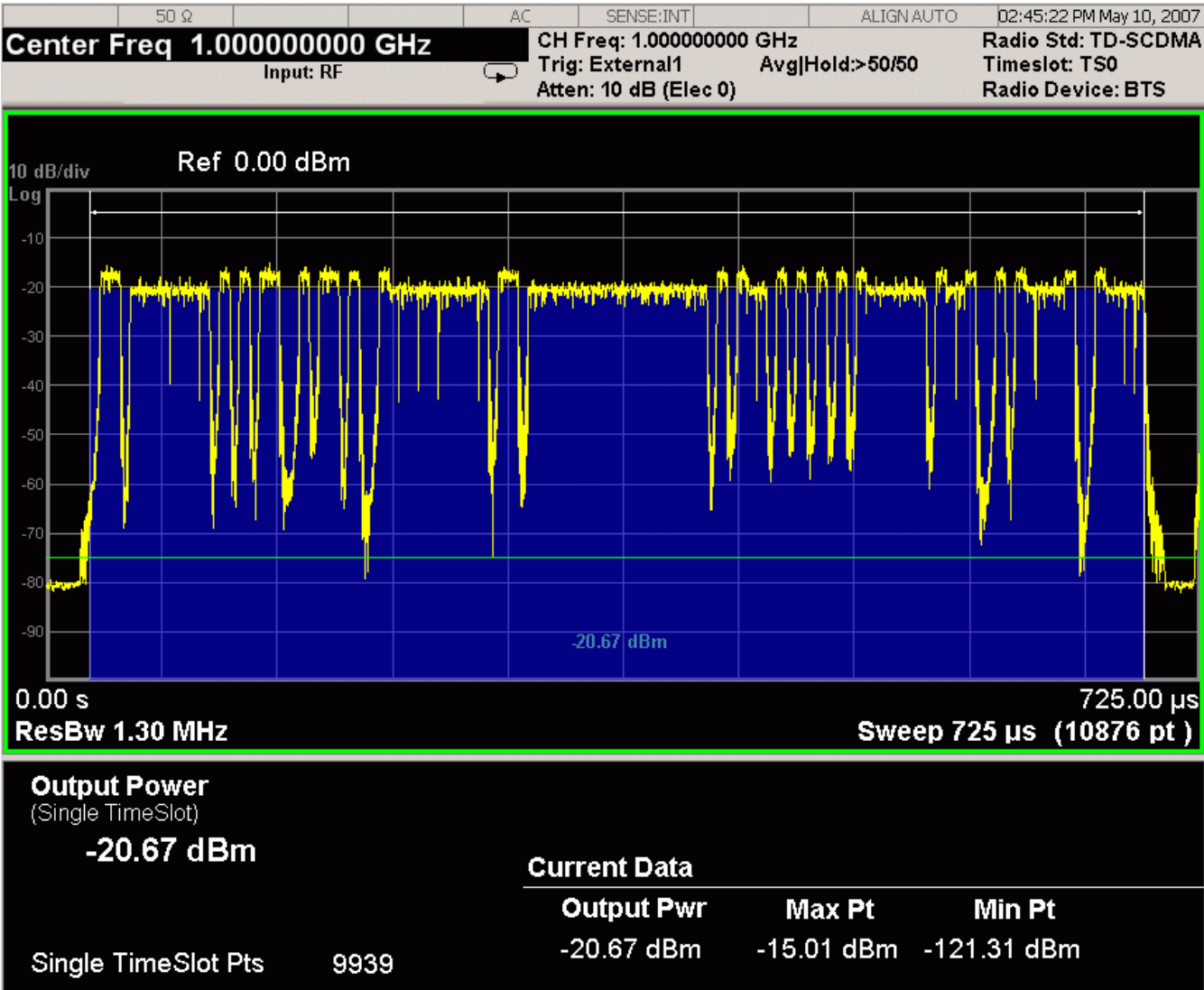


RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)



Burst Power (Transmit Power)
View/Display

RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)



The bar graph represents the measured portion of the trace. It is the blue bar in the second figure. Its state (On/Off) is controlled by the <XREF>Bar Graph key under the View/Display key.

RF Envelope window

Marker Operation	Yes
Corresponding Trace	Corrected measured trace (n=2,3,4)

Metrics window

Name	Corresponding Results	Display Format

Mean Transmit Power	n=1 3rd	99.99 dBm
Above Threshold or Measured Burst Width	Power Value above the threshold or measured burst width for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of power averaged is the same as the Mean Transmit Power of Current Data.	
Full Burst Width	n=1 9th	999.9 us
	Burst width that is determined by the <XREF>Threshold Lvl.	
Measured Width	n=1 10th	999.9 us
	Time length that is used to calculate Mean Transmit Power when <XREF>Meas Method is Measured Burst Width. If <XREF>Meas Method is set to Above Threshold, disappear from the window.	
Above Thresh Pts	n=1 6th	9999
	Number of points that were above the threshold level and were used for the power calculation when <XREF>Meas Method is Above Threshold Level.	
Thresh Pts	N=1 6th	9999
	Number of points that were used for the power calculation when Meas Method is Measured Burst Width.	
Abs Amplitude Threshold	n=1 5th	99.99 dBm
	Threshold value is the threshold (in dBm) above which the power is calculated.	
Rel Amplitude Threshold		99.99 dB
	Threshold (in dB) relative to the peak carrier level above which the power is calculated	
Mean Transmit power (Current data)	n=1 2nd	99.99 dBm
	Power value above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition.	
Max Pt	n=1 7th	99.99 dBm
	Maximum peak level of the most recently acquired trace data.	
Min Pt	n=1 8th	99.99 dBm
	Minimum peak level of the most recently acquired trace data.	
Key Path	Front panel key	
Mode	SA, GSM, TD-SCDMA	
Instrument S/W Revision	A.01.60 or later	

Display

Invokes Display menu. All measurements have same Display menu and same functionality for each key under Display menu. For details about this key, see “Display” on page 1109.

Key Path	View/Display
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	A.01.60 or later

Bar Graph

Enables you to select visible/invisible Bar Graph.

Key Path	View/Display
Mode	SA, GSM, TD-SCDMA
Remote Command	:DISPlay:TXPower:BARGraph[:STATe] ON OFF 1 0 :DISPlay:TXPower:BARGraph[:STATe] ?
Example	DISP:TXP:BARG ON DISP:TXP:BARG?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

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The Spurious Emissions measurement identifies and determines the power level of spurious emissions in certain frequency bands. For measurement results and views, see [“View/Display” on page 762](#).

This topic contains the following sections:

[“Measurement Commands for Spurious Emissions” on page 697](#)

[“Remote Command Results for Spurious Emissions Measurement” on page 697](#)

Measurement Commands for Spurious Emissions

The following commands can be used to retrieve the measurement results:

```
:CONFigure:SPURious
:CONFigure:SPURious:NDEFault
:INITiate:SPURious
:FETCh:SPURious [n] ?
:READ:SPURious [n] ?
:MEASure:SPURious [n] ?
```

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 947](#).

Remote Command Results for Spurious Emissions Measurement

Command	Return Value
CONFigure:SPURious	N/A
INITiate:SPURious	
FETCh:SPURious [n]?	n = 1 (or not supplied)
MEASure:SPURious [n]?	Returns a variable-length (1+6*Spurs – up to 1201 entries) comma separated list containing detailed information in the following format:
READ:SPURious [n]?	Number of spurs in following list (Integer)
(Note – these commands are not available when viewing the Range Table)	[Repeat the following for each spur]
	Spur #
	Range # Spur was located (Integer)
	Frequency of Spur (Hz, Float64)
	Amplitude of Spur (dBm, Float32)
	Absolute Limit (dBm, Float32)
	Pass or Fail (1 0, Boolean)

n = 2 – 21

Returns a comma separated list of the trace data for the selected range (where range number = n – 1) using Detector 1. If selected range is not active SCPI_NAN is returned for each trace data element where SCPI_NAN = 9.91E37.

n = 22

Returns the number of spurs found.

n = 23 – 42

Returns a comma separated list of the trace data for the selected range (where range number = n – 22) using Detector 2. If selected range is not active or Detector 2 selection is off, SCPI_NAN is returned for each trace data element where SCPI_NAN = 9.91E37.

Key Path	Meas
Instrument S/W Revision	A.01.60 or later

AMPTD Y Scale

AMPTD Y Scale opens a menu of functions that enable you to modify the Amplitude parameters.

See AMPTD Y Scale in the "Analyzer Setup Functions: section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the value for the absolute power reference. When Auto Scaling for the Y-axis is off, the measurement uses the current reference level settings. When Auto Scaling for the Y-axis is on, the analyzer will set the reference level such that the absolute limit will be positioned two divisions down from the top of the display.

Key Path	AMPTD/Y Scale
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA,C2k, 1xEV-DO
Remote Command	:DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV1 < real> :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV1?
Example	DISP:SPUR:VIEW:WIND:TRAC:Y:RLEV -50 dBm DISP:SPUR:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	When the Y Auto Scaling is off, the measurement uses the current reference level settings. When the Y Auto Scaling is on, the analyzer automatically sets the reference level such that the absolute limit is positioned two divisions down from the top of the display. This is the most useful setting when searching for spurs. The algorithm used for determining the ref level is Ref Level = Absolute Limit + (2 * Scale/Div). All other reference level settings are left as the current base instrument settings.
Preset	0.00 dBm
State Saved	Saved in instrument state.
Min	-250.0 dBm
Max	250.0 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	10.0 dB (Scale/Div)

Instrument S/W Revision A.01.60 or later

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the key in square brackets is the current Total (Elec + Mech) attenuation. When in Pre-Adjust for Min Clip mode, this value can change at the start of every measurement.

See “Attenuation” on page 867 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

Key Path **AMPTD Y Scale**

Instrument S/W Revision A.01.60 or later

Scale/Div

Sets the units per division of the vertical scale in the logarithmic display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD/Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA
Remote Command	:DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDI Vision <rel_ampl> :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDI Vision?
Example	DISP:SPUR:VIEW:WIND:TRAC:Y:PDIV 10 dB DISP:SPUR:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA or WiMAX mode to use this command. Use INSTrument:SELEct to set the mode.
Dependencies/Couplings	When the Scale Coupling is On, this value is automatically determined by the measurement result. When you set a value manually, Scale Coupling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Range	0.10 dB to 20.00 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1, 2, 5, 10...
Instrument S/W Revision	A.01.60 or later

Presel Center

See AMPTD Y Scale, “Presel Center” on page 878 in the “Common Measurement Functions” section for more information.

Presel Adjust

See AMPTD Y Scale, “Preselector Adjust” on page 880 in the “Common Measurement Functions” section for more information.

Internal Preamp

Accesses a menu that enables you to control the internal preamplifiers. Turning Internal Preamp on gives a better noise figure, but a poorer inter-modulation distortion (TOI) to noise floor dynamic range. You can optimize this setting for your particular measurement.

See “Internal Preamp” on page 881 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

Key Path	AMPTD Y Scale
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA
Remote Command	:DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
Example	DISP:SPUR:VIEW:WIND:TRAC:Y:COUP OFF DISP:SPUR:VIEW:WIND:TRAC:Y:COUP?

Spurious Emissions Measurement

AMPTD Y Scale

Dependencies/Couplings	When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. When the Y Auto Scaling is off, the measurement uses the current reference level settings. When the Y Auto Scaling is on, the analyzer automatically sets the reference level such that the absolute limit is positioned two divisions down from the top of the display. This is the most useful setting when searching for spurs. The algorithm used for determining the ref level is $\text{Ref Level} = \text{Absolute Limit} + (2 * \text{Scale/Div})$. All other reference level settings are left as the current base instrument settings.
Preset	1
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

See [“AUTO COUPLE” on page 885](#) in the section "Common Measurement Functions" for more information.

BW

BW is unavailable in the Spurious Emissions measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889 in the section "Common Measurement Functions" for more information.

Frequency/Channel

Frequency/Channel is unavailable in the Spurious Emissions measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Input/Output

See “[Input/Output](#)” on page 897 in the section "Common Measurement Functions" for more information.

Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to **Normal**, **Delta** and **Off**. Normal enables you to activate the selected marker to read the power level and time. Delta enables you to read the differences in the power levels and time scales between the selected marker and the next marker. Off enables you to turn off the selected marker.

All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MODE POSition DELTa OFF :CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MODE?
Example	CALC:SPUR:MARK:MODE POS CALC:SPUR:MARK:MODE?

Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. You must be in the cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRUMENT:SElect to set the mode.
Dependencies/Couplings	No
Preset	=OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the Marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering an X value if the control mode is **Normal** or **Delta**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA
Remote Command	<pre>:CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: X <freq> :CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: X?</pre>
Example	<pre>CALC:SPUR:MARK2:X 25 kHz CALC:SPUR:MARK3:X?</pre>
Notes	If no suffix is sent it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" will be generated. The query returns the absolute X Axis marker value if the control mode is Normal, or the offset from the reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off, the response is not a number.
Preset	1 GHz
State Saved	No
Min	-9.9E+37

Spurious Emissions Measurement Marker

Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SPCI test
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command only)

Sets the Marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal** or **Delta** - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: X:POSition <integer> :CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: X:POSition?
Example	CALC:SPUR:MARK10:X:POS?
Notes	The query returns the absolute X Axis marker value in trace points if the control mode is Normal , or the offset from the reference marker in trace points if the control mode is Delta . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number.
Preset	300
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	Not tested in SCPI test
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: Y?

Example	CALC:SPUR:MARK11:Y?
Notes	If no suffix is sent, it will use the current Y Axis unit. If a suffix is sent that does not have units of absolute amplitude, an error "Invalid suffix" will be generated.
Preset	Depends on Y axis range of selected Trace.
State Saved	No
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Properties

Accesses the Properties menu to set certain properties of the selected marker.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Relative To

Selects the marker the selected marker will be relative to (its reference marker).

Every marker has another marker to which it is relative. This marker is referred to as the "reference marker" for that marker. This attribute is set by the **Marker, Properties, Relative To** key. The marker must be a **Delta** marker to make this attribute relevant. If it is a **Delta** marker, the reference marker determines how the marker is controlled and how its value is displayed. A marker cannot be relative to itself.

Key Path	Marker, Properties
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : REFerence <integer> :CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : REFerence?
Example	CALC:SPUR:MARK3:REF 5 CALC:SPUR:MARK:REF?

Notes	A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error –221: “Settings conflict; marker cannot be relative to itself.” When queried a single value will be returned (the specified marker numbers relative marker). You must be in the Spectrum Analysis mode, GSM mode or WiMAX mode or TD-SCDMA mode to use this command. Use INSTRUMENT:SELEct to set the mode.
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not **Off**. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:SPURious:MARKer:COUPle[:STATe]?
Example	CALC:SPUR:MARK:COUP ON CALC:SPUR:MARK:COUP?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns off all markers.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer:AOff
Example	CALC:SPUR:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no ‘Marker Functions’ supported in Spurious Emissions so this front-panel key will display a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

There is no 'Marker To' functionality supported in Spurious Emissions so this front-panel key will display a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 947 in the section "Common Measurement Functions" for more information.

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Avg/Hold Num

Specifies the number of measurement averages used to calculate the measurement result. The average is displayed at the end of each sweep.

Average State allows you to turn averaging On or Off.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA
Remote Command	<code>[:SENSe] :SPURious:AVERage:COUNt <integer></code> <code>[:SENSe] :SPURious:AVERage:COUNt?</code> <code>[:SENSe] :SPURious:AVERage [:STATe] ON OFF 1 0</code> <code>[:SENSe] :SPURious:AVERage [:STATe] ?</code>
Example	SPUR:AVER:COUN 2500 SPUR:AVER:COUN? SPUR:AVER ON SPUR:AVER?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Avg Mode

Enables you to set the averaging mode.

When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep.

When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

Key Path	Meas Setup
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA
Remote Command	[:SENSe] :SPURious:AVERage:TCONtrol EXPonential REPeat [:SENSe] :SPURious:AVERage:TCONtrol?
Example	SPUR:AVER:TCON REP SPUR:AVER:TCON?
Notes	You must be in the cdma2000 mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp Repeat
Instrument S/W Revision	A.01.60 or later

Range Table

The range table is used to enter the settings for up to twenty ranges.

Upon entering the range table (front panel only) the measurement is stopped and the analyzer is set to a constantly sweeping idle state. The analyzer will be set to the current values of range 1, regardless if it is on or off. If a range is outside the values in the current range table for that range, "---" will appear to indicate this range is currently inactive.

To change a parameter, select the appropriate menu key and enter the value using the numeric keypad, or the knob. The analyzer settings will be updated with the new parameter values. Although no measurements are being made, this allows you to preview the range they will be measuring.

If the range is changed, the analyzer will change its settings to reflect the currently selected range. The selected range will be displayed on the last line of the range table view unless; the selected range is 5 or less in the normal range table view. In this case, the first 5 entries of the range table will be displayed and the zoom mode is selected. In the zoom mode all 20 ranges can be displayed.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Range

Changing the range will update the values on the other menu keys so that they reflect the settings for the selected range. If Range is turned on, it will be used as part of the measurement. If it is off, it will be excluded. A range is made up of the next eleven parameters. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted. In other words, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, 1xEV-DO, WIMAX OFDMA, TD-SCDMA
Notes	You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRUMENT:SElect to set the mode.
Preset	1 SA, WIMAX OFDMA:ON,ON,ON,ON,ON,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF WCDMA:ON,ON,ON,ON,ON,ON,ON,ON,ON,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF C2k, 1xEV-DO: ON,ON,ON,ON, OFF,OFF, OFF,OFF OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF TD-SCDMA: ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF
Min	1
Max	20
Example	SPUR:STAT ON SPUR:STAT?
Instrument S/W Revision	A.01.60 or later

Start Freq

Sets the start frequency of the analyzer. This parameter can send up to 20 values. The location of where the start frequency occurs in the list sent to the measurement corresponds to the range the value is associated with.

Missing values are not permitted. In other words, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

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Remote Command	<pre>[:SPURious [:RANGe] [:LIST] :FREQuency:STARt <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :SPURious [:RANGe] [:LIST] :FREQuency:STARt?</pre>
Example	<pre>SPUR:FREQ:STAR 9 kHz, 150 kHz, 30 MHz, 1GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz SPUR:FREQ:STAR?</pre>
Notes	You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRument:SELEct to set the mode.
Preset	<pre>SA, WIMAX OFDMA:+1.92000000E+009,+1.89350000E+009,+2.10000000E+009,+2.17 500000E+009,+8.00000000E+008,+1.50000000E+009,+1.50000000E+009,+ 1.50000000E+009,+1.50000000E+009,+1.50000000E+009,+1.50000000E+0 09,+1.50000000E+009,+1.50000000E+009,+1.50000000E+009,+1.500000 0E+009,+1.50000000E+009,+1.50000000E+009,+1.50000000E+009,+1.500 00000E+009,+1.50000000E+009 WCDMA:9kHz,150kHz,30MHz,1GHz,2.1GHz,2.1GHz,2.1774GHz,2.18GH z,1.5GHz,1.5GHz,1.5GHz,1.5GHz,1.5GHz,1.5GHz,1.5GHz, 1.5GHz,1.5GHz,1.5GHz,1.5GHz,1.5GHz C2K,1xEV-DO: 9kHz, 150kHz, 30 MHz, 1GHz, 2.5GHz, 2.5GHz, 2.5GHz , 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz TD-SCDMA: 9 kHz, 150 kHz, 30 MHz, 1GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz, 1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz</pre>
State Saved	Saved in instrument state.
Min	–80 MHz
Max	Hardware Dependent: Option 503: 3699999990 Option 508: 8499999990 Option 513: 13799999990 Option 526: 26999999990
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	(stopFreq - startFreq) / 10
Instrument S/W Revision	A.01.60 or later

Stop Freq

Sets the stop frequency of the analyzer. This parameter can send up to 20 values.

The location of where the stop frequency occurs in the list sent to the measurement corresponds to the range the value is associated with.

Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>[:SENSe] :SPURious[:RANGe] [:LIST] :FREQuency:STOP <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :SPURious[:RANGe] [:LIST] :FREQuency:STOP?</pre>
Example	<pre>SPUR:FREQ:STOP 150kHz,30MHz,1GHz,2.1GHz,2.1GHz,2.1774GHz,2.18GHz,12.75GHz,2.5 GHz,2.5GHz,2.5GHz,2.5GHz,2.5GHz,2.5GHz,2.5GHz,2.5GHz,2.5G Hz,2.5GHz,2.5GHz SPUR:FREQ:STOP?</pre>
Notes	You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Preset	SA, WIMAX OFDMA: +1.98000000E+009, +1.91960000E+009, +2.10150000E+009, +2.18000000E+009, +1.00000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009, +2.50000000E+009 WCDMA: 150kHz, 30MHz, 1GHz, 2.1GHz, 2.1GHz, 2.1774GHz, 2.18GHz, 12.75GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz C2K, 1xEV-DO: 150kHz, 30 MHz, 1GHz, 5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz TD-SCDMA: 150kHz, 30 MHz, 1GHz, 12.75GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz
State Saved	Saved in instrument state.
Min	-79999990

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Max	Hardware Dependent: Option 503: 3.7 GHz Option 508: 8.5 GHz Option 513: 13.8 GHz Option 526: 27.0 GHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1. (stopFreq - startFreq) / 10
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the resolution bandwidth of the analyzer. This parameter can send up to 20 values.

The location of where the resolution bandwidth occurs in the list sent to the measurement corresponds to the range the value is associated with.

Missing values are not permitted. In other words, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] ? [:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] :AUTO OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] :AUTO?</pre>

Example	SPUR:BWND 1kHz,10kHz,100kHz,1MHz,1MHz,1MHz,1MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz SPUR:BWND? SPUR:BWID:AUTO ON, ON, ON, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, OFF, OFF, OFF, OFF, ON, ON SPUR:BWID:AUTO?
Notes	You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Preset	SA, WIMAX OFDMA:1.2MHz,0.51MHz,0.1MHz,0.1MHz,4MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz WCDMA:1kHz,10kHz,100kHz,1MHz,1MHz,1MHz,1MHz,1MHz,1MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz C2k, 1xEV-DO: 1kHz,10kHz,100kHz,1MHz,1MHz,1MHz,1MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz TD-SCDMA: 1kHz,10kHz,100kHz,1MHz, 3MHz, 3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz SA, WIMAX OFDMA:OFF,OFF,OFF,OFF,OFF,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON WCDMA:OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON C2k, 1xEV-DO:OFF,OFF,OFF,OFF,OFF,OFF,OFF,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON TD-SCDMA: OFF,OFF,OFF,OFF,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1.
	See GPSA PD for Details
Instrument S/W Revision	A.01.60 or later

Video BW

Sets the Video BW mode of the analyzer. This can be Auto, where the analyzer determines the optimum setting, or Manual, where you determine the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, in other words, if you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>[:SENSE] :SPURious [:RANGE] [:LIST] :BANDwidth:VIDeo <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSE] :SPURious [:RANGE] [:LIST] :BANDwidth:VIDeo? [:SENSE] :SPURious [:RANGE] [:LIST] :BANDwidth:VIDeo:AUTO OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSE] :SPURious [:RANGE] [:LIST] :BANDwidth:VIDeo:AUTO?</pre>
Example	<pre>SPUR:BAND:VID 1kHz,10kHz,100kHz,1MHz,1MHz,1MHz,1MHz, 3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz,3MHz, 3MHz,3MHz SPUR:BAND:VID? SPUR:BAND:VID:AUTO ON, ON, OFF, OFF, OFF, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON SPUR:BAND:VID:AUTO?</pre>
Notes	You must be in the cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRUMENT:SELEct to set the mode.
Preset	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO: Automatically calculated ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1. 1, 3, 10, ...

Instrument S/W Revision A.01.60 or later

Filter Type

Besides the Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions. The **Filter Type** menu gives you control over these parameters.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHAPE GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop, GAUSSian FLATtop [:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHAPE?
Example	SPUR:BAND:SHAP GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, FLAT, FLAT, FLAT, FLAT, FLAT, GAUS, GAUS, GAUS, GAUS, GAUS, FLAT, FLAT, GAUS, GAUS SPUR:BAND:SHAP?
Preset	GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, GAUS
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Instrument S/W Revision	A.01.60 or later

Abs Start Limit

Determines the limit above which spurs will report a failing. If Abs Stop Limit Mode is set to Auto, this is coupled to Abs Stop Limit to make a flat limit line. If set to Man, Abs Start Limit and Abs Stop Limit can take different values to make a sloped limit line.

If the Limit Line Test parameter is off then any spurs which are found to be above the current 'Peak Excursion' will be added to the results table. From these spurs, the amplitude will be checked using the abs limit start and abs limit stop parameters and then calculate the limit. An 'F' will be appended to the amplitude value of the spur if the measured amplitude is above the limit. If the Limit Line Test is on, only the spurs whose amplitudes exceed the limit will be reported.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always

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returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>:CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe r]:DATA[:START] <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl> :CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe r]:DATA[:START]?</pre>
Example	CALC:SPUR:LIM:ABS:DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 CALC:SPUR:LIM:ABS:DATA?
Preset	SA, WIMAX OFDMA: –5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001,–5.00000000E+001 WCDMA: –36dBm,–36dBm,–36dBm,–30dBm,–25dBm,–15dBm,–25dBm,–30dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm,–50dBm C2K, 1xEV-DO: –13 dBm, –13dBm, –13 dBm, –13 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm TD-SCDMA: –13 dBm, –13dBm, –13 dBm, –13 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm
State Saved	Saved in instrument state.
Min	–150.0 dBm
Max	50.0 dBm
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro–1.
	1
Instrument S/W Revision	A.01.60 or later

Abs Stop Limit

Abs Stop Limit is used to determine the limit above which spurs will report a failing. If Abs Stop Limit Mode is set to Auto, this is coupled to Abs Start Limit to make a flat limit line. If set to Man, Abs Start Limit and Abs Stop Limit can take different values to make a sloped limit line.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Abs Stop Limit Mode, when set to Couple, couples Abs Start Limit and Abs Stop Limit to make a flat limit line. If set to Man, Abs Start and Abs Stop can take different values to make a sloped limit line.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted, in other words, if you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path

Meas Setup, Range Table

Mode

SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Remote Command

```
:CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe
r]:DATA:STOP <ampl>, <ampl>, <ampl>, <ampl>, <ampl>,
<ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>,
<ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>, <ampl>,
<ampl>
```

```
:CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe
r]:DATA:STOP?
```

```
:CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe
r]:DATA:STOP:AUTO OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1, OFF|ON|0|1,
OFF|ON|0|1
```

```
:CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPe
r]:DATA:STOP:AUTO?
```

Example

```
CALC:SPUR:LIM:ABS:DATA:STOP
-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25,-25
```

```
CALC:SPUR:LIM:ABS:DATA:STOP?
```

```
CALC:SPUR:LIM:ABS:DATA:STOP:AUTO ON, ON, ON, ON, ON, ON,
ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON
```

```
CALC:SPUR:LIM:ABS:DATA:STOP:AUTO?
```

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Preset	SA, WIMAX OFDMA: -5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001,-5.00000000E+001, WCDMA: -36dBm,-36dBm,-36dBm,-30dBm,-25dBm,-15dBm,-25dBm,-30dBm,-50 dBm,-50dBm,-50dBm,-50dBm,-50dBm,-50dBm,-50dBm,-50dBm,-50dBm,-50dBm C2K, 1xEV-DO: -13 dBm, -13dBm, -13 dBm, -13 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm TD-SCDMA: -13 dBm, -13dBm, -13 dBm, -13 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm, -50 dBm ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON N,ON
State Saved	Saved in instrument state.
Min	-150.0 dBm
Max	50.0 dBm
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1. 1
Instrument S/W Revision	A.01.60 or later

Peak Excursion

Sets the minimum amplitude variation of signals that can be identified as peaks. If a value of 6 dB is selected, peaks that rise and fall more than 6 dB above the peak threshold value are identified. This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Remote Command	<pre>[:SENSe] :SPURious [:RANGe] [:LIST] :PEAK:EXCursion <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe] :SPURious [:RANGe] [:LIST] :PEAK:EXCursion?</pre>
Example	<pre>SPUR:PEAK:EXC 20,20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20 SPUR:PEAK:EXC?</pre>
Preset	<pre>+6.000000000E+000,+6.000000000E+000,+6.000000000E+000,+6.000000000E+ 000,+6.000000000E+000,+6.000000000E+000,+6.000000000E+000,+6.000000 000E+000,+6.000000000E+000,+6.000000000E+000,+6.000000000E+000,+6.00 0000000E+000,+6.000000000E+000,+6.000000000E+000,+6.000000000E+000,+ 6.000000000E+000,+6.000000000E+000,+6.000000000E+000,+6.000000000E+0 00,+6.000000000E+000</pre>
State Saved	Saved in instrument state.
Min	0.0 dB
Max	100.0 dB
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	1
Instrument S/W Revision	A.01.60 or later

Pk Threshold

Sets the minimum amplitude of signals that can be identified as peaks. For example, if a value of -90 dBm is selected, only peaks that rise and fall more than the peak excursion value which are above -90 dBm are identified. This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>[:SENSE] :SPURious[:RANGe] [:LIST] :PEAK:THReshold <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real>, <real></pre> <pre>[:SENSE] :SPURious[:RANGe] [:LIST] :PEAK:THReshold?</pre>
Example	<pre>SPUR:PEAK:THR 0,0,0</pre> <pre>SPUR:PEAK:THR?</pre>

Spurious Emissions Measurement

Meas Setup

[illegible]

Attenutaion

Defines attenuation value for each range. When Auto state is ON, attenuation value under AMPTD Y Scale is used. When Auto state is OFF, this value is used as mechanical attenuation value without electric attenuation.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :SPURious [:RANGE] [:LIST] :ATTenuation <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl> [:SENSe] :SPURious [:RANGE] [:LIST] :ATTenuation? [:SENSe] :SPURious [:RANGE] [:LIST] :ATTenuation:AUTO OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe] :SPURious [:RANGE] [:LIST] :ATTenuation:AUTO?
Example	SPUR:ATT 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB SPUR:ATT? SPUR:ATT:AUTO 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 SPUR:ATT:AUTO?

Notes	You must be in cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, SA mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	--“ is displayed as value when Auto state is ON, to indicate attenuation value under AMPTD Y Scale is being used.
Preset	10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB, 10dB ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,N,ON
State Saved	Saved in instrument state.
Min	0 dB
Max	70 dB
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported.
Instrument S/W Revision	A.01.60 or later

Detector 1

Sets the detector to be used by the trace for spur detection and limit line testing.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Spurious Emissions Measurement

Meas Setup

[illegible]

Detector 2

Sets the detector to be used by the trace for display purposes only.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Remote Command	[[:SENSE]:SPURious[:RANGE][[:LIST]:DETEctor2[:FUNCTION] OFF AVERAge NEGative NORMal POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS, OFF AVERAge NEGative NORMAl POSitive SAMPle RMS [[:SENSE]:SPURious[:RANGE][[:LIST]:DETEctor2[:FUNCTION] ?
Example	SPUR:DET2 AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER ,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER,AVER SPUR:DET2?
Notes	For backward compatibility, “NORMAl” is available as a SCPI command parameter. However this is treated same as “RMS” internally, so the query never returns “NORMAl” as its results.
Preset	OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,FF,OFF,OFF,OFF,OFF
State Saved	Saved in instrument state.
Range	Off Normal Average Peak Sample Negative Peak
Instrument S/W Revision	A.01.60 or later

Sweep Time

Sets the sweep time mode of the analyzer. This can be Auto, where the analyzer determines the optimum setting, or Manual, where you determine the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Remote Command	<pre>[:SENSe] :SPURious [:RANGe] [:LIST] :SWEep:TIME <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds>, <seconds> [:SENSe] :SPURious [:RANGe] [:LIST] :SWEep:TIME? [:SENSe] :SPURious [:RANGe] [:LIST] :SWEep:TIME:AUTO OFF ON 0 1, OFF ON 0 1 [:SENSe] :SPURious [:RANGe] [:LIST] :SWEep:TIME:AUTO?</pre>
Example	<pre>SPUR:SWE:TIME 10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10 SPUR:SWE:TIME? SPUR:SWE:TIME:AUTO ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON N,ON SPUR:SWE:TIME:AUTO?</pre>
Notes	You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, SA mode or WiMAX mode to use this command. Use INSTRUMENT:SELEct to set the mode.
Preset	Automatically calculated
State Saved	Saved in instrument state.
Min	1.0E-3
Max	2.0E+3
Test MIN/MAX/DEF	MIN MAX
Test UP/DOWN	Not supported in Zorro-1.
Instrument S/W Revision	A.01.60 or later

Points

Sets the number of points per sweep for the measurement. This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

The Points mode can be manual, where you determine the setting or auto, where the analyzer determines the number of trace points to ensure the sweep points resolution equals $RBW/2$. This is calculated using the following algorithm:

Points = (Stop Freq – Start Freq) / (ResBW / 2), with the computed values being clipped to a minimum of 101 and a maximum of 8192.

This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, in other words, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Key Path	Meas Setup, Range Table
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	[:SENSe] :SPURious [:RANGe] [:LISt]:SWEep:POINts <integer> [:SENSe] :SPURious [:RANGe] [:LISt]:SWEep:POINTs? [:SENSe]:SPURious[:RANGe][:LISt]:SWEep:POINTS:AUTO OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1, OFF ON 0 1 [:SENSe]:SPURious[:RANGe][:LISt]:SWEep:POINTS:AUTO?
Example	SPUR:SWE:POIN 1001,1001,1001 SPUR:SWE:POIN? SPUR:SWE:POIN:AUTO ON,ON,ON SPUR:SWE:POIN:AUTO?
Preset	SA, WiMAX OFDMA: +601,+601,+601,+601,+601,+601,+601,+601,+601,+601,+601,+601,+601,+601,+601, 01,+601,+601,+601,+601,+601,+601 WCDMA: 601,2985,9700,1100,601,601,601,10570,601,601,601,601,601,601,601,601,601,601,601, 01,601,601,601 C2K: 601,601,9970,11750,,601,601,601,601,601,601,601,601,601,601,601,601,601,601, 601,601,601 CDMA1xEVD0: 601,601,9970,11750,601,601,601,10570,601,601,601,601,601, 601,601,601,601,601,601,601 TD-SCDMA: 601, 5970, 19400, 20001, 601,601,601,601,601,601,601,601,601,601,601,601,601, 601,601,601,601 OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,O FF,OFF,OFF,OFF,OFF
State Saved	Saved in instrument state.
Min	101
Max	20001
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

IF Gain

Sets the IF Gain function to Auto, On (the extra 10 dB) or Off. These settings affect sensitivity and IF overloads. A switched IF amplifier with approximately 10 dB of gain is available. This amplifier takes full advantage of the RF dynamic range of the analyzer. When it can be turned on without an overload, the dynamic range is always better with the amplifier on than off.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

IF Gain Auto Activates the rules for auto IF Gain.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<pre>[:SENSe] :SPURious:IF:GAIN:AUTO[:STATe] OFF ON 0 1, OFF ON 0 1 [:SENSe] :SPURious:IF:GAIN:AUTO[:STATe] ?</pre>
Example	<pre>SPUR:IF:GAIN:AUTO ON,ON SPUR:IF:GAIN:AUTO?</pre>
Dependencies/Couplings	When the sweep type is Swept, 'Auto' sets IF Gain to High Gain under any of the following conditions: the input attenuator is set to 0 dB, the preamp is turned on, or the Max Mixer Level is 20 dBm or lower. For other settings using the swept sweep type, auto sets IF Gain to Low Gain.
Preset	OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF
State Saved	Saved in instrument state.
Range	Auto Man
Instrument S/W Revision	A.01.60 or later

IF Gain State Selects the range of IF Gain.

Remote Command:	<pre>[:SENSe] :SPURious:IF:GAIN[:STATe] OFF ON 0 1, OFF ON 0 1 [:SENSe] :SPURious:IF:GAIN[:STATe] ?</pre>
Example:	<pre>SPUR:IF:GAIN ON,ON SPUR:IF:GAIN?</pre>

Preset:	OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF
State Saved:	Saved in instrument state.
Range:	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Instrument S/W Revision:	A.01.60 or later

Meas Type

Selects either Examine or Full measurement type. This parameter is coupled to the average mode. Therefore, if the examine measurement type is selected, the measurement sets the average mode to exponential. If the full measurement type is selected, the measurement sets the average mode to repeat. The behavior of each measurement type is described in the table below. When averaging is on, trace averaging is used as each active range is measured. Averaging is not used at any other time.

	Single		Continuous	
	No Spurs Found	Spurs Found	No Spurs Found	Spurs Found
Examine	All active ranges are measured. On completion the measurement is set to the idle state and the 'No Spurs' happening is displayed.	All active ranges are measured and the spurs found reported. On completion the measurement is set to the idle state and the trace containing the worst spur restored. The spur menu key is enabled. A marker is also added which is set to the frequency of the worst spur.	All active ranges are measured. On completion the measurement is set to the idle state and the 'No Spurs' happening is displayed.	All active ranges are measured and the spurs found reported. On completion the SA is set to the range containing the worst spur found and continually sweeps this range. The spur menu key is enabled. A marker is also added which is set to the frequency of the worst spur.
Full	All active ranges are measured. On completion measurement is set to idle state and the 'No Spurs' happening is displayed.	All active ranges are measured and spurs found reported. On completion the measurement is set to the idle state, displaying the trace of the last active range.	Measurement continually cycles through all active ranges.	All active ranges are measured and spurs found reported. On each cycle of the active ranges the spurs found are reset. This ensures any remote queries retrieve the trace data that matches the currently displayed results.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Remote Command	<code>[:SENSe] :SPURious:TYPE EXAMine FULL</code> <code>[:SENSe] :SPURious:TYPE?</code>
Example	SPUR:TYPE FULL SPUR:TYPE?
Preset	EXAMine
State Saved	Saved in instrument state.
Range	Examine Full
Instrument S/W Revision	A.01.60 or later

Spur

Displays any spurs found. It is only enabled when the measurement type is set to examine and will turn on upon completion of a measurement. Once the Spur menu key has been enabled, you can view any spur. The measurement sets the analyzer to the range in which the currently selected spur was found. The range settings only changes if the spur selected is in a range which is different from the current range settings. A marker is used to identify the currently selected spur on the trace.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA
Remote Command	<code>[:SENSe] :SPURious:SPUR <integer></code> <code>[:SENSe] :SPURious:SPUR?</code>
Example	SPUR:SPUR 55 SPUR:SPUR?
Preset	1
State Saved	No
Min	1
Max	200
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Spurious Report Mode

Sets the spurious report mode to either Limit Line Test Only or All.

Select the Limit Line Test (LIMTest) option to report only spurs above the limit line. Any spurs reported will cause the measurement to fail. See Abs Start Limit for more information.

Select All (ALL) to report all spurs detected by Peak Threshold and Peak Excursion.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	[:SENSe] :SPURious:REPT:MODE ALL LIMTest [:SENSe] :SPURious:REPT:MODE?
Example	SPUR:REPT:MODE LIMIT SPUR:REPT:MODE?
Preset	ALL
State Saved	Saved in instrument state.
Range	All Limit Test
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all measurement parameters to their default values.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	:CONFigure:SPURious
Example	CONF:SPUR
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Range Preset (for TD-SCDMA only)

Sets the specific range parameters to meet the requirement of the BS mandatory limits (Category A), the BS mandatory limits (Category B) and the MS mandatory and optional limits in the TD-SCDMA mode. This key only shows up in the TD-SCDMA mode.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Category A (for TD-SCDMA only)

Sets the range parameters to meet the requirement of the BS mandatory spurious emissions limits (Category A).

Spurious Emissions Measurement Meas Setup

BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	–13 dBm	1 kHz	Bandwidth as in ITU-R SM.329–9, s4.1
150 kHz – 30 MHz		10 kHz	Bandwidth as in ITU-R SM.329–9, s4.1
30 MHz – 1 GHz		100 kHz	Bandwidth as in ITU-R SM.329–9, s4.1
1 GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329–9, s2.5 table 1

(The requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.)

Key Path	Meas Setup, Range Preset
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CATegory:A
Example	SPUR:CAT:A
Dependencies/Couplings	This key is grayed out when the radio device is MS.
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Category B (for TD-SCDMA only)

Sets the range parameters to meet the requirement of the BS mandatory spurious emissions limits (Category B).

BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	–36 dBm	1 kHz	Bandwidth as in ITU SM.329–9, s4.1
150kHz – 30MHz	– 36 dBm	10 kHz	Bandwidth as in ITU SM.329–9, s4.1
30MHz – 1GHz	–36 dBm	100 kHz	Bandwidth as in ITU SM.329–9, s4.1
1GHz	–30 dBm	1 MHz	Bandwidth as in ITU SM.329–9, s4.1
,			
Fc1–19,2 MHz or F1–10 MHz whichever is the higher			

Fc1 – 19,2 MHz or Fl –10 MHz whichever is the higher /	–25 dBm	1 MHz	Specification in accordance with ITU-R SM.329–9, s4.1
Fc1 – 16 MHz or Fl –10 MHz whichever is the higher			
Fc1 – 16 MHz or Fl –10 MHz whichever is the higher /	–15 dBm	1 MHz	Specification in accordance with ITU-R SM.329–9, s4.1
Fc2 + 16 MHz or Fu +10 MHz whichever is the lower			
Fc2 + 16 MHz or Fu + 10 MHz whichever is the lower /	–25 dBm	1 MHz	Specification in accordance with ITU-R SM.329–9, s4.1
Fc2 +19,2 MHz or Fu + 10 MHz whichever is the lower			
Fc2 + 19,2 MHz or Fu +10 MHz whichever is the lower /	–30 dBm	1 MHz	Bandwidth as in ITU-R SM.329–9, s4.1. Upper frequency as in ITU-R SM.329–9, s2.5 table 1
12,75 GHz			

(The requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.)

Key Path	Meas Setup, Range Preset
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CATegory:B
Example	SPUR:CAT:B
Dependencies/Couplings	This key is grayed out when the radio device is MS.
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Mobile (for TD-SCDMA only)

Sets the range parameters to meet the requirement of both the MS general and additional spurious emissions limits.

Spurious Emissions Measurement Meas Setup

General Spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36 dBm
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36 dBm
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36 dBm
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	1 MHz	-30 dBm

Additional Spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$925 \text{ MHz} \leq f \leq 935 \text{ MHz}$	100 KHz	-67 dBm*
$935 \text{ MHz} < f \leq 960 \text{ MHz}$	100 KHz	-79 dBm*
$1805 \text{ MHz} \leq f \leq 1880 \text{ MHz}$	100 KHz	-71 dBm*

* The measurements are made on frequencies which are integer multiples of 200 kHz.

(These requirements are only applicable for frequencies which are greater than 4 MHz away from the UE center carrier frequency.)

Key Path	Meas Setup, Range Preset
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CATegory:MOBile
Example	SPUR:CAT:MOB
Dependencies/Couplings	This key is grayed out when the radio device is BTS.
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Frequency Setup (for TD-SCDMA only)

Sets the required frequency parameters for the calculation of the start/stop frequency of the spurious emissions limits in TD-SCDMA mode.

The measurement does not restart when changing the values of the setup parameters. These parameters are used for calculating the range start and stop frequency in the measurement only. If you are going to perform a measurement with the newly-input values,, one of the soft key in the “Range Preset” menu should also be pressed afterwards.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Center Frequency of the First Carrier (Fc1) (for TD-SCDMA only) Sets the center frequency of emission of the first carrier transmitted by the base station. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category A” or “Category B” under the range preset menu pressed.

Key Path	Meas Setup, Freq Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CARRier:FREQuency:STARt <freq> [:SENSe] :SPURious:CARRier:FREQuency:STARt?
Example	SPUR:CARR:FREQ:STAR 2GHz SPUR:CARR:FREQ:STAR?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SELEct to set the mode.
Dependencies/Couplings	Coupled with Fc2 and Fl. The value of Fc1 is always not greater than the value of Fc2, and greater than the value of Fl. The following inequation for Fl, Fc1, Fc2 and Fu is satisfied: $Fl + 0.8\text{MHz} \leq Fc1 \leq Fc2 \leq Fu - 0.8\text{MHz}$; This key is grayed out when the radio device is MS.
Preset	2.0156 GHz
State Saved	Saved in instrument state.
Min	See Coupling
Max	See Coupling
Test MIN/MAX/DEF	No
Test UP/DOWN	1.0 MHz
Instrument S/W Revision	A.01.60 or later

Center Frequency of the Last Carrier (Fc2) (for TD-SCDMA only) Sets the center frequency of emission of the last carrier transmitted by the base station. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category A” or “Category B” under the range preset menu pressed.

Key Path	Meas Setup, Freq Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CARRier:FREQuency:STOP <freq> [:SENSe] :SPURious:CARRier:FREQuency:STOP?
Example	SPUR:CARR:FREQ:STOP 10GHz SPUR:CARR:FREQ:STOP?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SELEct to set the mode.

Spurious Emissions Measurement Meas Setup

Dependencies/Couplings	This key is grayed out when the radio device is MS. Coupled with Fc1 and Fu. The value of Fc2 is always not less than the value of Fc1, and less than the value of Fu. The following inequation for Fl, Fc1, Fc2 and Fu is satisfied: $F_l + 0.8\text{MHz} \leq F_{c1} \leq F_{c2} \leq F_u - 0.8\text{ MHz}$;
Preset	2.0236 GHz
State Saved	Saved in instrument state.
Min	See Coupling
Max	See Coupling
Test MIN/MAX/DEF	No
Test UP/DOWN	1.0 MHz
Instrument S/W Revision	A.01.60 or later

TDD Lower Frequency (Fl) (for TD-SCDMA only) Sets the lower frequency of the band in which TDD operates. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category B” under the range preset menu pressed.

Key Path	Meas Setup, Freq Setup
Mode	TD-SCDMA
Remote Command	[:SENSE] :SPURious:TDD:FREQuency:STARt <freq> [:SENSE] :SPURious:TDD:FREQuency:STARt?
Example	SPUR:TDD:FREQ:STAR 1GHz SPUR:TDD:FREQ:STAR?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	This key is grayed out when the radio device is MS. Coupled with Fc1. The value of Fl is always less than the value of Fc1. The following inequation for Fl, Fc1, Fc2 and Fu is satisfied: $F_l + 0.8\text{MHz} \leq F_{c1} \leq F_{c2} \leq F_u - 0.8\text{ MHz}$;
Preset	2.010 GHz
State Saved	Saved in instrument state.
Min	1.011 GHz
Max	See Coupling
Test MIN/MAX/DEF	No
Test UP/DOWN	1.0 MHz
Instrument S/W Revision	A.01.60 or later

TDD Upper Frequency (Fu) (for TD-SCDMA only) Sets the upper frequency of the band in which

TDD operates. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category B” under the range preset menu pressed.

Key Path	Meas Setup, Freq Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:TDD:FREQuency:STOP <freq> [:SENSe] :SPURious:TDD:FREQuency:STOP?
Example	SPUR:TDD:FREQ:STOP 1GHz SPUR:TDD:FREQ:STOP?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	This key is grayed out when the radio device is MS. Coupled with Fc2. The value of Fu is always greater than the value of Fc2. The following inequation for Fl, Fc1, Fc2 and Fu is satisfied: $F_l + 0.8\text{MHz} \leq F_{c1} \leq F_{c2} \leq F_u - 0.8\text{MHz}$;
Preset	2.025 GHz
State Saved	Saved in instrument state.
Min	See Coupling
Max	3.689 GHz
Test MIN/MAX/DEF	No
Test UP/DOWN	1.0 MHz
Instrument S/W Revision	A.01.60 or later

Center Frequency for Mobile (for TD-SCDMA only) Sets the center frequency of the mobile. This parameter is used for calculating the start/stop frequency of the range for mobile after the softkey “Mobile” under the range preset menu pressed.

Key Path	Meas Setup, Freq Setup
Mode	TD-SCDMA
Remote Command	[:SENSe] :SPURious:CARRier:FREQuency:MOBil <freq> [:SENSe] :SPURious:CARRier:FREQuency:MOBil?
Example	SPUR:CARR:FREQ:MOB 2GHz SPUR:CARR:FREQ:MOB?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.
Dependencies/Couplings	This key is grayed out when the radio device is BTS.
Preset	2.0204 GHz

Spurious Emissions Measurement Meas Setup

State Saved	Saved in instrument state.
Min	1.005 GHz
Max	3.695 GHz
Test MIN/MAX/DEF	No
Test UP/DOWN	1.0 MHz
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 965 in the section "Common Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page 977 in the section "Common Measurement Functions" for more information.

Peak Search

Performs a peak search and opens the Peak Search menu. The Peak Search functions allow you to define specific search criteria to determine which signals can be considered peaks, excluding unwanted signals from the search.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MAXimum
Example	CALC:SPUR:MARK2:MAX
Instrument S/W Revision	A.01.60 or later

Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the current marker value.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MAXimum:NEXT
Example	CALC:SPUR:MARK2:MAX:NEXT
Instrument S/W Revision	A.01.60 or later

Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker which meets all enabled peak criteria.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO

Spurious Emissions Measurement

Peak Search

Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MAXimum:RIGHt
Example	CALC:SPUR:MARK2:MAX:RIGH
Instrument S/W Revision	A.01.60 or later

Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker which meets all enabled peak criteria.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MAXimum:LEFT
Example	CALC:SPUR:MARK2:MAX:LEFT
Instrument S/W Revision	A.01.60 or later

Marker Delta

Performs the same function as the Delta 1-of-N selection key in the Marker menu. This sets the control mode for the selected marker to Delta mode. See the Marker section for the complete description of this function. The key is duplicated here in the Peak Search Menu to allow you to conveniently perform a peak search and change the control of the Marker mode to Delta without having to access two separate menus.

Key Path	Peak Search
Instrument S/W Revision	A.01.60 or later

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : PTPeak
Example	CALC:SPUR:MARK:PTP
Notes	Turns on the Marker Δ
Dependencies/Couplings	This key is not available (key is grayed out) when Coupled Markers is on.

Instrument S/W Revision

A.01.60 or later

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

Key Path	Peak Search
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO
Remote Command	:CALCulate:SPURious:MARKer [1] 2 3 4 5 6 7 8 9 10 11 12 : MINimum
Example	CALC:SPUR:MARK:MIN
Instrument S/W Revision	A.01.60 or later

Recall

See “[Recall](#)” on page 985 in the section "Common Measurement Functions" for more information.

Restart

See [“Restart” on page 1003](#) in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 1005 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 1027 in the section "Common Measurement Functions" for more information.

Source

See “[Source](#)” on page 1029 in the section "Common Measurement Functions" for more information.

Span X Scale

Span X Scale is unavailable in the Spurious Emissions measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Accesses the Sweep/Control menu keys used to set up and control the sweep time and source.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep Setup

Sets the sweep functions that control the sweep state and time.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states. Setting **Auto Sweep Time** to **Accy** will result in slower sweep times, usually about three times as long, but better amplitude accuracy for CW signals. The instrument amplitude accuracy specifications only apply when **Auto Sweep Time** is set to **Accy**.

Additional amplitude errors which occur when **Auto Sweep Time** is set to **Norm** are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, **Norm** is the preferred setting of **Auto Sweep Time**. **Auto Sweep Time** is set to **Norm** on a **Preset** or **Auto Couple**. This means that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

Key Path	Sweep/Control, Sweep Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO
Remote Command	<code>[[:SENSE]:SPURious:SWEep:TIME:AUTO:RULEs NORMal ACCuracy</code> <code>[[:SENSE]:SPURious:SWEep:TIME:AUTO:RULEs?</code>
Example	SPUR:SWE:TIME:AUTO:RUL ACC SPUR:SWE:TIME:AUTO:RUL?
Notes	In Zero Span, this key is irrelevant and inaccessible (because the whole Sweep Setup menu is grayed out), however, Sweep Setup settings can be changed remotely with no error indication. This command is implemented as “[:SENSE]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO:RULEs” to avoid illegal SCPI node definition. So, this command should be used as “[:SENSE]:SPURious:SWEep:TIME:AUTO:RULEs”.
Preset	NORMal
State Saved	Saved in instrument state.

Range	Norm Accy
Instrument S/W Revision	A.01.60 or later

Pause

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing the Resume resumes the measurement at the point it was at when paused.

See Pause/Resume in the "Measurement Setup Functions" section for more information.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Trace/Detector is unavailable in the Spurious Emissions measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trigger

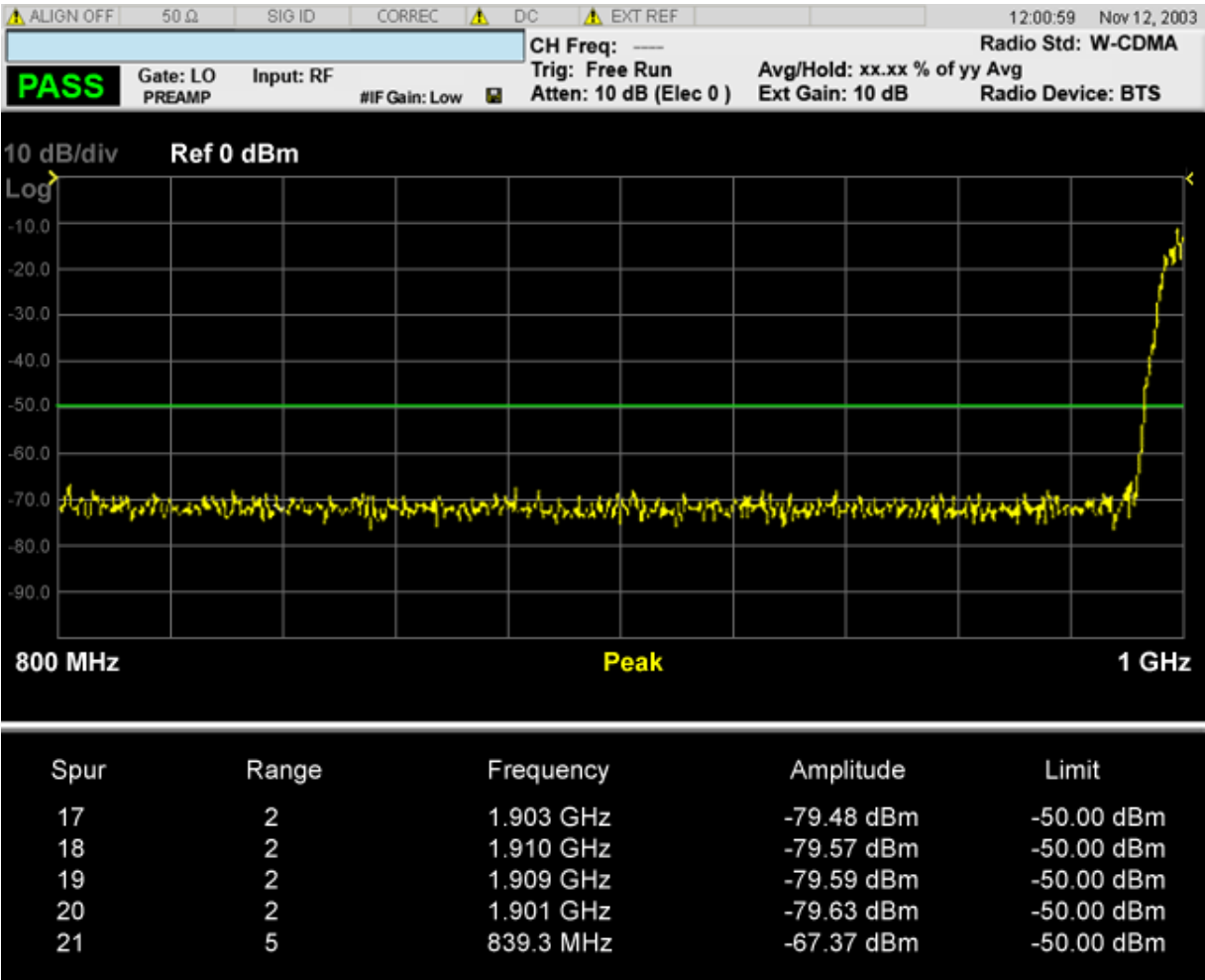
Accesses the Trigger menu which contains keys to control the 1-of-N selection of the Trigger source.

The trigger functions let you select the trigger settings for a sweep or measurement.

See [“Trigger” on page 1057](#) in the "Common Measurement Functions" section for more information.

View/Display

Standard Result Screen



Result	Units	Min	Max
Spur	N/A	0	200
Range	N/A	1	20
Frequency	Hz	Analyzer Min	Analyzer Max
Amplitude	dBm	-150	50
Limit	dBm	-150	50
Instrument S/W Revision	A.01.60 or later		

The spurs listed are within the current value of the Marker Peak Excursion setting of the absolute limit. All of the spurs listed passed. Any spur that has failed the absolute limit will have an 'F' beside it.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.

See [“Display” on page 1109](#) in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

The spectrum emission mask measures spurious signal levels in up to six pairs of offset frequencies and relates them to the carrier power.

This topic contains the following sections:

[“Measurement Commands for Spectrum Emission Mask” on page 765](#)

[“Remote Command Results for Spectrum Emission Mask Measurement” on page 765](#)

Measurement Commands for Spectrum Emission Mask

Offsets that are turned off (inactive) will return –999.0 when their results are queried over SCPI.

:CONFigure:SEMask

:CONFigure:SEMask:NDEFault

:INITiate:SEMask

:FETCh:SEMask [n] ?

:MEASure:SEMask [n] ?

:READ:SEMask [n] ?

For more measurement related commands, see the SENSE subsystem, and the section [“Remote Measurement Functions” on page 947](#).

Remote Command Results for Spectrum Emission Mask Measurement

Command

Return Value

FETCh:SEMask[n]?	N=1	In case the Meas Type is: Total Power Reference
MEASure:SEMask[n]?		Returns 82 comma-separated scalar results, in the following order:
READ:SEMask[n]?		1. Reserved for the future use, returns –999.0 2. Absolute power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns –999.0 4. Reserved for the future use, returns –999.0 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns –999.0 7. Reserved for the future use, returns –999.0 8. Reserved for the future use, returns –999.0 9. Reserved for the future use, returns –999.0 10. Reserved for the future use, returns –999.0 11. Relative integrated power on the negative offset A (dBc) 12. Absolute integrated power on the negative offset A (dBm) 13. Relative peak power on the negative offset A (dBc) 14. Absolute peak power on the negative offset A (dBm) 15. Peak power offset frequency from the center frequency in the negative offset A (Hz) 16. Relative integrated power on the positive offset A (dBc) 17. Absolute integrated power on the positive offset A (dBm) 18. Relative peak power on the positive offset A (dBc) 19. Absolute peak power on the positive offset A (dBm) 20. Peak power offset frequency from the center frequency in the positive offset A (Hz) 21. Relative integrated power on the negative offset B (dBc) ... 69. Absolute peak power on the positive offset F (dBm) 70. Peak power offset frequency from the center frequency in the positive offset F (Hz)

- N=1
- 71. Minimum margin from limit line on the negative offset A (dB)
 - 72. Minimum margin from limit line on the positive offset A (dB)
 - 73. Minimum margin from limit line on the negative offset B (dB)
 - 74. Minimum margin from limit line on the positive offset B (dB)
 - 75. Minimum margin from limit line on the negative offset C (dB)
 - 76. Minimum margin from limit line on the positive offset C (dB)
 - 77. Minimum margin from limit line on the negative offset D (dB)
 - 78. Minimum margin from limit line on the positive offset D (dB)
 - 79. Minimum margin from limit line on the negative offset E (dB)
 - 80. Minimum margin from limit line on the positive offset E (dB)
 - 81. Minimum margin from limit line on the negative offset F (dB)
 - 82. Minimum margin from limit line on the positive offset F (dB)

- N=1 In case the Meas Type is: Power Spectral Density Reference
- Returns 82 comma-separated scalar results, in the following order:
1. Reserved for the future use, returns –999.0
 2. Absolute power at the center frequency (reference) area (dBm)
 3. Reserved for the future use, returns –999.0
 4. Reserved for the future use, returns –999.0
 5. Peak frequency in the center frequency (reference) area (Hz)
 6. Reserved for the future use, returns –999.0
 7. Reserved for the future use, returns –999.0
 8. Reserved for the future use, returns –999.0
 9. Reserved for the future use, returns –999.0
 10. Reserved for the future use, returns –999.0
 11. Relative integrated power on the negative offset A (dB).
 12. Absolute integrated power on the negative offset A (dBm/Hz).
 13. Relative peak power on the negative offset A (dB)
 14. Absolute peak power on the negative offset A (dBm/Hz)
 15. Peak power offset frequency from the center frequency in the negative offset A (Hz)
 16. Relative integrated power on the positive offset A (dB).
 17. Absolute integrated power on the positive offset A (dBm/Hz).
 18. Relative peak power on the positive offset A (dB)
 19. Absolute peak power on the positive offset A (dBm/Hz)
 20. Peak power offset frequency from the center frequency in the positive offset A (Hz)
 21. Relative integrated power on the negative offset B (dB).
 - ...
 69. Absolute peak power on the positive offset F (dBm/Hz)
 70. Peak power offset frequency from the center frequency in the positive offset F (Hz)

- N=1
- 71. Minimum margin from limit line on the negative offset A (dB)
 - 72. Minimum margin from limit line on the positive offset A (dB)
 - 73. Minimum margin from limit line on the negative offset B (dB)
 - 74. Minimum margin from limit line on the positive offset B (dB)
 - 75. Minimum margin from limit line on the negative offset C (dB)
 - 76. Minimum margin from limit line on the positive offset C (dB)
 - 77. Minimum margin from limit line on the negative offset D (dB)
 - 78. Minimum margin from limit line on the positive offset D (dB)
 - 79. Minimum margin from limit line on the negative offset E (dB)
 - 80. Minimum margin from limit line on the positive offset E (dB)
 - 81. Minimum margin from limit line on the negative offset F (dB)
 - 82. Minimum margin from limit line on the positive offset F (dB)

N=1 In case the Meas Type is: Spectrum Peak Reference

Returns 82 comma-separated scalar results, in the following order:

1. Reserved for the future use, returns –999.0
2. Peak power at the center frequency (reference) area (dBm)
3. Reserved for the future use, returns –999.0
4. Reserved for the future use, returns –999.0
5. Peak frequency in the center frequency (reference) area (Hz)
6. Reserved for the future use, returns –999.0
7. Reserved for the future use, returns –999.0
8. Reserved for the future use, returns –999.0
9. Reserved for the future use, returns –999.0
10. Reserved for the future use, returns –999.0
11. Reserved for the future use, returns –999.0
12. Reserved for the future use, returns –999.0
13. Relative peak power on the negative offset A (dB)
14. Absolute peak power on the negative offset A (dBm)
15. Peak power offset frequency from the center frequency in the negative offset A (Hz)
16. Reserved for the future use, returns –999.0
17. Reserved for the future use, returns –999.0
18. Relative peak power on the positive offset A (dB)
19. Absolute peak power on the positive offset A (dBm)
20. Peak power offset frequency from the center frequency in the positive offset A (Hz)
21. Reserved for the future use, returns –999.0
- ...
69. Absolute peak power on the positive offset F (dBm)
70. Peak power offset frequency from the center frequency in the positive offset F (Hz)

- N=1 71. Minimum margin from limit line on the negative offset A (dB)
 72. Minimum margin from limit line on the positive offset A (dB)
 73. Minimum margin from limit line on the negative offset B (dB)
 74. Minimum margin from limit line on the positive offset B (dB)
 75. Minimum margin from limit line on the negative offset C (dB)
 76. Minimum margin from limit line on the positive offset C (dB)
 77. Minimum margin from limit line on the negative offset D (dB)
 78. Minimum margin from limit line on the positive offset D (dB)
 79. Minimum margin from limit line on the negative offset E (dB)
 80. Minimum margin from limit line on the positive offset E (dB)
 81. Minimum margin from limit line on the negative offset F (dB)
 82. Minimum margin from limit line on the positive offset F (dB)
- N=2 Returns the displayed frequency domain spectrum trace data separated by comma. The number of data is 2001.
- N=3 Returns the displayed frequency domain absolute limit trace data separated by comma. The number of data is determined 2001.
- N=4 Returns the displayed frequency domain relative limit trace data separated by comma. The number of data is 2001.
- N=5 In case the Meas Type is: Total Power Reference
 Returns 14 comma-separated scalar values (in dBm) of the absolute integrated power of the segment frequencies:
 1. Total power reference (dBm)
 2. Reserved for the future use, returns –999.0
 3. Absolute integrated power at negative offset frequency (A)
 4. Absolute integrated power at positive offset frequency (A)
 ...
 13. Absolute integrated power at negative offset frequency (F)
 14. Absolute integrated power at positive offset frequency (F)

- N=5 In case the Meas Type is: Power Spectral Density Reference
- Returns 14 comma-separated scalar values (in dBm/Hz) of the absolute integrated power of the segment frequencies. Returns –999.0 for the offsets if in WLAN:
1. Power spectral density reference (dBm/Hz)
 2. Reserved for the future use, returns –999.0
 3. Absolute integrated power at negative offset frequency (A)
 4. Absolute integrated power at positive offset frequency (A)
 - ...
 13. Absolute integrated power at negative offset frequency (F)
 14. Absolute integrated power at positive offset frequency (F)
- N=5 In case the Meas Type is: Spectrum Peak Reference
- Returns 14 comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies.
1. Spectrum Peak Power reference (dBm)
 2. Reserved for the future use, returns –999.0
 3. Absolute peak power at negative offset frequency (A)
 4. Absolute peak power at positive offset frequency (A)
 - ...
 13. Absolute peak power at negative offset frequency (F)
 14. Absolute peak power at positive offset frequency (F)
- N=6 In case the Meas Type is: Total Power Reference
- Returns 14 comma-separated scalar values (in dBc) of the integrated power relative to the carrier at the segment frequencies:
1. Reserved for the future use, returns –999.0
 2. Reserved for the future use, returns –999.0
 3. Relative integrated power at negative offset frequency (A)
 4. Relative integrated power at positive offset frequency (A)
 - ...
 13. Relative integrated power at negative offset frequency (F)
 14. Relative integrated power at positive offset frequency (F)

- N=6 In case the Meas Type is: Power Spectral Density Reference
- Returns 14 comma-separated scalar values (in dBc/Hz) of the integrated power relative to the carrier at the segment frequencies. Returns –999.0 for the offsets if in WLAN:
1. Reserved for the future use, returns –999.0
 2. Reserved for the future use, returns –999.0
 3. Relative integrated power at negative offset frequency (A)
 4. Relative integrated power at positive offset frequency (A)
 - ...
 13. Relative integrated power at negative offset frequency (F)
 14. Relative integrated power at positive offset frequency (F)
- N=6 In case the Meas Type is: Spectrum Peak Reference
- Returns 14 comma-separated scalar values (in dB) of the integrated power relative to the carrier at the segment frequencies.
1. Reserved for the future use, returns –999.0
 2. Reserved for the future use, returns –999.0
 3. Relative peak power at negative offset frequency (A)
 4. Relative peak power at positive offset frequency (A)
 - ...
 13. Relative peak power at negative offset frequency (F)
 14. Relative peak power at positive offset frequency (F)
- N=7 Returns 14 comma-separated pass/fail test results (0=passed, or 1=failed) determined by testing the minimum margin point from the limit line that is determined each offset's Limits setting.
1. Reserved for the future use, returns –999.0
 2. Reserved for the future use, returns –999.0
 3. At negative offset frequency (A)
 4. At positive offset frequency (A)
 - ...
 13. At negative offset frequency (F)
 14. At positive offset frequency (F)

N=8 Returns 14 comma-separated pass/fail test results (0=passed, or 1=failed) determined by testing the minimum margin point from the limit line that is determined each offset's Limits setting.

Note: This results (N=8) are the same as N=7 result.

1. Reserved for the future use, returns –999.0
2. Reserved for the future use, returns –999.0
3. At negative offset frequency (A)
4. At positive offset frequency (A)

...

13. At negative offset frequency (F)
14. At positive offset frequency (F)

N=9 Returns 14 comma-separated scalar values of frequency (in Hz) that have peak power in each offset:

1. Reserved for the future use, returns –999.0
2. Reserved for the future use, returns –999.0
3. Negative offset frequency (A)
4. Positive offset frequency (A)

...

13. Negative offset frequency (F)
14. Positive offset frequency (F)

N=10 Returns 14 comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies:

1. Reserved for the future use, returns –999.0
2. Reserved for the future use, returns –999.0
3. At negative offset frequency (A)
4. At positive offset frequency (A)

...

13. At negative offset frequency (F)
14. At positive offset frequency (F)

- N=11 Returns 14 comma-separated scalar values in dBc (dB if MeasType = PSD) of the peak power relative to the carrier at the segment frequencies:
1. Reserved for the future use, returns –999.0
 2. Reserved for the future use, returns –999.0
 3. At negative offset frequency (A)
 4. At positive offset frequency (A)
 - ...
 13. At negative offset frequency (F)
 14. At positive offset frequency (F)
- N=12 Returns the band power result (the peak power of the signal in the ref channel) when Meas Type is Spectrum Peak reference. Otherwise, the value returned will be –999.0

Key Path

Meas

Instrument S/W Revision

A.01.60 or later

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent except all Attenuation values and Internal Preamp selections that are measurement global.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Ref Value

Sets the value for the absolute power reference. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVe l <real> :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVe l?
Example	DISP:SEM:VIEW:WIND:TRAC:Y:RLEV 100 DISP:SEM:VIEW:WIND:TRAC:Y:RLEV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changed to Off.
Preset	All except CDMA1xEVDO: 10.0 dBm CDMA1xEVDO: -10.0dBm
State Saved	Saved in instrument state.
Min	-250 dBm
Max	250 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	10.0 dB
Instrument S/W Revision	A.01.60 or later

Attenuation

Accesses a menu of functions that enable you to change attenuation settings. This key has read-back text that describes the total attenuator value.

See AMPTD Y Scale, “Attenuation” on page 867 in the “Analyzer Setup Functions” section for more information.

Key Path	AMPTD Y Scale, Attenuation
Instrument S/W Revision	A.01.60 or later

Scale/Div

Sets the units-per-division of the vertical scale in the logarithmic display. When Auto Scaling is On, the scale per division value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIVi sion <rel_ampl> :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIVi sion?
Example	DISP:SEM:VIEW:WIND:TRAC:Y:PDIV 15dB DISP:SEM:VIEW:WIND:TRAC:Y:PDIV?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1, 2, 5, 10...
Instrument S/W Revision	A.01.60 or later

Presel Center

See AMPTD Y Scale, “[Presel Center](#)” on page 878 in the “Common Measurement Functions” section for more information.

Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 880 in the “Common Measurement Functions” section for more information.

Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See “[Internal Preamp](#)” on page 881 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

Ref Position

Positions the reference level at the top, center or bottom of the Y scale display. Changing the reference position does not affect the reference level value.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSi tion TOP CENTer BOTTom :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSi tion?
Example	DISP:SEM:VIEW:WIND:TRAC:Y:RPOS BOTT DISP:SEM:VIEW:WIND:TRAC:Y:RPOS?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use INSTRument:SElect to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	A.01.60 or later

Auto Scaling

Toggles the Auto Scaling function between On and Off.

When Auto Scaling is On and the Restart front-panel key is pressed, the analyzer automatically determines the scale per division and reference values based on the measurement results. When you set a

value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.

Key Path	AMPTD Y Scale
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPl e 0 1 ON OFF :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPl e?
Example	DISP:SEM:VIEW:WIND:TRAC:Y:COUP OFF DISP:SEM:VIEW:WIND:TRAC:Y:COUP?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

Auto Couple

See “[AUTO COUPLE](#)” on page 885 in the section "Common Measurement Functions" for more information.

BW

This key is unavailable for this measurement. The BW key will display a blank key menu when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Cont

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 889 in the section "Common Measurement Functions" for more information.

FREQ Channel

See “[FREQ Channel](#)” on page 891 in the section "Common Measurement Functions" for more information.

Input/Output

See “[Input/Output](#)” on page 897 in the section "Common Measurement Functions" for more information.

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. If there are no active markers, **Marker** selects marker 1, sets it to Normal and places it at the center of the display. You can turn on and control up to 12 markers.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Select Marker

Displays 12 markers available for selection.

Key Path	Marker
Instrument S/W Revision	A.01.60 or later

Marker Type

Sets the marker control mode to Normal and Off. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the **Marker Trace** rules. At the same time, **Marker X Axis Value** appears on the Active Function area. The marker X axis value entered in the active function area will display the marker value to its full entered precision. If the current control mode for the measurement is Off, there is no active function and the active function is turned off.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MODE POSITION OFF :CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12 :MODE?
Example	CALC:SEM:MARK:MODE POS CALC:SEM:MARK:MODE?
Notes	If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. Note that if the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.
Preset	OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF

State Saved	Saved in instrument state.
Range	Normal Off
Instrument S/W Revision	A.01.60 or later

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is **Normal**.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X <freq> :CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X?
Example	CALC:SEM:MARK3:X 1.0 GHz CALC:SEM:MARK3:X?
Notes	If no suffix is sent it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error “Invalid suffix” will be generated. The query returns the marker’s absolute X Axis value if the control mode is Normal. The query is returned in the fundamental units for the current marker X Axis scale. If the marker is Off the response is not a number. When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on instrument condition, although the Preset/Default is defined as 1.5 GHz.
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	–9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Instrument S/W Revision	A.01.60 or later

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal**, except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting

the value of the marker.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X:POSition <real> :CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X:POSition?
Example	CALC:SEM:MARK10:X:POS 1001 CALC:SEM:MARK10:X:POS?
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number. When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on the instrument condition although the Preset/Default is defined as 6507 (this value might be the expected value when all the offsets are on).
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Test MIN/MAX/DEF	No
Test UP/DOWN	No
Instrument S/W Revision	A.01.60 or later

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:Y?
Example	CALC:SEM:MARK11:Y 10 dBm CALC:SEM:MARK11:Y?
Notes	Since the result value is always calculated from acquisition data, the default value is arbitrary, although the Preset/Default values is defined.
Preset	Result dependent on markers setup and signal source
State Saved	No

Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not **Off**. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:SEMask:MARKer:COUPle[:STATe]?
Example	CALC:SEM:MARK:COUP ON CALC:SEM:MARK:COUP?
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

All Markers Off

Turns all active markers off in all views.

Key Path	Marker
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CALCulate:SEMask:MARKer:AOff
Example	CALC:SEM:MARK:AOff
Instrument S/W Revision	A.01.60 or later

Marker Function

There are no 'Marker Functions' supported in Spectrum Emission Mask so this front-panel key will display a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

There is no ‘Marker To’ functionality supported in Spectrum Emission Mask so this front-panel key will display a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Meas

See “[Meas](#)” on page 947 in the section "Common Measurement Functions" for more information.

Meas Setup

Displays the setup menu for the currently selected measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Avg/Hold Num

Toggles averaging On or Off in addition to enabling you to set the number of measurement averages used to calculate the measurement result. The average will be displayed at the end of each sweep. After the specified number of average counts, the average mode (termination control) setting determines the average action.

In the remote mode, use the Average State command to turn averaging on or off.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<code>[:SENSe] :SEMask :AVERage :COUNT <integer></code> <code>[:SENSe] :SEMask :AVERage :COUNT?</code> <code>[:SENSe] :SEMask :AVERage [:STATe] ON OFF 1 0</code> <code>[:SENSe] :SEMask :AVERage [:STATe] ?</code>
Example	SEM:AVER:COUN 100 SEM:AVER:COUN? SEM:AVER ON SEM:AVER?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Yes
Instrument S/W Revision	A.01.60 or later

Meas Type

Accesses a menu that enables you to select one of the following measurement reference types:

Total Pwr Ref – Sets the reference to the total carrier power and the measured data is shown in dBc and dBm.

PSD Ref – Sets the reference to the mean power spectral density of the carrier and the measured data is shown in dB and dBm/Hz.

Spectrum Peak Ref – Sets the reference to the spectrum peak power of the carrier and the measured data is shown in dB and dBm.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:TYPE PSDRef TPreRef SPRef [:SENSe] :SEMask:TYPE ?
Example	SEM:TYPE PSDR SEM:TYPE?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA, WCDMA, C2K, TD-SCDMA, 1xEVDO: TPreRef WIMAX OFDMA: SPRef
State Saved	Saved in instrument state.
Range	Total Pwr Ref PSD Ref Spectrum Peak Ref
Instrument S/W Revision	A.01.60 or later

Ref Channel

Accesses a menu that enables you to set up the measurement parameters used to calculate the power in the reference channel.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Integ BW

Specifies the integration bandwidth used to calculate the power in the reference channel.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Spectrum Emission Mask Measurement Meas Setup

Remote Command	<code>[:SENSe] :SEMask:BANDwidth[1] 2:INTEgration <bandwidth></code> <code>[:SENSe] :SEMask:BANDwidth[1] 2:INTEgration?</code>
Example	SEM:BAND:INT 10 MHz SEM:BAND:INT?
Notes	10% . 100% of Channel Span Parameter Value Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode or cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Cannot be higher than the channel Span. If lower than 1/10 of channel Span, then the channel Span is reduced to be 10 times the Integ BW.
Preset	SA: 3.84 MHz WCDMA: 3.84 MHz 3.84 MHz C2K: 1.23 MHz 1.23 MHz WIMAX OFDMA: 10 MHz 10 MHz TD-SCDMA: 1.28 MHz 1.28 MHz 1xEVDO: 1.23MHz
State Saved	Saved in instrument state.
Min	100.0 kHz
Max	50 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,1.5,2,3,5,7.5,10...sequence
Instrument S/W Revision	A.01.60 or later

Span

Specifies the span used to calculate the power in the reference channel.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<code>[:SENSe] :SEMask:FREQuency[1] 2:SPAN <freq></code> <code>[:SENSe] :SEMask:FREQuency[1] 2:SPAN?</code>
Example	SEM:FREQ:SPAN 3MHz SEM:FREQ:SPAN?

Notes	Frequency sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Range 1 kHz to 50 MHz (although restricted by Integ BW). If you set the channel Span lower than channel Integ BW, they will both track each other. As you increase the channel Span, the Integ BW will also increase if it is less than 1/10 of the channel Span.
Preset	SA: 5.0 MHz WCDMA: 5.0 MHz 5.0 MHz C2K: 1.25 MHz 1.25 MHz WIMAX OFDMA: 10 MHz 10 MHz TD-SCDMA: 1.6 MHz 1.6 MHz 1xEVDO: 1.25MHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	50 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,1.5,2,3,5,7.5,10...sequence
Instrument S/W Revision	A.01.60 or later

Sweep Time

Sets the sweep time used to calculate the power in the reference channel. Sweep Time can be set manually or put in auto mode.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:SWEep [1] 2:TIME <time> [:SENSe] :SEMask:SWEep [1] 2:TIME? [:SENSe] :SEMask:SWEep [1] 2:TIME:AUTO OFF 0 ON 1 [:SENSe] :SEMask:SWEep [1] 2:TIME:AUTO?
Example	SEM:SWE:TIME 9ms SEM:SWE:TIME? SEM:SWE:TIME:AUTO OFF SEM:SWE:TIME:AUTO?

Spectrum Emission Mask Measurement Meas Setup

Notes	Sweep Time sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When the Sweep Time is set manually, Auto is set to OFF. Value is coupled with Channel Detector selection, Channel Resolution BW, Channel Video BW if the state is Auto. When set to Auto, the Sweep Time is automatically calculated
Preset	Automatically calculated ON
State Saved	Saved in instrument state.
Min	1 ms
Max	10 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,1.5,2,3,5,7.5,10...sequence
Instrument S/W Revision	A.01.60 or later

Res BW

Sets the resolution bandwidth used to calculate the power in the reference channel. The Channel Resolution BW can be set manually or put in to auto mode.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:BANDwidth [1] 2 [:RESolution] <bandwidth> [:SENSe] :SEMask:BANDwidth [1] 2 [:RESolution] ? [:SENSe] :SEMask:BANDwidth [1] 2 [:RESolution] :AUTO OFF ON 1 0 [:SENSe] :SEMask:BANDwidth [1] 2 [:RESolution] :AUTO?</pre>
Example	<pre>SEM:BAND 100 kHz SEM:BAND? SEM:BAND:AUTO ON SEM:BAND:AUTO?</pre>
Notes	Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.

Dependencies/Couplings	When Res BW is set manually, Channel Resolution BW Mode is set to MANual. Value is coupled with Channel Detector selection, Channel Sweep Time, Channel Video BW. When set to Auto, the resolution bandwidth is automatically calculated.
Preset	SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 100 kHz TD-SCDMA: 30 kHz 1xEVDO: 30.0KHz OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,3,10 sequence
Instrument S/W Revision	A.01.60 or later

Video BW

Sets the video bandwidth used to calculate the power in the reference channel. The Channel Video BW can be set manually or put in to auto mode.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:BANDwidth[1] 2:VIDeo <bandwidth> [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo? [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:AUTO OFF ON 1 0 [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:AUTO?</pre>
Example	<pre>SEM:BAND:VID 100 kHz SEM:BAND:VID? SEM:BAND:VID:AUTO ON SEM:BAND:VID:AUTO?</pre>

Spectrum Emission Mask Measurement Meas Setup

Notes	Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	When Video BW is set manually, Channel Video BW Mode is set to MANual Value is coupled with Channel Detector selection, Channel Sweep Time, Channel Resolution BW. When set to Auto, the video bandwidth is automatically calculated.
Preset	SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 30 kHz TD-SCDMA: 300 kHz 1xEVDO: 300.0kHz ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,3,10 sequence
Instrument S/W Revision	A.01.60 or later

VBW/RBW

Sets the Video BW/Resolution BW Ratio to calculate the Channel Resolution BW and Channel Video BW. The VBW/RBW Ratio can be set manually or put in to auto mode.

Key Path	Meas Setup, Ref Chan
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA mode, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:RATio <real> [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:RATio [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:RATio:AUTO OFF ON 1 0 [:SENSe] :SEMask:BANDwidth[1] 2:VIDeo:RATio:AUTO?</pre>

Example	SEM:BAND:VID:RAT 0.1 SEM:BAND:VID:RAT? SEM:BAND:VID:RAT:AUTO ON SEM:BAND:VID:RATIO:AUTO?
Notes	Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	When Res BW is set manually, Mode coupling is set to MANual When set to Auto, the VBW/RBW Ratio is automatically calculated.
Preset	SA, WCDMA, C2K: 1.0 WIMAX OFDMA: 0.3 TD-SCDMA: 10 1xEVDO: 10.0 OFF
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	1,3,10 sequence
Instrument S/W Revision	A.01.60 or later

Power Ref

Sets the power reference in the carrier that will be used to compute the relative values for the offsets.

Key Path	Meas Setup Ref Chan
Instrument S/W Revision	A.01.60 or later

Total Pwr Ref

Sets the power in the carrier (ref channel) that will be used to compute the relative power values for the offsets. When the state is set to auto, this value is set to the measured carrier reference power. When set to manual, the result takes on the last measured value, or can be manually entered.

Key Path	Meas Setup, Ref Chan, Power Ref
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Spectrum Emission Mask Measurement Meas Setup

Remote Command	<pre>[:SENSe] :SEMask:CARRier[:POWer] <real> [:SENSe] :SEMask:CARRier[:POWer] ? [:SENSe] :SEMask:CARRier:AUTO[:STATe] OFF ON 1 0 [:SENSe] :SEMask:CARRier:AUTO[:STATe] ?</pre>
Example	<pre>SEM:CARR 100dBm SEM:CARR? SEM:CARR:AUTO OFF SEM:CARR:AUTO?</pre>
Notes	The min and max values given are for Meas Type = Total Pwr Ref. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode. This BAF SCPI command is available in all the Meas Type case.
Dependencies/Couplings	This "Total Power Ref" parameter is coupled with the "Meas Type" parameter. The softkey would be active if the Meas Type is set to Total Power Ref. Otherwise, grayout.
Preset	Measured carrier reference power
State Saved	Saved in instrument state.
Min	-200 dBm
Max	200 dBm
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

PSD Ref

Sets the power spectral density in the carrier that is used to compute the relative power spectral density values for the offsets when Meas Type is set to PSD Ref. When the state is set to auto, this will be set to the measured carrier power spectral density.

Key Path	Meas Setup, Ref Chan, Power Ref
Mode	SA, WCDMA, C2K , WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:CARRier:CPSD <real> [:SENSe] :SEMask:CARRier:CPSD?</pre>
Example	<pre>SEM:CARR:CPSD -80 SEM:CARR:CPSD?</pre>

Notes	Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	See Couplings This "PSD Ref" parameter is coupled with the "Meas Type" parameter. The softkey will be active if the Meas Type is set to PSD Ref. Otherwise, grayout.
Preset	Measured carrier PSD reference power
State Saved	Saved in instrument state.
Min	–200
Max	200
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Spectrum Peak Ref

Sets the spectrum peak power in the carrier that is used to compute the relative power spectral density values for the offsets when Meas Type is set to Spectrum Peak Ref. When the state is set to auto, this will be set to the measured carrier spectrum peak power. When set to manual, the result takes on the last measured value, or can be manually entered

Key Path	Meas Setup, Ref Chan, Power Ref
Mode	SA, WCDMA, C2K , WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:CARRier:PEAK[:POWER] <real> [:SENSe] :SEMask:CARRier:PEAK[:POWER] ?</pre>
Example	<pre>SEM:CARR:PEAK –80 SEM:CARR:PEAK:POWER?</pre>
Notes	Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	See Couplings This "Spectrum Peak Ref" parameter is coupled with the "Meas Type" parameter. This softkey would be active if the "Meas Type" is set to "Spectrum Peak Ref". Otherwise, grayout.

Spectrum Emission Mask Measurement

Meas Setup

Preset	Measured carrier Spectrum Peak reference power
State Saved	Saved in instrument state.
Min	–200
Max	200
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Offsets/Limits

Accesses a menu that enables you to set up the measurement parameters for the offset pairs. For example, you can assign the start and stop frequencies, select the resolution bandwidth, and set the sweep time.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Offset

Selects the offset pairs (upper and lower) that affect the menu keys, and displays the memory selection menu from A to F. The memory selection menu allows you to store up to 5 sets of parameter values for the offset pairs, such as Start Freq, Stop Freq, Sweep Time, Res BW, Meas BW, Abs Start, and Abs Stop. Press Offset until the letter of the desired offset (A, B, C, D, E, or F) is underlined. Only one selection at a time is shown on this menu key label.

Key Path	Meas Setup, Offsets/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Preset	A
Range	A B C D E F
Instrument S/W Revision	A.01.60 or later

Start Freq

Specifies the start frequency for the currently selected offset and enables you to toggle this function On or Off for each offset.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Remote Command	<pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:FREQuency:STARt <freq>,<freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :SEMask:OFFSet [1] 2:LIST:FREQuency:STARt? [:SENSe] :SEMask:OFFSet [1] 2:LIST:STATe ON OFF 1 0,ON OFF 1 0,ON OFF 1 0,ON OFF 1 0,ON OFF 1 0, ON OFF 1 0 [:SENSe] :SEMask:OFFSet [1] 2:LIST:STATe?</pre>
Example	<pre>SEM:OFFS2:LIST:FREQ:STAR 100 kHz SEM:OFFS2:LIST:FREQ:STAR? SEM:OFFS:LIST:STAT ON SEM:OFFS:LIST:STAT?</pre>
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Coupled to Stop Freq. Start cannot go above the stop freq less 100Hz. Similarly Stop freq cannot go below Start Freq plus 100Hz.

Spectrum Emission Mask Measurement Meas Setup

Preset	SA: 2.515 MHz, 2.715 MHz, 3.515 MHz, 4.00 MHz, 8.00 MHz, 12.50 MHz WCDMA: 2.515 MHz, 2.715 MHz, 3.515 MHz, 4.000 MHz, 8.000 MHz, 12.50 MHz 2.515MHz, 4.000 MHz, 7.500 MHz, 8.500 MHz, 12.5 MHz, 15 MHz C2K: 765.0 kHz, 795.0 kHz, 1.995 MHz, 3.2531 MHz, 7.500 MHz, 7.5 MHz 900.0 kHz, 1.995 MHz, 2.2531 MHz, 8.500 MHz, 12.50 MHz, 12.5 MHz WIMAX OFDMA: 4.75MHz,5.45MHz,9.75MHz,14.75MHz,19.75MHz,24.75MHz 4.75MHz,5.45MHz,9.75MHz,14.75MHz,19.75MHz,24.75MHz TD-SCDMA: 815kHz,1015kHz,1815kHz,2.3MHz, ,2.3MHz,,2.3MHz 815kHz,1815kHz,2.9MHz, 2.9MHz,2.9MHz,2.9MHz 1xEVDO: 765.0kHz, 795.0kHz, 1.995MHz, 3.253125MHz, 7.5MHz, 7.5MHz 900.0kHz, 1.995MHz, 1.995MHz , 1.995MHz, 1.995MHz, 1.995MHz, 1.995MHz SA: ON, ON, ON, ON, ON, OFF WCDMA: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, OFF, OFF C2K: ON, ON, ON, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF WIMAX OFDMA: ON, ON, ON, OFF, OFF, OFF ON, ON, ON, OFF, OFF, OFF TD-SCDMA: ON, ON, ON, ON, OFF, OFF ON, ON, ON, OFF, OFF, OFF 1xEVDO: ON, ON, ON, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF
State Saved	Saved in instrument state.
Min	0 Hz
Max	Stop Freq minus (-) 100 Hz (for that offset)
Test UP/DOWN	Not supported in Zorro-1. 100 kHz
Instrument S/W Revision	A.01.60 or later

Stop Freq

Specifies the stop frequency for the currently selected offset.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA
Remote Command	[:SENSE] :SEMask:OFFSet [1] 2:LIST:FREQuency:STOP <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSE] :SEMask:OFFSet [1] 2:LIST:FREQuency:STOP?

Example	SEM:OFFS:LIST:FREQ:STOP 100 kHz SEM:OFFS:LIST:FREQ:STOP?
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Coupled to Start Freq. Start cannot go above the stop freq less 100Hz. Similarly Stop freq cannot go below Start Freq plus 100Hz.
Preset	SA: 2.715 MHz, 3.515 MHz, 4.00 MHz, 8.00 MHz, 12.50 MHz, 15.0 MHz WCDMA:2.715 MHz, 3.515 MHz, 4.000 MHz, 8.000 MHz, 12.50 MHz, 15.0 MHz 3.485 MHz, 7.500 MHz, 8.500 MHz, 12.00 MHz, 15.00 MHz, 18.0 MHz C2K: 795.0 kHz, 1.995 MHz, 4.015 MHz, 4.0031 MHz, 12.50 MHz, 12.5 MHz 1.995 MHz, 4.015 MHz, 4.0031 MHz, 12.00 MHz, 15.00 MHz, 15.0 MHz WIMAX OFDMA: 5.45MHz,9.75MHz,14.75MHz,19.75MHz,24.75MHz,29.75MHz 5.45MHz,9.75MHz,14.75MHz,19.75MHz,24.75MHz,29.75MHz TD-SCDMA: 1015kHz,1815kHz,2.3MHz,4MHz, 4MHz,4MHz 1785kHz,2385kHz,3.5MHz, 3.5MHz ,3.5MHz ,3.5MHz 1xEVDO: 795.0kHz, 1.995MHz, 4.015MHz, 4.003125MHz, 12.5MHz, 12.5MHz 1.995MHz, 4.015MHz, 4.015MHz, 4.015MHz, 4.015MHz, 4.015MHz
State Saved	Saved in instrument state.
Min	Start Freq plus (+) 100 Hz (for that offset)
Max	500 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 100 kHz
Instrument S/W Revision	A.01.60 or later

Sweep Time

Specifies the sweep time for the currently selected offset and enables you to toggle this function On or Off for each offset.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Spectrum Emission Mask Measurement Meas Setup

Remote Command	<pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:SWEep:TIME <time>, <time>, <time>, <time>, <time>, <time> [:SENSe] :SEMask:OFFSet [1] 2:LIST:SWEep:TIME? [:SENSe] :SEMask:OFFSet [1] 2:LIST:SWEep:TIME:AUTO ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0 [:SENSe] :SEMask:OFFSet [1] 2:LIST:SWEep:TIME:AUTO?</pre>
Example	<pre>SEM:OFFS2:LIST:SWE:TIME 1.0 ms, 3.4 ms, 2.08 ms, 1.0 ms, 1.0 ms, 1.0 ms SEM:OFFS2:LIST:SWE:TIME? SEM:OFFS2:LIST:SWE:TIME:AUTO ON, ON, ON, ON, OFF, OFF SEM:OFFS2:LIST:SWE:TIME:AUTO?</pre>
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	When the sweep time is set manually, Mode coupling is set to MANual
Preset	Automatically calculated ON,ON,ON,ON,ON,ON
State Saved	Saved in instrument state.
Min	1 ms
Max	10 s
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 1,1.5,2,3,5,7.5,10...sequence
Instrument S/W Revision	A.01.60 or later

Offset Side

Specifies which offset side to measure.

You can turn off (not use) specific offsets with [:SENSe]:SEMask:OFFSet[n]:LIST:STATe.

BOTH - both of the negative (lower) and positive (upper) sidebands

NEGative - negative (lower) sideband only

POSitive - positive (upper) sideband only

Key Path **Meas Setup, Offset/Limits**

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:SIDE BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive</pre> <pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:SIDE?</pre>
Example	<pre>SEM:OFFS:LIST:SIDE BOTH SEM:OFFS:LIST:SIDE?</pre>
Notes	OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	BOTH, BOTH, BOTH, BOTH, BOTH, BOTH BOTH, BOTH, BOTH, BOTH, BOTH, BOTH
State Saved	Saved in instrument state.
Range	Neg Both Pos
Instrument S/W Revision	A.01.60 or later

Res BW

Specifies which Resolution BW filter to use when measuring the currently selected offset.

Offset Res BW Mode allows the instrument to determine the optimum Resolution BW filter to use when measuring the currently selected offset.. When changing the Meas BW parameter, if the Res BW needs to be changed to adhere to the rule

$$(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset}),$$

where N is the multiplier, this setting will automatically be changed to manual.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO mode
Remote Command	<pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth[:RESolution] <bandwidth>,<bandwidth>,<bandwidth>,<bandwidth>,<bandwidth>,<bandwidth>,<bandwidth></pre> <pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth[:RESolution] ?</pre> <pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth[:RESolution] :AUTO OFF ON 1 0,OFF ON 1 0,OFF ON 1 0,OFF ON 1 0,OFF ON 1 0,OFF ON 1 0,OFF ON 1 0</pre> <pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth[:RESolution] :AUTO?</pre>

Spectrum Emission Mask Measurement Meas Setup

Example	SEM:OFFS2:LIST:BAND 30.0 kHz, 30.0 kHz, 30.0 kHz, 1.00 MHz,1.00 MHz, 1.00 MHz SEM:OFFS2:LIST:BAND? SEM:OFFS:LIST:BAND:AUTO 1,1,1,1,1,1 SEM:OFFS:LIST:BAND:AUTO?
Notes	Comma separated list of 6 values. Sub op code OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Coupled to Start and Stop offset and Meas BW multiplier. This parameter must adhere to the rule $(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset})$, where N is the multiplier. If the multiplier is changed, the Res BW will be changed to ensure this. When set manually, Res BW Coupling is set to manual.
Preset	SA: 30.0 kHz, 30.0 kHz, 30.0 kHz, 1.00 MHz,1.00 MHz, 1.00 MHz WCDMA: 30.00 kHz, 30.00 kHz, 30.00 kHz, 100.00 kHz, 1.000 MHz, 1.00 MHz 30.00 kHz, 1.000 MHz, 1.000 MHz, 1.000 MHz, 1.000 MHz, 1.00 MHz C2K: 3.00 kHz, 30.00 kHz, 30.00 kHz, 6.2 kHz, 1.000 MHz, 1.00 MHz 30.00 kHz, 30.00 kHz, 6.2 kHz, 1.000 MHz, 1.000 MHz, 1.00 MHz WIMAX OFDMA: 100 KHz, 100 KHz, 100 KHz, 100 KHz, 100 KHz, 100 KHz 100 KHz, 100 KHz, 100 KHz, 100 KHz, 100 KHz, 100 KHz TD-SCDMA: 30 kHz, 30 kHz, 30 kHz, 50 kHz, 1 MHz, 1 MHz 30 kHz, 30 kHz, 50 kHz, 1 MHz, 1 MHz, 1 MHz 1xEVDO: 30.00 kHz, 30.00 kHz, 30.00 kHz, 6.2 kHz, 1.000 MHz, 1.000 MHz 30.00 kHz, 30.00 kHz, 30.00 kHz, 30.00 kHz, 30.00 MHz, 30.00 MHz OFF, OFF, OFF, OFF, OFF, OFF OFF, OFF, OFF, OFF, OFF, OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 1,3,10 sequence
Instrument S/W Revision	A.01.60 or later

Meas BW

Allows you to specify a multiplier of Res BW for the measurement integration bandwidth.

Meas BW is multiplier integer number. It shows a ratio between Integration BW and Resolution BW of the measurement result.

$\text{Integ BW} = \text{Meas BW} * \text{Resolution BW}$

Integration BW is desired resolution bandwidth and Resolution BW is actual bandwidth for sweep. Measurement sweeps with Resolution BW and Meas BW compensates sweep resolution bandwidth to Integration BW.

If you set this parameter greater than 1, you can set Resolution BW narrower to avoid carrier power leakage effect to the offset power integration.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:SEMask:OFFSet [1] 2:LIST:BANDwidth:IMULti <integer>, <integer>, <integer>, <integer>, <integer>, <integer> [:SENSe]:SEMask:OFFSet [1] 2:LIST:BANDwidth:IMULti?
Example	SEM:OFFS2:LIST:BAND:IMUL 1,1,1,1,1,1 SEM:OFFS2:LIST:BAND:IMUL?
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	This parameter must adhere to the rule $(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset})$, where N is the multiplier. If the Res Bw is changed, the multiplier will be changed to ensure this.
Preset	SA: 1, 1, 1, 1, 1, 1 WCDMA: 1, 1, 1, 10, 1, 1 1, 1, 1, 1, 1, 1 C2K: 10, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 WIMAX OFDMA: 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 TD-SCDMA:1, 1, 1, 20, 1, 1 1, 1, 20, 1, 1, 1 1xEVDO: 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	1
Max	1000
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 1
Instrument S/W Revision	A.01.60 or later

Spectrum Emission Mask Measurement Meas Setup

Video BW

Changes the analyzer post-detection filter.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSE] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo <freq>,<freq>,<freq>,<freq>,<freq>,<freq> [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo? [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:AUTO OFF ON 0 1,OFF ON 0 1,OFF ON 0 1,OFF ON 0 1,OFF ON 0 1, OFF ON 0 1 [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:AUTO?</pre>
Example	<pre>SEM:OFFS2:LIST:BAND:VID 3.00 kHz, 3.00 kHz, 3.00 kHz, 100.0 kHz,100.0 kHz, 100.0 kHz SEM:OFFS2:LIST:BAND:VID? SEM:OFFS2:LIST:BAND:VID:AUTO ON, ON, ON, ON, ON, ON SEM:OFFS2:LIST:BAND:VID:AUTO?</pre>
Notes	Comma separated list of 6 values. Sub op code OFFSet1is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	<pre>SA: 300 Hz, 300 Hz, 300 Hz, 10 kHz, 10 kHz, 10 kHz WCDMA: 300 Hz, 300 Hz, 300 Hz, 1 kHz, 10 kHz, 10 kHz 300 Hz, 10 kHz, 10 kHz, 10 kHz, 10 kHz, 10 kHz C2K: 30 Hz, 300 Hz, 300 Hz, 62 Hz, 10 kHz, 10 kHz 300 Hz, 300 Hz, 62 Hz, 10 kHz, 10 kHz, 10 kHz WIMAX OFDMA: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz TD-SCDMA: 300 kHz, 300 kHz, 300 kHz, 500 kHz, 1 MHz, 1 MHz 300 kHz, 300 kHz, 500 kHz, 1 MHz, 1 MHz, 1 MHz 1xEVDO: 300kHz, 300kHz, 300kHz, 62.5kHz, 10MHz, 10MHz 300kHz, 300kHz, 300kHz, 300kHz, 300kHz ON, ON, ON, ON, ON, ON ON, ON, ON, ON, ON, ON</pre>
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Test MIN/MAX/DEF	Yes

Test UP/DOWN	Not supported in Zorro-1. 1,3,10 sequence
Instrument S/W Revision	A.01.60 or later

VBW/RBW

Selects the ratio between the video and resolution bandwidths.

Key Path	Meas Setup, Offset/Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:RATio <real>,<real>,<real>,<real>,<real>,<real> [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:RATio? [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:RATio: AUTO OFF ON 0 1,OFF ON 0 1,OFF ON 0 1,OFF ON 0 1,OFF ON 0 1, OFF ON 0 1 [:SENSe] :SEMask:OFFSet [1] 2:LIST:BANDwidth:VIDeo:RATio: AUTO?</pre>
Example	<pre>SEM:OFFS2:LIST:BAND:VID:RAT 0.1, 0.1, 0.1, 0.1, 0.1, 0.1 SEM:OFFS2:LIST:BAND:VID:RAT? SEM:OFFS2:LIST:BAND:VID:RAT:AUTO ON, ON, ON, ON, ON, ON SEM:OFFS2:LIST:BAND:VID:RAT:AUTO?</pre>
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	<pre>SA, WCDMA, C2K: 0.01, 0.01, 0.01, 0.01, 0.01, 0.01 0.01, 0.01, 0.01, 0.01, 0.01, 0.01 WIMAX OFDMA: 0.3, 0.3, 0.3, 0.3, 0.3, 0.3 TD-SCDMA: 10, 10, 10, 10, 1, 1 10, 10, 10, 1, 1, 1 1xEVDO: 10, 10, 10, 10, 10, 10 10, 10, 10, 10, 10, 10 OFF, OFF, OFF, OFF, OFF, OFF OFF, OFF, OFF, OFF, OFF, OFF</pre>
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Test MIN/MAX/DEF	Yes

Spectrum Emission Mask Measurement

Meas Setup

Test UP/DOWN	Not supported in Zorro-1. 1,3,10...sequence
Instrument S/W Revision	A.01.60 or later

Limits

Accesses a menu that enables you to set the power limits for start and stop frequencies of the selected offsets.

Key Path	Meas Setup
Instrument S/W Revision	A.01.60 or later

Abs Start Sets the absolute power level limit at the start frequency for the selected offset. The absolute power level limit ranges from –200 to +50 dBm.

The fail condition for each offset channel is set remotely by [:SENSe]:SEMask:OFFSet[n]:LIST:TEST.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMask:OFFSet[n]:LIST:STATe.

The SCPI query returns the five (5) sets of real values currently set to the absolute power test limits.

Key Path	Meas Setup, Offset/Limits, Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:SEMask:OFFSet [1] 2:LIST:STARt:ABSolute <real>,<real>,<real>,<real>,<real>,<real> [:SENSe]:SEMask:OFFSet [1] 2:LIST:STARt:ABSolute?
Example	SEM:OFFS2:LIST:STAR:ABS –12.50 dBm, –12.50 dBm, –24.50 dBm, –11.50 dBm, –11.50 dBm, –11.50 dBm SEM:OFFS2:LIST:STAR:ABS?
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Coupled to Abs Stop if coupling set to “Couple”, that is, the Start value is equal to the Stop value.

Preset	SA, WIMAX OFDMA: -14.00 dBm , -14.00 dBm , -26.00 dBm , -13.00 dBm , -13.00 dBm, -13.00 dBm WCDMA: -12.50 dBm, -12.50 dBm, -24.50 dBm, -11.50 dBm, -11.50 dBm, -11.50 dBm -69.6 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm C2K: -27.00 dBm, -27.00 dBm, -27.00 dBm, -46.00 dBm, -13.00 dBm, -13.00 dBm -70.13 dBm, -70.13 dBm, -35.00 dBm, -13.00 dBm, -13.00 dBm, -13.00 dBm TD-SCDMA: -28 dBm, -28 dBm, -36 dBm, -21 dBm, -21 dBm, -21 dBm -71.3 dBm, -71.3 dBm, -56.07 dBm, -56.07 dBm, -56.07 dBm, -56.07 dBm 1xEVDO: -27.0dBm, -27.00 dBm, -27.00 dBm, -46.00 dBm, -13.00 dBm, -13.00 dBm -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm
State Saved	Saved in instrument state.
Min	-200 dBm
Max	50 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 10 dB
Instrument S/W Revision	A.01.60 or later

Abs Stop Sets the absolute power level limit at the stop frequency for the selected offset. The absolute power level limit ranges from -200 to +50 dBm. You can also toggle this function between couple and manual. If set to Couple, the **Abs Stop** power level limit is coupled to **Abs Start** to result in a flat limit line. If set to Man, Abs Start and Abs Stop take different values to result in a sloped limit line.

The SCPI query returns the five (5) sets of real values currently set to the offset stop absolute power limits.

Key Path	Meas Setup, Offset/Limits, Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSE] :SEMask:OFFSet [1] 2:LIST:STOP:ABSolute <real>, <real>, <real>, <real>, <real> [:SENSe] :SEMask:OFFSet [1] 2:LIST:STOP:ABSolute? [:SENSe] :SEMask:OFFSet [1] 2:LIST:STOP:ABSolute:COUPle ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0 [:SENSe] :SEMask:OFFSet [1] 2:LIST:STOP:ABSolute:COUPle?

Spectrum Emission Mask Measurement Meas Setup

Example	SEM:OFFS:LIST:STOP:ABS -12.50 dBm, -24.50 dBm, -24.50 dBm, -11.50 dBm, -11.50 dBm, -11.50 dBm SEM:OFFS1:LIST:STOP:ABS? SEM:OFFS:LIST:STOP:ABS:COUP ON, OFF, ON, ON, ON, ON SEM:OFFS:LIST:STOP:ABS:COUP?
Notes	Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Coupled to Abs Start if coupling set to “Couple”, that is, the Stop value is equal to the Start value.
Preset	SA, WIMAX OFDMA: -14.00 dBm, -26.00 dBm, -26.00 dBm, -13.00 dBm, -13.00 dBm, -13.00 dBm WCDMA: -12.50 dBm, -24.50 dBm, -24.50 dBm, -11.50 dBm, -11.50 dBm, -11.50 dBm -69.6 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm, -54.3 dBm C2K: -27.00 dBm, -27.00 dBm, -27.00 dBm, -46.00 dBm, -13.00 dBm, -13.00 dBm -70.13 dBm, -70.13 dBm, -35.00 dBm, -13.00 dBm, -13.00 dBm, -13.00 dBm TD-SCDMA: -28 dBm, -36 dBm, -36 dBm, -21 dBm, -21 dBm, -21 dBm -71.3 dBm, -71.3 dBm, -56.07 dBm, -56.07 dBm, -56.07 dBm, -56.07 dBm 1xEVDO: -27dBm, -27.00 dBm, -27.00 dBm, -46.00 dBm, -13.00 dBm, -13.00 dBm -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm, -70.13 dBm SA,WIMAX OFDMA: ON, OFF, ON, ON, ON, ON WCDMA: ON, OFF, ON, ON, ON, ON ON, ON, ON, ON, ON, ON C2K: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF TD-SCDMA: ON, OFF, ON, ON, ON, ON ON, ON, ON, ON, ON, ON 1xEVDO: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF
State Saved	Saved in instrument state.
Min	-200 dBm
Max	50 dBm
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 10
Instrument S/W Revision	A.01.60 or later

Rel Start Sets a relative power level limit at the start frequency for the selected offset. The relative power level limit ranges from –200 to +50 dBc.

The fail condition is set remotely by [:SENSe]:SEMask:OFFSet[n]:LIST:TEST for each offset channel test.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMask:OFFSet[n]:LIST:STATe.

The SCPI query returns the five (5) sets of real values currently set to the relative power test limits.

Key Path	Meas Setup, Offset/Limits, Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe]:SEMask:OFFSet[1] 2:LIST:START:RCARrier <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl> [:SENSe]:SEMask:OFFSet[1] 2:LIST:START:RCARrier?</pre>
Example	<pre>SEM:OFFS:LIST:STAR:RCAR -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB SEM:OFFS:LIST:STAR:RCAR?</pre>
Notes	See the following table for the default values for each Radio Standard. Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Coupled to Rel Stop is coupling set to “Couple”, that is, Start is made the same as Stop.
Preset	<pre>SA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB WCDMA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB -33.73 dB, -34.00 dB, -37.50 dB, -47.50 dB, -47.50 dB, -47.50 dB C2K: -45.00 dB, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB -42.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB WIMAX OFDMA: 0 dB, -25 dB, -32 dB, -50 dB, -50 dB, -50 dB TD-SCDMA: -54.00 dB, -54.00 dB, -62.00 dB, -47.00 dB, -47.00 dB, -47.00 dB -35.00 dB, -49.00 dB, -49.00 dB, -49.00 dB, -49.00 dB, -49.00 dB 1xEVDO: -45dBc, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB -42dBc, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB</pre>
State Saved	Saved in instrument state.
Min	–200 dB
Max	50 dB

Spectrum Emission Mask Measurement Meas Setup

Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 10
Instrument S/W Revision	A.01.60 or later

Rel Stop Sets a relative power level limit at the stop frequency for the selected offset. The relative power level limit ranges from –200 to +50 dBc.

The fail condition is set remotely by [:SENSe]:SEMask:OFFSet[n]:LIST:TEST for each offset channel.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMask:OFFSet[n]:LIST:STATe.

The SCPI query returns the five (5) sets of real values currently set to the offset stop relative power limits.

Key Path	Meas Setup, Offset/Limits, Limits
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	<pre>[:SENSe]:SEMask:OFFSet[1] 2:LIST:STOP:RCARrier <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl> [:SENSe]:SEMask:OFFSet[1] 2:LIST:STOP:RCARrier? [:SENSe]:SEMask:OFFSet[1] 2:LIST:STOP:RCARrier:COUPle ON OFF 1 0,ON OFF 1 0,ON OFF 1 0,ON OFF 1 0,ON OFF 1 0, ON OFF 1 0 [:SENSe]:SEMask:OFFSet[1] 2:LIST:STOP:RCARrier:COUPle?</pre>
Example	<pre>SEM:OFFS:LIST:STOP:RCAR -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB SEM:OFFS:LIST:STOP:RCAR? SEM:OFFS:LIST:STOP:RCAR:COUP ON, ON, ON, ON, ON, ON SEM:OFFS:LIST:STOP:RCAR:COUP?</pre>
Notes	See the following table for the default values for each Radio Standard. Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	Coupled to Rel Start if coupling set to “Couple”, that is, Start is made the same as Stop.

Preset	SA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB WCDMA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB -48.28 dB, -37.50 dB, -47.50 dB, -47.50 dB, -47.50 dB, -47.50 dB C2K: -45.00 dB, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB -42.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB WIMAX OFDMA: -25 dB, -32 dB, -50 dB, -50 dB, -50 dB, -50 dB TD-SCDMA: -54.00 dB, -62.00 dB, -62.00 dB, -47.00 dB, -47.00 dB, -47.00 dB -49.00 dB, -64.00 dB, -49.00 dB, -49.00 dB, -49.00 dB, -49.00 dB 1xEVDO: -45dB, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB -42dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB SA: ON, ON, ON, ON, ON, ON, ON WCDMA: ON, ON, ON, ON, ON, ON, ON OFF, OFF, OFF, ON, ON, ON C2K: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF WIMAX OFDMA: OFF, OFF, OFF, ON, ON, ON OFF, OFF, OFF, ON, ON, ON TD-SCDMA: ON, OFF, ON, ON, ON, ON OFF,OFF,ON,ON,ON,ON 1xEVDO: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF
State Saved	Saved in instrument state.
Min	-200 dB
Max	50 dB
Test MIN/MAX/DEF	Yes
Test UP/DOWN	Not supported in Zorro-1. 10
Instrument S/W Revision	A.01.60 or later

Fail Mask Selects one of the logic keys for fail conditions between the measurement results and the test limits:

Absolute and **Relative** both check the results against the respective limit.

OR checks against both limits, failing if either of the limits is broken.

AND will only display a fail if both of the limits are broken.

The absolute or relative power limit value for each offset channel can be set remotely with
[:SENSe]:SEMask:OFFSet[n]:LIST:ABSolute or [:SENSe]:SEMask:OFFSet[n]:LIST:RCARrier.

You can turn off (not use) specific offset channels remotely with
[:SENSe]:SEMask:OFFSet[n]:LIST:STATE.

Key Path	Meas Setup, Offset/Limits, Limits

Spectrum Emission Mask Measurement Meas Setup

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe]:SEMask:OFFSet [1] 2:LIST:TEST ABSolute AND OR RELative,ABSolute AND OR RELative,ABSolute AND OR RELative,ABSolute AND OR RELative,ABSolute AND OR RELative,ABSolute AND OR RELative,ABSolute AND OR RELative [:SENSe]:SEMask:OFFSet [1] 2:LIST:TEST?
Example	SEM:OFFS:LIST:TEST ABS, ABS, ABS, ABS, ABS, ABS SEM:OFFS:LIST:TEST?
Notes	See the following table for the default values for each Radio Standard. Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	None
Preset	SA: ABS, ABS, ABS, ABS, ABS, ABS WCDMA: ABS, ABS, ABS, ABS, ABS, ABS AND, AND, AND, AND, AND, AND C2K: REL, REL, REL, ABS, REL, REL AND, AND, ABS, REL, REL, REL WIMAX OFDMA: REL, REL, REL, REL, REL, REL REL, REL, REL, REL, REL, REL TD-SCDMA: ABS, ABS, ABS, ABS, ABS, ABS AND, AND, AND, AND, AND, AND 1xEVDO: REL, REL, REL, ABS, REL, REL AND, AND, AND, OR, AND, AND
State Saved	Saved in instrument state.
Range	Absolute Relative Abs AND Rel Abs OR Rel
Instrument S/W Revision	A.01.60 or later

Method

Sets the measurement method

Integ BW-enables you to set the channel integration bandwidth.

RRC Weight-selects Root Raised Cosine (RRC) filtering of the carriers and all adjacent channels. The α value (rolloff) for the filter is set to the value of the Filter Alpha parameter.

Key Path	Meas Setup
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA

Remote Command	[:SENSe] :SEMask:FILTer [:RRC] [:STATe] OFF ON 0 1 [:SENSe] :SEMask:FILTer [:RRC] [:STATe] ?
Example	SEM:FILT ON SEM:FILT?
Notes	For the CDMA2K and CDMA1xEVDO mode, this key is not available. 1 ON = RRC Weight, 0 OFF = IntegBW You must be in the Spectrum Analysis mode, W-CDMA mode or TD-SCDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Preset	SA, WIMAX OFDMA: OFF WCDMA, TD-SCDMA: ON
State Saved	Saved in instrument state.
Range	RRCWeight IntegBW
Instrument S/W Revision	A.01.60 or later

Filter Alpha

Sets the alpha value for the RRC Filter.

Key Path	Meas Setup
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA
Remote Command	[:SENSe] :SEMask:FILTer [:RRC] :ALPHa <real> [:SENSe] :SEMask:FILTer [:RRC] :ALPHa?
Example	SEM:FILT:ALPH 0.3 SEM:FILT:ALPH?
Notes	For the CDMA2K and CDMA1xEVDO mode, this key is not available. You must be in the Spectrum Analysis mode, W-CDMA mode or TD-SCDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1.0
Test MIN/MAX/DEF	Yes
Test UP/DOWN	0.01
Instrument S/W Revision	A.01.60 or later

Meas Preset

Restores all the measurement parameters to their default values.

Key Path	Meas Setup
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:CONFIgure:SEMask
Example	CONF:SEM
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	Selecting Meas Preset will restore all measurement parameters to their default values.
Instrument S/W Revision	A.01.60 or later

Limits State

The key “Limits State” is only displayed in the TD-SCDMA mode. The mask lines could be drawn in two different ways, according to the 3GPP standard for the base station when the key’s value is “Std”; or by the user-defined specifications listed in the Offset/Limits menu.

Key Path	Meas Setup
Mode	TD-SCDMA
Remote Command	[[:SENSE]:SEMask:LIMits STD MAN [:SENSE]:SEMask:LIMits?
Example	SEM:LIM STD SEM:LIM?
Notes	You must be in the TD-SCDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	See Couplings When the value of the “Limits” key is Std, the parameters displayed on the Offset/Limits panel will be modified depending on the carrier power, which corresponds to the measurement standard of the base station. On top of that, all the keys except “Offset”, “Relative Atten”, “Offset Side” and “Limits” displayed on the “Offset/Limits” panel will be grayed out. Meanwhile all the keys displayed on the “Limits” panel will be grayed out as well. When the value of the “Limits” key is Man, all of the previous manual specifications will be restored, and the keys which previously grayed out will be enabled again.
Preset	MAN
State Saved	Saved in instrument state.

Range	STD MAN
Instrument S/W Revision	A.01.60 or later

Mode

See “[Mode](#)” on page 965 in the section "Common Measurement Functions" for more information.

Mode Setup

See “[Mode Setup](#)” on page 977 in the section "Common Measurement Functions" for more information.

Peak Search

There is no ‘Peak Search’ supported in Spectrum Emission Mask so this front-panel key will display a blank menu key when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Recall

See [“Recall” on page 985](#) in the section "Common Measurement Functions" for more information.

Restart

See “[Restart](#)” on page 1003 in the section "Common Measurement Functions" for more information.

Save

See “[Save](#)” on page 1005 in the section "Common Measurement Functions" for more information.

Single

See “[Single \(Single Measurement/Sweep\)](#)” on page 1027 in the section "Common Measurement Functions" for more information.

Source

See [“Source” on page 1029](#) in the section "Common Measurement Functions" for more information.

Span X Scale

Span X Scale functionality is not supported in Spectrum Emission Mask, so this front panel key will display a blank key menu when pressed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep/Control

Displays a menu that enables you to set up and control the sweep time, gate method, and source of the current measurement. See [“Sweep / Control” on page 1033](#) in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point it was at when paused. See [“Pause/Resume” on page 1034](#) in “Common Measurement Functions” for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate

Accesses a menu that enables you to control the gating function .See Measurement Functions for more details.

The Gate functionality is used to view signals best viewed by qualifying them with other events. See [“Gate” on page 591](#) in “common Measurement Functions” for more details.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Trace/Detector

Accesses a menu of functions that enable you to control trace and detector for the current measurement.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trace Type

Allows you to select the type of trace for the current measurement. The menu contains a 1-of-N selection of the trace type (Clear Write, Average, Max Hold, Min Hold).

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:TRACe:SEMask:TYPE WRITe AVERAge MAXHold MINHold :TRACe:SEMask:TYPE?
Example	TRAC:SEM:TYPE MINH TRAC:SEM:TYPE?
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Dependencies/Couplings	When Detector setting is “Auto” ([[:SENSe]:SEMask:DETECTOR:AUTO?]), Detector ([[:SENSe]:SEMask:DETECTOR[:FUNCTION]?]) switches aligning with the switch of this parameter: “NORMal” with WRITe (Clear Write), “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	WRITe AVERAge MAXHold MINHold
Instrument S/W Revision	A.01.60 or later

Chan Detector

Accesses a menu of functions that enable you to control the detectors for reference channel. The following choices are available:

- Auto- the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.

- Normal-the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average-the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak-the detector determines the maximum of the signal within the sweep points.
- Sample-the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak-the detector determines the minimum of the signal within the sweep points.

Key Path	Trace/Detector
Instrument S/W Revision	A.01.60 or later

Chan Detector Selection

Selects the detector mode for the reference channel.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:DETECTOR:CARRier[:FUNCTION] AVERAge NEGAtive NORMAl POSitive SAMPle [:SENSe] :SEMask:DETECTOR:CARRier[:FUNCTION]?
Example	SEM:DET:CARR NEG SEM:DET:CARR?
Notes	When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. Note: This detector setting affects the reference channel. There is not a per trace detector. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Dependencies/Couplings	See Couplings in the Trace Type section.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Chan Detector Auto

Sets the detector to the default detection mode for the reference channel. This mode is dependent upon

the current reference channel conditions.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:DETECTOR:CARRier:AUTO ON OFF 1 0 [:SENSe] :SEMask:DETECTOR:CARRier:AUTO?
Example	SEM:DET:CARR:AUTO OFF SEM:DET:CARR:AUTO?
Notes	See Couplings in the Trace Type section. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use INSTRument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Offset Detector

Accesses a menu of functions that enable you to control the detector for offsets. The following choices are available.

- Auto- the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.
- Normal-the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average-the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak-the detector determines the maximum of the signal within the sweep points.
- Sample-the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak-the detector determines the minimum of the signal within the sweep points.

Key Path	Trace/Detector
Instrument S/W Revision	A.01.60 or later

Offset Detector Selection

Selects the detector mode for the offsets.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:DETEctor:OFFSet [:FUNctIon] AVERAge NEGAtive NORMAl POSitive SAMPle [:SENSe] :SEMask:DETEctor:OFFSet [:FUNctIon] ?
Example	SEM:DET:OFFS AVER SEM:DET:OFFS?
Notes	When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. Note: This detector setting has effects all offsets. There is not a per trace detector. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
Dependencies/Couplings	See Couplings in the Trace Type section.
Preset	SA, WCDMA, C2K, 1xEVDO: POSitive WIMAX OFDMA, TD-SCDMA: AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Offset Detector Auto

Sets the detector to the default detection mode for the offsets. This mode is dependent upon the current signal conditions of the offsets.

Key Path	Trace/Detector
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	[:SENSe] :SEMask:DETEctor:OFFSet:AUTO ON OFF 1 0 [:SENSe] :SEMask:DETEctor:OFFSet:AUTO?
Example	SEM:DET:OFFS:AUTO OFF SEM:DET:OFFS:AUTO?

Spectrum Emission Mask Measurement Trace/Detector

Notes	See Couplings in the Trace Type section. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Test MIN/MAX/DEF	No
Instrument S/W Revision	A.01.60 or later

Trigger

Accesses a menu that enables you to select and control the trigger source for the current measurement.

See [“Trigger” on page 1057](#) in the "Common Measurement Functions" section for more information.

View/Display

Accesses a menu of functions that enable you to control the instrument display.

The following keys select how the results are displayed:

Abs Pwr Freq-displays the absolute power levels in dBm and the corresponding frequencies in the text window.

Rel Pwr Freq-displays the relative power levels in dBc and the corresponding frequencies in the text window.

Integrated Power-displays the absolute and relative power levels integrated throughout the bandwidths between the start and stop frequencies in the text window.

[“View Selection by name \(SCPI only\)” on page 838](#)

[“Views Selection by Number \(SCPI Only\)” on page 838](#)

View Selection by name (SCPI only)

Key Path	View/Display
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW[:SElect] APFReq RPFReq IPOWER :DISPlay:SEMask:VIEW[:SElect] ?
Example	DISP:SEM:VIEW IPOW DISP:SEM:VIEW?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Dependencies/Couplings	In the SA mode, when "Radio Standard" is set to WLAN, IPOWer is not available and the key is grayed out.
Preset	SA, WCDMA, C2K, TD-SCDMA, 1xEVDO: APFReq WIMAX OFDMA: RPFReq
State Saved	Saved in instrument state.
Range	Abs Pwr & Freq Rel Pwr & Freq Integrated Power
Instrument S/W Revision	A.01.60 or later

Views Selection by Number (SCPI Only)

The following numerical selections select how the results are displayed:

- 1- displays the absolute power levels in dBm and the corresponding frequencies in the text window.
- 2- displays the relative power levels in dBc and the corresponding frequencies in the text window.

3- displays the absolute and relative power levels integrated throughout the bandwidths between the start and stop frequencies in the text window.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Remote Command	:DISPlay:SEMask:VIEW:NSElect <integer> :DISPlay:SEMask:VIEW:NSElect?
Example	DISP:SEM:VIEW:NSEL 2 DISP:SEM:VIEW:NSEL?
Notes	In the SA mode, when "Radio Standard" is set to WLAN, 3 is not available. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA, WCDMA, C2K, TD-SCDMA, 1xEVDO: 1 WIMAX OFDMA: 2
State Saved	Saved in instrument state.
Min	1
Max	3
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later
Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

Accesses a menu of functions that enable you to set the display parameters.

See [“Display” on page 1109](#) in the "Common Measurement Functions" section for more information.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

Abs Pwr Freq

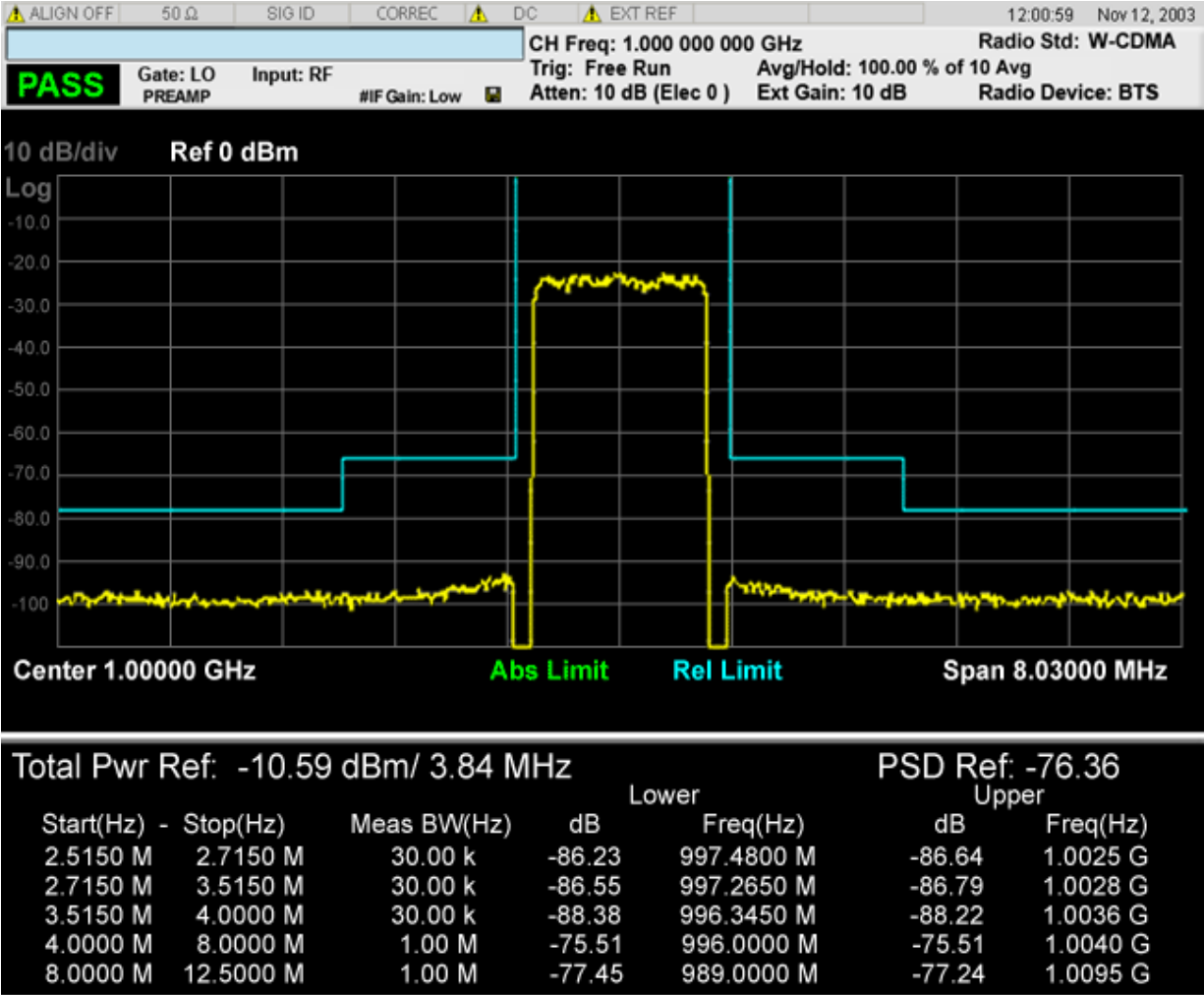
Abs Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

[“Trace Window” on page 841](#)

[“Results Window” on page 841](#)

Spectrum Emission Mask Measurement
View/Display



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

Name	Corresponding Results
Total Pwr Ref	n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth
PSD Ref	n=5 1st element Power spectral density reference at the reference area
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower(dBm/Hz)	Absolute peak power on minimum margin point of the negative offset
Lower Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the negative offset
Lower Freq(Hz)	Frequency on minimum margin point of the negative offset
Upper(dBm/Hz)	Absolute peak power on minimum margin point of the positive offset
Upper Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the positive offset
Upper Freq(Hz)	Frequency on minimum margin point of the positive offset
Key Path:	View/Display
Instrument S/W Revision	A.01.60 or later

Rel Pwr Freq

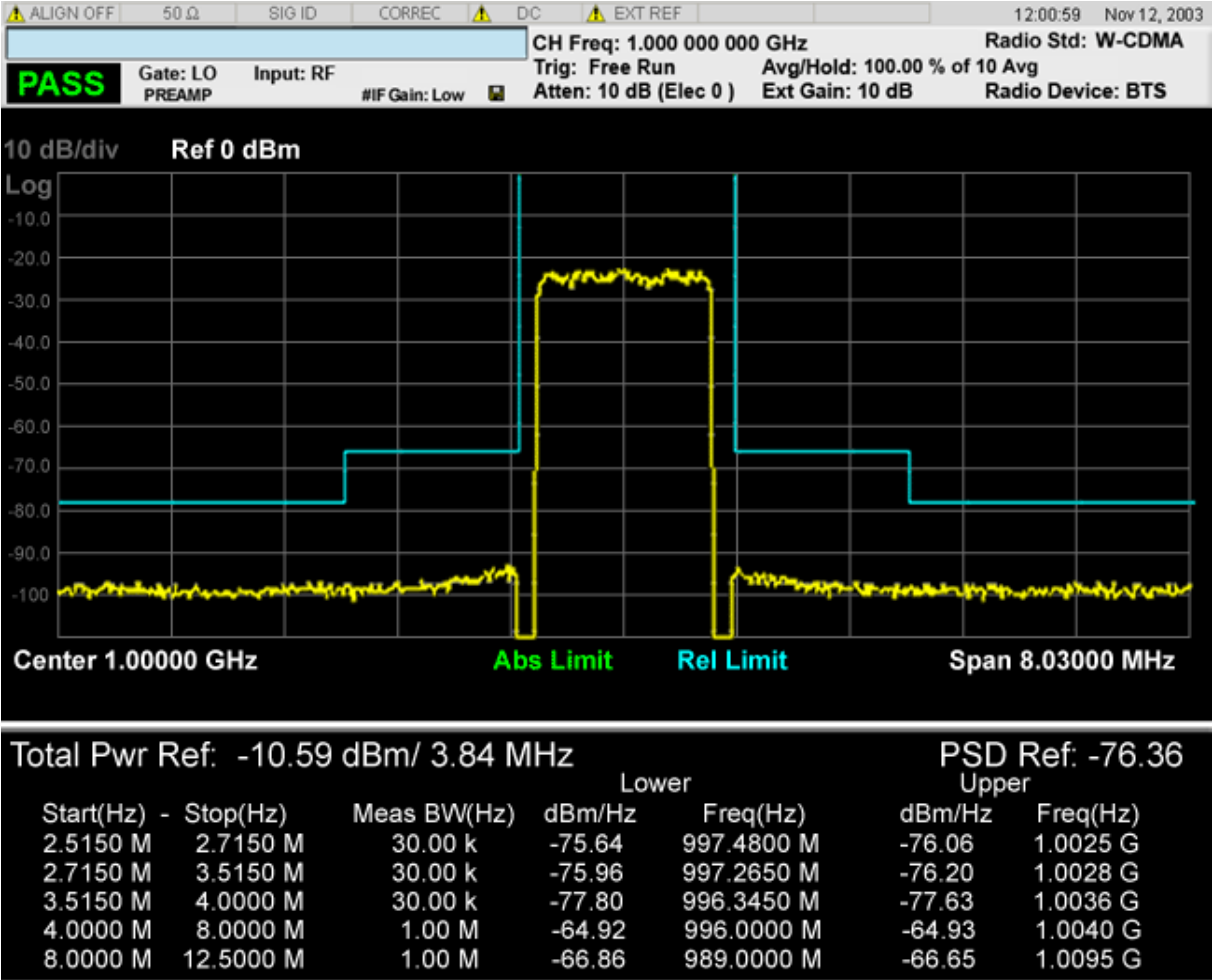
Rel Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

“Trace Window” on page 843

“Results Window” on page 843

Spectrum Emission Mask Measurement
View/Display



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

Name	Corresponding Results
Total Pwr Ref	n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth
PSD Ref	n=5 1st element Power spectral density reference at the reference area
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower(dB)	Relative peak power on minimum margin point of the negative offset
Lower Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the negative offset
Lower Freq(Hz)	Frequency on minimum margin point of the negative offset
Upper(dB)	Relative peak power on minimum margin point of the positive offset
Upper Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the positive offset
Upper Freq(Hz)	Frequency on minimum margin point of the positive offset
Key Path:	View/Display
Instrument S/W Revision	A.01.60 or later

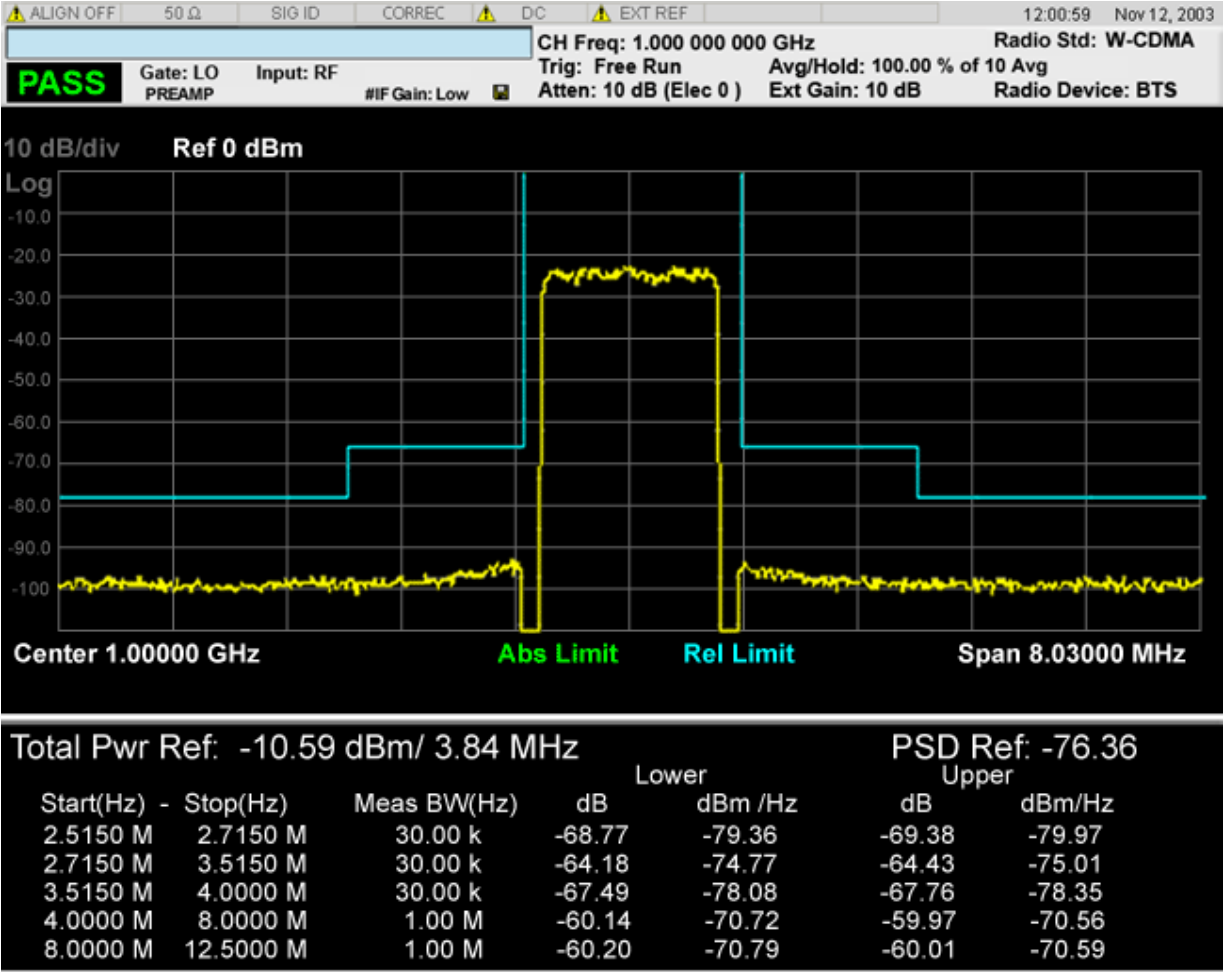
Integrated Power

Integrated Power (PSD Ref)

[“Trace Window” on page 845](#)

[“Results Window” on page 845](#)

Spectrum Emission Mask Measurement
View/Display



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

Name	Corresponding Results
Total Pwr Ref	n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth
PSD Ref	n=5 1st element Power spectral density reference at the reference area
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower(dB)	Relative integrated power on minimum margin point of the negative offset
Lower Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the negative offset
Lower(dBm/Hz)	Absolute integrated power on minimum margin point of the negative offset
Upper(dB)	Relative integrated power on minimum margin point of the positive offset
Upper Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the positive offset
Upper(dBm/Hz)	Absolute integrated power on minimum margin point of the negative offset
Key Path:	View/Display
Instrument S/W Revision	A.01.60 or later

Limit Lines

Toggles the limit lines display function for the spectrum emission mask measurements On and Off.

Key Path	View/Display
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

Remote Command	:CALCulate:SEMask:LLINe:STATe ON OFF 1 0 :CALCulate:SEMask:LLINe:STATe?
Example	CALC:SEM:LLIN:STAT OFF CALC:SEM:LLIN:STAT?
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	A.01.60 or later

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List Sweep

The List Sweep measurement is designed for fast measurement throughput. It lets you remotely extract amplitude values for multiple detectors at known frequencies. You can configure the analyzer to make a list of single-point measurements. This list can then be run multiple times saving analyzer setup time and reducing I/O overhead and traffic. The measurements are all performed in zero-span.

This topic contains the following sections:

- “Remote Commands:” on page 847
- “Remote Command Results” on page 847
- “More Information” on page 847

Remote Commands:

CONFigure:LIST
INITiate:LIST
FETCh:LIST?
READ:LIST?

Remote Command Results

Example	Assume that only one detector is used for each point and the list length is 4: READ:LIST? -12.3, 34.5, 56.7,23.4
	NOTE All returned values are in the internal unit of dBm.
SCPI Status Bits/OPC Dependencies	The Status Operation Register bit “Waiting for Trigger” is set at the same time when a new list point measurement is initiated. It is cleared when the trigger actually occurs (i.e. after the trigger event occurs and all the applicable trigger criteria have been met). While the Trigger bit is set/unset along with each triggering condition at each point, the Measurement bit is set once when the first point measurement is initiated. It is cleared only after all points measurement in the list are complete and results are available.
Remote Command Notes	If inconsistent list length is detected, an error is returned instead of results.

More Information

List Sweep can be selected using the front panel key or the remote command. Measurement setup control is only available remotely. While in the List Sweep measurement, the screen is blanked.
Any key press exits the measurement and returns to the default measurement for the mode. (Swept SA

for SANalyzer mode.) To avoid accidental key presses exiting the measurement, you may want to lock out the front panel keys. There are two ways to lock out the front panel keys. Accessing the instrument over GPIB (IEEE–488) puts it in remote operation, or you can send the SYSTem:KLOCK ON command.

Mode	SA
Key Path	Meas

Frequency List (Remote Command Only)

The command defines a list of analyzer center frequencies at which the measurements are made.

The query form queries the analyzer for the values in the frequency list.

Remote Command	<code>[:SENSe] :LIST:FREQuency <freq>{ , <freq> }</code> <code>[:SENSe] :LIST:FREQuency?</code>
Example	<code>LIST:FREQ 1GHz,1.5GHz,2GHz,2.5GHz</code> Sets a list of 4 frequencies.
Preset	Current center frequency value from previous measurement
State Saved	Saved in State
Range	Same as center frequency range.

The following command queries the analyzer for the number of points in the frequency list.

Remote Command	<code>[:SENSe] :LIST:FREQuency:POINts?</code>
Example	<code>LIST:FREQ:POIN?</code>

Mechanical Attenuator List (Remote Command Only)

This command defines a list of analyzer mechanical attenuator settings at which the measurements are made.

NOTE	Changing the mechanical attenuator within the list should be avoided if possible, because it slows down the measurement and wears out the attenuator.

The query form queries the analyzer for the values in the mechanical attenuation list.

Remote Command	<code>[:SENSe] :LIST:ATTenuation <power>{, <power>}</code> <code>[:SENSe] :LIST:ATTenuation?</code>
Example	LIST:ATT 10DB
Dependencies/Couplings	If the requested setting is not valid, it is ignored and the previous setting is retained.
Preset	Current mechanical attenuation value from previous measurement
State Saved	Saved in State
Range	Same as the mechanical attenuator range.

The following command queries the analyzer for the number of points in the mechanical attenuation list.

Remote Command	<code>[:SENSe] :LIST:ATTenuation:POINTs?</code>
Example	LIST:ATT:POIN?

Electronic Attenuation List (Remote Command Only)

This command defines a list of analyzer electronic attenuator settings at which the measurements are made.

The query form queries the analyzer for the values in the electronic attenuation list.

Remote Command	<code>[[:SENSe]:LIST:EATTenuation <power>{, <power>} [:SENSe]:LIST:EATTenuation?</code>
Example	LIST:EATT 10DB
Dependencies/Couplings	If the required hardware option is not present, an error message would be issued. However, the error message does not prevent list sweep from execution if all other list settings are set properly.
Preset	Current electronic attenuation value from previous measurement
State Saved	Saved in State
Range	Same as the electronic attenuator range.

The following command queries the analyzer for the number of points in the electronic attenuation list.

Remote Command	<code>[[:SENSe]:LIST:EATTenuation:POINTs?</code>
Example	LIST:EATT:POIN?

RBW Type List (Remote Command Only)

This command defines a list of analyzer RBW Type settings used for the measurements.

The query form queries the analyzer for the values in the RBW Type list.

Remote Command	<code>[:SENSe] :LIST:BANDwidth BWIDth:RESolution:TYPE <type>{, <type>}</code> <code>[:SENSe] :LIST:BANDwidth BWIDth:RESolution:TYPE?</code>
Example	<code>LIST:BAND:RES:TYPE GAUS</code> For this example, Types from Swept SA measurement include: <code>GAUSSian FLATtop EMI</code>
Preset	Current RBW Type setting from previous measurement
State Saved	Saved in State
Range	Same as the RBW Types available in previous measurement.

The following command queries the analyzer for the number of points in the RBW Type list.

Remote Command	<code>[:SENSe] :LIST:BANDwidth BWIDth:RESolution:TYPE:POINTs?</code>
Example	<code>LIST:BAND:RES:TYPE:POIN?</code>

RBW List (Remote Command Only)

This command defines a list of analyzer RBW settings at which the measurements are made.

The query form queries the analyzer for the values in the RBW list.

Remote Command	<code>[:SENSe] :LIST:BANDwidth BWIDth:RESolution <freq>{ , <freq> } [:SENSe] :LIST:BANDwidthBWIDth:RESolution?</code>
Example	<code>LIST:BAND:RES 100KHZ</code>
Preset	Current RBW value from previous measurement
State Saved	Saved in State
Range	Same as the RBW values available in the previous measurement.

The following command queries the analyzer for the number of points in the RBW list.

Remote Command	<code>[:SENSe] :LIST:BANDwidthBWIDth:RESolution:POINTs?</code>
Example	<code>LIST:BAND:RES:POIN?</code>

VBW List (Remote Command Only)

This command defines a list of analyzer VBW settings at which the measurements are made.
The query form queries the analyzer for the values in the VBW list.

Remote Command	<code>[:SENSe] :LIST:BANDwidth BWIDth:VIDeo <freq>{ , <freq>}</code> <code>[:SENSe] :LIST:BANDwidth BWIDth:VIDeo?</code>
Example	<code>LIST:BAND:VID 10KHZ</code>
Preset	Current Video BW value from previous measurement
State Saved	Saved in State
Range	Same as the Video BW values available in the previous measurement.

The following command queries the analyzer for the number of points in the VBW list.

Remote Command	<code>[:SENSe] :LIST:BANDwidth BWIDth:VIDeo:POINts?</code>
Example	<code>LIST:BAND:VID:POIN?</code>

Sweep Time List (Remote Command Only)

This command defines a list of analyzer sweep times at which the measurements are made. In zero span measurements, this is the time required to measure a single point given the current setting for the number of points in the sweep.

The query form queries the analyzer for the values in the sweep time list.

Remote Command	<code>[:SENSe] :LIST:SWEep:TIME <time>{, <time>}</code> <code>[:SENSe] :LIST:SWEep:TIME?</code>
Preset	Current Sweep Time value from previous measurement
State Saved	Saved in State
Range	Same as the Sweep Time range available in the previous measurement.

The following command queries the analyzer for the number of points in the sweep time list.

Remote Command	<code>[:SENSe] :LIST:SWEep:TIME:POINTs?</code>
Example	<code>LIST:SWE:TIME:POIN?</code>

Trigger Delay List (Remote Command Only)

This command defines a list of analyzer trigger delay time used when making the measurements.
The query form queries the analyzer for the values in the trigger delay list.

Remote Command	<code>[:SENSe] :LIST:TRIGger:DELaY <time>{, <time>}</code> <code>[:SENSe] :LIST:TRIGger:DELaY?</code>
Example	<code>LIST:TRIG:DEL 0.01S</code>
Preset	0 seconds
State Saved	Saved in State
Range	Same as the Trigger Delay range for EXTernal1 trigger.

The following command queries the analyzer for the number of points in the trigger delay list.

Remote Command	<code>[:SENSe] :LIST:TRIGger:DELaY:POINts?</code>
Example	<code>LIST:TRIG:DEL:POIN?</code>

Phase Noise Optimization (Remote Command Only)

This command defines a list of analyzer phase noise optimization settings at which the measurements are made.

Remote Command	[:SENSe]:LIST:FREQuency:SYNThesis 1 2 3 [:SENSe]:LIST:FREQuency:SYNThesis? [:SENSe]:LIST:FREQuency:SYNThesis:AUTO OFF ON 0 1 [:SENSe]:LIST:FREQuency:SYNThesis:AUTO?
Example	LIST:FREQ:SYNT:AUTO OFF LIST:FREQ:SYNT 2
Preset	Fast Tuning
State Saved	Saved in instrument state.
Range	Fast Tuning (3) Best Phase Noise for offsets <20kHz (2) Best Phase Noise for offsets >30kHz (1)
Min	1
Max	3

Detector List (Remote Command Only)

This command defines a list of analyzer detector settings at which the measurements are made. The choice of detectors is different from the choice in other measurements.

The query form queries the analyzer for the values in the detector list.

Remote Command	<code>[:SENSe] :LIST:DETeCTOR <type>{, <type>}</code> <code>[:SENSe] :LIST:DETeCTOR?</code>
Example	LIST:DET POS
Remote Command Notes	• LAVG : average detector. Average detected on the log scale. • VAVG : average detector. Average detected on the voltage scale. • RMS: average detector. Average detected on the power (rms) scale. • NEGative: negative peak detector. • POSitive: positive peak detector. • SAMPlE: sample detector. • PKAV: Peak-AVER detector, a newly defined term, would allow the simultaneous measurement and two-point reporting of the results of the positive peak and the average detector (voltage scale). • PRMS: Peak-RMS detector, a newly defined term, would allow the simultaneous measurement and two-point reporting of the results of the positive peak and the average detector (rms scale). • DAVG: DualAvg detector is similarly a newly defined term that allows two-point reporting of simultaneously made measurements. With this detector, one result (the former) is average detected on the power (rms) scale, and one is average detected on the voltage scale.
Preset	LAVG
State Saved	Saved in State
Range	LAVG VAVG RMS NEGative POSitive SAMPlE PKAV PRMS DAVG

The following command queries the analyzer for the detector list length.

Remote Command	<code>[:SENSe] :LIST:DETeCTOR:POINts?</code>
Example	LIST:DET:POIN?

Trigger Source (Remote Command Only)

This command sets the source for the trigger that controls the start of each new measurement point in the list. The other trigger command :TRIGger:SOURce, is used to start the list.

The query form queries the analyzer for the values in the trigger source of the list sweep.

Remote Command	[:SENSe]:LIST:TRIGger:SOURce EXTernal1 EXTernal2 IMMEDIATE BUS [:SENSe]:LIST:TRIGger:SOURce?
Example	LIST:TRIG:SOUR EXT2
Dependencies/Couplings	If the list trigger source is set to BUS for all points, you need a trigger for each list item. For example, if there are three points in the list, you have to send *TRG or TRIG:IMM three times to execute the complete List Sweep measurement. If the list trigger source is not set to BUS, use *TRG or TRIG:IMM to start the list measurement.
Remote Command Notes	- EXTernal1 2: external sources - IMMEDIATE: free run - BUS: software controlled trigger The BUS trigger is only in “List Sweep”. It specifies a common trigger source which allows a source and a receiver (analyzer) to coordinate triggering without requiring the connection of the trigger in and trigger out ports on the rear panels of the instruments.
Preset	IMMEDIATE
State Saved	Saved in State
SCPI Status Bits/OPC Dependencies	The trigger bit is set and cleared at each measurement point.

The following command queries the analyzer for the trigger source list length.

Remote Command	[:SENSe]:LIST:TRIGger:SOURce:POINts?
Example	LIST:TRIG:SOUR:POIN?
Remote Command Notes	Only one trigger source selection is allowed.

Trigger Holdoff (Remote Command Only)

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions are ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

Remote Command	[:SENSe] :LIST:TRIGger:HOLDoFF <time> [:SENSe] :LIST:TRIGger:HOLDoFF?
Example	LIST:TRIG:HOLD 100MS
Preset	0.0 s
State Saved	Saved in State
Min	0 s
Max	100 s

The following command queries the analyzer for the trigger holdoff list length.

Remote Command	[:SENSe] :LIST:TRIGger:HOLDoFF:POINts?
Example	LIST:TRIG:HOLD:POIN?
Remote Command Notes	Only one trigger holdoff selection is allowed.

Trigger Level (Remote Command Only)

Sets the value at which the selected trigger input will trigger a new sweep.

Remote Command	<code>[:SENSe] :LIST:TRIGger:LEVel <ampl></code> <code>[:SENSe] :LIST:TRIGger:LEVel?</code>
Example	<code>LIST:TRIG:LEV 0.4V</code>
Preset	1.2 V
State Saved	Saved in State
Min	-5 V
Max	5 V

The following command queries the analyzer for the trigger level list length.

Remote Command	<code>[:SENSe] :LIST:TRIGger:LEVel:POINts?</code>
Example	<code>LIST:TRIG:LEV:POIN?</code>
Remote Command Notes	Only one trigger level selection is allowed.

Trigger Slope (Remote Command Only)

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command	<code>[:SENSe] :LIST:TRIGger:SLOPe POSitive NEGative</code> <code>[:SENSe] :LIST:TRIGger:SLOPe?</code>
Example	<code>LIST:TRIG:SLOP NEG</code>
Preset	POSitive
State Saved	Saved in State
Range	Same as the Sweep Time range available in the previous measurement.

The following command queries the analyzer for the trigger slope list length.

Remote Command	<code>[:SENSe] :LIST:TRIGger:SLOPe:POINTs?</code>
Example	<code>LIST:TRIG:SLOP:POIN?</code>
Remote Command Notes	Only one trigger slope selection is allowed.

Sequencing (Remote Command Only)

Defines a sequence for stepping through the list. You must use LIST:SEQ or LIST:SEQ:AUTO before performing a measurement using the READ command. When lists are not of the same length (except lengths of 0 and 1) an error “Invalid List length” would be generated at sequencing time.

Remote Command	<pre>[:SENSe] :LIST:SEQuence <value>{ ,<value>} [:SENSe] :LIST:SEQuence? [:SENSe] :LIST:SEQuence:AUTO ON1 [:SENSe] :LIST:SEQuence:AUTO?</pre>
Example	LIST:SEQ 1,2,4,3
Remote Command Notes	LIST:SEQ: defines a sequence for stepping through the list. LIST:SEQ:AUTO: when on, the sequence is set to 1 through N, where N is the longest list.
Preset	Ascending order: 1 through N
Range	Depends on the number of frequency points in your list.

The following command returns the number of points currently in the sequence list.

Remote Command	<pre>[:SENSe] :LIST:SEQuence:POINts?</pre>
Example	LIST:SEQ:POIN?

List Sweep
Sequencing (Remote Command Only)

The key and command descriptions in this section describe functions that operate the same in multiple measurements and/or modes. This section is a library of functions that is referenced by many measurements and modes

To find the exact description and parameters for functions in a specific measurement, always look in the measurement section of this documentation. Pressing the front-panel key or softkey and then pressing the green Help key also provides the correct information.

NOTE

If you want to print the documentation, be sure to select this section and the measurement of interest to ensure having all the information you need. See [“Printing Acrobat Files” on page 103](#) for further instructions about printing.

AMPTD Y Scale (Amplitude Y Scale)

Some Amplitude features are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Amplitude key activates the Amplitude menu and selects Reference Level as the active function.

Instrument S/W Revision A.01.60 or later

Attenuation

This key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the key in square brackets is the current Total (Elec + Mech) attenuation. Note that when in “Pre-Adjust for Min Clip” this value can change at the start of every measurement.

All parameters in the Attenuation menus are Meas Global, meaning they are common to all the measurements and are unaffected by Meas Preset.

Key Path **AMPTD**
Instrument S/W Revision A.01.60 or later

Mech Atten Auto/Man

You can modify the mechanical attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamplifier Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below. However, when the electrical attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key disappears. The Auto/Man state of the key is remembered and restored when the electrical attenuator is once again disabled.

Some measurement applications have functionality that can pre-adjust the input signal for minimum clipping. That is, it attenuates the input so it does not over-drive the analyzer. When this functionality is available, the Auto/Man selection is not available.

Remote Command: [:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>
[:SENSe]:POWer[:RF]:ATTenuation?
[:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF|ON|0|1
[:SENSe]:POWer[:RF]:ATTenuation:AUTO?

Example: POW:ATT 20
Sets the attenuator to manual mode, and sets the value to 20 dB.

AMPTD Y Scale (Amplitude Y Scale)

Dependencies/Couplings:	When the electrical attenuator is enabled, the mechanical attenuator has no auto setting and Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electrical attenuator is once again disabled. If it is restored to man, the mechanical attenuation is set to the sum of the current values of mechanical and electrical attenuation, but if it is restored to Auto it recouples according to the Couplings, below. When the Input Attenuator is in 'auto', it uses the following algorithm to determine a value. Calculate a new value = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain. Limit this new value to be between 6 and 70 dB for MXA (or 60 dB for EXA). No value below 6 dB can ever be chosen by Auto. The resulting value should be rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).
Preset:	Auto (usually 10 dB, On)
State Saved:	Saved in State
Min:	0 dB
	The mechanical attenuation cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.
Max:	EXA: 60 dB MXA: 70 dB
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Enable Elec Atten

You can enable or disable the Electrical Attenuator. The Electrical Attenuator offers no significant advantage over the Mechanical Attenuator for front-panel operation. Therefore it is assumed you will use the Mechanical Attenuator when operating the analyzer from the front-panel.

The electronic attenuator is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then Enable Elec Atten is grayed out. If the Elec Atten is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz, which is to say the UI start, stop, center frequency and span values are all limited to a maximum of 3.6 GHz + Frequency Offset.

Remote Command: `[[:SENSE]:POWER[:RF]:EATTenuation:STATE OFF|ON|0|1`
`[[:SENSE]:POWER[:RF]:EATTenuation:STATE?`

Example: `POW:EATT:STAT ON`

Dependencies/Couplings: The electronic attenuator is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Elec Atten is grayed out.

If the Internal Preamplifier is on, meaning it is set to Low Band or Full, the electronic attenuator is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.

If either of the above is true, if the SCPI command is sent, a generic error indicating that the electronic attenuator is unavailable will be sent.

If the Electronic Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamplifier is unavailable.

Preset: OFF

State Saved: Saved in instrument state.

Key Path: **AMPTD, Attenuation**

Instrument S/W Revision: A.01.60 or later

When the Electrical Attenuator is enabled, the Mechanical Attenuator transitions to a state in which it has no Auto function. Here are the rules for transitioning the Mechanical Attenuator:

When the Electrical Attenuator is enabled:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or RPG, and it behaves as it normally would in manual mode
- The Auto/Man state of Mech Atten is saved
- The Auto/Man line on the Mech Atten key disappears and the auto rules are disabled
- The Electrical Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal value before Elec Atten enabled.

When the Electrical Attenuator is disabled:

- The Elec Atten key is grayed out

AMPTD Y Scale (Amplitude Y Scale)

- The Auto/Man state of Mech Atten is restored
- If now in Auto, Mech Atten recouples
- If now in man, Mech Atten sets to the value of total atten that existed before the Elec Atten was disabled. The resulting value should be rounded up to the smallest value possible given the Mech Atten Step setting - (That is, 57 dB would change to 58 dB when Mech Atten Step is 2 dB.)

Elec Atten

You can modify the electrical attenuation using this function

Remote Command:	<code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code>
Restriction and Notes:	Electrical Attenuation's spec is defined only when Mechanical Attenuation is 6 dB.
Dependencies/Couplings:	When Enable Elec Atten is off, Elec Atten key is grayed out.
Preset:	0 dB
State Saved:	Saved in instrument state.
Min:	0 dB
Max:	24 dB
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Adjust Atten for Min Clip

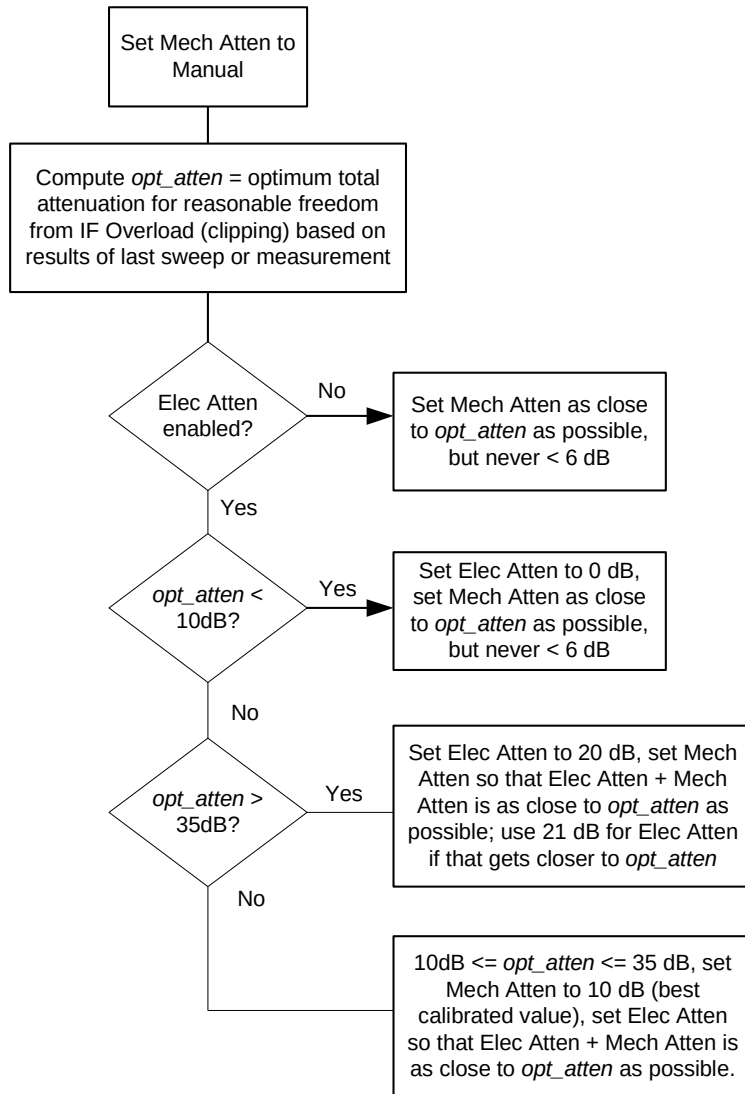
This function is similar to the “Optimize Ref Level” function in some measurements. Its purpose is to set the combination of mechanical and electrical attenuation based on the current measured signal level so that clipping will be at a minimum.

This is a “one-time” function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Remote Command:	<code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code>
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

The algorithm to be used is as follows:



vsd04

Pre-Adjust for Min Clip

This adjustment executes each time a measurement restarts. Therefore, in Continuous, it only executes before the first measurement.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Remote Command:	[:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined [:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation?
State Saved:	Saved in State
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

AMPTD Y Scale (Amplitude Y Scale)

Remote Command:	<code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code>
Remote Command Notes:	ON aliases to “Elec Atten Only” OFF aliases to “Off” The query returns true if not “Off”
Instrument S/W Revision:	A.01.60 or later

Off

Example:	<code>:POW:RANGe:OPT:ATT OFF</code>
Key Path:	AMPTD, Attenuation, Pre-Adjust for Min Clip
Instrument S/W Revision:	A.01.60 or later

Elec Atten Only

Example:	<code>:POW:RANGe:OPT:ATT ELEC</code>
Key Path:	AMPTD, Attenuation, Pre-Adjust for Min Clip
Instrument S/W Revision:	A.01.60 or later

Mech + Elec Atten

Example:	<code>:POW:RANGe:OPT:ATT COMB</code>
Key Path:	AMPTD, Attenuation, Pre-Adjust for Min Clip
Instrument S/W Revision:	A.01.60 or later

Mech Atten Step

This controls what step size is used when making adjustments to the Input Attenuation.

Remote Command:	<code>[:SENSe] :POWer [:RF] :ATTenuation:STEP[:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation:STEP[:INCRement] ?</code>
Example:	<code>POW:ATT:STEP 2</code>
Dependencies/Couplings:	Blanked in EXA if option FSA (2 dB steps) is not present. Attempts to set it via SCPI will yield the “Option not present” error. When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB

Remote Command Notes:	Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10.
Preset:	MXA: 2 dB EXA: 10 dB (2 dB with option FSA)
State Saved:	Saved in State
Key Path:	AMPTD, Attenuation
Instrument S/W Revision:	A.01.60 or later

Max Mixer Level

The Max Mixer Level controls the limitation on the Ref Level for a given attenuation setting, and therefore also interacts with the Auto rules for selecting the attenuation as a coupling from the reference level.

Remote Command:	[:SENSE] :POWER [:RF] :MIXer:RANGe [:UPPer] <real> [:SENSe] :POWER [:RF] :MIXer:RANGe [:UPPer] ?
Example:	POW:MIX:RANG -15 dBm
Preset:	-10 dBm
State Saved:	Saved in State
Min:	-50 dBm
Max:	-10 dBm
Key Path:	AMPTD, Attenuation
Default Unit:	Depends on the current selected Y axis unit, see Swept SA discussion of Y Axis Unit
Instrument S/W Revision:	A.01.60 or later

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

Gain Setting	Volts RMS	Volts Peak	Volts Peak - Peak	dBm (50Ω)	Break Point
0 dB	0.7071	1.0	2.0	10	n/a
6 dB	0.3536	0.5	1.0	4	0.502 V Peak
12 dB	0.1768	0.25	0.5	-2	0.252 V Peak

AMPTD Y Scale (Amplitude Y Scale)

18 dB 0.0884 0.125 0.25 -8 0.127 V Peak

Key Path	AMPTD Y Scale
State Saved	No
Restriction and Notes	Visible only when the selected input is I/Q.
Instrument S/W Revision	A.01.60 or later

Range Auto/Man

The Auto setting for Range will cause the range to be set based on the Y Scale settings. When Range is “Auto”, the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at top of screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows “Man” and MAN is returned to a SCPI query; but this does NOT change the Meas Global Auto/Man for Range, so when you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto.

Key Path	AMPTD Y Scale, Range
Remote Command	<code>[:SENSe] :VOLTage:IQ:RANGe:AUTO OFF ON 0 1</code> <code>[:SENSe] :VOLTage:IQ:RANGe:AUTO?</code>
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Dependencies/Couplings	When in Auto, both I Range and Q Range are set to the same value, computed as follows: Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: $Y_{Max} = \max(\text{abs}(\text{top}), \text{abs}(\text{bottom}))$. The I Range and Q Range are then set to YMax. If Auto is not supported, sending the SCPI command will generate an error.
Example	Put the I Range and Q Range in manual. <code>VOLT:IQ:RANG:AUTO OFF</code>
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI command to match the POWER form of the I Range and Q Range SCPI.

Remote Command:	<code>[:SENSe] :POWER:IQ:RANGe:AUTO OFF ON 0 1</code> <code>[:SENSe] :POWER:IQ:RANGe:AUTO?</code>

Preset:	ON
Range:	Auto Man
Remote Command Notes:	The POW:IQ:RANG:AUTO is an alternate form of the VOLT:IQ:RANG:AUTO command. This is to maintain consistency with I Range and Q Range, which support both the POWER and VOLTage forms of the command.
Example:	Put the I Range and Q Range in manual. POW:IQ:RANG:AUTO OFF
Instrument S/W Revision:	A.01.60 or later

I Range

This is the internal gain range for the I channel when Input Path is I Only or Ind I/Q, and it is used for both the I and Q channels when Input Path is I+jQ. See [“I/Q Gain Ranges” on page 878](#).

Key Path	AMPTD Y Scale, Range
Remote Command	[:SENSE] :VOLTage:IQ[:I] :RANGe[:UPPer] <voltage> [:SENSE] :VOLTage:IQ[:I] :RANGe[:UPPer] ?
Preset	1 V Peak
State Saved	Saved in instrument state.
Range	1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak
Dependencies/Couplings	When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man.
Remote Command Notes	The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V.
Example	Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI command to allow entry as a power.

Remote Command:	[:SENSE] :POWER:IQ[:I] :RANGe[:UPPer] <ampl> [:SENSE] :POWER:IQ[:I] :RANGe[:UPPer] ?
Preset:	10.0 dBm
Range:	–20 dBm to 10 dBm
Min:	–20 dBm
Max:	10 dBm

AMPTD Y Scale (Amplitude Y Scale)

Remote Command Notes:	The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9
Example:	Set the I Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω POW:IQ:RANG 4 dBm
Instrument S/W Revision:	A.01.60 or later

Q Range

Bring up the Q Range menu.

Key Path	AMPTD Y Scale, Range
Instrument S/W Revision	A.01.60 or later

Q Same as I Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only needs to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is “Off” the I and Q channel setups will be identical.

Key Path	AMPTD Y Scale, Range, Q Range
Remote Command	<pre>[:SENSe] :VOLTage POWER:IQ:MIRROred OFF ON 0 1 [:SENSe] :VOLTage POWER:IQ:MIRROred?</pre>
Preset	On
State Saved	Saved in instrument state.
Range	On Off
Dependencies/Couplings	When On, the I Range value is mirrored (copied) to the Q Range.
Example	Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF
Instrument S/W Revision	A.01.60 or later

Q Range Value This is the internal gain range for the Q channel. See [“I/Q Gain Ranges” on page 878](#).

The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

Key Path	AMPTD Y Scale, Range
Remote Command	[:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] <voltage> [:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] ?
Preset	1 V Peak
State Saved	Saved in instrument state.
Range	1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak
Dependencies/Couplings	When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man.
Remote Command Notes	The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.
Example	Set the Q Range to 0.5 V Peak VOLT:IQ:Q:RANG 0.5 V
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI command to allow entry as a power.

Remote Command:	[:SENSe] :POWer:IQ:Q:RANGe[:UPPer] <ampl> [:SENSe] :POWer:IQ:Q:RANGe[:UPPer] ?
Preset:	10.0 dBm
Range:	-20 dBm to 10 dBm
Min:	-20 dBm
Max:	10 dBm

AMPTD Y Scale (Amplitude Y Scale)

Remote Command Notes:	The POWer form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9
Example:	Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω POW:IQ:Q:RANG 4 dBm
Instrument S/W Revision:	A.01.60 or later

I/Q Gain Ranges

1 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

0.5 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

0.25 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

0.125 V Peak Set the channel gain state to 1 Volt Peak.

Key Path	AMPTD Y Scale, I Range Q Range
Instrument S/W Revision	A.01.60 or later

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering

on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, then perform centering on the marker's center frequency.

A number of considerations should be observed to ensure proper operation:

If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency.

There is no preselector for signals below about 3.6 GHz

The preselector can be bypassed (see **Input/Output, Preselector On/Off**). If it is bypassed, no centering will be attempted in that range (error 229).

When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command. Note further that if the box is in a measurement such as averaging when this happens, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.

Remote Command: `[ :SENSe] :POWer [ :RF] :PCENter`

Example: `POW:PCEN`

- Dependencies/Couplings:
- Grayed out if microwave preselector is off (see **Input/Output, Microwave Preselector On/Off**)
 - If the selected marker's frequency is below Band 1, advisory message is generated and no action is taken.
 - Grayed out if entirely in Band 0.
 - Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in such models, it generates an error.
 - Active marker position determines where the centering will be attempted.

Remote Command Notes: Note that the rules outlined above under the key description apply for the remote command as well as the key. Hence, the result of the command is dependent on marker position, etc. Any message shown by the key press is also shown in response to the remote command.

Key Path: **AMPTD**

SCPI Status Bits/OPC: The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.

Dependencies:

AMPTD Y Scale (Amplitude Y Scale)

Instrument S/W Revision: A.01.60 or later

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **Presel Center** is available (see **Presel Center**, above), that is, the same gray-out rules apply.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

Preselector Adjust is a Meas Global parameter.

Remote Command: [:SENSe]:POWer[:RF]:PADJust <freq>
[:SENSe]:POWer[:RF]:PADJust?

Example: POW:PADJ 100KHz
POW:PADJ?

Dependencies/Couplings:

- Grayed out if microwave preselector is off (see **Input/Output, Microwave Preselector On/Off**)
- Grayed out if entirely in Band 0.
- Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it generates an error.

Preset: 0 MHz

State Saved: The **Presel Adjust** value set by **Presel Center**, or by manually adjusting **Presel Adjust**, is not saved in Instrument State, and does not survive Preset or power cycle.

Min: -500 MHz

Max: 500 MHz

Key Path: **AMPTD**

Default Unit: Hz

Instrument S/W Revision: A.01.60 or later

Remote Command: `[:SENSe] :POWer [:RF] :PADJust :PRESelector
MWAVE | MMWave | EXTernal`

`[ :SENSe] :POWer [ :RF] :PADJust :PRESelector?`

Remote Command Notes: `[ :SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE|MMWave|EXTernal`
 where: MWAV = 3–26 GHz
 MMWave = 26–50 GHz
 EXTernal = External

Preselector Selection - PSA had multiple preselectors, and you could select which preselector to center. Since MXA will have only one preselector, the preselector selection key will no longer be available. However, in order to provide backward compatibility, we will support the remote command.

The command form is a NOP

The query will return MWAVE

Instrument S/W Revision: A.01.60 or later

Internal Preamp

Accesses keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

Preamp on/off and Preamp Band are Meas Global parameters.

Remote Command: `[ :SENSe] :POWer [ :RF] :GAIN [ :STATe] OFF | ON | 0 | 1`
`[ :SENSe] :POWer [ :RF] :GAIN [ :STATe] ?`

Dependencies/Couplings: Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.

The preamp is not available when the electronic attenuator is enabled.

Preset: OFF

State Saved: Saved in state

Key Path: **AMPTD**

Instrument S/W Revision: A.01.60 or later

AMPTD Y Scale (Amplitude Y Scale)

Remote Command:	<code>[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL</code> <code>[:SENSe] :POWer [:RF] :GAIN:BAND?</code>
Dependencies/Couplings:	Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an “Option not installed” message is generated.
Preset:	LOW
State Saved:	Saved in state
Key Path:	AMPTD, Internal Preamp
Instrument S/W Revision:	A.01.60 or later

Off

Turns the internal preamp off

Example:	<code>:POW:GAIN OFF</code>
Key Path:	AMPTD, Internal Preamp
Instrument S/W Revision:	A.01.60 or later

Low Band

Sets the internal preamp to use only the low band (0–3 GHz)

Example:	<code>:POW:GAIN ON</code> <code>:POW:GAIN:BAND LOW</code>
Key Path:	AMPTD, Internal Preamp
Instrument S/W Revision:	A.01.60 or later

Full Range

Sets the internal preamp to use its full range. The low band (0–3 GHz) is supplied by the low band preamp and the frequencies above 3.6 GHz are supplied by the high band preamp.

The instrument compensates for the preamp gain(s) as it sweeps. For the value of “Int Preamp Gain” in the Ref Level equations, we assume a preamp gain of 20 dB in Low Band Preamp mode and 35 dB in Full Range preamp mode. These gain rules are not dependent on start and stop frequencies. These gains are the maximum gain of the preamp hardware; we will always have the same or less actual gain, providing clipping margin.

The frequency range of the installed (optional) preamp is displayed in square brackets on the key label. If

the high band option is not installed the Full Range key does not appear.

Example:	:POW:GAIN ON
	:POW:GAIN:BAND FULL
Key Path:	AMPTD, Internal Preamp
Instrument S/W Revision:	A.01.60 or later

AMPTD Y Scale (Amplitude Y Scale)

AUTO COUPLE

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement which have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key is meas local key, so its actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

Remote Command:	:COUPle ALL NONE
Example:	:COUP ALL
Remote Command Notes:	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Instrument S/W Revision:	A.01.60 or later

AUTO COUPLE

BW

Bandwidth features are unique to each Measurement. See the specific Measurement for more information.

The front-panel key accesses keys to control measurement bandwidth settings.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Cont (Continuous Measurement/Sweep)

Cont Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

Remote Command:	:INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous?
Example:	:INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset:	ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved:	Saved in Instrument State
Key Path:	Front-panel key
Instrument S/W Revision:	A.01.60 or later

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc. when in Continuous mode. When the average count reaches the **Average/Hold Number** the count stops incrementing but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the **Average/Hold Number** is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of **Trace Average**, **Max Hold**, or **Min Hold**.

In Other Measurements/Modes:

With **Avg Number** (in **Meas Setup** menu) set to **Off** or set to **On** with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with **Avg Number** set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg Number is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the **Continuous** key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it's already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until k = N, at which point the current sequence will stop and the instrument will go to

Cont (Continuous Measurement/Sweep)

the idle state.

FREQ Channel

The Frequency key opens up a menu of softkeys that allow you to control the Frequency parameters of the instrument. The Center Frequency and Center Frequency Step settings are measurement global, so they affect all measurements (except the Spurious Emissions Measurement, which has no Frequency menu). The Swept SA measurement has additional keys described under that measurement.

Key Path	Front panel key
Instrument S/W Revision	A.01.60 or later

The keys listed in this section are common to all measurements, except Spurious Emissions.

Center Frequency

Sets the frequency that corresponds to the horizontal center of the graticule (for the normal setup where Frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is **Center Freq**.

The **Center Frequency** setting is the same for all measurements within a **Mode**. Some modes are also able to share a global **Center Frequency** value; if this is the case, the **Mode** will have a **Global Settings** key in its **Mode Setup** menu.

If your analyzer has multiple inputs, the Center Freq function sets (and queries) the Center Frequency for the currently selected input. If you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

FREQ Channel

See [“RF Center Freq” on page 893](#)

See [“I/Q Center Freq” on page 894](#)

See [“Center Frequency Presets” on page 893](#)

Remote Command	<pre>[:SENSe] :FREQuency:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:CENTer?</pre>
Default Unit	Hz
Dependencies/Couplings	When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop hit their limit. If the electrical attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.
Example	<pre>FREQ:CENT 50 MHz</pre> FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz <pre>FREQ:CENT?</pre>
Instrument S/W Revision	A.01.60 or later
Key Path	FREQUENCY, Center Freq
Mode	BASIC, GSM, WIMAXOFDMA, WCDMA
Scope	Meas Global
Notes	This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input. See “Center Frequency Presets” on page 893, “RF Center Freq” on page 893 and “I/Q Center Freq” on page 894.
State Saved	Saved in State

Min	Depends on instrument maximum frequency, mode, measurement, and selected input. See “Center Frequency Presets” on page 893, “RF Center Freq” on page 893 and “I/Q Center Freq” on page 894.
Max	Depends on instrument maximum frequency, mode, measurement, and selected input. See “Center Frequency Presets” on page 893, “RF Center Freq” on page 893 and “I/Q Center Freq” on page 894.
Test MIN/MAX/DEF	Yes
Status Bits/OPC Dependencies	non-overlapped
Instrument S/W Revision	A.01.60 or later

Center Frequency Presets

The following table provides the Center Frequency Presets for the various modes.

Freq Option	CF after Mode Preset	Stop Freq after Mode Preset	Max Freq (can't tune above)
503	1.805 GHz	3.6 GHz	3.7 GHz
507	3.505 GHz	7.0 GHz	7.1 GHz
508	4.205 GHz	8.4 GHz	8.5 GHz
513	6.805 GHz	13.6 GHz	13.8 GHz
526	13.255 GHz	26.5 GHz	27.0 GHz

RF Center Freq

SCPI command for specifying the RF Center Frequency. This will always access the RF value, even when the selected input is not RF. The front panel always uses the Freq Center (Selected Input).

Remote Command	[:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer?
Example	FREQ:RF:CENT 30 MHz
Instrument S/W Revision	A.01.60 or later
Mode	All
Scope	Meas Global
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.

FREQ Channel

Preset	See table above
State Saved	Saved in instrument state.
Min	–79.999995 MHz
Max	See table above. Basically instrument maximum frequency – 10 Hz minimum span. If the knob or step keys are being used, depends on the value of the other three interdependent parameters
Test MIN/MAX/DEF	Yes

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This will always access the I/Q value, even when the selected input is not I/Q. The front panel always uses the Freq Center (Selected Input).

Remote Command	<code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code>
Example	FREQ:IQ:CENt: 30 MHz
Instrument S/W Revision	A.01.60 or later
Mode	BASIC, GSM, WIMAX OFDMA, WCDMA
Scope	Meas Global
Notes	This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode.
Preset	0 Hz
State Saved	Saved in instrument state.
Min	–39.999995 MHz
Max	39.999995 MHz
Test MIN/MAX/DEF	Yes

CF Step

CF Step changes the step size for the center frequency and start/stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the Start and Stop frequencies also step by CF Step. It could be called Freq Step, but since Start

and Stop are rarely stepped, the legacy name “CF Step” best describes the key’s main use.

Remote Command	<pre>[:SENSe] :FREQuency:CENTer:STEP [:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP [:INCRement] ? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO?</pre>
Default Unit	Hz
Dependencies/Couplings	When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent –3 dB RBW value. Span, RBW, Center frequency If the electrical attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “–221, Settings conflict” warning.
Example	<pre>FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO?</pre>
SCPI Status Bits/OPC Dependencies	non-overlapped
Instrument S/W Revision	A.01.60 or later
Key Path	FREQUENCY, CF Step
Mode	SA, TDSCDMA, ADEMOD, VSA, WCDMA
Notes	Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)
Preset	Auto ADEMOD: 1 MHz ON
State Saved	Saved in State
Min	– (the maximum frequency of the instrument). (i.e. 27 GHz max freq instrument has a CF step range of +/- 27 GHz)
Max	the maximum frequency of the instrument. (i.e. 27 GHz max freq instrument has a CF step range of +/- 27 GHz)
Test MIN/MAX/DEF	Yes
Instrument S/W Revision	A.01.60 or later

Input/Output

The Input/Output features are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Input/Output key accesses the keys that control the Input/Output parameters of the instrument.

Other functions related to the input/output connections can be found under **Trig** (trigger input controls) and **System** (LAN and other I/O bus configurations) and **Amplitude** (optional internal preamp).

The functions in the Input/Output menu are common to all Modes (applications). They are “global”. But individual functions are only available in a mode if they make sense. They will be grayed out (as opposed to not showing them at all). This is a special behavior of the Input/Output Menu, which is the only menu that is common across all applications.

Remote Command:	[:SENSe] :FEED RF AIQ IQ IONLy QONLy INDependent AREFERENCE [:SENSe] :FEED?
Remote Command Notes:	The parameter EXTMixer is for future use and is not supported at this time; sending it generates an error.
Preset:	This setting is unaffected by a Preset or power cycle. It survives Mode Preset and mode changes. It is set to RF on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
State Saved:	Saved in state
Instrument S/W Revision:	A.01.60 or later

Virtually all the input/output settings are NOT a part of mode preset. They can be set to their default value by one of the three ways - by using the Restore Input/Output Defaults key on the first page of the input/output menu, by using the System->Restore System Defaults->Input/Output Settings or by using the System -> Restore System Defaults->All. Also, they survive Preset and Power cycle.

A very few of the Input/Output settings do respond to a Mode Preset; for example, if the Calibrator is on it turns off on a Preset, and if DC coupling is in effect it switches to AC on a Preset. These exceptions are made in the interest of reliability and usability, which overrides the need for absolute consistency. Exceptions are noted in the SCPI table for the excepted functions.

RF Input

Selects the front panel RF input port to be the analyzer signal input. If RF is already selected, pressing

Input/Output

this key accesses the RF input setup functions.

Example: [:SENSe]:FEED RF

Key Path: **Input/Output**

Instrument S/W Revision: A.01.60 or later

Input Z Correction

Sets the input impedance for unit conversions. This affects the results when the y axis unit is voltage or current units (dBmV, dBμV, dBμA, V, A) but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohm. Setting the computational input impedance to 75 ohm is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with 50 ohm input impedance.

There are a variety ways to make 50 to 75 ohm transitions, such as impedance transformers or minimum loss pads. The choice of the solution that is best for your measurement situation requires balancing the amount of loss that you can tolerate with the amount of measurement frequency range that you need. If you are using one of these pads/adaptors with the **Input Z Corr** function, you might also want to use the **Ext Gain** key. This function is used to set a correction value to compensate for the gain (loss) through your pad. This correction factor is applied to the displayed measurement values.

Remote Command: [:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50|75
[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?

Example: CORR:IMP 75 sets the input impedance correction to 75 ohms.
CORR:IMP?

Preset: This is unaffected by Preset but is set to 50 ohms on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Some instruments/options may have 75 ohms available.

State Saved: Saved in State

Key Path: **Input/Output, RF**

Instrument S/W Revision: A.01.60 or later

RF Coupling

Specifies alternating current (AC) or direct current (DC) coupling at the analyzer RF input port. Selecting AC coupling switches in a blocking capacitor that blocks any DC voltage present at the analyzer input. This decreases the input frequency range of the analyzer, but prevents damage to the input circuitry of the analyzer if there is a DC voltage present at the RF input.

In AC coupling mode, you can view signals less than 10 MHz but the amplitude accuracy is not specified. To accurately see a signal of less than 10 MHz, you must switch to DC coupling.

Some amplitude specifications apply only when coupling is set to DC. Refer to the appropriate

amplitude specifications and characteristics for your analyzer.

When operating in DC coupled mode, ensure protection of the analyzer input circuitry by limiting the DC part of the input level to within 200 mV of 0 Vdc. In AC or DC coupling, limit the input RF power to +30 dBm (1 Watt).

Selecting Input Coupling

X-Series Option	AC Frequency Range	N9010A DC Frequency Range	N9020A DC Frequency Range
Option 503	10 MHz to 3.6 GHz	9 kHz to 3.6 GHz	3 Hz to 3.6 GHz
Option 507	10 MHz to 7.0 GHz	9 kHz to 7.0 GHz	
Option 508	10 MHz to 8.4 GHz		3 Hz to 8.4 GHz
Option 513	10 MHz to 13.6 GHz	9 kHz to 13.6 GHz	3 Hz to 13.6 GHz
Option 526	10 MHz to 26.5 GHz	9 kHz to 26.5 GHz	3 Hz to 26.5 GHz

Remote Command: :INPut:COUPling AC|DC
:INPut:COUPling?

Example: INP:COUP DC

Preset: AC

State Saved: Saved in State

Key Path: **Input/Output, RF**

Instrument S/W Revision: A.01.60 or later

I/Q

This feature is not available unless the Baseband I/Q option (BBA) is installed.

Selects the front panel I/Q input ports to be the analyzer signal input. If I/Q is already selected, pressing this key accesses the I/Q setup menu.

Restriction and Notes Not all measurements support the use of the I/Q signal input. When I/Q is selected in a measurement that does not support it, the “Meas invalid with I/Q inputs” error condition occurs.

Input/Output

Remote Command Notes	The parameters IQ IONLy QONLy are only supported for backwards compatibility. The E44406 SCPI has the following that corresponds to FEED:IQ:TYPE for MXA. [[:SENSe]:FEED IQ IONLy QONLy [[:SENSe]:FEED? [[:SENSe]:FEED IQ will set the I/Q path to IQ [[:SENSe]:FEED IQNly will set the I/Q path to I Only [[:SENSe]:FEED IQNly will set the I/Q path to QOnly Note [[:SENSe]:FEED? will not be backward compatible. The query [[:SENSe]:FEED? will always return AIQ whatever the type of legacy parameters IQ IONLy QONLy has been used.
Example	FEED AIQ
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output
Mode	BASIC, CDMA2K, EDGE GSM, TDSCMDA, VSA89601, WIMAXOFDMA

The Baseband I/Q functionality is a hardware option. It is option BBA. If the option is not installed, none of the I/Q functionality is enabled.

The Baseband I/Q has four input ports and one output port. The input ports are I, I-bar, Q, and Q-bar. The I and I-bar together compose the I channel and the Q and Q-bar together compose the Q channel. Each channel has two modes of operation, Single-Ended (also called “unbalanced”) and Differential Input (also called “balanced”). When in Single-Ended operation, only the main port (I or Q) is used and the complementary port (I-bar or Q-bar) is ignored. When in Differential Input mode, both main and complementary ports are used.

The input settings (range, attenuation, skew, impedance, external gain) apply to the channels, not the individual ports.

The system supports a variety of 1 M Ω input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 M Ω probes, the probe will introduce a capacitive load on the circuit, unless higher attenuation is used at the probe interface. Higher attenuation reduces the signal level and degrades the signal-to-noise-ratio of the measurement. Passive probes are available with a variety of attenuation values for a moderate cost. Most Agilent passive probes can be automatically identified by the system, setting the input impedance setting required as well as the nominal attenuation. For single ended

measurements a single probe is used for each channel. Other passive probes can be used, with the attenuation and impedance settings configured manually.

For full differential measurements, the system supports probes on each of the four inputs. The attenuation of the probes should be the same for good common mode rejection and channel match.

Both active and passive probes in single ended and differential configurations can be calibrated. This calibration uses the Cal Out BNC connection and a probe connection accessory. The calibration achieves excellent absolute gain flatness in a probed measurement. It matches both the gain and frequency response of the I and Q channels as well as any delay skew, resulting in high accuracy in derived measurements such as Error Vector Magnitude (EVM).

When a probe is connected a status message will be displayed. The message will indicate if calibration data is available or not. Calibration data is saved for each type of probe (including “none”) for each port and will be reapplied whenever that type of probe is re-connected to the same port. For probes with EEPROM identification, the calibration data will be stored based on the unique probe identifier and will reapply data for that particular probe if it is available. The data will not follow a probe from one port to another. For probes without EEPROM identification, the instrument cannot distinguish between different probes of the same type and it will use the data from the last calibration for that probe type on that port.

When in differential mode, both the main and complementary probes are expected to be of the same type.

In some situations, the I and Q channels should be configured identically. In other situations it is convenient to control them independently. Some menus have a “Q Same as I” setting that will cause the Q channel configuration to mirror the I channel configuration, avoiding the overhead of double data entry when the channels should be the same.

The output port is for calibrating the I/Q input ports, although it can also be manually controlled.

There are two types of calibrations available: cable calibration and probe calibration. The cable calibration will guide you through connecting each input port in turn. All ports must be calibrated together. The probe calibration is done for a specific channel (I or Q). If in Single-Ended mode, only the main port is calibrated. When in Differential Input mode, you are guided through calibrating both main and complementary ports.

The front panel I/Q port LEDs indicate the current state of that port. On (green) indicates it is active, and off (dark) indicates it is not in use. For example, the Cal Out port LED is on if and only if there is signal coming out of that port.

The input is a context and some parameters have separate values for each context. The SCPI for these parameters has an optional “[:RF|IQ]” node. If the specific context is omitted, the command acts on the current input context's value. Here are the parameters that are input context sensitive:

- Center Frequency
- Trigger Source

It is important to distinguish between the I and Q input ports and the displayed I and Q data values. The I and Q input ports feed into a digital receiver that does digital tuning and filtering. The I and Q data seen by you (either on the display or through SCPI) corresponds to the real (“I”) and the imaginary (“Q”) output from the digital receiver. When the input path is I+jQ or I Only and the center frequency is 0 Hz the I input ends up in as the real output from the receiver and appears as “I” data. Likewise, when the input path is I+jQ and the center frequency is 0 Hz, the Q input ends up as the imaginary output from the

Input/Output

receiver and appears as “Q” data. However, when the input path is Q Only, the Q input is sent to the receiver as $Q+j0$, so the receiver output has the Q input coming out on the real output, and so in Q Only, the signal from the Q input port appears as the “I” data. Another situation where the I and Q data do not necessarily correspond directly to the I and Q inputs is when the center frequency is non-zero. The digital processing involved in the tuning is a complex operation. This will result in I Only data appearing as both “I” and “Q” data, the same as that signal would appear if seen through the RF input port.

I/Q Path

Select which I/Q input channels are active. The LED next to each I/Q input port will be on when that port is active.

The analysis bandwidth for each channel is the same as that of the instrument. So, for example, the base N09020A has a bandwidth of 10 MHz. With I/Q input the I and Q channels would each have an analysis bandwidth of 10 MHz, giving 20 MHz of bandwidth when the I/Q Path is I+jQ. With option B25, the available bandwidth becomes 25 MHz, giving 25 MHz each to I and Q and 50 MHz to I+jQ.

I/Q voltage to power conversion processing is dependent on the I/Q Path selected.

- With I+jQ input we know that the input signal may not be symmetrical about 0 Hz, because it has a complex component. Therefore, above 0 Hz only the positive frequency information is displayed, and below 0 Hz only the negative frequency information is displayed.
- With all other Input Path selections, the input signal has no complex component and therefore is always symmetrical about 0 Hz. In this case, by convention, the power conversion shows the combined voltage for both the positive and negative frequencies. The information displayed below 0 Hz is the mirror of the information displayed above 0 Hz. This results in a power reading 6.02 dB higher (for both) than would be seen with only the positive frequency voltage. Note also that, in this case the real signal may have complex modulation embedded in it, but that must be recovered by further signal processing.
-

Key Path	Input/Output, I/Q
Remote Command	[:SENSE] :FEED:IQ:TYPE IQ IONLY QONLY INDEPENDENT [:SENSE] :FEED:IQ:TYPE?
Preset	IQ
State Saved	Yes
	This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	I+jQ I Only Q Only Independent I and Q
Restriction and Notes	The Independent I and Q selection is only available in GPVSA
Example	Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ
Instrument S/W Revision	A.01.60 or later

Remote Command: :INPut [1] :IQ:TYPE IQ|I|Q
:INPut [1] :IQ:TYPE?

Preset: IQ

Instrument S/W Revision: A.01.60 or later

I+jQ Set the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

Key Path **Input/Output, I/Q, I/Q Path**

Example Set the input to be both the I and Q channels, combined as $I + j * Q$.

FEED:IQ:TYPE IQ

Instrument S/W Revision A.01.60 or later

I Only Set the signal input to be only the I channel. The Q channel will be ignored. The data collected is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

Key Path **Input/Output, I/Q, I/Q Path**

Example Set the input to be only the I channel.

FEED:IQ:TYPE IONL

Instrument S/W Revision A.01.60 or later

Q Only Set the signal input to be only the Q channel. The I channel will be ignored. The Q channel will be sent to the digital receiver block as $Q+j0$. The receiver's output is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant. Note that since the receiver's real output is displayed as the "I" data, when the center frequency is 0, the Q Only input appears as the "I" data.

Key Path **Input/Output, I/Q, I/Q Path**

Example Set the input to be only the Q channel.

FEED:IQ:TYPE QONL

Instrument S/W Revision A.01.60 or later

Independent I and Q Set the signal input to be both the I and Q channels, but as independent inputs. It is equivalent to treating I as channel 1 and Q as channel 2 in an oscilloscope. Each channel's data is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

This selection is only available in VXA.

Key Path **Input/Output, I/Q, I/Q Path**

Input/Output

Restriction and Notes	The Independent I and Q selection is only available in GPVSA
Example	Turn on both I and Q channels and treat I as channel 1 and Q as channel 2. FEED:IQ:TYPE IND
Instrument S/W Revision	A.01.60 or later

I Setup

Access the channel setup parameters for the I channel.

Key Path	Input/Output, I/Q
Instrument S/W Revision	A.01.60 or later

I Differential Input Select differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

Key Path	Input/Output, I/Q, I Setup
Remote Command	:INPut:IQ[:I]:DIFFerential OFF ON 0 1 :INPut:IQ[:I]:DIFFerential?
Preset	Off
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	Off On
Dependencies/Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use). When Q Same as I is On, the value set for I will also be copied to Q.
Restriction and Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB an error condition will be set.
Example	Put the I channel in Differential Input mode INP:IQ:DIFF ON
Instrument S/W Revision	A.01.60 or later
Remote Command:	:INPut [1] :IQ:BALanced[:STATe] OFF ON 0 1 :INPut [1] :IQ:BALanced[:STATe] ?

Preset:	OFF
Remote Command Notes:	This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.
Instrument S/W Revision:	A.01.60 or later

I Input Z Select the input impedance for the I channel. The impedance applies to both the I and I-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Remote Command	:INPut [1] :IQ[:I] :IMPedance LOW HIGH :INPut [1] :IQ[:I] :IMPedance?
Dependencies/Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed on Q and Q Same as I is On, the value set for I will also be copied to Q.
Remote Command Notes	LOW = 50 Ω , HIGH = 1 M Ω
Example	Set the I channel input impedance to 1 M Ω INP:IQ:IMP HIGH
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, I/Q, I Setup
Preset	LOW
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	50 Ω 1 M Ω

I Skew This command sets the skew factor for the I channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling.

Key Path	Input/Output, I/Q, I Setup
Remote Command	[:SENSe] :CORRection:IQ[:I] :SKEW <seconds> [:SENSe] :CORRection:IQ[:I] :SKEW?
Preset	0

Input/Output

State Saved	Yes
	This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	0 s to 100 ns
Example	Delay the data for the I channel by 10 ns. CORR:IQ:SKEW 10 ns
Instrument S/W Revision	A.01.60 or later

I Probe Access the probe setup parameters for the I channel. See [“I/Q Probe Setup” on page 909](#).

Key Path	Input/Output, I/Q, I Setup
State Saved	No
Instrument S/W Revision	A.01.60 or later

Combined Differential/Input Z This is SCPI only (no front panel) and is for backwards compatibility only. It combines the Differential Input and Input Z selections into a single SCPI command.

Remote Command:	INPut : IMPedance : IQ U50 B50 U1M B1M INPut : IMPedance : IQ?
Preset:	U50
Remote Command Notes:	The enum values translate as follows: U50: Differential Input = Off, Input Z = 50Ω B50: Differential Input = On, Input Z = 50Ω U1M: Differential Input = Off, Input Z = 1 MΩ B1M: Differential Input = On, Input Z = 1 MΩ This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) parameter with the Differential Input (Off = “Unbalanced”, On = “Balanced”) parameter into a single enumeration. This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On. Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has “IQ” before “IMP” while this command has that order reversed.
Dependencies/Couplings:	This command does not have an independent parameter, but instead is tied to the Differential Input and Input Z parameters. The coupling for those parameters apply to this command too.

Example: INPut:IMPedance:IQ U50
 This is equivalent to the following two SCPI commands:
 INP:IQ:DIFF OFF
 INP:IQ:IMP 50

Instrument S/W Revision: A.01.60 or later

Q Setup

Access the channel setup parameters for the Q channel.

Key Path **Input/Output, I/Q**
 Instrument S/W Revision A.01.60 or later

Q Same as I Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel parameters to be mirrored from the I channel. That way you only needs to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is turned off the I and Q channel setups will be identical. This does not apply to Probe settings or to parameters that determined by the probe.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:MIRRored OFF ON 0 1 :INPut:IQ:MIRRored?
Preset	This is unaffected by Preset but is set to the default value (Q Same as I set to "On") on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Range	On Off
Dependencies/Couplings	Only displayed for the Q channel. When Yes, the I channel values for some parameters are mirrored (copied) to the Q channel. However, when a parameter is determined by the type of probe and a probe is sensed, the probe setting is always used and the I channel setting is ignored. The following parameters are mirrored: Differential Input (when not determined by probe) Input Z (when not determined by probe)
Example	Turn off the mirroring of parameters from I to Q. INP:IQ:MIRR OFF
Instrument S/W Revision	A.01.60 or later

Q Differential Input Select differential input on or off for the Q channel. For differential input (also called balanced input), the analyzer uses both the Q and Q-bar ports. When differential input is off (also

Input/Output

called single-ended or unbalanced input), the analyzer uses only the Q port.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	:INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential?
Preset	Off
State Saved	On This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	Off On
Dependencies/Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use). When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On.
Restriction and Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB an error condition will be set.
Example	Put the Q channel in Differential Input mode INP:IQ:Q:DIFF ON
Instrument S/W Revision	A.01.60 or later

Q Input Z Select the input impedance for the Q channel. The impedance applies to both the Q and Q-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

Remote Command	:INPut [1] :IQ:Q:IMPedance LOW HIGH :INPut [1] :IQ:Q:IMPedance?
Dependencies/Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On.
Remote Command Notes	LOW = 50 Ω , HIGH = 1 M Ω
Example	Set the Q channel input impedance to 1 M Ω INP:IQ:Q:IMP HIGH

Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, I/Q, Q Setup
Preset	LOW
State Saved	On
	This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	50 Ω 1 M Ω

Q Skew This command sets the skew factor for the Q channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling and probes.

Key Path	Input/Output, I/Q, Q Setup
Remote Command	<code>[:SENSe] :CORRection:IQ:Q:SKEW <seconds></code> <code>[:SENSe] :CORRection:IQ:Q:SKEW?</code>
Preset	0
State Saved	Yes
	This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	0 s to 100 ns
Example	Delay the data for the Q channel by 10 ns. <code>CORR:IQ:Q:SKEW 10 ns</code>
Instrument S/W Revision	A.01.60 or later

Q Probe Access the probe setup parameters for the Q channel. See **I/Q Probe Setup**, below

Key Path	Input/Output, I/Q, Q Setup
State Saved	No
Instrument S/W Revision	A.01.60 or later

I/Q Probe Setup

The set of I/Q probe setup parameters will change based on the type of probe that is sensed. All probe types have the Attenuation parameter, and all probe types can be calibrated. The remaining parameters are only available for some probe types and will not be shown when not available. The probe type is determined by and reported for only for the I and Q ports, never the I-bar or Q-bar ports. The menu title will be “<ch>: <probe id>”, where “<ch>” is either “I” or “Q” and “<probe id>” is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be “I: 1130A”.

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe

Input/Output

type “Unknown” is used, and this is also is treated like a probe type with its own calibration data. When a probe is changed, the calibration data for that probe type for that port is restored. An advisory message will be displayed showing the new probe type and the calibration status. The calibration data is stored permanently (survives power cycle) and is not affected by Preset or any of the Restore commands. When the probe has EEPROM identification (most newer Agilent probes have this), the calibration data is stored by probe serial number and port, so if you has two probes of the same type, the correct calibration data will be used for each. For probes that do not have EEPROM identification, the calibration data is stored by probe type and port and the instrument cannot distinguish between different probes of the same type. In all cases (with or without EEPROM identification), the calibration data is port specific, so it will not follow a specific probe from port to port if the probe is moved.

The “Unknown” probe type is used whenever no probe is sensed. When no calibration data exists for “Unknown” the latest cable calibration data is used (see [“I/Q Guided Calibration” on page 929](#)).

Attenuation The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You is able to modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	<code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio <real></code> <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio?</code>
Preset	Each probe type has its own default. The default for the “Unknown” probe type is 1:1.
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	0.001 to 10000
Restriction and Notes	Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged.
Example	Set the attenuation for the current I probe to 100.00:1. <code>CORR:IQ:I:ATT:RAT 100</code>
Instrument S/W Revision	A.01.60 or later

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

Remote Command:	<code>[:SENSe] :CORRection:IQ:I Q:ATTenuation <rel_ampl></code> <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation?</code>
Range:	–60 dB to +80 dB
Example:	Set the attenuation for the current I probe type to 100.00:1. <code>CORR:IQ:I:ATT 20 dB</code>
Instrument S/W Revision:	A.01.60 or later

Offset Some active probes have DC offset capability. When one of these probes is connected this control will be visible. The signal is will be adjusted for the DC offset before entering the analyzer's port. This allows for removal of a DC offset before hitting the analyzer's input port voltage limits. For example, a signal that varies 1 V peak-to-peak with a DC offset equal to the analyzer's max input voltage would exceed the input limits of the analyzer for half its cycle. Removing the DC offset allows the analyzer to correctly process the entire signal.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:OFFSet:I Q <voltage> :INPut:OFFSet:I Q?
Preset	0 V
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	–18 V to +18 V
Restriction and Notes	Only some probe types support Offset. For those that do, each probe type has its own Offset setting. As probes are changed the Offset value will reflect the new probe's setting. Changing the Offset affects only the current probe type's setting and leaves all others unchanged.
Example	Remove a DC offset of –0.5 V from the I channel input. INP:OFF:I –0.5
Instrument S/W Revision	A.01.60 or later

Coupling Some probe types allow coupling to reject low frequencies. This will filter out the DC component of a signal that is composed of a DC bias plus some AC signal. This control is visible only for probe types that have this capability.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command	:INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q?
Preset	DC
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.
Range	DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2
Restriction and Notes	Only some probe types support Coupling. For those that do, each probe type has its own Coupling setting. As probes are changed the Coupling value will reflect the new probe's setting. Changing the Coupling affects only the current probe type's setting and leaves all others unchanged.
Example	Set the probe to low frequency rejection below 1.7 Hz. INP:COUP:I LFR1
Instrument S/W Revision	A.01.60 or later

Input/Output

DC Turn off low frequency rejection, allowing signals down to DC.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn off low frequency rejection on the I channel INP:COUP:I DC
Instrument S/W Revision	A.01.60 or later

LFR1 Turn on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1
Instrument S/W Revision	A.01.60 or later

LFR2 Turn on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example	Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2
Instrument S/W Revision	A.01.60 or later

Calibrate Invoke the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See [“I/Q Guided Calibration” on page 929](#).

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Instrument S/W Revision	A.01.60 or later

Clear Calibration Clear the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe; the probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the

main port is cleared.

Key Path	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Remote Command	<code>:CALibration:IQ:PROBe:I Q:CLEar</code>
Example	Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). <code>:CAL:IQ:PROBe:I:CLE</code>
Instrument S/W Revision	A.01.60 or later

Reference Z

Set the value of the impedance to be used in converting voltage to power for the I and Q channels. This does not change the hardware's path impedance (see [“I Input Z” on page 905](#)).

Key Path	Input/Output, I/Q
Remote Command	<code>:INPut:IMPedance:REFeRence <integer></code> <code>:INPut:IMPedance:REFeRence?</code>
Preset	50 Ω
State Saved	Yes This is unaffected by Preset but is set to the default value on a “Restore Input/Output Defaults” or “Restore System Defaults->All”
Range	1 Ω to 1 M Ω
Example	Set the I/Q reference impedance to 50 Ω <code>INP:IMP:REF 50</code>
Instrument S/W Revision	A.01.60 or later

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator “off” (meaning switches back to the selected input). If one of the three calibrator signals (50 MHz, –25 dBm, the 4.8 GHz internal amplitude reference or the 300 MHz comb signal) is chosen (as opposed to OFF), the analyzer routes the selected internal amplitude reference as the input signal, while leaving the input selection in the menus (RF, Ext Mix or I/Q) unchanged.

The 50 MHz internal reference and the 300 MHz comb signal are available with all the frequency options. The 4.8 GHz internal reference is only available with 507, 508, 513, 526, 544, and 550.

This function presets to OFF on a Mode Preset, which causes the internal circuitry to switch back to the selected input (RF, Ext Mix or I/Q).

Remote Command:	<code>[:SENSe] :FEED:AREFeRence REF50 REF4800 COMB OFF</code> <code>[:SENSe] :FEED:AREFeRence?</code>

Input/Output

Example:	FEED:AREF REF50 selects the 50 MHz amplitude reference as the signal input. FEED:AREF REF4800 selects the 4.8 GHz amplitude reference as the signal input FEED:AREF COMB selects the 300 MHz comb modulated signal as the signal input FEED:AREF OFF turns the calibrator “off” (meaning switches back to the selected input – RF, ExtMix or I/Q)
Dependencies/Couplings:	Selecting an input (RF, Ext Mix or I/Q) turns the Calibrator OFF. This is true whether the input is selected by the keys or with the [:SENSe]:FEED command.
Preset:	OFF
State Saved:	Saved in State
Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

50 MHz

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

Key Path	Input/Output, Amptd Ref
Instrument S/W Revision	A.01.60 or later

Comb

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

Off

Switches the input back to the selected input (RF, Ext Mix or I/Q)

Key Path	Input/Output, RF Calibrator
Instrument S/W Revision	A.01.60 or later

External Gain

Compensates for gain/loss in the measurement system outside the spectrum analyzer. The External Gain is subtracted from the amplitude readout (or the loss is added to the amplitude readout). So, the displayed signal level represents the signal level at the output of the device-under-test, which can be the input of an external device that provides gain/loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc., are all affected by External Gain. Changing the External Gain, even on a trace which is not updating, will immediately change all of the above, without new data needing to be taken.

Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep, but the data will not change until the trace data updates, because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.

In the Spectrum Analyzer mode, a Preamplifier is the common external device providing gain/loss. In a measurement application mode like GSM or W-CDMA, the gain/loss could be from a BTS (Base Transceiver Station) or an MS (Mobile Station). So in the Spectrum Analyzer mode MS and BTS would be grayed out and the only choice would be Ext Preamplifier. Similarly in some of the digital communications applications, Ext Preamplifier will be grayed out and you would have a choice of MS or BTS.

Dependencies/Couplings:	The Ext Preamplifier, MS, and BS keys may be grayed out depending on which measurement is currently selected. If any of the grayed out keys are pressed, or the equivalent SCPI command is sent, an advisory message is generated.
Key Path:	Input/Output
Instrument S/W Revision:	A.01.60 or later

Ext Preamplifier

This function is similar to the reference level offset function. Both affect the displayed signal level. Ref Lvl Offset is a mathematical offset only, no analyzer configuration is affected. Ext Preamplifier gain is used when determining the auto-coupled value of the Attenuator. The External Gain value and the Maximum Mixer Level settings are both part of the automatic setting equation for the RF attenuation setting. (10 dB of Attenuation is added for every 10 dB of External Gain.)

Please note that the Ref Lvl Offset and Maximum Mixer Level are described in the Amplitude section. They are reset by the instrument Preset. The External Preamplifier Gain is reset by the “Restore Input/Output Defaults” or “Restore System Defaults->All functions”. The External Gain is subtracted from the amplitude readout so that the displayed signal level represents the signal level at the output of the device-under-test, which is the input of the external device that is providing gain/loss.

Remote Command:	<code>[:SENSe] :CORRection:SA[:RF]:GAIN <rel_ampl></code>
	<code>[:SENSe] :CORRection:SA[:RF]:GAIN?</code>

Input/Output

Example:	CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB CORR:SA:GAIN -10 sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB)
Dependencies/Couplings:	The reference level limits are determined in part by the External Gain/Atten, Max Mixer Level, and RF Atten. This key is grayed out in many application Modes.
Preset:	This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in State
Min:	-81.90 dB
Max:	81.90 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

MS

Sets an external gain/attenuation value for MS (Mobile Station) tests.

Remote Command:	<pre>[:SENSe] :CORRection:MS [:RF] :GAIN <rel_ampl> [:SENSe] :CORRection:MS [:RF] :GAIN?</pre>
Example:	CORR:MS:GAIN 10 sets the Ext Gain value to 10 dB CORR:MS:GAIN -10 sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Dependencies/Couplings:	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in the SA Mode.
Preset:	This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in State
Min:	-50 dB
Max:	50 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

BTS

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

Remote Command:	<code>[:SENSe] :CORRection:BTS [:RF] :GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:BTS [:RF] :GAIN?</code>
Example:	CORR:BTS:GAIN 10 sets the Ext Gain value to 10 dB CORR:BTS:GAIN -10 sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Dependencies/Couplings:	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in the SA Mode.
Preset:	This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in State
Min:	-50 dB
Max:	50 dB
Key Path:	Input/Output, Ext Gain
Instrument S/W Revision:	A.01.60 or later

I Ext Gain

This function affects only the I channel input, except when the Input Path is I+jQ. In I+jQ this setting is applied to both I and Q channel inputs. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path	Input/Output, External Gain
Remote Command	<code>[:SENSe] :CORRection:IQ:I:GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:IQ:I:GAIN?</code>
Preset	0 dB This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Restriction and Notes	Not available unless option BBA is installed

Input/Output

Example	Set the I Ext Gain to 10 dB CORR:IQ:I:GAIN 10 Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:I:GAIN -10
Instrument S/W Revision	A.01.60 or later

Q Ext Gain

This function affects only the Q channel input and only when the Input Path is not I+jQ. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path	Input/Output, External Gain
Remote Command	[[:SENSE]:CORRection:IQ:Q:GAIN <rel_ampl> [:SENSE]:CORRection:IQ:Q:GAIN?
Preset	0 dB This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in instrument state.
Min	-100 dB
Max	100 dB
Restriction and Notes	Not available unless option BBA is installed
Example	Set the Q Ext Gain to 10 dB CORR:IQ:Q:GAIN 10 Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:Q:GAIN -10
Instrument S/W Revision	A.01.60 or later

Restore Input/Output Defaults

This selection causes the group of settings and data associated with **Input/Output** key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key.

Example:	:SYST:DEF INP presets all the Input/Output variables to their factory default values.
Remote Command Notes:	Please refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEfault INPut: command.

Key Path: **Input/Output**
Instrument S/W Revision: A.01.60 or later

Data Source

Gives you the choice of either using a hardware input signal as the input or raw data stored in a data storage buffer from an earlier acquisition. You can also share raw data across certain measurements that support this feature. The measurements must be capable of storing raw data. There are three choices under this menu. You can select "Inputs" which is the same as selecting one of the inputs from the input port, for example RF, AREF, I/Q, EXTMixer or IFALign. Selecting "Capture Buffer" allows you to use data that has been stored earlier in the same measurement or from a previous measurement using the "Current Meas -> Capture Buffer" feature. Selecting "Recorded Data" allows you to playback long data capture records stored in the record buffer.

When you make a recording (see **Record Data Now** below) or when you recall a recording (see the Recall section) the data source is automatically set to Recorded Data. You can toggle the data source between Inputs and the current Recording (if there is one). That is, the recording remains in memory until it is replaced by a new recording, or the application is closed.

Remote Command: [:SENSe] :FEED:DATA INPut | STORed | RECORded
[:SENSe] :FEED:DATA?
Example: FEED:DATA REC
FEED:DATA?
Dependencies/Couplings: Not all inputs are available in all modes. Unavailable keys are grayed out.

Remote Command Notes: INPut = Inputs
STORed = Capture Buffer
RECORded = Record Data Buffer
Preset: This is unaffected by Preset but is set to INPut on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved: Saved in state
Key Path: **Input/Output**
Instrument S/W Revision: A.01.60 or later

Input/Output

Inputs

Sets the measurement to use the input selections (RF, AREF, EXTMix, I/Q)

Example: FEED:DATA INP causes the measurement to look at the input selection

Key Path: **Input/Output, Data Source**

Instrument S/W Revision: A.01.60 or later

Capture Buffer

Some WCDMA and demod measurements support this feature. This allows sharing of the raw data across certain measurements. If you want to make another measurement on the same signal, you would store that raw data using the "Current Meas -> Capture Buffer" key. Then the data is available for the next measurement to use. You must have raw data stored in the instrument memory before the Capture Buffer choice is available for use.

If you switch to a measurement that does not support this feature, then the instrument switches to use "Inputs" and grays out this key. If the grayed out key is pressed, it generates a message.

Example: FEED:DATA STOR causes stored measurement data to be used with a different measurement that supports this.

Dependencies/Couplings: Grayed out in the SA measurement.

Key Path: **Input/Output, Data Source**

Instrument S/W Revision: A.01.60 or later

Recorded Data

Directs the instrument to get data from the record data buffer in the measurement, rather than from the RF Input Signal.

Example: FEED:DATA REC causes the measurement to extract data from the record data buffer

Dependencies/Couplings: Grayed out in the SA measurement.

Key Path: **Input/Output, Data Source**

Instrument S/W Revision: A.01.60 or later

Current Meas -> Capture Buffer

Pressing this key stores the raw data of one measurement in the internal memory of the instrument where it can then be used by a different measurement by pressing "Stored Data". When raw data is stored, then data source selection switch automatically changes to "Stored Data". Stored raw data cannot be directly accessed by a user. There is no save/recall function to save the raw data in an external media. However if you want to get the stored raw data, you must first perform a measurement using the stored raw data. Now you can access the used raw data, which is the same as stored raw data, using the FETch or READ

commands.

Remote Command:	[:SENSe] :FEED:DATA:STORe
Example:	FEED:DATA:STOR stores recorded data
Dependencies/Couplings:	Grayed out in the SA measurement.
Remote Command Notes:	This is command only, there is no query
Key Path:	Input/Output, Data Source
Instrument S/W Revision:	A.01.60 or later

Record Data Now

This causes the data source to change to Inputs (if it is not already set) and a recording is made with the current instrument setup. The length of the recording must be specified in advance.

This key changes to **Abort Recording** once the recording process has started. It changes back when the recording is complete.

The following dialogs show the progress of the recording:

This key is also available in the Sweep/Control menu.

Remote Command	[:SENSe] :RECORDing:INITiate[:IMMediate]
Example	REC:INIT
Dependencies/Couplings	Changes Data source to Recorded Data. Grayed out in the SA measurement.
Remote Command Notes	This is command only, there is no query. See the Recall functionality to access previously saved data.
Instrument S/W Revision	A.01.60 or later
Key Path	Input/Output, Data Source
Mode	VSA

Remote Command:	[:SENSe] :RECORDing:ABORt
Example:	REC:ABOR
Key Path:	Input/Output, Data Source
Remote Command Notes:	This is command only, there is no query. The command does nothing if it is sent when there is no recording in progress.
Instrument S/W Revision:	A.01.60 or later

Record Length

.

Input/Output

This specifies the length of the next recording. (You cannot use this to modify the length of the current recording.) The length defaults to seconds, but you can also specify it in points at the current sample rate, or in time records at the current time record length.

Remote Command [:SENSe]:RECORDing:LENGth <real>,SEConds|RECOrds|POINts
 [:SENSe]:RECORDing:LENGth:STATe MAX|MANual
 [:SENSe]:RECORDing:LENGth:STATe?

Example REC:LENG 20,REC
 REC:LENG 4.1E-4,SEC
 REC:LENG:STAT MAX
 REC:LENG:STAT?

Remote Command Notes There is no default unit. The unit must be specified.
 The length command does not have a query form. Length information is queried using the two commands following this table.
 If set to MAX, all of the available "recording memory" is used.

Instrument S/W Revision A.01.60 or later

Key Path **Input/Output, Data Source**

Mode VSA

Preset 50 Records, Manual

State Saved No

Min 0

Max Depends on memory available

Mode VSA

Remote Command [:SENSe]:RECORDing:LENGth:VALue?

Example REC:LENG:VAL?

Preset 50 Records

Remote Command Notes Query Only
 Returns the first (numeric) parameter of the most recent [:SENSe]:RECORDing:LENGth command.

Instrument S/W Revision A.01.60 or later

Mode VSA

Remote Command [:SENSe]:RECORDing:LENGth:UNIT?

Example	REC:LENG:UNIT?
Preset	RECORDs
Remote Command Notes	Query Only Returns the second parameter of the most recent [:SENSe]:RECORDing:LENGth command. Possible values are SEC REC POIN. If no second parameter was sent, then the return value is SEC.
Instrument S/W Revision	A.01.60 or later

Freq Ref In

Specifies the frequency reference as being the internal reference, external reference or sensing the presence of an external reference.

When the frequency reference is set to internal, the internal 10 MHz reference is used even if an external reference is connected.

When the frequency reference is set to external, the instrument will use the external reference. However, if there is no external signal present, or it is not within the proper amplitude range, an error condition detected message is generated. When the external signal becomes valid, the error is cleared.

If Sense is selected, the instrument checks whether a signal is present at the external reference connector and will automatically switch to the external reference when a signal is detected. When no signal is present, it automatically switches to the internal reference. No message is generated as the reference switches between external and internal. The monitoring of the external reference occurs approximately on 1 millisecond intervals, and never occurs in the middle of a measurement acquisition, only at the end of the measurement (end of the request).

If for any reason the instrument's frequency reference is not able to obtain lock, Status bit 2 in the Questionable Frequency register will be true and an error condition detected message is generated. When lock is regained, Status bit 2 in the Questionable Frequency register will be cleared and an error message is cleared will be sent.

If an external frequency reference is being used, you must enter the frequency of the external reference if it is not exactly 10 MHz. The External Ref Freq key is provided for this purpose.

Remote Command:	[:SENSe]:ROSCillator:SOURce:TYPE INTernal EXTernal SENSe [:SENSe]:ROSCillator:SOURce:TYPE?
Preset:	This is unaffected by Preset but is set to SENSe on a "Restore Input/Output Defaults" or "Restore System Defaults->All".
State Saved:	Saved in State.
Key Path:	Input/Output
SCPI Status Bits/OPC Dependencies:	STATus:QUESTionable:FREQuency bit 2 set if unlocked.

Input/Output

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:ROSCillator:SOURce?

Remote Command Notes: The query [SENSe]:ROSCillator:SOURce? returns the current switch setting. This means:

1. If it was set to SENSe but there is no external reference so the instrument is actually using the internal reference, then this query returns INTERNAL and not SENSe.
2. If it was set to SENSe and there is an external reference present, the query returns EXTERNAL and not SENSe.
3. If it was set to EXTERNAL, then the query returns "EXTERNAL"
4. If it was set to INTERNAL, then the query returns INTERNAL

Preset: SENSe

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:ROSCillator:SOURce INTERNAL|EXTERNAL

Instrument S/W Revision: A.01.60 or later

Sense

The external reference is used if a valid signal is sensed at the Ext Ref input. Otherwise the internal reference is used.

Example: :ROSC:SOUR:TYPE SENS

Key Path: **Input/Output, Freq Ref In**

Instrument S/W Revision: A.01.60 or later

Internal

The internal reference is used.

Example: :ROSC:SOUR:TYPE INT

Key Path: **Input/Output, Freq Ref In**

Instrument S/W Revision: A.01.60 or later

External

The external reference is used.

Example: :ROSC:SOUR:TYPE EXT

Key Path: **Input/Output, Freq Ref In**

Instrument S/W Revision: A.01.60 or later

Ext Ref Freq

This key tells the analyzer the frequency of the external reference. When the external reference is in use (either because the reference has been switched to External or because the Reference has been switched to Sense and there is a valid external reference present). This information is used by the analyzer to determine the internal settings needed to lock to that particular external reference signal or external reference.)

For the instrument to stay locked, the value entered must be within 5 ppm of the actual ext ref frequency. So it is important to get it close, or you risk an unlock condition.

Note that this value only affects the instrument's ability to lock. It does not affect any calculations or measurement results. See "Freq Offset" in the Frequency section for information on how to offset frequency values.

Remote Command:	[:SENSe] :ROSCillator:EXTernal:FREQuency <freq> [:SENSe] :ROSCillator:EXTernal:FREQuency?
Example:	ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference. ROSC:SOUR:TYPE EXT selects the external reference.
Preset:	This is unaffected by Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min:	EXA: 10 MHz MXA: 1 MHz
Max:	EXA: 10 MHz MXA: 50 MHz
Key Path:	Input/Output, Freq Ref In
Default Unit:	Hz
Instrument S/W Revision:	A.01.60 or later

Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

Instrument S/W Revision A.01.60 or later

Trig Out (1 and 2)

Select the type of output signal that will be output from the rear panel Trig 1 Out or Trig 2 Out

Input/Output

connectors.

Remote Command: :TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut
 HSWP|MEASuring|MAIN|GATE|GTRigger|OEVEN
 :TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut?

Example: TRIG:OUTP HSWP

Preset: Trigger 1: Sweeping (HSWP)

 Trigger 2: Gate

 This is unaffected by Preset but is preset to the above values on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

State Saved: Saved in instrument state

Key Path: **Input/Output, Output Config**

Instrument S/W Revision: A.01.60 or later

Polarity Sets the output to the Trig 1 Out connector to trigger on either the positive or negative polarity.

Remote Command: :TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut:POLarity
 POSitive|NEGative
 :TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut:POLarity?

Example: TRIG1:OUTP:POL POS

Preset: This is unaffected by Preset but is set to POSitive on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

State Saved: Saved in state

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Sweeping (HSWP) Selects the Sweeping trigger signal to be output to the Trig 1 Out connector. This signal has historically been known as "HSWP" but care should be taken to understand that in this analyzer, its function does not exactly match other products behavior.

Example: TRIG1:OUTP HSWP

Key Path: **Input/Output, Output Config, Trig 1 Output**

Instrument S/W Revision: A.01.60 or later

Measuring Selects the Measuring trigger signal to be output to the Trig 1 Out connector. This signal is

true while the Measuring status bit is true.

Example: TRIG1:OUTP MEAS
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Main Trigger Selects the current instrument trigger signal to be output to the Trig 1 Out connector.

Example: TRIG1:OUTP MAIN
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Gate Trigger Selects the gate trigger signal to be output to the Trig 1 Out connector. This is the source of the gate timing, not the actual gate signal.

Example: TRIG1:OUTP GTR
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Gate Selects the gate signal to be output to the Trig 1 Out connector. The gate signal has been delayed and its length determined by delay and length settings. When the polarity is positive, a high on the Trig 1 Out represents the time the gate is configured to pass the signal.

Example: TRIG1:OUTP GATE
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Odd/Even Trace Point Selects either the odd or even trace points as the signal to be output to the Trig 1 Out connector when performing swept spectrum analysis. When the polarity is positive, this output goes high during the time the analyzer is sweeping past the first point (Point 0) and every other following trace point. The opposite is true if the polarity is negative.

Example: TRIG1:OUTP OEV
 Key Path: **Input/Output, Output Config, Trig 1 Output**
 Instrument S/W Revision: A.01.60 or later

Off Selects no signal to be output to the Trig 1 Out connector.

Example: TRIG1:OUTP OFF
 Key Path: **Input/Output, Output Config, Trig 1 Output**

Input/Output

Instrument S/W Revision: A.01.60 or later

Digital Bus

Opens a menu that allows you to select options for configuring the digital bus output(s) of the analyzer.

Key Path **Input/Output, Output Config**

Instrument S/W Revision A.01.60 or later

Bus Out The Digital Bus is a connector located on the rear panel of the instrument. It is a unidirectional link of real time raw ADC data at a 90 MHz rate. No corrections are applied. The ADC is sampling a 22.5 MHz IF. When Bus Out is on, all acquisitions are streamed to the output port including acquisitions for internal purposes such as Alignment; internal processing and routing of acquisitions continues as usual and is unaffected by the state of Bus Out. This port is intended for use with the Agilent N5105 and N5106 products only. It is not available for general purpose use.

Remote Command :OUTPut:DBUS [1] [:STATe] ON|OFF|1|0

:OUTPut:DBUS [1] [:STATe] ?

Example OUTP:DBUS ON

Instrument S/W Revision A.01.60 or later

Key Path **Input/Output, Output Config, Digital Bus**

Scope Mode Global

Preset This is unaffected by Preset but is set to Off on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"

State Saved Saved in instrument state.

I/Q Cal Out

The Baseband I/Q "Cal Out" port can be turned on with either a 1 kHz or a 250 kHz square wave. This can be turned on independent of the input selection. A Preset will reset this to Off.

Key Path **Input/Output, Output Config**

Remote Command :OUTPut:IQ:OUTPut IQ1|IQ250|OFF

:OUTPut:IQ:OUTPut?

Preset Off

State Saved Saved in instrument state.

Range 1 kHz Square Wave|250 kHz Square Wave|Off

Dependencies/Couplings An I/Q Cable Calibration or an I/Q Probe Calibration will change the state of the Cal Out port as needed by the calibration routine. When the calibration is finished the I/Q Cal Out is restored to the pre-calibration state.

Example OUTP:IQ:OUTP IQ1

Instrument S/W Revision	A.01.60 or later

1 kHz Square Wave Turn on the 1 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out

Instrument S/W Revision	A.01.60 or later

250 kHz Square Wave Turn on the 250 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out

Instrument S/W Revision	A.01.60 or later

Off Turn off the signal at the Cal Out port. This choice is only available with option BBA.

Key Path	Input/Output, Output Config, I/Q Cal Out

Instrument S/W Revision	A.01.60 or later

I/Q Guided Calibration

Calibrating the Baseband I/Q ports requires several steps and manual connections. The Guided Calibration will interactively step a user through the required steps, displaying diagrams to help with the connections. The steps will vary depending on the setup.

In the Guided Calibration windows, the date and time of the last calibration are displayed. If any of the items listed are displayed in yellow, this indicates that the calibration for that item is inconsistent with the latest calibration, and you should complete the entire calibration process before you exit the calibration.

I/Q Isolation Calibration

The I/Q Isolation Calibration must be run before calibrating any port with either the I/Q Cable Calibration or I/Q Probe Calibration. This calibration is performed with nothing connected to any of the front panel I/Q ports. This is the first step in both the I/Q Cable Calibration and the I/Q Probe Calibration.

Next Perform the I/Q Isolation calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration

State Saved	No.

Remote Command	<code>:CALibration:IQ:ISOLation</code>

Restriction and Notes	All front panel I/Q ports must not be connected to anything.

Input/Output

Remote Command Notes	All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command.
Example	CAL:IQ:ISOL
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

I/Q Cable Calibration

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the keys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:I|IB|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

I Port The I port calibration is performed with the front panel's I port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Instrument S/W Revision	A.01.60 or later

Next Perform the I port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No.
Remote Command	<code>:CALibration:IQ:FLATness:I</code>
Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Remote Command Notes	The I port must be connected to the Cal Out port before issuing the SCPI command.
Example	<code>CAL:IQ:FLAT:I</code>
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

I-bar Port The I-bar port calibration is performed with the front panel's I-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration

Input/Output

Restriction and Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.

Instrument S/W Revision	A.01.60 or later

Next Perform the I-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration

State Saved	No

Remote Command	:CALibration:IQ:FLATness:IBAR

Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure.

The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.

Remote Command Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command.

Example	CAL:IQ:FLAT:IBAR

Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration

Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see [“Exit Confirmation” on page 939](#)).

Instrument S/W Revision	A.01.60 or later

Q Port The Q port calibration is performed with the front panel's Q port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration

Restriction and Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.

Instrument S/W Revision	A.01.60 or later

Next Perform the Q port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No
Remote Command	:CALibration:IQ:FLATness:Q
Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Remote Command Notes	The Q port must be connected to the Cal Out port before issuing the SCPI command.
Example	CAL:IQ:FLAT:Q
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

Q-bar Port The Q-bar port calibration is performed with the front panel's Q-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Next Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
State Saved	No

Input/Output

Remote Command	<code>:CALibration:IQ:FLATness:QBAR</code>
Restriction and Notes	The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
Remote Command Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command.
Example	<code>CAL:IQ:FLAT:QBAR</code>
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, I/Q Cable Calibration
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

I/Q Probe Calibration

The I/Q probe calibration creates correction data for one of the front panel I/Q channels. When the probe has EEPROM identification, the data is unique to that specific probe. When the probe does not have EEPROM identification, the data will be used for all probes of the same type. The data is also unique to the channel, so calibration data for the I channel will not be used for the Q channel and vice versa.

The guided calibration (front panel only) will show connection diagrams and guide you through the I/Q Isolation Calibration and through calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the port already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the probe. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the keys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

For Active probes or when Differential is Off, only the main port is calibrated, otherwise both the main and complementary ports are calibrated.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in

process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:PROB:I|IB|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs are on and the others are off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each relevant port is displayed. For passive probes with Differential On, any calibration that is more than a day older than the most recent calibration is displayed with the color amber.

I Port The I port calibration is performed with the probe body attached to the front panel's I port and the probe tip connected via an adapter to the Cal Out port. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 939](#).

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Restriction and Notes	Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.
Instrument S/W Revision	A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Instrument S/W Revision	A.01.60 or later

Next Perform the I port calibration.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
State Saved	No
Remote Command	:CALibration:IQ:PROBe:I
Remote Command Notes	The I port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:I
Instrument S/W Revision	A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired

Input/Output

calibration data.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Restriction and Notes	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

I-bar Port The I-bar port calibration is performed with the probe body attached to the front panel's I-bar port and the probe tip connected via an adapter to the Cal Out port. The I-bar probe calibration is only available for passive probes with Differential On. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 939](#).

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Restriction and Notes	Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.
Instrument S/W Revision	A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
Restriction and Notes	Using the Back button does restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Next Perform the I-bar port calibration.

Key Path	Input/Output, I/Q, I Setup, I Probe, Calibrate
State Saved	No
Remote Command	<code>:CALibration:IQ:PROBe:IBAR</code>
Remote Command Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.
Example	<code>CAL:IQ:PROB:IBAR</code>

Instrument S/W Revision A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path **Input/Output, I/Q, I Setup, I Probe, Calibrate**

Restriction and Notes Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see [“Exit Confirmation” on page 939](#)).

Instrument S/W Revision A.01.60 or later

Q Port The Q port calibration is performed with the probe body attached to the front panel's Q port and the probe tip connected via an adapter to the Cal Out port. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 939](#).

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Restriction and Notes Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.

Instrument S/W Revision A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Instrument S/W Revision A.01.60 or later

Next Perform the Q port calibration.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

State Saved No

Remote Command :CALibration:IQ:PROBe:Q

Remote Command Notes The Q port must be connected to the Cal Out port before issuing the SCPI command.

The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.

Example CAL:IQ:PROB:Q

Instrument S/W Revision A.01.60 or later

Input/Output

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Restriction and Notes	Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see “Exit Confirmation” on page 939).
Instrument S/W Revision	A.01.60 or later

Q-bar Port The Q-bar port calibration is performed with the probe body attached to the front panel's Q-bar port and the probe tip connected via an adapter to the Cal Out port. The Q-bar probe calibration is only available for passive probes with Differential On. The guided calibration shows a diagram of the required connections.

Show Adapter Show a connection diagram and instructions for the probe and adapter. See [“Show Adapter Screen” on page 939](#).

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Restriction and Notes	Either a passive or an active probe adapter diagram is shown, depending on the type of probe attached.
Instrument S/W Revision	A.01.60 or later

Back Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Restriction and Notes	Using the Back button does not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows you to go back to a prior step to redo that calibration step.
Instrument S/W Revision	A.01.60 or later

Next Perform the Q-bar port calibration.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
State Saved	No
Remote Command	<code>:CALibration:IQ:PROBe:QBAR</code>
Remote Command Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and survives power cycles. It is not reset by any preset or restore data commands.
Example	<code>CAL:IQ:PROB:QBAR</code>

Instrument S/W Revision A.01.60 or later

Exit Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path **Input/Output, I/Q, Q Setup, Q Probe, Calibrate**

Restriction and Notes Using the Exit button does not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog is displayed (see [“Exit Confirmation” on page 939](#)).

Instrument S/W Revision A.01.60 or later

Show Adapter Screen When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter is shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram is shown.

Exit Confirmation

When Exit is pressed on one during one of the calibration routines, the calibration may be in an inconsistent state with some of the ports having newly measured calibration data and others with old data. If this is the case, a dialog box appears to confirm that you really wants to exit. A "Yes" answer exits the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer returns to the calibration procedure.

Marker

Some Marker operation is common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Marker key accesses the Marker menu. A marker can be placed on a trace to allow the value of the trace at the marker point to be determined precisely. The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules.

Markers may also be used in pairs to read the difference (or delta) between two data points. They can be used in Marker Functions to do advanced data processing, or to specify operating points in functions like Signal Track and N dB Points.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker

Marker Function

Some Marker Functions are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Marker Function key opens up a menu of keys that allow you to control the Marker Functions of the instrument. Marker Functions perform post-processing operations on marker data. Band Functions are Marker Functions that allow you to define a band of frequencies around the marker. The band defines the region of data used for the numerical calculations. These marker functions also allow you to perform mathematical calculations on trace and marker data and report the results of these calculations in place of the normal marker result.

Unlike regular markers, marker function markers are not placed directly on the trace. They are placed at a location which is relative to the result of the function calculation.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

Some Marker operation is common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Marker To

Meas

The information in this section is common to all measurements. For key and remote command information on each measurement, refer to the section which describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Remote Measurement Functions

This section contains the following topics:

[“Measurement Group of Commands” on page 948](#)

[“Current Measurement Query \(Remote Command Only\) ” on page 951](#)

[“Limit Test Current Results \(Remote Command Only\)” on page 952](#)

[“Data Query \(Remote Command Only\)” on page 952](#)

[“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 952](#)

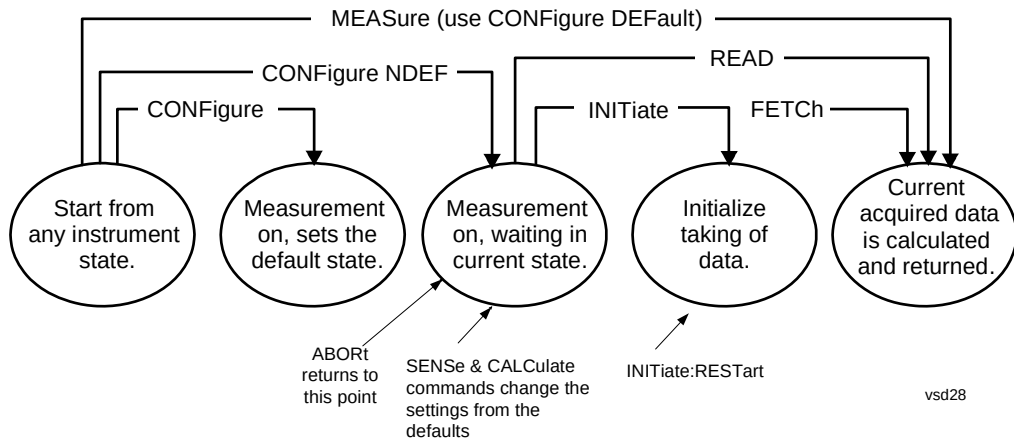
[“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 957](#)

[“Format Data: Numeric Data \(Remote Command Only\)” on page 959](#)

[“Format Data: Byte Order \(Remote Command Only\)” on page 961](#)

Instrument S/W Revision	A.01.60 or later

Measurement Group of Commands



Measure Commands:**:MEASure:<measurement>[n]?**

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (for example, radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.

The scalar measurement result are returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results are returned. See each command for details of what types of scalar results or trace data results are available.

ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure:NDEFault<measurement> stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The **CONFigure?** query returns the current measurement name.

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it does not change to a different measurement. An error is reported if a measurement other than the current one, is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results are returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results are returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument switches to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it changes from channel power to ACP and initiates an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it initiates a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:**:READ:<measurement>[n]?**

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP measurement and you send READ:ACP? it initiates a new measurement using the same instrument settings.
- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument switches to that measurement before it initiates the measurement and returns results.

For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It changes from channel power back to ACP and, using the previous ACP settings, initiates the measurement and return results.

- Blocks other SCPI communication, waiting until the measurement is complete before returning the results

If the optional [n] value is not included, or is set to 1, the scalar measurement results are returned. If the [n] value is set to a value other than 1, the selected trace data results are returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format.
(FORMat:DATA)

Instrument S/W Revision A.01.60 or later

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command: :CONFigure?

Example: CONF?

Instrument S/W Revision: A.01.60 or later

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command: :CALCulate:CLIMits:FAIL?

Example: CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits.

Returns a 0 or 1: 0 it passes, 1 it fails.

Instrument S/W Revision: A.01.60 or later

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command: :CALCulate:DATA[n] ?

Notes: The return trace depends on the measurement.

In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCh:<measurement>? query where <measurement> is the current measurement.

Instrument S/W Revision: A.01.60 or later

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst

in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command: :CALCulate:DATA<n>:COMPRESS?
BLOCK|CFIT|MAXimum|MINimum|MEAN|DMEan|RMS|RMSCubed|SAMPLE|SDEVIation|PPHase
[,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]

Remote Command Notes: The command supports 5 parameters. Note that the last 4 (<soffset>,<length>,<roffset>,<rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters.

This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.

Example: To query the mean power of a set of GSM bursts:
Supply a signal that is a set of GSM bursts.
Select the IQ Waveform measurement (in IQ Analyzer Mode).
Set the sweep time to acquire at least one burst.
Set the triggers such that acquisition happens at a known position relative to a burst.
Then query the mean burst levels using, CALC:DATA2:COMP?
MEAN,24e-6,526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)

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- **BLOCK** or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)
- **CFIT** or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query returns the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- **MINimum** - returns the minimum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- **MAXimum** - returns the maximum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.

MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is

returned. See the following equations.

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1
Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i \quad \text{vsd27-1}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2
Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i| \quad \text{vsd27-2}$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3
DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} \frac{X_i}{10} \right) \quad \text{vsd27-3}$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation.

This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4
RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2} \quad \text{vsd27-4}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

vsd27-5

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- **SAMPLE** - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- **SDEViation** - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.

For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

vsd27-7

where X_i is a data point value, $\bar{X}$ is the arithmetic mean of the data point values for the specified region(s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

vsd27-8

where $|X_i|$ is the magnitude of an I/Q pair, $\bar{X}$ is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- **PPHase** - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

Meas

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

vsd27-9

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

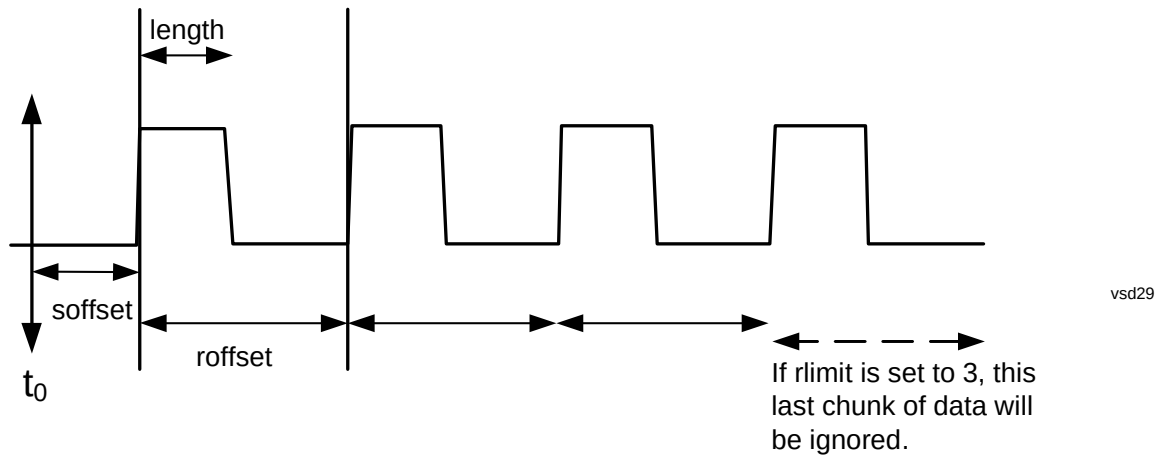
vsd27-10

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

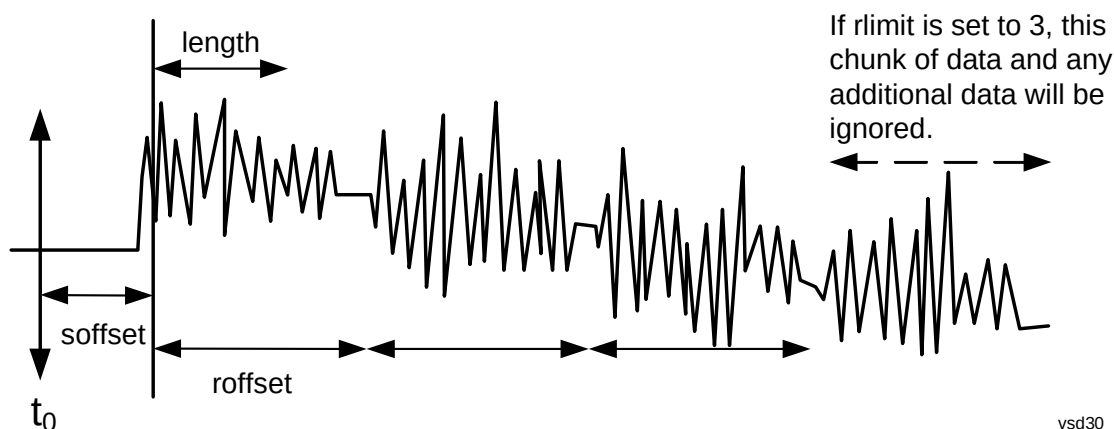
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)

Meas

- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

Remote Command:

For Swept SA measurement:

```
:CALCulate:DATA[1] | 2 | 3 | 4 | 5 | 6 :PEAKs?  
<threshold>, <excursion> [, AMPLitude | FREQuency | TIME [, ALL |  
GTDLine | LTDLine] ]
```

For most other measurements:

```
:CALCulate:DATA[1] | 2 | 3 | 4 | 5 | 6 :PEAKs?  
<threshold>, <excursion> [, AMPLitude | FREQuency | TIME]
```

Example:

Example for Swept SA measurement in Spectrum Analyzer Mode:

CALC:DATA4:PEAK? -40,10,FREQ,GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.

Query Results 1:

With FORMat:DATA REAL,32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).

If no peaks are found the peak list will consist of only the number of peaks, (0).

Dependencies/Couplings:

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported.

Notes:

<n> - is the trace that will be used

<threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.

<excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the excursion value stored under the Peak Criteria menu.

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Instrument S/W Revision: A.01.60 or later

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

Remote Command:

```
:FORMat [:TRACe] [:DATA] ASCii|INTeGer,32|REAL,32 |REAL,64
:FORMat [:TRACe] [:DATA] ?
```

Meas

Remote Command Notes:	The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm). Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32. The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Dependencies/Couplings:	Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL). Sending data to the analyzer which does not conform to the current FORMat specified, results in an error.
Preset:	ASCii
Instrument S/W Revision:	A.01.60 or later

The specs for each output type follow:

ASCii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command:	:FORMat:BORDER NORMal SWAPped :FORMat:BORDER?
Preset:	NORMal
Instrument S/W Revision:	A.01.60 or later

Meas

Meas Setup

Meas Control features are unique to each Measurement. See the specific Measurement for more information.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Mode

The Mode key allows you to select the available measurement applications. The application software must be loaded and license for it to be available. Measurement applications are a collection of measurement capabilities packaged together to provide an instrument personality that is specific to your measurement needs. Each mode software product is ordered separately by Model Number. The default measurement mode is the first listing in the menu.

Key operation can be different between modes. The information displayed in Help is about the current mode.

To access Help for a different Mode you must first exit Help (by pressing the Cancel (Esc) key). Then select the desired mode and re-access Help.

A list of the valid mode choices is returned with the INST:CAT? Query.

Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

Key Path	Mode
Remote Command	:INSTrument [:SElect] SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA GSM CDMA1XEV RLC :INSTrument [:SElect] ?
Example	:INST SA
Remote Command Notes	The available parameters are dependent upon installed and licensed applications resident in the instrument. Parameters given here are an example, specific parameters are in the individual Application. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.
Preset	Not affected by Preset. Set to SA following Restore System Defaults, if SA is the default mode.
State Saved	Saved in state
Instrument S/W Revision	A.01.60 or later

Application Mode Number Selection (Remote Command only)

Select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument.

Mode	:INSTrument:NSElect <integer>	:INSTrument[:SElect] <parameter>
Spectrum Analyzer	1	SA
I/Q Analyzer (Basic)	8	BASIC
WCDMA with HSDPA/HSUPA	9	WCDMA
cdma2000	10	CDMA2K
GSM & EDGE	13	EDGE GSM
Phase Noise	14	PNOISE
1xEV-DO	15	CDMA1XEV
802.16 OFDMA (WiMAX/WiBro)	75	WIMAXOFDMA
Vector Signal Analyzer	100	VSA
89601 VSA	101	VSA89601
LTE	102	LTE
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
Noise Figure	219	NFIGURE
Analog Demod	234	ADEMOD
Remote Language Compatibility	266	RLC
Instrument S/W Revision	A.01.60 or later	

Remote Command: :INSTrument:NSElect <integer>
:INSTrument:NSElect?

Example: :INST:NSEL 1

Remote Command Notes: SA mode is 1

The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available.

Preset: Not affected by Preset. Set to default mode (1 for SA mode) following Restore System Defaults.

State Saved: Saved in state

Instrument S/W Revision: A.01.60 or later

Application Mode Catalog Query (Remote Command only)

Returns a string containing a comma separated list of names of all the installed and licensed measurement modes (applications). These names can only be used with the :INSTrument[:SElect] command.

Remote Command: :INSTrument :CATalog?

Example: :INST:CAT?

Remote Command Notes: Query returns a quoted string of the installed and licensed modes separated with a comma. Example:

"SA,PNOISE,WCDMA"

Instrument S/W Revision: A.01.60 or later

Application Identification (Remote Commands only)

Each entry in the Mode Menu will have a Model Number and associated information: Version, and Options.

This information is displayed in the Show System screen. The corresponding SCPI remote commands are defined here.

Current Application Model

Returns a string which is the Model Number of the currently selected application (mode).

Remote Command: :SYSTem:APPLication[:CURRent] [:NAME] ?

Example: :SYST:APPL?

Remote Command Notes: Query returns a quoted string which is the Model Number of the currently selected application (Mode). Example:

"N9060A"

String length is 6 characters.

Preset: Not affected by Preset

State Saved: Not saved in state, the value will be the selected application when Save is done.

Instrument S/W Revision: A.01.60 or later

Current Application Revision

Returns a string which is the Revision of the currently selected application (mode).

Remote Command: :SYSTem:APPLication[:CURRent] :REVision?

Mode

Example:	:SYST:APPL:REV?
Remote Command Notes:	Query returns a quoted string which is the Revision of the currently selected application (Mode). Example: "1.0.0.0" String length is a maximum of 23 characters. (each numeral can be an integer + 3 decimal points)
Preset:	Not affected by Preset
State Saved:	Not saved in state, the value will be the selected application when Save is done.
Instrument S/W Revision:	A.01.60 or later

Current Application Options

Returns a string which is the Options list of the currently selected application (mode).

Remote Command:	:SYSTem:APPLication[:CURRent]:OPTion?
Remote Command Notes:	Query returns a quoted string which is the Option list of the currently selected application (Mode). The format is the name as the *OPT? or SYSTem:OPTion command: a comma separated list of option identifiers. Example: "1FP,2FP" String length is a maximum of 255 characters.
Preset:	Not affected by Preset
State Saved:	Not saved in state per se, value will be the selected application when Save is invoked
Example:	:SYST:APPL:OPT?
Instrument S/W Revision:	A.01.60 or later

Application Identification Catalog (Remote Commands only)

A catalog of the installed and licensed applications (Modes) can be queried for their identification.

Application Catalog number of entries

Returns the number of installed and licensed applications (Modes).

Remote Command:	:SYSTem:APPLication:CATalog[:NAME]:COUNT?
Example:	:SYST:APPL:CAT:COUN?
Preset:	Not affected by Preset

State Saved: Not saved in state.
 Instrument S/W Revision: A.01.60 or later

Application Catalog Model Numbers

Returns a list of Model Numbers for the installed and licensed applications (Modes).

Remote Command: :SYSTem:APPLication:CATalog[:NAME]?
 Example: :SYST:APPL:CAT?
 Remote Command Notes: Returned value is a quoted string of a comma separated list of Model Numbers. Example, if SAMS and Phase Noise are installed and licensed:
 "N9060A,N9068A"
 String length is COUNT * 7 – 1. (7 = Model Number length + 1 for comma. –1 = no comma for the 1st entry.)

Preset: Not affected by Preset
 State Saved: Not saved in state.
 Instrument S/W Revision: A.01.60 or later

Application Catalog Revision

Returns the Revision of the provided Model Number.

Remote Command: :SYSTem:APPLication:CATalog:REVision? <model>
 Example: :SYST:APPL:CAT:REV? 'N9060A'
 Remote Command Notes: Returned value is a quoted string of revision for the provided Model Number. The revision will be a null-string ("") if the provided Model Number is not installed and licensed. Example, if SAMS is installed and licensed:
 "1.0.0.0"

Preset: Not affected by Preset
 State Saved: Not saved in state.
 Instrument S/W Revision: A.01.60 or later

Application Catalog Options

Returns a list of Options for the provided Model Number

Remote Command: :SYSTem:APPLication:CATalog:OPTion? <model>

Mode

Example:	:SYST:APPL:CAT:OPT? 'N9060A'
Remote Command Notes:	Returned value is a quoted string of a comma separated list of Options, in the same format as *OPT? or :SYSTem:OPTion?. If the provided Model Number is not installed and licensed a null-string ("") will be returned. Example, if SAMS is installed and licensed: "2FP" String length is a maximum of 255 characters.
Preset:	Not affected by Preset
State Saved:	Not saved in state.
Instrument S/W Revision:	A.01.60 or later

Spectrum Analyzer

Selects the Spectrum Analyzer mode for general purpose measurements. There are several measurements available in this mode. General spectrum analysis measurements, in swept and zero span, can be done using the first key in the Meas menu, labeled Swept SA. Other measurements in the Meas Menu are designed to perform specialized measurement tasks, including power and demod measurements.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL SA INST:NSEL 1
Instrument S/W Revision	A.01.60 or later

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL BASIC INST:NSEL 8
Instrument S/W Revision	A.01.60 or later

Phase Noise

The Phase Noise mode provides pre-configured measurements for making general purpose measurements of device phase noise.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL PNOISE or INST:NSEL 14
Instrument S/W Revision	A.01.60 or later

Noise Figure

The Noise Figure mode provides pre-configured measurements for making general purpose measurements of device noise figure.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL NFIGURE Or INST:NSEL 219
Instrument S/W Revision	A.01.60 or later

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL RLC Or INST:NSEL 266
Instrument S/W Revision	A.01.60 or later

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL ADEMOD INST:NSEL 234
Instrument S/W Revision	A.01.60 or later

W-CDMA with HSDPA/HSUPA

Selects the W-CDMA with HSDPA/HSUPA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WCDMA INST:NSEL 9
Instrument S/W Revision	A.01.60 or later

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL WIMAXOFDMA INST:NSEL 75
Instrument S/W Revision	A.01.60 or later

GSM with EDGE

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL EDGE GSM INST:NSEL 13
Instrument S/W Revision	A.01.60 or later

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA2K INST:NSEL 10
Instrument S/W Revision	A.01.60 or later

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL TDSCDMA INST:NSEL 211
Instrument S/W Revision	A.01.60 or later

Vector Signal Analyzer

The 89601X Vector Signal Analyzer (VSA) provides vector-signal analysis measurement capability. It provides 3 main measurements that allow you to measure the signal quality of all varieties of RF modulation:

- Digital Demodulation
- Analog Demodulation
- Vector Signal Analysis

There are advanced modulation analysis and troubleshooting capabilities including the following

Mode

communications formats: AM, FM, PM, WiMAX, W-CDMA, 2G, 3G, 3.5G, WLAN, digital video, and more. It also provides standard-specific measurements for analysis of iDEN, WiDEN, and MotoTalk signals with Option H09.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL VSA INST:NSEL 100
Instrument S/W Revision	A.01.60 or later

89601 VSA

Selecting the 89601 VSA mode will start the 89600-Series VSA software application. The 89600 VSA software is powerful, PC-based software, offering the industry's most sophisticated general purpose and standards specific signal evaluation and troubleshooting tools for the R&D engineer. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 30 general-purpose analog and digital demodulators ranging from 2FSK to 1024QAM
- Standards specific modulation analysis including:
 - Cell: GSM, cdma2000, WCDMA, TD-SCDMA and more
 - Wireless networking: 802.11a/b/g, 802.11n, 802.16 WiMAX (fixed/mobile), UWB
 - RFID
 - Digital satellite video and other satellite signals, radar, LMDS
- Up to 400K bin FFT, for the highest resolution spectrum analysis
- A full suite of time domain analysis tools, including signal capture and playback, time gating, and CCDF measurements
- Six simultaneous trace displays and the industry's most complete set of marker functions
- Easy-to-use Microsoft ® Windows ® graphical user interface

For more information see the Agilent 89600 Series VSA web site at www.agilent.com/find/89600

To learn more about how to use the 89600 VSA running in the MXA, after the 89600 VSA application is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzers (MXA/EXA) with 89600-Series Software" help topic.

Key Path	Mode
Example	INST:SEL VSA89601 INST:NSEL 101
Instrument S/W Revision	A.01.60 or later

LTE

Selects the LTE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL LTE
	INST:NSEL 102
Instrument S/W Revision	A.01.60 or later

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	Mode
Example	INST:SEL CDMA1XEV
	INST:NSEL 15
Instrument S/W Revision	A.01.60 or later

Mode Setup

Mode Setup opens menu keys that allow you to select radio standard or non-standard measurement settings.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Radio Standard

Allows you to specify the radio standard to be used.

Key Path	Mode Setup
Mode	SA
Scope	Meas Global
Remote Command	<pre>[:SENSe] :RADio:STANdard[:SElect] NONE JSTD IS95a IS97D IS98D GSM W3GPP CDMA2000MC1 C2000 1X NADC PDC BLUEtooth TETRa WL802DOT11A WL802DOT11B WL8 02DOT11G HIPERLAN2 DVBTLN DVBTGPN DVBTIPN FCC15 SDMBSE UWBINDOOR [:SENSe] :RADio:STANdard[:SElect] ?</pre>
Example	RAD:STAN NONE RAD:STAN?
Notes	To find Default Values, see Poseidon Measurement Default Settings: http://webdoc.it.agilent.com/intradoc-cgi/idc.cgi_isapi.dll?IdcService=DOC_INFO&dID=129867
Dependencies/Couplings	By changing the radio standard, the measurement parameters will be automatically set to an appropriate default value.
State Saved	Saved in instrument state.
Range	None IS-95A J-STD-008 IS-97D/98D GSM/EDGE 3GPP W-CDMA cdma2000 1x NADC PDC Bluetooth TETRA W-LAN DVB-T FCC Part 15 Subpart F S-DMB System E UWB Indoor
Instrument S/W Revision	A.01.60 or later

Bluetooth

This function is only available when the standard you have selected is Bluetooth™. It enables you to set the instrument settings for testing DH1, DH3, or DH5 packet type.

(NOTE) The packet length is
 DH1 -> 366 s

Mode Setup

DH3 -> 1622 s

DH5 -> 2870 s

Key Path	Mode Setup, Radio Std Setup
Mode	SA
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio:STANdard:PACKet DH1 DH3 DH5</code> <code>[:SENSe] :RADio:STANdard:PACKet?</code>
Example	<code>RAD:STAN:PACK DH1</code> <code>RAD:STAN:PACK?</code>
Preset	DH1
State Saved	Saved in instrument state.
Range	DH1 DH3 DH5
Instrument S/W Revision	A.01.60 or later

Device

Allows you to specify the device to be used.

Key Path	Mode Setup, Radio Std Setup
Mode	SA
Scope	Meas Global
Remote Command	<code>[:SENSe] :RADio:STANdard:DEVIce BTS MS</code> <code>[:SENSe] :RADio:STANdard:DEVIce?</code>
Example	<code>RAD:STAN:DEV MS</code> <code>RAD:STAN:DEV?</code>
Preset	BTS
State Saved	Saved in instrument state.
Range	BTS MS
Instrument S/W Revision	A.01.60 or later

Band Class

This function is only available when you have selected the standard: IS-97D/98D. It enables you to select the band class.

Key Path	Mode Setup, Radio Std Setup
Mode	SA

Scope	Meas Global
Remote Command	[:SENSe] :RADio:STANdard:BAND:CLASs BC0 BC1 [:SENSe] :RADio:STANdard:BAND:CLASs?
Example	RAD:STAN:BAND:CLAS BC0 RAD:STAN:BAND:CLAS?
Preset	BC0
State Saved	Saved in instrument state.
Range	0 (800 MHz Band) 1 (1900 MHz Band)
Instrument S/W Revision	A.01.60 or later

Enable Non-Std Measurements

Allows you to specify whether all measurements and radio standards are enabled or not. In default, Enable All Measurements is set to No, so that a user can select only the valid combination of preset available standard and the measurement. Any measurement nor standard that make the combination has no valid preset value are grayed out. When Enable Non-Std Measurements is set to Yes, all measurements and standard selections are enabled so that the user can choose any.

NOTE: If you selected unavailable measurement or unavailable radio standard by using Enable Non-Std Measurement, the measurement results may not conform the selected standard.

Key Path	Mode Setup
Mode	SA
Scope	Meas Global
Remote Command	[:SENSe] :RADio:STANdard:EAMeas YES NO [:SENSe] :RADio:STANdard:EAMeas?
Example	RAD:STAN:EAM YES RAD:STAN:EAM?
Preset	NO
State Saved	Saved in instrument state.
Range	Yes No
Instrument S/W Revision	A.01.60 or later

Restore Mode Defaults

Restore Mode Defaults resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data and by performing a Mode Preset

Mode Setup

For more information, see the section under the Preset key in the Utility section.

Key Path	Mode setup
Instrument S/W Revision	A.01.60 or later

Global Settings

Opens up a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all modes which support global settings. For example, no matter what mode you are in when use set the “Global Center Frequency” switch to on, it applies to all modes which support Global Settings.

Key Path	Mode Setup
Instrument S/W Revision	A.01.60 or later

Global Center Freq

The software maintains a Mode Global value called “Global Center Freq”.

When the **Global Center Freq** key is switched to **On** in any mode, the current mode’s center frequency is copied into the Global Center Frequency, and from then on all modes which support global settings use the Global Center Frequency. So you can switch between any of these modes and the Center Freq will remain unchanged.

Adjusting the Center Freq of any mode which supports Global Settings, while **Global Center Freq** is **On**, will modify the Global Center Frequency.

When **Global Center Freq** is turned **Off**, the Center Freq of the current mode is unchanged, but now the Center Freq of each mode is once again independent.

When **Mode Preset** is pressed while **Global Center Freq** is **On**, the Global Center Freq is preset to the preset Center Freq of the current mode.

This function is reset to Off when the Restore Defaults key is pressed in the Global Settings menu, or when **System, Restore Defaults, All Modes** is pressed.

Key Path	Mode Setup, Global Settings
Scope	Mode Global
Remote Command	:INSTrument:COUPle:FREQuency:CENTer ALL NONE :INSTrument:COUPle:FREQuency:CENTer?
Example	INST:COUP:FREQ:CENT ALL INST:COUP:FREQ:CENT?
Preset	Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes
Range	On Off

Instrument S/W Revision	A.01.60 or later

Restore Defaults

This key resets all of the functions in the Global Settings menu to Off. This also occurs when **System, Restore Defaults, All Modes** is pressed.

Key Path	Mode Setup, Global Settings
Remote Command	:INSTrument :COUPle :DEFault
Example	INST:COUP:DEF
Instrument S/W Revision	A.01.60 or later

Peak Search

Pressing the Peak Search key displays the Peak Search menu and places the selected marker on the trace point with the maximum y-axis value for that marker's trace. The Peak Search features allow you to define specific search criteria to determine which signals can be considered peaks, excluding unwanted signals from the search.

If **Same as "Next Peak" Criteria** is selected, and either **Pk Excursion** or **Pk Threshold** are on, a signal must meet those criteria. If no valid peak is found, a message is generated and the marker is not moved. When **Highest Peak** is on, or both **Pk Excursion** and **Pk Threshold** are off, the marker is always placed at the point on the trace with the maximum y-axis value, even if that point is on the very edge of the trace (exception: negative frequencies and signals close to the LO are not searched at all).

Pressing Peak Search with the selected marker off causes the selected marker to be set to **Normal** at the center of the screen, then a peak search is immediately performed.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Recall

Recall functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Recall feature prompts you to answer the questions: What do you want to recall? And to where do you want to recall it? Once these questions are answered the recall can occur. The options in this menu answer the question "What do you want to Recall?"

The options are State, Trace and Data. (Screen Image can be saved, but not recalled.) The default paths for Recall are data type dependent and are the same as for Save.

Key Path	Recall
Remote Command Notes	No remote command directly controls the Recall Type that this key controls. The Recall type is a node in the :MMEM:LOAD command. An example is :MMEM:LOAD:STATe <filename>.
Instrument S/W Revision	A.01.60 or later

State

Accesses a menu that enables you to recall a State that has previously been saved. Recalling a saved state returns the analyzer as close as possible to the mode context and may cause a mode switch if the file selected is not for the current active mode. A State file can be recalled from either a register or a file. Once you pick the source of the recall in the State menu, the recall will occur.

When this key is pressed, you has determined what they want to recall is **State**. Recalling **State** is used to return as close as possible to the mode context of the save. Recalling State may cause a mode switch if the file selected is not for the currently active mode. This menu key will not actually cause the recall, since the recall feature still needs to know from where to recall the state. **State** can be recalled from either a register or a file. Pressing this key will bring up the State menu that provides you with the options of where to retrieve the state. For quick recalls, the State menu lists 6 registers to recall from or you can select a file to recall from.

Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Remote Command Notes	See “Open” on page 987 .
Instrument S/W Revision	A.01.60 or later
Key Path	Recall
Mode	All

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with

Recall

the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes; so if a Trace was updating and visible when the State was saved, it will come back updating and visible; hence its data will be rewritten right away. So if using State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank before saving.

This creates the following table describing the Trace Save/Recall possibilities:

You want to recall state and one trace's data, leaving other traces unaffected.	Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank) when the save is performed.	On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed.
You want to recall all traces	Save Trace+State from ALL traces.	On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved)
You want all traces to load exactly as they were when saved.	Save State	On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will, of course, have their data immediately overwritten.

Register 1 thru Register 6

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified.

Registers are shared by all modes, so recalling from any one of the 6 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message "Register <register number> recalled" appears in the message bar.

Selecting any one of these register menu keys: **Register 1**, **Register 2**, **Register 3**, **Register 4**, **Register 5**, **Register 6** causes the state of the mode from the specified Register to be recalled. The registers are provided for easy saving and recalling, since you does not have to specify a filename or navigate to a specific file. The date will follow the format specified in the Date Format setting under the **Control Panel**. The time will show hours, minutes and seconds.

Key Path	Recall, State
Example	*RCL 1
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, State

Example	*RCL 2
Instrument S/W Revision	A.01.60 or later

Key Path **Recall, State**

Example	*RCL 3
Instrument S/W Revision	A.01.60 or later

Key Path **Recall, State**

Example	*RCL 4
Instrument S/W Revision	A.01.60 or later

Key Path **Recall, State**

Example	*RCL 5
Instrument S/W Revision	A.01.60 or later

Key Path **Recall, State**

Example	*RCL 6
Instrument S/W Revision	A.01.60 or later

From File\ File Open

Brings up the File Open standard Windows® dialog and its corresponding **File Open** key menu.

When you first enter this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first *.state file is highlighted. The only files that are visible are the *.state files and the Files of type is *.state, since .state is the file suffix for the State Save Type. For more details, refer to [“File Open Dialog and Menu” on page 998](#).

Key Path	Recall, State
Restriction and Notes	Brings up Open dialog for recalling a State Save Type
Instrument S/W Revision	A.01.60 or later

Open Recalling State function first must verify the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, and then loading the State from the saved state file to as close as possible to the context in which the save occurred. You can open state files from any mode, so recalling a State File switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.

Recall

If there is a mismatch between file version or model number or instrument version or model number, the recall still tries to recall as much as possible and it returns a warning message of what it did.

No Trace data is loaded when recalling a State File. Measurements that support loading of trace data will include a Trace key in the Recall menu and will load State + Trace data from .trace files under that key.

Remote Command:	:MMEMory:LOAD:STATe <filename>
Example:	:MMEM:LOAD:STAT "myState.state" recalls the file myState.state on the default path
Restriction and Notes:	Auto return to the State menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete.
Remote Command Notes:	Although the trace data is included in the .state file it is not recalled; that is left for .trace files only for measurements that support recalling of trace data. Errors are generated if the specified file is empty or does not exist, or there is a file type mismatch.

Key Path:	Recall, State, From File...
Instrument S/W Revision:	A.01.60 or later

The state of a mode includes all of the variables affected by doing a full preset. It not only recalls Mode Preset settings, but it also recalls all of the mode persistent settings and data if the mode has either. Each mode determines whether data is part of mode state and if the mode has any persistent settings. **Recall State** also recalls all of the **Input/Output** system settings, since they are saved with each State File for each mode.

The Recall State function does the following:

Verifies that the file is recallable on this instrument using the version number and model number.

Aborts the currently running measurement.

Clears any pending operations.

Switches to the mode of the selected Save State file.

Sets mode State and Input/Output system settings to the values in the selected Saved State file.

- Limits settings that differ based on model number, licensing or version number.
- Makes the saved measurement for the mode the active measurement.
- Clears the input and output buffers.
- Status Byte is set to 0.
- Executes a *CLS

Trace (+State)

When this key is pressed, you has determined what they want to recall is **Trace**. Trace files include the state of the mode they were saved from as well as the trace data, with internal flags to indicate which trace you was trying to save which may include ALL traces. They are otherwise identical to State files. Recalling **Trace** may cause a mode switch if the file selected is not for the currently active mode.

Not all modes support saving of trace data with the state; and for modes that do, not all measurements do. The Trace key is grayed out for measurements that do not support trace recall. It is blanked for modes that do not support trace recall.

This key will not actually cause the recall, since the recall feature still needs to know from which file to recall the trace and which trace to recall it into. Pressing this key will bring up the Recall Trace menu that provides you with the options of where to retrieve the trace.

For quick recalls, the Trace menu lists 5 registers to recall from or you can select a file to recall from.

Example	MMEM:LOAD:TRAC TRACE2,"MyTraceFile.trace"
	This loads the trace file data (on the default file directory path) into the specified trace.
	:MMEM:LOAD:TRAC:REG TRACE1,2
	Restores the trace data in register 2 to Trace 1
Instrument S/W Revision	A.01.60 or later
Key Path	Recall
Mode	SA

Register 1 thru Register 5

Selecting any one of these register keys causes the Traces and State from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified.

Trace registers are shared by all modes, so recalling from any one of the 5 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message “Trace Register <register number> recalled” appears in the message bar.

Selecting any one of these register menu keys: **Register 1, Register 2, Register 3, Register 4, Register 5** causes the traces and state of the mode from the specified Register to be recalled. The registers are provided for easy saving and recalling, since you does not have to specify a filename or navigate to a

Recall

specific file. The date will follow the format specified in the Date Format setting under the **Control Panel**. The time will show hours, minutes and seconds.

Key Path	Recall, Trace

Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace

Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace

Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace

Instrument S/W Revision	A.01.60 or later

Key Path	Recall, Trace

Instrument S/W Revision	A.01.60 or later

To Trace

These key selections let you pick which Trace to recall the saved trace into; either 1, 2, 3, 4, 5, or 6. Not all modes have the full 6 traces available. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Import Data, or Save Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

If the .trace file is an "all trace" file, "**To Trace**" is ignored and the traces each go back to the trace they were saved from.

Once selected, the key returns back to the Recall Trace menu and the selected Trace number is annotated on the key. Now you have selected exactly where the trace needs to be recalled. In order to trigger a recall of the selected Trace, you must select the **Open** key in the Recall Trace menu.

Key Path	Save, Data, Trace

Mode	SA

Instrument S/W Revision	A.01.60 or later

Open...

Pressing **Open** brings up the File Open standard Windows dialog and its corresponding File Open key menu. When you navigates to this selection, they have already determined they are recalling Trace and now they want to specify from which file to do the recall.

When you first enters this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first *.trace file is highlighted. Also, the only files that are visible are the *.trace files and the Files of type is

*.trace, since .trace is the file suffix for the Trace Save Type. For more details, refer to [“File Open Dialog and Menu” on page 998](#).

Restriction and Notes	Brings up Open dialog for recalling a Trace Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Trace
Mode	SA

Open Recalling Trace first must verify the file is recallable in this instrument by checking instrument software version and model number, since it includes State. If everything matches, a full recall proceeds by aborting the currently running measurement, loads the state from the saved state file to as close as possible to the context in which the save occurred. Users can open .trace files from any mode that supports them, so recalling a Trace File switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file and the saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.

Once the state is loaded the trace data must be loaded. The internal flags are consulted to see which trace to load and the "To Trace" setting to see where to load it. Trace data is always loaded with the specified trace set to View, so that the data is visible and not updating (so as not to wipe out the recalled data). If the file is an "all trace" file, all traces are loaded with the saved data (to the original trace the data was saved from) and set to View. Traces whose data is not loaded are restored to the update state that existed when they were saved.

In every other way a Trace load is identical to a State load. See section [“Open” on page 987](#) for details.

Key Path	Recall, Trace, Open...
Restriction and Notes	Auto return to the Trace menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete.
Remote Command	:MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <filename> :MMEMory:LOAD:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <integer>

Recall

Remote Command Notes	Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: <code>MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3,<filename></code> The load trace command actually performs a load state, which in the Swept SA measurement includes the trace data. However it looks in the recalled state file to see how it was flagged at save time. The possibilities are: If the trace file was saved using one of the TRACE# enums, it is flagged as a single trace save file. The trace that was flagged as the one that was saved, is loaded to the trace specified. The trace is loaded with update off and display on, and none of the other traces are loaded. If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update".
Example	<code>:MMEM:LOAD:TRAC TRACE2,"myState.trace"</code> recalls the file <code>myState.trace</code> on the default path; if it is a "single trace" save file, that trace is loaded to trace 2, and will is set to be not updating. <code>:MMEM:LOAD:TRAC:REG TRACE1,2</code> restores the trace data in register 2 to Trace 1
Instrument S/W Revision	A.01.60 or later

Data (Mode Specific)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce the same type of data. The Import Menu only contains Data Types that are supported by the current measurement.

For any given mode, the Export Data and Import Data menus match, but keys in Import Data are blanked if the data type is supported for Save but not for Recall.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall will occur as soon as the Open key is pressed. See [“File Open Dialog and Menu” on page 998](#) for more details.

Remote Command Notes	No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the <code>MMEM:LOAD</code> commands.
Instrument S/W Revision	A.01.60 or later

Key Path	Recall
Mode	SA VSA
Preset	<mode specific>; Is not affected by Preset, but is reset during Restore Mode Defaults and survives subsequent running of the mode

Trace

This key selects the Traces as the data type to be imported with this recall request. It brings up the Trace Menu that lets you select which Trace to import the data into.

This key is grayed out when measurements are running that do not support trace importing.

For Vector Signal Analyzer Mode:

the trace data is loaded into the selected data register. Trace data registers are temporary storage places for trace data. They allow you to view past results next to current measurement results, and are also used in some functions like user defined filters. They are measurement global, so you can import data into a register while in the Digital Demod measurement and view it later while in the Vector measurement. Data registers are cleared when the measurement application is terminated, but not when you change Modes and return.

If the recalled file was saved with header information, the trace will initially be displayed with the same formatting and scaling as it had when it was saved. If headers are not saved, the scaling and format are set to defaults when the trace is recalled.

The following trace data formats may be imported:

Text and comma-separated variable (CSV)

Text

SDF.

Option 200 also allows import of these additional formats:

Matlab 4

Matlab 5

Matlab HDF5

N5110A compatible binary

Example	MMEM:LOAD:TRAC:DATA TRACE2,"MyTraceFile.csv" This loads the trace file data (on the default file directory path) into the specified trace.
Dependencies/Couplings	Trace data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it. For SA measurements, traces cannot be recalled from a trace file that was saved with ALL traces selected.

Recall

Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data
Mode	SA Analog Demod VSA
Preset	1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles
State Saved	Saved in State

Trace 1, 2, 3, 4, 5, 6 These keys let you pick which Trace to import the data into; either 1, 2, 3, 4, 5 or 6. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Recall Trace, or Save Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

Once selected, the key returns back to the Import Data menu and the selected Trace number is annotated on the key. Now you have selected exactly what needs to be imported. In order to trigger a import of the selected trace, you must select the Open key in the Import Data menu.

An example of using this menu is: If you select 4 and continue to the File Open dialog, then import Trace 4 from the file selected or entered in File Name option in the File Open dialog.

Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data, Trace
Mode	SA VSA

Display in Selected Trace In Vector Signal Analyzer Mode, data registers are used as temporary storage places for trace data.

A register may be displayed in any trace. If "Display in Selected Trace" key is set to "Yes" then the data register into which the file is recalled is then assigned to the currently selected trace.

Example	Related command: MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT This command explicitly puts the data in the specified trace.

Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data (Import), Trace (to)
Mode	VSA

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data

(unprocessed).

Example	MMEM:LOAD:CAPT "MyCaptureData.bin"
	This loads the file of capture data (on the default file directory path) into the instrument.
Dependencies/Couplings	Capture buffer data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data
Mode	WCDMA

Zone map

A map file contains zone definitions that will help simplify making measurements of frequently used signals. The OFDMA frame structure can contain multiple-zone definitions for the uplink and downlink subframes and multiple data burst allocations. You can recall map files in which you have saved complicated OFDMA frame analysis zone definitions; this can save you time and ensure the accuracy of repeat measurements. map files are also useful for recreating measurement settings so they can be used by other users.

Example	MMEM:LOAD:ZMAP "MyZonemapFile.omf"
	This loads the file of zone map data (on the default file directory path) into the custom map.
Dependencies/Couplings	Zone map data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data
Mode	OFDMA WIMAX

Recorded Data

This allows you to recall previously saved, recorded data for analysis.

This feature is only available with 89601X VSA Option 200 and Option G01.

Example	MMEM:LOAD:REC "MyRecording.sdf"
Instrument S/W Revision	A.01.60 or later
Key Path	Recall, Data (Import)
Mode	VSA

Recall

Notes

Available file types are:

- CSV (Comma delimited) (*.csv)
- MAT-File (*.mat)
- MAT-File (Version 4) (*.mat)
- MAT-File (HDF5) (*.mat;*.hdf;*.h5)
- N5110A Waveform (*.bin)
- SDF (Fast) (*.sdf;*.dat)
- SDF (Export) (*.sdf;*.dat)
- Text (Tab delimited) (*.txt)

Open...

Pressing **File Open** brings up the File Open standard Windows dialog and the File Open key menu. When you navigates to this selection, they have already determined they are recalling a specific Data Type and now they want to specify which file to open.

When you first enter this dialog, the path is in the Look In: field in this File Open dialog depends on which import data type you navigated here from.

The only files that are visible are those specific to the file type being recalled.

Key Path	Recall, Data
Restriction and Notes	Brings up Open dialog for recalling a <mode specific> Save Type
Instrument S/W Revision	A.01.60 or later

Open The import starts by checking for errors. Then the import can start. For all data types, the actual import starts by aborting the currently running measurement. Then the import does data type specific behavior:

Trace Import: A trace cannot be imported if the trace points in the file do not match the sweep points in the mode. If this happens, an error is generated. When a trace is imported, then **Trace Update** is always turned OFF for that trace and **Trace Display** is always turned ON. The trace file has meta data. If the meta data in the file does not match the corresponding SA state, the dirty marker is displayed.

Mode	SA
Remote Command	:MMEMory:LOAD:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <filename>
Example	:MMEM:LOAD:TRAC DATA TRACE2,"myTrace2.csv" imports the 2nd trace from the file myTrace2.csv in the default path.

Remote Command Notes Traces cannot be recalled from a trace data file that was saved with ALL traces selected.

Errors are reported if the file is empty or missing, or if the file type does not match.

Instrument S/W Revision A.01.60 or later

Remote Command `MMEMory:LOAD:TRACe:DATA`
`D1|D2|D3|D4|D5|D6,<filename>[,CSV|TXT|SDF]`

Example `MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT`

Restriction and Notes If you are not licensed to recall a particular file type, then an error –203.9010 will be returned. If the file format cannot be determined or the file cannot be recalled successfully, then an error –250.5290 is returned. If the recall is successful, then advisory message is shown.

Remote Command Notes If the file format parameter is not included in the SCPI command, the file format is determined by the file name extension. If this is not sufficient, the file is scanned to determine the format.

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data (Import), Trace (to), Open . . .**

Mode VSA

Recall captured data for reuse in demod measurements using the Load Capture Buffer functionality. This function is enabled for ‘Code Domain’ and ‘Modulation Accuracy’ measurements only.

Remote Command `:MMEMory:LOAD:CAPTured <filename>`

Restriction and Notes Errors are reported if the file is empty or missing, or if the file type does not match.

Example `:MMEM:LOAD:CAPT "My`
`Documents\WCDMA\data\IQ\captureBuffer\myCaptureBuffer.bin"`

Recall

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data, File Open**

Mode WCDMA

Remote Command `MMEMory:LOAD:RECORDing <filename>`

Example `MMEM:LOAD:REC "MyRecording.sdf"`

Remote Command Notes SCPI reflects the action performed when this key is selected and File Open is pressed.

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data (Import), Recorded Data, Open . . .**

Mode VSA

Remote Command `:MMEMory:LOAD:ZMAP <filename>`

Example `:MMEM:LOAD:ZMAP "myZoneMap.omf"` recalls the Zone map data from the file myZoneMap.omf on the default directory to the Custom map for Modulation Analysis measurement.

Instrument S/W Revision A.01.60 or later

Key Path **Recall, Data, Zone map**

Mode WIMAXOFDMA

File Open Dialog and Menu

The **File Open** is a standard Windows dialog and has a **File Open** key menu. Each key in this menu corresponds to the selectable items in the **File Open** dialog box. The menu keys can be used for easy navigation between the selections within the dialog or the standard **Tab** and **Arrow** keys can be used for dialog navigation. When you navigate to this selection, you have already limited the file recall type and now you want to specify which file to open.

Instrument S/W Revision A.01.60 or later

Open

This selection and the **Enter** key when a filename has been selected or specified actually cause the load to occur. **Open** loads the specified or selected file to the previously selected recall type of either **State** or a specific import data type.

Restriction and Notes: Advisory Event "File <file name> recalled" after recall is complete.

Instrument S/W Revision: A.01.60 or later

File/Folder List

This menu key navigates to the center of the dialog that contains the list of files and folders. Once here you can get information about the file.

Key Path	Recall, <various>, Open...
Restriction and Notes	Pressing this key navigates you to the files and folders list in the center of the dialog.
Instrument S/W Revision	A.01.60 or later

Sort

Pressing this key brings up the Sort menu that allows you a way to sort the files within the File Open scope. Only one sorting type can be selected at a time and the sorting happens immediately.

Key Path	Recall, <various>, Open...
Remote Command Notes	No SCPI command directly controls the sorting.
Instrument S/W Revision	A.01.60 or later

By Date This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending data order. The date is the last data modified.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

By Name This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on the filename.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

By Extension This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on the file extension for each file.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Recall

By Size This allows you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on file size.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Ascending This causes the display of the file list to be sorted, according to the sort criteria above, in Ascending order.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Descending This causes the display of the file list to be sorted, according to the sort criteria above, in Descending order.

Key Path	Recall, <various>, Open..., Sort
Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Instrument S/W Revision	A.01.60 or later

Files Of Type

This menu key corresponds to the Files Of Type selection in the dialog. It follows the standard Windows supported Files Of Type behavior. It shows the current file suffix that corresponds to the type of file you has selected to save. If you navigated here from recalling State, "State File (*.state)" is in the dialog selection and is the only type available in the pull down menu. If you navigated here from recalling Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from importing a data file, "Data File (*.csv)" is in the dialog and is the only type available in the pull down menu. Modes can have other data file types and they would also be listed in the pull down menu.

Key Path	Recall, <various>, Open...
Restriction and Notes	Pressing this key causes the pull down menu to list all possible file types available in this context.
Instrument S/W Revision	A.01.60 or later

Up One Level

This menu key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. It follows the standard Windows supported Up One Level behavior. When pressed, it causes the file and

folder list to navigate up one level in the directory structure.

Key Path	Recall, <various>, Open...
Restriction and Notes	When pressed, the file and folder list is directed up one level of folders and the new list of files and folders is displayed.
Instrument S/W Revision	A.01.60 or later

Cancel

This menu key corresponds to the Cancel selection in the dialog. It causes the current File Open request to be cancelled. It follows the standard Windows supported Cancel behavior.

Key Path	Recall, <various>, Open...
Restriction and Notes	Pressing this key causes the Open dialog to go away and auto return.
Instrument S/W Revision	A.01.60 or later

Recall

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/hold sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:REStart

Remote Command: :INITiate[:IMMEDIATE]

Example: :INIT:IMM

Dependencies/Couplings: Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.

Remote Command Notes: :INITiate:REStart
:INITiate:IMMEDIATE

Either of the above commands perform exactly the same function.

SCPI Status Bits/OPC This is an Overlapped command.

Dependencies:

The STATus:OPERation register bits 0 through 8 are cleared.

The STATus:QUEStionable register bit 9 (INTEgrity sum) is cleared.

The SWEEPING bit is set.

The MEASURING bit is set.

Instrument S/W Revision: A.01.60 or later

Remote Command: :INITiate:REStart

Example: :INIT:REST

Dependencies/Couplings: Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement.

Remote Command Notes: :INITiate:REStart
:INITiate:IMMEDIATE

Either of the above commands perform exactly the same function.

Restart

SCPI Status Bits/OPC	This is an Overlapped command.
Dependencies:	The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTionable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set.

Instrument S/W Revision: A.01.60 or later

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average**, **Max Hold**, or **Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

Save functionality is common across multiple Modes and Measurements. These common features are described in this section.

The Save feature prompts you to essentially answer the questions: What do you want to save? And where do you want to save it? Once these questions are answered the save can occur. The options in this menu answer the question, "What do you want to save?"

Accesses a menu that provides the save type options. The **Save Type** options are **State**, **Trace**, **Data**, or a **Screen Image** depending on the active mode.

Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

State

Selects **State** as the save type and accesses a menu that provides the options of where to save. You can save either to a register or a file. This menu key will not actually cause the save until the location is chosen.

Saving the state is the only way to save this exact measurement context for the current active mode. The entire state of the active mode is saved in a way that when a recall is requested, the mode will return to as close as possible the context in which the save occurred. This includes all settings and data for only the current active mode.

It should be noted that the Input/Output settings will be saved when saving State, since these settings plus the state of the mode best characterize the current context of the mode, but the mode independent System settings will not be saved.

This key will not actually cause the save, since the save feature still needs to know where to save the state. Pressing this key will bring up the Save State menu that provides you with these options.

For rapid saving, the State menu lists registers to save to, or you can select a file to save to. Once they pick the destination of the save in the State menu, the save will occur.

Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Remote Command Notes	See "Save" on page 1007 .
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

Register 1 thru Register 6

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified.

These 6 registers are all that is available from the front panel for all modes in the instrument. There are not 6 registers available for each mode. From remote, 127 Registers are available. Registers are files that are visible to you in the My Documents\System folder.

Example	*SAV 1
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Example	*SAV 2
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Example	*SAV 3
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Example	*SAV 4
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Example	*SAV 5
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Example	*SAV 6
Instrument S/W Revision	A.01.60 or later

Key Path	Save, State
Mode	All

To File . . .

Accesses a menu that enables you to select the location for saving the State. This menu is similar to a standard Windows® **Save As** dialog.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer). This path is the **Save In:** path in the **Save As** dialog for all State Files when they first enter this dialog.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Save As . . .

This menu lets you select the location where you can save the State. This menu is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

When you first enter this dialog, the path in the **Save In:** field depends on the data type. The only files that are visible are the *.state files and the Save As type is *.state, since .state is the file suffix for the State Save Type.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, State
Mode	All

Save Saves all of the State of the currently active mode plus the system level Input/Output settings to the specified file.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single sweep icon. After the save completes, the Advisory Event "File <register number>

Save

saved" is displayed.

Remote Command	:MMEMory:STORe:STATe <filename>
Example	:MMEM:STOR:STAT "myState.state" saves the file myState.state on the default path
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the State menu and the Save As dialog goes away.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, State, To File...
Mode	All

Trace (+State)

Selects a state file which includes trace data for recalling as the save type and accesses a menu that enables you to select which trace to save. You can save to either a register or a file. Not all modes support saving trace data with the state; and for modes that do, not all measurements do. This key is grayed out for measurements that do not support trace saves. It is blanked for modes that do not support trace saves. Saving **Trace** is identical to saving State except a .trace extension is used on the file instead of .state, and internal flags are set in the file indicating which trace was saved. You may also select to save ALL traces.

This key will not actually cause the save, since the save feature still needs to know which trace to save and where to save it. Pressing this key will bring up the Save Trace menu that provides you with these options.

For rapid saving, the Trace menu lists registers to save to, or you can select a file to save to. Once you pick the destination of the save in the Trace menu, the save will occur.

Example	MMEM:STOR:STATe TRACE2,"MyTraceFile.trace" This stores trace 2 data in the file MyTraceFile.trace in the default directory. :MMEM:STOR:TRAC:REG TRACE1,2 stores trace 1 data in trace register 2 :MMEM:STOR:TRAC:REG ALL,3 saves the data for all 6 traces in trace register 3
Remote Command Notes	See "Save" on page 1010 .
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	SA

Register 1 thru Register 5

Selecting any one of these register menu keys causes the Trace(s) specified under From Trace, along with the state of the currently active mode, to be saved to the specified Trace Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified.

These 5 trace registers are all that is available for all modes in the instrument. At present, only the Swept SA measurement of the Spectrum Analyzer mode supports saving to Trace+State files. Registers are files that are visible to you in the My Documents\System folder.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace
Mode	SA

From Trace

Accesses a menu that enables you to select the trace to be saved. You can choose either 1, 2, 3, 4, 5, 6 or All. Not all modes have the full six traces. Once a trace is selected, the key returns back to the Save Trace menu and the selected trace number is annotated on the key. The default is the currently selected trace, selected in this menu or in the Trace/Det, Export Data, Import Data or Recall Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace. To save the Trace you must select **Save As**.

These keys let you pick which trace to save. Now you have selected exactly what needs to be saved. In

Save

order to trigger a save of the selected **Trace**, you must select the **Save As** key in the Save Trace menu.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace + State
Mode	SA

Save As . . .

This menu lets you select the location where you can save the Trace. It is a standard Windows® dialog with Save As menu keys.

The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files including .trace files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

When you first enter this dialog, the path in the Save In: field depends on the data type. The only files that are visible are the *.trace files and the Save As type is *.trace, since .trace is the file suffix for the Trace Save Type.

Restriction and Notes	Brings up Save As dialog for saving a Trace Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace (+State)
Mode	SA

Save This key initiates the save of the .trace file. All of the State of the currently active mode plus the system level Input/Output settings are saved to the specified file as well as all of the trace data, including internal flags set in the file indicating which trace is to be saved.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single sweep icon. After the save completes, the Advisory Event "File <register number> saved" is displayed.

Remote Command	<code>:MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <filename> > :MMEMory:STORe:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <integer></code>

Example	:MMEM:STOR:TRAC TRACE1,“myState.trace” saves the file myState.trace on the default path and flags it as a “single trace” file with Trace 1 as the single trace (even though all of the traces are in fact stored). :MMEM:STOR:TRAC ALL,“myState.trace” saves the file myState.trace on the default path and flags it as an “all traces” file :MMEM:STOR:TRAC:REG TRACE1,2 stores trace 1 data in trace register 2
Remote Command Notes	Some modes and measurements do not have available all 6 traces. The Phase Noise mode command, for example, is: MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 ALL,<filename> This command actually performs a save state, which in the Swept SA measurement includes the trace data. However it flags it (in the file) as a “save trace” file of the specified trace (or all traces). The range for the register parameter is 1–5
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the State menu and the Save As dialog goes away.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Trace, Save As...
Mode	SA

Data (Mode Specific)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

For any given mode, the Export Data and Import Data menus match, but keys in Import Data are blanked if the data type is supported for Save but not for Recall.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed. See section [“Save As . . .” on page 1022](#) for more details.

Remote Command Notes	No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.

Save

Dependencies/Couplings	If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show if there are no measurements in Mode that supports it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All
Preset	<mode specific>; Is not affected by Preset, but is reset during Restore Mode Defaults and survives subsequent running of the mode.

Trace

Pressing this key selects Traces as the data type to be exported with this save request. Pressing this key when it is already selected brings up the Trace Menu, which allows you to select which Trace to save. This is the same as the Select Trace menu under Trace. The trace selected on that menu appears selected here, and selecting a trace here causes the same trace to be selected on the Select Trace menu. (That is, there is only one "selected trace".) This key is grayed out when measurements are running that do not support trace exporting.

Example	MMEM:STOR:TRAC:DATA TRACE3,"MyTraceFile.csv" This stores the specified trace data in the file MyTraceFile.csv in the default directory. VSA Example: MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON

Remote Command Notes	See
Dependencies/Couplings	Trace data is not available from all Measurements. In that case, the key will be grayed out. The key will not show if no measurements in the Mode support it. For SA measurements, traces cannot be recalled from a trace file that was saved with ALL traces selected.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	SA Analog Demod VSA
Preset	Not part of Preset, but is reset by Restore Mode Defaults and survives power cycles.
State Saved	Saved in State

Trace selection These keys let you pick which Trace to save. The traces may have names, or they may be labeled 1, 2, 3, 4, 5, or 6, depending on the current mode. Once selected, the key returns back to the Export Data menu and the selected trace name/number is annotated on the key. The default is the currently selected trace, selected in this menu or in the Trace/Det, Import Data, Recall Trace or Save

Trace menus, except if you have chosen All then it remains chosen until you specifically change it to a single trace.

In order to trigger a save of the selected trace, you must select the Save As key in the Export Data menu.

Some measurements have an "ALL" selection. This saves all six traces in one .csv file with the x-axis data in the first column and the individual trace data in succeeding columns. The header data and x-axis data in this file reflect the current settings of the measurement. Note that any traces which are in View or Blank may have different x-axis data than the current measurement settings; but this data will not be output to the file.

Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Trace
Mode	SA Analog Demod VSA
Preset	The first trace key shown.

Include Header The trace header information includes enough state information to display the trace data with the same formatting and scaling when it is recalled. However, no other instrument state information is saved. If headers are not saved, the scaling and format are set to defaults when the trace is recalled.

Example	MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON The On/Off setting is the last variable passed in the MMEMory:STORe:TRACe:DATA command.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Trace
Mode	VSA
Preset	On

Measurement Results

Different types of results are available for each particular measurement. The results that are available are documented under the individual measurements. These measurement results are the same as the results that are returned when using the MEASure:<measurement> command (usually for sub-opcode 1).

Measurement results may not be available for all measurements.

Example	MMEM:STOR:RES "MyResultsFile.xml" This stores the measurement results data in the file MyResultsFile.xml in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later

Save

Key Path	Save, Data
Mode	SA ADEMOD BASIC(IQ Analyzer) CDMA2K GSMEDGE PNOISE WCDMA WIMAXOFDMA TDS CDMA

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

Example	MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	WCDMA

Zone map

A map file contains zone definitions that will help simplify making measurements of frequently used signals. The OFDMA frame structure can contain multiple-zone definitions for the uplink and downlink subframes and multiple data burst allocations. You can store map files in which you have saved complicated OFDMA frame analysis zone definitions. This can save you time and ensure the accuracy of repeated measurements. map files are also useful for recreating measurement settings so they can be used by other users.

Example	MMEM:STOR:ZMAP "MyZonemapFile.omf" This stores the zone map data in the file MyZonemapFile.omf in the default directory.
Remote Command Notes	See
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	OFDMA WiMAX

Recorded Data

Saving recorded data is not available for all measurements. Recorded data, and the optional header info, may be recalled later (or transferred to another instrument) for analysis.

This function is available in 89601X VSA Option 200, but not in Option 205.

Example	MMEM:STOR:REC "MyRecording.sdf",SDF,ON,ON,OFF
Restriction and Notes	Grayed out unless there is recorded data in the buffer.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data (Export)
Mode	VSA

Save As . . .

This menu lets you select the location where you can save Data Type files. It is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the Quick Save key documentation for more on the automatic file naming algorithm.

When you first enter this dialog, the path in the Save In: field depends on the data type. The only files that are visible are the files with the corresponding data type suffix, and the **Save As** type lists the same suffix.

For example, if the Data Type is **Amplitude Corrections**, the file suffix is .csv and the *.csv files are the only visible files in the **Save As** dialog and .csv is the Save As Type.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<mode name>\data\<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<mode name>\data\captureBuffer

Restriction and Notes	Brings up Save As dialog for saving a <mode specific> Save Type
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data
Mode	All

Save Saves the specified Data Type. This section describes any specific save behavior relevant to Data

Save

that is common to all modes.

When a Save of a specific Data File is requested, the specified data is saved to the specified or selected file. The save is performed immediately and does not wait until the measurement is complete.

If the file already exists, a dialog will popup that allows you to replace the existing file by selecting an **OK** or you can **Cancel** the request.

While the save is being performed, the floppy icon will show up in the settings bar near the Continuous/Single icon. After a register save completes, the corresponding register key annotation is updated with the date the time and an advisory message that the file was saved appears in the message bar.

Key Path	Save, Data, Save As...
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.
Instrument S/W Revision	A.01.60 or later
Mode	SA ADEMOD BASIC(IQ Analyzer) CDMA2K GSMEDGE PNOISE WCDMA WIMAXOFDMA TDSCDMA
Remote Command	:MMEMory:STORe:RESults <filename>
Example	:MMEM:STOR:RES "myResults.csv" saves the results from the current measurement to the file myResults.csv in the default path. :MMEM:STOR:RES "MyDocuments\Basic\data\ComplexSpectrum\results\myResults.xml" saves the results from the current measurement (Complex Spectrum) to the file myResults.xml in the default path for IQ Analyzer (Basic) Mode. This command form is not supported for the Swept SA measurement; see below.
Instrument S/W Revision	A.01.60 or later
Remote Command	:MMEMory:STORe:RESults:MTABle PTABle <filename>
Example	:MMEM:STOR:RES:MTAB "myResults.csv" saves the results from the current marker table to the file myResults.csv in the default path. :MMEM:STOR:RES:PTAB "myResults.csv" saves the results from the current peak table to the file myResults.csv in the default path. This command form is only supported for the Swept SA measurement; see above.

Dependencies/Couplings	If a save of Marker Table results is requested and the Marker Table is not on, no file is saved an error is generated: Mass Storage error; Mkr Table must be on to save Mkr Table as Meas Results If a save of Peak Table results is requested and the Peak Table is not on, no file is saved an error is generated: Mass Storage error; Pk Table must be on to save Pk Table as Meas Results
Instrument S/W Revision	A.01.60 or later
Mode	SA
Preset	Peak Table
State Saved	Saved in State
Range	Peak Table Marker Table
Mode	SA Analog Demod
Remote Command	<pre>:MMEMory:STORe:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 ALL, <filename ></pre>
Example	:MMEM:STOR:TRAC:DATA TRACE2,"myTrace2.csv" exports the 2nd trace to the file myTrace2.csv in the default path.
Remote Command Notes	Not all measurements have the ALL selection. Traces cannot be recalled from files that were saved using the ALL selection. If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.

Instrument S/W Revision	A.01.60 or later

Trace Number	Analog Demod Mode: Trace Names
TRACE1	RF Spectrum
TRACE2	Demod
TRACE3	Demod Ave
TRACE4	Demod Max
TRACE5	Demod Min
TRACE6	AF Spectrum

Mode	VSA
Remote Command	<code>:MMEMory:STORe:TRACe:DATA TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, "<filename>" [, CSV TXT SDF [, OFF ON 0 1]]</code>
Example	<code>MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON</code>
Restriction and Notes	If you are not licensed to save a particular file type, then an error will be returned. If an invalid file format is specified or the file cannot be saved successfully, then an error is returned. 8901X Option 205 allows export in TXT, CSV, and SDF formats. 8901X Option 200 allows the Option 205 formats and additionally: Matlab 4, 5 and HDF5, and an N5110A compatible binary format.
Remote Command Notes	File format is selected by the second parameter, but no default extension is appended to the filename. If the second parameter is not supplied, then the filename extension is used to determine the format. *.mat selects Matlab 5 format. *.sdf, or an unrecognized extension chooses the SDF fast format. The optional Boolean determines if the file is saved with headers. By default the headers are saved.
Instrument S/W Revision	A.01.60 or later
Remote Command	<code>:MMEMory:STORe:CAPTured <filename></code>
Example	<code>:MMEM:STOR:CAPT</code> "MyDocuments\WCDMA\data\captureBuffer\myCaptureBuffer.bin" saves the capture buffer data from the current measurement to the file myCaptureBuffer.bin in the default path.
Restriction and Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Save As
Mode	WCDMA
Remote Command	<code>:MMEMory:STORe:ZMAP <filename></code>
Example	<code>:MMEM:STOR:ZMAP "myZoneMap.omf"</code> saves current Zone map as 89601 compatible file type.

Restriction and Notes	If a file with the same name already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of overwriting the file during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Once a save is complete, the Export Data menu will appear, and the Save As dialog will disappear. The message "File <file name> saved" will appear after the save is complete.
Instrument S/W Revision	A.01.60 or later
Key Path	Save, Data, Zone map
Mode	WIMAXOFDMA
Mode	VSA
Remote Command	<pre>:MMEMory:STORe:RECOding <filename> [, SDF SDFX CSV TXT MAT4 MAT HDF5 BIN [, OFF ON 0 1 [, OFF ON 0 1 [, OFF ON 0 1]]]]</pre>
Example	MMEM:STOR:REC "MyRecording.sdf",SDF,ON,ON,OFF
Remote Command Notes	Recorded data must be available in the buffer. File format is selected by the second parameter, but no default extension is appended to the filename. If the second parameter is not supplied, then the filename extension is used to determine the format. *.mat selects Matlab 5 format. *.sdf, or an unrecognized extension chooses the SDF fast format. The three optional Booleans determine if: 1. file is saved with headers 2. data is resampled to the current span before saving 3. player position settings limit the data saved
Instrument S/W Revision	A.01.60 or later

Screen Image

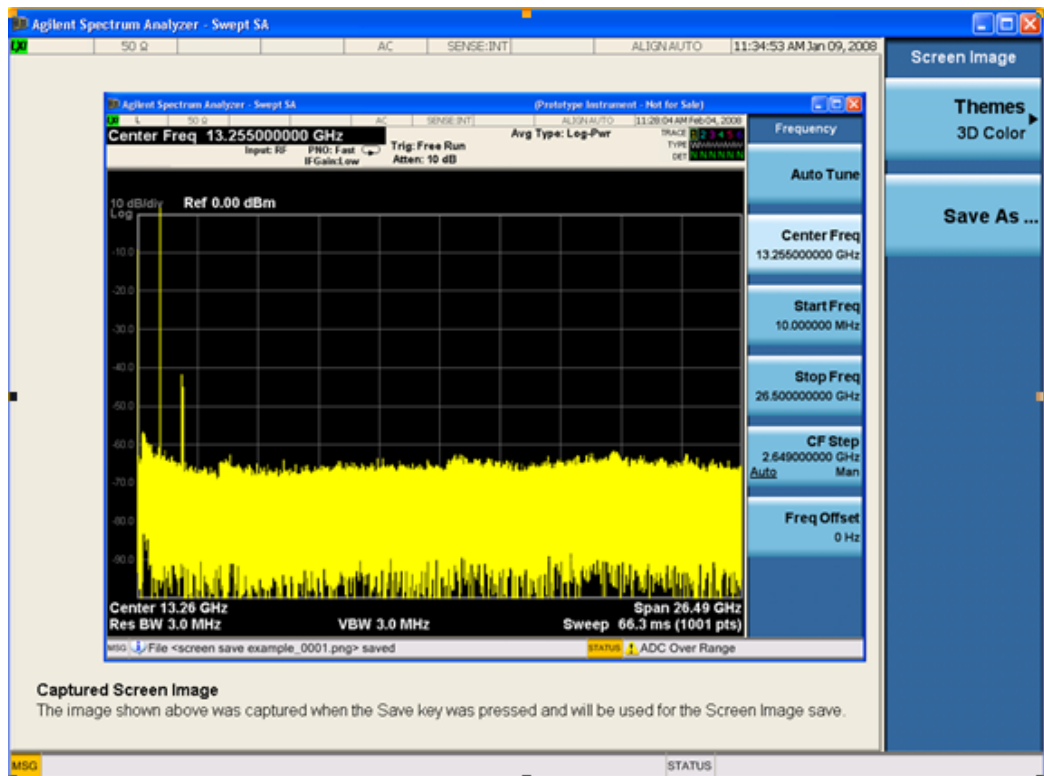
Accesses a menu of functions that enable you to specify a format and location for the saved screen image.

Pressing Screen Image brings up a menu which allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the **Save** front-panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:

Save



When you continue on into the **Save As** menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the **Save** menus.

After you have completed the save, the **Quick Save** front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu keys, not the menus and the active function that were on the screen when you first pressed the Save front-panel key.

Example	MMEM:STOR:SCR "MyScreenFile.png"
	This stores the current screen image in the file MyScreenFile.png in the default directory.
Remote Command Notes	See
Instrument S/W Revision	A.01.60 or later
Key Path	Save
Mode	All

Themes

Accesses a menu of function that enable you to choose the theme to be used when saving the screen

image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to pick between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEMe TDCOLOR TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe?
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes
Example	:MMEM:STOR:SCR:THEM TDM
Instrument S/W Revision	A.01.60 or later

3D Color Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Instrument S/W Revision	A.01.60 or later

3D Monochrome Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Instrument S/W Revision	A.01.60 or later

Flat Color Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Instrument S/W Revision	A.01.60 or later

Flat Monochrome Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Instrument S/W Revision	A.01.60 or later

Save

Save As...

Accesses a menu that enables you to select the location where you can save the Screen Image. This menu is a standard Windows® dialog with Save As menu keys. The **Save As** dialog is loaded with the file information related to the Screen Image Type. The filename is filled in using the auto file naming algorithm for the Screen Image Type and is highlighted. The only files that are visible are the *.png files and the Save As Type is *.png, since .png is the file suffix for the Screen Image Type.

The default path for Screen Images is

My Documents\<mode name>\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

This path is the **Save In:** path in the **Save As** dialog for all Screen Files when you first enters this dialog.

Key Path	Save, Screen Image
Restriction and Notes	Brings up Save As dialog for saving a Screen Image Save Type
Instrument S/W Revision	A.01.60 or later

Save Saves the screen image to the specified file using the selected theme. The image that is saved is the measurement display prior to when the **Save As** dialog appeared. The save is performed immediately and does not wait until the measurement is complete.

Remote Command:	:MMEMory:STORe:SCReen <filename>
Example:	:MMEM:STOR:SCR "myScreen.png"
Restriction and Notes:	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during a instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the Screen Image menu and the Save As dialog goes away. Advisory Event "File <file name> saved" after save is complete.

Key Path:	Save, Screen Image, Save As...
Instrument S/W Revision:	A.01.60 or later

Save As . . .

The **Save As** is a standard Windows dialog and with the **Save As** key menu. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The **Save As** dialog will have the last path loaded in **Save In:** for this particular file type. User specified

paths are remembered and persist through subsequent runs of the mode. These remembered paths are mode specific and are reset back to the default using **Restore Mode Defaults**.

Instrument S/W Revision A.01.60 or later

Save

Performs the actual save to the specified file of the selected type. The act of saving does not affect the currently running measurement and does not require you to be in single measurement mode to request a save. It performs the save as soon as the currently running measurement is in the idle state; when the measurement completes. This ensures the State or Data that is saved includes complete data for the current settings. The save only waits for the measurement to complete when the state or data that depends on the measurement setup is being saved. The save happens immediately when exporting corrections or when saving a screen image.

If the file already exists, a dialog will popup with corresponding menu keys that allows you to replace the existing file with an **OK** or to **Cancel** the request.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single icon. After the save completes, the corresponding register menu key annotation is updated with the date the time and the message "File <file name> saved" appears in the message bar.

Restriction and Notes:	If the file already exists, the File Exist dialog pops up and allows you to replace it or not by selecting the Yes or No menu keys that appear with the dialog. Then the key causes an auto return and Save As dialog goes away. Advisory Event "File <file name> saved" after save is complete.

Instrument S/W Revision: A.01.60 or later

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file.

Key Path	Save, <various>, Save As...
Restriction and Notes	Pressing this key navigates you to the files and folders list in the center of the dialog.
Instrument S/W Revision	A.01.60 or later

File Name

Brings up the Alpha Editor as shown in the screen image. Use the knob to choose the letter to add and the Enter front-panel key to add the letter to the file name. In addition to the list of alpha characters, this editor includes a **Space** menu key and a **Done** menu key. The **Done** menu key completes the filename, removes the Alpha Editor and returns back to the **File Open** dialog and menu, but does not cause the save to occur. You can also use **Enter** to complete the file name entry and this will cause the save to

Save

occur.

Key Path	Save, <various>, Save As...
Restriction and Notes	Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog.
Instrument S/W Revision	A.01.60 or later

Save As Type

This key corresponds to the **Save As Type** selection in the dialog. It follows the standard Windows® supported **Save As Type** behavior. It shows the current file suffix that corresponds to the type of file you have selected to save. If you navigated here from saving State, "State File (*.state)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from saving Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from exporting a data file, "Data File (*.csv)" is in the dialog and is available in the pull down menu. Modes can have other data file types and they would also be listed in the pull down menu.

Key Path	Save, <various>, Save As...
Restriction and Notes	Pressing this key causes the pull down menu to list all possible file types available in this context. All types available are loaded in a 1-of-N menu key for easy navigation.
Instrument S/W Revision	A.01.60 or later

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. It follows the standard Windows® supported **Up One Level** behavior. When pressed, it causes the file and folder list to navigate up one level in the directory structure.

Key Path	Save, <various>, Save As...
Restriction and Notes	When pressed, the file and folder list is directed up one level of folders and the new list of files and folders is displayed
Instrument S/W Revision	A.01.60 or later

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. It follows the standard Windows® supported **Create New Folder** behavior. When pressed, a new folder is created in the current directory with the name **New Folder** and allows you to enter a new folder name using the Alpha Editor.

Key Path	Save, <various>, Save As...
Restriction and Notes	Creates a new folder in the current folder and lets you fill in the folder name using the Alpha Editor.

Instrument S/W Revision A.01.60 or later

Save

Cancel

This key corresponds to the **Cancel** selection in the dialog. It follows the standard Windows supported **Cancel** behavior. It causes the current **Save As** request to be cancelled.

Key Path	Save, <various>, Save As...
Restriction and Notes	Pressing this key causes the Save As dialog to go away and auto return.
Instrument S/W Revision	A.01.60 or later

Single (Single Measurement/Sweep)

Single sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing **Single** does a Resume.

Example:	:INIT:CONT OFF
Remote Command Notes:	See Cont key description.
Key Path:	Front-panel key
Instrument S/W Revision:	A.01.60 or later

Single (Single Measurement/Sweep)

Source

This mode does not have any Source control functionality.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Source

SPAN X Scale

Span features are unique to each Measurement. See the specific Measurement for more information.
The front-panel key accesses keys to control span (or X-axis) settings.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Sweep / Control

This section describes the keys in the Sweep, Control and Capture menu that are common to multiple Modes and Measurements. See the Measurement descriptions for information on features that are unique.

The Meas Uncal (measurement uncalibrated) warning is given in the Status Bar in the lower right corner of the screen when the manual sweep time entered is too fast to give accurate measurements with the current setting of Res BW. When this happens, increase the Sweep Time or the Res BW.

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORt is sent, the alignment finishes before the abort function is performed. So ABORt does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

Remote Command:	:ABORt
Example:	:ABOR
Dependencies/Couplings:	For continuous measurement, ABORt is equivalent to the Restart key. Not all measurements support the abort command.
Remote Command Notes:	If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTinuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.
SCPI Status Bits/OPC Dependencies:	The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.
Instrument S/W Revision:	A.01.60 or later

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing **Restart**, **Single** or **Cont** does a Resume.

Remote Command:	:INITiate:PAUSE
Dependencies/Couplings:	Grayed out in Measurements that don't support Pausing. Blanked in Modes that don't support Pausing.

Key Path:	Sweep/Control
Instrument S/W Revision:	A.01.60 or later

Remote Command:	:INITiate:RESume
Dependencies/Couplings:	Grayed out in Measurements that don't support Pausing. Blanked in Modes that don't support Pausing.

Key Path:	Sweep/Control
Instrument S/W Revision:	A.01.60 or later

Record Data Now

This key makes a data recording using input at the current frequency settings. This key is a duplicate of the Record Data Now key in the Input/Output, Data Source menu. It is included in this menu as a convenience to be near the playback and pause functions that it is often used with. [“Record Data Now ” on page 1034](#)

Some settings of the recorded data can be queried remotely, like center frequency, span, rate, length, and data type. See [“Querying Recording Information” on page 1037](#).

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Playback (Recorded Data)

Accesses controls for the playback of a recording. A recording is a long buffer of contiguous time samples together with meta-data about the sample rate and other related state properties at the time it was made. It may be saved and recalled from a file. A recording is typically much longer than a single measurement time record.

When the instrument data source is recorded data (see Input/Output, Data Source), a measurement takes a complete time record from the recording buffer starting at the current playback position. Then the playback position pointer is moved ahead from 1 to 100% of the current time record length, depending on whether overlap processing is allowed. Data is taken sequentially from the recording until the play

position is less than a time record length away from the time stored in the Stop Time property. The measurement can be made to pause at this point, or to loop back to the beginning and continue if more time records are needed. (It resets the play position to the Start Time for this loop back functionality.) Initially the Start Time and Stop Time properties are set to the beginning and end of the recording, but they can be restricted to a portion of it.

Some settings of the recorded data can be queried remotely, like center frequency, span, rate, length, and data type. See [“Querying Recording Information” on page 1037](#).

Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Playback Position

This lets you to view or change the current playback position. It is not an active function, so the arrow keys and knob have no effect on it. It must be entered numerically.

Remote Command:	<code>[:SENSe] RECOding:PLAYback:POStion <time></code> <code>[:SENSe] RECOding:PLAYback:POStion?</code>
Example:	REC:PLAY:POS 1 US
Dependencies/Couplings:	Measurement restart sets this back to the Start Time (minus any points needed for settling the measurement)
Preset:	0
Min:	0
Max:	End of recording
Key Path:	Sweep/Control, Playback
Instrument S/W Revision:	A.01.60 or later

Start Time

This is where the playback position is set to when a measurement is restarted, or loops back from the end of the recording.

Remote Command:	<code>[:SENSe] RECOding:PLAYback:STARt <time></code> <code>[:SENSe] RECOding:PLAYback:STARt?</code> <code>[:SENSe] RECOding:PLAYback:STARt:AUTO OFF ON 0 1</code> <code>[:SENSe] RECOding:PLAYback:STARt:AUTO?</code>
Example:	REC:PLAY:STAR 2 US REC:PLAY:STAR:AUTO ON

Sweep / Control

Dependencies/Couplings:	If Start Time is set after the current play position, then the play position is updated to the new start time at the next measurement. If this is set greater than the stop time and a measurement is started, an error is generated. Setting the start time via front panel or SCPI forces this to Man. Recalling a recording file or making a new recording sets this to Auto
Remote Command Notes:	Selecting Auto sets the Start Time to 0
Preset:	On, 0 s
State Saved:	No
Min:	0
Max:	End of recording
Key Path:	Sweep/Control, Playback
Instrument S/W Revision:	A.01.60 or later

Stop Time

No measurement data will be taken after this position in the recording buffer. If there is not a complete time record length between the playback position and the stop time, the measurement either pauses or loops back to the start time setting. The Loop at End setting determines which of these it does.

Remote Command:

```
[ :SENSe] RECOding:PLAYback:STOP <time>
[ :SENSe] RECOding:PLAYback:STOP?
[ :SENSe] RECOding:PLAYback:STOP:AUTO OFF|ON|0|1
[ :SENSe] RECOding:PLAYback:STOP:AUTO?
```

Example:

```
REC:PLAY:STOP 2 US
REC:PLAY:STOP:AUTO ON
```

Dependencies/Couplings:	If Stop Time is set prior to the current play position plus time record length, then the play position loops back to the Start time at the next measurement. If this is set less than the start time and a measurement is started, an error is generated Setting the stop time via front panel or SCPI forces this to Manual. Recalling a recording file or making a new recording sets this to auto

Remote Command Notes:	Selecting Auto sets the Stop Time to the end of the data.
Preset:	End of recording, Auto On
State Saved:	No
Min:	0

Max: End of recording
 Key Path: **Sweep/Control, Playback**
 Instrument S/W Revision: A.01.60 or later

Loop at End

This setting determines whether the measurement stops, or resets the play position back to the start time, when there is not enough data left between the playback position and the stop time.

Remote Command: [:SENSe] RECOding:PLAYback:LOOP OFF|ON|0|1
 [:SENSe] RECOding:PLAYback:LOOP?
Example: REC:PLAY:LOOP ON
Preset: ON
State Saved: No
Range: Off|On
Key Path: **Sweep/Control, Playback**
Instrument S/W Revision: A.01.60 or later

Querying Recording Information

Various information about the recording is saved with the recording and can be queried remotely:

- Measurement center frequency when recording was made
- Span setting when recording was made
- Span of the recording (may be larger than the measurement span setting)
- Sample rate of recording
- Time length of recording
- Whether recording is complex or real

Remote Command: [:SENSe] :RECOding:PLAYback:FREQuency:CENTer?
Remote Command Notes: Query Only
 Returns the center frequency at which the recording was made
Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe] :RECOding:PLAYback:FREQuency:SPAN?

Sweep / Control

Remote Command Notes: Query Only
Returns the span setting when the recording was initiated. The actual recording span may be greater.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:FREQuency:SPAN:MAX?

Remote Command Notes: Query Only
Returns the actual span at which the recording was made. The actual recording span may be greater than the span that was displayed when the recording was initiated.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:LENGth?

Remote Command Notes: Query Only
Returns the length (in seconds) of the recording.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:SRATe?

Remote Command Notes: Query Only
Returns the sample rate (in Hz) of the data in the recording.

Instrument S/W Revision: A.01.60 or later

Remote Command: [:SENSe]:RECORDing:PLAYback:ZOOM?

Remote Command Notes: Query Only
Always returns 1 currently (0 means data is real, 1 means it is complex)

Instrument S/W Revision: A.01.60 or later

Gate

The Gate key in the Sweep/Control menu accesses a menu that enables you to control the gating function.

The Gate functionality is used to view signals best viewed by qualifying them with other events. Gate setup parameters are meas global, so the settings will be the same in all the measurements.

Sweep Time autocoupling rules and annotation are changed by Gate being on.

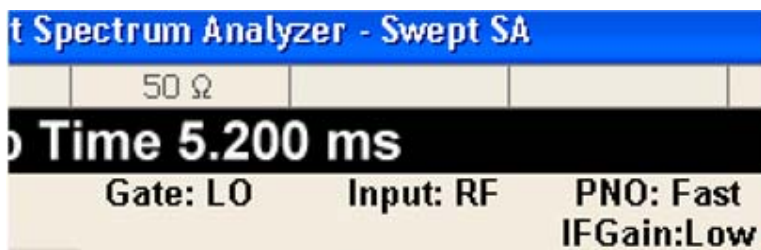
Key Path	Sweep/Control
Instrument S/W Revision	A.01.60 or later

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the Meas Bar reflects that it is on and what method is used, as seen in the "Gate: LO" annunciator below.



Remote Command: `[ :SENSe ] :SWEep:EGATe [ :STATe ] OFF | ON | 0 | 1`
`[ :SENSe ] :SWEep:EGATe [ :STATe ] ?`

Example: `SWE:EGAT ON`
`SWE:EGAT?`

Sweep / Control

Dependencies/Couplings:	The function is unavailable (grayed out) and Off when: Gate Method is LO or Video and FFT Sweep Type is manually selected. Gate Method is FFT and Swept Sweep Type is manually selected. Marker Count is ON. When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out. Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out. When Gate is on, Offset Res BW and Offset Video BW is ignored (if user sets these values) and measurement works like as all Offset Res BW and all Offset Video BW are coupled with Res BW and Video BW under BW menu. When Gate is on, Offset BW key in Offset/Limit menu is grayed out.
Preset:	Off
Range:	On Off
State Saved:	Saved in State
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display.

Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window showing the positions of the Gate is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

Key Path	Sweep/Control, Gate
Remote Command	<code>[:SENSe] :SWEep:EGATe:VIEW ON OFF 1 0</code> <code>[:SENSe] :SWEep:EGATe:VIEW?</code>
Example	SWE:EGAT:VIEW ON turns on the gate view.

Dependencies/Couplings

These couplings apply to the Swept SA measurement:

- When Gate View is turned on, the instrument is set to Zero Span.
- Gate View automatically turns off whenever a Span other than Zero is selected.
- Gate View automatically turns off if you presses Last Span while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span).

When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in [“Gate View Sweep Time” on page 1044](#).

- When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time.
- If Gate View is on and Gate is off, then turning on Gate turns off Gate View.

In the Swept SA measurement:

In Gate View, the regular Sweep Time key is grayed out, to avoid confusing you who wants to set Gate View Sweep Time.

In the other measurements:

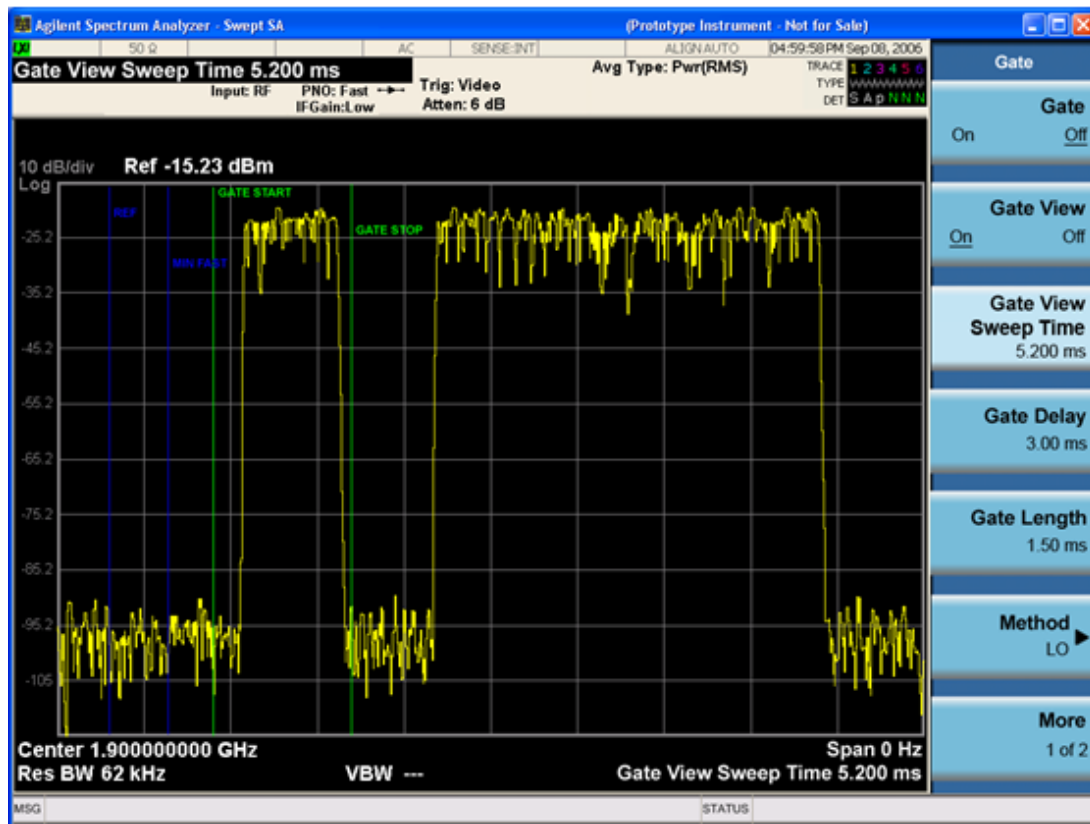
When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window.

- When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time.

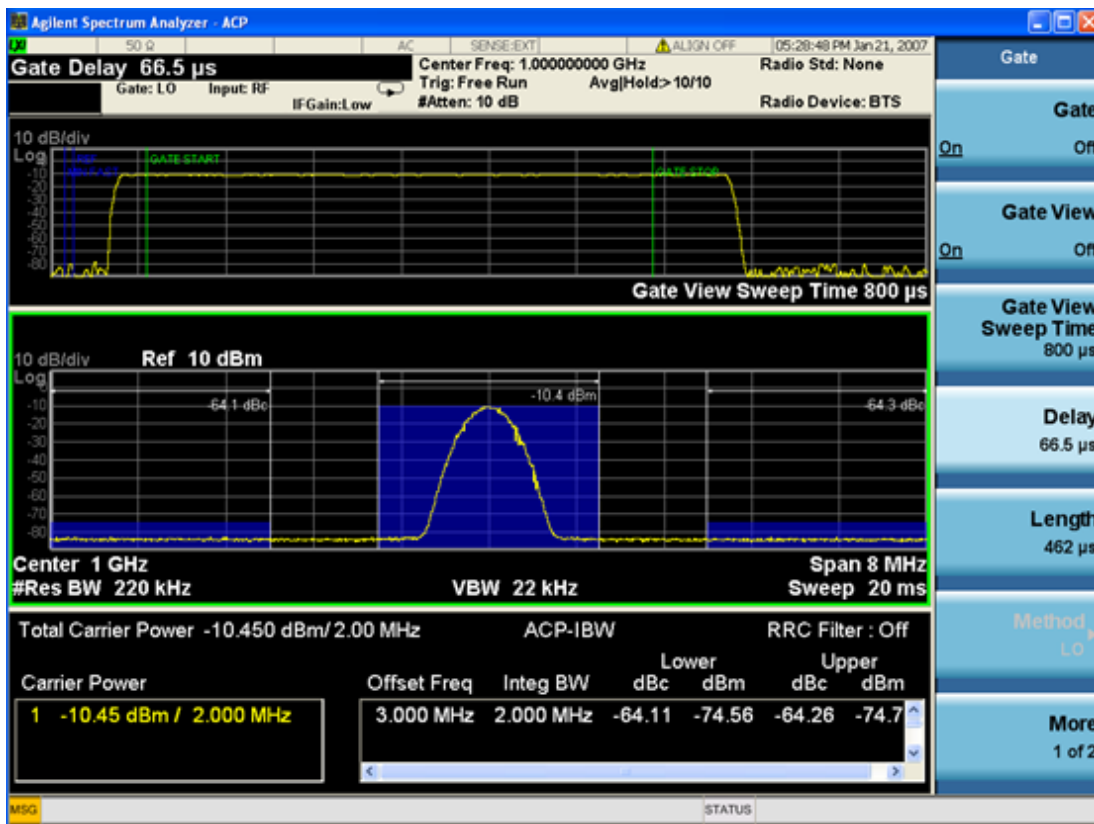
Preset	OFF
State Saved	Saved in state
Range	On Off
Instrument S/W Revision	A.01.60 or later

A sample of the Gate View screen in the Swept SA measurement is shown below:

Sweep / Control



A sample of the Gate View screen in other measurements is shown below. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The Meas Bar and keys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period (defined by Length, even in FFT. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.

Sweep / Control

- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the bucket length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO). The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Sweep Time

Controls the sweep time in the Gate View window. In order to provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

Remote Command: `[ :SENSe ] :SWEep:EGATe:TIME <time>`
`[ :SENSe ] :SWEep:EGATe:TIME?`

Example: `SWE:EGAT:TIME 500 ms`

Dependencies/Couplings:

Gate View Sweep Time is initialized:

on Preset (after initializing delay and length).

every time the Gate Method is set/changed.

Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.

1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$.

Preset:

519.3 μs

WiMAX OFDMA: 5 ms

GSM/EDGE: 1 ms

State Saved:

Saved in state

Min:

1 μs

Max:

6000 s

Key Path:

Sweep/Control, Gate

Instrument S/W Revision:

A.01.60 or later

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

Remote Command:

[:SENSe]:SWEep:EGATe:DElay <time>

[:SENSe]:SWEep:EGATe:DElay?

Example:

SWE:EGAT:DElay 500ms

SWE:EGAT:DElay?

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Remote Command Notes:	Units of time are required or no units; otherwise an invalid suffix error will be generated. See error –131.
Preset:	57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us
State Saved:	Saved in state
Min:	0.0 us
Max:	100 s
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

Gate Length

Controls the length of time that the gate is on after it opens.

Remote Command: [:SENSe]:SWEep:EGATe:LENGth <time>
[:SENSe]:SWEep:EGATe:LENGth?

Example: SWE:EGAT:LENG 1
SWE:EGAT:LENG?

Dependencies/Couplings: Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.

Gate Length
(=1.83/RBW)
2.8 ms

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The key is also grayed out if Gate Control = Level.

Remote Command Notes:	Units of time are required or no units; otherwise an invalid suffix will be generated.
Preset:	461.6 us WiMAX OFDMA: 50 us GSM/EDGE: 200 us
State Saved:	Saved in state
Min:	100 ns
Max:	5 s
Key Path:	Sweep/Control, Gate

Instrument S/W Revision: A.01.60 or later

Method

This lets you choose one of the three different types of gating.

Not all types of gating are available for all measurements.

Remote Command: [:SENSe] :SWEep:EGATe:METHod LO | VIDEo | FFT
[:SENSe] :SWEep:EGATe:METHod?

Example: SWE:EGAT:METH FFT

Preset: LO

State Saved: Saved in state

Key Path: **Sweep/Control, Gate**

Instrument S/W Revision: A.01.60 or later

LO When set to Gate (On), the LO sweeps whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source.

This form of gating is more sophisticated, and results in faster measurements. With Gated LO, the analyzer only sweeps while the gate conditions are satisfied. This means that a sweep could take place over several gate events. It would start when the gate signal goes true and stop when it goes false, then continue when it goes true again. But since the LO is sweeping as long as the gate conditions are satisfied, the sweep typically finishes much more quickly than with Gated Video.

When in zero span, there is no actual sweep performed. But data is only taken while the gate conditions are satisfied. So even though there is no sweep, the gate settings will impact when data is acquired.

Dependencies/Couplings: Key is unavailable when Gate is On and FFT Sweep Type manually selected.
When selected, Sweep Type is forced to Swept and the FFT key in Sweep Type is grayed out.

Key Path: **Sweep/Control, Gate, Method**

Instrument S/W Revision: A.01.60 or later

Video When set to Gate (On), the video signal is allowed to pass through whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source.

This form of gating may be thought of as a simple switch, which connects the signal to the input of the spectrum analyzer. When the gate conditions are satisfied, the switch is closed, and when the gate conditions are not satisfied, the switch is open. So we only look at the signal while the gate conditions are satisfied.

With this type of gating, you usually set the analyzer to sweep very slowly. In fact, a general rule is to sweep slowly enough that the gate is guaranteed to be closed at least once per bucket (data measurement

Sweep / Control

interval). Then if the peak detector is used, each bucket will represent the peak signal as it looks with the gate closed.

Dependencies/Couplings:	Key is unavailable when Gate is On and FFT Sweep Type manually selected. When selected, Sweep Type is forced to Swept and the FFT key in Sweep Type is grayed out
Key Path:	Sweep/Control, Gate, Method
Instrument S/W Revision:	A.01.60 or later

FFT When set to Gate (On), the an FFT is performed whenever the gate conditions as specified in the Gate menu are satisfied by the signal at the Gate Source. This is an FFT measurement which begins when the gate conditions are satisfied. Since the time period of an FFT is approximately $1.83/\text{RBW}$, you get a measurement which starts under predefined conditions and takes place over a predefined period. So, in essence, this is a gated measurement. You have limited control over the gate length but it works in FFT sweeps, which the other two methods do not.

Gated FFT cannot be done in zero span since the instrument is not sweeping. So in zero span the Gated LO method is used. Data is still only taken while the gate conditions are satisfied, so the gate settings do impact when data is acquired.

The Gate Length will be $1.83/\text{RBW}$.

This is a convenient way to make a triggered FFT measurement under control of an external gating signal.

Dependencies/Couplings:	Key is unavailable when Gate is On and Swept Sweep Type manually selected. Key is unavailable when gate Control is set to Level. When selected, Sweep Type is forced to FFT and the Swept key in Sweep Type is grayed out Forces Gate Length to $1.83/\text{RBW}$ (see Length key description above)
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

Gate Source

The menus under the **Gate Source** key follow the same pattern as those under **Trigger**, with the exception that neither **Free Run** nor **Video** are available as Gate Source selections. Any changes to the settings in the setup menus under each Gate Source selection key (for example: **Trigger Level**) also affect the settings under the Trigger menu keys. Note that the selected Trigger Source does not have to

match the Gate Source.

Remote Command:	[:SENSe] :SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAME RFBurst TV [:SENSe] :SWEep:EGATe:SOURce?
Preset:	EXTernal 1 GSM/EDGE: FRAME
Key Path:	Sweep/Control, Gate
Dependencies/Couplings:	TV triggering is not available yet.
Instrument S/W Revision:	A.01.60 or later

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

Remote Command:	[:SENSe] :SWEep:EGATe:CONTrol EDGE LEVel [:SENSe] :SWEep:EGATe:CONTrol?
Example:	SWE:EGAT:CONT EDGE
Dependencies/Couplings:	If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected.
Preset:	EDGE
State Saved:	Saved in stat
Key Path:	Sweep/Control, Gate
Instrument S/W Revision:	A.01.60 or later

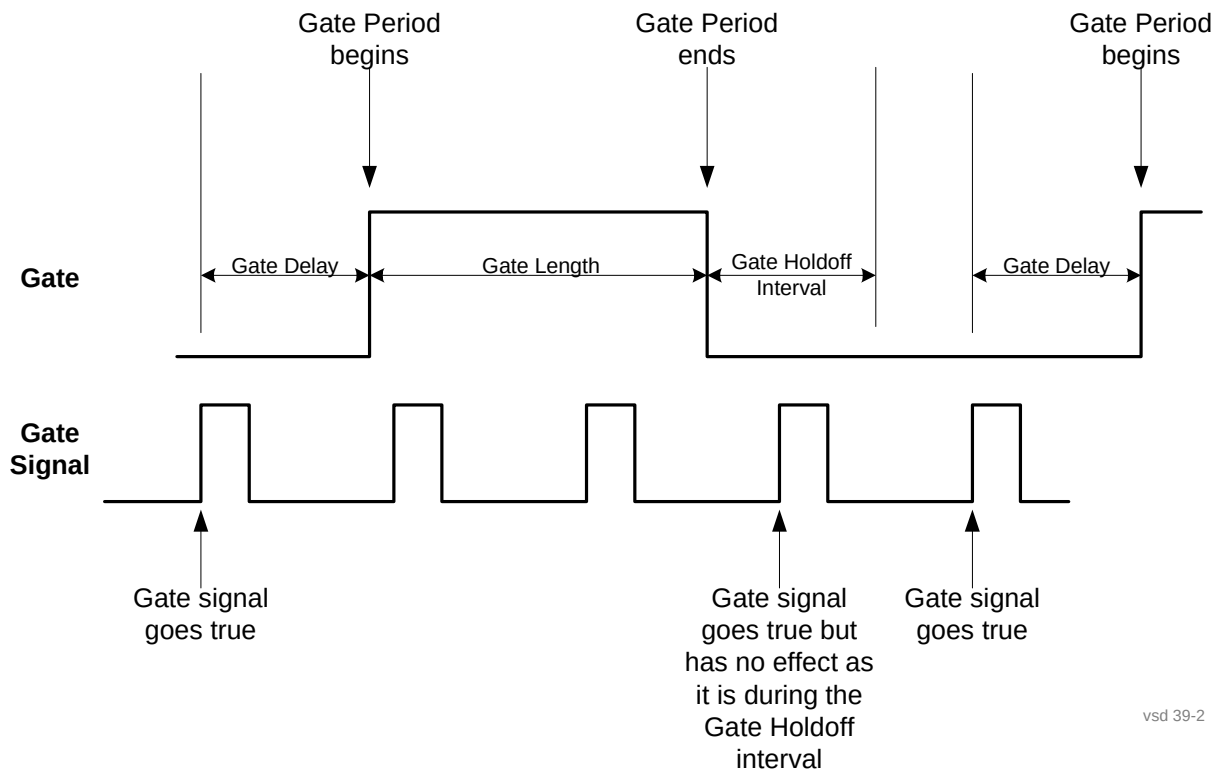
Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors,

Sweep / Control

including RBW and Phase Noise Optimization setting. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, you may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When **Method** is set to **Video** or **FFT**, the **Gate Holdoff** function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is "---" and ??? is returned to a query.

Remote Command

```
[ :SENSe ] :SWEp:EGATe:HOLDoFF <time>
[ :SENSe ] :SWEp:EGATe:HOLDoFF?
[ :SENSe ] :SWEp:EGATe:HOLDoFF:AUTO OFF|ON|0|1
[ :SENSe ] :SWEp:EGATe:HOLDoFF:AUTO?
```


Dependencies/Couplings	When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time. Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows you to adjust the value. If the value is adjusted, the setting changes to Man. Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now you can adjust the value. Pressing the key while it is in Man and selected, cause the value to change back to Auto. Pressing the key while it is in Man and not selected, causes the key to become selected and allows you to adjust the value. When Method is set to Video or FFT, the Gate Holdoff function has no effect. See Coupling, above
Example	SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?
Instrument S/W Revision	A.01.60 or later
Key Path	Sweep/Control, Gate
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Preset	Auto
	Auto/On
State Saved	Saved in instrument state.
Min	1 μ sec
Max	1 sec

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects. The intent is to make it unnecessary for you to worry about the effects that RBW will have on the gate circuitry, by automatically compensating for them.

You can select between uncompensated operation and two types of compensation, **Delay Until RBW Settled** and **Compensate for RBW Group Delay**.

Sweep / Control

See [“More Information” on page 1052](#)

Remote Command:	<code>[:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE</code> <code>OFF SETTled GDELay</code> <code>[:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE?</code>
Example:	<code>SWE:EGAT:DEL:COMP:TYPE SETT</code> <code>SWE:EGAT:DEL:COMP:TYPE?</code>
Scope:	Meas Global
Range:	Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay
Preset:	TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled
State Saved:	Saved in state
Key Path:	Sweep/Control, Gate
Notes:	Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with “Uncompensated” showing as the selection, the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an “Undefined Header” error is generated. Measurements that do not support this function include: Swept SA
Instrument S/W Revision:	A.01.60 or later

More Information

Selecting **Uncompensated** means that the actual gate delay is as you sets it.

Selecting **Delay Until RBW Settled** causes the gate delay to be increased above you setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (fro example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the **Gate Delay** key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated.

Selecting **Compensate for RBW Group Delay** causes the gate delay to be increased above you setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the **Gate Delay** key does NOT change. **Compensate for RBW Group Delay** also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to **Delay Until RBW Settled**, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section [“Gate View On/Off” on page 1040](#). If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you to set an optimal gate delay value for the current measurement setup.

Remote Command: `[ :SENSe] :SWEep:EGATe:MINFast?`

Example: `SWE:EGAT:MIN?`

Instrument S/W Revision: A.01.60 or later

Trace / Detector

Trace/Detector features are unique to each Measurement. See the specific Measurement for more information.

The front-panel key accesses keys to control Trace and Detector settings.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Trigger

The Trig front-panel key accesses a menu of keys to control the selection of the trigger source and the setup of each of the trigger sources. The analyzer is designed to allow triggering from a number of different sources, for example, Free Run, Video, External, RF Burst, etc.

The TRIG:SOURce command (below) will specify the trigger source for the currently selected input (RF or I/Q). If you change inputs, the new input remembers the trigger source it was last programmed to for the current measurement, and uses that trigger source. You can directly set the trigger source for each input using the TRIGger:RF:SOURce and TRIGger:IQ:SOURce commands (later in this section).

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

See [“Trigger Source Presets” on page 1058](#)

See [“RF Trigger Source” on page 1061](#)

See [“I/Q Trigger Source” on page 1062](#)

See [“More Information” on page 1063](#)

Key Path	Front-panel key
Remote Command	:TRIGger:<measurement>[:SEQuence]:SOURce EXTernal1 EXTernal2 IMMediate LINE FRAMe RFBurst VIDeo IF ALARm LAN IQMag IDEMod QDEMod IINPut QINPut AIQMag :TRIGger:<measurement>[:SEQuence]:SOURce?
Example	TRIG:ACP:SOUR EXT1 Selects the external 1 trigger input for the ACP measurement and the selected input TRIG:SOUR VID Selects video triggering for the SANalyzer measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword.

Trigger

Remote Command Notes

Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.

Not all trigger sources are available for each input. See the “[RF Trigger Source](#)” on page 1061 and “[I/Q Trigger Source](#)” on page 1062 commands (below) for detailed information on which trigger sources are available for each input.

Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.

*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.

Available ranges and presets can vary from mode to mode.

Preset

See table below

SCPI Status Bits/OPC Dependencies

The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision

A.01.60 or later

Trigger Source Presets

Here are the Trigger Source Presets for the various measurements:

Meas	Mode	Preset for RF	Preset for IQ	Notes
Swept SA	SA	IMM	IQ not supported	
CHP	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB	IMM	IQ not supported	

OBW	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO	1xEVDO: EXT1 others: IMM	IQ not supported	For 1xEVDO mode, the trigger source is coupled with the gate state, as well as the gate source. When the trigger source changes to RFBurst, External1 or External2, the gate state is set to on, and the gate source is set identically with the trigger source. When the trigger source changes to IMMEDIATE, VIDEO, LINE, FRAME or IF, the gate state is set to off.
CCDF	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB	SA, WCDMA, C2K: IMMEDIATE WIMAX OFDMA : RFBurst TD-SCDMA: BTS: External 1 MS: RFBurst	TD-SCDMA: BTS: External 1 MS: IQMAG Others: IMM	For TD-SCDMA: Trigger source is coupled with radio device. When radio device changes to BTS, trigger source will be changed to EXTERNAL1. When radio device changes to MS, trigger source will be set as RFBurst for RF or IQ Mag for BBIQ. When Trigger Source is RFBurst or IQ Mag, Measure Interval is grayed out.
ACP	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB	IMM	IQ not supported	
Tx Power	SA, GSM, TD-SCDMA	SA, GSM: RFBurst TD-SCDMA: EXTERNAL	IMM	TD-SCDMA doesn't support the Line and Periodic Timer parameters. When the mode is TD-SCDMA, if the Radio Device is switched to BTS, the value will be changed to External 1 and if the Radio device is switched to MS, the value will be changed to RFBurst
SPUR	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO	IMM	IQ not supported	

Trigger

SEM	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO	SA, WCDMA, C2K, TD-SCDMA, WIMAX OFDMA: IMMEDIATE 1xEVDO(BTS): EXTERNAL1	IQ not supported	
CDP	WCDMA	IMM		
RHO	WCDMA	IMM		
PCON	WCDMA	IMM		
QPSK	WCDMA, C2K, 1xEVDO	All except CDMA1xEVDO: IMMEDIATE CDMA1xEVDO: EXT1		
MON	All except SA and BASIC	IMM	IQ not supported	
WAV		All except GSM/EDGE: IMMEDIATE GSM/EDGE: RFBURST	IQMAG	
PVT	WIMAXOFDMA	RFB	IMM	
EVM	WIMAXOFDMA	IMM	IMM	
SPEC	BASIC	IMM	IMM	
LOG Plot	PN	IMM	IQ not supported	
Spot Freq	PN	IMM	IQ not supported	
GMSK PVT	EDGE/GSM	RFB	IMM	
GMSK PFER	EDGE/GSM	RFB	IQMAG	
GMSK ORFS	EDGE/GSM	RFB	IQ not supported	
EDGE PVT	EDGE/GSM	RFB	IMM	
EDGE EVM	EDGE/GSM	RFB	IQMAG	
EDGE ORFS	EDGE/GSM	RFB	IQ not supported	

Combine d WCDMA	WCDMA	IMM	IQ not supported	
Combine d GSM	EDGE/GSM	RFB	IQ not supported	
List Power Step	WCDMA, EDGE/GSM	IMM	IQ not supported	

RF Trigger Source

The **RF Trigger Source** command (below) selects the trigger to be used for the specified measurement when RF is the selected input. The RF trigger source can be queried and changed even while another input is selected, but it is inactive until RF becomes the selected input.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

Remote Command:

```
:TRIGger:<measurement>[:SEquence]:RF:SOURce
EXTErnal1|EXTErnal2|IMMediate|LINE|FRAME|RFBurst|VIDeo|
IF|ALARm|LAN

:TRIGger:<measurement>[:SEquence]:RF:SOURce?
```

Example:

```
TRIG:ACP:RF:SOUR EXT1
```

Selects the external 1 trigger input for the ACP measurement and the RF input

```
TRIG:RF:SOUR VID
```

Selects video triggering for the SANalyzer measurement and the RF input.
For SAN, do not use the <measurement> keyword.

Trigger

Remote Command Notes: Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.

Not all trigger sources are available for each input. For the **RF Trigger Source**, the following trigger sources are available:

- IMMEDIATE - free run triggering
- VIDEO - triggers on the video signal level
- LINE - triggers on the power line signal
- EXTERNAL1 - triggers on an externally connected trigger source on the rear panel
- EXTERNAL2 - triggers on an externally connected trigger source on the front panel
- RFBURST - triggers on the bursted frame
- FRAME - triggers on the periodic timer
- IF (video) - same as video, for backwards compatibility only
- ALARM - LXI Alarm
- LAN - LXI LAN event

*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.

Available ranges, and presets can vary from mode to mode.

SCPI Status Bits/OPC Dependencies:

The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

I/Q Trigger Source

The **I/Q Trigger Source** command (below) selects the trigger to be used for the specified measurement when I/Q (which requires option BBA) is the selected input. The I/Q trigger source can be queried and changed even while another input is selected, but it is inactive until I/Q becomes the selected input.

Remote Command:

```
:TRIGger:<measurement>[:SEquence]:IQ:SOURce  
EXTernal1|EXTernal2|IMMEDIATE|IQMag|IDEMod|QDEMod|IINPu  
t|QINPut|AIQMag  
:TRIGger:<measurement>[:SEquence]:IQ:SOURce?
```

Example:

```
TRIG:WAVEform:SOUR IQM
```

Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input

Remote Command Notes:	Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available. Not all trigger sources are available for each input. For the I/Q Trigger Source, the following trigger sources are available: — IMMEDIATE - free run triggering — EXTERNAL1 - triggers on an externally connected trigger source on the rear panel — EXTERNAL2 - triggers on an externally connected trigger source on the front panel — IQMag - triggers on the magnitude of the I/Q signal — IDEMod - triggers on the I/Q signal's demodulated I voltage — QDEMod - triggers on the I/Q signal's demodulated Q voltage — IINPut - triggers on the I channel's ADC voltage — QINPut - triggers on the Q channel's ADC voltage — AIQMag - triggers on the magnitude of the auxiliary receiver channel I/Q signal *OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned. Available ranges, and presets can vary from mode to mode.
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

More Information

The trigger menus let you select the trigger source and trigger settings for a sweep or measurement. In triggered operation (basically, any trigger source other than Free Run), the analyzer will begin a sweep or measurement only when the selected trigger conditions are met, generally when your trigger source signal meets the specified trigger level and polarity requirements. (In FFT measurements, the trigger controls when the data acquisition begins for FFT conversion.)

For each of the trigger sources, you may define a set of operational parameters or settings which will be applied when that source is selected as the current trigger source. Examples of these settings are Trigger Level, Trigger Delay, and Trigger Slope. You may apply different settings for each source; so, for example, you could have a Trigger Level of 1v for External 1 trigger and -10 dBm for Video trigger.

Once you have established the settings for a given trigger source, they generally will remain unchanged for that trigger source as you go from measurement to measurement within a Mode (although the settings do change as you go from Mode to Mode). Furthermore, the trigger settings within a Mode are the same

Trigger

for the **Trigger** menu, the **Gate Source** menu, and the **Sync Source** menu that is part of the **Periodic Timer Trigger Setup** menu. That is, if **Ext1** trigger level is set to 1v in the **Trigger** menu, it will appear as 1v in both the **Gate Source** and the **Sync Source** menus. For these reasons the trigger settings commands are not qualified with the measurement name, the way the trigger source commands are.

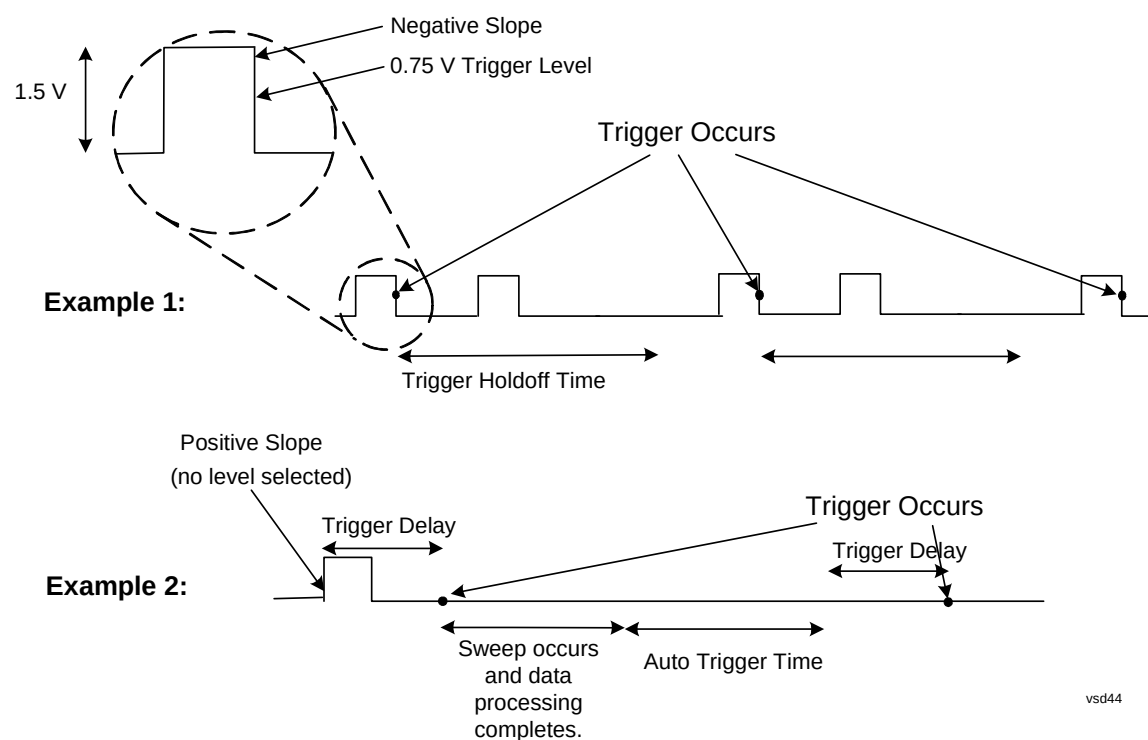
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into the Video Trigger Setup menu.

Trigger Setup Parameters:

The following examples show trigger setup parameters using an external trigger source.

Example 1 illustrates the trigger conditions with negative slope and no trigger occurs during trigger Holdoff time.

Example 2 illustrates the trigger conditions with positive slope, trigger delay, and auto trigger time.



Free Run

Pressing this key, when it is not selected, selects free-run triggering. Free run triggering occurs immediately after the sweep/measurement is initiated.

Example:	TRIG:SOUR IMM	Swept SA measurement
	TRIG:<meas>:SOUR IMM	Measurements other than Swept SA
State Saved:	Saved in instrument state.	

Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Video (IF Envelope)

Pressing this key, when it is not selected, selects the video signal as the trigger. The Video trigger condition is met when the video signal (the filtered and detected version of the input signal, including both RBW and VBW filtering) crosses the video trigger level.

When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

The video trigger level is shown as a labeled line on the display. The line is displayed as long as video is the selected trigger source.

Pressing this key, when it is already selected, accesses the video trigger setup functions.

Example:	TRIG:SOUR VID Swept SA measurement TRIG:<meas>:SOUR VID Measurements other than Swept SA
Dependencies/Couplings:	Video trigger is allowed in average detector mode.
State Saved:	Saved in instrument state.
Key Path:	Trig
Notes:	Log Plot and Spot Frequency measurements do not support Video Trigger
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets a level for the video signal trigger. When the video signal crosses this level, with the chosen slope, the trigger occurs. This level is displayed with a horizontal line only if **Video** is the selected trigger

Trigger

source.

Remote Command:	<code>:TRIGger[:SEquence]:VIDeo:LEVel <ampl></code> <code>:TRIGger[:SEquence]:VIDeo:LEVel?</code>
Example:	TRIG:VID:LEV -40 dBm
Dependencies/Couplings:	This same level is used for the Video trigger source in the Trigger menu and for the Video selection in the Gate Source menu. The range of the Video Trigger Level is dependent on the Reference Level.
Preset:	Set the Video Trigger Level -25 dBm on Preset. When the Video Trigger Level becomes the active function, if the value is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was.
State Saved:	Saved in instrument state.
Min:	Same as reference level
Max:	Same as reference level
Key Path:	Trig, Video
Default Unit:	depends on the current selected Y axis unit
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command:	<code>:TRIGger[:SEquence]:VIDeo:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEquence]:VIDeo:SLOPe?</code>
Example:	TRIG:VID:SLOP NEG
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, Video
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept

spans.

Remote Command:

```
:TRIGger[:SEquence]:VIDeo:DELaY <time>
:TRIGger[:SEquence]:VIDeo:DELaY?
:TRIGger[:SEquence]:VIDeo:DELaY:STATe OFF|ON|0|1
:TRIGger[:SEquence]:VIDeo:DELaY:STATe?
```

Example: TRIG:VID:DEL:STAT ON
TRIG:VID:DEL 100 ms

Preset: Off, 1 us

State Saved: Saved in instrument state.

Min: -150 ms

Max: +500 ms

Key Path: **Trig, Video**

Default Unit: s

Instrument S/W Revision: A.01.60 or later

Line

Pressing this key, when it is not selected, selects the line signal as the trigger. A new sweep/measurement will start synchronized with the next cycle of the line voltage. Pressing this key, when it is already selected, access the line trigger setup menu.

Example: TRIG:SOUR LINE Swept SA measurement
TRIG:<meas>:SOUR LINE Measurements other than Swept SA

Dependencies/Couplings: Line trigger is not available when operating from a "dc power source", for example, when the instrument is powered from batteries.

State Saved: Saved in instrument state.

Key Path: **Trig**

SCPI Status Bits/OPC Dependencies: The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

Trigger

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command:	<code>:TRIGger[:SEQuence]:LINE:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEQuence]:LINE:SLOPe?</code>
Example:	<code>TRIG:LINE:SLOP NEG</code>
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, Line
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:	<code>:TRIGger[:SEQuence]:LINE:DELay <time></code> <code>:TRIGger[:SEQuence]:LINE:DELay?</code> <code>:TRIGger[:SEQuence]:LINE:DELay:STATe OFF ON 0 1</code> <code>:TRIGger[:SEQuence]:LINE:DELay:STATe?</code>
Example:	<code>TRIG:LINE:DEL:STAT ON</code> <code>TRIG:LINE:DEL 100 ms</code>
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	–150 ms
Max:	500 ms
Key Path:	Trig, Line
Default Unit:	S
Instrument S/W Revision:	A.01.60 or later

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

Example:	TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
State Saved:	Saved in instrument state.
Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Remote Command:	:TRIGger[:SEQuence]:EXTernal1:LEVel <level> :TRIGger[:SEQuence]:EXTernal1:LEVel?
Example:	TRIG:EXT1:LEV 0.4 V
Dependencies/Couplings:	This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu.
Preset:	1.2 V
State Saved:	Saved in instrument state.
Min:	–5 V
Max:	5 V
Key Path:	Trig, External 1
Default Unit:	V
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a

Trigger

falling edge.

Remote Command:	<code>:TRIGger[:SEquence]:EXTeRnal1:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEquence]:EXTeRnal1:SLOPe?</code>
Example:	TRIG:EXT1:SLOP NEG
Dependencies/Couplings:	This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, External 1
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:	<code>:TRIGger[:SEquence]:EXTeRnal1:DELAy <time></code> <code>:TRIGger[:SEquence]:EXTeRnal1:DELAy?</code> <code>:TRIGger[:SEquence]:EXTeRnal1:DELAy:STATe OFF ON 0 1</code> <code>:TRIGger[:SEquence]:EXTeRnal1:DELAy:STATe?</code>
Example:	TRIG:EXT1:DEL:STAT ON TRIG:EXT1:DEL 100 ms
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	–150 ms
Max:	+500 ms
Key Path:	Trig, External 1
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

Example:	TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
State Saved:	Saved in instrument state.
Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Remote Command:	:TRIGger [:SEQuence] :EXTErnal2:LEVEl :TRIGger [:SEQuence] :EXTErnal2:LEVEl?
Example:	TRIG:EXT2:LEV 1.1 V
Dependencies/Couplings:	This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu.
Preset:	1.2 V
State Saved:	Saved in instrument state.
Min:	-5 V
Max:	5 V
Key Path:	Trig, External 2
Default Unit:	V
Instrument S/W Revision:	A.01.60 or later

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a

Trigger

falling edge.

Remote Command:	<code>:TRIGger[:SEquence]:EXternal2:SLOPe POSitive NEGative</code> <code>:TRIGger[:SEquence]:EXternal2:SLOPe?</code>
Example:	TRIG:EXT2:SLOP NEG
Dependencies/Couplings:	This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, External 2
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:	<code>:TRIGger[:SEquence]:EXternal2:DELAy <time></code> <code>:TRIGger[:SEquence]:EXternal2:DELAy?</code> <code>:TRIGger[:SEquence]:EXternal2:DELAy:STATe OFF ON 0 1</code> <code>:TRIGger[:SEquence]:EXternal2:DELAy:STATe?</code>
Example:	TRIG:EXT2:DEL:STAT ON TRIG:EXT2:DEL 100 ms
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	–150 ms
Max:	500 ms
Key Path:	Trig, External 2
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

RF Burst (Wideband)

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector.

Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

Example:	TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA
Key Path:	Trig
State Saved:	Saved in instrument state.
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision:	A.01.60 or later

Trigger Level

Sets the trigger level for the RF burst envelope.

In some measurements, both absolute and relative burst trigger functions are available. When Relative is available, this key will display a toggle between **Abs** and **Rel** on the third line. When **Abs** is selected, the value on the key is the absolute trigger level; when **Rel** is selected, the value is the relative trigger level.

If no toggle appears on the key, the measurement only supports absolute trigger level.

The relative RF Burst trigger is implemented as follows:

The measurement starts with the absolute RF Burst trigger setting. If it can not get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by you. The following formula is used:

absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level

If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)

Trigger

Steps 2 and 3 repeat for subsequent measurements.

Remote Command: :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl>
 :TRIGger[:SEquence]:RFBurst:LEVel:RELative <ampl>
 :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute?
 :TRIGger[:SEquence]:RFBurst:LEVel:RELative?
 :TRIGger[:SEquence]:RFBurst:LEVel:TYPE
 ABSolute|RELative
 :TRIGger[:SEquence]:RFBurst:LEVel:TYPE?

Example: TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm.

Dependencies/Couplings: This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu.

Preset: Absolute: -20 dBm
 Relative: -6 dB
 GSM: -25 dB
 ABSolute

State Saved: Saved in instrument state.

Min: Absolute: -200 dBm
 Relative: -45 dB

Max: Absolute: 100 dBm
 Relative: 0 dB

Key Path: **Trig, RF Burst**

Default Unit: Absolute: depends on the current selected Y-Axis unit
 Relative: dB or dBc

Instrument S/W Revision: A.01.60 or later

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Remote Command: :TRIGger[:SEquence]:RFBurst:SLOPe POSitive|NEGative
 :TRIGger[:SEquence]:RFBurst:SLOPe?

Example: TRIG:RFB:SLOP NEG

Dependencies/Couplings:	This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu).
Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	Trig, RF Burst
Instrument S/W Revision:	A.01.60 or later

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

Remote Command:	:TRIGger[:SEquence]:RFBurst:DElay <time> :TRIGger[:SEquence]:RFBurst:DElay? :TRIGger[:SEquence]:RFBurst:DElay:STATe OFF ON 0 1 :TRIGger[:SEquence]:RFBurst:DElay:STATe?	
Example:	TRIG:RFB:DEL:STAT ON TRIG:RFB:DEL 100 ms	
Preset:	Off, 1.000 us	
State Saved:	Saved in instrument state.	
Min:	–150 ms	
Max:	500 ms	
Key Path:	Trig, RF Burst	
Default Unit:	s	
Instrument S/W Revision:	A.01.60 or later	

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

Example:	TRIG:SOUR FRAM	Swept SA measurement
	TRIG:<meas>:SOUR FRAM	Measurements other than Swept SA
State Saved:	Saved in instrument state.	

Trigger

Key Path:	Trig
SCPI Status Bits/OPC Dependencies:	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.

Instrument S/W Revision: A.01.60 or later

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

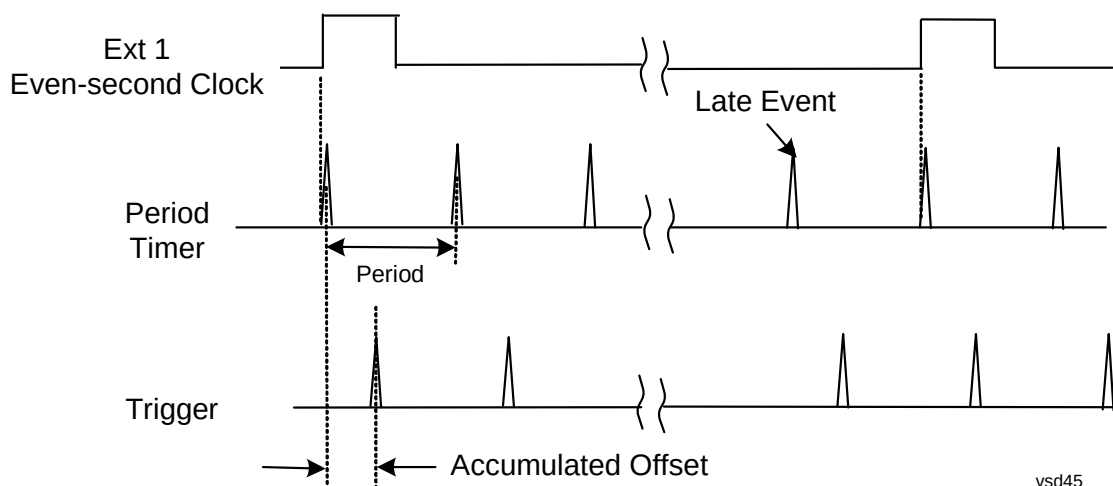
The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not mis-trigger. Mis-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

Remote Command: `:TRIGger[:SEquence]:FRAMe:PERiod <time>`

`:TRIGger[:SEquence]:FRAMe:PERiod?`

Example: `TRIG:FRAM:PER 100 ms`

Dependencies/Couplings: The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes.

The same period is used in the Gate Source selection of the period timer.

Preset: 20 ms

GSM: 4.615383

State Saved: Saved in instrument state.

Min: 100.000 ns

Max: 559.0000 ms

Key Path: **Trig, Periodic Timer**

Default Unit: S

Instrument S/W Revision: A.01.60 or later

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important,

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you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the RPG or the SCPI adjust command, serves to delay the timing of the trigger event.

Remote Command:	<code>:TRIGger[:SEquence]:FRAMe:OFFSet <time></code> <code>:TRIGger[:SEquence]:FRAMe:OFFSet?</code>
Example:	TRIG:FRAM:OFFS 1.2 ms
Dependencies/Couplings:	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. The same offset is used in the Gate Source selection of the period timer.
Remote Command Notes:	When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. The SCPI query simply returns the value currently showing on the key.
Preset:	0 s
State Saved:	Saved in instrument state.
Min:	-10.000 s
Max:	10.000 s
Key Path:	Trig, Periodic Timer
Default Unit:	S
Instrument S/W Revision:	A.01.60 or later

Offset Adjust (Remote Command only) This remote command does not work at all like the related front-panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command:	<code>:TRIGger[:SEquence]:FRAMe:ADJust <time></code>
Example:	TRIG:FRAM:ADJ 1.2 ms

Dependencies/Couplings:	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. The same offset is used in the Gate Source selection of the period timer.
Remote Command Notes:	The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query.
Preset:	0 s
State Saved:	Saved in instrument state.
Min:	-10.000 s
Max:	10.000 s
Default Unit:	S
Instrument S/W Revision:	A.01.60 or later

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the **Offset** key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The **Offset** key can then be used to add offset relative to this new timing.

Remote Command:	:TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet
Example:	TRIG:FRAM:OFFS:DISP:RES
Key Path:	Trig, Periodic Timer
Instrument S/W Revision:	A.01.60 or later

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of

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which menu it is accessed from.

Remote Command: :TRIGger[:SEquence]:FRAMe:SYNC
EXTernal1|EXTernal2|RFBurst|OFF
:TRIGger[:SEquence]:FRAMe:SYNC?

Example: TRIG:FRAM:SYNC EXT2

Preset: Off
GSM/EDGE: RFBurst

State Saved: Saved in instrument state.

Key Path: **Trig, Periodic Timer**

Instrument S/W Revision: A.01.60 or later

Off Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

Example: TRIG:FRAM:SYNC OFF

Key Path: **Trig, Periodic Timer, Sync Source**

Instrument S/W Revision: A.01.60 or later

External 1 Pressing this key, when it is not selected, selects the external input port that you will use for the periodic trigger synchronization. Pressing this key, when it is already selected, accesses the external 1 sync source setup menu.

Example: TRIG:FRAM:SYNC EXT

Dependencies/Couplings: Same as External 1 trigger source.

Key Path: **Trig, Periodic Timer, Sync Source**

Instrument S/W Revision: A.01.60 or later

External 2 Pressing this key, when it is not selected, selects the external input port that you will use for the periodic frame trigger synchronization.

Pressing this key, when it is already selected, accesses the external 2 sync source setup menu.

Example: TRIG:FRAM:SYNC EXT2

Dependencies/Couplings: Same as External 2 trigger source.

Key Path: **Trig, Periodic Timer, Sync Source**

Instrument S/W Revision: A.01.60 or later

RF Burst (Wideband) Pressing the key once selects the RF burst envelope signal to be used for the periodic timer trigger synchronization.

Press the key a second time to access the RF burst sync source setup menu.

Example:	TRIG:FRAM:SYNC RFB
Dependencies/Couplings:	Same as RF Burst trigger source.
Key Path:	Trig, Periodic Timer, Sync Source
Instrument S/W Revision:	A.01.60 or later

Trig Delay

This setting delays the measurement timing relative to the Periodic Timer.

Remote Command:	:TRIGger [:SEquence] :FRAMe:DELAy <time> :TRIGger [:SEquence] :FRAMe:DELAy? :TRIGger [:SEquence] :FRAMe:DELAy:STATe OFF ON 0 1 :TRIGger [:SEquence] :FRAMe:DELAy:STATe?
Preset:	Off, 1.000 us
State Saved:	Saved in instrument state.
Min:	–150 ms
Max:	+500 ms
Key Path:	Trig, Periodic Timer
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

Remote Command:	:TRIGger [:SEquence] :FRAMe:SYNC:HOLDoff <time> :TRIGger [:SEquence] :FRAMe:SYNC:HOLDoff? :TRIGger [:SEquence] :FRAMe:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger [:SEquence] :FRAMe:SYNC:HOLDoff:STATe?
Preset:	On, 1.000 ms
State Saved:	Saved in instrument state.
Min:	0 ms

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Max:	+500 ms
Key Path:	Trig, Periodic Timer
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

LXI Trigger

Pressing this key when it is not selected selects the LXI system as the trigger. Pressing the key when it is already selected accesses the LXI trigger type selection menu, where either LAN Event or Alarm can be chosen. The key is annotated to display which of the two is currently selected.

TIP	For information about setting up measurements using LXI, refer to the Programmer's Guide located in your analyzer at: C:/Program Files/Agilent/Signal Analysis/Help/Bookfiles/x_series_prog.pdf. It is also available by selecting the "Additional Documentation" page of the Help.

Instrument S/W Revision	A.01.60 or later
Key Path	Trig
Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.

LAN Event

Pressing this key when it is not selected selects the LAN event system as the LXI trigger. A new sweep/measurement starts when the pre-configured LAN message arrives if the LXI trigger is selected (see [“LXI Trigger” on page 1082](#)). Pressing this key when it is already selected accesses the LAN trigger setup menu.

Pressing this button causes Enabled LXI Alarm Triggers to be ignored, since the Trigger source is changed to LXI LAN Event.

Example	TRIG:SOUR LAN Swept SA measurement TRIG:<meas>:SOUR LAN Measurements other than Swept SA
SCPI Status Bits/OPC Dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger

Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.
State Saved	Saved in instrument state.

Disable All Sets the Enable parameter of every member of the LXI LAN Event list to OFF.

Remote Command	:TRIGger[:SEquence]:LXI:LAN:DISable:ALL
Example	:TRIG:LXI:LAN:DIS:ALL
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event
Mode	SA, IQ (Basic)

LAN Event List After selecting LAN as the trigger source, you are presented with a list of LXI Trigger LAN Events to be configured. By default, LAN0-LAN7 are available. Using the TRIG:LXI:LAN:ADD and TRIG:LXI:LAN:REM commands, the size of this list can be changed arbitrarily. Pressing a LAN event branches to that event's setup menu.

Remote Command	:TRIGger[:SEquence]:LXI:LAN:LIST?
Example	:TRIG:LXI:LAN:LIST? Returns the complete list of Trigger LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event
Mode	SA, IQ (Basic)
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
State Saved	Saved in instrument state.

Detection Pressing this button brings up the Trigger Detection menu.

Selecting "Rise" causes the instrument to trigger on the receipt of a signal low LAN Event followed by a signal high LAN Event.

Selecting "Fall" causes the instrument to trigger on the receipt of a signal high LAN Event followed by a signal low LAN Event.

Selecting "High" causes the instrument to trigger on every signal high LAN Event.

Selecting "Low" causes the instrument to trigger on every signal low LAN Event.

Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:DETection "LANEVENT", HIGH LOW RISE FALL

Trigger

Example	:TRIG:LXI:LAN:DET "LAN0",HIGH
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:DETection? "LANEVENT"
Example	:TRIG:LXI:LAN:DET? "LAN0"?
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH LOW RISE FALL

Delay Sets the amount of delay that should pass between receiving a LXI Trigger LAN Event Trigger and the trigger action. A Delay of 0.0 s indicates that the instrument will trigger as soon as possible after receiving the proper LXI LAN Event.

Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:DELay "LANEVENT",<time>
Example	:TRIG:LXI:LAN:DEL "LAN0",5S
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Remote Command	:TRIGger[:SEquence]:LXI:LAN[:SET]:DELay? "lanEvent"

Example	:TRIG:LXI:LAN:DEL? "LAN0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Enabled/Disabled When the Trigger Source is set to LXI Trigger LAN Event, the instrument triggers upon receiving any event from the LXI Trigger LAN Event List whose Enabled parameter is set to ON.

If the Enabled parameter is set to OFF, the event is ignored.

Remote Command :TRIGger [:SEquence] :LXI:LAN[:SET] :ENABLEd
"LANEVENT", ON|OFF|1|0

Example	:TRIG:LXI:LAN:ENAB "LAN0",ON
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1

Remote Command :TRIGger [:SEquence] :LXI:LAN[:SET] :ENABLEd? "LANEVENT"

Example	:TRIG:LXI:LAN:ENAB? "LAN0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig, LXI Trigger, LAN Event, <lanEvent>
Mode	SA, IQ (Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1

Add (Remote Only) Adds the provided string to the list of possible LAN events to trigger on. As new LAN events are added, keys are generated in the LAN source menu. New key panels are generated as the number of possible LAN events increases past a multiple of six, and the "More" keys are updated to

Trigger

reflect the new number of key panels in the LAN source menu.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEQuence] :LXI:LAN:ADD "LANEVENT"
Example	:TRIG:LXI:LAN:ADD "LANEVENT"
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated to 16 characters and added. No event is added if the LAN Event already exists. This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Remove (Remote Only) Removes the provided string from the list of possible LAN events to trigger on. As LAN events are removed, keys are removed from the LAN source menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LAN source menu. It is not possible to remove the "LAN0" – "LAN7" events.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEQuence] :LXI:LAN:REMOve [:EVENT] "LANEVENT"
Example	:TRIG:LXI:LAN:REM "LANEVENT"
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Restriction and Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and the corresponding LAN Event is removed. Nothing happens if the LAN event does not exist. This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Remove All (Remote Only) Clears the list of customer added LAN events that can cause the instrument to trigger. Events LAN0-LAN7 are not affected. As LAN events are removed, keys are removed from the LAN source menu. Key panels are removed as the number of possible LAN events decreases past a multiple of six, and the "More" keys are updated to reflect the new number of key panels in the LAN source menu.

It is not possible to remove the "LAN0" – "LAN7" events.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEquence] :LXI:LAN:REMove:ALL
Example	:TRIG:LXI:LAN:REM:ALL
Restriction and Notes	This command modifies the LXI Trigger LAN Event List Parameter.
Instrument S/W Revision	A.01.60 or later

Event Filter (Remote Only) Only LXI Trigger LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

Filter == ([host[:port]] | [ALL[:port]]) [,Filter]

Specifying an empty string means that LXI trigger packets are accepted as a Trigger from any port on any host on the network via either TCP or UDP.

Specifying only the port means that any host communicating over that port can send events.

Specifying ALL indicates that UDP multicast packets are accepted if they are directed to the Internet Assigned Numbers Authority (IANA) assigned multicast address on the IANA assigned default port, or the designated port if specified.

Examples:

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

Mode	SA, IQ (Basic)
Remote Command	:TRIGger [:SEquence] :LXI:LAN[:SET] :FILTer "LANEVENT", "filterString" :TRIGger [:SEquence] :LXI:LAN[:SET] :FILTer?
Example	:TRIG:LXI:LAN:FILT "LAN0","agilent.com" :TRIG:LXI:LAN:FILT?
Preset	"" (empty string)
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes	The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.
Instrument S/W Revision	A.01.60 or later

Trigger

Count (Remote Only) Returns the number of items in the LXI Trigger LAN Event List.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:LAN:COUNT?
Example	:TRIG:LXI:LAN:COUN?
Instrument S/W Revision	A.01.60 or later

Identifier (Remote Only) Sets the string that is expected to arrive over the LAN for a given Trigger LAN Event to occur. The Identifier is variable to allow for easier system debugging.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:LAN[:SET]:IDENtifier "LANEVENT","identifier" :TRIGger[:SEQuence]:LXI:LAN[:SET]:IDENtifier? "LANEVENT"
Example	:TRIG:LXI:LAN:IDEN "LAN0","debugstring"
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Restriction and Notes	The maximum length of the string is 16 characters. Nothing happens if the LAN event does not exist. The default value is that the identifier is equivalent to the name of the LAN Event.
Instrument S/W Revision	A.01.60 or later

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:LAN[:SET]:CONFIgure "lanEvent", <enable>, <detection>, <delay>,<filter>,<identifier>
Example	:TRIG:LXI:LAN:CONF "LAN0",1,FALL,0.0,"ALL","debugIdentifier"
Instrument S/W Revision	A.01.60 or later

Alarm

Pressing this key when it is not selected selects the alarm system as the LXI trigger. A new sweep/measurement starts when the configured IEEE 1588 time occurs if the LXI trigger is selected as the active trigger (see [“LXI Trigger” on page 1082](#)). Pressing this key when it is already selected accesses the alarm source selection menu.

Example	TRIG:ACP:SOUR ALAR

SCPI Status Bits/OPC Dependencies	The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger
Mode	SA, IQ (Basic)
Preset	ON
State Saved	Saved in instrument state.

Disable All This key causes all Alarms in the trigger alarm list to go into the disabled state.

(Enabled = OFF)

Remote Command	:TRIGger[:SEquence]:LXI:ALARm:DISable:ALL
Example	:TRIG:LXI:ALAR:DIS:ALL
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm
Mode	SA, IQ (Basic)

Alarm List After selecting Alarm as the trigger source, you are presented with a list of possible alarms. Pressing an alarm (for example, "ALARM0") branches to the alarm setup menu.

Remote Command	:TRIGger[:SEquence]:LXI:ALARm:LIST?
Example	:TRIG:LXI:ALAR:LIST? Returns the complete list of Alarm events which is: "ALARM0"
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm
Mode	SA, IQ (Basic)
Preset	"ALARM0"
State Saved	Saved in instrument state.

Date/Time Absolute alarm time sets an alarm for one specific time using the date and time of day (for example, 12/14/2007 at 11:45:15.3456). The Date and Time are represented in the instrument's local time. This is the only way to set an alarm from the front panel.

Epoch time is another type of absolute alarm time. A specific time is identified by the number of seconds it occurs after January 1, 1970 00:00:00 in International Atomic Time (TAI). Epoch Time is time zone invariant. Epoch time is only set via remote; see ["Epoch Time Value \(Remote Only\)" on page 1092](#).

Trigger

The date and time the alarm is scheduled to go off is noted on the branch key.

The Epoch Time Second and Epoch Time Fraction are the ultimate source of alarm information. The Absolute Time and Date may be changed from the front panel without being applied. When querying the Absolute Time and Date parameters from SCPI, if the Absolute Time and Date have not been applied (and therefore do not match the Epoch Time Second and Epoch Time Fraction), the string "(epoch time not set)" is added to the return value.

Instrument S/W Revision A.01.60 or later

Key Path **Trig LXI Trigger, Alarm, <alarmEvent>**

Mode SA, IQ (Basic)

Remote Command :TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolu
te "alarmEvent","date","time"

Example :TRIG:LXI:ALAR:TIME:ABS "ALARM0","2007/4/6","15:45:02.123456"

Remote Command Notes "date" is a representation of the date the alarm should occur in the form of
"YYYY/MM/DD" where:
YYYY is the four digit representation of year. (for example, 2007)
MM is the two digit representation of month. (for example. 01 to 12)
DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31
depending on the month and year)
"time" is a representation of the time of day the alarm should occur in the form
of "HH:MM:SS.SSSSSS" where:
HH is the two digit representation of the hour in 24 hour format
MM is the two digit representation of minute
SS.SSSSSS is a real representing seconds (for example 02.123456)

Instrument S/W Revision A.01.60 or later

Key Path **Trig LXI Trigger, Alarm, <alarmEvent>,Time**

Mode SA, IQ (Basic)

Preset Current date at initialization at 00:00:00.000000

State Saved Saved in instrument state.

Remote Command :TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolu
te? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:ABS? "ALARM0"

This query returns data using the following format "YYYY/MM/DD
HH:MM:SS.SSSSSS" If the Absolute time has been changed from the front
panel, but has not been applied, the return value is of the form
"YYYY/MM/DD HH:MM:SS.SSSSSS (epoch time not set)".

Remote Command Notes	<date> is a representation of the date the alarm should occur in the form of YYYY/MM/DD where: YYYY is the four digit representation of year. (for example, 2007) MM is the two digit representation of month. (for example. 01 to 12) DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year) <time> is a representation of the time of day the alarm should occur in the form of HH:MM:SS.SSSSSS where: HH is the two digit representation of the hour in 24 hour format MM is the two digit representation of minute SS.SSSSSS is a real representing seconds (for example 02.123456)
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state.

Date The date the alarm should occur. All absolute alarm time parameters are set using the same SCPI command; however they each have their own front panel control.

When setting alarm values from the front panel, the new alarm time is not registered with the alarm system until the "Set" key is pressed.

Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	Current date
State Saved	Saved in instrument state.
Range	current date – 214748/12/31. Values representing a time in the past result in an error.

Time The time of the day, in the instrument's local time (this takes into account time zones and daylight savings time), the alarm should occur. This parameter is based on a 24 hour clock.

All absolute alarm time parameters are set using the same SCPI command; however they each have their own front panel control.

When setting alarm values from the front panel, the new alarm time is not registered with the alarm system until the

Trigger

"Set" key is pressed.

Restriction and Notes	Uses a 24 hour clock. Values representing a time in the past result in an error. Only valid time values are accepted. The <second> field accepts a decimal number, and is valid to the microsecond position. The <year>, <month>, <hour>, and <minute> fields all accept integers.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)
Preset	00:00:00.000000
State Saved	Saved in instrument state.
Range	00:00:00.000000 – 23:59:59.999999

Apply (Front Panel Only) Causes the Absolute Alarm Time values to be converted into an Epoch time (see [“Epoch Time Value \(Remote Only\)” on page 1092](#)), compared to the current time, and sent to the Alarm Trigger subsystem. This key can only be pressed when the epoch time and the absolute time are out of sync.

Restriction and Notes	Alarm times are settable to microsecond resolution.
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>,Time
Mode	SA, IQ (Basic)

Epoch Time Value (Remote Only) Sets the LXI Alarm Time. This represents the number of seconds after January 1, 1970 00:00:00, in TAI time, that the alarm should go off.

Mode	SA, IQ (Basic)
Remote Command	<pre>:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue] "alarmEvent",<seconds>, <fractionalSeconds></pre>
Example	:TRIG:LXI:ALAR:TIME "ALARM0",123456.0 S, 0.123456
Preset	Seconds: The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time) Fractional Seconds: 0
State Saved	Saved in instrument state.
Range	Seconds: Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC Fractional Seconds: 0.0 – 0.999999

Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later
Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]?
Example	:TRIG:LXI:ALAR:TIME?
Preset	Seconds: The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time) Fractional Seconds: 0
State Saved	Saved in instrument state.
Range	Seconds: Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC Fractional Seconds: 0.0 – 0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Epoch Time Seconds (Remote only) Sets the seconds portion of the LXI Alarm time. This represents the number of seconds after January 1, 1970 00:00:00 (in TAI time) that the alarm should go off.

Values must be in the form of whole seconds; decimal values result in an error.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds "alarmEvent", <seconds>
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0",123456.0 S
Preset	The number of whole seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time)
State Saved	Saved in instrument state.
Range	Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Instrument S/W Revision	A.01.60 or later
Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds? "alarmEvent"
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0"?

Trigger

Preset	The number of seconds between Jan. 1, 1970 at 00:00:00 (in TAI time) and the current date at initialization at 00:00:00 (in TAI time)
State Saved	Saved in instrument state.
Range	Epoch time of current date at 00:00:00 (in TAI time) – 253402300800 + number of seconds local time zone offset from UTC
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Instrument S/W Revision	A.01.60 or later

Epoch Time Fraction (Remote Only) Sets the sub-second value of the Epoch time.

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on "alarmEvent", <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0",0.123456 S
Preset	0
State Saved	Saved in instrument state.
Range	0.0 – 0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Mode	SA, IQ (Basic)
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on? "alarmEvent"
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0"?
Preset	0
State Saved	Saved in instrument state.
Min	0.0
Max	0.999999
Restriction and Notes	Values representing a time in the past result in an error.
Instrument S/W Revision	A.01.60 or later

Relative Time (Remote Only) Sets the values of Epoch Time Seconds and Epoch Time Fraction by adding an offset to the time when the command is issued. For example, if the Relative Time command is issued with an argument of 60s, the alarm will occur 1 minute in the future.

Mode	SA, IQ (Basic)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati
ve "alarmEvent",<seconds>

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0",60.0s

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision A.01.60 or later

Mode SA, IQ (Basic)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELati
ve? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0"?

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision A.01.60 or later

Period Sets the amount of time that should elapse between alarms in a repeating alarm trigger.

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:PERiod
"alarmEvent",<seconds>

Example :TRIG:LXI:ALAR:PER "ALARM0",1.2345 s

Restriction and Notes A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously

Instrument S/W Revision A.01.60 or later

Key Path **Trig LXI Trigger, Alarm, <alarmEvent>**

Mode SA, IQ (Basic)

Preset 0.0 s

State Saved Saved in instrument state.

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:PERiod?
"alarmEvent"

Example :TRIG:LXI:ALAR:PER "ALARM0"?

Restriction and Notes A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously

Instrument S/W Revision A.01.60 or later

Key Path **Trig LXI Trigger, Alarm, <alarmEvent>**

Mode SA, IQ (Basic)

Preset 0.0 s

Trigger

State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)

Repetitions Sets the number of times a repeating alarm should fire once the initial alarm time has occurred.

Remote Command	<code>:TRIGger[:SEquence]:LXI:ALARm[:SET]:REPeat "alarmEvent", <repetitions></code>
Example	<code>:TRIG:LXI:ALAR:REP "ALARM0",10</code>
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)
Preset	1
State Saved	Saved in instrument state.
Range	1 – 2,147,483,647

Remote Command	<code>:TRIGger[:SEquence]:LXI:ALARm[:SET]:REPeat? "alarmEvent "</code>
Example	<code>:TRIG:LXI:ALAR:REP "ALARM0",10</code>
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	2,147,483,647

Enabled If Enabled is set to ON and the trigger source is set to ALARm, this alarm causes the instrument to trigger.

If Enabled is set to OFF, this alarm is ignored

Remote Command	<code>:TRIGger[:SEquence]:LXI:ALARm[:SET]:ENABled "alarmEvent ", ON OFF 1 0</code>
Example	<code>:TRIG:LXI:ALAR:ENAB "ALARM0",ON</code>
Instrument S/W Revision	A.01.60 or later
Key Path	Trig LXI Trigger, Alarm, <alarmEvent>
Mode	SA, IQ (Basic)

Preset	OFF
State Saved	Saved in instrument state.
Range	1 0

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:ENABled?
"alarmEvent"

Example :TRIG:LXI:ALAR:ENAB "ALARM0"?

Instrument S/W Revision A.01.60 or later

Key Path **Trig LXI Trigger, Alarm, <alarmEvent>**

Mode SA, IQ (Basic)

Preset OFF

State Saved Saved in instrument state.

Range 1|0

Configure (Remote Only) Allows the configuration of some of the above parameters from a single SCPI command.

Mode SA, IQ (Basic)

Remote Command :TRIGger[:SEquence]:LXI:ALARm[:SET]:CONFigure
"alarmEvent", <enable>, <epochSeconds>, <epochFraction>,
<period>, <repeat>

Example :TRIG:LXI:ALAR:CONF "ALARM0",1,1000000.0,0.123456,1,2,3

Instrument S/W Revision A.01.60 or later

Count (Remote Only) Returns the number of alarms in the LXI Trigger Alarm List.

Remote Command: :TRIGger1|TRIGger[:SEquence]:LXI:ALARm:COUNT?

Example: :TRIG:LXI:ALAR:COUN?

Instrument S/W Revision: A.01.60 or later

Baseband I/Q

Pressing this key when it is not selected selects Baseband I/Q as the trigger. Pressing the key when it is already selected accesses the Baseband I/Q trigger type selection menu. The key is annotated to display which of the Baseband I/Q trigger types is currently selected.

Instrument S/W Revision A.01.60 or later

Key Path **Trig**

Mode SA, IQ (Basic)

Trigger

State Saved No

I/Q Mag

Pressing this key, when it is not selected, selects the I/Q magnitude signal as the trigger. The I/Q Magnitude trigger condition is met when the I/Q magnitude crosses the I/Q magnitude trigger level. The magnitude is measured at the output of the main I/Q digital receiver.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IQM
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path	Trigger, Baseband I/Q, I/Q Mag
Remote Command	:TRIGger[:SEquence]:IQMag:LEVel <ampl > :TRIGger[:SEquence]:IQMag:LEVel?
Preset	–25 dBm
State Saved	Saved in instrument state.
Range	–200 dBm to 100 dBm
Remote Command Notes	The I/Q reference impedance is used for converting between power and voltage.
Example	TRIG:IQM:LEV –30 dBm
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, I/Q Mag
Remote Command	:TRIGger[:SEquence]:IQMag:SLOPe POSitive NEGative :TRIGger[:SEquence]:IQMag:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:IQM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the

trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, I/Q Mag
Remote Command	:TRIGger[:SEquence]:IQMag:DElay <time> :TRIGger[:SEquence]:IQMag:DElay? :TRIGger[:SEquence]:IQMag:DElay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IQMag:DElay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	–2.5 s to +10 s
Example	TRIG:IQM:DEL 10 ms TRIG:IQM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

I (Demodulated)

Pressing this key, when it is not selected, selects the main receiver's output I voltage as the trigger. The I (Demodulated) trigger condition is met when the I voltage crosses the I voltage trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IDEM
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the I (Demodulated) trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:LEVel <voltage> :TRIGger[:SEquence]:IDEMod:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.
Range	–1 to 1 V
Example	TRIG:IDEM:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to

Trigger

trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:IDEMod:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:IDEM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, I (Demodulated)
Remote Command	:TRIGger[:SEquence]:IDEMod:DELaY <time> :TRIGger[:SEquence]:IDEMod:DELaY? :TRIGger[:SEquence]:IDEMod:DELaY:STATe OFF ON 0 1 :TRIGger[:SEquence]:IDEMod:DELaY:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:IDEM:DEL 10 ms TRIG:IDEM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Q (Demodulated)

Trigger Level Sets a level for the Q (Demodulated) trigger. When the signal crosses this level, with the chosen slope, the trigger occurs. If the specific Measurement displays the signal from the chosen sampling point a green line will be displayed to indicate the trigger level.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:LEVel <voltage> :TRIGger[:SEquence]:QDEMod:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.

Range	–1 to 1 V
Example	TRIG:QDEM:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:SLOPe POSitive NEGative :TRIGger[:SEquence]:QDEMod:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:QDEM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEquence]:QDEMod:DELAy <time> :TRIGger[:SEquence]:QDEMod:DELAy? :TRIGger[:SEquence]:QDEMod:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:QDEMod:DELAy:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	–2.5 s to +10 s
Example	TRIG:QDEM:DEL 10 ms TRIG:QDEM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Input I

Pressing this key, when it is not selected, selects the I channel's ADC voltage as the trigger. The Input I trigger condition is met when the voltage crosses the trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IINP

Trigger

Instrument S/W Revision A.01.60 or later

Trigger Level Sets a level for the Input I trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path	Trigger, Baseband I/Q, Input I
Remote Command	:TRIGger[:SEquence]:IINPut:LEVel <voltage> :TRIGger[:SEquence]:IINPut:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.
Range	–1 to 1 V
Example	TRIG:IINP:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Input I
Remote Command	:TRIGger[:SEquence]:IINPut:SLOPe POSitive NEGative :TRIGger[:SEquence]:IINPut:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:IINP:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Input I
Remote Command	:TRIGger[:SEquence]:IINPut:DELaY <time> :TRIGger[:SEquence]:IINPut:DELaY? :TRIGger[:SEquence]:IINPut:DELaY:STATe OFF ON 0 1 :TRIGger[:SEquence]:IINPut:DELaY:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	–2.5 s to +10 s

Example	TRIG:IINP:DEL 10 ms TRIG:IINP:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Input Q

Pressing this key, when it is not selected, selects the Q channel's ADC voltage as the trigger. The Input Q trigger condition is met when the voltage crosses the trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR QINP
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the Input Q trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger[:SEquence]:QINPut:LEVel <voltage> :TRIGger[:SEquence]:QINPut:LEVel?
Preset	0.25 V
State Saved	Saved in instrument state.
Range	–1 to 1 V
Example	TRIG:QINP:LEV 0.5 V
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger[:SEquence]:QINPut:SLOPe POSitive NEGative :TRIGger[:SEquence]:QINPut:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:QINP:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the

Trigger

trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Input Q
Remote Command	:TRIGger[:SEquence]:QINPut:DELay <time> :TRIGger[:SEquence]:QINPut:DELay? :TRIGger[:SEquence]:QINPut:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:QINPut:DELay:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	–2.5 s to +10 s
Example	TRIG:QINP:DEL 10 ms TRIG:QINP:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Auxiliary Channel I/Q Mag

Pressing this key, when it is not selected, selects the Auxiliary Channel I/Q magnitude signal as the trigger. The Auxiliary Channel I/Q Magnitude trigger condition is met when the auxiliary receiver's I/Q magnitude output crosses the Auxiliary I/Q magnitude trigger level.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR AIQM
Instrument S/W Revision	A.01.60 or later

Trigger Level Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:LEVel <ampl > :TRIGger[:SEquence]:AIQMag:LEVel?
Preset	–25 dBm
State Saved	Saved in instrument state.
Range	–200 dBm to 100 dBm
Remote Command Notes	The I/Q reference impedance is used for converting between power and voltage.
Example	TRIG:AIQM:LEV –30 dBm
Instrument S/W Revision	A.01.60 or later

Trig Slope Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:SLOPe POSitive NEGative :TRIGger[:SEquence]:AIQMag:SLOPe?
Preset	POSitive
State Saved	Saved in instrument state.
Example	TRIG:AIQM:SLOP POS
Instrument S/W Revision	A.01.60 or later

Trig Delay Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:DELAy <time> :TRIGger[:SEquence]:AIQMag:DELAy? :TRIGger[:SEquence]:AIQMag:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:AIQMag:DELAy:STATe?
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Example	TRIG:AIQM:DEL 10 ms TRIG:AIQM:DEL:STAT ON
Instrument S/W Revision	A.01.60 or later

Trigger Center Frequency This key sets the center frequency to be used by the auxiliary receiver.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:CENTer <freq> :TRIGger[:SEquence]:AIQMag:CENTer?
Preset	0 Hz
State Saved	Saved in instrument state.
Range	-40 MHz to 40 MHz

Trigger

Restriction and Notes	Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min
Example	:TRIG:AIQM:CENT 10 MHz
Instrument S/W Revision	A.01.60 or later

Trigger Bandwidth This key sets the information bandwidth used by the auxiliary receiver for the Auxiliary Channel I/Q Magnitude trigger.

Key Path	Trigger, Baseband I/Q, Aux Channel I/Q Mag
Remote Command	:TRIGger[:SEquence]:AIQMag:BANDwidth <freq> :TRIGger[:SEquence]:AIQMag:BANDwidth?
Preset	Bandwidth option dependent: No Opt: 10 MHz Opt B25: 25 MHz Opt S40: 40 MHz
State Saved	Saved in instrument state.
Range	10 Hz to Maximum
Restriction and Notes	The combined sample rate for the main and auxiliary receivers cannot exceed 100 MSa/sec. The bandwidth available to the Trigger BW is limited to what is available after the main receiver's bandwidth (Info BW, sometimes pre-FFT BW) is set. Because of this limitation, the Max is not always achievable. The combination of Trigger Center Freq and Trigger BW is also limited: Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min
Example	:TRIG:AIQM:BAND 8 MHz
Instrument S/W Revision	A.01.60 or later

Auto Trig

Sets the time that the analyzer will wait for the trigger conditions to be met. If they are not met after that much time, then the analyzer is triggered anyway.

Remote Command:	:TRIGger[:SEquence]:ATRigger <time> :TRIGger[:SEquence]:ATRigger? :TRIGger[:SEquence]:ATRigger:STATe OFF ON 0 1 :TRIGger[:SEquence]:ATRigger:STATe?
Example:	TRIG:ATR:STAT ON TRIG:ATR 100 ms

Preset:	Off, 100 ms
State Saved:	Saved in instrument state.
Min:	1 ms
Max:	100 s
Key Path:	Trig
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Trig Holdoff

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions will be ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

Remote Command:	:TRIGger[:SEquence]:HOLDoff <time> :TRIGger[:SEquence]:HOLDoff? :TRIGger[:SEquence]:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:HOLDoff:STATe?

Example:	TRIG:HOLD:STAT ON TRIG:HOLD 100 ms Supplemental Information

Preset:	Off, 100 ms
State Saved:	Saved in instrument state.
Min:	0 s
Max:	0.5 s
Key Path:	Trig
Default Unit:	s
Instrument S/W Revision:	A.01.60 or later

Trigger

View/Display

The View/Display key opens up the View menu for the current measurement. This menu includes the **Display** key for controlling items on the display. The Display functions are common across multiple Modes and Measurements and are described in this section. See each measurement description for information on data views that are unique to that Measurement.

Views are different ways of looking at data, usually different ways of looking at the same data, especially when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms. In some modes, like the Spectrum Analyzer mode, we are mostly concerned with swept spectrum analysis, and those views may represent different ways of looking at the same signal.

Key Path	Front-panel key
Instrument S/W Revision	A.01.60 or later

Display

This is a menu common to all measurements for configuring items on the display. Keys not relevant to a given measurement should be grayed out. Keys not relevant to any measurement in a mode should be blanked. The Display menu settings are specific to the measurement selected under the **Meas** key, except for those settings under the **System Display Settings** key.

Key Path	View/Display
Instrument S/W Revision	A.01.60 or later

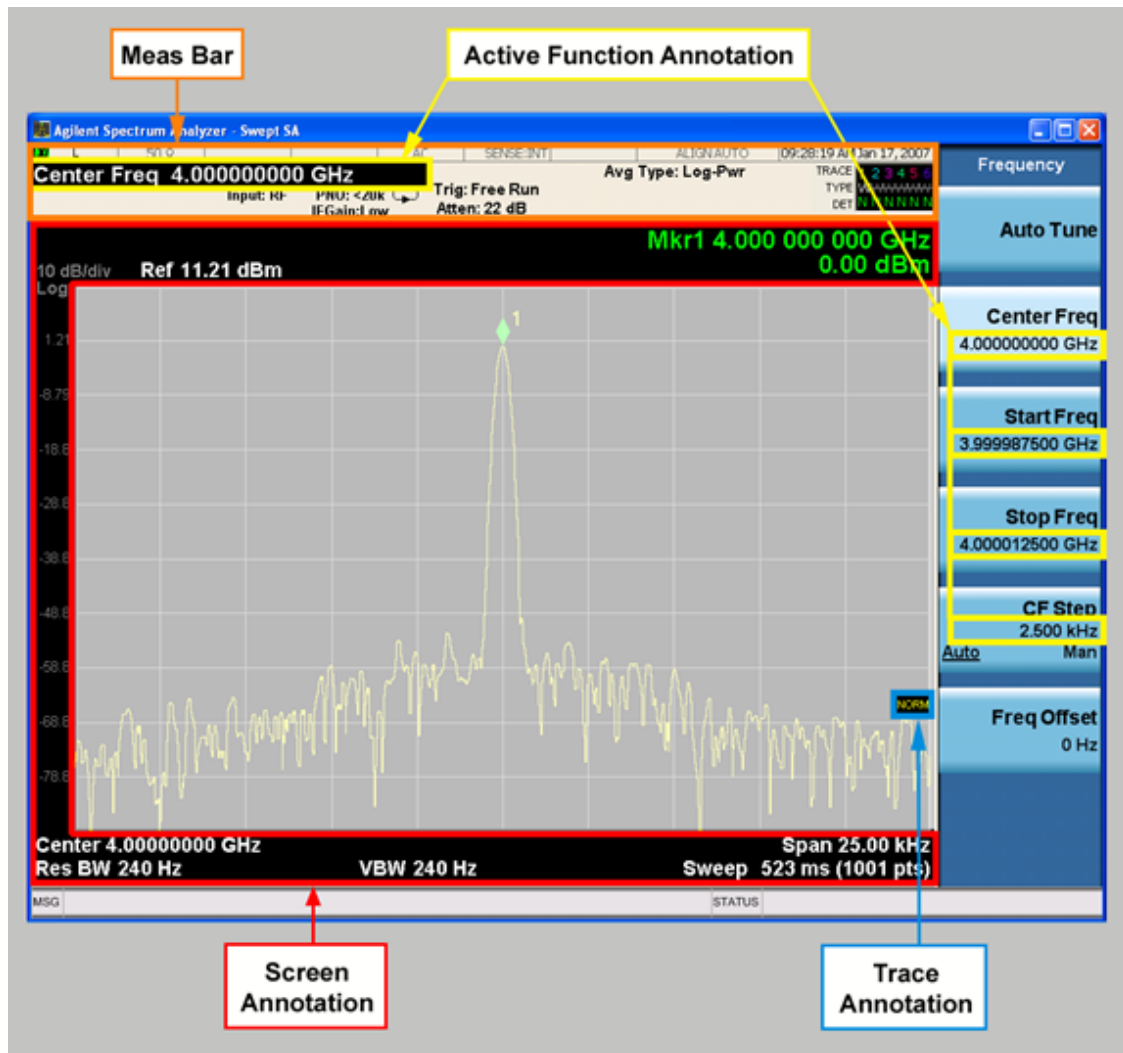
Annotation

Turns on/off various parts of the display annotation. The annotation is divided up into four categories:

1. **Meas Bar:** This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. **Screen Annotation:** this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. **Trace annotation:** these are the labels on the traces, showing their detector (or their math mode).
4. **Active Function annotation:** this is the active function display in the meas bar, and all of the active function values displayed on keys.

See the figure below. Each type of annotation can be turned on and off individually.

View/Display



Key Path **View/Display, Display**

Instrument S/W Revision A.01.60 or later

Meas Bar On/Off This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

Remote Command:

```
:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1
:DISPlay:ANNotation:MBAR[:STATe] ?
```

Example: DISP:ANN:MBAR OFF

Dependencies/Couplings: Grayed out and forced to OFF when **System Display Settings, Annotation** is set to Off.

Preset:	On
	This should remain Off through a Preset when System Display Settings, Annotation is set to Off.
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

Screen This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

Remote Command:	<code>:DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1</code> <code>:DISPlay:ANNotation:SCReen[:STATe] ?</code>
Example:	DISP:ANN:SCR OFF
Dependencies/Couplings:	Grayed out and forced to OFF when System Display Settings, Annotation is set to Off.
Preset:	On
	This should remain Off through a Preset when System Display Settings, Annotation is set to Off
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

Trace Turns on and off the labels on the traces, showing their detector (or their math mode) as described in the Trace/Detector section.

If trace math is being performed with a trace, then the trace math annotation will replace the detector annotation.

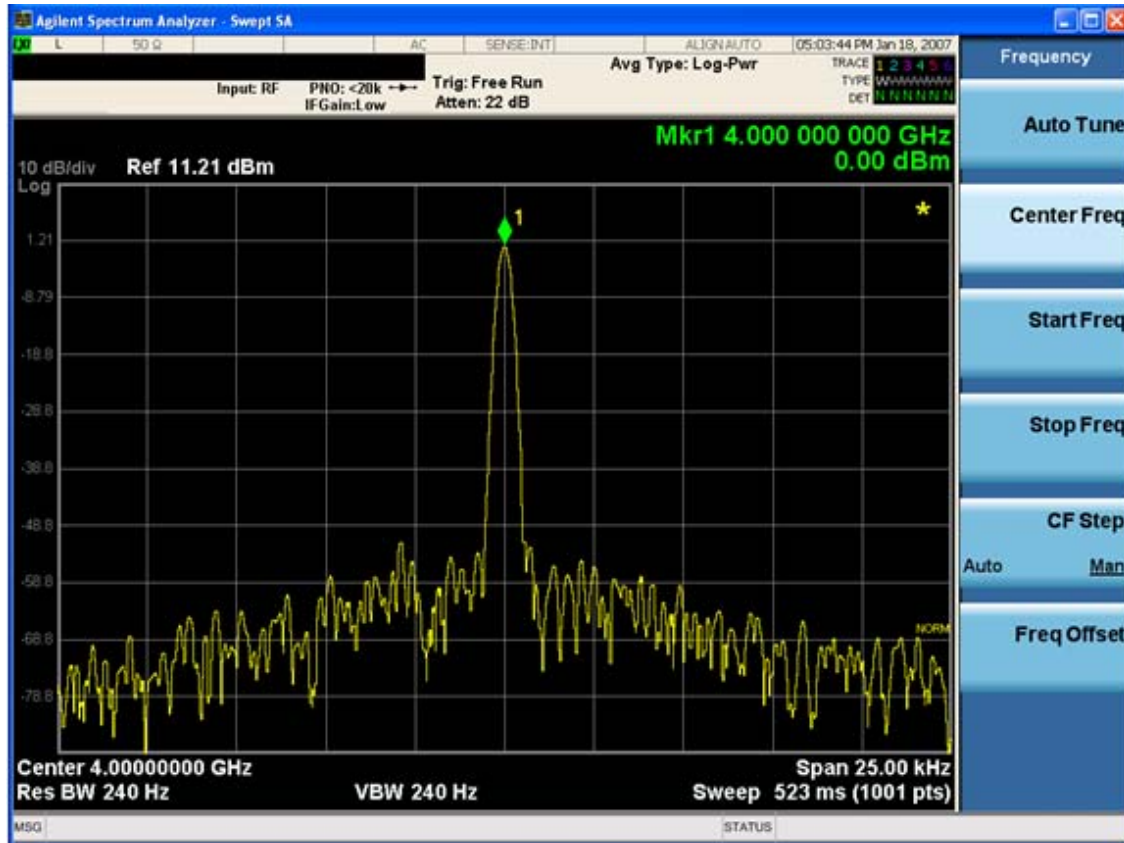
Remote Command:	<code>:DISPlay:ANNotation:TRACe[:STATe] ON OFF 1 0</code> <code>:DISPlay:ANNotation:TRACe[:STATe] ?</code>
Example:	DISP:ANN:TRAC OFF
Preset:	Off
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Instrument S/W Revision:	A.01.60 or later

Active Function Values On/Off Turns on/off the active function display in the Meas Bar, and all of the

View/Display

active function values displayed on the keys.

Note that all of the keys that have active functions have these numeric values blanked when this function is on. This is a security feature.



Remote Command: `:DISPlay:ACTivefunc[:STATe] ON|OFF|1|0`
`:DISPlay:ACTivefunc[:STATe] ?`

Example: `DISP:ACT OFF`

Dependencies/Couplings: Grayed out and forced to OFF when **System Display Settings, Annotation** is set to Off.

Preset: On

This should remain Off through a Preset when **System Display Settings, Annotation** is set to Off

State Saved: Saved in instrument state.

Key Path: **View/Display, Display, Annotation**

Instrument S/W Revision: A.01.60 or later

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
Instrument S/W Revision	A.01.60 or later

Change Title Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press **Change Title** again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing **Title, Clear Title**.

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Instrument S/W Revision	A.01.60 or later
Key Path	View/Display, Display, Title
Mode	All
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.

Clear Title Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

Example:	DISP:ANN:TITL:DATA "" clears any existing title characters.
Remote Command Notes:	Use the :DISPlay:ANNotation:TITLe:DATA <string> command with an empty string.
Preset:	Performed on Preset.

View/Display

Key Path: **View/Display, Display, Title**

Instrument S/W Revision: A.01.60 or later

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

Remote Command: `:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]
OFF|ON|0|1
:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?`

Example: `DISP:WIND:TRAC:GRAT:GRID OFF`

Preset: On

State Saved: saved in instrument state

Key Path: **View/Display, Display**

Instrument S/W Revision: A.01.60 or later

Display Line

Activates an adjustable horizontal line that is used as a visual reference line. The line's vertical position corresponds to its amplitude value. The value of the display line (for example, "-20.3 dBm") appears above the line itself on the right side of the display in the appropriate font.

The display line can be adjusted using the step keys, knob, or numeric keypad. The unit of the Display Line is determined by the **Y axis unit** setting under **Amplitude**. If more than one window has a display line, the display line of the selected window is controlled.

If the display line is off the screen, it shows as a line at the top/bottom of the screen with an arrow pointing up or down. As with all such lines (Pk Thresh, Trigger Level, etc.) it is drawn on top of all traces.

The display line is unaffected by Auto Couple.

Remote Command: `:DISPlay:WINDow[1]:TRACe:Y:DLINe <ampl>
:DISPlay:WINDow[1]:TRACe:Y:DLINe?
:DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe OFF|ON|0|1
:DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe?`

Example: `DISP:WIND:TRAC:Y:DLIN:STAT ON`

`DISP:WIND:TRAC:Y:DLIN:STAT -32 dBm`

Preset: Set the Display Line to Off and -25 dBm on Preset. When the Display Line goes from Off to On, if it is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was.

The Display Line's value does not change when it is turned off.

State Saved:	Saved in instrument state.
Min:	– (minus infinity) in current units
Max:	+ (plus infinity) in current units
Key Path:	View/Display, Display
Default Unit:	Depends on the current selected Y axis unit
Instrument S/W Revision:	A.01.60 or later

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by **Restore Misc Defaults** or **Restore System Defaults** under System.

Key Path	View/Display, Display, System Display Settings
Instrument S/W Revision	A.01.60 or later

Annotation Local Settings/All Off This is a Mode Global override of the meas local annotation settings. When it is **All Off**, it forces **Screen Annotation, Meas Bar, Trace, and Active Function Values** settings to be **OFF** for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is **All Off, Screen, Meas Bar, Trace, and Active Function Values** keys under the **Display, Annotation** menu are grayed out and forced to **Off**. When **Local Settings** has been selected, you are able to set the local annotation settings on a measurement by measurement basis.

Remote Command:	:DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]?
Example:	:DISP:WIND:ANN OFF
Preset:	On (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	View/Display, Display, System Display Settings, Annotation
Instrument S/W Revision:	A.01.60 or later

Theme This key allows you to change the Display theme. This is similar to the Themes selection under Page Setup and Save Screen Image. The four themes are detailed below.

Remote Command:	:DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome :DISPlay:THEME?
Preset:	TDColor (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	View/Display, Display, System Display Settings

View/Display

Remote Command Notes:	TDCOLOR – 3D is the standard color theme with filling and shading TDMonochrome – is similar to 3D color, but only black is used FCOLOR – flat color is intended for inkjet printers to conserve ink. It uses a white background instead of black. FMONochrome – is like flat color, but only black is used
Example:	DISP:THEM TDM sets the display theme to 3D Monochrome.
Instrument S/W Revision:	A.01.60 or later

Backlight Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

Remote Command:	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset:	ON (Set by Restore Misc Defaults)
Key Path:	View/Display, Display, System Display Settings
Instrument S/W Revision:	A.01.60 or later

On Turns the display backlight on.

Example:	DISP:BACK ON
Key Path:	View/Display, Display, System Display Settings, Backlight
Instrument S/W Revision:	A.01.60 or later

Off Turns the display backlight off.

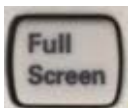
Example:	DISP:BACK OFF
Key Path:	View/Display, Display, System Display Settings, Backlight
Instrument S/W Revision:	A.01.60 or later

Backlight Intensity An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

Remote Command:	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example:	DISP:BACK:INT 50
Preset:	100 (Set by Restore Misc Defaults)

Min:	0
Max:	100
Key Path:	View/Display, Display, System Display Settings
Instrument S/W Revision:	A.01.60 or later

Full Screen



When **Full Screen** is pressed the measurement window expands horizontally over the entire instrument display. The screen graticule area expands to fill the available display area.

It turns off the display of the key labels, however the menus and active functions still work. (Though it would obviously be very hard to navigate without the key labels displayed.) Pressing **Full Screen** again while Full Screen is in effect cancels Full Screen.

Note that the banner and status lines are unaffected. You can get even more screen area for your data display by turning off the Meas Bar (in the Display menu) which also turns off the settings panel.

Full Screen is a Meas Global function. Therefore it is cancelled by the **Preset** key.

Remote Command:	<code>:DISPlay:FSCreen[:STATe] OFF ON 0 1</code> <code>:DISPlay:FSCreen[:STATe] ?</code>
Preset:	Off
State Saved:	Not saved in state.
Key Path:	Display
Instrument S/W Revision:	A.01.60 or later

Display Enable (Remote Command Only)

Turns the display on/off, including the display drive circuitry. The backlight stays lit so you can tell that the instrument is on. The display enable setting is mode global. The reasons for turning the display off are three:

- To increase speed as much as possible by freeing the instrument from having to update the display
- To reduce emissions from the display, drive circuitry
- For security purposes

If you have turned off the display:

- and you are in local operation, the display can be turned back on by pressing any key or by sending the `SYSTem:DEFaults MISC` command or the `DISPlay:ENABle ON` (neither `*RST` nor `SYSTem:PRESet` enable the display.)

View/Display

- and you are in remote operation, the display can be turned back on by pressing the **Local** or **Esc** keys or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)

and you are using either the SYSTem:KLOCK command or GPIB local lockout, then no front-panel key press will turn the display back on. You must turn it back on remotely.

Remote Command: :DISPlay:ENABle OFF|ON|0|1
:DISPlay:ENABle?

Example: DISP:ENAB OFF

Dependencies/Couplings: DISP:ENAB OFF turns Backlight OFF and DISP:ENAB ON turns Backlight ON. However, settings of Backlight do not change the state of DISP:ENAB

Preset: On
Set by SYST:DEF MISC, but Not affected by *RST or SYSTem:PRESet.

State Saved: Not saved in instrument state.

Instrument S/W Revision: A.01.60 or later