



# **Agilent X-Series Signal Analyzer**

**This manual provides documentation for the  
for the following analyzers:**

**MXA Signal Analyzer N9020A  
EXA Signal Analyzer N9010A**

**N9020A/N9010A Spectrum  
Analyzer Mode User's and  
Programmer's Reference**



**Agilent Technologies**

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[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:FREQUency:STARt? . . . . .	886
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:FREQUency:STOP <freq>,<freq>,<freq>,<freq>,<freq>,<freq> . . . . .	888
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:FREQUency:STOP? . . . . .	888
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:SIDE BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGative POSitive,BO TH NEGative POSitive,BOTH NEGative POSitive . . . . .	891
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:SIDE? . . . . .	891
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STARt:ABSolute <real>,<real>,<real>,<real>,<real>,<real> . . . . .	897
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STARt:ABSolute? . . . . .	897
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STARt:RCARrier <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl> . . . . .	899
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STARt:RCARrier? . . . . .	899
[[: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 . . . . .	886
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STATe? . . . . .	886
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:ABSolute <real>,<real>,<real>,<real>,<real>,<real> . . . . .	898
[[: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 . . . . .	898
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:ABSolute:COUple? . . . . .	898
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:ABSolute? . . . . .	898
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:RCARrier <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl> . . . . .	901
[[: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 . . . . .	901
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:RCARrier:COUple? . . . . .	901
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:STOP:RCARrier? . . . . .	901
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:SWEep:TIME <time>,<time>,<time>,<time>,<time>,<time> . . . . .	890
[[: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 . . . . .	890
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:SWEep:TIME:AUTO? . . . . .	890
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:SWEep:TIME? . . . . .	890
[[:SENSe]:SEMAsk:OFFSet[1]]2:LIST:TEST	











---

## List of Commands

[[:SENSe]:SWEep:EGATe:METhod LO VIdEO FFT	1169
[[:SENSe]:SWEep:EGATe:METhod?	1169
[[:SENSe]:SWEep:EGATe:MINFast?	1175
[[:SENSe]:SWEep:EGATe:SOURce EXTernal1 EXTernal2  LINE FRAME RFBurst TV	1171
[[:SENSe]:SWEep:EGATe:SOURce?	1171
[[:SENSe]:SWEep:EGATe:TIME <time>	1167
[[:SENSe]:SWEep:EGATe:TIME?	1167
[[:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0.	1164
[[:SENSe]:SWEep:EGATe:VIEW?	1164
[[:SENSe]:SWEep:EGATe[:STATe] OFF ON 0 1	1163
[[:SENSe]:SWEep:EGATe[:STATe]?	1163
[[:SENSe]:SWEep:FFT:WIDTh <real>.	446
[[:SENSe]:SWEep:FFT:WIDTh:AUTO OFF ON 0 1	446
[[:SENSe]:SWEep:FFT:WIDTh:AUTO?	446
[[:SENSe]:SWEep:FFT:WIDTh?	446
[[:SENSe]:SWEep:POINts <integer>	447
[[:SENSe]:SWEep:POINts?.	447
[[:SENSe]:SWEep:TIME <time>	438
[[:SENSe]:SWEep:TIME:AUTO OFF ON 0 1	438
[[:SENSe]:SWEep:TIME:AUTO:RULEs NORMal ACCuracy SRESponse	440
[[:SENSe]:SWEep:TIME:AUTO:RULEs:AUTO[:STATe] ON OFF 1 0.	441
[[:SENSe]:SWEep:TIME:AUTO:RULEs:AUTO[:STATe]?	441
[[:SENSe]:SWEep:TIME:AUTO:RULEs?	440
[[:SENSe]:SWEep:TIME:AUTO?.	438
[[:SENSe]:SWEep:TIME?.	438
[[:SENSe]:SWEep:TYPE FFT SWEep	442
[[:SENSe]:SWEep:TYPE:AUTO OFF ON 0 1	443
[[:SENSe]:SWEep:TYPE:AUTO:RULEs SPEEd DRANge	444
[[:SENSe]:SWEep:TYPE:AUTO:RULEs:AUTO[:STATe] OFF ON 0 1.	444
[[:SENSe]:SWEep:TYPE:AUTO:RULEs:AUTO[:STATe]?	444
[[:SENSe]:SWEep:TYPE:AUTO:RULEs?	444

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## List of Commands

[[:SENSe]:SWEep:TYPE:AUTO? .....	443
[[:SENSe]:SWEep:TYPE? .....	442
[[:SENSe]:TXPower:AVERAge:COUNt <integer> .....	749
[[:SENSe]:TXPower:AVERAge:COUNt? .....	749
[[:SENSe]:TXPower:AVERAge:TCONtrol EXPOnential REPeat .....	750
[[:SENSe]:TXPower:AVERAge:TCONtrol? .....	750
[[:SENSe]:TXPower:AVERAge:TYPE LOG MAXimum MINimum RMS .....	751
[[:SENSe]:TXPower:AVERAge:TYPE LOG RMS .....	751
[[:SENSe]:TXPower:AVERAge:TYPE? .....	751
[[:SENSe]:TXPower:AVERAge:TYPE? .....	751
[[:SENSe]:TXPower:AVERAge[::STATe] OFF ON 0 1 .....	749
[[:SENSe]:TXPower:AVERAge[::STATe]? .....	749
[[:SENSe]:TXPower:BANDwidth:TYPE GAUSSian FLATtop .....	736
[[:SENSe]:TXPower:BANDwidth:TYPE? .....	736
[[:SENSe]:TXPower:BANDwidth[::RESolution] <bandwidth> .....	735
[[:SENSe]:TXPower:BANDwidth[::RESolution]? .....	735
[[:SENSe]:TXPower:BURSt:AUTO ON OFF 1 0 .....	754
[[:SENSe]:TXPower:BURSt:AUTO? .....	754
[[:SENSe]:TXPower:BURSt:WIDTh <time> .....	754
[[:SENSe]:TXPower:BURSt:WIDTh? .....	754
[[:SENSe]:TXPower:IF:GAIN:AUTO[::STATe] OFF ON 0 1 .....	755
[[:SENSe]:TXPower:IF:GAIN:AUTO[::STATe]? .....	755
[[:SENSe]:TXPower:IF:GAIN[::STATe] ON OFF 1 0 .....	756
[[:SENSe]:TXPower:IF:GAIN[::STATe]? .....	756
[[:SENSe]:TXPower:METHod THReshold BWIDth SINGle .....	753
[[:SENSe]:TXPower:METHod THReshold BWIDth .....	753
[[:SENSe]:TXPower:METHod? .....	753
[[:SENSe]:TXPower:METHod? .....	753
[[:SENSe]:TXPower:SWEep:TIME <integer> .....	757
[[:SENSe]:TXPower:SWEep:TIME <integer> .....	770
[[:SENSe]:TXPower:SWEep:TIME <time> .....	770

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## List of Commands

[[:SENSe]:TXPower:SWEEP:TIME? .....	757
[[:SENSe]:TXPower:SWEEP:TIME? .....	770
[[:SENSe]:TXPower:SWEEP:TIME? .....	770
[[:SENSe]:TXPower:THRShold <real> .....	752
[[:SENSe]:TXPower:THRShold:TYPE ABSolute RELative. ....	752
[[:SENSe]:TXPower:THRShold:TYPE? .....	752
[[:SENSe]:TXPower:THRShold? .....	752
[[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer] <voltage> .....	975
[[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer]? .....	975
[[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF ON 0 1 .....	972
[[:SENSe]:VOLTage:IQ:RANGe:AUTO? .....	972
[[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer] <voltage> .....	973
[[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer]? .....	973
[[:SENSe]:VOLTage POWER:IQ:MIRROred OFF ON 0 1 .....	975
[[:SENSe]:VOLTage POWER:IQ:MIRROred? .....	975



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 103](#).

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See [“Navigating the Help Window Without a Mouse” on page 108](#) 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 117](#).

See [“Navigating the Help Window with a Mouse” on page 106](#) 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 97](#).

To locate **Other Available Help Resources**, see [“Locating Other Help Resources” on page 96](#).

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.

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 112.



## 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	<b>HTML Help Format (CHM Files)</b>	<b>Acrobat Format (PDF Files)</b>
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

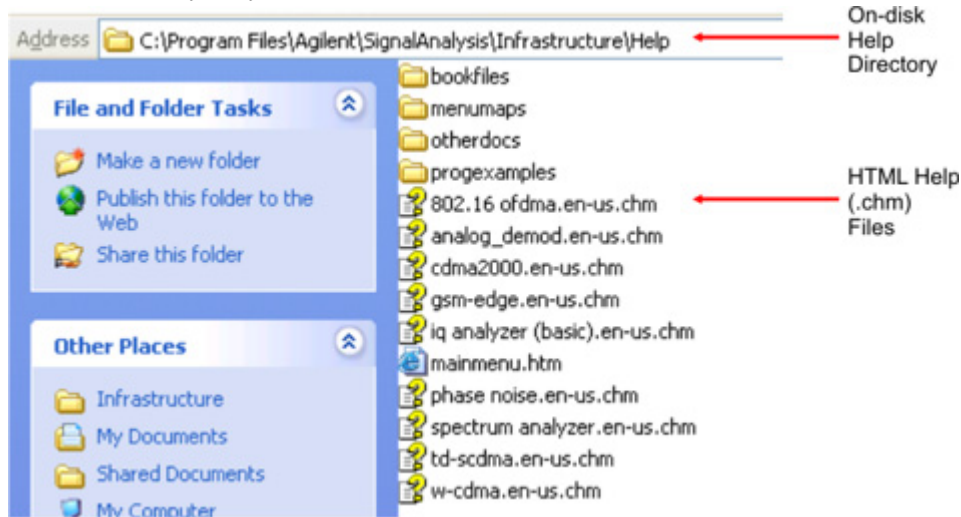
### Copying the HTML Help (CHM) Files

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.




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

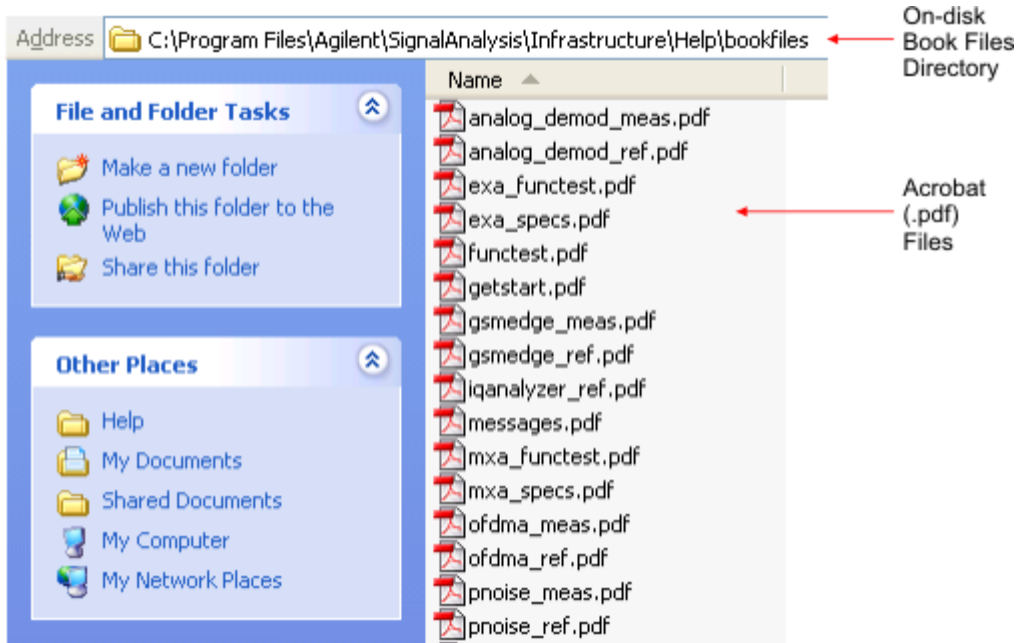
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## Copying the Acrobat (PDF) Files

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.



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## How Help is Organized

This topic contains the following sections:

[Help Contents Listing](#)

[System Functions](#)

[Key Descriptions for Each Measurement](#)

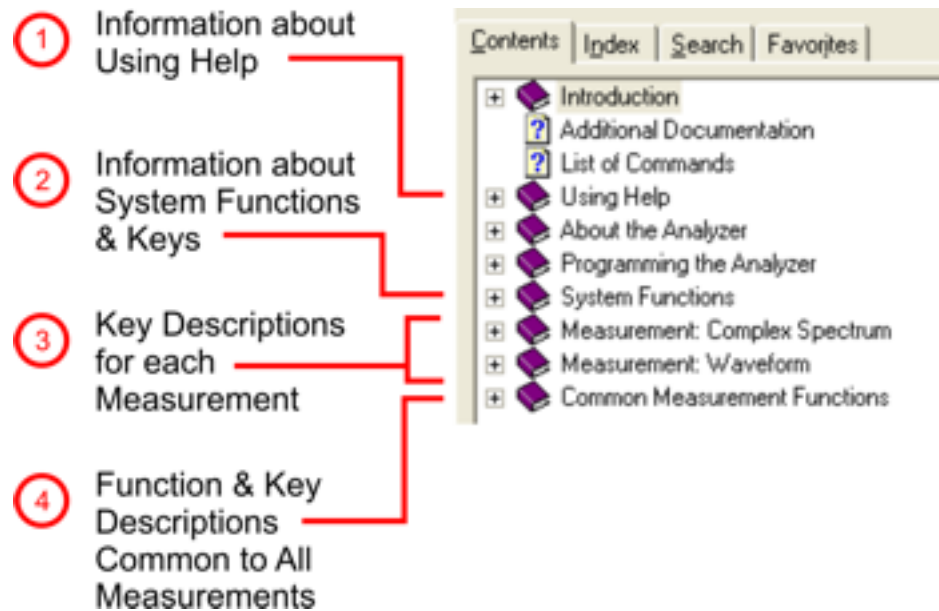
[Key Information for Softkeys](#)

[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 for the HTML Help version of the document. The structure of the PDF version is similar.



Help information is split between these sections as follows:

1. Using Help: this section.
2. System Functions. See [“System Functions” on page 100](#) below.
3. Measurement Functions. See [“Key Descriptions for Each Measurement” on page 101](#) below.
4. Common Measurement Functions. See [“Common Measurement Functions” on page 102](#) below.

### System Functions

This section contains information for the following keys, which are listed in alphabetical order: **File**,

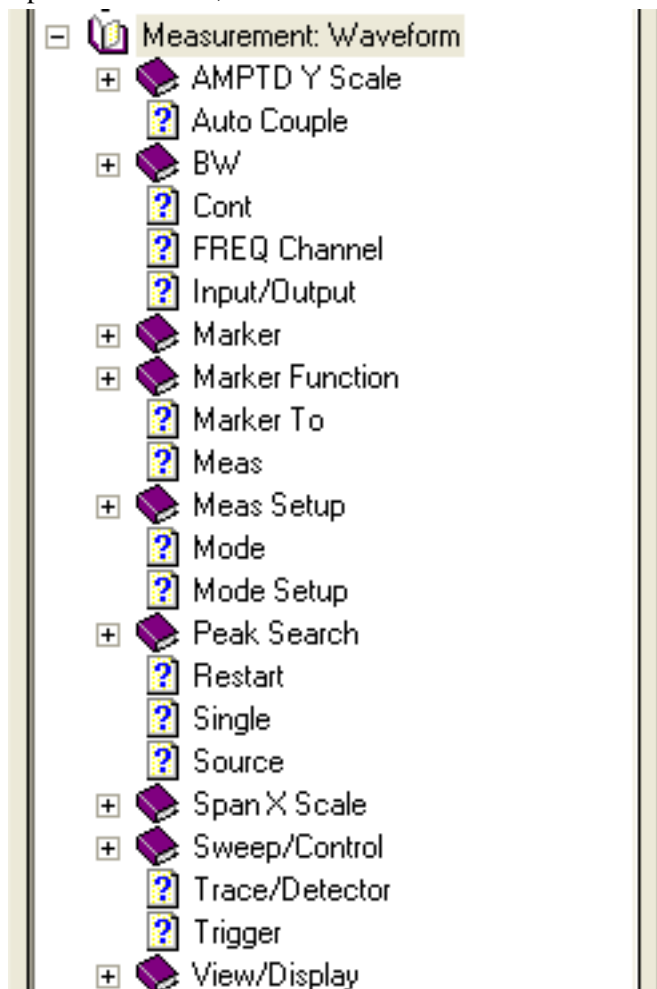
### **Preset, Print, Quick Save, Recall, Save, System, User Preset.**

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 102, 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.



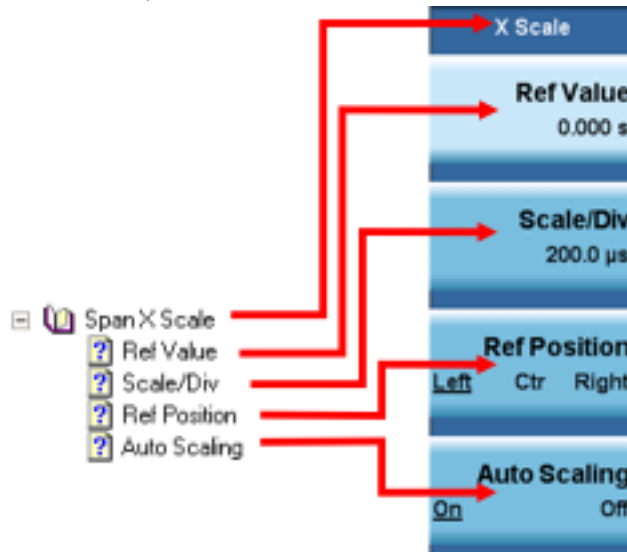
If you don't see a topic for a Front-panel key in the Measurement-specific section, then it is located in the section [System Functions](#).

### **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).

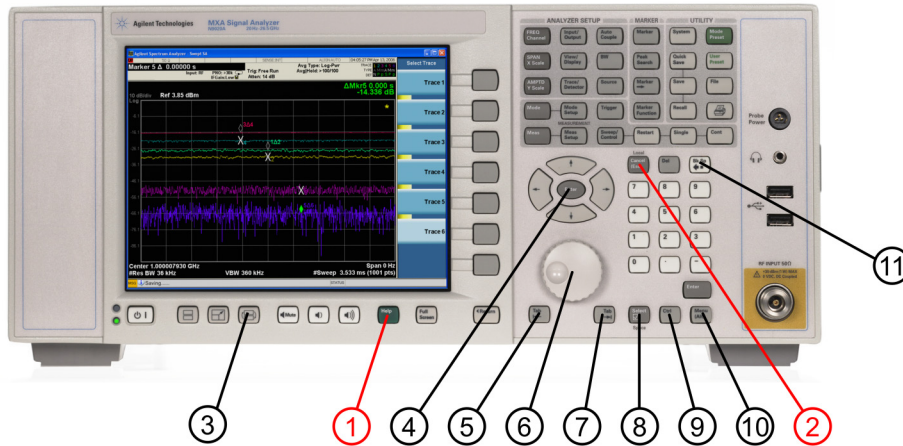
### Common Measurement Functions

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.

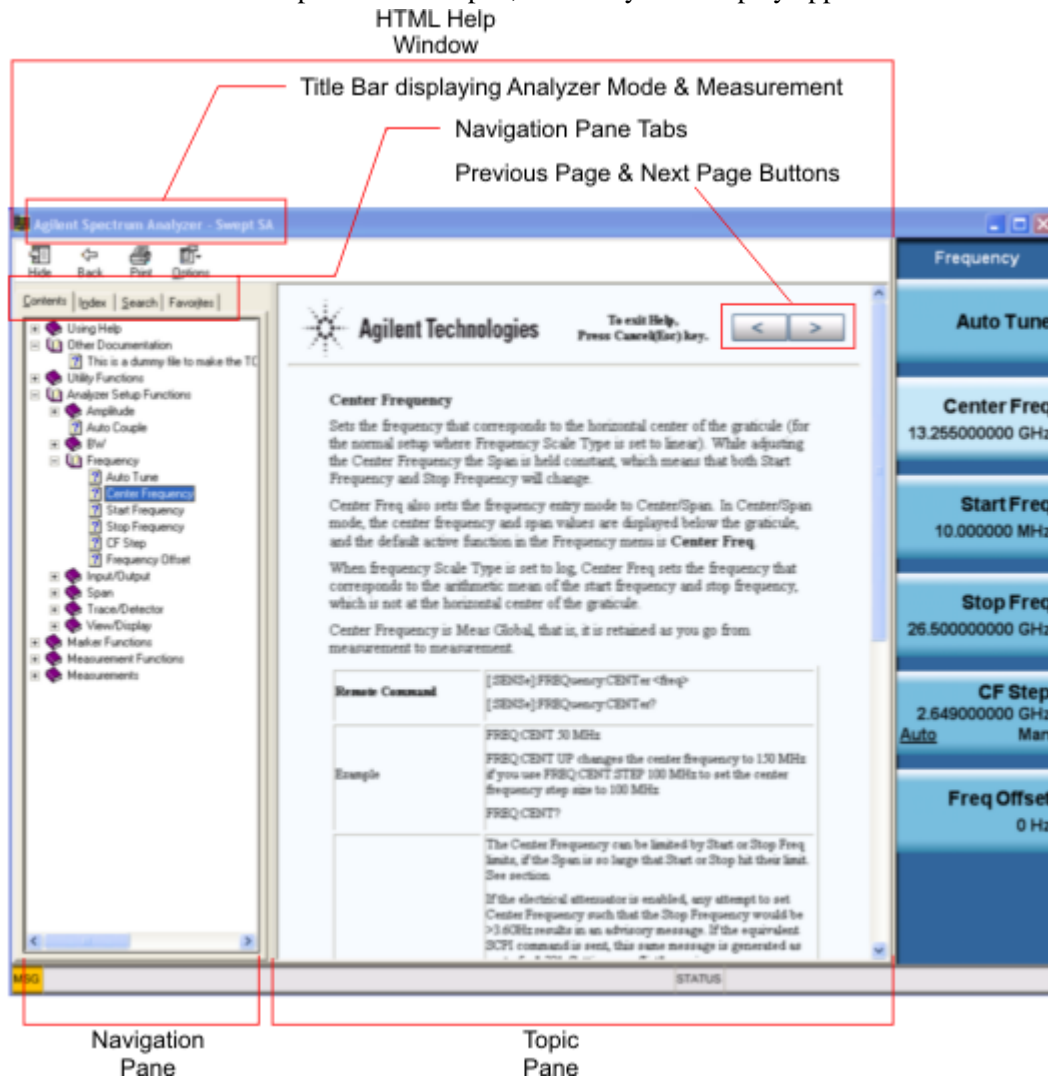


#	Item Name	Description
1	Help Key	Opens Help (displaying the topic for the last key pressed).
2	Cancel (Esc) Key	Exits Help.
3	Next Window Key	Changes the current window pane selection.
4	Arrow / Enter Keys	A central <b>Enter</b> key, surrounded by four directional arrow keys. Navigates within the Help 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 <a href="#">Navigating Windows HTML Help (CHM) Files</a> .
10	Alt Key	Navigates within the Help system, in conjunction with other keys. See <a href="#">Navigating Windows HTML Help (CHM) Files</a> .
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 108.

## 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 103.

## 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 106), 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

## Using Help

### Navigating Windows HTML Help (CHM) Files

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 110 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:

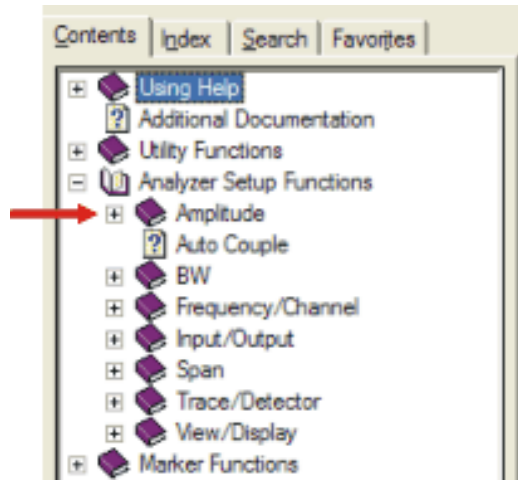
- If you have a mouse and keyboard attached, see the Section [Navigating the Help Window with a Mouse](#).
- If you don't have a mouse and keyboard attached, see the Section [Navigating the Help Window Without a Mouse](#).

#### 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 105, 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.

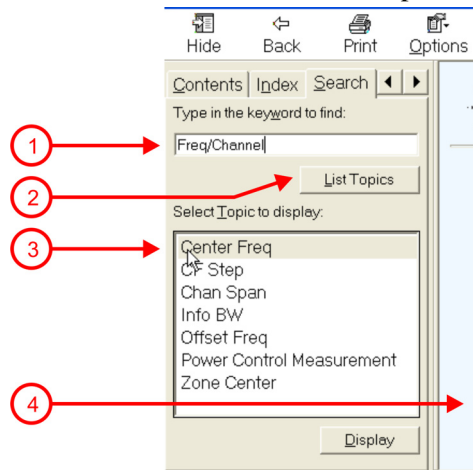


- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the *Topic* Pane), as shown below.



**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 111.

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 103.

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



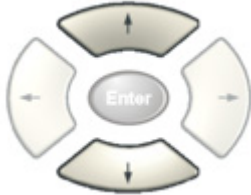
**To Switch the Active Tab within the Navigation Pane** Perform this procedure to display either the Contents, Index, Search or Favorites tab of the Help window’s Navigation Pane.

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

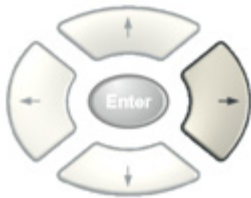


**To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane**

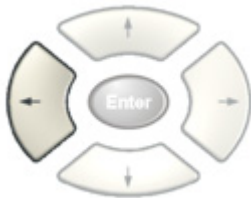
With the focus in the Navigation Pane, press the **Up Arrow** or **Down Arrow** keys.



**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:

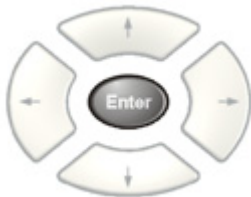


Or press the **Left Arrow** key to *collapse* the selected topic.

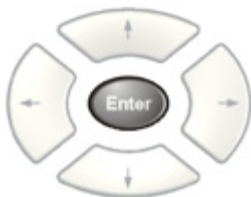


**To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane**

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.

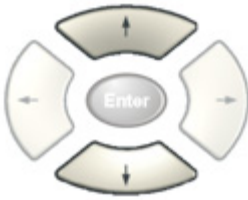


**To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane** With the focus in the Index Tab of the Navigation Pane, press the **Enter** key.



**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



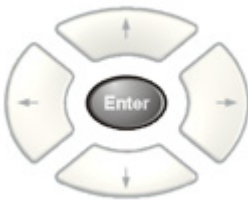
to select the **> (Next Page)** key at the top right of the Pane, if you want to go to the *next* page,



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.

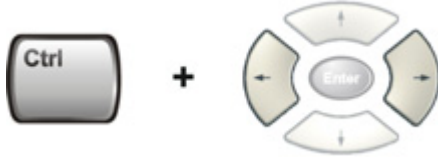


To go *forward*, hold down the **Alt** key, then press the **Right Arrow** key.



(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.

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## Navigating Acrobat (PDF) Files

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

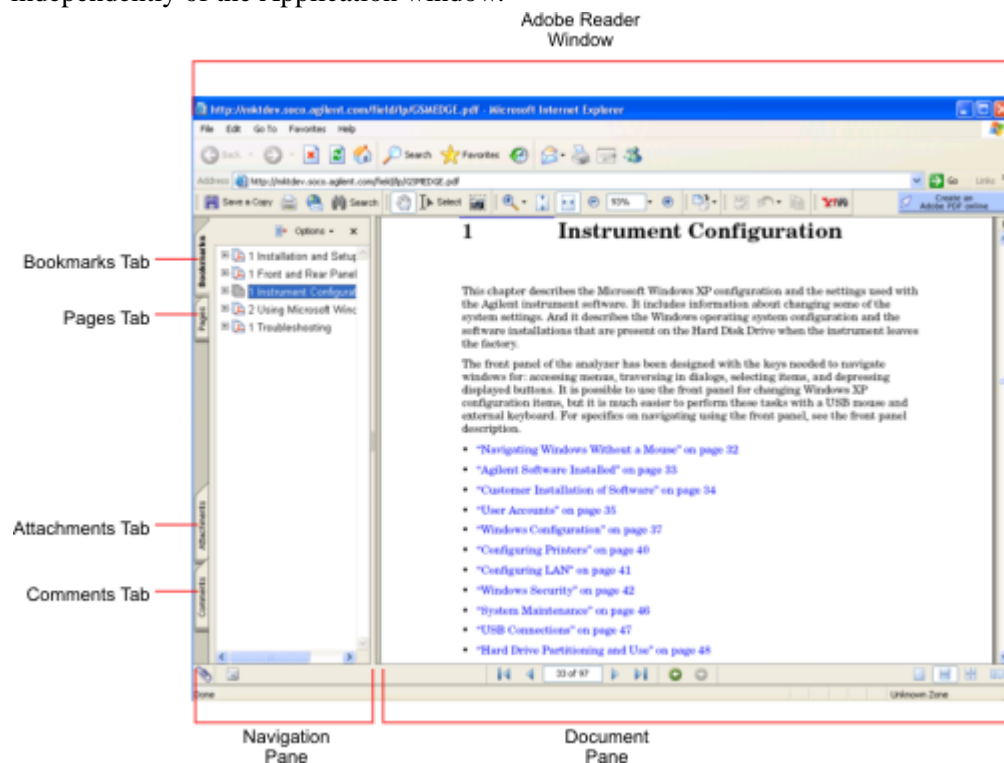
If it is not possible to attach a mouse and keyboard to the Analyzer, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the Analyzer's hard disk can also be found on the Documentation CD shipped with the Analyzer. For details, see [“Copying the Acrobat \(PDF\) Files” on page 98](#).

---

### 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.



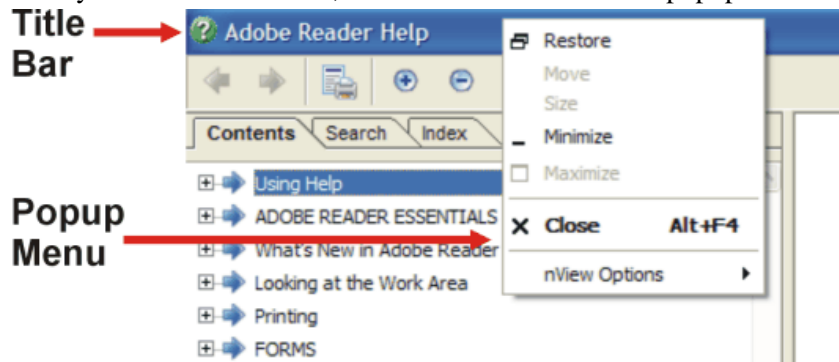
## Navigating the Acrobat Reader Window

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

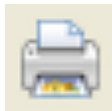
---

**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.

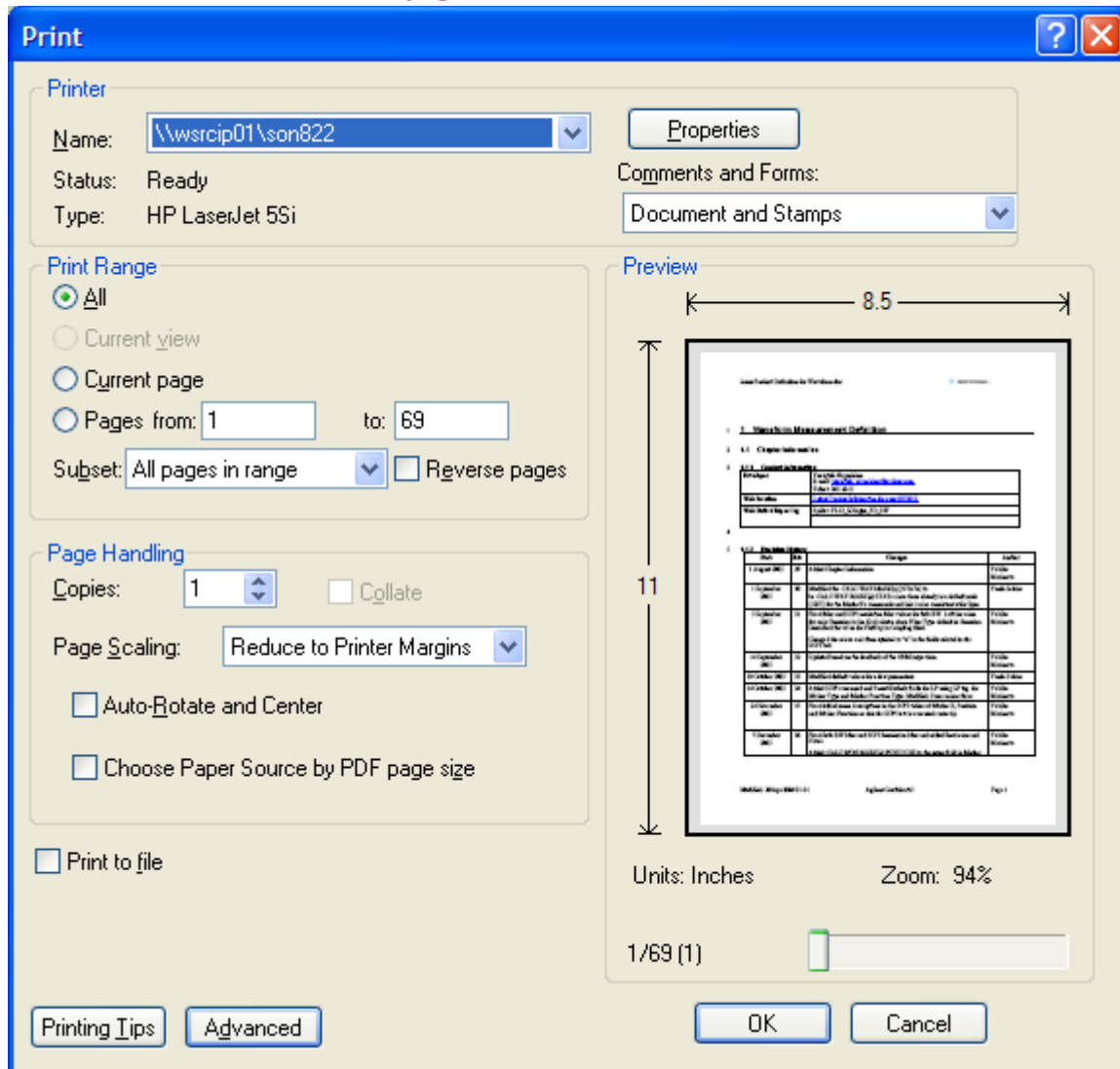
1. *Either*,
  - a. click on the Print icon in the Acrobat Reader toolbar,



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

Using Help  
Navigating Acrobat (PDF) Files

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.

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## 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.

<b>Term</b>	<b>Meaning</b>
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 <b>Enter</b> 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 <b>Factory Preset</b> .
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.

Using Help  
**Terms Used in This Documentation**

<b>Term</b>	<b>Meaning</b>
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 <b>Power On Last State</b> or <b>User Preset</b> .

---

## 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 107](#).
- If your Analyzer does *not* have an attached Mouse and Keyboard, see the Section [“Finding a Topic without a Mouse and Keyboard” on page 117](#) 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” on page 118](#) below.


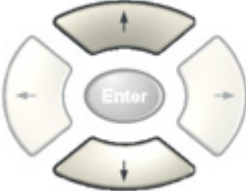
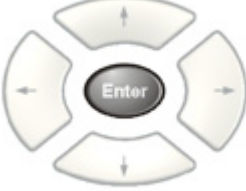
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**TIP** If you want to understand the organization of Help, see the Section [“How Help is Organized” on page 100](#).

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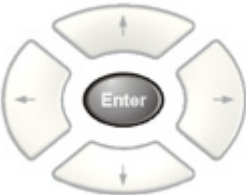
### Finding a Topic without a Mouse and Keyboard

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 <b>Next Window</b> 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 <b>Up Arrow</b> or <b>Down Arrow</b> keys. Topics become highlighted upon selection.	
3. Display the selected topic, by pressing the <b>Enter</b> 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:
<p>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 <b>Next Window</b> key.</p> <p>Ensure that the focus is in the <i>Topic Pane</i>.</p>	
<p>2. Move from link to link in the Topic Pane (right side of display) by pressing the <b>Forward Tab</b> and <b>Backward Tab</b> keys. Links become highlighted upon selection.</p> <p>NOTE: When a Help page is first displayed, no link is selected. Clicking the <b>Forward Tab</b> key once selects the <b>Previous Page</b> key. Clicking the <b>Forward Tab</b> key a second time selects the <b>Next Page</b> key. Clicking the <b>Forward Tab</b> key for a third time selects the first hyperlink on the page.</p> <p>It is sometimes difficult to see the highlighting of the <b>Previous</b> and <b>Next Page</b> keys.</p>	<p>Use the <b>Forward</b> and <b>Backward Tab</b> keys</p>  <p>to select the <b>Previous</b> and <b>Next Page</b> keys</p> 
<p>3. When you have selected the desired link, activate it by pressing the <b>Enter</b> key.</p>	

The X-Series signal analyzer measures and monitors complex RF and microwave signals. Analog baseband analysis is available on MXA. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The analyzer has Windows XP Pro<sup>®</sup> 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.

## 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](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

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**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.

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### 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.



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

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## 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/mxa_software)  
[http://www.agilent.com/find/exa\\_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.

## X-Series Options and Accessories

[“MXA Instrument Options” on page 121](#)

[“MXA Accessories” on page 122](#)

[“EXA Instrument Options” on page 122](#)

[“EXA Accessories” on page 123](#)

[“Advanced Measurement Application Software” on page 123](#)

### MXA Instrument Options

Product	Description
N9020A	MXA Signal Analyzer
N9020A-503	Frequency range from 20 Hz to 3.6 GHz
N9020A-508	Frequency range from 20 Hz to 8.4 GHz
N9020A-513	Frequency range from 20 Hz to 13.6 GHz
N9020A-526	Frequency range from 20 Hz to 26.5 GHz
N9020A-B25	Analysis bandwidth, 25 MHz
N9020A-BBA	Analog baseband IQ inputs
N9020A-PFR	Precision frequency reference
N9020A-PRC	Portable configuration

About the Analyzer  
**Installing Application Software**

<b>Product</b>	<b>Description</b>
N9020A-EA3	Electric attenuator, 3.6 GHz
N9020A-S40	Baseband analysis bandwidth, 40 MHz/channel
N9020A-P03	Preamplifier, 3.6 GHz
N9020A-P08	Preamplifier, 8.4 GHz
N9020A-P13	Preamplifier, 13.6 GHz
N9020A-P26	Preamplifier, 26.5 GHz

**MXA Accessories**

<b>Product</b>	<b>Description</b>
N9020A-MLP	75 ohm minimum loss pad
N9020A-EFM	USB flash drive
N9020A-DVR	DVD-ROM drive
N9020A-MSE	Mouse, USB interface
N9020A-KYB	Keyboard, USB interface
N9020A-HTC	Hard transit case
N9020A-1CP	Rackmount kit with handles
N9020A-1CN	Front handle kit
N9020A-1CM	Rackmount kit
N9020A-1CR	Rack slide kit
N9020A-CPU	Instrument security, additional CPU and HDD
N9020A-UK6	Commercial Calibration Certificate with Test Data
N9020A-1A7	ISO 17025 Compliant Calibration
N9020A-A6J	ANSI Z540 Compliant Calibration

**EXA Instrument Options**

<b>Product</b>	<b>Description</b>
N9010A	EXA Signal Analyzer (3.6, 7.0, 13.6, and 26.5 GHz)
N9010A-503	Frequency range from 9 kHz to 3.6 GHz
N9010A-507	Frequency range from 9 kHz to 7.0 GHz
N9010A-513	Frequency range from 9 kHz to 13.6 GHz
N9010A-526	Frequency range from 9 kHz to 26.5 GHz

<b>Product</b>	<b>Description</b>
N9010A-FSA	Fine step attenuator
N9010A-PFR	Precision frequency reference
N9010A-PRC	Portable configuration
N9010A-EA3	Electric attenuator, 3.6 GHz
N9010A-P03	Preamplifier, 3.6 GHz

### **EXA Accessories**

<b>Product</b>	<b>Description</b>
N9010A-MLP	Minimum loss pad, 50 to 75 ohms
N9010A-EFM	USB flash drive
N9010A-DVR	DVD-ROM/CD-R/RW drive
N9010A-MSE	Mouse, USB interface
N9010A-KYB	Keyboard, USB interface
N9010A-HTC	Hard transit case
N9010A-1CP	Rackmount kit with handles
N9010A-1CN	Front handle kit
N9010A-1CM	Rackmount kit
N9010A-1CR	Rack slide kit
N9010A-CPU	Instrument security, additional CPU and HDD
N9010A-UK6	Commercial Calibration Certificate with Test Data
N9010A-1A7	ISO 17025 Compliant Calibration
N9010A-A6J	ANSI Z540 Compliant Calibration

### **Advanced Measurement Application Software**

For a current list of application software, go to the following URLs.

**For MXA,**

<http://www.agilent.com/find/mxa/options>

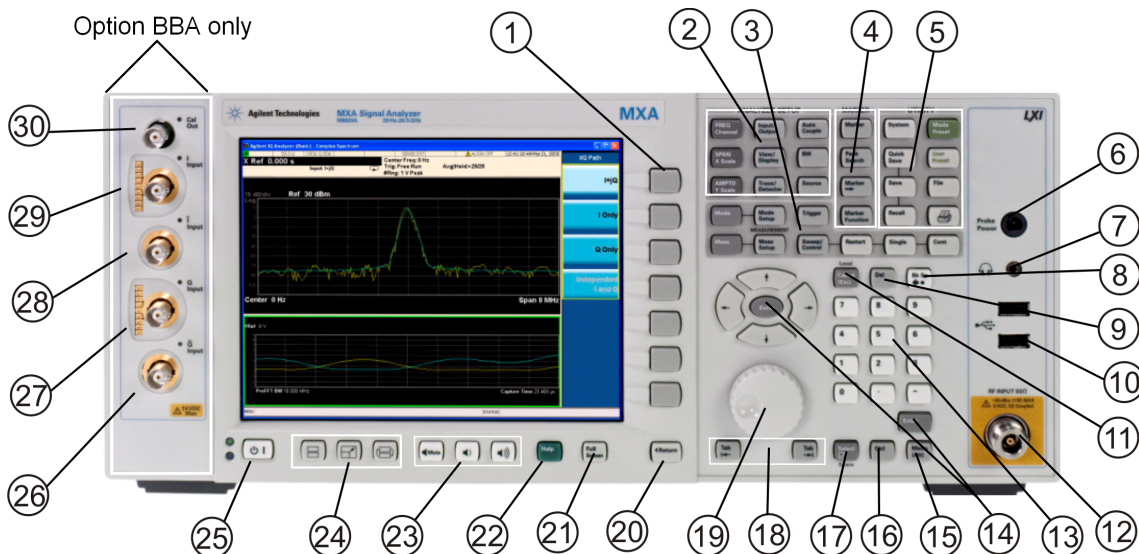
Select the *MXA N9020A, Options and Measurement Applications* link on the top of the page.

**For EXA,**

<http://www.agilent.com/find/exa/options>

Select the *EXA N9010A, Options and Measurement Applications* link on the top of the page.

## 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 such as: <ul style="list-style-type: none"> <li>instrument configuration information and I/O setup,</li> <li>printer setup and printing,</li> <li>file management, save and recall,</li> <li>instrument presets.</li> </ul>
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.

Item		Description
#	Name	
10	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive.
11	Local/Cancel/(Esc) Key	<p>If you are in remote operation, Local:</p> <ul style="list-style-type: none"> <li>• returns instrument control from remote back to local (the front panel).</li> <li>• turns the display on (if it was turned off for remote operation).</li> <li>• can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.)</li> </ul> <p>If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value.</p> <p>Esc works the same as it does on a pc keyboard. It:</p> <ul style="list-style-type: none"> <li>• exits Windows dialogs</li> <li>• clears errors</li> <li>• aborts printing</li> <li>• cancels operations.</li> </ul>
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	<p>The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit.</p> <p>The arrow keys:</p> <ul style="list-style-type: none"> <li>• Increment and decrement the value of the current measurement selection.</li> <li>• Navigate help topics.</li> <li>• Navigate, or make selections, within Windows dialogs.</li> <li>• Navigate within forms used for setting up measurements.</li> <li>• Navigate within tables.</li> </ul> <p><b>Note</b> The arrow keys cannot be used to move a mouse pointer around on the display.</p>
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.

About the Analyzer  
**Front-Panel Features**

Item		Description
#	Name	
21	Full Screen Key	Pressing this key turns off the softkeys to maximize the graticule display area. Press the key again to restore the normal display.
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.  <div style="border: 1px solid gray; padding: 2px; display: inline-block; margin-bottom: 5px;">NOTE</div> 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.*
27	Q Input	Input port for the Q channel for either single or differential mode.*
28	I Input	Input port for the I channel when in differential mode.*
29	I Input	Input port for the I channel for either single or differential mode.*
30	Cal Out	Output port for calibrating the I, I, Q and Q inputs and probes used with these inputs..*

\*. 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. For example, the Auto/Man type of key. 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.

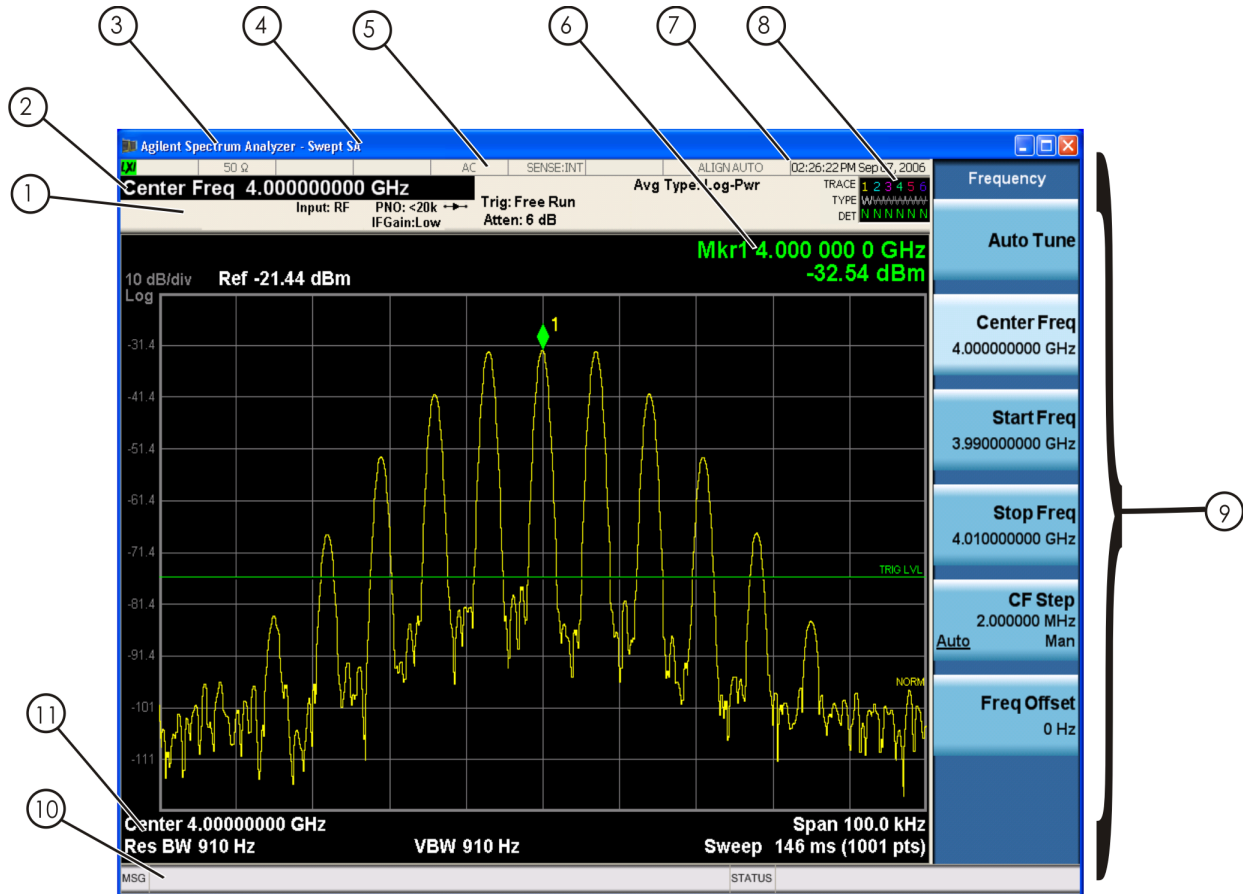
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are 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.



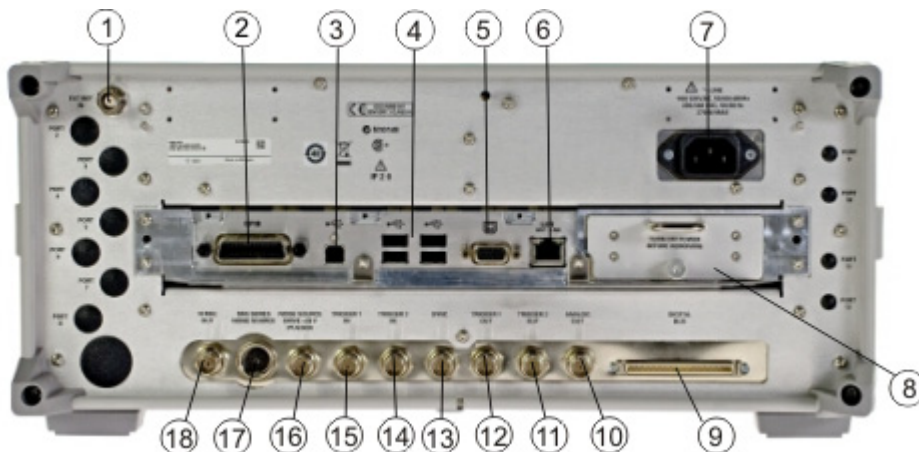
Item	Description	Function Keys
1	Measurement bar - Shows general measurement settings and information.   Indicates single/continuous measurement. Some measurements include limits that the data is tested against. A Pass/Fail indication may be shown in the lower left of the measurement bar.	All the keys 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.	<b>Mode</b>
4	Measurement title - shows title information for the current measurement, or a title that you created for the measurement.	<b>Meas</b> <b>View/Display, Display, Title</b>



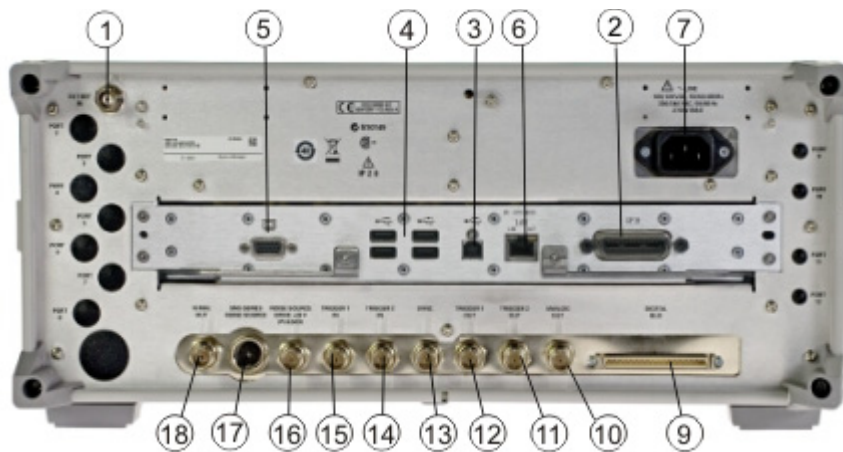
Item	Description	Function Keys
5	Settings panel - displays system information that is not specific to any one application. <ul style="list-style-type: none"> <li>• Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ</li> <li>• Input impedance and coupling</li> <li>• Selection of external frequency reference</li> <li>• Setting of automatic internal alignment routine</li> </ul>	<b>Local and System, I/O Config</b>  <b>Input/Output, Amplitude, System</b> and others
6	Active marker frequency, amplitude or function value	<b>Marker</b>
7	Settings panel - time and date display.	<b>System, Control Panel</b>
8	Trace and detector information	<b>Trace/Detector, Clear Write (W) Trace Average (A) Max Hold (M) Min Hold (m)</b> <b>Trace/Detector, More, Detector, Average (A) Normal (N) Peak (P) Sample (S) Negative Peak (p)</b>
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.

## Rear-Panel Features

### MXA and EXA with Option PC2



### EXA



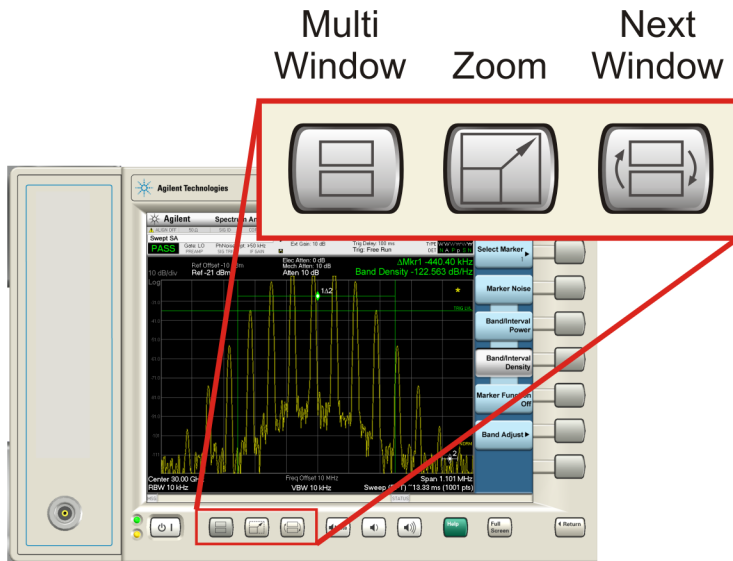
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal:  For MXA – 1 to 50 MHz For EXA – 10 MHz.

Item		Description
#	Name	
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.
3	USB Connector	USB 2.0 port, Type B. USB TMC (test and measurement class) connects to an external pc controller to control the instrument and for data transfers over a 480 Mbps link.
4	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, printer, DVD drive, or hard drive.
5	MONITOR	Allows connection of an external VGA monitor.
6	LAN	A TCP/IP Interface that is used for remote analyzer operation.
7	Line power input	The AC power connection. See the product specifications for more details.
8	Removable Disk Drive	Standard on MXA. Optional on EXA.
9	Digital Bus	Reserved for future use.
10	Analog Out	Reserved for future use.
11	TRIGGER 2 OUT	A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys.
12	TRIGGER 1 OUT	A trigger output used to synchronize other test equipment with the analyzer. Configurable from the Input/Output keys.
13	Sync	Reserved for future use.
14	TRIGGER 2 IN	Allows external triggering of measurements.
15	TRIGGER 1 IN	Allows external triggering of measurements.
16	Noise Source Drive +28 V (Pulsed)	For use with Agilent 346A, 346B, and 346C Noise Sources
17	SNS Series Noise Source	For use with Agilent N4000A, N4001A, N4002A Smart Noise Sources (SNS).
18	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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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 will get 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.

---

**NOTE** 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:ZOOM

Remote Command:                   :DISPlay:WINDow:FORMat:TILE  
Example:                            :DISP:WIND:FORM:ZOOM sets zoomed  
                                      :DISP:WIND:FORM:TILE sets un-zoomed  
Preset:                             TILE  
Instrument S/W Revision:         Prior to A.02.00

## 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>  
Instrument S/W Revision:         Prior to A.02.00

## Selected Window

One and only one window is always selected. The selected window has the focus; as far as you are concerned, all key presses are going to that window.

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.

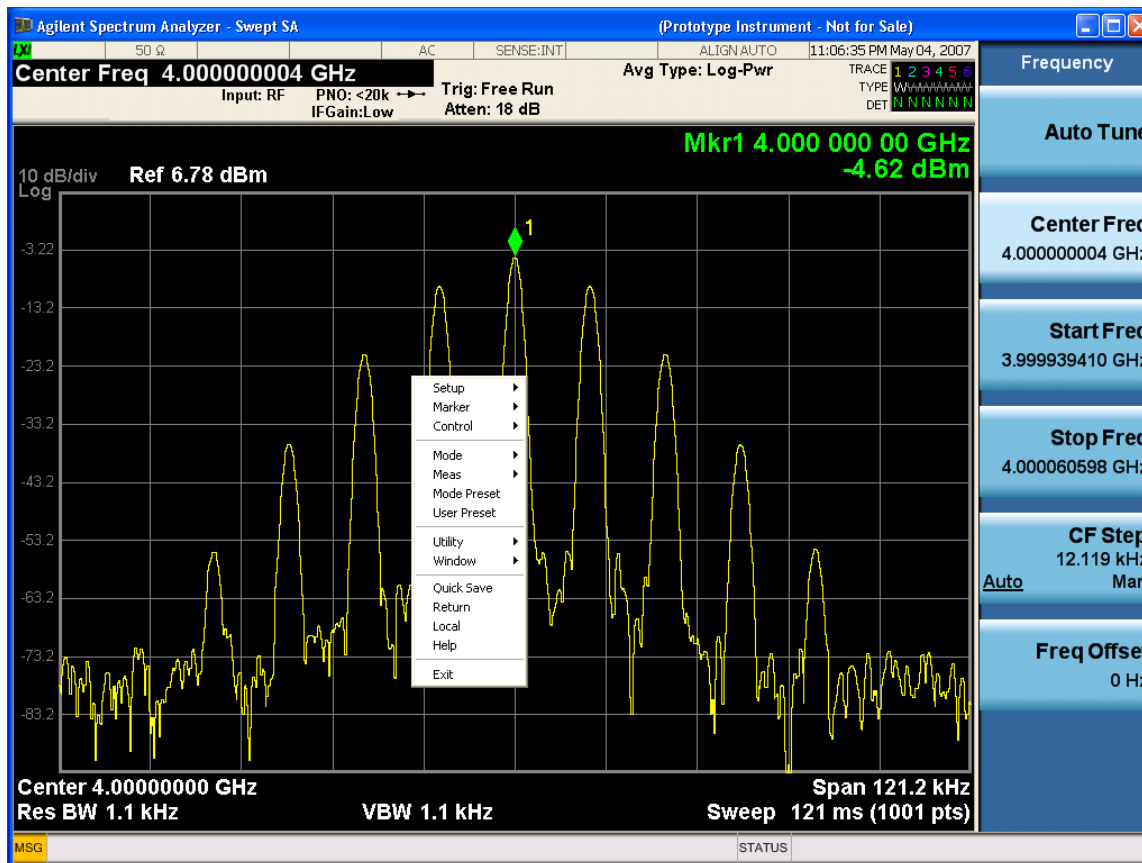
The window navigation does NOT use the arrow and select keys. Those are reserved for navigation within a window.

## Mouse and Keyboard Control

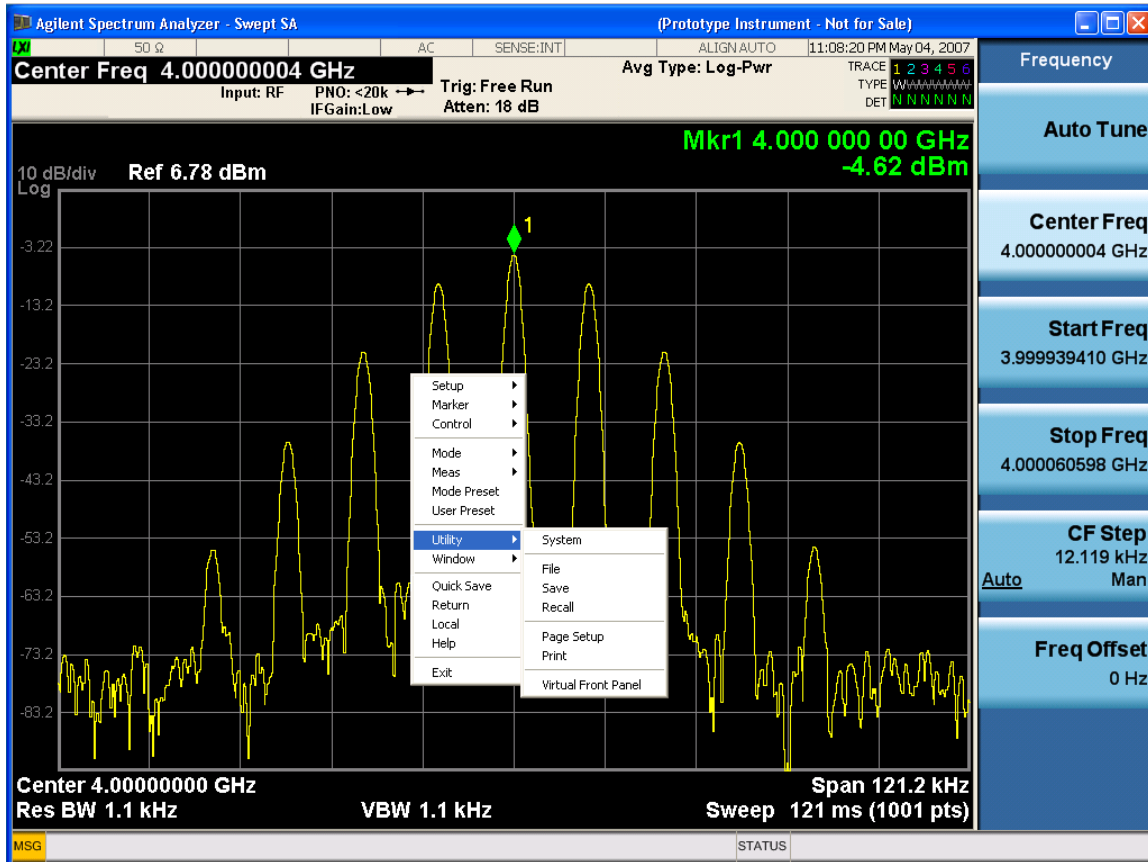
If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

### Right-Click

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

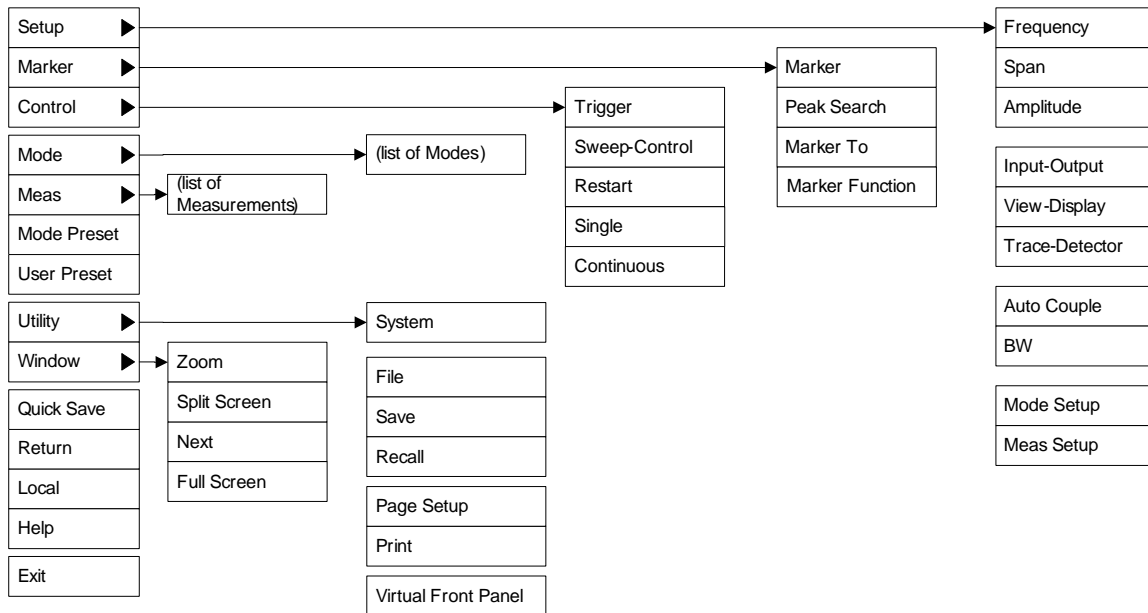


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



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
Quick Save	CTRL+SHIFT+Q
Save	CTRL+S
Recall	CTRL+R
Mode Preset	CTRL+M
User Preset	CTRL+U
Print	CTRL+P
File	CTRL+SHIFT+L
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



Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
Next Window	CTRL+SHIFT+N
Split Screen	CTRL+L
Full Screen	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 key 1	CTRL+SHIFT+F1
Menu key 2	CTRL+SHIFT+F2
Menu key 3	CTRL+SHIFT+F3
Menu key 4	CTRL+SHIFT+F4
Menu key 5	CTRL+SHIFT+F5
Menu key 6	CTRL+SHIFT+F6
Menu key 7	CTRL+SHIFT+F7
Backspace	BACKSPACE
Enter	ENTER
Tab	Tab
1	1



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## 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

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#### 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](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

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<b>NOTE</b>	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.
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### 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.

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

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### 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/mxa_software)

[http://www.agilent.com/find/exa\\_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.

About the Spectrum Analyzer Measurement Application  
**Installing Application Software**

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

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## What Programming Information is Available?

The X-Series Documentation can be accessed through the Additional Documentation page in the instrument Help system and is included on the Documentation CD shipped with the instrument. It can also be found in the instrument at: C:\ProgramsFiles\Agilent\SignalAnalysis\Infrastructure\Help\otherdocs, or online at: [http://www.agilent.com/find/mxa\\_manuals](http://www.agilent.com/find/mxa_manuals).

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

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Resource	Description
<b>X-Series Programmer's Guide</b>	<p>Provides general SCPI programming information on the following topics:</p> <ul style="list-style-type: none"><li>• Programming the X-Series Applications</li><li>• Programming fundamentals</li><li>• Programming examples</li></ul> <p>Note that SCPI command descriptions for measurement applications are NOT in this book, but are in the User's and Programmer's Reference.</p>
<b>User's and Programmer's Reference manuals</b>	<p>Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that:</p> <ul style="list-style-type: none"><li>• Each measurement application has its own User's and Programmer's Reference.</li><li>• The content in this manual is duplicated in the analyzer's Help (the Help that you see for a key is identical to what you see in this manual).</li></ul>
<b>Embedded Help in your instrument</b>	<p>Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application.</p> <p>Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.</p>
<b>X-Series Getting Started Guide</b>	<p>Provides valuable sections related to programming including:</p> <ul style="list-style-type: none"><li>• Licensing New Measurement Application Software - After Initial Purchase</li><li>• Configuring instrument LAN Hostname, IP Address, and Gateway Address</li><li>• Using the Windows XP Remote Desktop to connect to the instrument remotely</li><li>• Using the Embedded Web Server Telnet connection to communicate SCPI</li></ul> <p>This printed document is shipped with the instrument.</p>
<b>Agilent Application Notes</b>	<p>Printable PDF versions of pertinent application notes.</p>
<b>Agilent VISA User's Guide</b>	<p>Describes the Agilent Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs.</p>

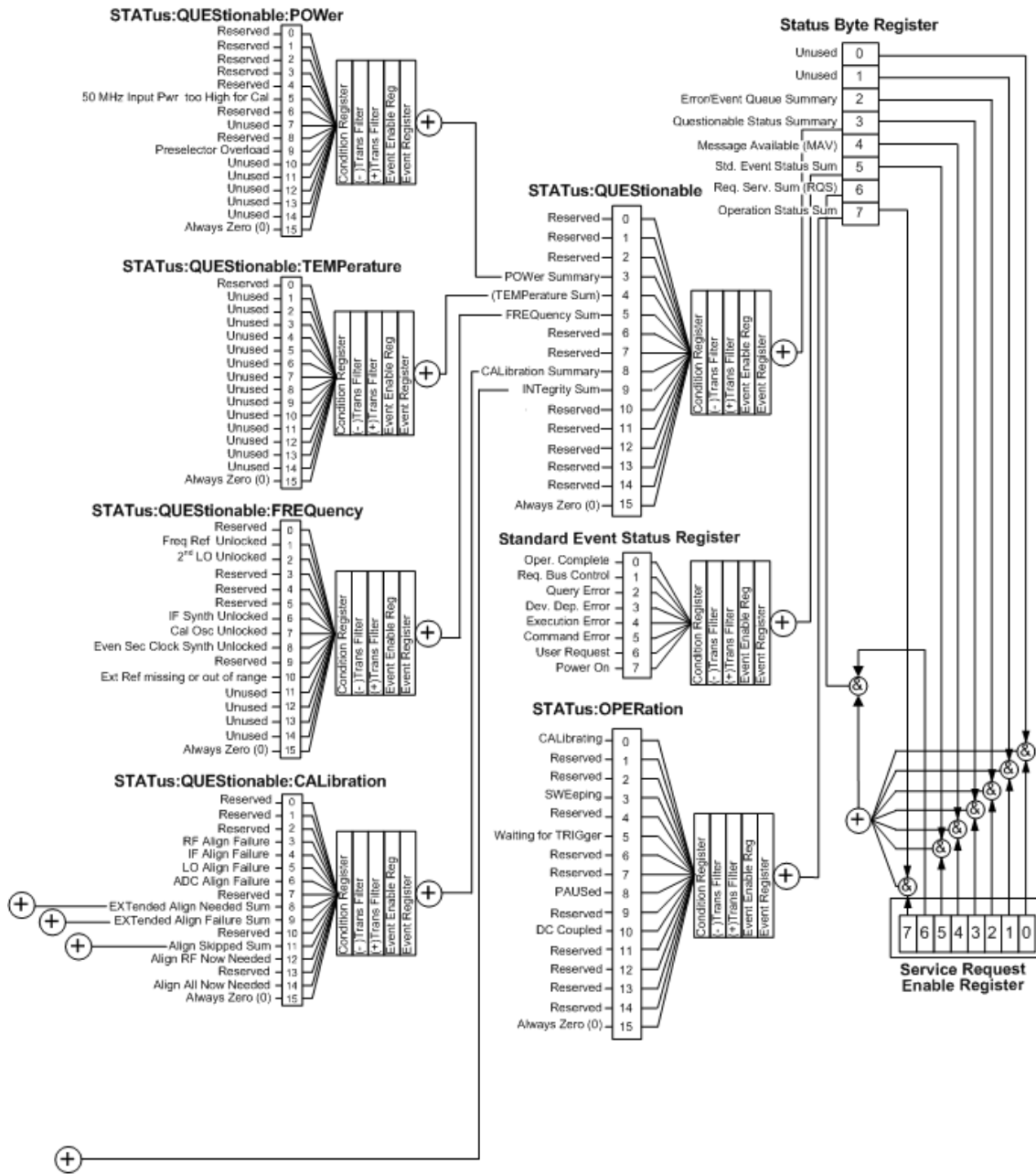
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## STATus Subsystem (No equivalent front-panel keys)

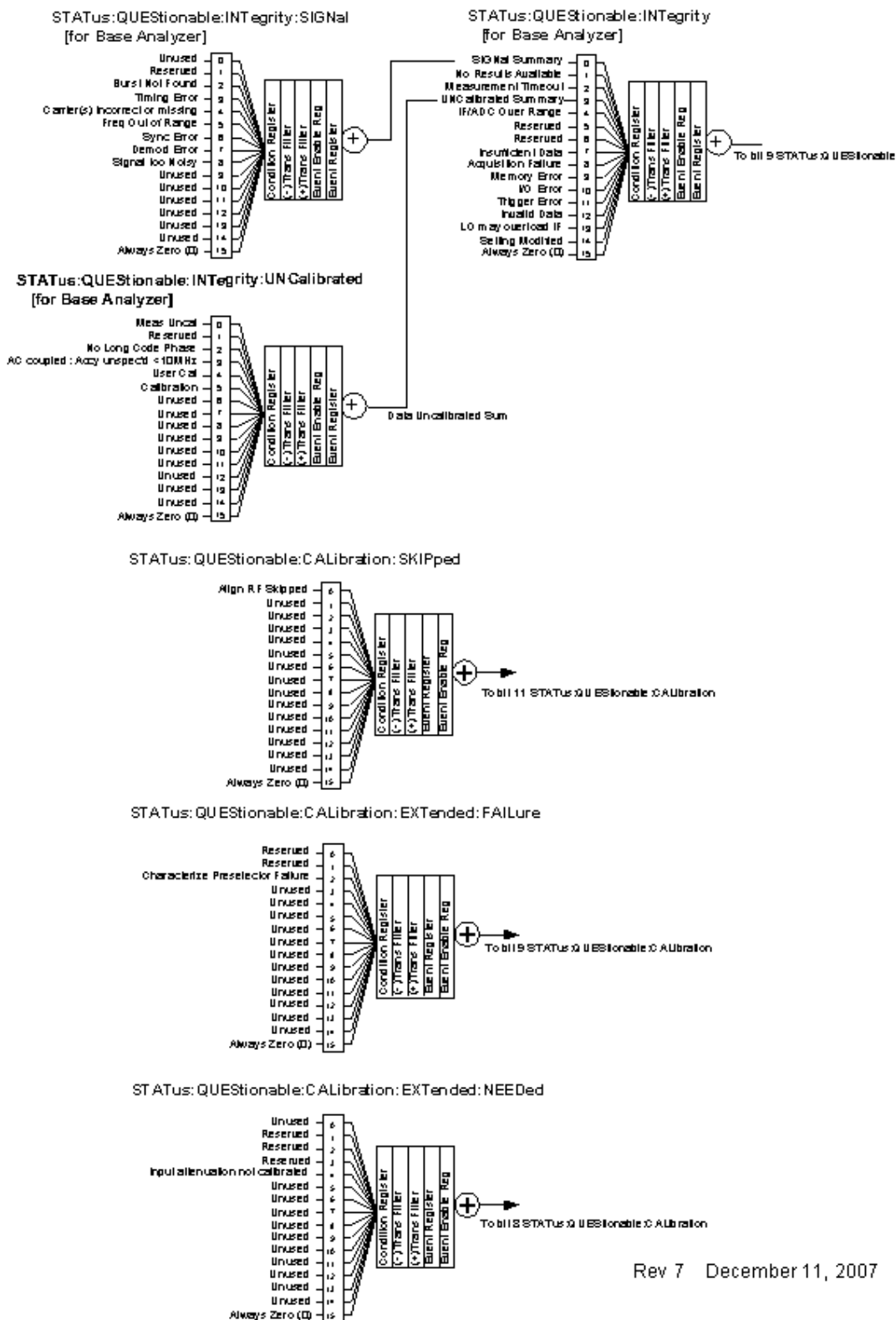
The following graphics show the current X-Series Status Register Subsystem implementation.

### X-Series Status Byte Register System



Programming the Analyzer  
**STATUS Subsystem (No equivalent front-panel keys)**

**Additional Registers:**



Rev 7 December 11, 2007

## 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. See the overall system in Figure at the beginning of this section.

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 will stay 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

<b>Decimal Value</b>																
		32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2
<b>Bit Number</b>	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, 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 care about that specific condition. For example, you want to know what was happening with bit 10 in the Status Questionable Integrity register, and do not care 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 enables you to 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 show when an auto-trigger timeout occurs. If you want to know when the Auto-trigger timeout condition is cleared, 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 will come 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 look at only 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 can use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You can 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.

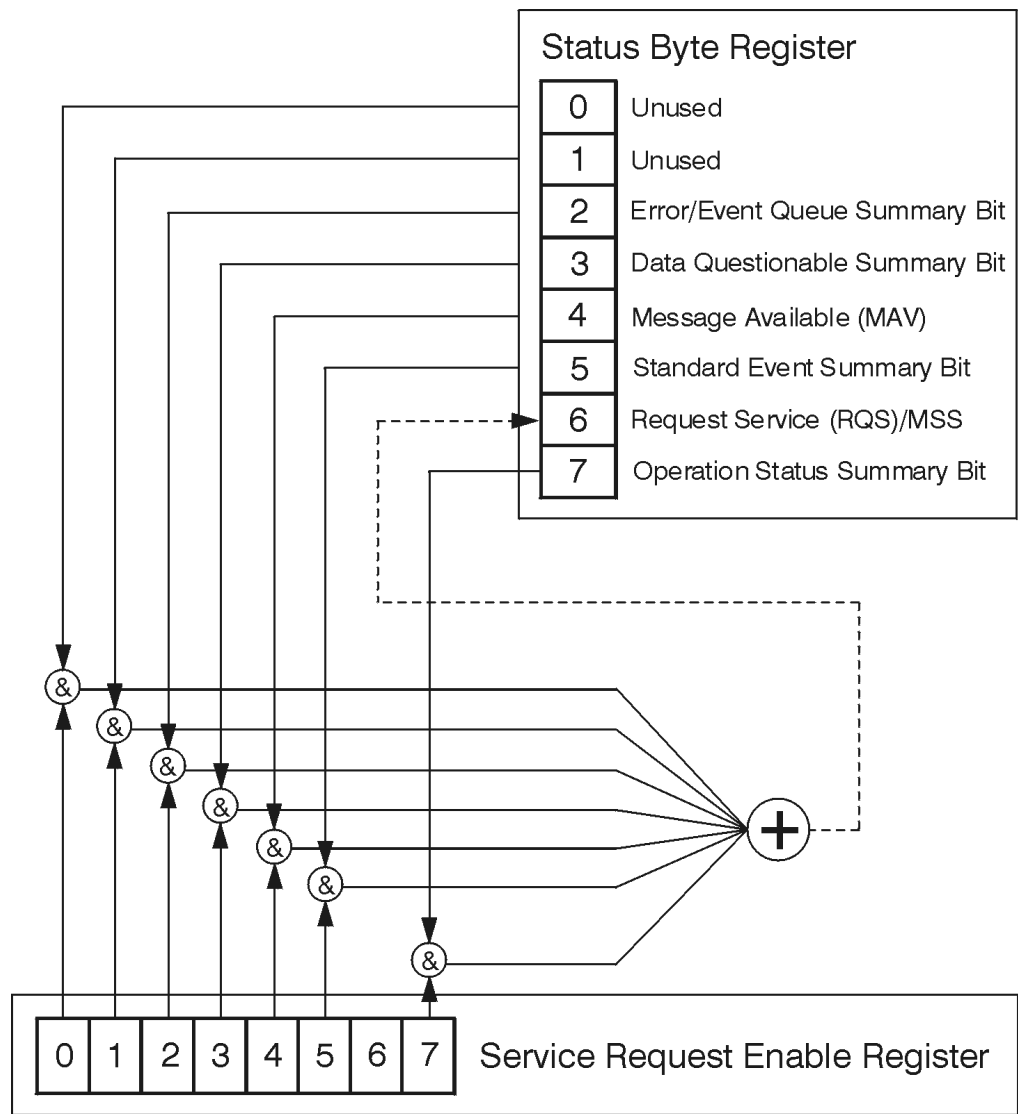
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

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.



<b>Description</b>	<i>Standard Operation Status Summary Bit</i>	<i>Request Service (RQS) Summary Bit</i>	<i>Standard Event Status Summary Bit</i>	<i>Message Available (MAV)</i>	<i>Data Questionable Status Summary Bit</i>	<i>Error/Event Queue Summary Bit</i>	<i>Unused</i>	<i>Unused</i>	
<b>Bit Number</b>	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 will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the 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.

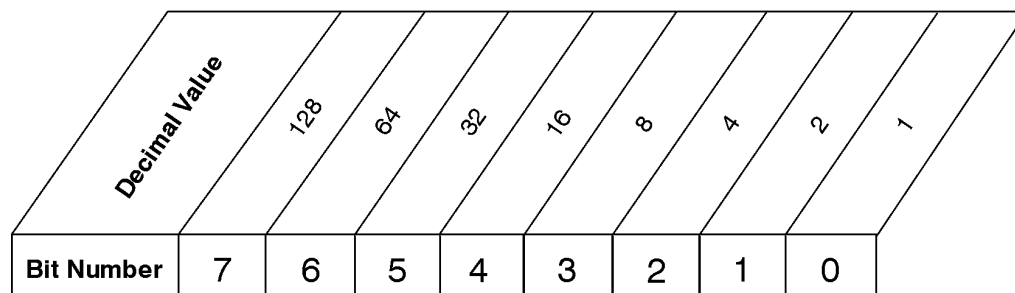
In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

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

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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).

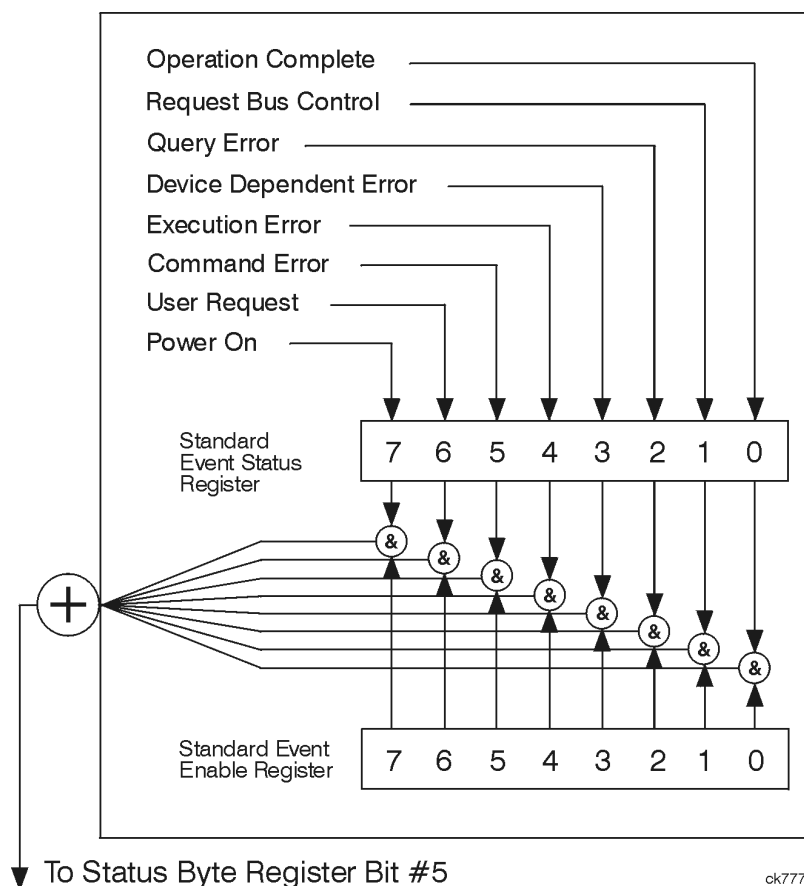


\*SRE <num>  
 \*SRE?

**Service Request Enable Register**

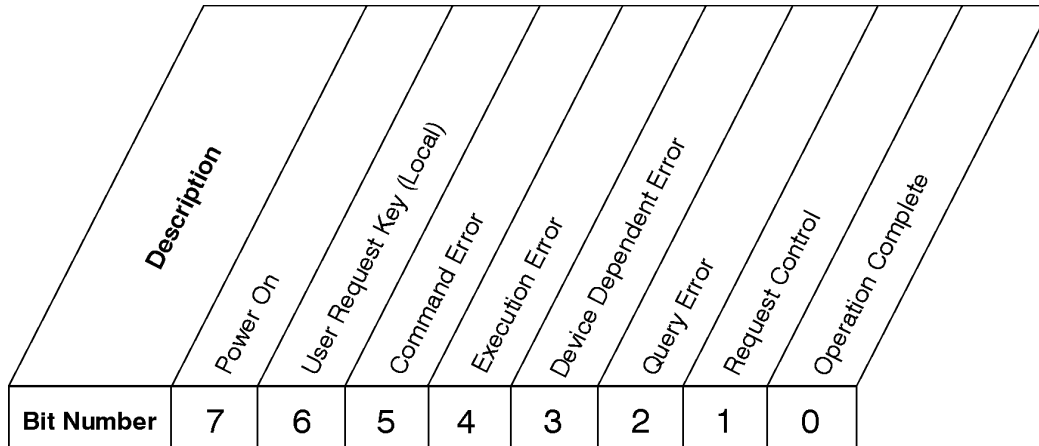
ck726a

**Standard Event Status Register**



ck777a

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.

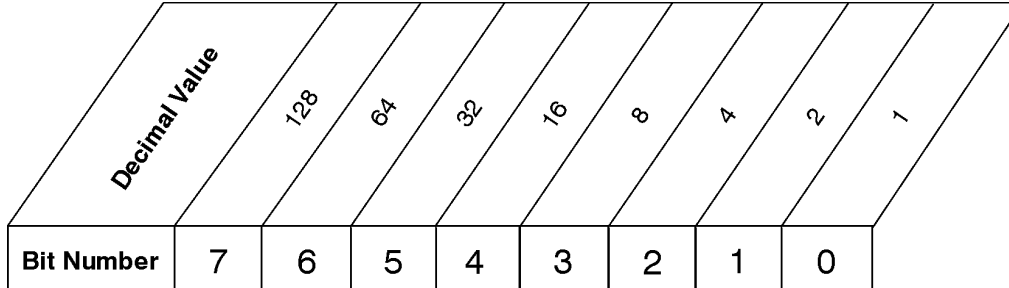
The standard event status register is used to determine the specific event that set bit 5 in the status byte register. To query the standard event status register, send the command \*ESR?. The response will be the decimal sum of the bits which are enabled (set to 1). For example, if bit number 7 and bit number 3 are enabled, the 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

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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).



\*ESE <num>  
 \*ESE?

**Standard Event Status Enable Register**

ck728a

**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. See the figure at the beginning of this chapter.

**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 valid for most X-Series Modes.
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.

---

**NOTE** 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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**Operation Enable** This command determines which bits in the Operation Event register, will set the

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Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

---

**NOTE** 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.

---

Mode	All
Remote Command	:STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle?
Example	STAT:OPER:ENAB 1 Sets the register so that Align Now operation will be reported to the Status Byte Register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**Operation Event Query** This query returns the decimal value of the sum of the bits in the Operation 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:OPERation[:EVENT]?
Example	STAT:OPER?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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 will be reported to the Status Byte Register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 will be reported to the Status Byte Register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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

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Example: STAT:PRES  
Instrument S/W Revision: Prior to A.02.00

### Questionable Register

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

---

**NOTE** 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  
Instrument S/W Revision Prior to A.02.00

**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.

---

**NOTE** 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 will be reported to the Status Byte Register  
:STATus:QUESTionable:ENABle?  
Example STAT:OPER:PTR 1  
Align Now operation beginning will be reported to the Status Byte Register.  
Preset 0  
SCPI Status Bits/OPC Sequential command  
Dependencies



Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**Questionable Event Query** This query returns the decimal value of the sum of the bits in the Questionable 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[:EVENT]?
Example	STAT:QUES?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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' will be reported to the Status Byte Register.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**Questionable Positive Transition** This command determines which bits in the Questionable Condition

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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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**Questionable Calibration Register**

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

---

**NOTE** 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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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.
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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

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SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:CONDi tion?
Example	STAT:QUES:CAL:EXT:FAIL:COND?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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

## Programming the Analyzer

### STATus Subsystem (No equivalent front-panel keys)

want to enable.

Mode	All
Remote Command	:STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition <integer>  :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRan sition?
Example	STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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:PTRan sition <integer>  :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRan sition?
Example	STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

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

Remote Command	:STATus:QUEStionable:CALibration:EXTended:NEEDED[:EVENT] ]?
Example	STAT:QUES:CAL:EXT:NEED?
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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:NTRans ition <integer>  :STATus:QUEStionable:CALibration:EXTended:NEEDED:NTRans ition?
Example	STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required.
Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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:PTRans ition <integer>  :STATus:QUEStionable:CALibration:EXTended:NEEDED:PTRans ition?
Example	STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required.
Preset	32767

SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

**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 will be reported to the Frequency Summary of the Status Questionable register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

**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

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

SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

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

Remote Command	:STATus:QUEStionable:INTEgrity:SIGNal:ENABle <integer> :STATus:QUEStionable:INTEgrity:SIGNal:ENABle?
Example	STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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



SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

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

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**Questionable Power Event Query** This query returns the decimal value of the sum of the bits in the Questionable Power 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:POWer[:EVENT]?
Example	STAT:QUES:POW?

Preset	0
SCPI Status Bits/OPC Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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.
Preset	32767
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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 Dependencies	Sequential command
Instrument S/W Revision	Prior to A.02.00

**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
SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00

**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?
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

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**STATus Subsystem (No equivalent front-panel keys)**

SCPI Status Bits/OPC Dependencies	Sequential command
Min	0
Max	32767
Instrument S/W Revision	Prior to A.02.00



## IEEE Common GPIB Commands

Numeric values for bit patterns can be entered using decimal or hexi-decimal 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]?

### 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.

Key Path	<b>No equivalent key. Related key System, Show Errors, Clear Error Queue</b>
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.
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.
Instrument S/W Revision	Prior to A.02.00

### 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.

Key Path	<b>No equivalent key. Related key System, Show Errors, Clear Error Queue</b>
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.

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### IEEE Common GPIB Commands

Remote Command Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
SCPI Status Bits/OPC Dependencies	Event Enable Register of the Standard Event Status Register.
State Saved	Not saved in state.
Min	0
Max	255
Instrument S/W Revision	Prior to A.02.00

### 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.
Remote Command Notes:	For related commands, see the STATus subsystem commands.
Preset:	0
SCPI Status Bits/OPC Dependencies:	Standard Event Status Register (bits 0 – 7).
Min:	0
Max:	255
Instrument S/W Revision:	Prior to A.02.00

### Identification Query

Returns a string of instrument identification information. The string will contain 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

Key Path **No equivalent key. See related key System, Show System.**

Remote Command	*IDN?
Example	*IDN? Returns instrument identification information, such as: Agilent Technologies,N9020A,US01020004,A.01.02
Instrument S/W Revision	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00

## 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”.

To be IEEE compliant, this command should return an arbitrary ascii variable that would not begin and end with quotes. But the quotes are needed to be backward compatible with previous Spectrum Analyzer products and software. So, the actual implementation will use arbitrary ascii. But quotes will be sent as the first and last ascii characters that are sent with the comma-separated option list.

Remote Command:	*OPT?
Instrument S/W Revision:	Prior to A.02.00

## Recall Instrument State

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

## Programming the Analyzer

### IEEE Common GPIB Commands

- 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 will be loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the instrument will only load 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
Instrument S/W Revision:	Prior to A.02.00

### 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
Instrument S/W Revision:	Prior to A.02.00

### 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.

Remote Command Notes:	For related commands, see the STATUS subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset:	0
SCPI Status Bits/OPC Dependencies:	Service Request Enable Register (all bits, 0 – 7).
Min:	0
Max:	255
Instrument S/W Revision:	Prior to A.02.00

## 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.
Remote Command Notes:	See related command *CLS.
SCPI Status Bits/OPC Dependencies:	Status Byte Register (all bits, 0 – 7).
Instrument S/W Revision:	Prior to A.02.00

## Trigger

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

Key Path	<b>No equivalent key. See related keys Single and Restart.</b>
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 <code>:INITiate:IMMediate</code> .
Instrument S/W Revision	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00



## 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.

Instrument S/W Revision            Prior to A.02.00

## File Explorer

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

Instrument S/W Revision            Prior to A.02.00

## Page Setup

Refer to your Microsoft Windows Operating System manual.

Instrument S/W Revision            Prior to A.02.00

## 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
Instrument S/W Revision	Prior to A.02.00

## Print

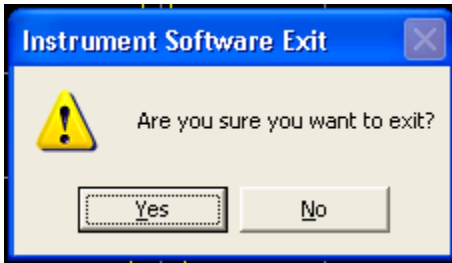
Refer to your Microsoft Windows Operating System manual.

## Exit

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



you intended to exit the application:



Key Path	<b>File, Exit</b>
Mode	All
Remote Command Notes	The Instrument Application will be closed. No further SCPI commands can be sent after this command. Use with caution!
Instrument S/W Revision	Prior to A.02.00

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## 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.

Key Path	<b>Front-panel key</b>
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
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.
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.
Instrument S/W Revision	Prior to A.02.00

### How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front panel access (Key Path). 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

## System Functions

### Preset

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.

Key Path	<b>Mode Setup</b>
Remote Command	:INSTrument:DEFault
Example	:INST:DEF
Remote Command Notes	Clears all pending OPC bits. The Status Byte is set to 0.
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.
Instrument S/W Revision	Prior to A.02.00

### **\*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
Remote Command Notes:	Sequential
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.
Instrument S/W Revision:	Prior to A.02.00

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## **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
Instrument S/W Revision	Prior to A.02.00

## Quick Save

The Quick Save front-panel key repeats the most recent save which was performed from the Save menu, with some qualification:

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 Save front-panel key. 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 running 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 you 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, et cetera).

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 you had not entered their own file name.

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**NOTE** 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.

---

Key Path	Quick Save
Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	Prior to A.02.00

## **Recall**

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 1103](#).



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## **Save**

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1129](#).

## System

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

Key Path	<b>Front-panel key</b>
Remote Command Notes	No remote command for this key specifically.
Instrument S/W Revision	Prior to A.02.00

## Show

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

Key Path	<b>System</b>
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
Instrument S/W Revision	Prior to A.02.00

## 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 the 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.

Key Path	<b>System, Show</b>
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
Instrument S/W Revision	Prior to A.02.00

**Next Page** Next Page and Previous Page menu keys move you 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	<b>System, Show, Errors</b>
Instrument S/W Revision	Prior to A.02.00

**Previous Page** See “Next Page” on page 203.

Key Path	<b>System, Show, Errors</b>
Instrument S/W Revision	Prior to A.02.00

**History** The History and Status keys select the Errors view. The Status key has a second line which

## System Functions

### System

shows a number in [square brackets]. This is the number of currently open status items.

Key Path	<b>System, Show, Errors</b>
Instrument S/W Revision	Prior to A.02.00

**Status** See “History” on page 203.

**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.

Key Path	<b>System, Show, Errors</b>
Mode	All
Remote Command	:SYSTem:ERRor:VERBoSe OFF ON 0 1 :SYSTem:ERRor:VERBoSe?
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
Instrument S/W Revision	Prior to A.02.00

**Refresh** When pressed, refreshes the Show Errors display.

Key Path	<b>System, Show, Errors</b>
Instrument S/W Revision	Prior to A.02.00

**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	<b>System, Show, Errors</b>
Instrument S/W Revision	Prior to A.02.00

### 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 unavailable if the first page of information is presently displayed. The Next Page menu key is unavailable if the last page is information is presently displayed.

Key Path	<b>System, Show</b>
Mode	All
Example	SYST:SHOW SYST
Instrument S/W Revision	Prior to A.02.00

## 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:



Instrument S/W Revision            Prior to A.02.00

**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**

Instrument S/W Revision            Prior to A.02.00

**Next Page** See “Next Page” on page 203

Key Path                                **System, Show, Errors**

Instrument S/W Revision            Prior to A.02.00

**Previous Page** See “Next Page” on page 203.

Key Path                                **System, Show, Errors**

Instrument S/W Revision            Prior to A.02.00

**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.

Key Path                                **System, Show, LXI, LXI Event Log**

Remote Command                    :LXI:EVENTt:LOG:CIRCular[:ENABle] ON|OFF|1|0  
    :LXI:EVENTt:LOG:CIRCular[:ENABle]?

## System Functions

### System

Example	:LXI:EVENT:LOG:CIRC 1
Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing <b>System, Restore Defaults, Misc.</b>
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	Prior to A.02.00

**Clear** Clears the event log of all entries.

Key Path	<b>System, Show, LXI, LXI Event Log</b>
Remote Command	:LXI:EVENT:LOG:CLEAr
Example	:LXI:EVENT:LOG:CLE
Instrument S/W Revision	Prior to A.02.00

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

Key Path	<b>System, Show, LXI, LXI Event Log</b>
Remote Command	:LXI:EVENT:LOG:SIZE <size> :LXI:EVENT:LOG:SIZE?
Example	:LXI:EVENT:LOG:SIZE 256
Preset	Not affected by a Preset. The default value of "64" can be restored by pressing <b>System, Restore Defaults, Misc.</b>
State Saved	Saved in instrument state.
Range	>= 0
Instrument S/W Revision	Prior to A.02.00

**Enabled** Enables and disables the logging of LXI Events.

Key Path	<b>System, Show, LXI, LXI Event Log</b>
Remote Command	:LXI:EVENT:LOG:ENABle ON OFF 1 0 :LXI:EVENT:LOG:ENABle?
Example	:LXI:EVENT:LOG:ENAB ON
Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing <b>System, Restore Defaults, Misc.</b>
State Saved	Saved in instrument state.
Range	ON OFF 0 1
Instrument S/W Revision	Prior to A.02.00



**Count (Remote Command 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  
 Instrument S/W Revision:        Prior to A.02.00

**Next Entry (Remote Command 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 : EVEN : LOG ?  
 Instrument S/W Revision:        Prior to A.02.00

**All (Remote Command 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 : EVEN : 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.  
 Instrument S/W Revision:        Prior to A.02.00

**Specific Entry (Remote Command 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 ? <intIndex>  
 Example:                           : LXI : EVEN : LOG : ENTR ? 0 Returns the first entry in the event log.  
 An example may look like the following:  
 "11/12/2007,18:14:10.770385,Error,LogOverwrite,Rise,,,"  
 The contents of the Event Log vary, based on the operation of the instrument.  
 Instrument S/W Revision:        Prior to A.02.00

**Beginning Entry (Remote Command 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?

## System Functions System

command has a reference entry for indexing individual entries in the log.

Remote Command: :LXI:EVENT:LOG:CIRCular:FBENtry  
Example: :LXI:EVEN:LOG:CIRC:FBEN  
Instrument S/W Revision: Prior to A.02.00

### 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.

Key Path	<b>System</b>
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
Instrument S/W Revision	Prior to A.02.00

### 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.

Key Path	<b>System, Power On</b>
Mode	All
Example	SYST:PON:TYPE MODE
Instrument S/W Revision	Prior to A.02.00

### 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.

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

---

Key Path	<b>System, Power On</b>
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Mode	All
Example	SYST:PON:TYPE USER
Instrument S/W Revision	Prior to A.02.00

### 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.

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<b>NOTE</b>	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.

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Key Path	<b>System, Power On</b>
Mode	All
Example	SYST:PON:TYPE LAST
Restriction and Notes	Power on Last State only works if you have 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.
Instrument S/W Revision	Prior to A.02.00

### Power On Application

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 application is used for Power On Type "Mode and Input/Output Defaults" and Restore System Defaults All.

Key Path	<b>System, Power On</b>
Mode	All
Remote Command	:SYSTem:PON:MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89 601 WCDMA WIMAXOFDMA :SYSTem:PON:MODE?

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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
Instrument S/W Revision	Prior to A.02.00

### Configure Applications

The Configure Application utility allows you configure the bootup for fastest first mode switch time or faster boot time. In addition, there are more applications available for the X-Series than can fit into Windows® Virtual Memory. The Configure Application utility allows you to choose which licensed applications to load in-memory. There will be multiple opportunities for you to perform the configuration.

The Configure Applications utility will provide a graphical representation of the amount of Virtual Memory consumed. The indicator will be green when <90% of the memory limit is consumed, yellow for memory consumption is 90% to 100%, and red when consumption is >100% of the limit.

Key Path	<b>System, Power On</b>
Instrument S/W Revision	A.02.00

### Configure Applications - Next application startup

**Select All** Select All marks all applications in the selection list. This allows you to enable all applications licensed on the instrument for pre-loading, or is a convenience for selecting all applications in one operation and then letting you deselect individual applications.

Key Path	<b>System, Power On, Configure Applications</b>
Instrument S/W Revision	A.02.00

**Deselect All** Deselect All removes marks from all applications in the selection list, with the exception of the Power On application (the Power On application cannot be eliminated from the pre-load list). This allows you to disable all applications licensed on the instrument for pre-loading (with the exception of the Power On application), or is a convenience for deselecting all applications in one operation and then select individual applications.

Key Path	<b>System, Power On, Configure Applications</b>
Instrument S/W Revision	A.02.00

**Move Up** The application list is the order in which applications appear in the Mode Menu. Move Up shifts the selected application up in the list, thus moving the selected application earlier in the Mode

Menu.

Key Path	<b>System, Power On, Configure Applications</b>
Instrument S/W Revision	A.02.00

**Move Down** The application list is the order in which applications appear in the Mode Menu. Move Down shifts the selected application down in the list, thus moving the selected application later in the Mode Menu.

Key Path	<b>System, Power On, Configure Applications</b>
Instrument S/W Revision	A.02.00

**Select/Deselect** Toggles the currently highlighted application in the list.

Key Path	<b>System, Power On, Configure Applications</b>
Instrument S/W Revision	A.02.00

**Save Changes** Applies the configuration of applications list: marked application will be pre-loaded in memory the next time the instrument application is started, and the order of applications in the list will be the order of applications in the Mode Menu.

Key Path	<b>System, Power On, Configure Applications</b>
Notes	The menu key will be unavailable when the virtual memory of the selected applications exceeds 100% of the limit.
Instrument S/W Revision	A.02.00

**System Restart** System Restart provides a means to restart the instrument application. Upon restart the applications in the pre-load list will be loaded in memory.

Key Path	<b>System, Power On, Configure Applications</b>
Remote Command	:SYSTem:PUP:PROcEss
Example	:SYST:PUP:PROC Must Wait after this command for the instrument application to restart
Notes	You cannot use *WAI or *OPC? to synchronize operation; this command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded.
Instrument S/W Revision	A.02.00

### Configure Applications - Remote commands

**Configuration list (Remote Command Only)** This remote command is used to set or query the list of

## System Functions System

applications to be loaded in-memory.

Remote Command:	:SYSTem:PON:APPLication:LLISt <string of INSTRument:SElect names> :SYSTem:PON:APPLication:LLISt?
Example:	:SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"
Notes:	<string of INSTRument:SElect names> are from the enums of the :INSTRument:SElect command  The order of the <INSTRument:SElect names> is the order in which the applications are loaded into memory, and the order in which they appear in the Mode Menu.  Error -225 "Out of Memory" is reported when more applications are listed than can reside in Virtual Memory. In such circumstance the existing applications load list is unchanged.
Preset:	Not affected by Preset
State Saved:	Not saved in state
Instrument S/W Revision:	A.02.00

**Configuration Memory Available (Remote Command Only)** This remote command is used to query the amount of Virtual Memory remaining.

Remote Command:	:SYSTem:PON:APPLication:VMEMory[:AVAIlable]?
Example:	:SYST:PON:APPL:VMEM?
Preset:	Not affected by Preset
Instrument S/W Revision:	A.02.00

**Configuration Memory Total (Remote Command Only)** This remote command is used to query the limit of Virtual Memory allowed for applications.

Remote Command:	:SYSTem:PON:APPLication:VMEMory:TOTal?
Example:	:SYST:PON:APPL:VMEM:TOT?
Preset:	Not affected by Preset
Instrument S/W Revision:	A.02.00

**Configuration Memory Used (Remote Command Only)** This remote command is a query of the amount of Virtual Memory used by all measurement applications.

Remote Command:	:SYSTem:PON:APPLication:VMEMory:USED?
Example:	:SYST:PON:APPL:VMEM:USED?
Preset:	Not affected by Preset

Instrument S/W Revision: A.02.00

**Configuration Application Memory (Remote Command Only)** This remote command is used to query the amount of Virtual Memory a particular application consumes.

Remote Command: :SYSTem:PON:APPLication:VMEMory:USED:NAME?  
<INSTRument:SElect name>

Example: :SYST:PON:APPL:VMEM:USED:NAME? CDMA2K

Notes: <INSTRument:SElect name> is from the enums of the :INSTRument:SElect command.

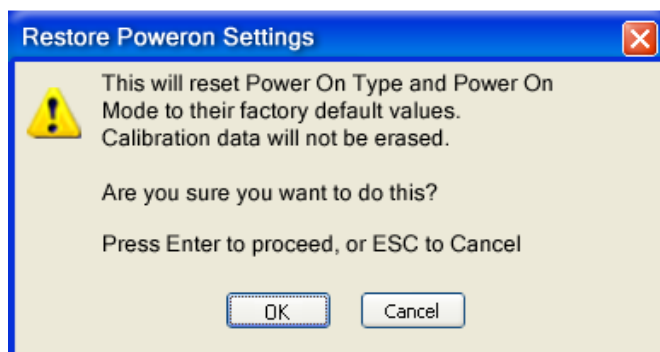
Value returned will be 0 (zero) if the name provided is invalid.

Preset: Not affected by Preset

Instrument S/W Revision: A.01.70 or later

### Restore Power On Defaults

This selection causes the Power On Type and Power On Application 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.

Key Path **System, Power On**

Example :SYST:DEF PON

Instrument S/W Revision Prior to A.02.00

### 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	<b>System</b>
Instrument S/W Revision	Prior to A.02.00

### 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**.

Key Path	<b>System, Alignments</b>
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.
Preset	This is unaffected by Preset but is set to ON upon a "Restore System Defaults->Align".
SCPI Status Bits/OPC Dependencies	When Auto Align is executing, bit 0 in the Status Operational register is set.
Dependencies/Couplings	Auto Align is set to Off if Restore Align Data is invoked.
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Auto Align</b>
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Mode	All
Example	:CAL:AUTO ON
Restriction and Notes	<p>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.</p> <p>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.</p>
SCPI Status Bits/OPC Dependencies	<p>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 <b>Align Now, RF</b>, the Error Condition and Status Questionable Calibration bit 11 are cleared.</p>
Instrument S/W Revision	Prior to A.02.00

**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 of 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

Key Path	<b>System, Alignments, Auto Align</b>
Mode	All
Example	:CAL:AUTO PART
Restriction and Notes	Auto Align Partial begins the elapsed time counter for Auto Align Off time.
Instrument S/W Revision	Prior to A.02.00

**Off Auto Align, Off** disables automatic alignment and the maintenance of warranted operation, for the

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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:

Key Path	<b>System, Alignments, Auto Align</b>
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.
Instrument S/W Revision	Prior to A.02.00

**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):

Key Path	<b>System, Alignments, Auto Align</b>
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
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Auto Align</b>
Mode	All
Remote Command	:CALibration:AUTO:ALERT TTEMPerature   DAY   WEEK   NONE :CALibration:AUTO:ALERT?
Example	:CAL:AUTO:ALER 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".
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.
State Saved	No
Instrument S/W Revision	Prior to A.02.00

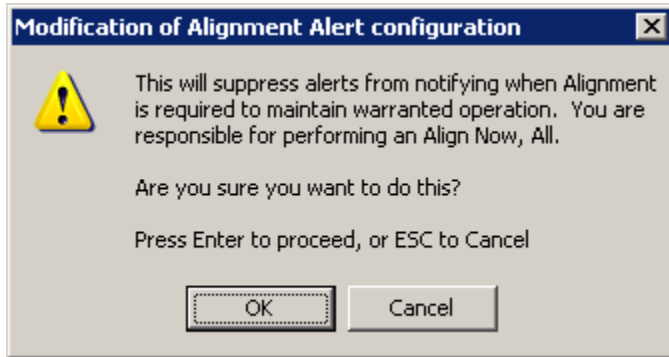
**Time & Temperature** With Auto Align Alert set to **Time & Temperature** the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition "Align Now, All required". If this choice for Alert is selected,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

Key Path	<b>System, Alignments, Auto Align, Alert</b>
Mode	All
Example	:CAL:AUTO:ALER TTEM
SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Instrument S/W Revision	Prior to A.02.00

**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".

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

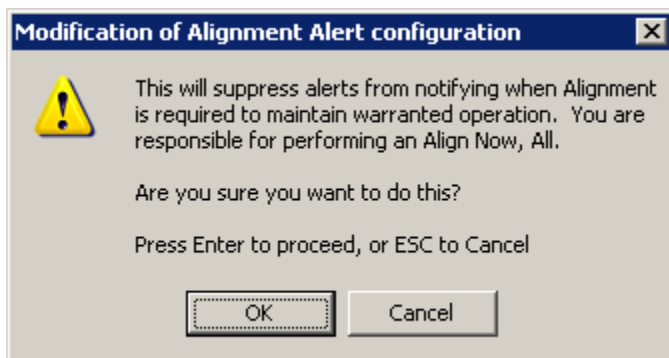


No confirmation is required when Alert is configured through a remote command.

Key Path	<b>System, Alignments, Auto Align, Alert</b>
Mode	All
Example	:CAL:AUTO:ALER DAY
SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Instrument S/W Revision	Prior to A.02.00

**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:



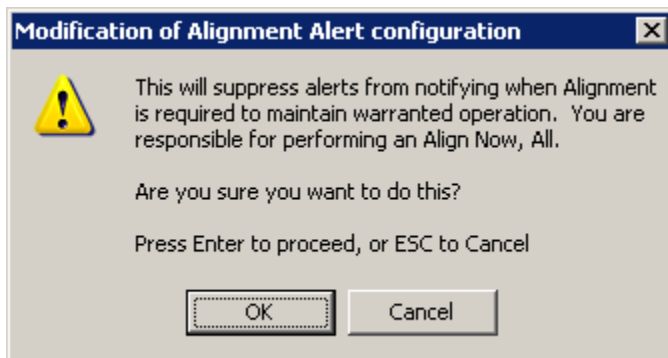
No confirmation is required when Alert is configured through a remote command.

Key Path	<b>System, Alignments, Auto Align, Alert</b>
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Mode	All
Example	:CAL:AUTO:ALER WEEK
SCPI Status Bits/OPC Dependencies	Bit 14 is set in the Status Questionable Calibration register.
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Auto Align, Alert</b>
Mode	All
Example	:CAL:AUTO:ALER NONE
Instrument S/W Revision	Prior to A.02.00

### Align Now

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

Key Path	<b>System, Alignments</b>
Instrument S/W Revision	Prior to A.02.00

**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).

## System Functions

### System

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.

Key Path	<b>System, Alignments, Align Now</b>
Mode	All
Remote Command	:CALibration[:ALL] :CALibration[:ALL]?
Example	:CAL

Remote Command Notes	<p>:CALibration[:ALL]? returns 0 if successful</p> <p>:CALibration[:ALL]? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>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.</p> <p>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.</p> <p>Successful completion will clear bit 14 in the Status Questionable Calibration register.</p> <p>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.</p>
Restriction and Notes	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
SCPI Status Bits/OPC Dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Dependencies/Couplings	<p>Initializes the time for the Last Align Now, All Time.</p> <p>Records the temperature for the Last Align Now, All Temperature.</p> <p>If Align RF component succeeded, initializes the time for the Last Align Now, RF Time.</p> <p>If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.</p>
Instrument S/W Revision	Prior to A.02.00
Mode	All
Remote Command	*CAL?
Example	*CAL?
Remote Command Notes	<p>*CAL? returns 0 if successful</p> <p>*CAL? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>See additional remarks described with :CALibration[:ALL]?</p>
Restriction and Notes	Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Instrument S/W Revision	Prior to A.02.00

**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, and then restart the

## System Functions System

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.

Key Path	<b>System, Alignments, Align Now</b>
Mode	All
Remote Command	:CALibration:NRF :CALibration:NRF?
Example	:CAL:NRF
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”.
SCPI Status Bits/OPC Dependencies	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Dependencies/Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature.
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Align Now</b>
Mode	All
Remote Command	:CALibration:RF :CALibration:RF?
Example	:CAL:RF
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.
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

SCPI Status Bits/OPC Dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Dependencies/Couplings	Initializes the time for the Last Align Now, RF Time. Records the temperature for the Last Align Now, RF Temperature.
Instrument S/W Revision	Prior to A.02.00

### 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	<b>System, Alignments</b>
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Align Now</b>
Mode	All
Remote Command	:CALibration:YTF :CALibration:YTF?
Example	:CAL:YTF
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. 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.
Instrument S/W Revision	Prior to A.02.00

### 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:

## System Functions System

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	} Times & Temperature delta. Shown as "---" if none since start-up.
	Temperature since last Align Now All: -1.3 degC	
	Time since last Align Now RF: 5 min	
If TG Option (Not Zorro1)	Temperature since last Align Now RF: +0.1 degC	} Time & Temperature 'stamp'
	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	

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.

Key Path	<b>System, Alignments</b>
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.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>

System Functions  
System

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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Visual annotation in the Show Alignment Statistics screen</b>
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
Instrument S/W Revision	Prior to A.02.00

## 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.

Key Path	<b>System, Alignments</b>
Mode	All
Remote Command	:CALibration:FREQuency:REFerence:MODE CALibrated USER :CALibration:FREQuency:REFerence:MODE?
Example	:CAL:FREQ:REF:MODE CAL
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.
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.
Preset	This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”.
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Timebase DAC</b>
Mode	All
Example	:CAL:FREQ:REF:MODE CAL
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, Alignments, Timebase DAC</b>
Mode	All
Example	:CAL:FREQ:REF:MODE USER
Instrument S/W Revision	Prior to A.02.00

## System Functions System

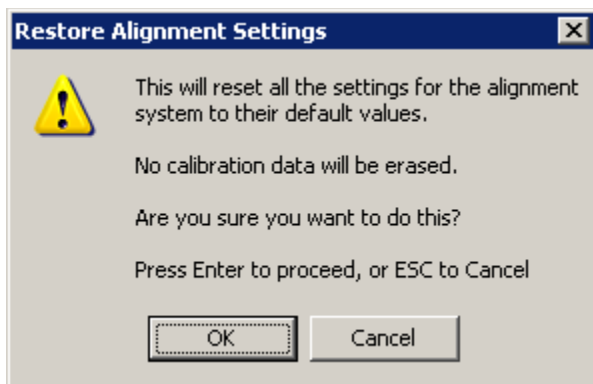
Key Path	<b>System, Alignments, Timebase DAC</b>
Mode	All
Remote Command	:CALibration:FREQuency:REFErence:FINE <integer> :CALibration:FREQuency:REFErence:FINE?
Example	:CAL:FREQ:REF:FINE 8191
Restriction and Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Preset	This is unaffected by Preset but is set to the factory setting on a “Restore System Defaults->Align”.
Dependencies/Couplings	Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER
State Saved	No
Min	0
Max	16383
Instrument S/W Revision	Prior to A.02.00
Remote Command:	:CALibration:FREQuency:REFErence:COARse <integer> :CALibration:FREQuency:REFErence:COARse?
Example:	:CAL:FREQ:REF:COAR 8191
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.
Dependencies/Couplings:	Setting :CAL:FREQ:REF:COAR sets :CAL:FREQ:REF:MODE USER
Instrument S/W Revision:	Prior to A.02.00

### 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:

<b>Parameter</b>	<b>Setting</b>
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
Key Path	<b>System, Alignments</b>
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.
Instrument S/W Revision	Prior to A.02.00

### Backup and Restore Alignment Data

Alignment data for the instrument resides on the hard drive in a database. Agilent uses high quality hard drives; however it is highly recommended the alignment data be backed-up to storage outside of the instrument. Additionally, for customers who use multiple CPU Assemblies or multiple disk drives, the alignment that pertains to the instrument must be transferred to the resident hard drive after a CPU or hard drive is replaced. This utility facilitates backing-up and restoring the alignment data.

---

**NOTE** This utility allows the operator to navigate to any location of the Windows file system. It is intended that the operator use an USB memory device or Mapped Network Drive to backup the alignment data to storage outside of the instrument.

---

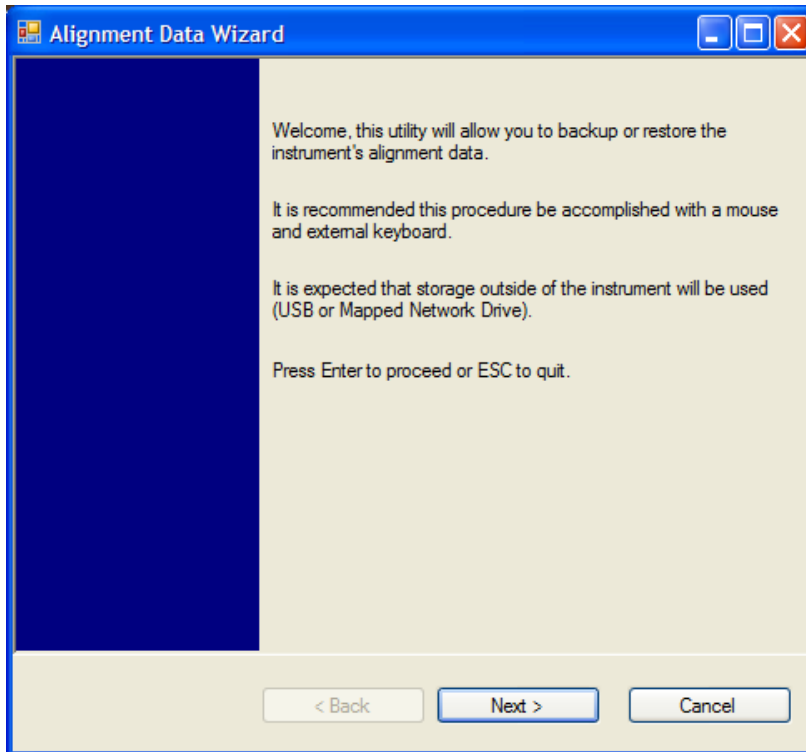
## System Functions System

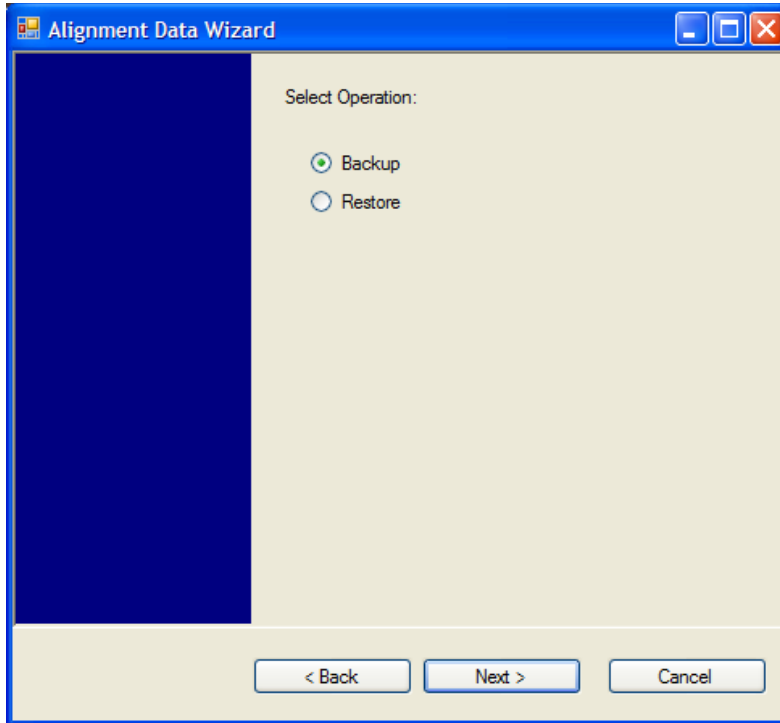
**Backup or Restore Align Data...** Opens the utility for backing-up or restoring the alignment data.

Key Path	<b>System, Alignments</b>
Instrument S/W Revision	A.02.00
Key Path	<b>System, Alignments</b>
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.
Instrument S/W Revision	Prior to A.02.00

**Alignment Data Wizard** The Backup or Restore Alignment Data wizard will guide the you through the operation of backing-up or restoring the alignment data.

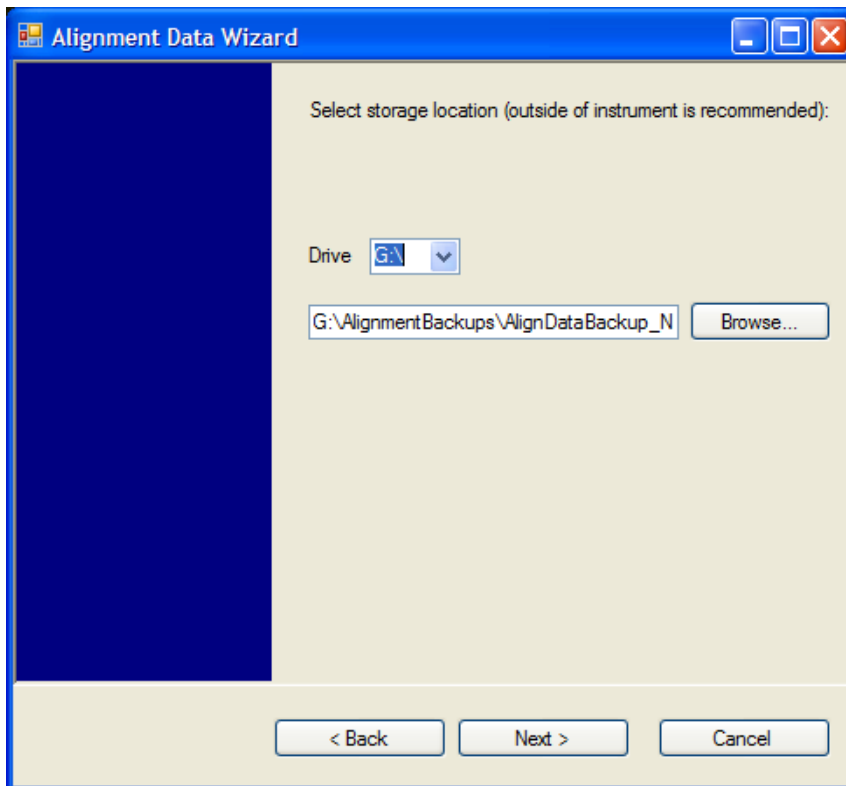
The following dialogue boxes operate without a mouse or external keyboard when you use the default file names.





The backup screen will indicate the approximate amount of space required to contain the backup file.

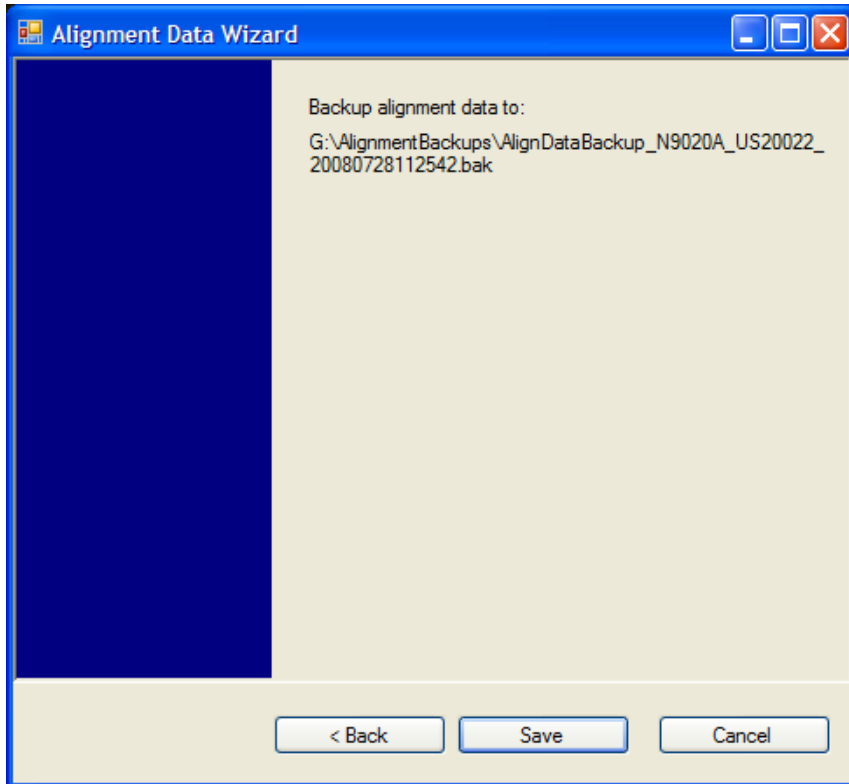
The default file name will be AlignDataBackup\_<model number>\_<serial number>\_<date in YYYYMMDDHHMMSS>.bak.

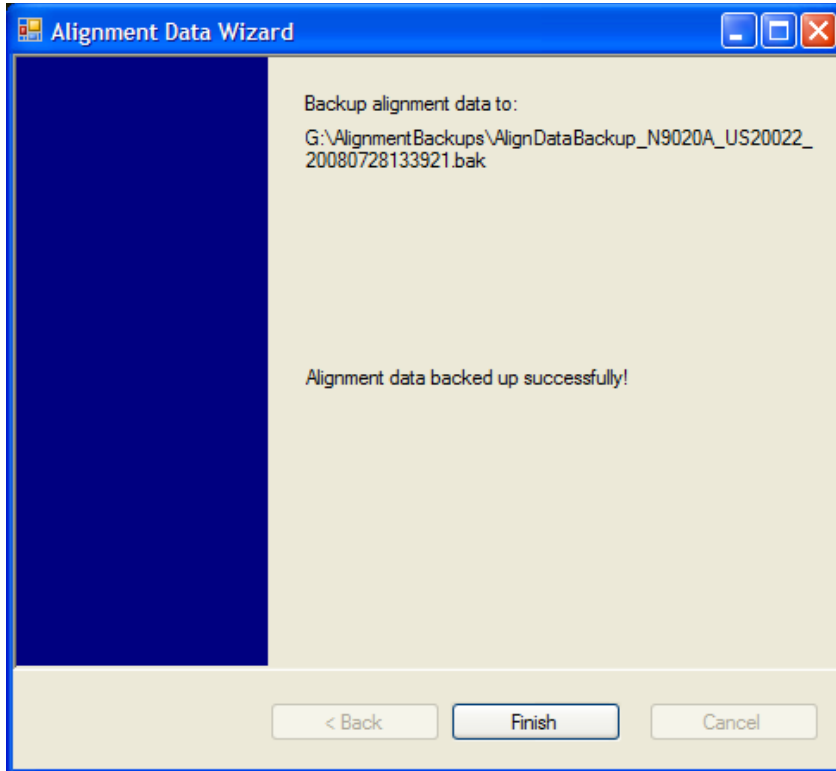


## System Functions

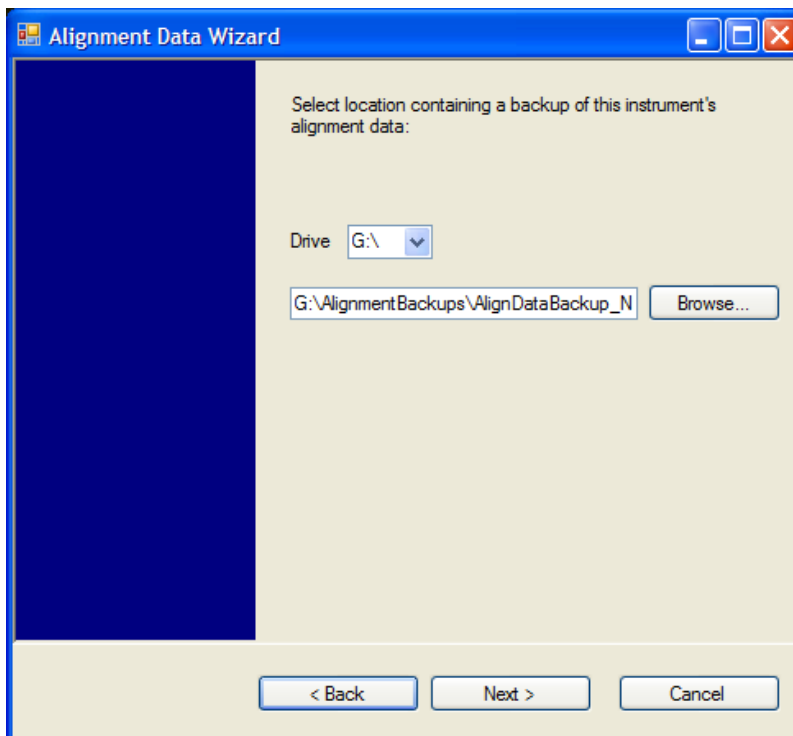
### System

Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down is populated with connected drives which provide s you with write access. If there are many unreachable network drives connected to the instrument, this step can take a few seconds. If a USB drive is present, it will be selected by default. The path defaults to the AlignmentBackups folder, and a filename will be automatically created in the form of AlignDataBackup\_<model>\_<serial number>\_<date><time>. When the "Next >" button is pressed, you will be prompted to create a new folder if the chosen path does not yet exist.





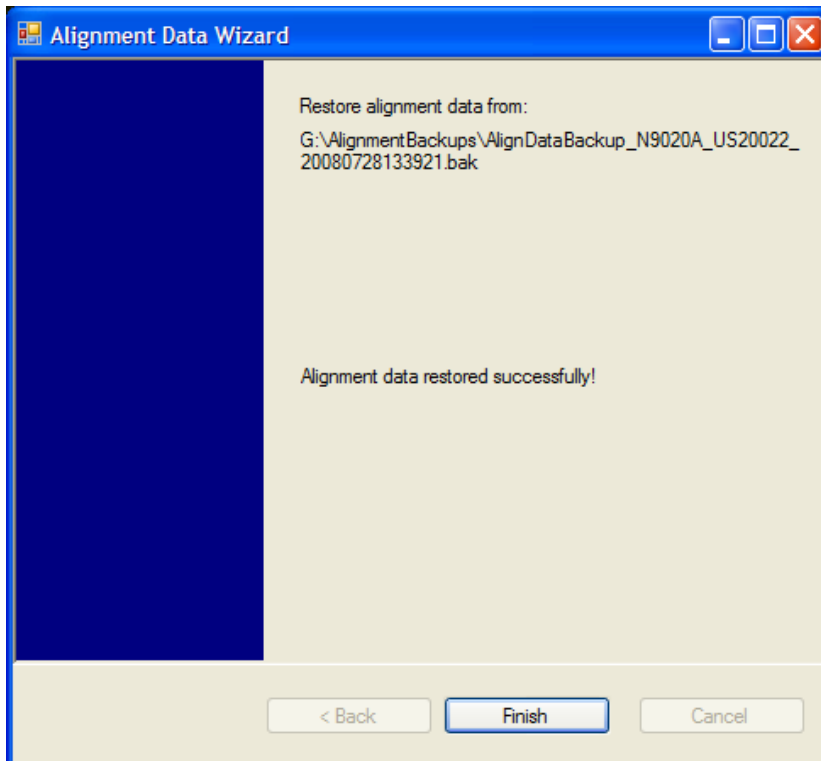
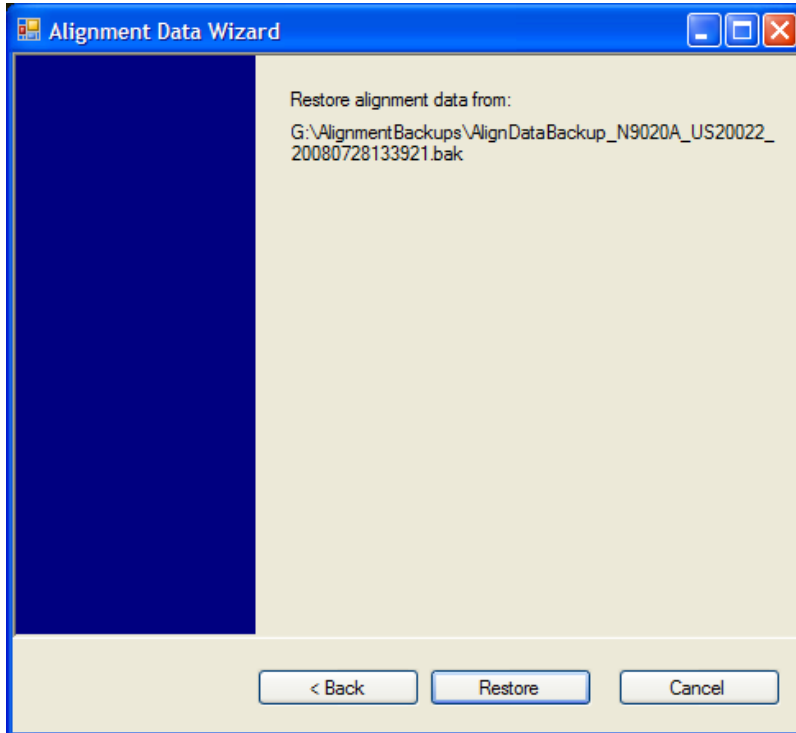
The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.



Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the

## System Functions System

drive drop-down is populated with connected drives which provide you with read access. The path defaults to the AlignBackups folder. The most recent \*.bak file in the folder will also be selected by default.



**Perform Backup (Remote Command Only)** Invokes an alignment data backup operation to the provided Folder.

---

**NOTE** It is recommended that the Folder provided is outside of the instrument (USB or Mapped Network Drive).

---

Remote Command: :CALibration:DATA:BACKup <filename>  
 Example: :CAL:DATA:BACK  
 "F:\AlignDataBackup\_N9020A\_US00000001\_2008140100.bak"  
 Instrument S/W Revision: A.02.00

**Perform Restore (Remote Command Only)** Invokes an alignment data restore operation from the provided filename.

Remote Command: :CALibration:DATA:REStore <filename>  
 Example: :CAL:DATA:RESt "F:\  
 AlignDataBackup\_N9020A\_US00000001\_2008140100.bak "  
 Instrument S/W Revision: A.02.00

## I/O Config

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

Key Path **System**  
 Instrument S/W Revision Prior to A.02.00

## GPIB

Activates a menu for configuring the GPIB I/O port.

Key Path **System, I/O Config**  
 Instrument S/W Revision A.02.00

**GPIB Address** Select the GPIB remote address.

Key Path **System, I/O Config, GPIB**  
 Mode All  
 Remote Command :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess <integer>  
 :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess?  
 Example :SYST:COMM:GPIB:ADDR 17  
 Remote Command Notes NOTE: Changing the Address on the GPIB port requires all further communication to use the new address.

## System Functions

### System

Preset	This is unaffected by Preset but is set to 18 on a “Restore System Defaults->Misc”
State Saved	No
Range	0 to 30
Instrument S/W Revision	Prior to A.02.00

**GPIB Controller**  Sets the GPIB port into controller or device mode. In the normal state, GPIB controller is disabled, which allows the analyzer to be controlled by a remote computer. When GPIB Controller is enabled, the instrument can run software applications that use the instrument's computer as a GPIB controller; controlling devices connected to the instrument's GPIB port.

---

**NOTE** When GPIB Controller is enabled, the analyzer application itself cannot be controlled over GPIB; however, in this case it can easily be controlled via LAN or USB. The GPIB port cannot be a controller and device at the same time. Additionally, only one controller can be active on the GPIB bus at any given time; if the analyzer is the controller an external PC cannot be a controller.

---

To control the instrument from the software that is performing GPIB controller operation, you can use an internal TCP/IP connection to the analyzer application. Use the address TCPIP0::localhost::inst0::INSTR to send SCPI commands to the analyzer application.

Remote Command	:SYSTem:COMMunicate:GPIB[1][:SELF]:CONTroller[:ENABle] ON OFF 0 1  :SYSTem:COMMunicate:GPIB[1][:SELF]:CONTroller[:ENABle]?
Example	:SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller
Key Path	<b>System, I/O Config, GPIB</b>
Mode	All
Scope	Mode Global
Notes	When the instrument becomes the Controller bit 0 in the Standard Event Status Register is set (and when the instrument relinquishes Controller capability bit 0 is cleared in the Standard Event Status Register).
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc”
State Saved	No
Range	Disabled Enabled
Instrument S/W Revision	A.02.00

**Disabled** Selection for disabling the GPIB Controller capability, this is the default (or normal) setting.

Key Path **System, I/O Config, GPIB, GPIB Controller**



Example	:SYST:COMM:GPIB:CONT OFF	Will set GPIB port to Device
Instrument S/W Revision	A.02.00	

**Enabled** Selection for enabling the GPIB Controller capability.

Key Path	<b>System, I/O Config, GPIB, GPIB Controller</b>	
Example	:SYST:COMM:GPIB:CONT ON	Will set GPIB port to Controller
Instrument S/W Revision	A.02.00	

## SCPI LAN

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	<b>System, I/O Config</b>
Instrument S/W Revision	Prior to A.02.00

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

Key Path	<b>System, I/O Config, SCPI LAN</b>
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 with a “Restore System Defaults->Misc”
State Saved	No
Range	On   Off
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, I/O Config, SCPI LAN</b>
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?

## System Functions System

Example	:SYST:COMM:LAN:SCPI:SOCK:ENAB OFF
Preset	This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On   Off
Instrument S/W Revision	Prior to A.02.00

**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 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. You 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
Instrument S/W Revision	Prior to A.02.00

**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.)

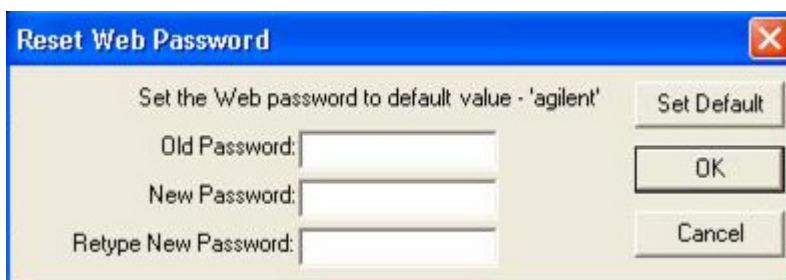
Parameter	Description	Setting
Maximum Connections	The maximum number of connections that can be accessed simultaneously	5
Instrument Name	The name (same as the remote SICL address) of your analyzer	inst0
Instrument Logical Unit	The unique integer assigned to your analyzer when using SICL LAN	8
Emulated 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
Key Path	<b>System, I/O Config, SCPI LAN</b>	
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 with a “Restore System Defaults->Misc”	
State Saved	No	
Range	On   Off	
Instrument S/W Revision	Prior to A.02.00	

### 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).

Selecting Reset web password brings up a control for resetting the password, 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) front panel key.

Mode	All	
Key Path	<b>System, I/O Config</b>	
Instrument S/W Revision	Prior to A.02.00	

### Query USB Connection (Remote Command Only)

Enables you to determine the speed of USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:CONNecTION?
Example	:SYST:COMM:USB:CONN?
Remote Command Notes	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.
State Saved	No
Range	NONE LSPeed HSPeed FSPeed
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

### LXI

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 "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	<b>System, I/O Config</b>
Instrument S/W Revision	Prior to A.02.00

**LAN Reset** This key resets the LAN connection.

Key Path	<b>System, I/O Config, LXI</b>
Instrument S/W Revision	Prior to A.02.00

**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 \(Remote Command Only\)](#)" on page 259 "[Domain \(Remote Command Only\)](#)" on page 259).

Key Path	<b>System, I/O Config, LXI</b>
Remote Command	:LXI:EVENT:DOMain <intDomain> :LXI:EVENT:DOMain?
Example	:LXI:EVEN:DOM 128 :LXI:EVEN:DOM?

## System Functions

### System

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
Instrument S/W Revision	Prior to A.02.00

**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	<b>System, I/O Config, LXI</b>
Instrument S/W Revision	Prior to A.02.00

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

Key Path	<b>System, I/O Config, LXI, LXI Output LAN Events</b>
Remote Command	:LXI:EVENT[:OUTPUT]:LAN:DISable:ALL
Example	:LXI:EVEN:LAN:DIS:ALL
Instrument S/W Revision	Prior to A.02.00

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

Key Path	<b>System, I/O Config, LXI, LXI Output LAN Events</b>
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	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings.  Preset/Default values: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"

State Saved: Saved in instrument state.  
Instrument S/W Revision: Prior to A.02.00

**Add (Remote Command 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:EVENT: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  
Instrument S/W Revision: Prior to A.02.00

**Remove (Remote Command 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:EVENT: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: No  
Range: Uppercase, Lowercase, Numeric, Symbol  
Instrument S/W Revision: Prior to A.02.00

**Remove All (Remote Command 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`

## System Functions System

Example:	:LXI:EVEN:LAN:REM:ALL
Restriction and Notes:	Only LAN Events added with the Add command are removed. Default events cannot be removed.
Instrument S/W Revision:	Prior to A.02.00

**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”

Key Path	<b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE “LANEVENT” , “SourceEvent” :LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE? “LANEVENT”
Example	:LXI:EVEN:LAN:SOUR “LANEVENT”,“WaitingForTrigger”
Restriction and Notes	The maximum length of the string is 45 characters.



Preset	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings.  Preset/Default values: “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” “Recalling” “LAN0” “LAN1” ”LAN2” ”LAN3” ”LAN4” ”LAN5” ”LAN6” ”LAN7”  any user-added Input LAN Event
Instrument S/W Revision	Prior to A.02.00

**Destination (Remote Command 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:                               Not affected by a Preset. The default value of "ALL" can be restored by using the command:

:SYSTem:DEFault INPut

State Saved:                       Saved in instrument state.

Range:                               Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision:       Prior to A.02.00

**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.

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

## System Functions System

Remote Command	:LXI:EVENT[:OUTPUT]:LAN[:SET]:DRIVE "LANEVENT", OFF NORMAl WOR  :LXI:EVENT[:OUTPUT]:LAN[:SET]:DRIVE? "LANEVENT"
Example	:LXI:EVENT:LAN:DRIVE "LANEVENT",WOR
Preset	Not affected by a Preset. The default value of "NORMAl" can be restored by using the command:  :SYSTEM:DEFAULT INPUT
State Saved	Saved in instrument state.
Range	OFF NORMAl WOR
Instrument S/W Revision	Prior to A.02.00

**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

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

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe "LANEVENT", POSitive NEGative  :LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe? "LANEVENT"
Example	:LXI:EVEN:LAN:SLOP "LANEVENT",POS
Preset	Not affected by a Preset. The default value of "Positive" can be restored by using the command:  :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	POSitive NEGative
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta "LANEVENT", <seconds>  :LXI:EVENT[:OUTPut]:LAN[:SET]:TSDelta? "LANEVENT"
Example	:LXI:EVEN:LAN:TSD "LANEVENT",10.5 s
Preset	Not affected by a Preset. The default value of "0.0 s" can be restored by using the command:  :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 s (Max Double)
Instrument S/W Revision	Prior to A.02.00

**Enabled** 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.

Key Path	<b>System, I/O Config, LXI, LXI Output LAN Events, LAN[n]</b>
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled "LANEVENT",ON OFF 1 0  :LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled? "LANEVENT"
Example	:LXI:EVEN:LAN:ENAB "LAN0",ON
Preset	Not affected by a Preset. The default value of "OFF" can be restored by using the command:  :SYSTem:DEFault INPut

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State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	Prior to A.02.00

**Count (Remote Command 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?
Instrument S/W Revision:	Prior to A.02.00

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

Remote Command:	:LXI:EVENT[:OUTPut]:LAN[:SET]:CONFigure "lanEvent", <enabled>, <source>, <slope>, <drive>, <destination>
Example:	:LXI:EVEN:LAN:CONF "LAN0",1,"WaitingForTrigger",POS,NORM,"ALL"
Instrument S/W Revision:	Prior to A.02.00

**Send (Remote Command 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
Instrument S/W Revision:	Prior to A.02.00

**Identifier (Remote Command Only)** Sets the string that will be placed in the peer-to-peer packet when the Output LAN Event is transmitted. The Identifier is variable to allow for easier system debugging. The Identifier must be unique, for example the "LAN0" and "LAN1" output events cannot have identical identifiers.

Remote Command:	:LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier "LANEVENT", "identifier" :LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier? "LANEVENT"
Example:	:LXI:EVEN: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  
Instrument S/W Revision: Prior to A.02.00

### IEEE 1588 Time (Remote Command Only)

**Time Epoch Time (Remote Command 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 you 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: Not affected by a Preset. The default value of "System Time" can be restored by using the command:  
`:SYSTEM:DEFAULT INPUT`

State Saved: No

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

Instrument S/W Revision: Prior to A.02.00

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

Instrument S/W Revision: Prior to A.02.00

**Seconds (Remote Command Only)** If the device is selected as the IEEE 1588 master clock, this sets the seconds

## System Functions

### System

portion of the clock. Otherwise, this allows you 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:	Not affected by a Preset. The default value of "System Time" can be restored by using the command: :SYSTEM:DEFAULT INPUT
State Saved:	No
Range:	0.0 – 1.7976931348623157 x 10308 s (Max Double)
Instrument S/W Revision:	Prior to A.02.00

**Fraction (Remote Command Only)** If the device is selected as the IEEE 1588 master clock, this sets the sub-second value of the clock. Otherwise, this allows you 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)
Instrument S/W Revision:	Prior to A.02.00

**Local Time (Remote Command 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"
Notes:	LXI:CLOCK[:TIME]:LOCAL? Returns Any string constituting a valid date and time
Instrument S/W Revision:	Prior to A.02.00

**Leap Second Offset (Remote Command Only)** Enables you to set the leap second offset between the UTC and

TAI time standards.

Remote Command: :LXI:CLOCK[:TIME]:LSOffset <integer>  
:LXI:CLOCK[:TIME]:LSOffset?  
Example: :LXI:CLOC:LSOF 55  
Range: 0 – 2147483647 (Max Integer)  
Instrument S/W Revision: Prior to A.02.00

**International Atomic Time (Remote Command 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"  
Notes: :LXI:CLOCK[:TIME]:TAI? Returns Any string constituting a valid date and time  
Instrument S/W Revision: Prior to A.02.00

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

Remote Command: :LXI:CLOCK[:TIME]:TZONe?  
Example: :LXI:CLOC:TZON?  
Notes: :LXI:CLOC:TZON? returns "01:00:00" if the current local time zone is 1 hour ahead from Greenwich Mean Time  
Instrument S/W Revision: Prior to A.02.00

**Daylight Savings (Remote Command Only)** Retrieves the current status of the Windows System setting for Daylight Savings Time. Whether or not daylight savings time is in effect influences the time zone parameter.

Remote Command: :LXI:CLOCK[:TIME]:DLSavings?  
Example: :LXI:CLOC:DLS?  
Notes: :LXI:CLOC:DLS? Returns 1 when Daylight Savings Time is On and 0 if the when Daylight Savings Time is Off  
Instrument S/W Revision: Prior to A.02.00

**Coordinated Universal Time (Remote Command 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"  
Notes: :LXI:CLOC:UTC? Returns Any string constituting a valid date and time

## System Functions System

Instrument S/W Revision: Prior to A.02.00

**Time Marker (Remote Command 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
```

Instrument S/W Revision: Prior to A.02.00

**Time Marker Clear (Remote Command 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
```

Instrument S/W Revision: Prior to A.02.00

**Time Marker Delta (Remote Command 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: :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?

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)

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

Instrument S/W Revision: Prior to A.02.00

**Measurement Data Timestamp (Remote Command 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

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)

Instrument S/W Revision: Prior to A.02.00

**Clear Measurement Data Timestamp (Remote Command 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:CLE

Instrument S/W Revision: Prior to A.02.00

**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

## System Functions System

activities using this common time base.

**Accuracy (Remote Command 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.

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 : CLOcK : PTP : ACC US25

Preset:                            Not affected by a Preset. The default value of "GT10S" can be restored by  
                                  using the command:  
                                  SYSTem:DEFault INPut

Range:                            NS25|NS100|NS250|NS1000|NS2500|US10|US25|US100|US250|US1000|US  
                                  2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown

Instrument S/W Revision:        Prior to A.02.00

**Announce Interval (Remote Command 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 : CLOcK : PTP : ANN:INT 1

Preset:                            Not affected by a Preset. The default value of "4" can be restored by using the  
                                  command:  
                                  SYSTem:DEFault INPut

Range:                            1|2|4|8|16

Instrument S/W Revision:        Prior to A.02.00

**Announce Receipt Time Out (Remote Command 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: Not affected by a Preset. The default value of "3" can be restored by using the command:  
SYSTem:DEFault INPut

Min: 2

Max: 10

Instrument S/W Revision: Prior to A.02.00

**Clock Class (Remote Command 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: Not affected by a Preset. The default value of "248" can be restored by using the command:  
SYSTem:DEFault INPut

Min: 6

Max: 248

Instrument S/W Revision: Prior to A.02.00

**Deviation (Remote Command 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?

Instrument S/W Revision: Prior to A.02.00

**Domain (Remote Command 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: Not affected by a Preset. The default value of "0" can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0

## System Functions System

Max: 127  
Instrument S/W Revision: Prior to A.02.00

**Offset (Remote Command Only)** Returns the difference between the instrument clock PTP time and the Master clock PTP time.

Remote Command: :LXI:CLOCK:PTP:OFFSet?  
Example: :LXI:CLOC:PTP:OFFS?  
Range: 0.0 to – 1.7976931348623157 x 10308 s (Min Double)  
Instrument S/W Revision: Prior to A.02.00

**First Priority (Remote Command 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: Not affected by a Preset. The default value of "128" can be restored by using the command:  
SYSTem:DEFault INPut  
Min: 0  
Max: 255  
Instrument S/W Revision: Prior to A.02.00

**Second Priority (Remote Command 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?  
Example: :LXI:CLOC:PTP:PRI:SEC 50  
Preset: Not affected by a Preset. The default value of "128" can be restored by using the command:  
SYSTem:DEFault INPut  
Min: 0  
Max: 255  
Instrument S/W Revision: Prior to A.02.00

**State (Remote Command 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  
 Instrument S/W Revision: Prior to A.02.00

**Traceability (Remote Command 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  
 Instrument S/W Revision: Prior to A.02.00

**Variance (Remote Command 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)  
 Instrument S/W Revision: Prior to A.02.00

**Sync Interval (Remote Command 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 0.25s  
 Preset: Not affected by a Preset. The default value of "1" can be restored by using the  
 command:  
 SYSTem:DEFault INPut  
 Range: 0.0625s|0.125s|0.25s|0.5s|1s|2s  
 Instrument S/W Revision: Prior to A.02.00

Remote Command: :LXI:CLOCK:PTP:SINTerval?  
 Example: :LXI:CLOC:PTP:SINT?  
 Preset: 1

## System Functions System

Range: 0.0625s|0.125s|0.25s|0.5s|1s|2s

Instrument S/W Revision: Prior to A.02.00

**Delay Request Interval (Remote Command 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 15 ms

Preset: Not affected by a Preset. The default value of "8 s" can be restored by using the command:

SYSTem:DEFault INPut

Range: 1 s | 2 s | 4 s | 8 s | 16 s | 32 s

Instrument S/W Revision: Prior to A.02.00

Remote Command: :LXI:CLOCK:PTP:DRINterval?

Example: :LXI:CLOC:PTP:DRIN 15 ms

Preset: 8 s

Min: 0.0 s

Max:  $2^{32} = 4294967296$  s

Instrument S/W Revision: Prior to A.02.00

### Grand Master Accuracy (Remote Command 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

Instrument S/W Revision: Prior to A.02.00

### MAC Address (Remote Command Only)

Returns the Grand Master's MAC Address.

Remote Command: :LXI:CLOCK:PTP:GMASter:MADAddress?

Example: :LXI:CLOC:PTP:GMAS:MADD? For example, this might return "00-00-50-1e-ca-ad".

Range: Uppercase, Lowercase, Numeric, Symbol  
Instrument S/W Revision: Prior to A.02.00

### Traceability (Remote Command 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  
Instrument S/W Revision: Prior to A.02.00

### Master MAC Address (Remote Command 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  
Instrument S/W Revision: Prior to A.02.00

### Servo Algorithm (Remote Command Only)

The Servo Algorithm parameters are considered advanced settings for tweaking IEEE 1588 performance.

### Log (Remote Command 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 Command 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

## System Functions System

Remote Command: :LXI:CLOCK:SALGORITHM:LOG[:NEXT]?

Example: :LXI:CLOC:SALG:LOG?

Range: Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision: Prior to A.02.00

### Circular (Remote Command 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[:ENABLED] ON|OFF|0|1  
:LXI:CLOCK:SALGORITHM:LOG:CIRCULAR[:ENABLED]?

Example: :LXI:CLOC:SALG:LOG:CIRC 1

Preset: Not affected by a Preset. The default value of "1" can be restored by using the command:

SYSTEM:DEFAULT INPUT

Range: ON|OFF|0|1

Instrument S/W Revision: Prior to A.02.00

### Beginning Entry (Remote Command 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

Example: LXI:CLOCK:SALG:LOG:CIRC:FBEN

Instrument S/W Revision: Prior to A.02.00

### Clear (Remote Command Only)

Clears all entries from the Servo Log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:CLEAR

Example: :LXI:CLOC:SALG:LOG:CLE

Instrument S/W Revision: Prior to A.02.00

### Count (Remote Command 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  
 Instrument S/W Revision: Prior to A.02.00

**Enabled (Remote Command 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:ENABLED ON|OFF|0|1  
 :LXI:CLOCK:SALGORITHM:LOG:ENABLED?  
 Example: :LXI:CLOC:SALG:LOG:ENAB 1  
 Preset: Not affected by a Preset. The default value of "0" can be restored by using the command:  
 SYSTEM:DEFAULT INPUT  
 Range: ON|OFF|0|1  
 Instrument S/W Revision: Prior to A.02.00

**Size (Remote Command 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: Not affected by a Preset. The default value of "256" can be restored by using the command:  
 SYSTEM:DEFAULT INPUT  
 Min: 0  
 Max: 1024  
 Instrument S/W Revision: Prior to A.02.00

**All (Remote Command Only)**

Non-destructively returns the entire contents of the Servo Log.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:ALL?

## System Functions System

Example: :LXI:CLOC:SALG:LOG?  
Range: Uppercase, Lowercase, Numeric, Symbol  
Instrument S/W Revision: Prior to A.02.00

### Specific Entry (Remote Command 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  
Instrument S/W Revision: Prior to A.02.00

**Statistics (Remote Command 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"  
Instrument S/W Revision: Prior to A.02.00

### Clear Statistics (Remote Command Only)

Resets the long-term servo performance statistics.

Remote Command: :LXI:CLOCK:SALGORITHM:LOG:STATISTICS:CLEAR  
Example: :LXI:CLOC:SALG:LOG:STAT? Example of result :  
"3643,0.000000000,0.000000000,0.000000000,0.000000000"  
Instrument S/W Revision: Prior to A.02.00

### Asymmetry (Remote Command 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:                            Not affected by a Preset. The default value of "0.0 s " can be restored by using the command:  
                                      SYSTem:DEFault INPut

Min:                                -1

Max:                                1

Instrument S/W Revision:        Prior to A.02.00

**Coarse/Fine Threshold (Remote Command 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:                            Not affected by a Preset. The default value of "1.0e-11 " can be restored by using the command:  
                                      SYSTem:DEFault INPut

Min:                                0

Max:                                1

Instrument S/W Revision:        Prior to A.02.00

**Coarse Proportional Constant (Remote Command 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

## System Functions

### System

Preset: Not affected by a Preset. The default value of "0.4 " can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

**Coarse Integral Constant (Remote Command 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: Not affected by a Preset. The default value of "0.2 " can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

**Fine Proportional Constant (Remote Command 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: Not affected by a Preset. The default value of "0.35 " can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0

Max: 1

Instrument S/W Revision: Prior to A.02.00

**Fine Integral Constant (Remote Command 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:                               Not affected by a Preset. The default value of "0.05" can be restored by using the command:

SYSTem:DEFault INPut

Min:                                   0

Max:                                   1

Instrument S/W Revision:       Prior to A.02.00

**Maximum Outlier Discard Count (Remote Command 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:                               Not affected by a Preset. The default value of "5" can be restored by using the command:

SYSTem:DEFault INPut

Min:                                   0

Max:                                   25

Instrument S/W Revision:       Prior to A.02.00

**Outlier Threshold (Remote Command 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

## System Functions System

Preset: Not affected by a Preset. The default value of "5.0" can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0.25

Max: 6.0

Instrument S/W Revision: Prior to A.02.00

**Outlier Threshold Enable (Remote Command 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:OTEN OFF

Preset: Not affected by a Preset. The default value of "OFF" can be restored by using the command:  
SYSTem:DEFault INPut

Instrument S/W Revision: Prior to A.02.00

### Set/Steer Threshold (Remote Command Only) I

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: Not affected by a Preset. The default value of "0.1 s" can be restored by using the command:  
SYSTem:DEFault INPut

Min: 0.0001

Max: 10.0

Instrument S/W Revision: Prior to A.02.00

**Configure (Remote Command 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  
Instrument S/W Revision: Prior to A.02.00

### Synchronization (Remote Command Only) Master (Remote Command 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  
Instrument S/W Revision: Prior to A.02.00

### Local Enabled (Remote Command Only)

Enable steering of the local clock with the PTP IEEE 1588 clock.

Remote Command: :LXI:CLOCK:SYNC:LOCAL:ENABLEd ON|OFF|0|1  
:LXI:CLOCK:SYNC:LOCAL:ENABLEd?  
Example: :LXI:CLOC:SYNC:LOC:ENAB ON  
Preset: Not affected by a Preset. The default value of "ON" can be restored by using the command:  
SYSTem:DEFault INPut  
Range: ON|OFF|0|1  
Instrument S/W Revision: Prior to A.02.00

### Local Interval (Remote Command 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: Not affected by a Preset. The default value of "60" can be restored by using the command:  
SYSTem:DEFault INPut  
Min: 0  
Max: 3600  
Instrument S/W Revision: Prior to A.02.00

## Instrument Status Events

### Enable (Remote Command Only)

Setting the enabled parameter to ON enables 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[:ENABled] "STATUSEVENT",ON OFF 1 0
Example:	:LXI:EVEN:STAT "WaitingForTrigger",1
Preset:	Not affected by a Preset. The default value of "1" can be restored by using the command, :SYSTem:DEFault INPut.
State Saved:	Saved in instrument state.
Range:	1 0 ON OFF
Instrument S/W Revision:	Prior to A.02.00

Remote Command:	:LXI:EVENT:STATus[:ENABled]? "STATUSEVENT"
Example:	:LXI:EVEN:STAT? "WaitingForTrigger" Returns 1 if previously enabled. Otherwise, returns 0.
Preset:	ON
State Saved:	Saved in instrument state.
Range:	1 0 ON OFF
Instrument S/W Revision:	Prior to A.02.00

## LXI State Recall

### Location (Remote Command 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 n

ext state locations are also automatically recalled.

Remote Command:	:LXI:EVENT:INPut:LAN:LOCation "LANEVENT", "path"
Example:	:LXI:EVEN:INP:LAN: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



Instrument S/W Revision:	Prior to A.02.00
Remote Command:	:LXI:EVENT:INPut:LAN:LOCation? "LANEVENT"
Example:	:LXI:EVEN:INP:LAN: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
Instrument S/W Revision:	Prior to A.02.00

### Disable All (Remote Command Only)

Causes all LXI Input LAN Events to go into the disabled state (Enabled = OFF).

Remote Command:	:LXI:EVENT:INPut:LAN:DISable:ALL
Example:	:LXI:EVEN:INP:LAN:DIS:ALL
Instrument S/W Revision:	Prior to A.02.00

### Add (Remote Command 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
Instrument S/W Revision:	Prior to A.02.00

### Remove (Remote Command 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
Instrument S/W Revision:	Prior to A.02.00

### Remove All (Remote Command 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:EVEN:INP:LAN:REM:ALL
Restriction and Notes:	Only LAN Events added with the Add command are removed. Default events cannot be removed.
Instrument S/W Revision:	Prior to A.02.00

### Filter (Remote Command Only)

Only LXI Input LAN Events coming from hosts matching the filter string are processed. There is no Key Path 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:INPut:LAN:FILTer “LANEVENT”, “filterString” :LXI:EVENT:INPut:LAN:FILTer?
Example:	:LXI:EVEN:INP:LAN:FILT “LAN0”, “agilent.com” :LXI:EVEN: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
Instrument S/W Revision:	Prior to A.02.00

### Identifier (Remote Command 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:INPut:LAN:IDENtifier “LANEVENT”, “identifier” :LXI:EVENT:INPut:LAN:IDENtifier? “LANEVENT”
Example:	:LXI:EVEN: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
Instrument S/W Revision:	Prior to A.02.00

### Detection (Remote Command 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.

## System Functions

### System

- 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:	Not affected by a Preset. The default value of "HIGH" can be restored by using the remote command: :SYSTem:DEFault INPut
State Saved:	Saved in instrument state.
Range:	HIGH   LOW   RISE   FALL
Instrument S/W Revision:	Prior to A.02.00

Remote Command:	:LXI:EVENT:INPut:LAN[:SET]:DETEction? "LANEVENT"
Example:	:LXI:EVEN: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
Instrument S/W Revision:	Prior to A.02.00

### Enabled (Remote Command Only)

When the Enabled 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 Enabled parameter is OFF, the Input LAN Event is ignored.

Remote Command:	:LXI:EVENT:INPut:LAN[:SET]:ENABled "LANEVENT",ON OFF 1 0
Example:	:LXI:EVEN:INP:LAN:ENAB "LAN0",1
Preset:	Not affected by a Preset. The default value of "OFF" can be restored by using the remote command: :SYSTem:DEFault INPut
State Saved:	Saved in instrument state.
Range:	1 0
Instrument S/W Revision:	Prior to A.02.00

Remote Command:                   : LXI : EVENT : INPut : LAN [ : SET ] : ENABled? "LANEVENT"  
 Example:                           : LXI:EVEN:INP:LAN:ENAB? "LAN0"  
 Preset:                            OFF  
 State Saved:                       Saved in instrument state.  
 Range:                             1|0  
 Instrument S/W Revision:         Prior to A.02.00

### Count (Remote Command 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?  
 Instrument S/W Revision:         Prior to A.02.00

### List (Remote Command 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.  
 Instrument S/W Revision:         Prior to A.02.00

### Configure (Remote Command 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"  
 Instrument S/W Revision:         Prior to A.02.00

### 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

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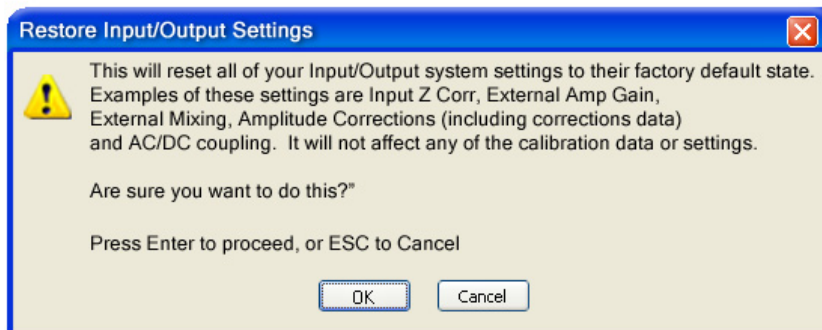
default values.

Key Path	<b>System</b>
Mode	All
Remote Command	:SYSTem:DEFault [ALL]   ALIGn   INPut   MISC   MODes   PON
Example	SYST:DEF
State Saved	No
Instrument S/W Revision	Prior to A.02.00

### 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:

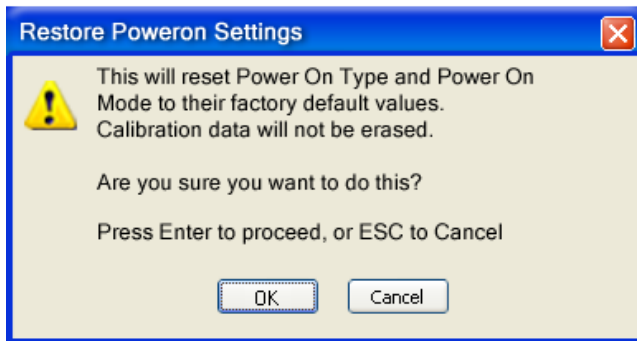


Key Path	<b>System, Restore System Defaults</b>
Example	:SYST:DEF INP
Instrument S/W Revision	Prior to A.02.00

### 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 Application reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



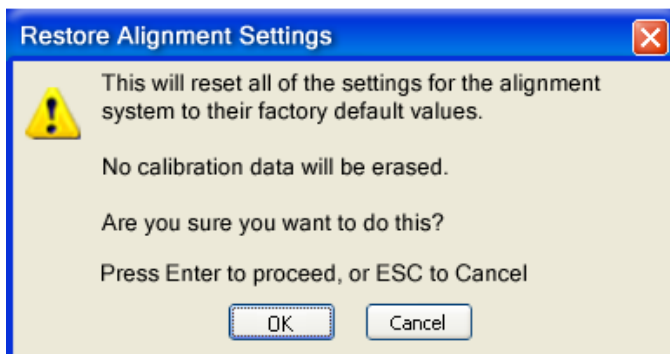
Key Path	<b>System, Restore System Defaults</b>
Example	:SYST:DEF PON
Instrument S/W Revision	Prior to A.02.00

### 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:



Key Path	<b>System, Restore System Defaults</b>
Example	:SYST:DEF ALIG
Instrument S/W Revision	Prior to A.02.00

### Restore Misc Defaults

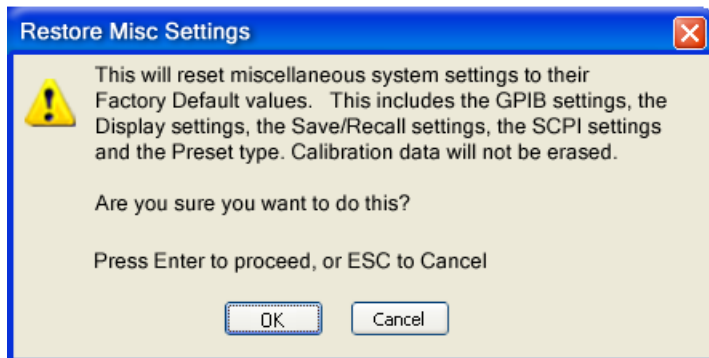
This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode

## System Functions System

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
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:



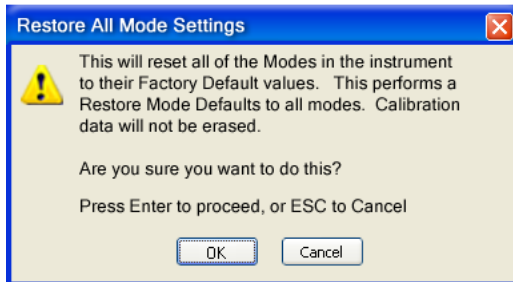
Key Path	<b>System, Restore System Defaults</b>
Example	:SYST:DEF MISC
Instrument S/W Revision	Prior to A.02.00



### 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:

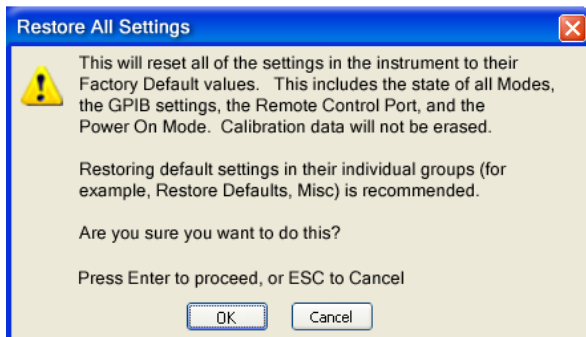


Key Path	<b>System, Restore System Defaults</b>
Example	:SYST:DEF MOD
Dependencies/Couplings	An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode. It gets the mode to a consistent state with all of the default couplings set.
Instrument S/W Revision	Prior to A.02.00

### 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:



Key Path	<b>System, Restore System Defaults</b>
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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.
Instrument S/W Revision	Prior to A.02.00

### Control Panel...

Opens the Windows Control Panel.

Pressing any key will cause the Control Panel to exit.

Key Path	<b>System</b>
Remote Command Notes	No remote command for this key.
Instrument S/W Revision	Prior to A.02.00

### Licensing...

Opens the license explorer.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

Key Path	<b>System</b>
Remote Command Notes	No equivalent remote command for this key.
Instrument S/W Revision	Prior to A.02.00

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.
Instrument S/W Revision:	Prior to A.02.00
Remote Command:	:SYSTEM:LKEY:DELeTe <"OptionInfo">,<"LicenseInfo">

Example:	SYST:LKEY:DEL "N9073A-1FP","027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91"
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.
Instrument S/W Revision:	Prior to A.02.00
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
Instrument S/W Revision:	Prior to A.02.00
Remote Command:	:SYSTem:LKEY? <"OptionInfo">
Example:	SYST:LKEY? "N9073A-1FP"

## System Functions

### System

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"
Instrument S/W Revision:	Prior to A.02.00
Remote Command:	:SYSTem:HID?
Remote Command Notes:	Return value is the host ID as a string
Instrument S/W Revision:	Prior to A.02.00

## Agilent Upgrade Service

The Agilent Upgrade Service entitles an instrument to software enhancements, if and when they occur, for the duration of the service period. Beginning in September, 2008, all new X-Series instruments will contain 2 years of upgrade service included with the purchase of the instrument. The Agilent Upgrade Service will be option AUS on the N9010A or N9020A. For new instrument purchases the two year entitlement will be from date of manufacture (plus one month for transit and receiving).

The Agilent Upgrade Service is administered via a license which carries the end date of the upgrade entitlement. The license can be viewed in Agilent License Manager, or via the Show System screen.

The Agilent Upgrade Service is for an individual instrument, it cannot be transferred from one instrument to another.

For existing instruments that do not have the Agilent Upgrade Service, or for extending the upgrade service after it has expired, the Agilent Upgrade Service is available as a standalone upgrade product. The two year entitlement will be from the date of redemption of the license.

### Agilent Upgrade Service - software update installation

When a software update is being performed on an instrument, the installer will determine if the instrument has a valid Agilent Upgrade Service for the revision of software that is being installed. If the Agilent Upgrade Service is valid, the installation proceeds unencumbered. If the service is not valid, the operator is provided a prompt to contact Agilent for purchasing an Agilent Upgrade Service and the software update is not performed.

### Agilent Upgrade Service - software removal

When a software update is being removed from instrument via Add/Remove Programs, the uninstall will check if there is an AUS license with date remaining on the service. If the AUS is expired, the operator will be given a prompt warning that an AUS Renewal may be required to install newer software and how to contact Agilent to obtain the renewal. The operator can choose to proceed with uninstall or terminate

at which no software will be removed or altered.

### Agilent Upgrade Service - viewing end-of-service date

There are two methods for viewing the end-of-service date of the Agilent Upgrade Service. The first is to use the Show System screen in the instrument application System -> Show -> System. The second is to use the Agilent License Manager. The Agilent License Manager can be invoked from the System menu of the instrument application or by right-mouse clicking on the License Notifier icon in the Windows® task tray.

**Agilent Upgrade Service - Listing end-of-service date (Remote Command Only)** The end-of-service date for the Agilent Upgrade Service can be queried via SCPI.

Remote Command:	:SYSTem:AUService:DATE?
Example:	:SYST:AUS:DATE?
Notes:	If there is no Agilent Upgrade Service license installed the date will return "01-sep-2008"
Instrument S/W Revision:	A.02.00

### 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 will require an authentication Service Code.

Key Path	<b>System</b>
Instrument S/W Revision	Prior to A.02.00

### Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

Key Path	<b>System, More</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

System Functions  
System

Std Header	Product Number: N9020A Serial Number: US46340924 Firmware Revision: A.01.01																		
Mechanical relays	<table> <tr><td>Calibrator Switch Cycles:</td><td>1800</td></tr> <tr><td>AC/DC Switch Cycles:</td><td>60</td></tr> <tr><td>2 dB #1 Mechanical Atten Cycles</td><td>23489</td></tr> <tr><td>2 dB #2 Mechanical Atten Cycles</td><td>23400</td></tr> <tr><td>6 dB Mechanical Atten Cycles</td><td>500000</td></tr> <tr><td>10 dB Mechanical Atten Cycles</td><td>1000000</td></tr> <tr><td>20 dB Mechanical Atten Cycles</td><td>2500</td></tr> <tr><td>30 dB Mechanical Atten Cycles</td><td>60000</td></tr> <tr><td></td><td>4339</td></tr> </table>	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
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																		
	<table> <tr><td>High operating temperature extreme:</td><td>+37.2 degC</td></tr> <tr><td>Low operating temperature extreme</td><td>+18.1 degC</td></tr> </table>	High operating temperature extreme:	+37.2 degC	Low operating temperature extreme	+18.1 degC														
High operating temperature extreme:	+37.2 degC																		
Low operating temperature extreme	+18.1 degC																		
Odometer	Elapsed Time (on time) (hours): 1600																		

The data will be updated only when the Show Hardware Statistics menu key is pressed, it will not be updated while the screen is displayed.

The tabular data should be directly printable.

Key Path	<b>System, Diagnostics</b>
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.
Instrument S/W Revision	Prior to A.02.00

**Query the Mechanical Relay Cycle Count** Returns the count of mechanical relay cycles.

Remote Command:	:SYSTem:MRELay:COUNT?
Example:	:SYST:MREL:COUN?
Remote Command Notes:	Query Only

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>”

Instrument S/W Revision: Prior to A.02.00

**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
Instrument S/W Revision	Prior to A.02.00

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.

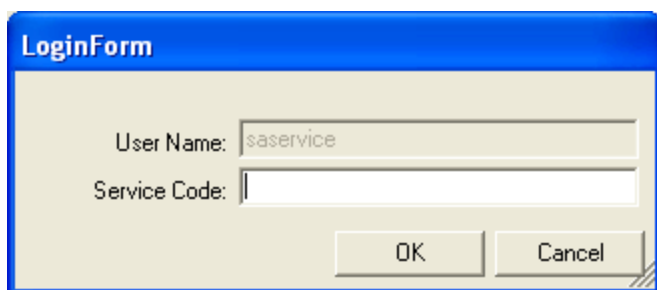
Mode	All
Remote Command	:SYSTem:TEMPerature:HEXTreme?
Example	:SYST:TEMP:HEXT?
Restriction and Notes	Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up.
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Query the Elapsed Time since 1st power on** Returns the elapsed on-time in minutes since 1st power-on.

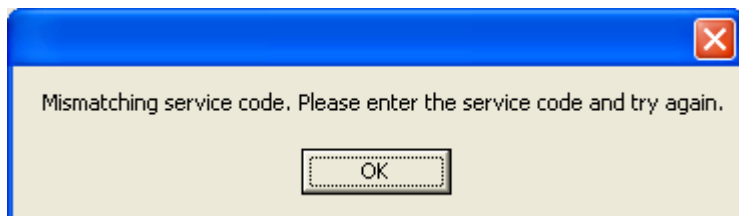
Remote Command:	:SYSTem:PON:ETIMe?
Example:	:SYST:PON:ETIM?
Remote Command Notes:	Query Only
Instrument S/W Revision:	Prior to A.02.00

### 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 you are provided the following dialog:



Key Path	<b>System, Diagnostics</b>
Restriction and Notes	<b>Password is required to access this menu.</b>
Instrument S/W Revision	Prior to A.02.00

### 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



Instrument S/W Revision      Prior to A.02.00

## 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
Instrument S/W Revision	Prior to A.02.00

## 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)
Instrument S/W Revision:	Prior to A.02.00

## 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?  
Instrument S/W Revision: Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

### 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
Instrument S/W Revision	Prior to A.02.00

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## User Preset

The User Preset key opens up a menu that gives you three choices – execute the **User Preset** by pressing the **User Preset** key, User Preset all of the modes in the analyzer by pressing the **User Preset All Modes** key, and save the current state for the current mode by pressing the **Save User Preset** key.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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:PRESet: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.

Key Path	<b>User Preset</b>
Remote Command	:SYSTem:PRESet:USER

## System Functions

### User Preset

Example	: SYST: PRES: USER: SAVE : SYST: PRES: USER
Remote Command Notes	: SYST: PRES: USER: SAVE is used to save the current state as the user preset state.
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.
Instrument S/W Revision	Prior to A.02.00

### 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.

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**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.

Key Path	<b>User Preset</b>
Remote Command	: SYSTem: PRESet: USER: ALL
Example	: SYST: PRES: USER: SAVE : SYST: PRES: USER: ALL
Remote Command Notes	: SYST: PRES: USER: SAVE is used to save the current state as the user preset state.
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.
Instrument S/W Revision	Prior to A.02.00

## Save User Preset

Save User Preset saves the currently active mode and its state. The way you recall 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.

Key Path	<b>User Preset</b>
Remote Command	:SYSTem:PRESet:USER:SAVE
Example	:SYST:PRES:USER:SAVE
Restriction and Notes	:SYST:PRES:SAVE creates the same file as if you requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow you to specify the filename or the location of the file.
Instrument S/W Revision	Prior to A.02.00

System Functions  
**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 297](#) 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 1057](#).

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 <b>Single Sweep, or Update=Off</b> 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
Instrument S/W Revision	Prior to A.02.00

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## Amplitude/Y Scale

The Amplitude front-panel key activates the Amplitude menu and selects Reference Level as the active function.

Instrument S/W Revision      Prior to A.02.00

### 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:**                    :DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>  
  :DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?

Example:                                 DISP:WIND:TRAC:Y:RLEV 20 dBm

Sets the reference level to 20 dBm, which displays in the current Y axis unit. For example, if the Y axis unit is dB $\mu$ V, then 126.99 dB $\mu$ V 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:                                      RefLevelMin = -170 dBm + RefLevelOffset - ExtGain.

Max:                                      The heat-limited maximum Ref Level is:  
  +30 dBm + RL Offset – External Gain (for MXA)  
  +23 dBm + RL Offset – External Gain (for EXA)

The actual maximum value may be less than this, depending on other values including Mech Atten, Int Preamp Gain, Swept IF Gain, FFT IF Gain, Max Mixer Level, and the total attenuation currently available.

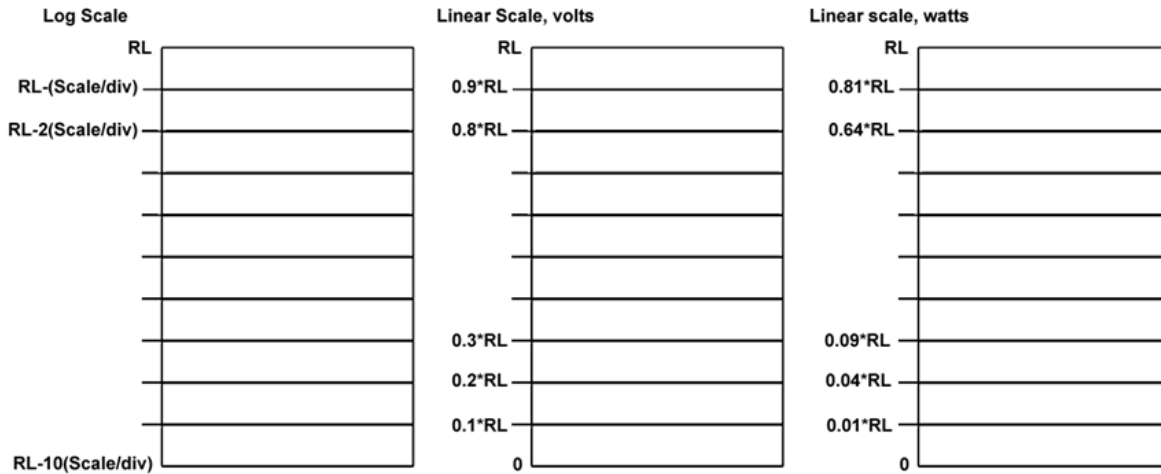
Key Path:                                **AMPTD Y Scale**

Default Unit:                            depends on the current selected Y axis unit

Instrument S/W Revision: Prior to A.02.00

### Amplitude Representations

The following is an illustration of what the reference level indicates in the log and linear scales.



### Attenuation

Operation of this key is identical across several measurements. For details about this key, see [“Attenuation” on page 965](#).

### 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**

Instrument S/W Revision: Prior to A.02.00

## 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.

---

<b>Remote Command:</b>	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing LINear LOGarithmic  :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing?</code>
Example:	<code>DISP:WIND:TRAC:Y:SPAC LOG DISP:WIND:TRAC:Y:SPAC?</code>
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:	<b>AMPTD Y Scale</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

### NOTE:

All four of the EMI units (dB $\mu$ A/m, dB $\mu$ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude

Corrections for accurate and meaningful results.

**NOTE:**

If a SCPI command is sent to the box which uses one of the EMI units as a terminator, the box treats it as though DBUV had been sent as the terminator.

<b>Remote Command:</b>	:UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBUVM DBUAM DBPT DBG :UNIT:POWer?
Example:	UNIT:POW dBmV UNIT:POW?
Dependencies/Couplings:	<p>If an amplitude correction with an Antenna Unit other than <b>None</b> is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out.</p> <p>If an amplitude correction with an Antenna Unit other than <b>None</b> is applied and enabled, and you then turn off that correction or set <b>Apply Corrections to No</b>, the Y Axis Unit is set to dB<math>\mu</math>V and an informational message, "Amplitude Corrections off, Y Axis Unit set to dBuV" is generated.</p> <p>The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types (see above)</p>
Remote Command Notes:	<p>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:</p> <p>Example 1, set the following:</p> <p>Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm</p> <p>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.</p> <p>Example 2, set the following:</p> <p>Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div)</p> <p>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.</p>
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

## Swept SA Amplitude/Y Scale

Key Path: **AMPTD Y Scale**  
Readback line: 1-of-N selection  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### **dBm**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

Remote Command Example: UNIT:POW DBM  
Dependencies/Couplings: Grayed out if an Amplitude Correction with an Antenna Unit is ON.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dBm  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### **dBmV**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

Remote Command Example: UNIT:POW DBMV  
Dependencies/Couplings: Grayed out if an Amplitude Correction with an Antenna Unit is ON.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dBmV  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### **dBmA**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

Remote Command Example: UNIT:POW DBMA  
Dependencies/Couplings: Grayed out if an Amplitude Correction with an Antenna Unit is ON.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dBmA  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

## W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

Remote Command Example:	UNIT:POW W
Dependencies/Couplings:	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>
Readback:	W
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

## V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

Remote Command Example:	UNIT:POW V
Dependencies/Couplings:	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>
Readback:	V
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

## A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

Remote Command Example:	UNIT:POW A
Dependencies/Couplings:	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>
Readback:	A
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

## dB $\mu$ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB $\mu$ V.

Remote Command Example:	UNIT:POW DBUV
Dependencies/Couplings:	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>

## Swept SA Amplitude/Y Scale

Readback: dB $\mu$ V  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### **dB $\mu$ A**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB $\mu$ A.

Remote Command Example: UNIT:POW DBUA  
Dependencies/Couplings: Grayed out if an Amplitude Correction with an Antenna Unit is ON.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dB $\mu$ A  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### **dB $\mu$ V/m**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB $\mu$ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

Remote Command Example: UNIT:POW DBUVM  
Dependencies/Couplings: Grayed out if no Amplitude Correction with an Antenna Unit is on.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dB $\mu$ V/m  
Instrument S/W Revision: A.02.00

### **dB $\mu$ A/m**

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB $\mu$ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

Remote Command Example: UNIT:POW DBUAM  
Dependencies/Couplings: Grayed out if no Amplitude Correction with an Antenna Unit is on.  
Key Path: **AMPTD Y Scale, Y Axis Unit**  
Readback: dB $\mu$ A/m  
Instrument S/W Revision: A.02.00



## dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

Remote Command Example:	UNIT:POW DBPT
Dependencies/Couplings:	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>
Readback:	dBpT
Instrument S/W Revision:	A.02.00

## dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

Remote Command Example:	UNIT:POW DBG
Dependencies/Couplings:	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Key Path:	<b>AMPTD Y Scale, Y Axis Unit</b>
Readback:	dBG
Instrument S/W Revision:	A.02.00

## 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 306](#)

<b>Remote Command:</b>	: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
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.

## Swept SA Amplitude/Y Scale

Max: 327.6 dB  
Key Path: **AMPTD Y Scale**  
Instrument S/W Revision: Prior to A.02.00

### 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, and et cetera, 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

Operation of this key is identical across several measurements. For details about this key, see [“Internal Preamp” on page 980](#).

---

## **Auto Couple**

Operation of this key is identical across several measurements. For details about this key, see “[AUTO COUPLE](#)” on page 983.

---

## 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
Instrument S/W Revision	Prior to A.02.00

## 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 309

**Remote Command:**

```
[ :SENSe]:BANDwidth|BWIDth[:RESolution] <freq>  
[ :SENSe]:BANDwidth|BWIDth[:RESolution]?  
[ :SENSe]:BANDwidth|BWIDth[:RESolution]:AUTO OFF|ON|0|1  
[ :SENSe]:BANDwidth|BWIDth[:RESolution]:AUTO?
```

Example:

```
BAND 1 KHZ  
BAND?  
BWID:AUTO ON  
BWID:AUTO?
```

Dependencies/Couplings:	<p>When in Zero Span with no EMI Standard selected, 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.</p> <p>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.</p> <p>When a CISPR or MIL EMI Standard is in use, the Res BW is coupled to Center Frequency and not to Span, and this is true even in Zero Span.</p> <p>Sweep time is coupled to RBW when in a non-zero span. If <b>Sweep Time</b> is set to Auto, then the sweep time is changed as the RBW changes, to maintain amplitude calibration.</p> <p>Video bandwidth (VBW) is normally coupled to RBW. If <b>VBW</b> 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 311” key description.</p>
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:	<b>BW</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00

## 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** or the **EMC Standard**. 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 normally no meaningful RBW coupling in Zero Span. However, when a MIL or CISPR EMC Standard is selected, there IS a meaningful coupling for RBW in Zero Span – in fact, it is coupled to Center Frequency, in order to make measurements according to the EMI specifications.

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  
CISPR filter BW :Res BW (CISPR) 200 Hz  
MIL filter BW:Res BW (MIL) 1 kHz  
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:** [ :SENSe]:BANDwidth|BWIDth:VIDeo <freq>  
[ :SENSe]:BANDwidth|BWIDth:VIDeo?  
[ :SENSe]:BANDwidth|BWIDth:VIDeo:AUTO OFF|ON|0|1  
[ :SENSe]:BANDwidth|BWIDth:VIDeo:AUTO?

Example: BAND:VID 1 KHZ  
BAND:VID?  
BWID:VID:AUTO ON  
BWID:VID:AUTO?

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 the Quasi-Peak, EMI Average or RMS Average detector is selected the VBW is implemented by the digital IF as part of the 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:	<b>BW</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

### 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

## Swept SA BW

Key Path: **BW**  
Instrument S/W Revision: Prior to A.02.00  
Modified at S/W Revision: A.02.00

### 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  
EMI Average  
Quasi Peak  
RMS Average

Use that detector to pick the ratio based on the following criteria:

1. If the detector is **Peak and the EMC Standard is set to either CISPR or MIL**, use 10.0 (we use wide VBWs to capture peak levels accurately).
2. Otherwise, if the detector is **Negative Peak**, use 1.0 (in the Negative Peak case, there are no known significant use models so we use a medium ratio).
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.
5. Otherwise, if the detector is EMI Average, Quasi Peak or CISPR RMS, use 1.0. In fact this is a “don’t care” since no VBW is used for these detectors, as noted under “Dependencies” for the VBW key.
6. Otherwise, the detector is simply **Peak** or **Sample**. These two detectors can use the same rules. In these cases, 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, 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, and for backward compatibility with earlier analyzers.

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**.

<b>Remote Command:</b>	<pre>[ :SENSE ]:FREQuency:SPAN:BANDwidth[ :RESolution ]:RATio &lt;integer&gt;  [ :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:	<pre>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?</pre>
Dependencies/Couplings:	<p>Grayed out when the EMC Standard is set to CISPR or MIL, since RBW is coupled to Center Frequency rather than Span in this case.</p> <p>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.</p>
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:	<b>BW</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

Dependencies/Couplings	The <b>RBW Control</b> key is grayed out if the <b>EMC Standard</b> is set to <b>CISPR</b> or <b>MIL</b> . In this case the <b>Filter Type</b> is always Gaussian; the <b>Filter BW</b> is chosen as appropriate for the filter and the standard.
Key Path	<b>BW</b>
Readback line	[<filter type>] or, if Filter Type is Gaussian, [Gaussian,<filter BW>]
Instrument S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

### 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 314](#)

<b>Remote Command:</b>	[ :SENSE ] :BANDwidth   BWIDth :SHAPE GAUSSian   FLATtop [ :SENSE ] :BANDwidth   BWIDth :SHAPE?
Example:	BAND:SHAP GAUS
Dependencies/Couplings:	When <b>EMC Standard</b> is set to <b>CISPR</b> or <b>MIL</b> , the <b>Filter Type</b> is always Gaussian
Notes:	GAUSSian = Gaussian FLATtop = Flattop
Preset:	Auto Couple chooses the preset value
State Saved:	Saved in State
Key Path:	<b>BW, RBW Control</b>
Readback line:	1-of-N selection
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

### 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. See remote command in section “ <a href="#">Filter Type</a> ” on <a href="#">page 314</a> .
Example:	BAND:SHAP GAUS
Key Path:	<b>BW, RBW Control, Filter Type</b>
Readback:	Gaussian
Instrument S/W Revision:	Prior to A.02.00

**Flattop** Selects the flat top filter type

Example:	BAND:SHAP FLAT
Key Path:	<b>BW, RBW Control, Filter Type</b>
Readback:	Flattop
Instrument S/W Revision:	Prior to A.02.00

### 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 316

<b>Remote Command:</b>	[ :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. When <b>EMC Standard</b> is set to <b>CISPR</b> or <b>MIL</b> , the <b>Filter BW</b> is chosen as appropriate for the filter and the standard.
Notes:	DB3 = -3 dB (Normal) DB6 = -6 dB IMPulse = Impulse NOISe = Noise
Preset:	Auto Couple chooses the preset value
State Saved:	Saved in State
Key Path:	<b>BW, RBW Control</b>
Readback line:	1-of-N selection
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

### More Information

The analyzer provides four ways of specifying the bandwidth of a Gaussian filter:

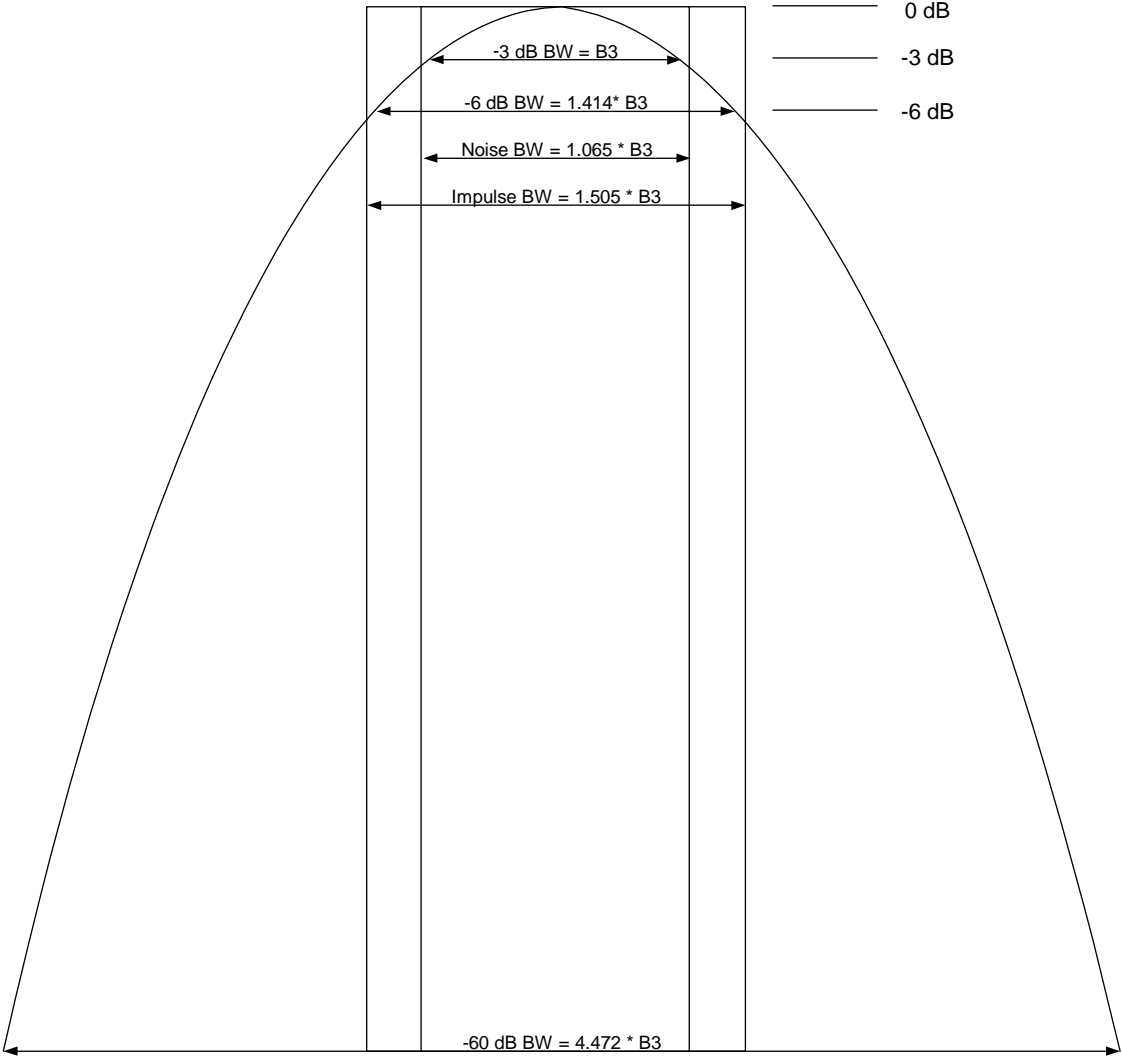
The -3 dB bandwidth of the filter

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.

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:	<b>BW, RBW Control, Filter BW</b>
Readback:	–3 dB
Instrument S/W Revision:	Prior to A.02.00

## Swept SA BW

**-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**  
Readback: -6 dB  
Instrument S/W Revision: Prior to A.02.00

**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**  
Readback: Noise  
Instrument S/W Revision: Prior to A.02.00

**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**  
Readback: Impulse  
Instrument S/W Revision: Prior to A.02.00

---

## Cont

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987.

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## Frequency

The Frequency key opens up a menu of softkeys that allow you to control the Frequency parameters of the instrument.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

---

<b>Remote Command:</b>	[ :SENSe ] :FREQuency:TUNE:IMMediate
Instrument S/W Revision:	Prior to A.02.00

### Center Frequency

Operation of this key is identical across several measurements. For details about this key, see [“Center Frequency” on page 989](#).

### 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**.

<b>Remote Command:</b>	[ :SENSe ] :FREQuency:STARt <freq> [ :SENSe ] :FREQuency:STARt?
------------------------	--

Example:	FREQ:STAR 200 MHz FREQ:STAR?
----------	---------------------------------



Dependencies/Couplings:	<p>By direct entry: You cannot set Start frequency &gt; 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.</p> <p>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.</p> <p>The Start Frequency can be limited by Span limits, if the Stop Frequency is below its preset value.</p> <p>If the electrical attenuator is enabled, any attempt to set Start Frequency such that the Stop Frequency would be &gt;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.</p> <p>See details under Center Freq for more information about span couplings.</p>
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:	<b>FREQUENCY, Start Freq</b>
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Instrument S/W Revision:	Prior to A.02.00

## 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

## Swept SA Frequency

menu is **Start Freq.**

<b>Remote Command:</b>	<code>[ :SENSe ] :FREQuency:STOP &lt;freq&gt;</code> <code>[ :SENSe ] :FREQuency:STOP?</code>
Example:	<code>FREQ:STOP 220 MHz</code> <code>FREQ:STOP?</code>
Dependencies/Couplings:	<p>By direct entry: You cannot set Stop frequency &lt; 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.</p> <p>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.</p> <p>The Stop Frequency can be limited by Span limits, if the Start Frequency is above its preset value.</p> <p>If the electrical attenuator is enabled, any attempt to set Stop Frequency &gt;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.</p> <p>See details under Center Freq for more information about span couplings.</p> <p>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.</p>
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:	-79.99999999 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:	<b>FREQUENCY, Stop Freq</b>
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Instrument S/W Revision:	Prior to A.02.00

## CF Step

Operation of this key is identical across several measurements. For details about this key, see [“CF Step” on page 992](#).

## Freq Offset

Freq 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 323](#).

<b>Remote Command:</b>	[ :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 <a href="#">“X-Series Frequency Ranges and Preset Values ” on page 324</a> .
State Saved:	Saved in State
Min:	-500 GHz
Max:	500 GHz
Key Path:	<b>FREQUENCY, Freq Offset</b>
Default Unit:	Hz
SCPI Status Bits/OPC	non-overlapped
Dependencies:	
Instrument S/W Revision:	Prior to A.02.00

## 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

## Swept SA Frequency

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.

---

### **X-Series 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

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## **Input/Output**

Operation of this key is identical across several measurements. For details about this key, see [“Input/Output” on page 995](#).

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## Marker

See “Marker Control Mode” on page 326.

See “Setting the Marker X Axis Value” on page 327.

See “Setting the Marker X Position in Trace Points” on page 327.

See “Setting the Marker Y Axis Value” on page 328.

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.

<b>Remote Command:</b>	: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
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### 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). Unlike legacy analyzers, where the markers were forced to be on screen, X-Series marker values are not limited and do not clip

**Default Unit:**                       determined by X Axis Scale

**Instrument S/W Revision:**       Prior to A.02.00

### 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,

## Swept SA Marker

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.

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<b>Remote Command:</b>	<code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X:POSitio n &lt;real&gt;</code>  <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X:POSitio n?</code>
Remote Command Notes:	<p>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.</p> <p>The query returns the marker’s absolute X Axis value in trace points if the control mode is <b>Normal</b> or <b>Fixed</b>. It returns the offset from the marker’s reference marker in trace points if the control mode is <b>Delta</b>. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points</p>
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
Instrument S/W Revision:	Prior to A.02.00

### 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**.

<b>Remote Command:</b>	<code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:Y &lt;real&gt;</code>  <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:Y?</code>
Example:	<code>CALC:MARK2:MODE POS</code> turns on marker 2 as a normal marker.  <code>CALC:MARK2:X 20 GHZ</code> 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:	-∞ (minus infinity)



Max:	+ ∞ (plus infinity)
Instrument S/W Revision:	Prior to A.02.00

## 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	<b>Marker</b>
Preset	Marker 1
State Saved	The number of the selected marker is saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

## 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:	<ul style="list-style-type: none"> <li>the marker addressed by this command becomes the selected marker on the front panel</li> </ul>
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:	<b>Marker</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 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.
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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:	<b>Marker</b>
Instrument S/W Revision:	Prior to A.02.00

### Fixed

See [“Fixed Marker X Axis Value”](#) on page 331.

See [“Fixed Marker Y Axis Value”](#) on page 331.

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:	<p>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.</p> <p>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.</p>
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:	<b>Marker, Fixed</b>
Instrument S/W Revision:	Prior to A.02.00

## Fixed Marker Y Axis Value

Example:	:CALC:MARK:MODE FIX sets Marker 1 to Fixed.
Dependencies/Couplings:	<p>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.</p>
Remote Command Notes:	See the description under the <b>Marker</b> 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:	<b>Marker, Fixed</b>
Resolution:	The settable resolution of the function is 0.001 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
Instrument S/W Revision:	Prior to A.02.00

## Off

## Swept SA Marker

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:	<b>Marker</b>
Instrument S/W Revision:	Prior to A.02.00

### Properties

Opens a menu used to set certain properties of the selected marker.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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 <b>Fixed</b> 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 <b>Restore Mode Defaults</b> . This is not reset by <b>Marker Off, All Markers Off, or Preset</b> .
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:	<b>Marker, Properties</b>
SCPI Status Bits/OPC Dependencies:	none Default (selected when <b>Restore Mode Defaults</b> is pressed): next higher numbered marker or 1 if marker 12.
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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.

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**

## Swept SA Marker

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**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**

Instrument S/W Revision: Prior to A.02.00

**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**

Instrument S/W Revision: Prior to A.02.00

**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**

Instrument S/W Revision: Prior to A.02.00

**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:	<b>Marker, Properties, X Axis Scale</b>
Instrument S/W Revision:	Prior to A.02.00

**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
State Saved:	The X Axis Scale setting is saved in instrument state
Key Path:	<b>Marker, Properties, X Axis Scale</b>
Instrument S/W Revision:	Prior to A.02.00

### 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 336](#).

See [“Auto Init Rules Flowchart” on page 336](#).

See “Auto Init OFF” on page 337.

<b>Remote Command:</b>	: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?
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 <b>Auto Init</b> for each marker is saved in instrument state.
Min:	1
Max:	6
Key Path:	<b>Marker, Properties</b>
Readback line:	[TraceN, Auto Init] or [TraceN, Manual] where N is the trace number to which the marker is currently assigned.
Instrument S/W Revision:	Prior to A.02.00

## 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).

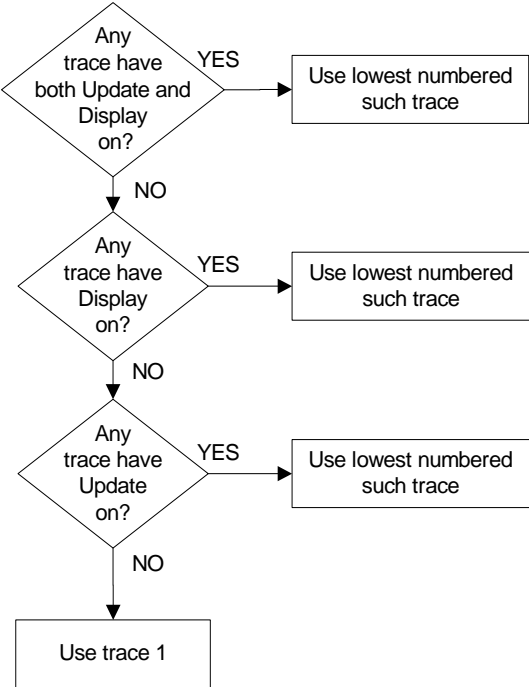
Note this is true even if the marker is off screen. Thus, a marker that is at the center of the screen on the old trace stays at the center of the screen on the new trace. A marker that is off screen one whole screen to the left on the old trace remains off screen one whole screen to the left on the 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

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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.
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Marker, Properties</b>
Instrument S/W Revision:	Prior to A.02.00

### Marker Table

<b>Remote Command:</b>	: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:	<b>Marker</b>

Instrument S/W Revision: Prior to A.02.00

## Marker Count

Accesses the marker count menu.

Key Path **Marker**  
 Readback line [On] if count on for the selected marker, [Off] if it is off.  
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## 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 339](#).

See [“Query Count Value” on page 341](#).

**Remote Command:** :CALCulate:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:FCOunt[:S  
TATe] OFF|ON|0|1

:CALCulate:MARKer[1]|2|3|4|5|6|7|8|9|10|11|12:FCOunt[:S  
TATe]?

Example: CALC:MARK2:FCO ON selects marker 2, turns it on, and turns on the counter  
 CALC:MARK2:FCO:X? returns the counted frequency.

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**

Instrument S/W Revision: Prior to A.02.00

## Understanding the Marker Counter

See [“Counting Off-screen Markers” on page 340](#).

## Swept SA Marker

See “Delta Marker” on page 340.

See “Fixed Markers” on page 340.

See “More Information on "Counter"” on page 341.

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 press the Marker, Fixed key to select Fixed Markers, and then press it a second time 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.

Instrument S/W Revision: Prior to A.02.00

### 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

## Swept SA Marker

trigger is received and delayed.

<b>Remote Command:</b>	<code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime &lt;time&gt;</code> <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime?</code> <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime:AUTO OFF ON 0 1</code> <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FCOunt:GATetime:AUTO?</code>
Example:	<code>:CALC:MARK2:FCO:GAT 1e-2</code> 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:	<b>Marker Function, Marker Count</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>:CALCulate:MARKer:COUple[:STATE] OFF ON 0 1</code> <code>:CALCulate:MARKer:COUple[:STATE]?</code>
Example:	<code>:CALC:MARK:COUP ON</code> sets Couple Markers on.
Preset:	Off, presets on Mode Preset and All Markers Off
State Saved:	Saved in State
Key Path:	<b>Marker</b>
Instrument S/W Revision:	Prior to A.02.00

## All Markers Off

Turns off all markers. See Marker, “Off” on page 331.

<b>Remote Command:</b>	:CALCulate:MARKer:AOFF
Example:	CALC:MARK:AOFF turns off all markers.
Dependencies/Couplings:	sets the selected marker to 1.
Preset:	n/a.
Key Path:	<b>Marker</b>
Instrument S/W Revision:	Prior to A.02.00

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## 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 344.

See “[Fixed marker functions](#)” on page 345.

See “[Interval Markers](#)” on page 345.

<b>Remote Command:</b>	: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
Instrument S/W Revision:	Prior to A.02.00

### 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 329.

### 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

## Swept SA Marker Fctn

noise power bandwidth, in the band specified under the **Band Adjust** key.

See “[More Information](#)” on page 346.

See “[Off-trace Markers](#)” on page 346.

Example:	<p>CALC:MARK:FUNC NOIS turns on marker 1 as a noise marker.</p> <p>CALC:MARK:FUNC? returns the current marker function for the marker specified. In this case it returns the string: NOIS.</p> <p>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 <math>0.22 = 0.04</math>. 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).</p>
Dependencies/Couplings:	<p>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.</p> <p>Average detector and Power Averaging auto selected when Marker Noise on.</p> <p>See also the “Trace/Detector” section.</p> <p>If the selected (specified) marker is off, selecting Marker Noise via front panel or SCPI will turn the marker on.</p>
Remote Command Notes:	See the description under the “ <a href="#">Marker Fctn</a> ” on page 344” key, above.
Key Path:	<b>Marker Fctn</b>
Instrument S/W Revision:	Prior to A.02.00

### 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:	<p>CALC:MARK:FUNC BPOW turns on marker 1 as a band power marker.</p> <p>CALC:MARK2:FUNC? returns the current setting of marker function for marker 2. In this case it returns the string: BPOW.</p> <p>CALC:MARK:Y? 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 <math>0.22 = 0.04</math>. 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).</p>
Dependencies/Couplings:	<p>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.</p> <p>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.</p> <p>See also the "Trace/Detector" section.</p> <p>If the selected (specified) marker is off, selecting Band Power via front panel or SCPI will turn the marker on.</p>
Remote Command Notes:	See the description under the " <a href="#">Marker Fctn</a> " on page 344" key, above.
Key Path:	<b>Marker Fctn</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 348.

## Swept SA Marker Fctn

See “What is band/interval density?” on page 348

Example:	<p>CALC:MARK:FUNC BDEN turns on marker 1 as a band density marker.</p> <p>CALC:MARK:FUNC? returns the current setting of band function for the marker specified. In this case it returns the string: BDEN.</p> <p>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 <math>0.22 = 0.04</math>. 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).</p>
Dependencies/Couplings:	<p>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.</p> <p>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.</p> <p>See also the “Trace/Detector” section.</p> <p>If the selected (specified) marker is off, selecting Band Density via front panel or SCPI will turn the marker on.</p>
Remote Command Notes:	See the description under the “Marker Fctn” on page 344” key, above.
State Saved:	n/a.
Key Path:	<b>Marker Fctn</b>
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Marker, Marker Fctn</b>
Instrument S/W Revision:	Prior to A.02.00

## 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:	<b>Marker Function</b>
Instrument S/W Revision:	Prior to A.02.00

## 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  $\text{sweep\_points}$  is the number of sweep points, set in the **Sweep** menu.

<b>Remote Command:</b>	: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

## Swept SA Marker Fctn

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. Unlike legacy analyzers, where the markers were forced to be on screen, X-Series marker values are not limited and do not clip
Key Path:	<b>Marker Fctn, Band Adjust</b>
Instrument S/W Revision:	Prior to A.02.00

### 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  $\text{sweep\_points}$  is the number of sweep points, set in the **Sweep** menu.

<b>Remote Command:</b>	<code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCtion: BAND:LEFT &lt;freq&gt;</code>  <code>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCtion: BAND:LEFT?</code>
Example:	<code>:CALC:MARK12:FUNC:BAND:LEFT 20 GHz</code> sets the left edge of the band span of marker 12 to 20 GHz  <code>:CALC:MARK:FUNC:BAND:LEFT?</code> queries the band span of Marker 1

Dependencies/Couplings:	<p>Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Center values</p> <p>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</p> <p>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</p>
Remote Command Notes:	<p>Sending this command selects the subcoded marker</p> <p>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).</p> <p>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.</p>
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. Unlike legacy analyzers, where the markers were forced to be on screen, X-Series marker values are not limited and do not clip
Key Path:	<b>Marker Fctn, Band Adjust</b>
Instrument S/W Revision:	Prior to A.02.00

### 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  $\text{sweep\_points}$  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.

<b>Remote Command:</b>	<pre>:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION: BAND:RIGHT &lt;freq&gt;</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 sets the right edge of the band span of marker 12 to 20 GHz</pre> <pre>:CALC:MARK:FUNC:BAND:RIGHT? queries the band span of Marker 1</pre>

## Swept SA Marker Fctn

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. Unlike legacy analyzers, where the markers were forced to be on screen, X-Series marker values are not limited and do not clip
Key Path:	<b>Marker Fctn, Band Adjust</b>
Instrument S/W Revision:	Prior to A.02.00

### Measure at Marker

This key and all the keys in this menu only appear with Option EMC installed and licensed.

This key opens up a menu which contains the Measure at Marker functions. This key only appears with option EMC installed.

Key Path	<b>Marker Function</b>
Instrument S/W Revision	A.02.00

### Measure at Marker

When this key is pressed, the analyzer executes one Measure at Marker function and then returns. Measure at Marker goes to the frequency of the selected marker and takes a reading with each of the three detectors selected in the Detectors menu, using the dwell times specified there, then displays the readings in a window on the display.

When the Measure at Marker is complete, the analyzer restores all settings to their

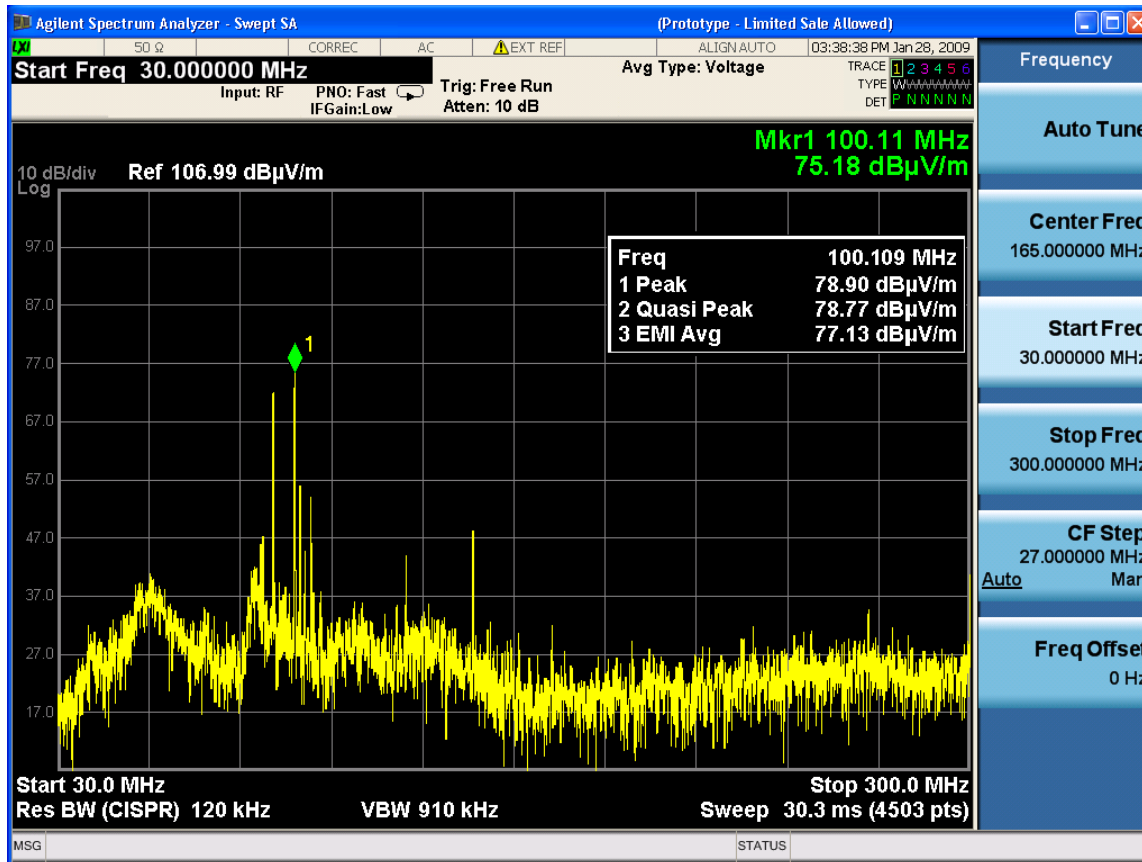


pre-Measure-at-Marker values and normal sweeps resume.

<b>Remote Command:</b>	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:FUNCTION:MAMarker?
Example:	:CALC:MARK2:FUNC:MAM?  Performs a Measure at Marker function at Marker 2's current frequency and, when completed, returns the results of the measure at marker window in a query
Notes:	This query command returns comma separated values for the 3 specified detectors and the frequency value of the marker. If a Detector is off or if no measurement has yet completed, -999.0 will be returned.  The size of the return data array is fixed at 4. The elements are: <ol style="list-style-type: none"><li>1. Detector 1 value (if off, -999.0 for backwards compatibility)</li><li>2. Detector 2 value (if off, -999.0 for backwards compatibility)</li><li>3. Detector 3 value (if off, -999.0 for backwards compatibility)</li><li>4. Frequency of Marker</li></ol> If a sweep is in process when this function executes it aborts, and restarts after the function is complete.  This command is not backwards compatible with the E7400 and PSA option 239 so the Backwards Compatibility command is included.
Dependencies/Couplings:	If <b>BW &amp; Avg Type</b> is in Autocoupled state, the (up to three) measurements taken by Measure at Marker are taken with Auto Coupled settings for the functions in the BW menu, even if those functions are in manual.  If the specified Marker is not on, the analyzer turns it on at center of screen and does a peak search before performing the function.
Key Path:	<b>Marker Function, Measure at Marker</b>
Status Bits/OPC dependencies:	OPC goes true when the measurement is complete
Instrument S/W Revision:	A.02.00

Measure at Marker presents its information in a separate window which normally appears in the upper right of the display but can be repositioned to the upper left.

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The Measure at Marker box shows the detector name for the selected detectors and “Off” for those not selected. The names used are:

Name	Detector
Normal	Normal
Peak	Peak
Sample	Sample
Neg Peak	Negative Peak
RMS	Average detector with Power Average (RMS)
Log Avg	Average detector with Log-Pwr Average
VoltageAvg	Average detector with Voltage Average
Quasi Peak	Quasi Peak
EMI Avg	EMI Average
RMS Avg	RMS Average

The marker frequency is shown in the “Freq” field. The measured value is shown for all detectors except those that are “Off.” For these, --- is displayed. The current Y-Axis unit is used, and the precision that is used for the detector value displays is exactly the same as for the Marker. The precision used for the Frequency display is six significant digits.

The sequence of steps in the measurement is as follows:

- Any sweep in progress is aborted.
- If in Zero Span, the Center Frequency is used as the frequency at which to take the reading, since in Zero Span, all markers are by definition at the Center Frequency
- If not in Zero Span:
  - If the selected marker is Off, it is first turned on in the center of the screen and a peak search performed.
  - If the selected marker is on, but off screen, it is first moved to the center of the screen and a peak search performed.
  - A frequency “zoom” function is performed to determine the frequency of the selected marker to the required precision. If you are operating with too large a value of (span/sweep points) then the Measure at Marker window will not display, but instead an advisory message, “Span per point too large, narrow span or increase RBW or number of points”. This means you have chosen a combination of RBW, span and sweep points that makes each trace point much wider than the RBW, so that the trace point in which the signal appears is an inadequately precise measure of its frequency—for example, with a 30 MHz to 1000 MHz span, 601 trace points and 120 kHz RBW, each trace point is 13 times as wide as the RBW. In this case, a SCPI query of the results will yield -999 dBm for each detector.
  - If the zoom is successful, the analyzer goes to zero span at this frequency
- Each detector is then read in successive single-point zero span sweeps, using a sweep time equal to the specified dwell time. The value displayed by Measure at Marker represents the maximum value output by the detector during the dwell time Autocoupled bandwidth and average type settings are used for each detector unless the **BW & Avg Type** key is set to **As Set**, in which case the current bandwidth and average type settings are used.
- Each result is then displayed in the measure at marker window as it becomes available.
- The analyzer returns to its pre-Measure at Marker span and settings after executing a Measure at Marker function, including Bandwidth, Avg Type, and EMC Std - regardless of the setting of **BW & Avg Type**
- Finally, if the sweep had to be aborted, the aborted sweep is restarted.

While the function is executing, all the fields except Freq show --- for their values until the measurement is complete for that detector. As each detector is read, an informational message is displayed in the status line, for example,

Measuring with detector 1 (Peak) with RBW=120 kHz

After the last detector, the status line is cleared.

### Meas at Marker Window

This key opens a menu which controls the Measure at Marker window.

Key Path

**Marker Function, Measure at Marker**

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Readback	In square brackets, the state of the window then the window position, separated by commas, as [On, Left]
Instrument S/W Revision	A.02.00

**Window On/Off** This key turns the Measure at Marker window on and off. It turns on automatically when Measure at Marker is initiated and turns off on a Preset. If the Window is turned on without a Measure at Marker result, --- is displayed for each result for which the detector is not “Off”.

<b>Remote Command:</b>	:DISPlay:WINDow:MAMarker[:STATe] ON OFF 1 0 :DISPlay:WINDow:MAMarker[:STATe]?
Example:	:DISP:WIND:MAM ON
Dependencies/Couplings:	The window turns on automatically when Measure at Marker is initiated and turns off on a Preset.
Preset:	Off
State Saved:	Saved in state
Key Path:	<b>Marker Function, Measure at Marker, Meas at Marker Window</b>
Readback Text:	On Off
Instrument S/W Revision:	A.02.00

**Position Left/Right** This key controls the placement of the Measure at Marker window on the display.

<b>Remote Command:</b>	:DISPlay:WINDow:MAMarker:POSition LEFT RIGHT :DISPlay:WINDow:MAMarker:POSition?
Example:	:DISP:WIND:MAM:POS RIGH
Preset:	Right
State Saved:	Saved in state
Key Path:	<b>Marker Function, Measure at Marker, Meas at Marker Window</b>
Readback Text:	Left Right
Instrument S/W Revision:	A.02.00

### Detectors

This key opens up a menu that allows you to configure the detectors to be used for the Measure at Marker reading. Any of the analyzer’s detectors can be used for each of the three detectors, or any of the three can be turned off. The dwell time for each detector is also settable.

When performing a Meas at Marker, the dwell time settings that you select will depend on the characteristics of the emission you are measuring. The default dwell time (200 ms) should work well for typical EUT emissions, but sometimes you will encounter emissions for which the defaults are not optimal. This is especially the case for emissions that vary slowly over time or have a slow repetition

rate. By lengthening the dwell times you can increase the likelihood of accurately measuring these low repetition rate signals.

When Measure at marker is activated, the receiver makes a zero span measurement for each of the (up to) three detectors selected, using the Dwell Time set for each detector. If the signal's repetition period is greater than 200 ms (the default setting), the dwell time should be increased to capture at least two and preferably more repetitions of the signal. Additionally, if you do not need or do not wish to use a detector to make a measurement, that specific detector may be turned off.

If the Measure at Marker window is being displayed, and one of the detectors is changed, any value being displayed for that detector changes to "---" until the next successful reading from that detector.

**Remote Command:** :CALCulate:MAMarker:DETECTOR[1]|2|3  
OFF|NORMal|AVERage|POSitive|SAMPle|NEGative|QPEak|EAverage|RAverage  
:CALCulate:MAMarker:DETECTOR[1]|2|3?

**Example:** :CALC:MAM:DET2 QPE  
Sets the detector for measure at marker detector 2 to Quasi peak  
:CALC:MAM:DET OFF  
Sets the detector for measure at marker detector 1 to Off

State Saved: Saved in state

Key Path: **Marker Function, Measure at Marker,**

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**Remote Command:** :CALCulate:MAMarker:DETECTOR[1]|2|3:DWELL <dwell time>  
:CALCulate:MAMarker:DETECTOR[1]|2|3:DWELL?

**Example:** :CALC:MAM:DET2:DWELL 500 ms  
Sets the detector for measure at marker detector 2 to dwell for 500 ms

State Saved: Saved in state

Key Path: **Marker Function, Measure at Marker,**

Instrument S/W Revision: A.02.00

**Detector 1** This menu lets you select the detector to be used for Detector 1, or turn Detector 1 off. This is a 1-of-N menu that shows the normal list of detectors, but with the “Auto” key replaced by “Off”.

**Remote Command:** See [“Detectors” on page 356](#).

**Example:** :CALC:MARK:FUNC:MAM:DET QPE  
Sets the detector for measure at marker detector 1 to Quasi peak  
:CALC:MARK:FUNC:MAM:DET OFF  
Sets the detector for measure at marker detector 1 to Off

## Swept SA Marker Fctn

Preset: Peak  
State Saved: Saved in state  
Key Path: **Marker Function, Measure at Marker, Detectors**  
Readback Text: Detector name  
Instrument S/W Revision: A.02.00

**Detector 2** This menu lets you select the detector to be used for Detector 2, or turn Detector 2 off. This is a 1-of-N menu that shows the normal list of detectors, but with the “Auto” key replaced by “Off”.

**Remote Command:** See “Detectors” on page 356.

Example: :CALC:MARK:FUNC:MAM:DET2 QPE  
Sets the detector for measure at marker detector 2 to Quasi peak  
:CALC:MARK:FUNC:MAM:DET2 OFF  
Sets the detector for measure at marker detector 2 to Off

Preset: Quasi Peak  
State Saved: Saved in state  
Key Path: **Marker Function, Measure at Marker, Detectors**  
Readback Text: Detector name  
Instrument S/W Revision: A.02.00

**Detector 3** This menu lets you select the detector to be used for Detector 3, or turn Detector 3 off. This is a 1-of-N menu that shows the normal list of detectors, but with the “Auto” key replaced by “Off”.

**Remote Command:** See “Detectors” on page 356.

Example: :CALC:MARK:FUNC:MAM:DET3 QPE  
Sets the detector for measure at marker detector 3 to Quasi peak  
:CALC:MARK:FUNC:MAM:DET3 OFF  
Sets the detector for measure at marker detector 3 to Off

Preset: EMI Average  
State Saved: Saved in state  
Key Path: **Marker Function, Measure at Marker, Detectors**  
Readback Text: Detector name  
Instrument S/W Revision: A.02.00

**Detector 1 Dwell Time** This is the time specified by the user to dwell while taking the measurement for detector 1. The minimum allowed dwell time is based on the current detector. If “Off” is selected for

detector 1, this key is grayed out and shows 200 ms.

<b>Remote Command:</b>	See <a href="#">“Detectors” on page 356.</a>
Example:	:CALC:MARK:FUNC:MAM:DET:DWEL 400 ms Sets the dwell time for detector 1 to 400 ms
Preset:	200 ms
Min:	1 ms
Max:	60 s
Default Unit:	s
State Saved:	Saved in state
Key Path:	<b>Marker Function, Measure at Marker, Detectors</b>
Instrument S/W Revision:	A.02.00

**Detector 2 Dwell Time** This is the time specified by the user to dwell while taking the measurement for detector 2. The minimum allowed dwell time is based on the current detector. If “Off” is selected for detector 2, this key is grayed out and shows 200 ms.

<b>Remote Command:</b>	See <a href="#">“Detectors” on page 356.</a>
Example:	:CALC:MARK:FUNC:MAM:DET2:DWEL 400 ms Sets the dwell time for detector 2 to 400 ms
Preset:	200 ms
Min:	1 ms
Max:	60 s
Default Unit:	s
State Saved:	Saved in state
Key Path:	<b>Marker Function, Measure at Marker, Detectors</b>
Instrument S/W Revision:	A.02.00

**Detector 3 Dwell Time** This is the time specified by the user to dwell while taking the measurement for detector 3. The minimum allowed dwell time is based on the current detector. If “Off” is selected for detector 3, this key is grayed out and shows 200 ms.

<b>Remote Command:</b>	See <a href="#">“Detectors” on page 356.</a>
Example:	:CALC:MARK:FUNC:MAM:DET3:DWEL 400 ms Sets the dwell time for detector 1 to 400 ms
Preset:	200 ms

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Min:	1 ms
Max:	60 s
Default Unit:	s
State Saved:	Saved in state
Key Path:	<b>Marker Function, Measure at Marker, Detectors</b>
Instrument S/W Revision:	A.02.00

### BW & Avg Type

This key controls the type of bandwidth and average type coupling used in Measure at Marker.

If set to “Autocoupled”, then the RBW and Average Type are selected by the instrument during the Measure at Marker function, according to the normal Autocouple rules, regardless of whether RBW and Average Type are currently in Auto. If set to “As Set”, then the current value for RBW and Average Type are used (which of course, could also be “Auto”).

Here are the details of the two modes:

If **BW & Avg Type** is set to **Autocoupled, Measure at Marker** behaves as follows:

- 1) The **EMC Std** changes to CISPR if any of the CISPR detectors (EMI Avg, RMS Avg, QPD) becomes selected; for all other detectors, the value of **EMC Std** that existed before Measure at Marker is used.
- 2) **RBW** autocouples throughout Measure at Marker, even if **RBW** is set to **Manual**. The autocouple rules are based on whatever the instantaneous setting of EMC Std, Span, and Center Freq are.

If **BW & Avg Type** is set to **As Set, Measure at Marker** behaves as follows:

- 1) The **EMC Std** never changes; so if it is set to **None** it stays at **None** throughout, even if one of the CISPR detectors is selected.
  - 2) If **RBW** is set to **Auto**, then **RBW** autocouples throughout Measure at Marker. The autocouple rules are based on whatever the setting of EMC Std, Span, and Center Freq are.
  - 3) If **RBW** is set to **Manual**, the RBW never changes at all throughout Measure at Marker, it stays at the value to which it was set before Measure at Marker began.
- The analyzer returns to its pre-Measure at Marker span and settings after executing a Measure at Marker function, including Bandwidth, Avg Type, and EMC Std.

It is important to note that, when RBW is coupled to Frequency, as it is when **EMC Std** is anything but “None”, for all EMI measurements, the frequency it is coupled to for Measure at Marker is the MARKER frequency, not the Center Frequency.

<b>Remote Command:</b>	:CALCulate:MAMarker:COUpling ON OFF 1 0 :CALCulate:MAMarker:COUpling?
Example:	:CALC:MAM:COUP ON
Preset:	Autocoupled
State Saved:	Saved in state



Key Path: **Marker Function, Measure at Marker**  
Readback Text: Autocoupled|As Set  
Instrument S/W Revision: A.02.00

### Center Presel On/Off

This key controls the automatic centering of the preselector for the Measure at Marker function.

When Center Presel is On, the first step in performing the Measure at Marker function is to perform a Presel Center. This is not performed if the microwave preselector is off, or the selected marker's frequency is below Band 1. If the function is not performed, no message is generated.

**Remote Command:** :CALCulate:MAMarker:PCENTER ON|OFF|1|0  
:CALCulate:MAMarker:PCENTER?

Example: :CALC:MAM:PCEN ON

Preset: On  
State Saved: Saved in state

Key Path: **Marker Function, Measure at Marker**  
Instrument S/W Revision: A.02.00

## 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**.

Instrument S/W Revision      Prior to A.02.00

### 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 subcoded 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 ->**

Instrument S/W Revision:                Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	: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:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## Mkr->Stop

Changes the stop frequency to the frequency of the selected marker. The marker stays at this frequency,

## Swept SA Marker To

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.

<b>Remote Command:</b>	: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:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## Mkr $\Delta$ ->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.

<b>Remote Command:</b>	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12[:SET]:DELTA:SPAN
Example:	CALC:MARK2:DELTA: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 429).
Remote Command Notes:	Sending this command selects the subopcoded marker
Key Path:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

**Mkr $\Delta$ ->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.

<b>Remote Command:</b>	: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:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

**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.

<b>Remote Command:</b>	: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 <a href="#">“Amplitude/Y Scale ” on page 298</a> ”).
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:	<b>Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## **Meas**

Measurements available under the Meas key are specific to the current Mode, but aspects of this key are identical across several measurements. For details, see [“Meas” on page 1057](#).

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## 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.

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**NOTE** In the Meas Setup menu you may configure Averaging, by setting the Average Number and the Average Type.

---

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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 367](#).

See [“AVER:CLE command” on page 368](#).

<b>Remote Command:</b>	[ :SENSe]:AVERage:COUNT <integer> [ :SENSe]:AVERage:COUNT?
------------------------	---

Dependencies/Couplings:	The table in the Section “Sweep/Control” shows how changing the <b>Average/Hold Number</b> (and the <b>Single/Cont</b> setting) affects the state of the <b>Average</b> , <b>Max Hold</b> and <b>Min Hold</b> 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
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Min:	1
------	---

Max:	10000
------	-------

Key Path:	<b>Meas Setup</b>
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SCPI Status Bits/OPC Dependencies:	See the Section “Sweep/Control” for a discussion of the Sweeping, Measuring, Settling and OPC bits, and the Hi Sweep line. All are affected when a sequence is reset.
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Instrument S/W Revision:	Prior to A.02.00
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### 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 368, below. For details on how the various control functions in the instrument start and restart averaging, see Sweep/Control.

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

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### **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 369.

**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**

Readback line: 1-of-N selection as  
Log-Pwr (Video) for Log-Pwr (Video) Avg  
Pwr (RMS) for Power Avg  
Voltagefor Voltage



Instrument S/W Revision:	Prior to A.02.00
<b>Remote Command:</b>	[ :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
Instrument S/W Revision:	Prior to A.02.00

## 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”) 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”) averages signal amplitudes during the time or frequency interval represented by a particular measurement point.

Noise Marker (see Section “Marker Fctn” on page 344”) averages signal amplitudes across measurement points to reduce variations for noisy signals.

VBW filtering (see Section “BW” on page 308”) 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

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Dependencies/Couplings:	Here are the auto-select rules for <b>Average Type</b> :  <b>Auto</b> selects <b>Voltage Averaging</b> if the Detector for any active trace is <b>EMI Average</b> or <b>QPD</b> or <b>RMS Average</b> ; otherwise it selects <b>Power (RMS) Averaging</b> if a <b>Marker Function (Marker Noise, Band/Intvl Power)</b> is on, or <b>Detector</b> is set to <b>Man</b> and <b>Average</b> ; otherwise if <b>Amplitude, Scale Type</b> is set to <b>Lin</b> it selects <b>Voltage Averaging</b> ; otherwise, if the EMC Standard is set to CISPR, it selects <b>Voltage</b> ; otherwise <b>Auto</b> selects <b>Log-Power Average</b> .  Note that these rules are only applied to active traces. Traces which are not updating do not impact the auto-selection of Average Type.
Remote Command Notes:	See <b>Average Type</b> , above
State Saved:	Saved in Instrument State
Key Path:	<b>Meas setup, Average Type</b>
Readback:	The type auto-selected is displayed in the readback line on the <b>Average Type</b> key
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### 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 368”, above
Example:	AVER:TYPE LOG
Dependencies/Couplings:	See ““Auto” on page 369”, above
Key Path:	<b>Meas setup, Average Type</b>
Readback:	<b>Log-Pwr (Video)</b>
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### 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.)

$$NewAverage = 10Log((1/K)(K-1)(10^{(OldAvg)/10}) + 10^{(NewData)/10}))$$

Equation assumes all values are in the decibel scale.

Example:	AVER:TYPE RMS
Dependencies/Couplings:	See ““Auto” on page 369”, above
Remote Command Notes:	See ““Average Type” on page 368”, above
Key Path:	<b>Meas setup, Average Type</b>
Readback:	<b>Pwr (RMS)</b>
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### 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.)

$$NewAverage = 20Log((1/K)(K-1)(10^{(OldAvg)/20}) + 10^{(NewData)/20}))$$

Equation assumes all values are in the decibel scale.

Example:	AVER:TYPE SCAL
Dependencies/Couplings:	See ““Auto” on page 369”, above.
Remote Command Notes:	See ““Average Type” on page 368”, above
Key Path:	<b>Meas setup, Average Type</b>
Readback:	<b>Pwr (RMS)</b>
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### Limits

The limits softkey opens up a menu of softkeys to control the limits for the current measurement. Limits arrays can be entered by the user, sent over SCPI, or loaded from a file.

Key Path	<b>Meas Setup</b>
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Dependencies/Couplings:	This key will not appear unless the proper Option is present in your instrument.
Preset	Limits are turned off by a Preset, but the Limits arrays (data) are only reset (deleted) by Restore Mode Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.
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### Select Limit

Specifies the selected limit. The term “selected limit” is used throughout this document to specify which limit will be affected by the functions.

Key Path	<b>Meas Setup, Limits</b>
Preset	Limit 1, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved	Saved in State.
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### Limit On/Off

Selects whether the limit and margin are displayed. If Test Limits is on, this also determines whether the test trace (see [“Test Trace” on page 373](#)) will be tested against the limit. If **Limit On/Off** is **On**, the following occurs:

- The limit line is displayed, in the same color as the limited trace, but paler. Portions of traces which fail the limits will be displayed in red.
- The margin line is displayed if Margin is on and the Margin Value is non-zero (see [“Margin” on page 378](#)). The margin line is displayed in the same color as the limit line, but paler still and dashed. Portions of traces which pass the limits but fail the margin will be displayed in amber.
- The trace is tested for the purpose of the “Trace Pass/Fail” indication in the graticule if, in addition to **Limit On/Off** being **On**, the trace is displayed and **Test Limits (All Limits)** is on (see [“Test Limits” on page 383](#)). If the trace is not tested, no report of the trace passing or failing is seen on the graticule. Note that the SCPI queries of Limit Pass/Fail are independent of these conditions; the test is always performed when queried over SCPI.

The PASS/FAIL box in the corner of the Meas Bar is only displayed if there is at least one “Trace Pass/Fail” indication displayed in the graticule.

- Note that the red and amber coloring of traces which fail the limits and/or margins only applies to traces whose X-axis corresponds to the current analyzer X-axis. Traces which are not updating (in View, for example) will not change color if the analyzer X-axis settings (e.g., start and stop frequency) do not match those of the trace, for example if they have been changed since the trace stopped updating. In this case, the Invalid Data indicator (\*) will appear in the upper right hand corner.
- When the limits are frequency limits but the trace is a zero-span trace, the limit trace is drawn at the limit amplitude of the center frequency. When the limits are time limits but the trace is a frequency domain trace, the limit trace is drawn according to the current time axis, with the left of the screen

being 0 and the right being equal to sweep time.

<b>Remote Command:</b>	:CALCulate:LLINe[1]   2   3   4   5   6 :DISPlay OFF   ON   0   1 :CALCulate:LLINe[1]   2   3   4   5   6 :DISPlay?
Example:	:CALC:LLIN2:DISP ON !turns on the display for limit line 2.
Dependencies/Couplings:	Limit display ON selects the limit. Testing is done on all displayed limits if <b>Test Limits (All Limits)</b> is ON. Entering the limit menu from the GUI turns on the selected limit. This command will generate an "Option not available" error unless the proper Option is present in your instrument.
Preset:	OFF
State Saved:	Saved in State.
Key Path:	<b>Meas Setup, Limits</b>
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## Properties

Accesses a menu which lets you set the properties of the selected limit.

Key Path	<b>Meas Setup, Limits</b>
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**Select Limit** Specifies the selected limit. The term “selected limit” is used throughout this document to specify which limit will be affected by the functions.

Key Path	<b>Meas Setup, Limits, Properties</b>
Preset	Limit 1, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved	Saved in State.
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**Test Trace** Selects the trace you want the limit to test. A limit is applied to one and only one trace; each trace can have both an upper and a lower limit. When executing Limit Test, the limit is applied only to the specified trace.

A trace can have multiple limit lines simultaneously; in that case, only one upper and one lower limit line will affect the color of the trace. Other limit lines will be displayed, and will affect the pass/fail status,

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but the trace will not turn red if it crosses a secondary limit line.

<b>Remote Command:</b>	:CALCulate:LLINe[1] 2 3 4 5 6:TRACe 1 2 3 4 5 6 :CALCulate:LLINe[1] 2 3 4 5 6:TRACe?
Example:	:CALC:LLIN3:TRAC 2 applies limit 3 to trace 2.
Dependencies/Couplings:	This matters when testing a trace or limit line for failure, via :CALC:LLIN3:FAIL? or :CALC:TRAC2:FAIL?
Preset:	Limits 1 and 2 preset to 1, Limits 3 and 4 preset to 2, Limits 5 and 6 preset to 3 Not affected by Mode Preset, preset by Restore Mode Defaults.
Min:	1
Max:	6
State Saved:	Saved in State.
Readback:	Trace 1 2 3 4 5 6
Key Path:	<b>Meas Setup, Limits, Properties</b>
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**Type** Selects whether the limit you are editing is an upper or lower limit. An upper limit fails if the trace exceeds the limit. A lower limit fails if the trace falls below the limit.

<b>Remote Command:</b>	:CALCulate:LLINe[1] 2 3 4 5 6:TYPE UPPer LOWer :CALCulate:LLINe[1] 2 3 4 5 6:TYPE?
Example:	:CALC:LLIN2:TYPE LOW !sets limit line 2 to act as a lower limit.
Dependencies/Couplings:	If a margin has already been set for this limit line, and this key is used to change the limit type, then the margin value will reverse sign.
Preset:	Upper for Line 1, 3, and 5; Lower for Line 2, 4, 6. Not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State.
Key Path:	<b>Meas Setup, Limits, Properties</b>
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**Interpolation** Accesses a menu which lets you set the frequency and amplitude interpolation of the selected limit.

Key Readback:	[Lin Log Frequency, Lin Log Amplitude]
Key Path:	<b>Meas Setup, Limits, Properties</b>
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**Frequency Interpolation** This key is grayed out if Time is the selected X Axis Units. Sets the interpolation between frequency points, allowing you to determine how limit trace values are computed between points in a limit table. The available interpolation modes are linear and logarithmic. If frequency interpolation is logarithmic (Log), frequency values between limit points are computed by first taking the logarithm of both the table values and the intermediate value. A linear interpolation is then performed in this logarithmic frequency space. An exactly analogous manipulation is done for logarithmic amplitude interpolation.

Note that the native representation of amplitude is in dB.

For linear amplitude interpolation and linear frequency interpolation, the interpolation is computed as:

$$y = 20 \log\left(\frac{10^{\frac{y_{i+1}}{20}} - 10^{\frac{y_i}{20}}}{f_{i+1} - f_i}(f - f_i) + 10^{\frac{y_i}{20}}\right)$$

For linear amplitude interpolation and log frequency interpolation, the interpolation is computed as:

$$y = 20 \log\left(\frac{10^{\frac{y_{i+1}}{20}} - 10^{\frac{y_i}{20}}}{\log f_{i+1} - \log f_i}(\log f - \log f_i) + 10^{\frac{y_i}{20}}\right)$$

For log amplitude interpolation and linear frequency interpolation, the interpolation is computed as:

$$y = \frac{y_{i+1} - y_i}{f_{i+1} - f_i}(f - f_i) + y_i$$

For log amplitude interpolation and log frequency interpolation, the interpolation is computed as:

$$y = \frac{y_{i+1} - y_i}{\log f_{i+1} - \log f_i}(\log f - \log f_i) + y_i$$

---

**NOTE** Note: Interpolation modes determine how limit values are computed between points in the limit table. The appearance of a limit trace is also affected by the amplitude scale, which may be linear or logarithmic.

---

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:CONTRol:INTerpolate:TYPE LOGarithmic LINear  :CALCulate:LLINE[1] 2 3 4 5 6:CONTRol:INTerpolate:TYPE?
Example:	:CALC:LLIN:CONT:INT:TYPE LIN !sets limit line 1 frequency interpolation to linear.
Preset:	Linear, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State.
Key Path:	<b>Meas Setup, Limits, Properties, Interpolation</b>
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**Amplitude Interpolation** Sets the interpolation to linear or logarithmic for the specified limiting points set, allowing you to determine how limit trace values are computed between points in a limit table. See Frequency Interpolation for the equations used to calculate limit values between points.

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:AMPLitude:INTERpolate:TYPE LOGarithmic LINEar :CALCulate:LLINE[1] 2 3 4 5 6:AMPLitude:INTERpolate:TYPE?
Example:	:CALC:LLIN:AMPL:INT:TYPE LIN !sets limit line 1 amplitude interpolation to linear.
Preset:	Logarithmic, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Properties, Interpolation</b>
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**Fixed / Relative** Opens a menu which will allow you to specify that the selected limit is relative to either Center Frequency or Reference level.

Key Readback	Fixed Rel to CF Rel to RL Rel to CF + RL (square brackets)
Key Path	<b>Meas Setup, Limits, Properties</b>
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**Relative to CF** Chooses whether the limit line frequency points are coupled to the instrument center frequency, and whether the frequency points are expressed as an offset from the instrument center frequency. If the limit lines are specified with time, this has no effect. The limit table must in this case support negative frequencies.

For example, assume you have a frequency limit line, and the analyzer center frequency is at 1 GHz. If Relative to CF is “Off”, entering a limit line segment with a frequency coordinate of 300 MHz displays the limit line segment at 300 MHz, and the limit line segment will not change frequency if the center frequency changes. If Relative to CF is “On”, entering a limit line segment with a frequency coordinate of 300 MHz displays the limit line segment at CF + 300 MHz, or 1.3 GHz. Furthermore, if the center frequency changes to 2 GHz, the limit line segment will be displayed at CF + 300 MHz, or 2.3 GHz.

It is possible to change this setting after a limit line has been entered. When changing from On to Off or vice-versa, the frequency values in the limit line table change so that the limit line remains in the same position for the current frequency settings of the analyzer.

Pressing this button makes Center Frequency the active function.

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:FREQuency:CMODE:RELative ON OFF 1 0 :CALCulate:LLINE[1] 2 3 4 5 6:FREQuency:CMODE:RELative?
Example:	:CALC:LLIN:FREQ:CMOD:REL ON !makes limit line 1 relative to the center frequency.



Remote Command Notes:	If the Trace Domain is changed to Time (:CALCulate:LLINE:CONTRol:DOMain TIME), the SCPI command :CALCulate:LLINE[1] 2 3 4 5 6:FREQUENCY:CMODE:RELative ON OFF 1 0 will have no effect.
Dependencies/Couplings:	Pressing this button makes Center Frequency the active function.
Preset:	Off, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Properties, Fixed/Relative</b>
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**Relative to RL** Chooses whether the limit line amplitude points are coupled to the instrument reference level, and whether the amplitude points are expressed as an offset from the instrument reference level.

For example, assume you have a limit line, and the reference level at  $-10$  dBm. If Relative to RL is “Off”, entering a limit line segment with an amplitude coordinate of  $-20$  dB displays the limit line segment at  $-20$  dBm, and the limit line segment will not change amplitude if the reference level amplitude changes. If Relative to RL is “On”, entering a limit line segment with an amplitude coordinate of  $-20$  dB displays the limit line segment at RL  $-20$  dB, or  $-30$  dBm. Furthermore, if the reference level amplitude changes to  $-30$  dBm, the limit line segment will be displayed at RL  $-20$  dB, or  $-50$  dBm.

It is possible to change this setting after a limit line has been entered. When changing from On to Off or vice-versa, the amplitude values in the limit line table change so that the limit line remains in the same position for the current reference level settings of the analyzer.

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:AMPLitude:CMODE:RELative ON OFF 1 0 :CALCulate:LLINE[1] 2 3 4 5 6:AMPLitude:CMODE:RELative?
Example:	:CALC:LLIN:AMPL:CMOD:REL ON !makes limit line 1 relative to the reference level amplitude.
Dependencies/Couplings:	Pressing this button makes Reference level the active function.
Preset:	Off, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Properties, Fixed/Relative</b>
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**Description** Provides a description of up to 60 characters by which the operator can easily identify the limit. Will be stored in the exported file. Can be displayed in the active function area by selecting as the active function, if desired to be in a screen dump.

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:DESCRiption "Description" :CALCulate:LLINE[1] 2 3 4 5 6:DESCRiption?
Example:	:CALC:LLIN:DESC "European Emissions"

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Preset:	"" (null String), not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Properties</b>
Readback:	As much of the description will fit on one line of the key, followed by "... " if some of the description will not fit on one line of the key.
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**Comment** Sets an ASCII comment field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to be in a screen dump. The Limits .csv file supports this field.

<b>Remote Command:</b>	:CALCulate:LLINe[1] 2 3 4 5 6:COMMeNt "text" :CALCulate:LLINe[1] 2 3 4 5 6:COMMeNt?
Example:	:CALC:LLIN1:COMM "this is a comment"
Preset:	"" (null String), not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Properties</b>
Readback:	As much of the description will fit on one line of the key, followed by "... " if some of the description will not fit on one line of the key.
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### Margin

Selects a margin for this limit, which will cause a trace to Fail Margin when the trace is between the limit line and the margin line. Portions of the traces which pass the limit but fail the margin will be displayed in an amber color.

A margin is always specified in dB relative to a limit – an upper limit will always have a negative margin, and a lower limit will always have a positive margin. If a value is entered with the incorrect sign, the system will automatically take the negative of the entered value.

If the limit type is switched from lower to upper while margin is present, the margin will reverse sign.

When the Margin is selected, it may be turned off by pressing the Margin key until Off is underlined. This may also be done by performing a preset. Margin is the default active function whenever the margin is on, and it is not the active function whenever the margin is off.

The margin lines are displayed in the same color as limit lines, but paler. If the limited trace is blanked

then the limit line and the margin line will be blanked as well.

<b>Remote Command:</b>	:CALCulate:LLINE[1] 2 3 4 5 6:MARGin <rel_amp1> :CALCulate:LLINE[1] 2 3 4 5 6:MARGin? :CALCulate:LLINE[1] 2 3 4 5 6:MARGin:STATe OFF ON 0 1 :CALCulate:LLINE[1] 2 3 4 5 6:MARGin:STATe?
Example:	:CALC:LLIN1:MARG -2dB !sets limit line 1's margin to -2 dB (Limit Line 1 is by default an upper limit). :CALC:LLIN2:MARG 1dB !sets limit line 2's margin to 1 dB (Limit Line 2 is by default a lower limit). :CALC:LLIN2:MARG:STAT OFF !turns off the margin for limit line 2 and removes any tests associated with that margin line.
Remote Command Notes:	The queries "Limit Line Fail?" (:CALCulate:LLINE[1] 2 3 4 5 6:FAIL?) and "Trace Fail?" (:CALCulate:TRACe[1] 2 3 4 5 6:FAIL?) will return 1 if the margin fails.
Dependencies/Couplings:	This will affect :CALC:LLIN3:FAIL or :CALC:TRAC2:FAIL?
Preset:	not affected by Mode Preset, set to 0 dB for all Limits by Restore Mode Defaults.
State Saved:	Saved in State.
Key Path:	<b>Meas Setup, Limits</b>
Min:	-40 dB (Upper); 0 dB (Lower)
Max:	0 dB (Upper); 40 dB (Lower);
Default Unit:	dB
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## Edit

Opens the Table Editor for the selected limit line.

When entering the menu, the editor window (with the limit table) turns on, the selected Limit is turned **On** and the amplitude scale is set to **Log**. The display of the trace to which the selected limit applies is turned on (thus, traces in Blank are set to View and traces in Background are set to On). Turning on the Limit means it's display will be on, and it's testing mode will be on as well; you should turn off any other limits that are on if they interfere with the editing of the selected limit.

---

**NOTE** The table editor will only operate properly if the analyzer is sweeping, because its updates are tied to the sweep system. Thus, you should not try to use the editor in single sweep, and it will be sluggish during compute-intensive operations like narrow-span FFT sweeps.

---

When exiting the edit menu (by using the Return key or by pressing an instrument front panel key), the editor window turns off, however the Limit is still on and displayed, and the amplitude scale remains

### Log.

Limits are turned off by a Preset, but the Limits arrays (data) are only reset (deleted) by Restore Mode Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.

Dependencies/Couplings:	Turns the Limit Peaks table off. A remote user can enter or access limit line data via :CALCulate:LLINe[1] 2 3 4 5 6:DATA
Key Path:	<b>Meas Setup, Limits</b>
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**Navigate** Lets you move through the table to edit the desired point

Key Path	<b>Meas Setup, Limits, Edit</b>
Notes	There is no value readback on the key
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**Frequency** Lets you edit the frequency of the current row.

Key Path	<b>Meas Setup, Limits, Edit</b>
Notes	There is no value readback on the key
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**Amplitude** Lets you edit the Amplitude of the current row.

Key Path	<b>Meas Setup, Limits, Edit</b>
Notes	There is no value readback on the key
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**Insert Point Below** Pressing this key inserts a point below the current point. The new point is a copy of the current point. And becomes the current point. The new point is not yet entered into the underlying table, and the data in the row is displayed in Light Gray.

Key Path	<b>Meas Setup, Limits, Edit</b>
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**Delete Point** This is an immediate action key. It will immediately delete the currently-selected point, whether or not that point is being edited, and select Navigate. The point following the currently-selected point (or the point preceding if there is none) will be selected.

Key Path	<b>Meas Setup, Limits, Edit</b>
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**Copy from Limit** Copies an existing limit into the current limit, including all secondary parameters (Description, Associated Trace, Type, Margin, Interpolation, Relative to CF/RL).

**Remote Command:**                    :CALCulate:LLINE[1] | 2 | 3 | 4 | 5 | 6 :COPY  
LLINE1 | LLINE2 | LLINE3 | LLINE4 | LLINE5 | LLINE6

Example:                                :CALC:LLINE2:COPY LLINE1 !copies the data from line 1 into line 2.

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**Build from Trace** Builds a limit using an existing trace. This command will overwrite all data in the limit. Since a straight copy would typically have hundreds or thousands of segments, the data will be approximated to better represent a limit line; small excursions whose width is less than 10 trace buckets will sometimes not be captured. Secondary parameters which are not associated with traces (Description, Associated Trace, Type, Margin, Interpolation, Relative to CF/RL) will be unchanged.

When taking a trace in order to build a limit, it will often work well to take the trace with a resolution bandwidth wider than the expected measurement, a video bandwidth lower than the expected measurement, and with the detector set to Max Hold or Min Hold.

Note that an upper limit will be built above the trace, while a lower limit will be built below the trace. If the trace is constant, the limit should pass after being built.

**Remote Command:**                    :CALCulate:LLINE[1] | 2 | 3 | 4 | 5 | 6 :BUILD  
TRACE1 | TRACE2 | TRACE3 | TRACE4 | TRACE5 | TRACE6

Example:                                :CALC:LLIN2:BUIL TRACE1 !builds limit line 2 based on the data in trace 1. This will overwrite the data in the table editor.

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**Offset** Enters a menu which allows you to offset the limit trace by a specified frequency, time, or amplitude. The offsets will be immediately applied to the limit trace for display and failure calculation; the offset can also be applied to the points in the limit line.

Key Path                                **Meas Setup, Limits, Edit**

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**X Offset** Offsets the limit trace by some specified frequency (for Frequency-based limit lines) or a time (for time-based limit lines).

**Remote Command:**                    :CALCulate:LLINE[1] | 2 | 3 | 4 | 5 | 6 :OFFSet:X <value>  
:CALCulate:LLINE[1] | 2 | 3 | 4 | 5 | 6 :OFFSet:X?  
<value> = <freq> if Limit X-Axis Unit is Frequency,  
<value> = <time> if Limit X-Axis Unit is Time

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Example:	:CALC:LLIN:OFFS:X -50MHZ !sets the X axis offset to -50 MHz. :CALC:LLIN:OFFS:UPD !will apply the X axis offset to all points in the limit line, then reset the X axis offset to zero.
Preset:	0 Hz if Limit X-Axis Unit is Frequency 0 S if Limit X-Axis Unit is Time
State Saved:	Saved in State, survives Preset
Key Path:	<b>Meas Setup, Limits, Edit, Offset</b>
Min:	-500 GHz
Max:	500 GHz
Default Unit:	Determined by X axis scale.
Instrument S/W Revision:	A.02.00

**Y Offset** Offsets all segments in the limit line by some specified amplitude.

<b>Remote Command:</b>	:CALCulate:LLINe[1]   2   3   4   5   6 :OFFSet:Y <rel ampl> :CALCulate:LLINe[1]   2   3   4   5   6 :OFFSet:Y?
Example:	:CALC:LLIN:OFFS:Y -3 dB !sets the Y axis offset to -3 dB. :CALC:LLIN:OFFSet:UPD !will apply the Y axis offset to all points in the limit line, then reset the Y axis offset to zero.
Preset:	0 dB
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits, Edit, Offset</b>
Min:	-Infinity
Max:	+Infinity
Default Unit:	dB
Instrument S/W Revision:	A.02.00

**Apply Offsets to Limit Table** Adds the X and Y offsets to each point in the limit table, then resets the X and Y offset values to zero. This has no effect on the position of the limit trace.

<b>Remote Command:</b>	:CALCulate:LLINe[1]   2   3   4   5   6 :OFFSet:UPDate
Example:	:CALC:LLIN:OFFS:UPD !sets updates the limit table to reflect the X and Y offsets, then resets the offsets to zero.
State Saved:	No state
Key Path:	<b>Meas Setup, Limits, Edit, Offset</b>
Instrument S/W Revision:	A.02.00

**Scale X Axis** Matches the X Axis to the selected Limit, as well as possible.

For frequency limits and a frequency-domain X-axis, sets the Start and Stop Frequency to contain the minimum and maximum Frequency of the selected Limit. The range between Start Frequency and Stop Frequency is 12.5% above the range between the minimum and maximum Frequency so that span exceeds this range by one graticule division on either side.

For time limits and a time-domain X-axis, sets the sweep time to match the maximum Time of the selected Limit.

If the domain of the selected limit does not match the domain of the X Axis, no action is taken. Standard clipping rules apply, if the value in the table is outside the allowable range for the X axis.

Key Path	<b>Meas Setup, Limits, Edit</b>
Instrument S/W Revision	A.02.00

### Delete Limit

Deletes the currently selected limit line. Pressing Delete Limit purges the data from the limit line tables.

Limit data – including secondary parameters such as description, margin value, etc. - will be cleared and returned to factory preset settings.

When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete limit. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message “Limit deleted” appears in the MSG line.

<b>Remote Command:</b>	:CALCulate:LLINe[1]   2   3   4   5   6 :DELete
Example:	:CALC:LLIN2:DEL !deletes all data for limit line 2.
Key Path:	<b>Meas Setup, Limits</b>
Instrument S/W Revision:	A.02.00

### Test Limits

Selects whether displayed traces are tested against displayed limits (i.e. those for which Limit On/Off is set to On).

For each displayed trace for which a Limit is turned on, a message will be displayed in the upper-left corner of the graticule to notify whether the trace passes or fails the limits.

If the trace is at or within the bounds of all applicable limits and margins, the text “Trace x Pass” will be displayed in green, where x is the trace number. A separate line is used for each reported trace.

If the trace is at or within the bounds of all applicable limits, but outside the bounds of some applicable margin, the text “Trace x Fail Margin” will be displayed in amber, where x is the trace number. A separate line is used for each reported trace.

If the trace is outside the bounds of some applicable limits, the text “Trace x Fail” will be displayed in red, where x is the trace number. A separate line is used for each reported trace.

If the trace has no enabled limits, or the trace itself is not displayed, no message is displayed for that trace.

## Swept SA Meas Setup

The PASS/FAIL box in the corner of the Meas Bar is only displayed if there is at least one “Trace Pass/Fail” indication displayed in the graticule.

If two amplitude values are entered for the same frequency, a single vertical line is the result. In this case, if an upper line is chosen, the lesser amplitude is tested. If a lower line is chosen, the greater amplitude is tested.

This command only affects the display, and has no impact on remote behavior. Limit queries over SCPI test the trace against the limit regardless of whether the trace or the limit is turned on (exception: the query `:CALCulate:TRACe[1]|2|3|4|5|6:FAIL?` tests only the limits that are turned on for that trace).

<b>Remote Command:</b>	<code>:CALCulate:LLINe:TEST OFF ON 0 1</code> <code>:CALCulate:LLINe:TEST?</code>
Example:	<code>:CALC:LLIN:TEST ON</code> !turns on testing, and displays the results in the upper left corner.
Preset:	On, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	<b>Meas Setup, Limits</b>
Instrument S/W Revision:	A.02.00

### X-Axis Unit

Selects how the limit-line segments are defined. Pressing X Axis Unit selects whether the limit lines will be entered using frequency (Freq) or sweep time (Time) to define the segments. They can be specified as a table of limit-line segments of amplitude versus frequency, or of amplitude versus time. When the X-Axis Unit is set to Time, a time value of zero corresponds to the start of the sweep, which is at the left edge of the graticule, and the column and softkey in the Limit Table Editor will read Time instead of Frequency

Switching the limit-line definition between Freq and Time will erase all of the current limit lines. When you do this from the front panel, a warning dialog will pop up letting you know that you are about to erase all the limit lines, and prompting you to hit “OK” if you are sure:

Warning: changing the X Axis Unit will erase all your limit lines. Are you sure you want to do this?  
Press Enter or OK to proceed, or Cancel (Esc) to Cancel

<b>Remote Command:</b>	<code>:CALCulate:LLINe:CONTRol:DOMain FREQuency TIME</code> <code>:CALCulate:LLINe:CONTRol:DOMain?</code>
Example:	<code>:CALC:LLIN:CONT:DOM FREQ</code> !deletes all currently existing limit lines, then sets all limit lines to be specified in terms of frequency.
Dependencies/Couplings:	This affects all limit lines simultaneously, and resets all limit line data except the .wav file and email address stored in the Actions.
Preset:	Freq, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State



Key Path: **Meas Setup, Limits**

Instrument S/W Revision: A.02.00

### Delete All Limits

Deletes all limit lines. Pressing Delete All Limits purges the data from all limit line tables.

All limit data will be cleared and returned to factory preset settings.

When this key is pressed a prompt is placed on the screen that says "Please press Enter or OK key to delete all limits. Press ESC or Cancel to close this dialog." The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message "All Limits deleted" appears in the MSG line.

**Remote Command:** :CALCulate:LLINe:ALL:DELeTe

Example: :CALC:LLIN:ALL:DEL !deletes all data for all limit lines.

Key Path: **Meas Setup, Limits**

Instrument S/W Revision: A.02.00

### Limit Line Data (Remote Only, Backwards Compatibility)

Defines the limit line values, and destroys all existing data. Up to 200 points may be defined for each limit using the following parameters.

<x>Frequency or time values as specified by :Calculate:LLINe:CONTRol:DOMain. Units default to Hz (for frequency) and seconds (for time).

Range: -30 Gs to +30 Gs for time limits, -3 kHz to +350 GHz for frequency limits.

<ampl>Amplitude values units default to dBm. Up to two amplitude values can be provided for each x-axis value, by repeating <x-axis> in the data list.

Range: -1000 dBm to +1000 dBm

<connect> connect values are either "0" or "1." A "1" means this point will be connected to the previously defined point to define the limit line. A "0" means that it is a point of discontinuity and is not connected to the preceding point. The connect value is ignored for the first point.

**Remote Command:** :CALCulate:LLINe[1] | 2 | 3 | 4 | 5 | 6 :DATA  
<x> , <ampl> , <connect> { , <x> , <ampl> , <connect> }  
:CALCulate:LLINe[1] | 2 | 3 | 4 | 5 | 6 :DATA?

Example: :CALC:LLIN3:DATA  
1E9,-20,0,2E9,-20,1,2E9,-10,1,3E9,-10,1  
describes a stair-stepped limit line.

Preset: Limit line data is cleared by Restore Mode Defaults. However, it survives shutdown/restart of the analyzer application (including power cycle)

State Saved: Saved in instrument state.

Instrument S/W Revision: A.02.00

### Limit Line Fail? (Remote Only)

Tests a limit line against its associated trace. Returns a 0 if the trace is within the limit and margin, a 1 if the trace exceeds either the limit or the margin.

Note that this command only tests one limit line – other limit lines are not tested when executing this command. To see whether a trace passed all limits, use :CALCulate:TRACe:FAIL?.

Note this command performs the test regardless of whether the trace or the limit is turned on the display.

**Remote Command:** :CALCulate:LLINe[1]|2|3|4|5|6:FAIL?

Example: :CALC:LLIN:FAIL? returns a zero if limit line 1's associated trace has no failure, 1 if there is a margin or limit failure.

Instrument S/W Revision: A.02.00

### Limit State (Remote Only, SCPI standard compatibility)

Sets or queries whether the limit line is tested. This command is identical to :CALC:LLIN[1]|2|3|4|5|6:DISP.

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:STATE ON|OFF|0|1  
:CALCulate:LIMit[1]|2|3|4|5|6:STATE?

Example: :CALC:LIM:STAT ON  
turns on limit line 1

Dependencies/Couplings: This command is identical to :CALC:LLIN:DISP  
Testing is done on all displayed limits if "Test All Limits" is ON.

Preset: Off (all limits)

State Saved: Saved in State.

Instrument S/W Revision: A.02.00

### Limit Line Control (Remote Only, SCPI standard compatibility)

Defines a list of limit line control (frequency or time) values for a given limit line. Up to 2000 points may be defined for each limit using the following parameters.

<x>Frequency or time values as specified by :Calculate:LLINe:CONTRol:DOMain. Units default to Hz (for frequency) and seconds (for time).

Range: –30 Gs to +30 Gs for time limits, –3 kHz to +1200 GHz for frequency limits.

Note that X values may be repeated if a vertical step in the limit line is desired.

The points query returns the number of points in the control. It should match the number of points in the

amplitude, that is, the number of values for the CONTROL axis and for the corresponding UPPER and/or LOWER limit lines must be identical. If one array is larger than the other, the limit trace is built using only as much data as is contained in the smaller array.

An empty array returns not a number (9.91e+37 to a data query), 0 to a POINTs query.

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:CONTRol[:DATA] <x>, <x>, ...  
:CALCulate:LIMit[1]|2|3|4|5|6:CONTRol[:DATA]?

**Example:** :CALC:LIM:CONT 1GHz,2GHz,2GHz,3GHz  
!describes the X values of a stair-stepped limit line.

**Preset:** Limit line data is cleared by Restore Mode Defaults.

**State Saved:** Saved in State.

**Instrument S/W Revision:** A.02.00

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:CONTRol:POINTs?

**Example:** :CALC:LIM:CONT:POIN?  
!returns the number of points in the limit line.

**Preset:** Limit line data is cleared by Restore Mode Defaults.

**State Saved:** Saved in instrument state.

**Instrument S/W Revision:** A.02.00

### Limit Line Upper / Lower (Remote Only, SCPI standard compatibility)

Defines a list of amplitude values for a given limit line. Changing the number of elements in the list spectrum will automatically turn the limit line off. Using the “UPP” syntax defines an upper limit line, using the “LOW” syntax defines a lower limit line. Note that a line may not be simultaneously both upper and lower; the type of the limit line will automatically be changed as appropriate. Up to 200 points may be defined for each limit using the following parameters.

<ampl>Amplitude values units default to dBm.

Range: –200 dBm to +100 dBm

The points query returns the number of points in the amplitude list. It will not be possible to turn on the limit line unless the number of points in the control matches the number of points in the amplitude.

The points query returns the number of points in the amplitude list. It should match the number of points in the control, that is, the number of values for the CONTROL axis and for the corresponding UPPER and/or LOWER limit lines must be identical. If one array is larger than the other, the limit trace is built using only as much data as is contained in the smaller array.

An empty array returns the system error “list is empty” to a data query, 0 to a POINTs query.

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:UPPPer[:DATA] <ampl>,  
<ampl>, ...  
:CALCulate:LIMit[1]|2|3|4|5|6:UPPPer[:DATA]?

## Swept SA Meas Setup

Example: :CALC:LIM:UPP -10, -10, -20, -20  
!describes the amplitude values of an upper limit line

Preset: Limit line data is cleared by Restore Mode Defaults.

State Saved: Saved in State.

Instrument S/W Revision: A.02.00

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:UPPer:POINts?

Example: :CALC:LIM:UPP:POIN? !returns the number of points in the upper limit line.

Preset: Upper Limit line data/points is cleared by Restore Mode Defaults.

State Saved: Saved in instrument state.

Instrument S/W Revision: A.02.00

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:LOWer[:DATA] <ampl>, ...  
:CALCulate:LIMit[1]|2|3|4|5|6:LOWer[:DATA]?

Example: :CALC:LIM:LOW -10, -10, -20, -20  
!describes the amplitude values of an lower limit line

Preset: Limit line data is cleared by Restore Mode Defaults.

State Saved: Saved in instrument state.

Instrument S/W Revision: A.02.00

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:LOWer:POINts?

Example: :CALC:LIM:UPP:POIN? !returns the number of points in the lower limit line.

Preset: Limit line data/points is cleared by Restore Mode Defaults.

State Saved: Saved in instrument state.

Instrument S/W Revision: A.02.00

### Limit Fail? (Remote Only, SCPI standard Compatibility)

Tests a limit line against its associated trace. Returns a 0 if the trace is within the limit and margin, a 1 if the trace exceeds either the limit or the margin. This command is identical to “:CALC:LLIN:FAIL?”

Note that this command only tests one limit line – other limit lines are not tested when executing this command. To see whether a trace passed all limits, use :CALCulate:TRACe:FAIL?.

Note this command performs the test regardless of whether the trace or the limit is turned on the display.

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:FAIL?

Example: :CALC:LIM:FAIL? !returns a zero if limit line 1’s associated trace has no failure, 1 if there is a margin or limit failure.

Dependencies/Couplings: This command is identical to :CALC:LLIN:FAIL?  
Instrument S/W Revision: A.02.00

### Limit Clear (Remote Only, SCPI standard Compatibility)

Clears a limit line, and all associated data. This command is identical to “:CALC:LLIN:DEL”

**Remote Command:** :CALCulate:LIMit[1]|2|3|4|5|6:CLEar  
Example: :CALC:LIM2:CLE !deletes all data for limit line 2.  
Dependencies/Couplings: This command is identical to :CALC:LLIN:DEL  
Instrument S/W Revision: A.02.00

### Trace Fail? (Remote Only)

Tests a trace against all associated limit lines. Returns a 0 if the trace is within all limits and margins, a 1 if the trace exceed either the limit or the margin. If no limits apply to the selected trace, this will automatically return a 0.

Only applies to limits that are turned on, if a Limit is off it will not be tested. If a Trace is not displaying it will still be tested, and if **Test Limits (All Limits)** is off the Trace will still be tested.

This command ignores limit lines that are assigned to other traces.

**Remote Command:** :CALCulate:TRACe[1]|2|3|4|5|6:FAIL?  
Example: :CALC:TRAC3:FAIL? !returns a zero if there is no failure, 1 if the trace exceeds either the limit or the margin.  
Instrument S/W Revision: A.02.00

### Fixed / Relative Limit (Remote Only, Backwards Compatibility)

This command sets both Relative to CF and Relative to RL simultaneously for all limits. If queried, it returns whether Limit Line 1 is set Relative to CF, and ignores all other fixed/relative data.

**Remote Command:** :CALCulate:LLINe:CMODE FIXed|RELative  
:CALCulate:LLINe:CMODE?  
Example: :CALC:LLIN:CMOD REL !makes all limit lines relative to the center frequency and reference level.

## Swept SA Meas Setup

Remote Command Notes: This SCPI command is only supported for Backwards Compatibility.

PSA offers only the following softkey, which is generic to all limit lines:  
Limits Fixed / Rel.

On MXA, this functionality is provided by a softkey which is specific to each limit line, and which provides a sub-menu with 2 softkeys (Relative to CF / Relative to RL).

In order to be consistent with the implementation of the following new commands:

```
:CALCulate:LLINE[1]|2|3|4|5|6:FREQuency:CMODE:RELative ON|OFF|1|0  
:CALCulate:LLINE[1]|2|3|4|5|6:FREQuency:CMODE:RELative?  
and  
:CALCulate:LLINE[1]|2|3|4|5|6:AMPLitude:CMODE:RELative ON|OFF|1|0  
:CALCulate:LLINE[1]|2|3|4|5|6:AMPLitude:CMODE:RELative?
```

The `:CALCulate:LLINE:CMODE?` Query will returns 1 if Limit Line 1 is set Relative to CF, and returns 0 otherwise.

Preset: Fixed

Instrument S/W Revision: A.02.00

### Merge Limit Line Data

Adds the points with the specified values to the current limit line, allowing you to merge limit line data. Up to two amplitude values are allowed for each X value. If more than 200 points are entered to be merged, the first 200 points are merged, then an error ‘too many DATA entries’ is reported.

**Remote Command:** `:CALCulate:LLINE[1]|2|3|4|5|6:DATA:MERGE  
<x-axis>,<ampl>,<connected>{,<x-axis>,<ampl>,<connected>}`

Example: `:CALC:LLIN1:DATA:MERG 1000000000,-20,0,2000000000,-30,1 !merges  
the 10GHz segment and the 20GHz segment into limit line 1. Note that the  
20GHz segment will be connected to the next lower point, which may or may  
not be the 10GHz point.`

Remote Command Notes: This SCPI command is only supported for Backwards Compatibility.

Although PSA had a limit of 200 points, it is acceptable to increase that limit.

Preset: Fixed

Instrument S/W Revision: A.02.00

### 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 391.

See “More Information” on page 391.

<b>Remote Command:</b>	:CALCulate:BWIDth BANDwidth:NDB <rel_amp1> :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:	<b>Meas Setup</b>
Instrument S/W Revision:	Prior to A.02.00

## N dB Points Results Query

<b>Remote Command:</b>	: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
Instrument S/W Revision:	Prior to A.02.00

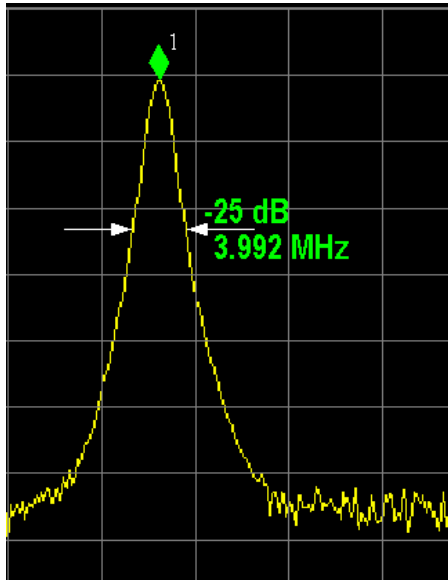
## More Information

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

## Swept SA Meas Setup

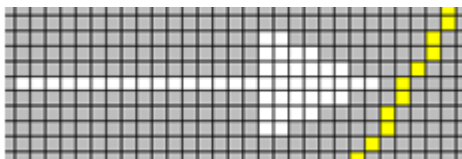
pixel). They point in, horizontally, at the trace below a peak, on either side of its skirts. There is one pixel between the arrow and the trace



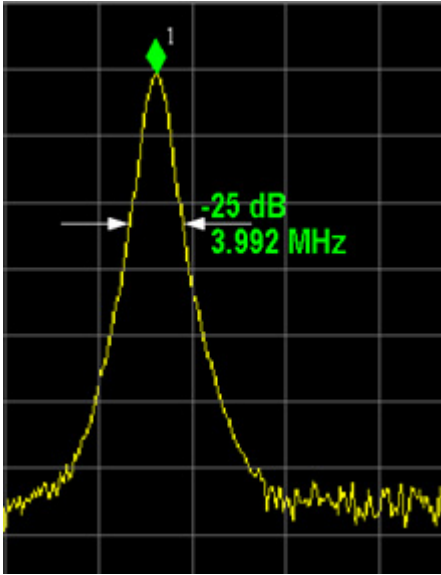
N dB Points can be used to measure the bandwidth of a signal; it is commonly used in conjunction with a tracking generator to measure filter bandwidths.

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 off screen to the right then it displays on the left arrow.

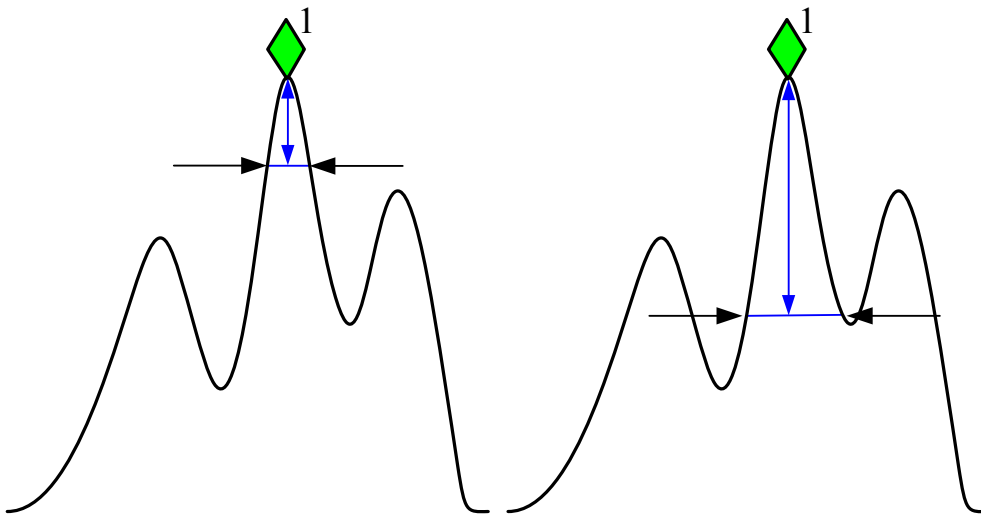
If the analyzer is unable to find data that is N dB below the marker on either side of the marker, the arrows are displayed at the indicator point of the marker, no value (---) will be displayed as the result and -100 Hz returned remotely (see figure below):



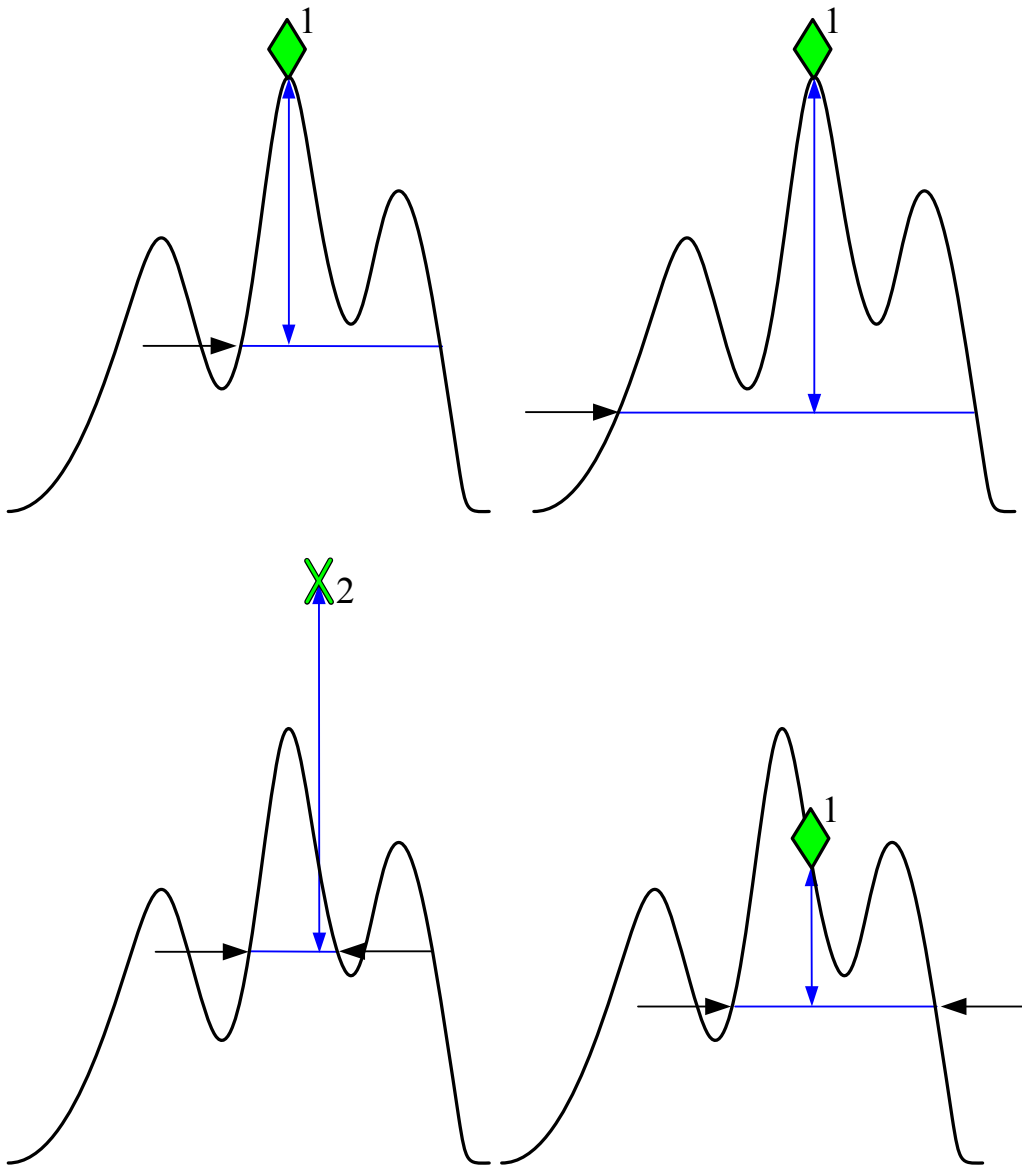




Some sample N dB scenarios are shown below, to illustrate how the function works in various cases. In each case, the two-headed blue arrow represents N dB of amplitude.



## Swept SA Meas Setup



## PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various desired operating conditions.

**Remote Command:** `[ :SENSe ] :FREQuency:SYNTHeSis [ :STATe ] 1 | 2 | 3`  
`[ :SENSe ] :FREQuency:SYNTHeSis [ :STATe ] ?`

Example: `FREQ:SYNT 2` selects optimization for best wide offset phase noise

Remote Command Notes:	Parameter: 1 - optimizes phase noise for small frequency offsets from the carrier. 2 - optimizes phase noise for wide frequency offsets from the carrier. 3 - optimizes LO for tuning speed  (In units whose hardware does not provide for an extra-fast tuning option, the settings for option 1 are used if option 3 is selected. This gives the fastest possible tuning for that hardware set)
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
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

### Auto

Selects the LO phase noise behavior to optimize dynamic range and speed 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 Close in Phase Noise**;

otherwise, **Best Wide-offset Phase Noise**

remembering that in units whose hardware does not provide for an extra-fast tuning option, the settings for Fast Tuning are the same as Best Close-in, so in those boxes you will see no difference between these settings.

These rules apply whether in swept spans, zero span, or FFT spans.

<b>Remote Command:</b>	[ :SENSe ] :FREQuency:SYNTHeSis:AUTO[ :STATe ] OFF   ON   0   1 [ :SENSe ] :FREQuency:SYNTHeSis:AUTO[ :STATe ] ?
Example:	FREQ:SYNT:AUTO ON
Preset:	ON
State Saved:	Saved in instrument state
Key Path:	<b>Meas Setup, PhNoise Opt</b>
Instrument S/W Revision:	Prior to A.02.00

### Best Close-in Noise

The LO phase noise is optimized for smaller offsets from the carrier, at the expense of phase noise



range. So making measurements with ADC dither gives you better amplitude linearity, but turning ADC dither off gives you a lower noise floor (better sensitivity).

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.

When ADC Dither is on, the linearity of low-level signals is improved. The enhanced linearity is mostly improved scale fidelity. 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.

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 0.2 dB.

**Remote Command:** [ :SENSE ] :ADC:DITHer [ :STATe ] OFF | ON  
[ :SENSe ] :ADC:DITHer [ :STATe ] ?

Preset: AUTO

Key Path: **Meas Setup**

Instrument S/W Revision: Prior to A.02.00

Modified at S/W Revision: A.02.00

### Auto

Sets the ADC dither to automatic. The analyzer then chooses the dither level according to which is most likely to be the best selection, based on other settings within the digital IF.

**Remote Command:** [ :SENSE ] :ADC:DITHer:AUTO [ :STATe ] OFF | ON | 0 | 1  
[ :SENSe ] :ADC:DITHer:AUTO [ :STATe ] ?

Example: ADC:DITH:AUTO ON

Preset: ON

State Saved: Saved in instrument state

Key Path: **Meas Setup, ADC Dither**

Readback: The “Auto” is underlined, and the readback value is whatever setting is auto-selected

Instrument S/W Revision: Prior to A.02.00

### Medium (Log Accy)

The Medium setting of ADC Dither (known as “On” in earlier versions of the instrument software) improves the linearity of low-level signals at the expense of some noise degradation.

Example ADC:DITH:ON

## Swept SA Meas Setup

Key Path	<b>Meas setup, ADC Dither</b>
Readback	If manually selected, the readback is Medium, with the “Man” underlined
Instrument S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

### Off (Best Noise)

When ADC Dither is Off, the instrument noise floor is improved, because without the need to make room for the dither, you get a lower noise floor and better sensitivity.

Example	ADC:DITH:OFF
Key Path	<b>Meas setup, ADC Dither</b>
Readback	If manually selected, the readback is Off, with the “Man” underlined.
Instrument S/W Revision	Prior to A.02.00

### 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 the 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.

<b>Remote Command:</b>	[ :SENSE ] : IF : GAIN : SWEPT [ : STATE ] OFF   ON   0   1 [ :SENSE ] : IF : GAIN : SWEPT [ : STATE ] ?
Example:	IF : GAIN : SWEP ON

Dependencies/Couplings:	<p>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).</p> <p>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.</p> <p>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.</p>
Remote Command Notes:	<p>where ON = high gain OFF = low gain</p>
Preset:	<p>Auto after Preset which yields Off unless the Preamp is on Auto and Off after Meas Preset</p>
State Saved:	Saved in State
Key Path:	<b>Meas Setup</b>
Readback Line:	High Gain or Low Gain
Instrument S/W Revision:	Prior to A.02.00

## Auto

Activates the auto rules for Swept IF Gain

<b>Remote Command:</b>	<pre>[ :SENSe ] :IF:GAIN:SWEPT:AUTO[ :STATe ] OFF ON 0 1 [ :SENSe ] :IF:GAIN:SWEPT:AUTO[ :STATe ]?</pre>
Example:	IF:GAIN:SWEP:AUTO ON
Preset:	ON
Key Path:	<b>Meas setup</b>
Instrument S/W Revision:	Prior to A.02.00

## Low Gain (Best for Large Signals)

Forces Swept IF Gain to be off.

Example:	IF:GAIN:SWEP OFF
----------	------------------

## Swept SA Meas Setup

State Saved: Saved in Instrument State  
Key Path: **Meas setup, ADC Ranging**  
Readback: Low Gain  
Instrument S/W Revision: Prior to A.02.00

### 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**  
Readback: High Gain  
Instrument S/W Revision: Prior to A.02.00

### 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 the data is re-acquired. 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**  
Readback Line: Autorange, High Gain or Low Gain  
Instrument S/W Revision: Prior to A.02.00



**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.

<b>Remote Command:</b>	[ :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:	<b>Meas setup</b>
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Meas setup, FFT IF Gain</b>
Readback:	Autorange
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Meas setup, FFT IF Gain</b>
Readback:	Low Gain
Instrument S/W Revision:	Prior to A.02.00

**High Gain (Best Noise Level)**

Forces FFT IF Gain to be on.

Example:	IF : GAIN : FFT HIGH
Dependencies/Couplings:	The High setting for <b>FFT IF Gain</b> is grayed out when <b>Swept IF Gain</b> is manually set to Low (not when Low is chosen by the auto-rules).

## Swept SA Meas Setup

State Saved:	Saved in Instrument State
Key Path:	<b>Meas setup, FFT IF Gain</b>
Readback:	High Gain
Instrument S/W Revision:	Prior to A.02.00

### 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. This key only appears if the N9063A Analog Demod personality is installed and licensed, or if Option EMC is installed and licensed.

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.

<b>Remote Command:</b>	[ :SENSe ] :DEMod AM FM PM OFF [ :SENSe ] :DEMod?
Example:	DEM AM turns amplitude demodulation function ON
Dependencies/Couplings:	When Tune & Listen is turned on, all active traces are forced to use the same detector.  CISPR detectors (QPD, EMI Avg, RMS Avg) and Tune & Listen are mutually exclusive. No sound output will be heard if one of these detectors is selected.
Preset:	OFF
State Saved:	Saved in Instrument State
Key Path:	<b>Meas Setup</b>
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00

### 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	<b>Meas Setup, Analog Demod Tune&amp;Listen</b>
State Saved	Saved in Instrument State
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command:</b>	[ :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:	<b>Meas Setup, Analog Demod Tune&amp;Listen, AM</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00

## 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:	<b>Meas Setup, Analog Demod Tune&amp;Listen</b>
Instrument S/W Revision:	Prior to A.02.00

## 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

## Swept SA Meas Setup

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.

<b>Remote Command:</b>	<code>[ :SENSe ] :DEMod:FM:BANDwidth:CHANnel &lt;freq&gt;</code> <code>[ :SENSe ] :DEMod:FM:BANDwidth:CHANnel?</code>
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:	<b>Meas Setup, Analog Demod Tune&amp;Listen, FM</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00

### 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 M.

<b>Remote Command:</b>	<code>[ :SENSe ] :DEMod:FM:DEEMphasis OFF US25 US50 US75 US750</code> <code>[ :SENSe ] :DEMod:FM:DEEMphasis?</code>
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 $\mu$ s pre-emphasis)
State Saved:	Saved in Instrument State
Key Path:	<b>Meas Setup, Analog Demod Tune &amp; Listen, FM</b>
Readback line:	1-of-N selection
Instrument S/W Revision:	Prior to A.02.00

**Off** This setting bypasses the De-emphasis filter.

Example: DEM:FM:DEEM OFF  
Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**  
Readback: Off  
Instrument S/W Revision: Prior to A.02.00

**25  $\mu$ s** Sets the De-emphasis time constant to 25 $\mu$ s.

Example: DEM:FM:DEEM US25  
Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**  
Readback: 25  $\mu$ s  
Instrument S/W Revision: Prior to A.02.00

**50  $\mu$ s** Sets the De-emphasis time constant to 50  $\mu$ s.

Example: DEM:FM:DEEM US50  
Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**  
Readback: 50  $\mu$ s  
Instrument S/W Revision: Prior to A.02.00

**75  $\mu$ s** Sets the De-emphasis time constant to 75  $\mu$ s.

Example: DEM:FM:DEEM US75  
Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**  
Readback: 75  $\mu$ s  
Instrument S/W Revision: Prior to A.02.00

**750  $\mu$ s** Sets the De-emphasis time constant to 750  $\mu$ sec.

Example: DEM:FM:DEEM US750  
Key Path: **Meas Setup, Analog Demod Tune&Listen, FM, De-emphasis**  
Readback: 750  $\mu$ s  
Instrument S/W Revision: Prior to A.02.00

## PM

Pressing this key, when it is not selected, selects and activates the PM demodulation function. Pressing it

## Swept SA Meas Setup

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:	<b>Meas Setup, Analog Demod Tune&amp;Listen</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	[ :SENSe ] :DEMod:PM:BANDwidth:CHANnel <freq> [ :SENSe ] :DEMod:PM:BANDwidth:CHANnel?
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Example:	DEM:PM:BAND:CHAN 200 MHz
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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.
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Preset:	100 kHz
State Saved:	Saved in Instrument State
Min:	390 Hz
Max:	8 MHz
Key Path:	<b>Meas Setup, Analog Demod Tune&amp;Listen, M</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00

### 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**  
 Instrument S/W Revision: Prior to A.02.00

### 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

Max: 100 s

Key Path: **Meas Setup, Analog Demod Tune&Listen**  
 Instrument S/W Revision: Prior to A.02.00

### 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

Instrument S/W Revision: Prior to A.02.00

### 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.

## Swept SA Meas Setup

See “More Information” on page 408.

<b>Remote Command:</b>	: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:	<b>Meas Setup</b>
Remote Compatibility Info:	In previous Noise Figure analysis applications, this command could optionally be preceded with the :SENSE keyword. The optional :SENSe keyword is no longer supported.
Instrument S/W Revision:	Prior to A.02.00

### 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

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**

Remote Compatibility Info:        In previous Noise Figure analysis applications, this command could optionally be preceded with the :SENSE keyword. The optional :SENSe keyword is no longer supported.

Instrument S/W Revision:         Prior to A.02.00

## 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

## Swept SA Meas Setup

Remote Compatibility Info: In previous Noise Figure analysis applications, this command could optionally be preceded with the :SENSE keyword. The optional :SENSE keyword is no longer supported.

Instrument S/W Revision: Prior to A.02.00

### 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

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## 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 411](#).

<b>Remote Command:</b>	: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
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:CALCulate:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:NEXT
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## Swept SA Peak Search

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 subpcoded marker
State Saved:	Not part of saved state
Key Path:	<b>Peak Search</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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 subpcoded marker
State Saved:	Not part of saved state
Key Path:	<b>Peak Search</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Peak Search</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 326”](#) 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	<b>Peak Search or Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Mkr->CF

Assigns the selected marker’s frequency to the Center Frequency setting. See the Section [““Marker To” on page 362”](#) 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:	<b>Peak Search or Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## Mkr->Ref Lvl

Assigns the selected marker’s level to the Reference Level setting. See the Section [““Marker To” on page 362”](#) 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:	<b>Peak Search or Marker -&gt;</b>
Instrument S/W Revision:	Prior to A.02.00

## 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

## Swept SA Peak Search

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	<b>Peak Search</b>
Instrument S/W Revision	Prior to A.02.00

### “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.

<b>Remote Command:</b>	:CALCulate:MARKer:PEAK:SEARch:MODE MAXimum PARAMeter :CALCulate:MARKer:PEAK:SEARch:MODE?
Remote Command Notes:	MAXimum corresponds to the <b>Highest Peak</b> setting PARAMeter corresponds to the <b>Same as “Next Peak” Criteria</b> setting
Preset:	MAXimum
State Saved:	Saved in state
Key Path:	<b>Peak Search, Peak Criteria</b>
Readback line:	Current state
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Peak Search, Peak Criteria, “Peak Search” Criteria</b>
Readback:	Highest Peak
Instrument S/W Revision:	Prior to A.02.00

**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**  
 Readback: Use Excurs & Thr  
 Instrument S/W Revision: Prior to A.02.00

### “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**  
 Instrument S/W Revision Prior to A.02.00

**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

## Swept SA Peak Search

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:	<b>Peak Search, Peak Criteria, "Next Peak" Criteria</b>
Instrument S/W Revision:	Prior to A.02.00

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:	<b>Peak Search, Peak Criteria, "Next Peak Criteria"</b>
Default Unit:	depends on the current selected Y axis unit
Instrument S/W Revision:	Prior to A.02.00

**Pk Threshold Line On/Off** Turns the peak threshold line on or off. Preset state is off. No equivalent SCPI command.

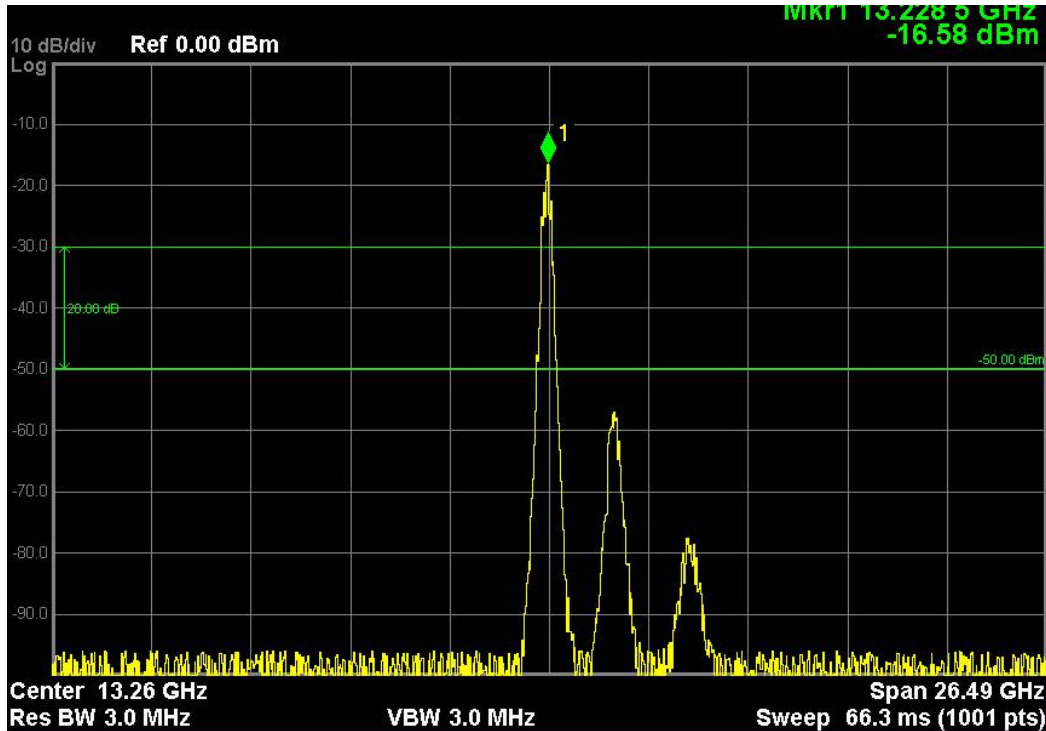
See ["More Information" on page 417](#).

Dependencies/Couplings:	If Peak Threshold is Off and the Peak Threshold line is turned on, it should turn on Peak Threshold.
Instrument S/W Revision:	Prior to A.02.00

## 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.

## Swept SA Peak Search



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	<b>Peak Search</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Peak Search, Peak Table</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Peak Search, Peak Table</b>
Instrument S/W Revision:	Prior to A.02.00

### 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 (GTDLLine) - 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

## Swept SA Peak Search

the display line requirements.

<b>Remote Command:</b>	<code>:CALCulate:MARKer:PEAK:TABLE:READout ALL GTDLine LTDLine  :CALCulate:MARKer:PEAK:TABLE:READout?</code>
Example:	<code>CALC:MARK:PEAK:TABL:READ GTDL</code>
Dependencies/Couplings:	Turning Display Line off forces Readout to ALL
Preset:	All
Preset:	All
State Saved:	Saved in State
Key Path:	<b>Peak Search, Peak Table</b>
Readback line:	1-of-N selection
Instrument S/W Revision:	Prior to A.02.00

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.

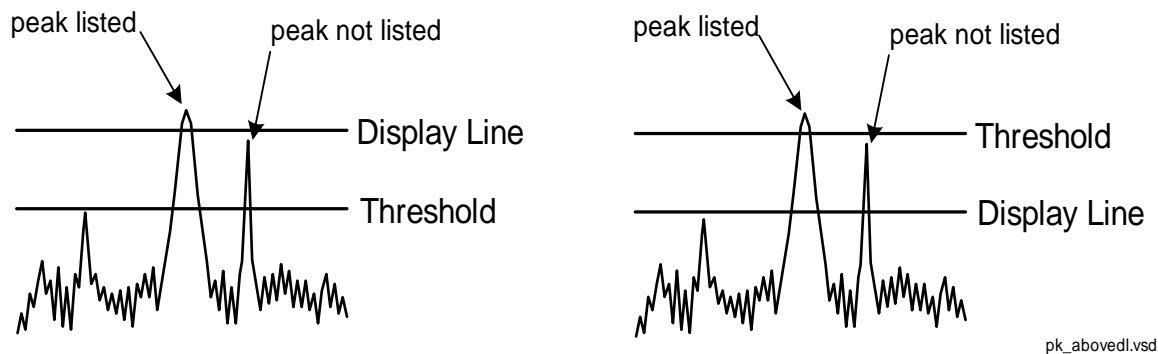


Figure 1- 2Above Display Line Peak Identification

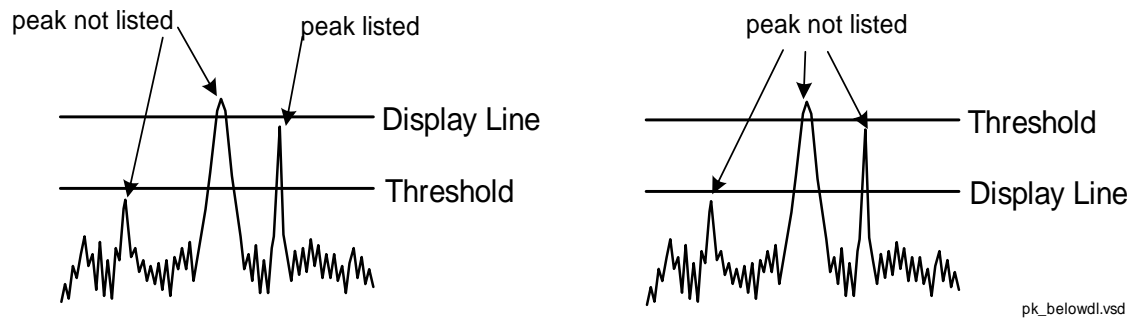


Figure 1- 3Below Display Line Peak Identification

**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**  
Readback: All  
Instrument S/W Revision: Prior to A.02.00

**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**  
Readback: Above DL  
Instrument S/W Revision: Prior to A.02.00

**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**  
Readback: Below DL  
Instrument S/W Revision: Prior to A.02.00

## 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.

## Swept SA Peak Search

See “More Information” on page 422.

<b>Remote Command:</b>	: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 <b>Fixed</b> 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.  <b>Signal Track</b> and <b>Continuous Peak Search</b> are mutually exclusive so if <b>Signal Track</b> is on, <b>Continuous Peak Search</b> will be grayed out and vice versa.
Remote Command Notes:	Sending this command selects the subcoded marker
Preset:	Mode Preset
State Saved:	Saved in State
Key Path:	<b>Peak Search</b>
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.
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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 <b>Coupled Markers</b> 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:	<b>Peak Search</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	: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:	<b>Peak Search</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 1068](#).

## Recall

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 1103](#).



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## **Restart**

Operation of this key is identical across several measurements. For details about this key, see [“Restart” on page 1127](#).

## Save

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1129](#).

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## **Single**

Operation of this key is identical across several measurements. For details about this key, see “[Single \(Single Measurement/Sweep\)](#)” on page 1155.

## Source

Operation of this key is identical across several measurements. For details about this key, see [“Source” on page 1157](#).

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## Span

The Span key activates the Span function and displays the menu of span functions.

Instrument S/W Revision      Prior to A.02.00

### 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**                    [ :SENSE ] :FREQuency:SPAN <freq>

[ :SENSE ] :FREQuency:SPAN?

Example                                FREQ:SPAN 2GHz sets the span to 2GHz

FREQ:SPAN 0 Hz sets the span to 0 Hz and puts the instrument in Zero Span

## Swept SA Span

Dependencies/Couplings	<p>If the electrical attenuator is enabled, any attempt to set Span such that the Stop Frequency would be &gt;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.</p> <p>Span affects RBW, sweep time, FFT &amp; Sweep choice (including FFT Width, Phase Noise Optimization and ADC Dither auto couplings.)</p> <p>When operating in “swept span”:</p> <ul style="list-style-type: none"><li>• 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</li><li>• 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</li></ul> <p>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.</p>
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	<b>Span X Scale</b>
Preset	<p>SA Mode: Depends on instrument maximum frequency (see the table “X-Series Frequency Ranges and Preset Values ” on page 324 in the Section “Frequency” on page 320”.)</p> <p>Option 503: 3.59 GHz</p> <p>Option 507: 6.99 GHz</p> <p>Option 508: 8.39 GHz</p> <p>Option 513: 13.59 GHz</p> <p>Option 526: 26.49 GHz</p>
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.

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.
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command:</b>	[ :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:	<b>Span X Scale</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

## Swept SA 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 unless the EMC Standard is CISPR or MIL	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**

Instrument S/W Revision:    Prior to A.02.00

## 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.

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.

<b>Remote Command:</b>	[ :SENSe ] :FREQuency:SPAN:PREVious
Example:	FREQ:SPAN:PREV sets the span to the previous value
Key Path:	<b>Span X Scale</b>
Instrument S/W Revision:	Prior to A.02.00

### 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	<b>Span X Scale, Zone</b>
Preset	Off
State Saved	Saved in State
Instrument S/W Revision	Prior to A.02.00

### 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

## Swept SA Span

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 433”.) 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:	<b>Span X Scale, Zone</b>
Default Unit:	Hz
SCPI Status Bits/OPC Dependencies:	non-overlapped
Instrument S/W Revision:	Prior to A.02.00

### 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 433”.) 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:	<b>Span X Scale, Zone</b>
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)
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:CALCulate:ZONE:MAXimum:RIGHT
Example:	CALC:ZONE:MAX:RIGH
State Saved:	Not part of saved state
Key Path:	<b>Span X Scale, Zone</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:CALCulate:ZONE:MAXimum:LEFT
Example:	CALC:ZONE:MAX:LEFT
State Saved:	Not part of saved state
Key Path:	<b>Span X Scale, Zone</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	: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?.
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:	<b>FREQUENCY, Signal Track</b>
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.
Instrument S/W Revision:	Prior to A.02.00

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.

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## Sweep/Control

This section describes the keys in the Sweep, Control and Capture menu. This includes the time gating control and the capture functions. It also describes the Restart, Single, and Cont key functions that control the data acquisition of the instrument.

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**NOTE** 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 Res BW setting. When this happens, increase the Sweep Time or the Res BW.

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Key Path	Front-panel key
Instrument S/W Revision	Prior to A.02.00

### 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 ]:SWEep:TIME <time>
[ :SENSe ]:SWEep:TIME?
[ :SENSe ]:SWEep:TIME:AUTO OFF|ON|0|1
[ :SENSe ]:SWEep:TIME:AUTO?
```

Example:

```
SWE:TIME 500 ms
SWE:TIME:AUTO OFF
```

Dependencies/Couplings:	<p>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.</p> <p>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.</p> <p>Grayed out while in Gate View, to avoid confusing the user who wants to set Gate View Sweep Time.</p> <p>Key is grayed out in Measurements that don't support swept mode.</p> <p>Key is blanked in Modes that don't support swept mode.</p> <p>Set to Auto when Auto Couple is pressed or sent remotely</p> <p>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.</p> <p>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 <b>Auto Couple</b> is pressed) it returns to Auto and recouples when returning to non-zero spans.</p> <p>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).</p>
Remote Command Notes:	<p>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.</p>
Preset:	<p>The preset Sweep Time value is hardware dependent since Sweep Time presets to "Auto".</p>
State Saved:	<p>Saved in State</p>
Min:	<p>in zero span: 1 <math>\mu</math>s</p> <p>in swept spans: 1 ms</p>
Max:	<p>in zero span: 6000 s</p> <p>in swept spans: 4000 s</p>
Key Path:	<p><b>Sweep/Control</b></p>
SCPI Status Bits/OPC Dependencies:	<p>Meas Uncal is Bit 0 in the <code>STATUS:QUESTIONable:INTEgrity:UNCalibrated</code> register</p>
Instrument S/W Revision:	<p>Prior to A.02.00</p>

## 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:	<b>Sweep/Control</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 440](#).

<b>Remote Command:</b>	[ :SENSE ] :SWEep:TIME:AUTO:RULEs NORMal   ACCuracy   SRESponse  [ :SENSE ] :SWEep:TIME:AUTO:RULEs?
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:	<b>Sweep/Control, Sweep Setup</b>
Instrument S/W Revision:	Prior to A.02.00

## 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**

Instrument S/W Revision: Prior to A.02.00

**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**

Readback: SA - Normal

Instrument S/W Revision: Prior to A.02.00

**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

## Swept SA Sweep/Control

Key Path: **Sweep/Control, Sweep Setup, Sweep Time Rules**  
Readback: SA - Accuracy  
Instrument S/W Revision: Prior to A.02.00

**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**  
Readback: SR  
Instrument S/W Revision: Prior to A.02.00

### 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.

FFT “sweeps” should not be used when making EMI measurements; therefore, when a CISPR detector (Quasi Peak, EMI Average, RMS Average) is selected for any active trace (one for which Update is on), the FFT key in the Sweep Type menu is grayed out, and the Auto Rules only choose Swept. If Sweep Type is manually selected to be FFT, the CISPR detectors are all grayed out.

**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**  
 Instrument S/W Revision: Prior to A.02.00

**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**  
 Instrument S/W Revision: Prior to A.02.00

**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  
 This selection is chosen automatically if any of the CISPR detectors is chosen for any active trace, in which case the FFT Sweep Type selection is also grayed out.  
 State Saved: Saved in instrument state  
 Key Path: **Sweep/Control, Sweep Setup, Sweep Type**  
 Readback: Swept  
 Instrument S/W Revision: Prior to A.02.00  
 Modified at S/W Revision: A.02.00

**FFT** Manually selects FFT analysis, so it cannot change automatically to Swept.

Example: SWE:TYPE FFT

## Swept SA Sweep/Control

Dependencies/Couplings:	<p>When a CISPR detector (Quasi Peak, EMI Average, RMS Average) is selected for any active trace, the FFT key is grayed out.</p> <p>If Sweep Type is manually selected to be FFT, the CISPR detectors are all grayed out.</p> <p>Grayed out while in Gated LO (meaning Gate is ON and Gate Method is LO).</p> <p>Grayed out while in Gated Video (meaning Gate is ON and Gate Method is Video).</p> <p>If this key is selected, all the gate Methods except Gated FFT are grayed out.</p> <p>If Manual FFT is selected, the Signal ID key is grayed out.</p> <p>When Signal ID is on, Manual FFT is grayed out.</p> <p>For both the dynamic range case and the speed case, swept is chosen whenever any form of Signal ID is on.</p>
State Saved:	Saved in instrument state
Key Path:	<b>Sweep/Control, Sweep Setup, Sweep Type</b>
Readback:	FFT
Instrument S/W Revision:	Prior to A.02.00

### Sweep Type Rules

Selects which set of rules will be used for automatically choosing the Sweep Type when Sweep Type is in Auto.

<b>Remote Command:</b>	<pre>[ :SENSe ] :SWEep:TYPE:AUTO:RULEs SPEed  DRANge [ :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:	<b>Sweep/Control, Sweep Setup</b>
Instrument S/W Revision:	Prior to A.02.00

**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.

<b>Remote Command:</b>	<pre>[ :SENSe ] :SWEep:TYPE:AUTO:RULEs:AUTO[ :STATe ] OFF  ON  0  1 [ :SENSe ] :SWEep:TYPE:AUTO:RULEs:AUTO[ :STATe ]?</pre>
Example:	<pre>:SWE:TYPE:AUTO:RUL:AUTO ON</pre>

Dependencies/Couplings:	Pressing Auto Couple always sets Sweep Type Rules to Auto.
Preset:	ON
State Saved:	Saved in instrument state
Key Path:	<b>Sweep/Control, Sweep Setup, Sweep Type Rules</b>
Instrument S/W Revision:	Prior to A.02.00

**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 ≤ 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

If any of the CISPR detectors is chosen for any active trace, always use Swept.

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:	<b>Sweep/Control, Sweep Setup, Sweep Type Rules</b>
Readback:	Dynamic Range
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Sweep/Control, Sweep Setup, Sweep Type Rules</b>
Readback:	Speed.
Instrument S/W Revision:	Prior to A.02.00

## 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.

## Swept SA Sweep/Control

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:** [ :SENSE ] :SWEep:FFT:WIDTh <real>  
[ :SENSE ] :SWEep:FFT:WIDTh?

Example: SWE:FFT:WIDTh 167 kHz 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.

When Auto is selected the Auto rules for the FFT Width are these: when the Gate is On, set the **FFT Width** to **<7.99 MHz**. Otherwise, if **Swp Type Rules** are set to **Best Dynamic Range**, choose the **<411.9 kHz** setting; otherwise, **Swp Type Rules** are set to **Best Speed**, where the **FFT Width** is set to **7.99 MHz**

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**

Instrument S/W Revision: Prior to A.02.00

**Remote Command:** [ :SENSE ] :SWEep:FFT:WIDTh:AUTO OFF|ON|0|1  
[ :SENSE ] :SWEep:FFT:WIDTh:AUTO?

Example: :SWE:FFT:WIDTh:AUTO ON

Dependencies/Couplings: Pressing Auto Couple always sets FFT Width to Auto.

Preset:	ON
State Saved:	Saved in instrument state
Key Path:	<b>Sweep/Control, Sweep Setup</b>
Instrument S/W Revision:	Prior to A.02.00

## Gate

Operation of this key is identical across several measurements. For details about this key, see [“Gate ” on page 1162](#).

## Points

Sets the number of points taken per sweep, and displayed in the traces. The current value of points is displayed parenthetically, next to the sweep time in the lower-right corner of the display. Using more points provides greater resolution; using fewer points compacts the data and decreases the time required to access a trace over the remote interface.

Increasing the number of points does not increase the sweep time; however, it can slightly impact the trace processing time and therefore the overall measurement speed. Decreasing the number of points does not decrease the sweep time, but it may speed up the measurement, depending on the other sweep settings (for example, in FFT sweeps). In any case, fewer points will always speed up the I/O.

Due to minimum sweep rate limitations of the hardware, the minimum sweep time available to the user will increase above its normal value of 1 ms as the number of sweep points increases above 15001.

Changing the number of sweep points has several effects on the analyzer. The sweep time resolution will change. Trace data for all the traces will be cleared and, if Sweep is in Cont, a new trace taken. If any trace is in average or hold, the averaging starts over.

**Remote Command:** [ :SENSe ] :SWEep :POINts <integer>  
[ :SENSe ] :SWEep :POINts?

Example: SWE:POIN 5001  
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

Swept SA  
**Sweep/Control**

Preset:	1001
State Saved:	Saved in instrument state
Min:	1
Max:	40001
Key Path:	<b>Sweep</b>
Instrument S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.02.00



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## 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**

**Instrument S/W Revision:** Prior to A.02.00

### Trace Update Indicator

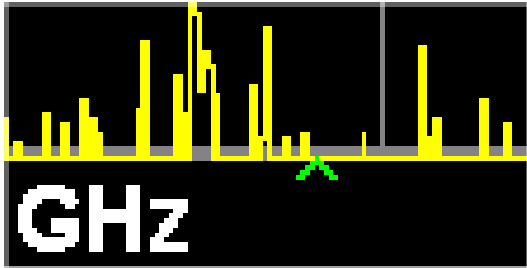
Trace updates can take one of two forms:

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.

## Swept SA Trace/Detector

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 strike through (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  
Q=Quasi Peak  
E=EMI Average  
R=RMS Average  
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:

NORM	Normal
PEAK	Peak
SAMP	Sample
NPEAK	Negative Peak
RMS	Average detector with Power Average (RMS)
LG AVG	Average detector with Log-Pwr Average
VAVG	Average detector with Voltage Average
QPEAK	Quasi Peak
EMI AVG	EMI Average
RMS AVG	RMS Average

The trace math labels are:

PDIF	Power Difference
PSUM	Power Sum
LOFF	Log Offset
LDIF	Log 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

Instrument S/W Revision

Prior to A.02.00

## 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 <b>Clear Write</b> or send the equivalent SCPI command, <b>Update</b> is set to <b>On</b> and <b>Display</b> is set to <b>On</b> .  Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections
Remote Command Notes:	See <a href="#">“Trace/Detector” on page 449</a> .
Preset:	After a Preset, any trace that is in <b>Clear Write</b> is cleared (all trace points set to mintracevalue).
State Saved:	The type for each trace is saved in Instrument State
Key Path:	<b>Trace/Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 367](#) and [“Average Type” on page 368](#) in the Meas Setup Section.

See [“Trace Averaging: More Information” on page 453](#).

Example:	TRAC2:TYPE AVER
Dependencies/Couplings:	Affected by <b>Average Type</b> and <b>Average/Hold Number</b>  Whenever you press <b>Trace Average</b> or send the equivalent SCPI command, <b>Update</b> is set to <b>On</b> and <b>Display</b> is set to <b>On</b> .  Automatic detector selection and the VBW:RBW ratio auto rules both depend on the trace type selections.
Remote Command Notes:	See <a href="#">“Trace/Detector” on page 449</a> .

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:	<b>Trace/Detector</b>
Instrument S/W Revision:	Prior to A.02.00

### Trace Averaging: 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`

## Swept SA Trace/Detector

Dependencies/Couplings:	Affected by <b>Average Type</b> and <b>Average/Hold Number</b> Whenever you press <b>Max Hold</b> or send the equivalent SCPI command, <b>Update</b> is set to <b>On</b> and <b>Display</b> is set to <b>On</b> . 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 449”.
Preset:	After a Preset, any trace that is in <b>Max Hold</b> is cleared (all trace points set to mintracevalue).
State Saved:	The type for each trace is saved in Instrument State
Key Path:	<b>Trace/Detector</b>
Instrument S/W Revision:	Prior to A.02.00

### 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 367 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 <b>Average Type</b> and <b>Average/Hold Number</b> . Whenever you press <b>Min Hold</b> or send the equivalent SCPI command, <b>Update</b> is set to <b>On</b> and <b>Display</b> is set to <b>On</b> . 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 449”.
Preset:	After a Preset, any trace that is in <b>Min Hold</b> is cleared (all trace points set to maxtracevalue).
State Saved:	The type for each trace is saved in Instrument State

Key Path: **Trace/Detector**  
Instrument S/W Revision: Prior to A.02.00

## 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 strike through 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 456.

See “Trace Display State On/Off” on page 456.

See “More Information” on page 456.

### 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 Trace On (**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 Trace On (**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 Trace On (**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**.

Key Path **Trace/Detector**  
Instrument S/W Revision Prior to A.02.00

## Trace Update State On/Off

<b>Remote Command:</b>	: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 <b>Update</b> to <b>On</b> for any trace, the <b>Display</b> is set to <b>On</b> for that trace.
Preset:	1 0 0 0 0 0 ( <b>On</b> for Trace 1; <b>Off</b> for 2–6)
State Saved:	Saved in Instrument State
Key Path:	<b>Trace/Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## Trace Display State On/Off

<b>Remote Command:</b>	: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 <b>Update</b> to <b>On</b> for any trace, the <b>Display</b> is set to <b>On</b> for that trace.
Preset:	1 0 0 0 0 0 ( <b>On</b> for Trace 1; <b>Off</b> for 2–6)
State Saved:	Saved in Instrument State
Key Path:	<b>Trace/Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## 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.

The three detectors on the second page of the Detector menu, Quasi Peak, EMI Average, and RMS Average, are referred to collectively as the “CISPR detectors” because their behaviors are specified by the CISPR 16–1–1 specification.

See [“More Information” on page 459](#)

<b>Remote Command:</b>	[ :SENSE ] :DETector :TRACe [ 1 ]   2   3   4   5   6 AVERage   NEGative   NORMal   POSitive   SAMPlE   QPEak   EAverage   RAverage
	[ :SENSe ] :DETector :TRACe [ 1 ]   2   3   4   5   6 ?
<b>Example:</b>	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
<b>Dependencies/Couplings:</b>	The auto detector rules depend upon marker type, averaging state and type, trace state writing mode, and trace active state.  If the Avg Type is in Auto, and any of the CISPR detectors is selected on any active trace, the Voltage Averaging type is auto-selected.

## Swept SA Trace/Detector

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 Returned Definition

NORM	Normal
AVER	Average / RMS
POS	Positive peak
SAMP	Sample
NEG	Negative peak
QPE	Quasi Peak
EAV	EMI Average
RAV	RMS Average

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**

Instrument S/W Revision: Prior to A.02.00

Modified at S/W Revision: A.02.00

**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:** This is a SCPI only legacy command to preserve the classic functionality wherein all traces are affected when a detector is selected.

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.

The EPOS selection sets the detector type to Peak and the EMI Standard to CISPR. A query will then return POS

The MPOS selection sets the detector type to Peak and the EMI Standard to MIL Impluse. A query will then return POS

The RAV parameter is not included in the command because this is not a legacy detector; nonetheless, if it happens to be the detector on Trace 1 then RAV will be returned.

#### String ReturnedDefinition

NORM	Normal
AVER	Average / RMS
POS	Positive peak
SAMP	Sample
NEG	Negative peak
QPE	Quasi Peak
EAV	EMI Average
RAV	RMS Average

**Preset:** NORMal

**State Saved:** Saved in State

**Instrument S/W Revision:** Prior to A.02.00

**Modified at S/W Revision:** A.02.00

## 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.

The Quasi-Peak detector is a fast-rise, slow-fall detector used in making CISPR compliant EMI measurements.

The EMI-Average detector provides a standard means to “smooth” the signal while still providing compliance to CISPR pulse response standards. It displays the average value of the amplitude envelope, rather than the average value of sample-detected amplitude, and uses an advanced algorithm to realize a lowpass filter that conforms to the latest CISPR standard.

The RMS Average detector is a frequency dependent RMS or Averaging filter, used in making CISPR compliant EMI measurements, which performs one averaging process (in the VBW hardware) on the "power" (also known as RMS) scale, and another process on the voltage scale using a "meter movement simulator". This filter conforms to the 2007 revision of the CISPR 16-1-1 standard.

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. Some detectors utilize more resources; the Quasi-Peak detector, for example, utilizes most of the digital IF's resources, and the hardware in some analyzers is incapable of providing another detector when Quasi-Peak is on. If the limit of system resources is exceeded, detectors on some existing traces may be forced to change. When this happens, they change to match the detector just requested, and a message is generated: “Detector <X> changed due to physical constraints”, where X might contain multiple values.

Example: User has traces 1, 2, and 3 with Peak, Average, and Negative Peak. User specifies QPD for trace 1. Traces 2 and 3 also change to QPD and we generate the message “Detector 2,3 changed due to physical constraints”. Now all three traces have the QPD.

## 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:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00
<b>Remote Command:</b>	[ :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.
Instrument S/W Revision:	Prior to A.02.00

### 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 <b>Update On and Display On</b> 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:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00

### 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:	<p>Selecting any detector (even the currently selected detector) for a given trace turns Update and Display on for that trace.</p> <p>Selecting a specific detector type turns “Auto” to false for this trace (manual).</p> <p>Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts <b>Update On and Display On</b> for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior.</p> <p>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.</p> <p>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). If no traces are active for which VBW applies (traces with Normal, Peak, Neg Pk or Sample detectors selected), then the VBW annotation shows "---" on the front panel, although still returns the current value of VBW to a SCPI query.</p> <p>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 “<a href="#">“Video BW” on page 310</a>”.</p>
Remote Command Notes:	<p>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:</p> <pre>AVER:TYPE RMS DET:TRAC AVER</pre>
Key Path:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## 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:	<p>Selecting a specific detector type turns “Auto” to false for this trace (manual).</p> <p>Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts <b>Update On</b> and <b>Display On</b> for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior.</p> <p>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.</p>
Key Path:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## 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:	<p>Selecting a specific detector type turns “Auto” to false for this trace (manual).</p> <p>Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts <b>Update On</b> and <b>Display On</b> for that trace, even if that detector was already selected. Note that the legacy command [:SENS]:DET[:FUNC] does NOT exhibit this behavior.</p> <p>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.</p>
Key Path:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## 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 <b>Update On</b> and <b>Display On</b> 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:	<b>Trace/Det, Detector</b>
Instrument S/W Revision:	Prior to A.02.00

## Quasi Peak

Only appears with Option EMC installed and licensed.

This is a fast-rise, slow-fall detector used in making CISPR compliant EMI measurements and defined by CISPR Publication 16–1–1. Quasi-peak detection displays a weighted, sample-detected amplitude using specific, charge, discharge, and meter time constants derived from the legacy behaviors of analog detectors and meters. It is used for EMI measurements to provide a specific and consistent response to EMI-like signals.

Note that CISPR standard operation is to perform the averaging associated with quasi peak detection on the voltage scale. The user can manually set the Average Type to Log-Power or Power, but the results will no longer be CISPR compliant.

Example:	DET:TRAC3 QPE selects the quasi-peak detector for trace 3.
Dependencies/Couplings:	Unavailable in manual FFT sweep.  If the user selects this detector on any active trace, the EMI Standard will be set to CISPR. If any inactive trace with this detector selected goes active, the EMI Standard is set to CISPR.  If the Avg Type is in Auto, and this detector is selected on any active trace, the Voltage Averaging type is auto-selected.  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). If no traces are active for which VBW applies (traces with Normal, Peak, Neg Pk or Sample detectors selected), then the VBW annotation shows "---" on the front panel, although still returns the current value of VBW to a SCPI query.  Selecting a specific detector type turns the ““Auto” on page 369” to false for this trace (manual).  Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts <b>Update On</b> and <b>Display On</b> 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**

Instrument S/W Revision: A.02.00

In the past, Quasi Peak and EMI Average measurements were often made on a linear display scale because those detectors only worked properly with signals on a linear (voltage) scale. The X-series analyzers are capable of making Quasi Peak and EMI Average detected measurements correctly on a log scale, due to the digital IF. This latter capability means that the user can observe detected EMI levels on a log scale, allowing a large visible dynamic range.

Also in the past, EMI analysis equipment would need to perform a ranging operation to set the reference level when one of these detectors was turned on, but the X-series analyzers do not - because of its digital IF, there is no need to set the reference level (range) to improve the accuracy nor to allow visibility of the detected level.

### **EMI Average**

Only appears with Option EMC installed and licensed.

The EMI Average detector in Agilent's X-Series analyzers is so called to distinguish it from the Average detector, although EMI users typically refer to it simply as the "Average detector". The intent of this detector is to provide a standard means to "smooth" the signal while still providing compliance to CISPR pulse response standards

Unlike the regular Average detector, the EMI Average detection displays the average value of the amplitude envelope, rather than the average value of sample-detected amplitude. It is defined for EMI measurements by the CISPR 16-1-1 standard and, in the X-series, uses a sophisticated algorithm to implement a lowpass filter that conforms to the latest CISPR standard.

Note that CISPR standard operation is to perform the envelope averaging on the voltage scale. The user can manually set the Average Type to Log-Power or Power, but the results will no longer be CISPR compliant.

Example: DET:TRAC3 EAV selects the EMI average detector for trace 3.

## Swept SA Trace/Detector

**Dependencies/Couplings:** If the user selects this detector on any active trace, the EMI Standard will be set to CISPR. If any inactive trace with this detector selected goes active, the EMI Standard is set to CISPR.

If the Avg Type is in Auto, and this detector is selected on any active trace, the Voltage Averaging type is auto-selected.

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). If no traces are active for which VBW applies (traces with Normal, Peak, Neg Pk or Sample detectors selected), then the VBW annotation shows "---" on the front panel, although still returns the current value of VBW to a SCPI query.

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.

Unavailable in manual FFT sweep.

**Key Path:** **Trace/Det, Detector**

**Instrument S/W Revision:** A.02.00

### RMS Average

Only appears with Option EMC installed and licensed.

This key selects the RMS Average detector, a frequency dependent RMS/Averaging filter, used in making CISPR compliant EMI measurements. This filter conforms to the 2007 revision of the CISPR 16-1-1 standard.

This detector does one averaging process (in the VBW hardware) on the "power" (also known as RMS) scale and another process on the voltage scale using a "meter movement simulator" similar to the one used in the QPD filter.

Note that the user can manually set the Average Type to Log-Power or Power, but the results will no longer be CISPR compliant.

**Example:** DET:TRAC3 RAV selects the RMS Average detector for trace 3.

**Dependencies/Couplings:** 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.

Unavailable in manual FFT sweep.

**Key Path:** **Trace/Det, Detector**

**Instrument S/W Revision:** A.02.00

## 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.

Dependencies/Couplings:	When you have manually selected FFT sweep, the Detector Preset choices that contain any CISPR detectors, are grayed out. If the grayed out 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.
Preset:	No interaction with preset
State Saved:	Not saved in state
Instrument S/W Revision:	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00

## 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.
Instrument S/W Revision:	Prior to A.02.00

## 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**

Instrument S/W Revision: Prior to A.02.00

## 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**

Instrument S/W Revision: Prior to A.02.00

## 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 “[Math: More Information](#)” on page 470.

**Remote Command:** :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

Dependencies/Couplings:	<p>Trace Math is not available if <b>Normalize</b> is on.</p> <p>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.</p> <p>Whenever a math function is turned on for a trace, that trace is set to Display=On and Update=On.</p>
Remote Command Notes:	<p>The Trace Math Function command has 6 main set of parameters:</p> <ul style="list-style-type: none"> <li>- Set 1 defines the “result trace”: TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6</li> <li>- Set 2 defines the “function”: PDIFference   PSUM   LOFFset   LDIFference   OFF</li> <li>- Set 3 is a “trace operand” (1): TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6</li> <li>- Set 4 is a “trace operand” (2): TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6</li> <li>- Set 5 defines the “Log Offset” (in dB).</li> <li>- Set 6 defines the “Log Difference Reference” (in dBm).</li> </ul> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Remote command examples are included in each section below.</p>
Preset:	<pre>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</pre>
State Saved:	The trace math function for each trace is saved in Instrument State.
Key Path:	<b>Trace/Detector</b>
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
Instrument S/W Revision:	Prior to A.02.00

## Math: 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

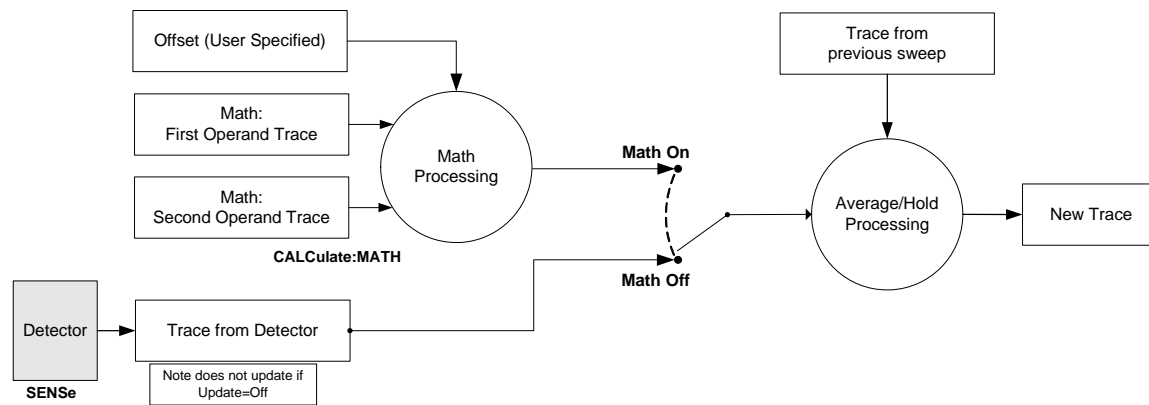
A copy or exchange of trace data

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.



## Swept SA Trace/Detector

Instrument S/W Revision: Prior to A.02.00

### 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**

Instrument S/W Revision: Prior to A.02.00

### 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 trace 1 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 473.

Example:	<code>:CALC:MATH TRACE1,LDIF,TRACE4,TRACE5,,-6.00</code> sets Trace 1 to <b>Log Diff</b> trace math function, sets the <b>First Trace</b> operand (for Trace 1) to Trace 4, sets the <b>Second Trace</b> 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 ( <b>Update On and Display On</b> ), 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:	<b>Trace/Detector, Math</b>
Default Unit:	depends on the current selected Y axis unit
Instrument S/W Revision:	Prior to A.02.00

## 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:	<code>CALC:MATH TRACE1 OFF</code> 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:	<b>Trace/Detector, Math</b>
Readback:	Off
Instrument S/W Revision:	Prior to A.02.00

## 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:	<b>Trace, Math</b>
Readback line:	In square brackets, the First Trace operand, new line, and the second trace operand, as:  [Op1=Trace 1, Op2=Trace2]  where Trace 1 is operand 1 and Trace 2 is operand 2.
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Trace, Math, Trace Operands</b>
Readback:	Trace <trace number>
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Trace, Math, Trace Operands</b>
Readback:	Trace <trace number>

Instrument S/W Revision: Prior to A.02.00

## Normalize

Displays menu keys that let you normalize trace data.

Key Path	<b>Trace/Detector</b>
Readback	[On] or [Off]
Instrument S/W Revision	Prior to A.02.00

### 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 475](#).

See [“Normalize Block Diagram” on page 476](#).

**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**

Instrument S/W Revision: Prior to A.02.00

### 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  $-10 \text{ dB}$ . 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.

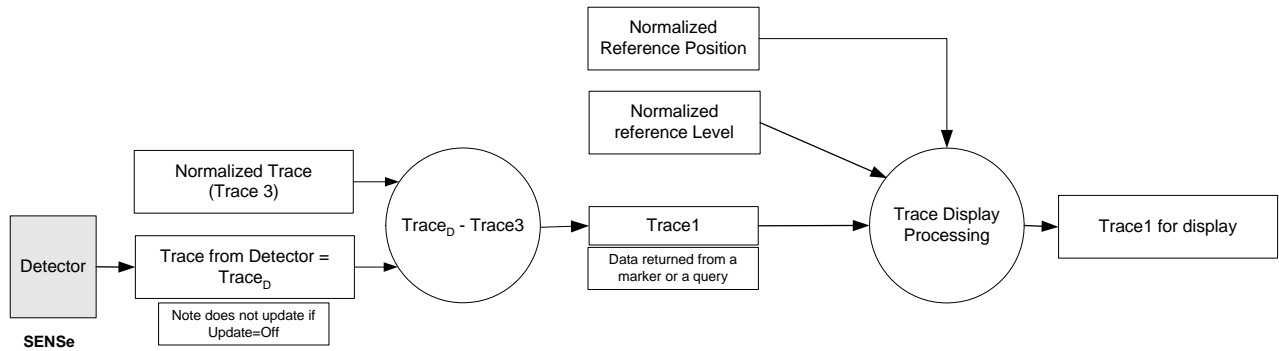
As Normalize displays a ratio between two traces (a difference, in dB) the Y-Axis Unit while in Normalize is dB in Log Amplitude and dimensionless in Linear. The Y Axis Unit chosen in the Y Axis Unit menu is unaffected by Normalize. When you leave Normalize the Y Axis Unit returns to the value set in 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  $-40 \text{ dBm}$ , that bucket is plotted at  $-40 \text{ dB}$ . 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:	<ul style="list-style-type: none"> <li>If Normalize (On) is pressed before Store Ref (1 3), an error message is generated. Normalize remains off in this case.</li> </ul>
Remote Command Notes:	There is no remote command for this function, however the trace copy command can be used for this purpose.
Key Path:	<b>Trace/Detector, Normalize</b>
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Trace/Detector, Normalize</b>
Instrument S/W Revision:	Prior to A.02.00

### Norm Ref Lvl

Sets the level (in dB) of the normalized reference.

**Remote Command:**                   :DISP:WIND:WIND[1]:TRACe:Y[:SCALe]:NRLevel <rel\_amp1>  
  :DISP:WIND:WIND[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

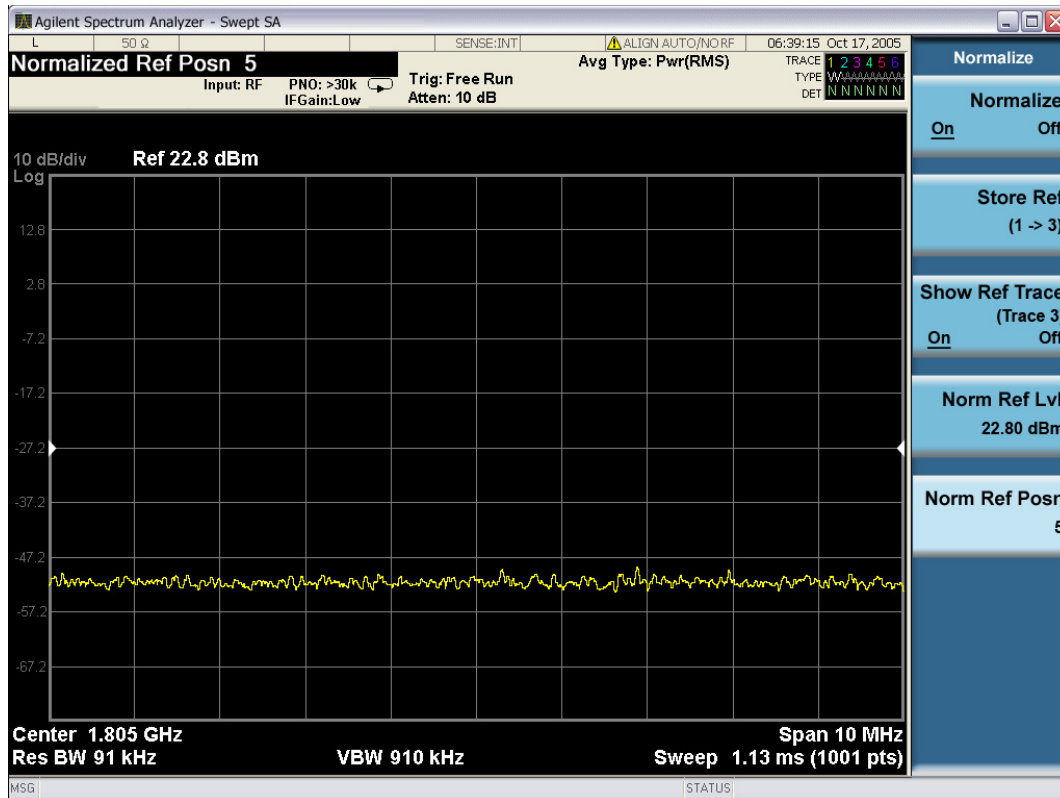
Max:                                   327.6 dB

Key Path:                             **Trace/Detector, Normalize**

Instrument S/W Revision:           Prior to A.02.00

### 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:



**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**

**Instrument S/W Revision:**         Prior to A.02.00

## 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**

Instrument S/W Revision: Prior to A.02.00

**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

Instrument S/W Revision: Prior to A.02.00

### 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**

Instrument S/W Revision: Prior to A.02.00

### 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:	<b>Trace/Detector, Copy/Exchange</b>
Instrument S/W Revision:	Prior to A.02.00

### Copy Now

Executes the Copy operation and puts the destination trace in **Update=Off, Display=On**.

Remote Command Notes:	See “Copy/Exchange”.
Key Path:	<b>Trace/Detector, Copy/Exchange</b>
Instrument S/W Revision:	Prior to A.02.00

### Exchange Now

Executes the Exchange operation and puts both traces in **Update=Off, Display=On**.

Remote Command Notes:	See “Copy/Exchange”.
Key Path:	<b>Trace/Detector, Copy/Exchange</b>
Instrument S/W Revision:	Prior to A.02.00

### 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 482](#).

See [“More Information” on page 482](#).

<b>Remote Command:</b>	<code>:TRACe[:DATA] TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6, &lt;data&gt;</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.

## Swept SA Trace/Detector

Remote Command Notes: The TRACe[:DATA] command is of the form:  
:TRACe:DATA <trace>, <data>  
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.

Instrument S/W Revision: Prior to A.02.00

### 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.

Instrument S/W Revision: Prior to A.02.00

### 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 1070](#).

### **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 1072](#).

### **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:**                   :TRACe:MATH:SMOoth  
TRACE1 | TRACE2 | TRACE3 | TRACE4 | TRACE5 | TRACE6

Instrument S/W Revision:       Prior to A.02.00

### **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

Instrument S/W Revision: Prior to A.02.00

### 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

Instrument S/W Revision: Prior to A.02.00

### 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 1063.

### 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 1063.

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## Trigger

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1179](#).

## View/Display

The View/Display key opens up the Display Menu (common to most measurements) and the View menu for the current measurement.

Some measurements have simple View menus, or even no View menu, others provide many different Views.

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.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Display

Operation of this key is identical across several measurements. For details about this key, see Display [“Display” on page 1233](#).

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 534](#).

This topic contains the following sections:

[“Measurement Commands for Channel Power” on page 487](#)

[“Remote Command Results for Channel Power Measurement” on page 488](#)

## 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, DTMB, DVB-T/H 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 1057](#).

## Remote Command Results 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: <ol style="list-style-type: none"> <li>1. Channel Power is a floating point number representing the total channel power in the specified integration bandwidth.</li> <li>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.</li> </ol>
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.

The following commands are only available for DVB-T/H and DTMB mode.

Condition	n	Results Returned
	n=1 (or not specified)	Returns scalar results: <ol style="list-style-type: none"> <li>1. Channel Power is a floating point number representing the total channel power in the specified integration bandwidth.</li> <li>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.</li> </ol>
	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.



<p>Mode = DVB-T/H</p> <p>or Mode = DTMB</p>	3	<p>Returns 7 comma-separated scalar results, in the following order.</p> <ol style="list-style-type: none"> <li>1. The shoulder attenuation result (dB)</li> <li>2. Lower shoulder attenuation result (dB)</li> <li>3. Upper shoulder attenuation result (dB)</li> <li>4. Lower Offset - MAX shoulder point power (dBm)</li> <li>5. Lower Offset - MAX shoulder point frequency (MHz)</li> <li>6. Upper Offset - MAX shoulder point power (dBm)</li> <li>7. Upper Offset - MAX shoulder point frequency (MHz)</li> </ol> <p>If the results are not available, -999.0 is returned.</p> <p>For example, if current view is RF spectrum or spectrum mask, -999.0 is returned.</p>
<p>Mode = DVB-T/H</p> <p>or Mode = DTMB</p>	4	<p>Returns floating point numbers that are the captured trace data of the power (in dBm/resolution BW) of the signal in the left graph of the shoulder attenuation view.</p> <p>If the results are not available, -999.0 is returned.</p> <p>For example, if current view is RF spectrum or spectrum mask, -999.0 is returned.</p>
<p>Mode = DVB-T/H</p> <p>or Mode = DTMB</p>	5	<p>Returns floating point numbers that are the captured trace data of the power (in dBm/resolution BW) of the signal in the right graph of the shoulder attenuation view.</p> <p>If the results are not available, -999.0 is returned.</p> <p>For example, if current view is RF spectrum or spectrum mask, -999.0 is returned.</p>
<p>Mode = DVB-T/H</p> <p>or Mode = DTMB</p>	6	<p>Returns floating point numbers that are the captured trace data of the power (in dBm/resolution BW) of the mask in the spectrum mask view.</p> <p>If the results are not available, -999.0 is returned.</p> <p>For example, if current view is RF spectrum or shoulder attenuation, -999.0 is returned.</p>

## Channel Power Measurement

Mode = 7 Returns the failed point information in the following order:  
DVB-T/H  
or Mode =  
DTMB

1. the 1st failed point frequency (MHz)
2. the 1st failed point absolute power (dBm)
3. the 1st failed point relative power (dB)
4. the 2nd failed point frequency (MHz)
5. the 2nd failed point absolute power (dBm)
6. the 2nd failed point relative power (dB)
- ...
- 3\*N-2. the (3\*N-2)th failed point frequency (MHz)
- 3\*N-1. the (3\*N-1)th failed point absolute power (dBm)
- 3\*N. the (3\*N)th failed point relative power (dB)

If the number of failed points is less than 20, it will show all of them (frequency, power and relative power),  $N < 20$ ;

If the number of failed points is great than 20, the first ten failed points and the last ten failed points will be show,  $N = 20$ .

If the results are not available, -999.0 is returned.

For example, if current view is RF spectrum or shoulder attenuation, -999.0 is returned.

Key Path	<b>Meas</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el &lt;real&gt;</code>  <code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEV el?</code>
Example	<code>DISP:CHP:VIEW:WIND:TRAC:Y:RLEV 10 dBm</code> <code>DISP:CHP:VIEW:WIND:TRAC:Y:RLEV?</code>
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELect to set the mode.
Preset	All except CDMA1xEVDO:10.00 dBm CDMA1xEVDO: -10.00dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Instrument S/W Revision	Prior to A.02.00

### 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 965 in the “Common Measurement Functions” section for more information.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIV ision &lt;rel_ampl&gt;</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>
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Instrument S/W Revision	Prior to A.02.00

### 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 977 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	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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 978 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	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, “[Internal Preamp](#)” on page 980 in the “Analyzer Setup Functions” section for more information.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	<code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION TOP CENTer BOTTom</code>  <code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION?</code>
Example	<code>DISP:CHP:VIEW:WIND:TRAC:Y:RPOS CENT</code> <code>DISP:CHP:VIEW:WIND:TRAC:Y:RPOS?</code>
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use <code>:INSTrument:SElect</code> to set the mode.

## Channel Power Measurement AMPTD Y Scale

Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	Prior to A.02.00

### Auto Scaling

Toggles the Auto Scaling function between On and Off.

<b>Remote Command</b>	<code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPl e 0 1 OFF ON</code> <code>:DISPlay:CHPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPl e?</code>
Example	<code>DISP:CHP:VIEW:WIND:TRAC:Y:COUP OFF</code> <code>DISP:CHP:VIEW:WIND:TRAC:Y:COUP?</code>
Dependencies/Couplings	<p>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.</p> <p>When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.</p>
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	1
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## **Auto Couple**

See “**AUTO COUPLE**” on page 983 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### **Filter Type**

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

<b>Remote Command</b>	[ :SENSe]:CHPower:BANDwidth:SHAPE GAUSSian FLATtop [ :SENSe]:CHPower:BANDwidth:SHAPE?
Example	CHP:BAND:SHAP GAUS CHP:BAND:SHAP?
Key Path	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flattop
Instrument S/W Revision	Prior to A.02.00



## **Cont**

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987 in the section "Common Measurement Functions" for more information.

## **FREQ Channel**

See “[FREQ Channel](#)” on page 989 in the section "Common Measurement Functions" for more information.

## **Input/Output**

See “[Input/Output](#)” on page 995 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 “[Marker](#)” on page 1051 in “Common Measurement Functions” for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> 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	Prior to A.02.00

### 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**.

<b>Remote Command</b>	: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?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	The query returns the marker's absolute X Axis value if the control mode is <b>Normal</b> , or the offset from the marker's reference marker if the control mode is <b>Delta</b> . The query is returned in the fundamental units for the current marker X Axis scale: Hz for <b>Frequency</b> .
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
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?

## Channel Power Measurement Marker

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is <b>Normal</b> , or the offset from the marker's reference marker in trace points if the control mode is <b>Delta</b> .
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
Instrument S/W Revision	Prior to A.02.00

### Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer[1 2 3 4 5 6 7 8 9 10 11 12]:Y? ?
Example	CALC:CHP:MARK11:Y?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	Result dependent on Markers setup and signal source.
State Saved	No
Instrument S/W Revision	Prior to A.02.00

### Properties

Accesses the marker properties menu.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Relative To

Selects the desired marker. The selected marker is relative to its reference marker.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence <integer>  :CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence?
Example	CALC:CHP:MARK:REF 5  CALC:CHP:MARK:REF?
Key Path	<b>Marker, Properties</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
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
Instrument S/W Revision	Prior to A.02.00

## Marker Trace

Accesses a menu that allows you to assign a specified marker to the designated trace. This function is only valid for DVB-T/H and DTMB mode.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe RFSPectrum LSHoulder RSHoulder MASK  :CALCulate:CHPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?
Example	CALC:CHP:MARK:TRAC RFSP  CALC:CHP:MARK:TRAC?
Key Path	<b>Marker, Properties</b>
Mode	DVB-T/H, DTMB
Preset	RFSPectrum
State Saved	Saved in instrument state.

## Channel Power Measurement Marker

Range	RF Spectrum   Left Shoulder   Right Shoulder   Spectrum Mask
Instrument S/W Revision	A.02.00

### Couple Markers

When this function is active, moving any marker causes an “equal X Axis movement” of every other marker that is not set to **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.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer:COUple[:STATE] ON OFF 1 0 :CALCulate:CHPower:MARKer:COUple[:STATE]?
Example	CALC:CHPower:MARK:COUP ON
Key Path	<b>Marker, More</b>
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

### All Markers Off

Turns off all markers.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer:AOff
Example	CALC:CHP:MARK:AOff
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00



## **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	Prior to A.02.00

## 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	Prior to A.02.00

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## **Meas**

See “[Meas](#)” on page 1057 in the section "Common Measurement Functions" for more information.

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## 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 Prior to A.02.00

### 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.

**Remote Command**            [:SENSe]:CHPower:AVERage:COUNT <integer>  
                                  [:SENSe]:CHPower:AVERage:COUNT?  
                                  [:SENSe]:CHPower:AVERage[:STATe] ON|OFF|1|0  
                                  [:SENSe]:CHPower:AVERage[:STATe]?

**Example**                      CHP:AVER:COUN 15  
                                  CHP:AVER:COUN?  
                                  CHP:AVER ON  
                                  CHP:AVER?

**Key Path**                      **Meas Setup**

**Mode**                            SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB

**Notes**                           You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB 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 CDMA2K: 20 1xEVDO: 20 DVB-T/H: 20 DTMB: 20 ON
State Saved	Saved in instrument state.
Min	1
Max	10000
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSE]:CHPower:AVERage:TCONtrol EXPonential REPeat [ :SENSe]:CHPower:AVERage:TCONtrol?
Example	CHP:AVER:TCON EXP CHP:AVER:TCON?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB 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	Prior to A.02.00

## Integ BW

Specifies the range of integration used in calculating the power in the channel. The integration bandwidth (IBW) is displayed on the trace as two markers connected by an arrow.

<b>Remote Command</b>	[ :SENSe ] :CHPower :BANDwidth :INTEgration <bandwidth> [ :SENSe ] :CHPower :BANDwidth :INTEgration?
Example	CHP:BAND:INT 10MHz CHP:BAND:INT?
Dependencies/Couplings	The minimum value of the span is coupled with the integration bandwidth.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 2 MHz WCDMA: 5 MHz C2K: 1.23 MHz WIMAX OFDMA: 10 MHz 1xEVDO: 1.23 MHz DVB-T/H: 7.61MHz DTMB: 8MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	1 GHz
Instrument S/W Revision	Prior to A.02.00

## IF Gain

Sets the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

Key Path	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :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.
Key Path	<b>Meas Setup, IF Gain</b>
Preset	OFF
State Saved	Saved in instrument state.
Range	Off   On
Instrument S/W Revision	Prior to A.02.00

### IF Gain State

Selects the range of the IF Gain.

<b>Remote Command</b>	[ :SENSe ] :CHPower : IF : GAIN [ : STaTe ] ON   OFF   1   0 [ :SENSe ] :CHPower : IF : GAIN [ : STaTe ] ?
Example	CHP : IF : GAIN ON CHP : IF : 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.
Key Path	<b>Meas Setup, IF Gain</b>
Notes	ON = high gain OFF = low gain
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain   High Gain

## Channel Power Measurement Meas Setup

Instrument S/W Revision      Prior to A.02.00

### RRC Filter

Turns the Root Raised Cosine (RRC) filter On or Off. The  $\alpha$  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.

<b>Remote Command</b>	<code>[ :SENSe ] :CHPower :FILTer [ :RRC ] [ :STATE ] OFF   ON   0   1</code> <code>[ :SENSe ] :CHPower :FILTer [ :RRC ] [ :STATE ] ?</code>
Example	CHP:FILT OFF CHP:FILT?
Dependencies/Couplings	For CDMA2K mode, this key is blank. For 1xEVDO mode, this key is blank.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, DVB-T/H, DTMB
Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode, DVB-T/H mode, DTMB mode or W-CDMA 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	Prior to A.02.00

### Filter BW

Inputs the Root Raised Cosine (RRC) filter bandwidth. Normally, the filter bandwidth is the same as the symbol rate of the signal.

<b>Remote Command</b>	<code>[ :SENSe ] :CHPower :FILTer [ :RRC ] :BANDwidth &lt;real&gt;</code> <code>[ :SENSe ] :CHPower :FILTer [ :RRC ] :BANDwidth ?</code>
Example	CHP:FILT:BAND 10MHz CHP:FILT:BAND?
Dependencies/Couplings	For CDMA2K mode, this key is blank. For 1xEVDO mode, this key is blank.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, WIMAX OFDMA, DVB-T/H, DTMB



Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode, DVB-T/H mode, DTMB 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 DVB-T/H: 8MHz DTMB: 7.56MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	100 MHz
Instrument S/W Revision	Prior to A.02.00

## Filter Alpha

Inputs the alpha value for the Root Raised Cosine (RRC) filter.

<b>Remote Command</b>	[ :SENSE ] :CHPower :FILTer [ :RRC ] :ALPHa <real> [ :SENSe ] :CHPower :FILTer [ :RRC ] :ALPHa?
Example	CHP:FILT:ALPH 0.5 CHP:FILT:ALPH?
Dependencies/Couplings	For CDMA2K mode, this key is blank.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, DVB-T/H, DTMB
Notes	This parameter is normally used when TETRA is selected as the Radio Std. You must be in the Spectrum Analysis mode, DVB-T/H mode, DTMB mode or W-CDMA mode to use this command. Use :INSTRUMENT:SELEct to set the mode.
Preset	SA, WCDMA, DVB-T/H: 0.22 DTMB: 0.05
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Instrument S/W Revision	Prior to A.02.00

## PSD Unit

Sets the unit bandwidth for Power Spectral Density. The available units are dBm/Hz and dBm/MHz.

<b>Remote Command</b>	: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).
Key Path	<b>Meas Setup, More</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	DBMHZ
State Saved	Saved in instrument state.
Range	dBm/Hz dBm/MHz
Instrument S/W Revision	Prior to A.02.00

## Meas Preset

Restores all the measurement parameters to their default values.

<b>Remote Command</b>	:CONFigure:CHPower
Example	CONF:CHP
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## **Mode**

See “[Mode](#)” on page 1075 in the section "Common Measurement Functions" for more information.

## **Mode Setup**

See “[Mode Setup](#)” on page 1089 in the section "Common Measurement Functions" for more information.

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## 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.

<b>Remote Command</b>	:CALCulate:CHPower:MARKer[1 2 3 4 5 6 7 8 9 10 11 12]:MAXimum
Example	CALC:CHP:MARK2:MAX
Key Path	<b>Front panel key</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## **Recall**

See “[Recall](#)” on page 1103 in the section "Common Measurement Functions" for more information.

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## **Restart**

See “Restart” on page 1127 in the section "Common Measurement Functions" for more information.

## **Save**

See “[Save](#)” on page 1129 in the section "Common Measurement Functions" for more information.



## **Single**

See “[Single \(Single Measurement/Sweep\)](#)” on page 1155 in the section "Common Measurement Functions" for more information.

## **Source**

See “[Source](#)” on page 1157 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSE ] :CHPower:FREQuency:SPAN <freq> [ :SENSe ] :CHPower:FREQuency:SPAN?
Example	CHP:FREQ:SPAN 10 MHz CHP:FREQ:SPAN?
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.
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.

## Channel Power Measurement Span X Scale

Preset	SA: 3 MHz WCDMA: 7.5 MHz C2K: 1.845 MHz WIMAX OFDMA: 20 MHz 1xEVDO: 2.0MHz DVB-T/H: 10MHz DTMB: 10MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	1 GHz
Instrument S/W Revision	Prior to A.02.00

### Full Span

Changes the span to show the full frequency range of the spectrum analyzer.

<b>Remote Command</b>	[ :SENSe ] :CHPower :FREQuency :SPAN :FULL
Example	CHP:FREQ:SPAN:FULL
Dependencies/Couplings	Selecting full span changes the measurement span value.
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Instrument S/W Revision	Prior to A.02.00

### Last Span

Changes the span to the previous span setting. If no previous span value exists, then the span remains unchanged.

<b>Remote Command</b>	[ :SENSe ] :CHPower :FREQuency :SPAN :PREVious
Example	CHP:FREQ:SPAN:PREV
Dependencies/Couplings	Selecting last span changes the measurement span value.
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB

Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Instrument S/W Revision	Prior to A.02.00

## 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 1161 in the “Common Measurement Functions” section for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>[ :SENSe]:CHPower:SWEep:TIME &lt;time&gt; [ :SENSe]:CHPower:SWEep:TIME? [ :SENSe]:CHPower:SWEep:TIME:AUTO OFF ON 0 1 [ :SENSe]:CHPower:SWEep:TIME:AUTO?</pre>
Example	<pre>CHP:SWE:TIME 25ms CHP:SWE:TIME? CHP:SWE:TIME:AUTO OFF CHP:SWE:TIME:AUTO?</pre>
Dependencies/Couplings	When the user manually changes the Sweep Time, this state automatically goes to ‘Man’.
Key Path	<b>Sweep/Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	<p>SA, WIMAX OFDMA: Automatically Calculated</p> <p>WCDMA: 1.0 ms</p> <p>CDMA2K: 9.4ms</p> <p>1xEVDO: 2.66ms</p> <p>DVB-T/H: Automatically Calculated</p> <p>DTMB: Automatically Calculated</p>

State Saved	Saved in instrument state.
Min	1 ms
Max	4000 s
Instrument S/W Revision	Prior to A.02.00

## Sweep Setup

Accesses a menu that enables you to set the sweep state for the current measurement.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :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?
---------	--

Key Path	<b>Sweep/Control, Sweep Setup</b>
----------	-----------------------------------

Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
------	--

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	Prior to A.02.00
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## 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 1162](#) in “Common Measurement Functions” section for more details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## Gate

Accesses a menu that enables you to control the gating function. See [“Gate” on page 1162](#) 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	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	<code>[ :SENSe ] :CHPower :SWEep :POINts &lt;integer&gt;</code> <code>[ :SENSe ] :CHPower :SWEep :POINts?</code>
Example	CHP:SWE:POIN 501 CHP:SWE:POIN?
Dependencies/Couplings	Whenever the number of sweep points change, the sweep time is re-quantized.
Key Path	<b>Sweep/Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB



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
Preset	DVB-T/H: 2001 DTMB: 2001 Other: 1001
State Saved	Saved in instrument state.
Min	101
Max	20001
Instrument S/W Revision	Prior to A.02.00

## Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	:TRACe:CHPower:TYPE WRITe   AVERAge   MAXHold   MINHold :TRACe:CHPower:TYPE?
Example	TRAC:CHP:TYPE WRIT TRAC:CHP:TYPE?
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.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Preset	AVERAge
State Saved	Saved in instrument state.
Range	ClearWrite   Average   MaxHold   MinHold
Instrument S/W Revision	Prior to A.02.00

### 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.

- 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	<b>Detector</b>
Instrument S/W Revision	Prior to A.02.00

### Detector Selection

Selects a detector to be used by the analyzer for the current measurement.

<b>Remote Command</b>	<pre>[ :SENSe ]:CHPower:DETECTOR[:FUNction] NORMAL AVERAge POSitive SAMPle NEGative  [:SENSe]:CHPower:DETECTOR[:FUNction]?</pre>
Example	<pre>CHP:DET NORM CHP:DET?</pre>
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.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.</p> <p>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.</p> <p>The Average detector determines the average of the signal within the sweep points. The averaging method is Power Average (RMS).</p> <p>The Peak detector determines the maximum of the signal within the sweep points.</p> <p>The Sample detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.</p> <p>The Negative Peak detector determines the minimum of the signal within the sweep points.</p>

## Channel Power Measurement Trace/Detector

Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	Prior to A.02.00

### Auto

Sets the detector for the currently selected trace to Auto.

<b>Remote Command</b>	<code>[ :SENSe ] :CHPower :DETECTOR :AUTO ON OFF   1   0</code> <code>[ :SENSe ] :CHPower :DETECTOR :AUTO?</code>
Example	CHP:DET:AUTO ON CHP:DET:AUTO?
Dependencies/Couplings	When Detector setting is “Auto” ( <code>[ :SENSe ] :CHPower :DETECTOR :AUTO?</code> ), Detector ( <code>[ :SENSe ] :CHPower :DETECTOR [ :FUNCTION ]?</code> ) switches aligning with the switch of this parameter: “NORMal” with Clear Write, “AVERAge” with AVERAge, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Preset	ON DVB-T/H, DTMB: OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

## Trigger

Accesses a menu of functions that enable you to select and control the trigger source for the current measurement.

See [“Trigger” on page 1179](#) in the "Common Measurement Functions" section for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

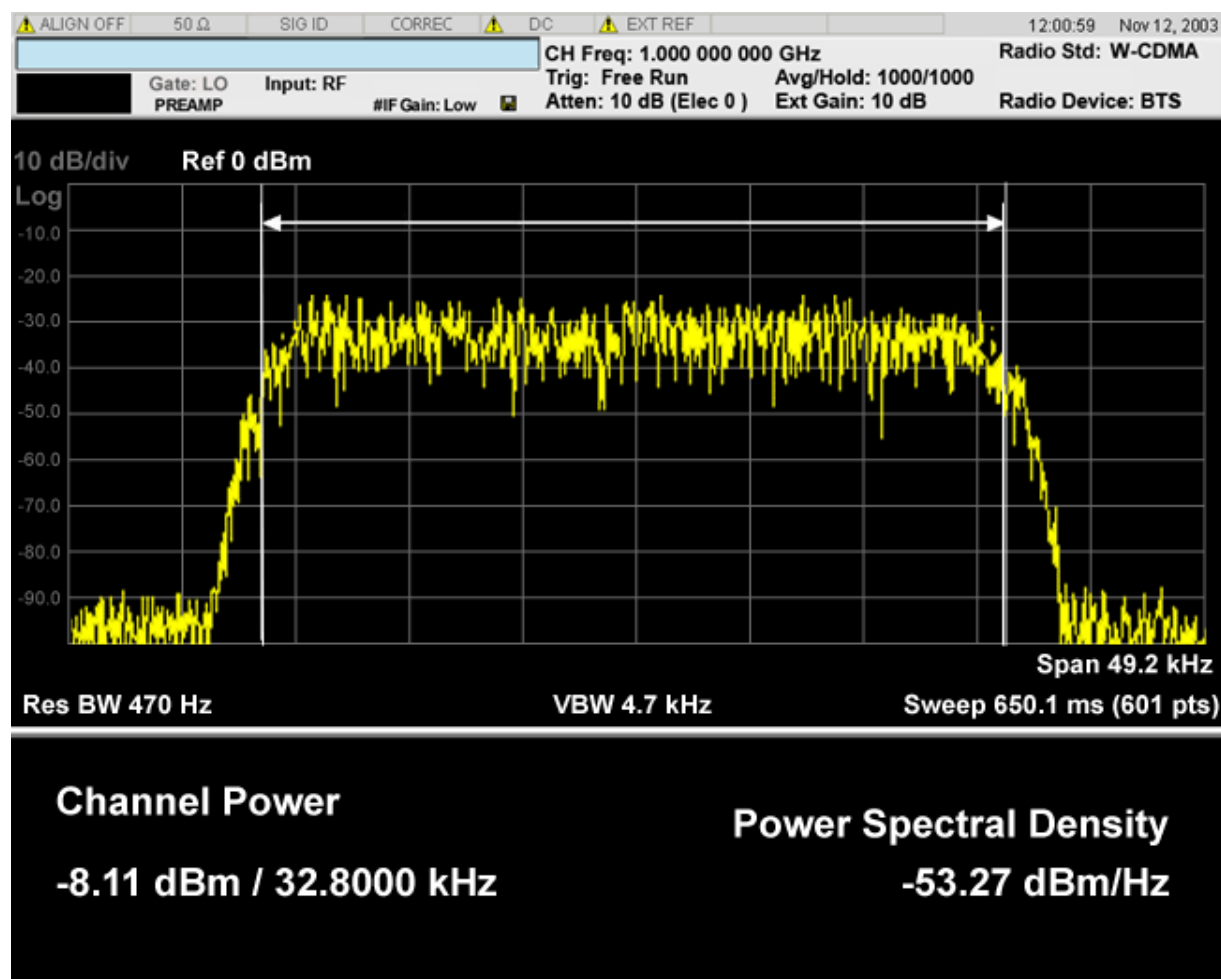
## View/Display

Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

If current mode is NOT DVB-T/H or DTMB mode, 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.

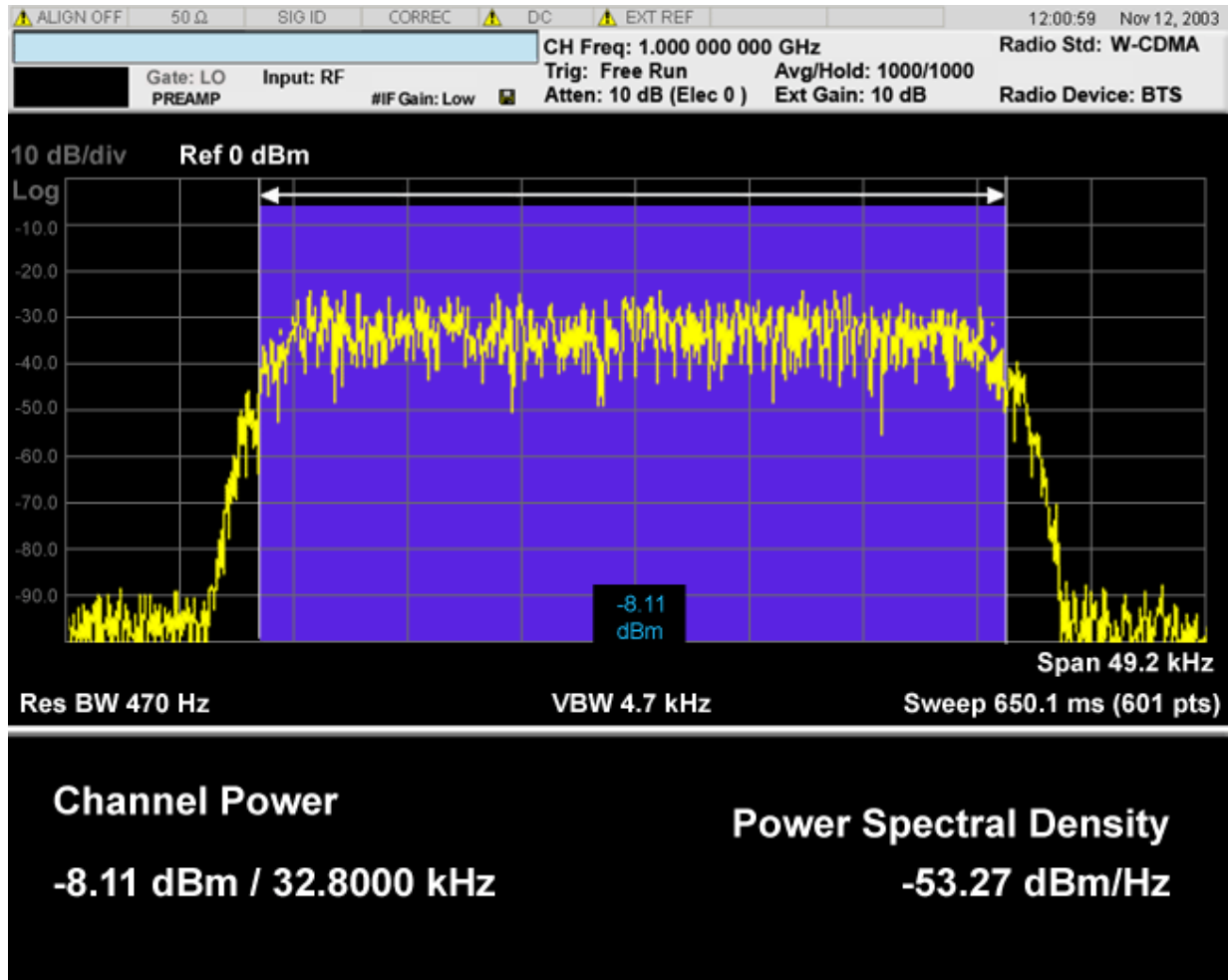
### Spectrum View with Bar Graph off



### 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 bottom of the bar.



If current mode is DVB-T/H or DTMB, the front panel views contain three views: RF Spectrum View, Shoulder Attenuation View and Spectrum Mask View. The RF Spectrum View is the common view, the same as the Spectrum view, and the Shoulder Attenuation View and Spectrum Mask View are special view for DVB-T/H and DTMB.

### View selection by name (SCPI Only) (DTMB, DVB-T/H only)

Selects the results view. The following SCPI command allows you to select the desired measurement view by enumeration.

**Remote Command**                   :DISPlay:CHPower:VIEW[:SElect] RFSpectrum|SHOUlder|MASK  
  :DISPlay:CHPower:VIEW[:SElect]?

Example                                 DISP:CHP:VIEW RFSP  
  DISP:CHP:VIEW?

## Channel Power Measurement View/Display

Key Path	<b>View/Display</b>
Mode	DVB-T/H, DTMB
Preset	RFSPpectrum
State Saved	Saved in instrument state.
Range	RF Spectrum   Shoulder Attenuation   Spectrum Mask
Instrument S/W Revision	A.02.00

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Display

Accesses a menu of functions that enable you to set the display parameters.

See “[Display](#)” on page 1233 in the "Common Measurement Functions" section for more information.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

### Bar Graph

Turns the Bar Graph On and Off.

<b>Remote Command</b>	: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?
---------	--

Key Path	<b>DVB-T/H or DTMB: View/Display, RF Spectrum</b> <b>Other: View/Display</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, DTMB 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	Prior to A.02.00



## RF Spectrum (DTMB, DVB-T/H only)

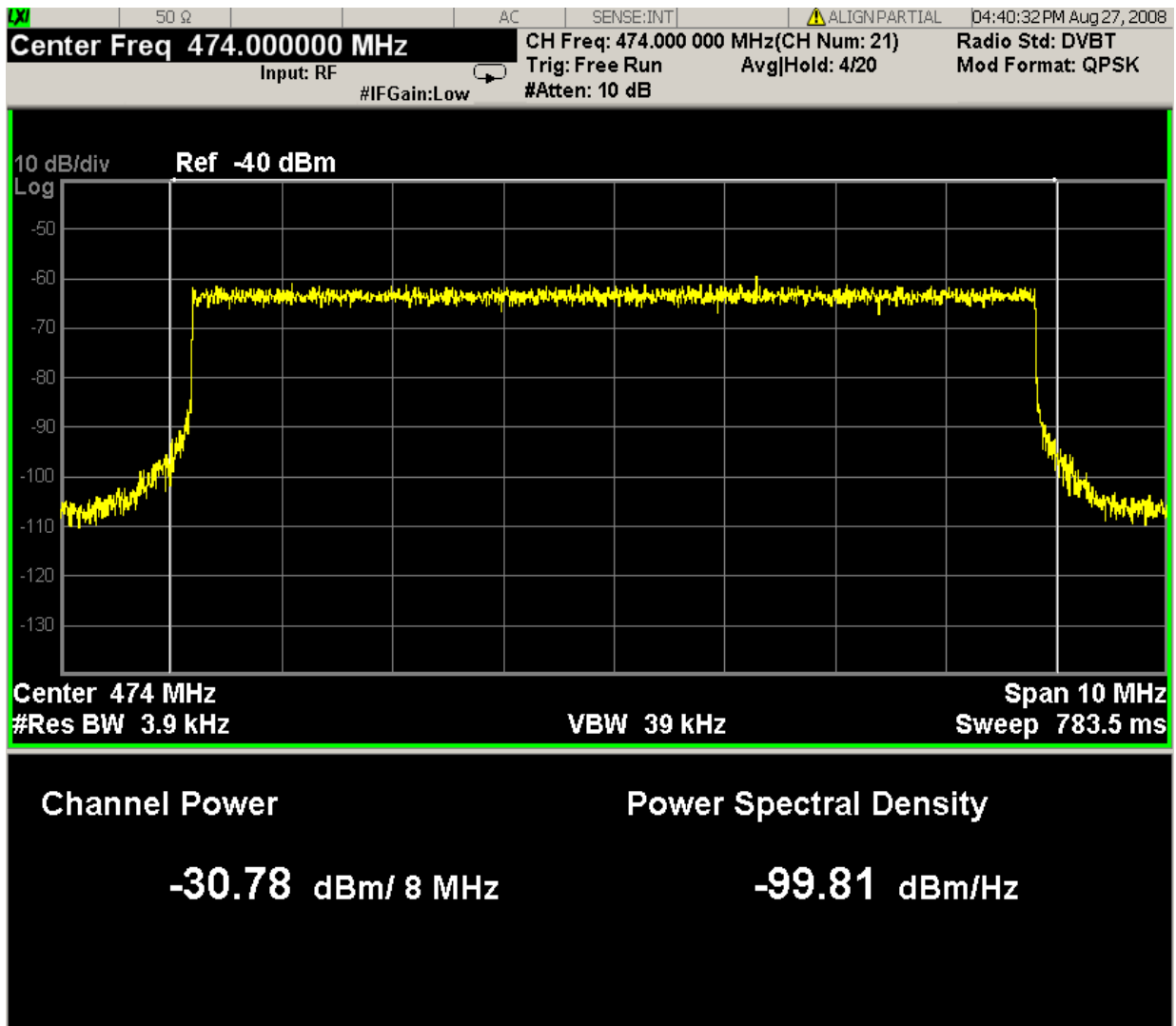
**NOTE** This view is the same as the Spectrum View above.

Selects the RF Spectrum view. This view consists of the following two windows:

“Traces Window” on page 538

“Results Window” on page 538

The measurement results are shown in a graph window and in a text window. The text window shows the absolute power and its mean power spectral density values over 8 MHz. This view also supports bar graph functionality. The bar graph is activated when the “Bar Graph” Soft Key is set to ON under the RF Spectrum menu. The actual measured output power level is displayed on the display at the bottom of the bar.



## Traces Window

Corresponding Trace      yellow - spectrum trace;

## Results Window

Name	Corresponding Results
Channel Power	n=1, 1st element Total channel power in the specified integration bandwidth Channel Integration Bandwidth
Power Spectral Density	n=1, 2nd element The power in the specified unit bandwidth

Example                      DISP:CHP:VIEW RFSP  
                                    DISP:CHP:VIEW?

Key Path                      **View/Display**

Instrument S/W Revision    A.02.00

## Shoulder Attenuation (DTMB, DVB-T/H only)

Selects the Shoulder Attenuation view. This view is only available in DVB-T/H and DTMB mode:

[“Shoulder Attenuation view for DVB-T/H mode” on page 539](#)

[“Shoulder Attenuation view for DTMB mode” on page 540](#)

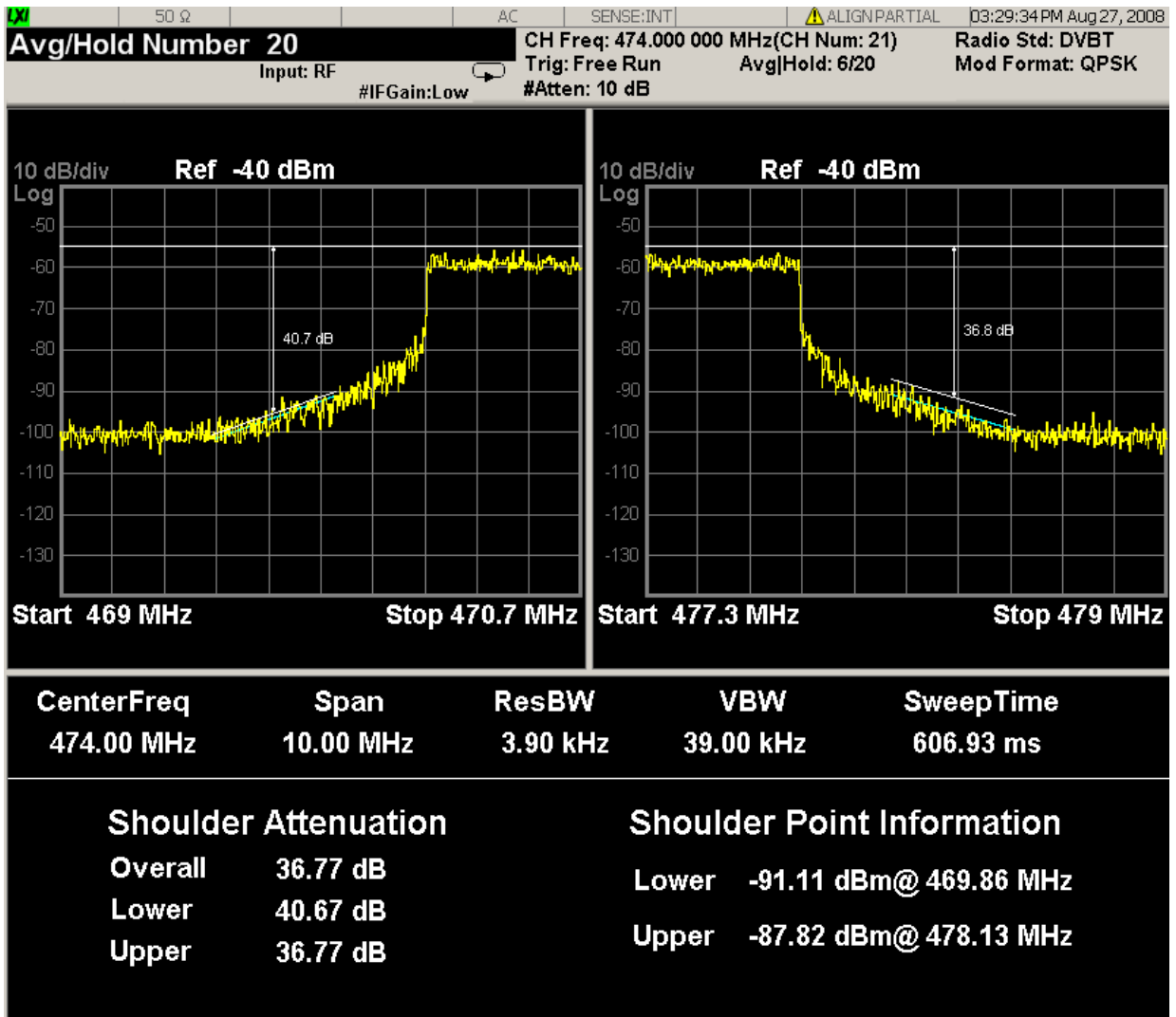
This view consists of the following three windows:

[“Lower Shoulder Trace Window” on page 541](#)

[“Upper Shoulder Trace Window” on page 541](#)

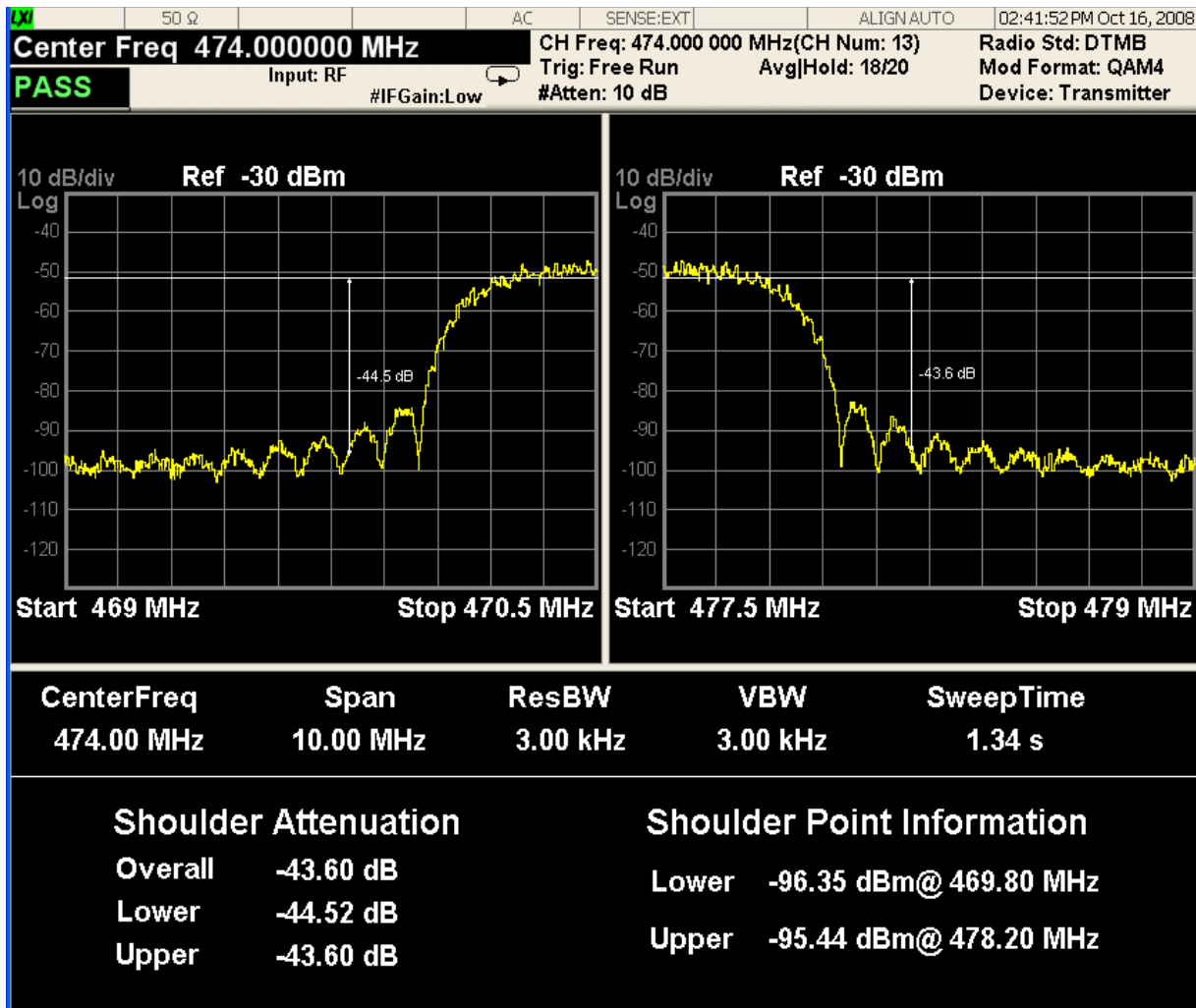
[“Results Window” on page 541](#)

Shoulder Attenuation view for DVB-T/H mode



Channel Power Measurement  
View/Display

Shoulder Attenuation view for DTMB mode



NOTE

The pass/fail functionality is only valid for DTMB mode. When the device type (under mode setup panel) is Transmitter, the pass/fail limit is -36dBc, and for another type - Exciter, the pass/fail limit is -48dBc.

## Lower Shoulder Trace Window

Corresponding Trace \*      yellow - lower edge of the spectrum trace;  
    white - assistant lines to indicate the lower shoulder attenuation;  
    cyan – assistant beeline from shoulder range begin point to the range end point;

## Upper Shoulder Trace Window

Corresponding Trace \*      yellow - upper edge of the spectrum trace;  
    white - assistant lines to indicate the upper shoulder attenuation;  
    cyan – assistant beeline from shoulder range begin point to the range end point;

## Results Window

Name	Corresponding Results
CenterFreq (MHz)	The center frequency of the measurement
Span (MHz)	The span of the measurement
ResBW (kHz)	The resolution bandwidth of the measurement
VBW (kHz)	The video bandwidth of the measurement
SweepTime (ms)	The sweep time of the measurement
Overall Shoulder Attenuation (dB)	n=3, 1st element Shoulder attenuation result
Lower Shoulder Attenuation (dB)	n=3, 2nd element Lower shoulder attenuation result
Upper Shoulder Attenuation (dB)	n=3, 3rd element Upper shoulder attenuation result
Lower Shoulder Point Power (dBm) **	n=3, 4th element The power value of the point with maximum power level in the lower edge of the spectrum
Lower Shoulder Point Frequency (MHz) **	n=3, 5th element The frequency of the point with maximum power level in the lower edge of the spectrum
Upper Shoulder Point Power (dBm) **	n=3, 6th element The power value of the point with maximum power level in the upper edge of the spectrum

## Channel Power Measurement View/Display

Upper Shoulder Point Frequency (MHz) **	n=3, 7th element The frequency of the point with maximum power level in the upper edge of the spectrum
--	--

\*: For DVB-T/H mode: All three traces are valid. The cyan line is connecting the measurement points 300kHz and 700kHz from each of the upper and lower edges of the spectrum (yellow trace).

For DTMB mode: There are only two traces: yellow trace and white trace.

\*\* : For DVB-T/H mode: Shoulder Point Information shows the information of the maximum power level point between the points at 300 kHz and 700 kHz from each of the upper and lower edges of the spectrum trace. It contains two parts: the frequency and the power level.

For DTMB mode: Shoulder Point Information shows the power level of the fixed point, which is  $\pm 4.2$  MHz away from center frequency for 8 MHz radio bandwidth and  $\pm 3.2$  MHz away from center frequency for 6 MHz radio bandwidth.

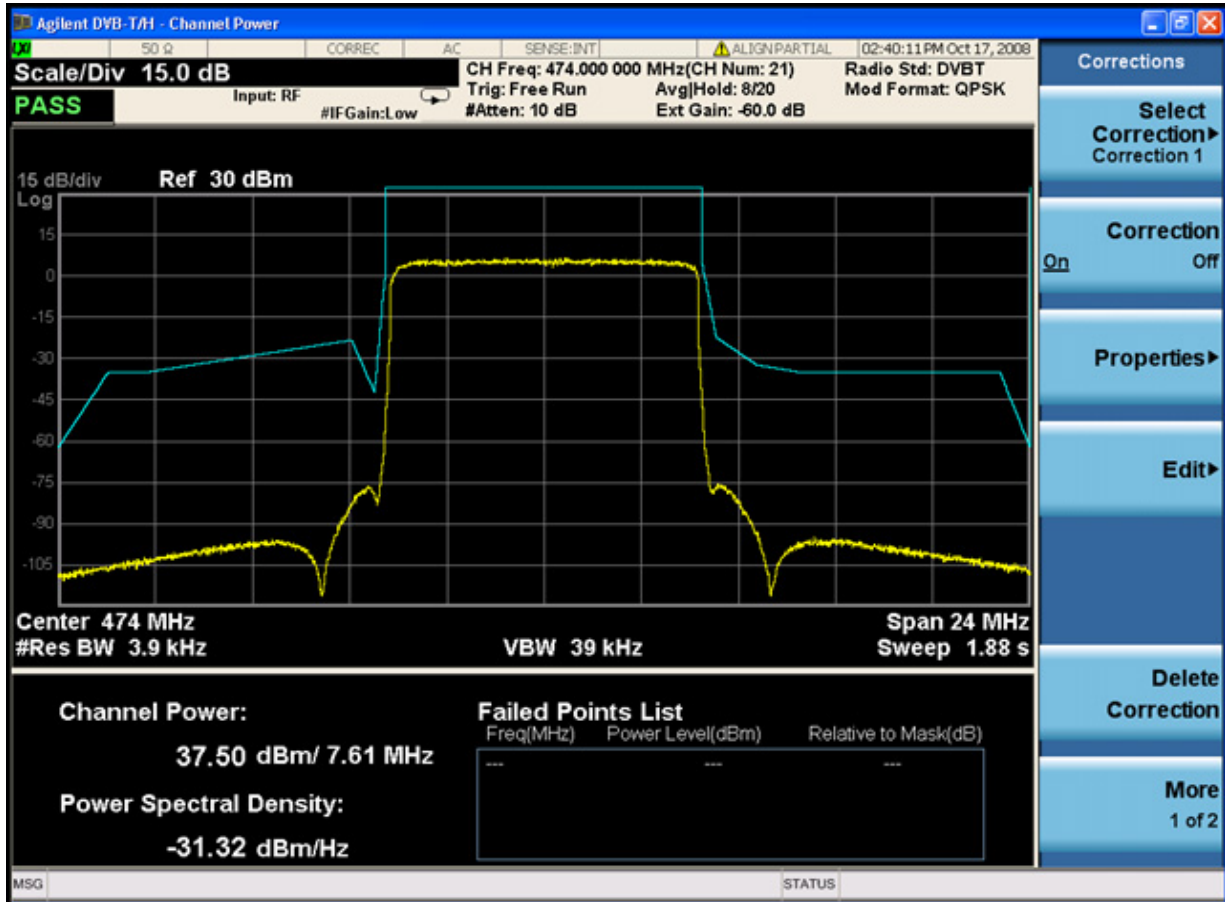
Example	DISP:CHP:VIEW SHOU DISP:CHP:VIEW?
Key Path	<b>View/Display</b>
Instrument S/W Revision	A.02.00

### **Spectrum Mask (DTMB, DVB-T/H only)**

Selects the Spectrum Mask view. This view consists of the following two windows:

[“Trace Window” on page 544](#)

[“Results Window” on page 544](#)



**NOTE** If current radio bandwidth is not 8MHz, the limit line (Mask) is not available and the failed points list shows “---”. The STATUS message “No Result; No mask for X MHz” appears. (X may be 5, 6 and 7 for DVB-T/H mode and 6 for DTMB mode.)

## Trace Window

Corresponding Trace      yellow - spectrum trace;  
                                 cyan - limit line trace;

## Results Window

Name	Corresponding Results
Channel Power	n=1, 1st element Total channel power in the specified integration bandwidth Channel Integration Bandwidth
Power Spectral Density	n=1, 2nd element The power in the specified unit bandwidth
Failed Points List *	n=7 The failed point's information: frequency, absolute power and relative power

\*: If the number of failed points is less than twenty, it will show all of them (frequency, power and relative power); and if the number of failed points is great than twenty, the first ten failed points will be showed at the first ten positions of the list, and the last ten failed points will be showed at the last ten positions of the list.

Example	DISP:CHP:VIEW MASK DISP:CHP:VIEW?
Key Path	<b>View/Display</b>
Instrument S/W Revision	A.02.00

## Mask - selection by Enum (Only for DVB-T/H mode)

Select the mask line in the spectrum mask view. The following SCPI command allows you to select the desired mask by enumeration. It contains six kinds of limit line: L/SECAM/NICAM, G/PAL/NICAM, I/PAL/NICAM, G/PAL/A2, K/SECAM and K/PAL.

<b>Remote Command</b>	:DISPlay:CHPower:VIEW:MASK[ :SElect ] LSNI   GPNI   IPNI   GPA2   KSKP :DISPlay:CHPower:VIEW:MASK[ :SElect ]?
Example	DISP:CHP:VIEW:MASK LSNI DISP:CHP:VIEW:MASK?
Dependencies/Couplings	If current Radio BW is not 8MHz, the STATUS message "No result" will be displayed. But the keys under the Spectrum Mask are also displayed.



Key Path	<b>View/Display, Spectrum Mask</b>
Mode	DVB-T/H
Preset	LSNI
State Saved	Saved in instrument state.
Range	LSecam_Nicam   GPal_Nicam   IPal_Nicam   GPal_A2   KSecam_KPal
Instrument S/W Revision	A.02.00

### Scroll

Accesses the Scroll menu, which contains features that enable you to navigate the display.

Key Path	<b>View/Display</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**Prev Page** Moves the display one page back to the previous page of the result metrics window in Spectrum Mask view.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**Next Page** Moves the display one page forward to the next page of the result metrics window in Spectrum Mask view.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**Scroll Up** Moves one line upward from the current line of the result metrics window in Spectrum Mask view.

Pressing the up arrow hard key has the same effect as this function, if no active function is shown. If an active function is shown, the up arrow hard key controls the active function, but has no effect on line movement.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**Scroll Down** Moves one line downward from the current line of the result metrics window in Spectrum

## Channel Power Measurement View/Display

Mask view.

Pressing the down arrow hard key has the same effect as this function, if no active function is shown. If an active function is shown, the up arrow hard key controls the active function, but has no effect on line movement, as the Scroll Down function does.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**First Page** Moves the display to the first page of the result metrics window in Spectrum Mask view.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

**Last Page** Moves the display to the last page of the result metrics window in Spectrum Mask view.

Key Path	<b>View/Display, Spectrum Mask, Scroll</b>
Mode	DVB-T/H, DTMB
Instrument S/W Revision	A.02.00

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 ” on page 547](#)

[“Remote Command Results for Occupied Bandwidth Measurement” on page 547](#)

## 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 1057](#).

## Remote Command Results for Occupied Bandwidth Measurement

For descriptions of the results, see [“Measurement Results” on page 549](#).

n	Results Returned
---	------------------

## Occupied Bandwidth Measurement

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

Prior to A.02.00

## Measurement Results

Measurement results are described in this section. Views are described under the “View/Display” on page 593 key.

The following result descriptions are available:

“Occupied Bandwidth” on page 549

“Total Power” on page 549

“Transmit Freq Error” on page 549

“x dB Bandwidth” on page 549

### 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) for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	:DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV e1 <real>  :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV e1?
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
Instrument S/W Revision	Prior to A.02.00

### 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 965](#) for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

### 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 977](#) for more information.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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 978 for more information.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See “[Internal Preamp](#)” on page 980 for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	: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	Prior to A.02.00



## Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	: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	Prior to A.02.00

## **Auto Couple**

The Auto Couple function is not supported in this measurement.

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	<pre>[ :SENSE]:OBwidth: BANDwidth[ :RESolution] &lt;bandwidth&gt; [ :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	<p>Sweep time is coupled to RBW. As the RBW changes, the sweep time (if set to Auto) is changed to maintain amplitude calibration.</p> <p>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).</p> <p>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.</p>

## Occupied Bandwidth Measurement 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
Instrument S/W Revision	Prior to A.02.00

### Video BW

Changes the analyzer post-detection filter.

Key Path	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE ] :OBWidth :BANDwidth :VIDeo <bandwidth> [ :SENSE ] :OBWidth :BANDwidth :VIDeo? [ :SENSE ] :OBWidth :BANDwidth :VIDeo :AUTO ON   OFF   1   0 [ :SENSE ] :OBWidth :BANDwidth :VIDeo :AUTO?
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	<p>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).</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>When the video bandwidth is AUTO coupled, the video bandwidth value is set to:</p> <p>Resolution Bandwidth * Video Bandwidth to Resolution Bandwidth Ratio</p>
Preset	<p>SA: Auto</p> <p>WCDMA: 300 kHz</p> <p>CDMA2K:120 kHz</p> <p>WIMAX OFDMA: 1MHz</p> <p>TD-SCDMA: 300kHz</p> <p>1xEVDO: 300kHz</p> <p>ON</p>
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

## 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	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	<p>[ :SENSE]:OBwidth:BA<b>N</b>Dwidth:SHA<b>P</b>e GAU<b>S</b>sian FLATtop</p> <p>[ :SENSE]:OBwidth:BA<b>N</b>Dwidth:SHA<b>P</b>e?</p>

## Occupied Bandwidth Measurement BW

Example	OBW:BAND:SHAP GAUS OBW:BAND:SHAP?
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian Flattop
Instrument S/W Revision	Prior to A.02.00

## **Cont (Continuous)**

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987.

## **FREQ/Channel (Frequency or Channel)**

Operation of this key is identical across several measurements. For details about this key, see FREQ Channel “FREQ Channel” on page 989.



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## **Input/Output**

Operation of this key is identical across several measurements. For details about this key, see [“Input/Output” on page 995](#).

## 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 1051.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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
<b>Remote Command</b>	: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 <b>Normal</b> , or the offset from the marker’s reference marker if the control mode is <b>Delta</b> . The query is returned in the fundamental units for the current marker X Axis scale: Hz for <b>Frequency</b> .
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
Instrument S/W Revision	Prior to A.02.00

## 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
<b>Remote Command</b>	: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 <b>Normal</b> , or the offset from the marker's reference marker in trace points if the control mode is <b>Delta</b> .
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
Instrument S/W Revision	Prior to A.02.00

## 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
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

## 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 Value** appears on the Active Function area.

Key Path	<b>Marker</b>
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## Occupied Bandwidth Measurement Marker

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	:CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSITION DELTA OFF :CALCulate:OBWidth:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE?
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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> 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	Prior to A.02.00

### Properties

Accesses the marker properties menu.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker, Properties</b>
Instrument S/W Revision	Prior to A.02.00

### Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

Key Path	<b>Marker, Properties</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO

<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

## All Markers Off

Turns off all markers.

Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	:CALCulate:OBWidth:MARKer:AOff
Example	CALC:OBW:MARK:AOff
Instrument S/W Revision	Prior to A.02.00

## **Marker Function**

There are no 'Marker Functions' supported in this measurement.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

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## **Marker To**

There is no 'Marker To' functionality supported in this measurement.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

## **Meas**

Operation of this key is identical across several measurements. For details about this key, see [“Meas” on page 1057](#).



## Meas Setup

Displays the setup menu for the current measurement. The measurement setup parameters include the number of measurement averages used to calculate the measurement result and the averaging mode. The setup menu also includes the option to reset the measurement settings to their factory defaults.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Avg/Hold Num

Specifies the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

Initiates an averaging routine that averages the sweep points in a number of successive sweeps, resulting in trace smoothing.

After the specified number of average counts, the average mode (termination control) setting determines the average action.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSe]:OBwidth:AVERage:COUNT <integer> [ :SENSe]:OBwidth:AVERage:COUNT? [ :SENSe]:OBwidth:AVERage[ :STATe] ON OFF 1 0 [ :SENSe]:OBwidth:AVERage[ :STATe]?
Example	OBW:AVER:COUN 1500 OBW:AVER:COUN? OBW:AVER ON OBW: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.
Dependencies/Couplings	Averaging state is coupled to Max Hold. If Max Hold is changed from Off to On, Averaging state is automatically set to On.
Preset	10 ON
State Saved	Saved in instrument state.
Min	1

## Occupied Bandwidth Measurement Meas Setup

Max	10000
Instrument S/W Revision	Prior to A.02.00

### 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 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE]:OBWidth:AVERage:TCONtrol EXPonential REPeat [ :SENSE]:OBWidth:AVERage:TCONtrol?
Example	OBW:AVER:TCON REP OBW:AVER:TCON?
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	EXP
State Saved	Saved in instrument state.
Range	Exp   Repeat
Instrument S/W Revision	Prior to A.02.00

### Max Hold (Remote Command Only)

When On, Max Hold displays and holds the maximum responses of the current measurement. Turn Max Hold to Off to disable the maximum hold feature.

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE]:OBWidth:MAXHold ON OFF 1 0 [ :SENSE]:OBWidth:MAXHold?
Example	OBW:MAXH ON OBW:MAXH?
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	Max Hold is coupled to Average/Hold state. The Max Hold function is activated only if Average state is On. If Max Hold is changed to On when Average state is Off, Average state is automatically set to On.
Preset	OFF
State Saved	Saved in instrument state.
Range	On   Off
Instrument S/W Revision	Prior to A.02.00

## Occ BW % Pwr

Assigns the percentage of the total power that is measured within the Occupied Bandwidth for the current measurement. The resulting Occupied Bandwidth limits are displayed by markers placed on the frequencies of the specified percentage.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSe]:OBwidth:PERCent <real> [ :SENSe]:OBwidth:PERCent?
Example	OBW:PERC 75 OBW:PERC?
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	99.00
State Saved	Saved in instrument state.
Min	10
Max	99.99
Instrument S/W Revision	Prior to A.02.00

## x dB

Sets the x dB value used for the "x dB bandwidth" result that measures the bandwidth between two points on the signal which is x dB down from the highest signal point within the OBW Span.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSe]:OBwidth:XDB <rel_ampl> [ :SENSe]:OBwidth:XDB?

## Occupied Bandwidth Measurement Meas Setup

Example	OBW:XDB -20 OBW:XDB?
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	-26.0 dB
State Saved	Saved in instrument state.
Min	-100.0 dB
Max	-0.1 dB
Instrument S/W Revision	Prior to A.02.00

### IF Gain

The **IF Gain** key can be used to set the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

Key Path	<b>Meas Setup, IF Gain</b>
Instrument S/W Revision	Prior to A.02.00

### IF Gain Auto

Activates the Auto Rules for IF Gain. When Auto is active, the IF Gain is set to High Gain under and 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	<b>Meas Setup, IF Gain</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE]:OBWidth:IF:GAIN:AUTO[:STATE] ON OFF 1 0 [:SENSE]:OBWidth:IF:GAIN:AUTO[:STATE]?
Example	OBW:IF:GAIN:AUTO OFF OBW:IF:GAIN:AUTO?
Dependencies/Couplings	When the auto attenuation exists (for example, with 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 less than 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	Prior to A.02.00

### IF Gain State

Selects the range of the IF Gain.

Key Path	<b>Meas Setup, IF Gain</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE ] :OBWidth :IF :GAIN [ :STATE ] ON   OFF   1   0 [ :SENSE ] :OBWidth :IF :GAIN [ :STATE ] ?
Example	OBW : IF : GAIN ON OBW : IF : GAIN ?
Notes	Where ON = high gain OFF = low gain
Dependencies/Couplings	When the auto attenuation exists (for example, with 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 less than 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	Prior to A.02.00

### Limit

Enables you to turn on or off limit checking at the specified frequency. For results that fail the limit test, a red FAIL appears in the measure bar.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	:CALCulate:OBWidth:LIMit:FBLimit <freq> :CALCulate:OBWidth:LIMit:FBLimit? :CALCulate:OBWidth:LIMit[:TEST] ON   OFF   1   0 :CALCulate:OBWidth:LIMit[:TEST] ?

## Occupied Bandwidth Measurement Meas Setup

Example	CALC:OBW:LIM:FBL 50 kHz CALC:OBW:LIM:FBL? CALC:OBW:LIM OFF CALC:OBW:LIM?
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: 5 MHz C2K: 1.48 MHz WIMAX OFDMA: 10MHz TD-SCDMA: 1.6MHz 1xEVDO: 1.48MHz SA: OFF WCDMA, WIMAX OFDMA, TD-SCDMA, 1xEVDO: ON
State Saved	Saved in instrument state.
Min	10 kHz
Max	10 MHz
Instrument S/W Revision	Prior to A.02.00

### Meas Preset

Restores all measurement parameters to their default values.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	:CONFigure:OBWidth
Example	CONF:OBW
Instrument S/W Revision	Prior to A.02.00

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## **Mode**

Operation of this key is identical across several measurements. For details about this key, see “[Mode](#)” on [page 1075](#).

## **Mode Setup**

Operation of this key is identical across several measurements. For details about this key, see [“Mode Setup”](#) on page 1089.



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## 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	<b>Front panel key</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	: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	Prior to A.02.00

## **Recall**

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 1103](#).

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## **Restart**

Operation of this key is identical across several measurements. For details about this key, see [“Restart” on page 1127](#).

## **Save**

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1129](#).

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## **Single**

Operation of this key is identical across several measurements. For details about this key, see [“Single \(Single Measurement/Sweep\)”](#) on page 1155.

## **Source**

Operation of this key is identical across several measurements. For details about this key, see [“Source” on page 1157](#).

## Span X Scale

Activates the Span function and displays the menu of span functions. The parameter values are measurement independent.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Span

Set the frequency of the occupied bandwidth span for the current measurement.

Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :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	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
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA
<b>Remote Command</b>	[ :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	Prior to A.02.00

## 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	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA
<b>Remote Command</b>	[ :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	Prior to A.02.00



## 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 1161](#).

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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:

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.

This is not available when the selected input is I/Q.

Key Path	<b>Sweep/Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :SENSE]:OBwidth:SWEep:TIME <time> [ :SENSE]:OBwidth:SWEep:TIME? [ :SENSE]:OBwidth:SWEep:TIME:AUTO OFF ON 0 1 [ :SENSE]:OBwidth:SWEep:TIME:AUTO?
Example	OBW:SWE:TIME 50 ms OBW:SWE:TIME? OBW:SWE:TIME:AUTO ON OBW:SWE:TIME:AUTO?
Dependencies/Couplings	When you manually change the Sweep Time, this state automatically goes to ‘Man’.

## Occupied Bandwidth Measurement 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
Instrument S/W Revision	Prior to A.02.00

### Sweep Setup

Accesses the sweep setup settings for the current measurement.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Sweep/Control, Sweep Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :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      Prior to A.02.00

## 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 1162](#) for more information.

Key Path                              **Sweep/Control**  
Instrument S/W Revision      Prior to A.02.00

## 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 1162](#).

Key Path                              **Sweep/Control**  
Instrument S/W Revision      Prior to A.02.00

## 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 Measurement Sweep/Control

Notes	<p>This function is not available when signal identification is set to On (external mixing).</p> <p>Affected by:</p> <p>log sweep, segmented sweep</p> <p>Grayed out in measurements that don't support swept</p> <p>Blanked in modes that do not support swept.</p> <p>Whenever the number of sweep points change:</p> <ul style="list-style-type: none"><li>- All trace data is erased</li><li>- Any traces with Update Off also go to Display Off (like going from View to Blank in the older analyzers)</li><li>- Sweep time is re-quantized</li><li>- Any limit lines that are on are updated</li><li>- If averaging/hold is on, averaging/hold starts over</li></ul>
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
Instrument S/W Revision	Prior to A.02.00

## Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	: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	Prior to A.02.00

## 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	<b>Detector</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
<b>Remote Command</b>	[ :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	Prior to A.02.00

### 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	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO mode
<b>Remote Command</b>	[ :SENSE]:OBWidth:DETECTOR:AUTO ON OFF 1 0 [ :SENSE]:OBWidth:DETECTOR:AUTO?
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	Prior to A.02.00

## **Trigger**

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1179](#).



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## 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

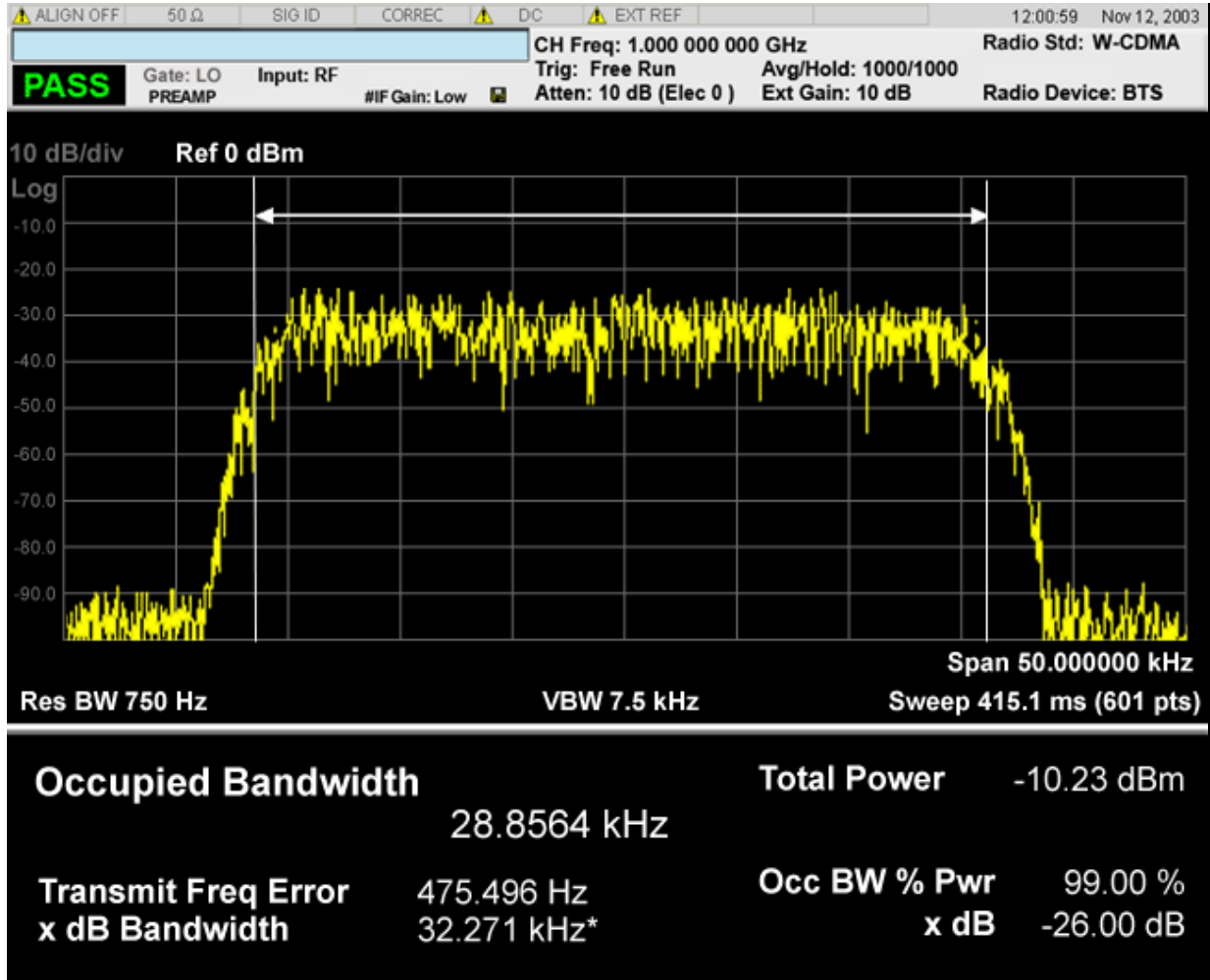
---

**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.

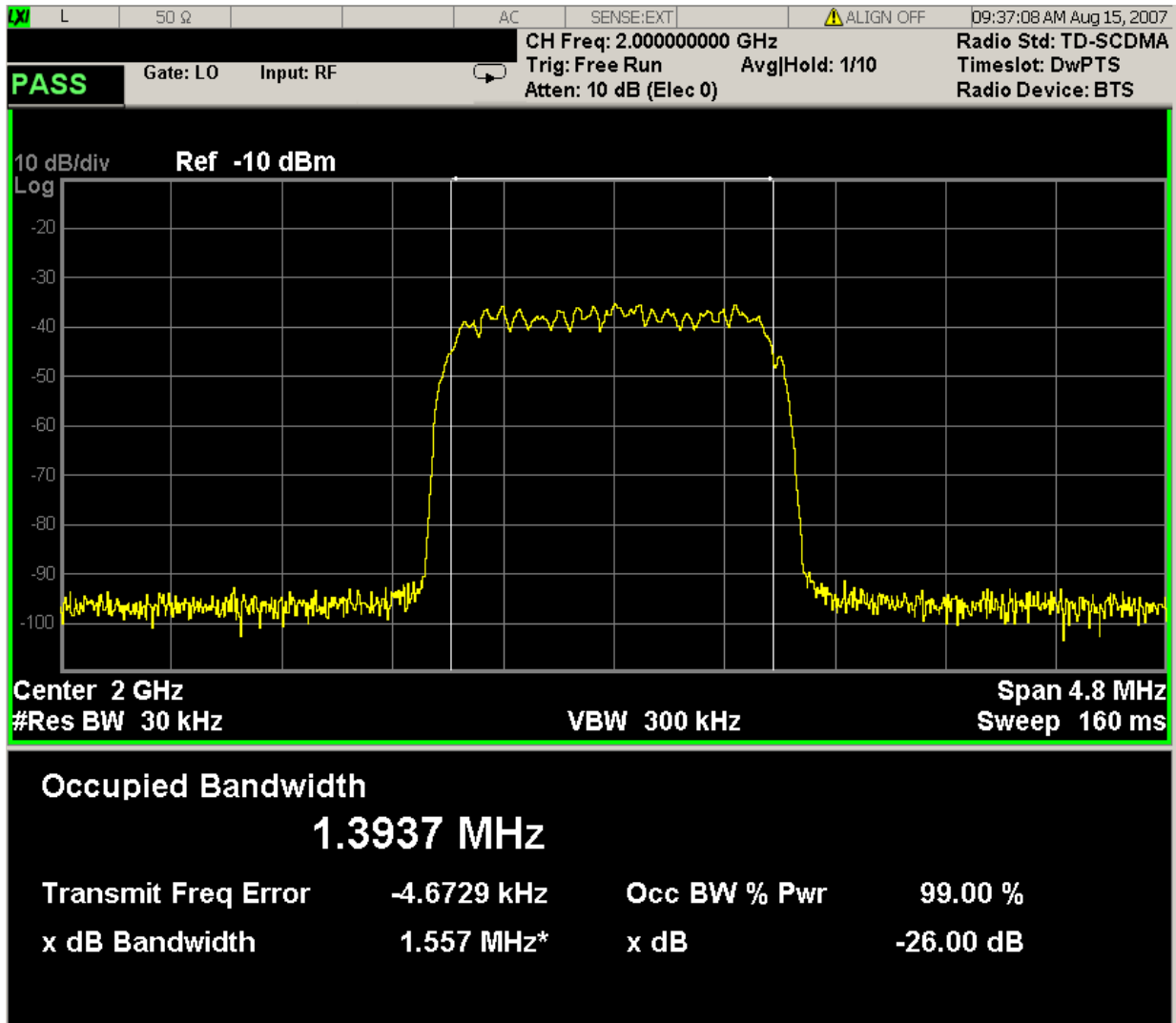
---

For SA, WCDMA, C2K, 1xEVDO, WIMAX OFDMA mode:

Occupied Bandwidth Measurement  
View/Display



For TD-SCDMA mode only:



Key Path **Front-panel key**

Instrument S/W Revision Prior to A.02.00

## 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 1233](#).

Key Path **View/Display**

Instrument S/W Revision Prior to A.02.00



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. For measurement results and views, see [“View/Display” on page 678](#).

This topic contains the following sections:

[“Measurement Commands for ACP” on page 597](#)

[“Remote Command Results for ACP Measurement” on page 597](#)

## 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 1057](#).

## 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).

## ACP Measurement

Meas Type = Total power reference	Not specified or n=1	Returns 28 comma-separated scalar results, in the following order. <ol style="list-style-type: none"><li>1. 0.0</li><li>2. Total carrier power (dBm)</li><li>3. 0.0</li><li>4. Reference carrier power (dBm)</li><li>5. Lower offset A - relative power (dB)</li><li>6. Lower offset A - absolute power (dBm)</li><li>7. Upper offset A - relative power (dB)</li><li>8. Upper offset A - absolute power (dBm)</li><li>9. Lower offset B - relative power (dB)</li><li>10. Lower offset B - absolute power (dBm)</li><li>11. Upper offset B - relative power (dB)</li><li>12. Upper offset B - absolute power (dBm)</li><li>...</li><li>25. Lower offset F - relative power (dB)</li><li>26. Lower offset F - absolute power (dBm)</li><li>27. Upper offset F - relative power (dB)</li><li>28. Upper offset F - absolute power (dBm)</li></ol> If the results are not available, -999.0 is returned.
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Meas Type = Power spectral density reference	not specified or n=1	<p>Returns 28 comma-separated scalar results, in the following order.</p> <ol style="list-style-type: none"> <li>1. 0.0</li> <li>2. Total carrier power (dBm/Hz or dBm/MHz)</li> <li>3. 0.0</li> <li>4. Reference carrier power (dBm/Hz or dBm/MHz)</li> <li>5. Lower offset A - relative power (dB)</li> <li>6. Lower offset A - absolute power (dBm/Hz or dBm/MHz)</li> <li>7. Upper offset A - relative power (dB)</li> <li>8. Upper offset A - absolute power (dBm/Hz or dBm/MHz)</li> <li>9. Lower offset B - relative power (dB)</li> <li>10. Lower offset B - absolute power (dBm/Hz or dBm/MHz)</li> <li>11. Upper offset B - relative power (dB)</li> <li>12. Upper offset B - absolute power (dBm/Hz or dBm/MHz)</li> <li>...</li> <li>25. Lower offset F - relative power (dB)</li> <li>26. Lower offset F - absolute power (dBm/Hz or dBm/MHz)</li> <li>27. Upper offset F - relative power (dB)</li> <li>28. Upper offset F - absolute power (dBm/Hz or dBm/MHz)</li> </ol> <p>If the results are not available, -999.0 is returned.</p>
Meas Method = FAST	not specified or n=1	<p>Returns 5 comma-separated results, in the following order:</p> <ol style="list-style-type: none"> <li>1. Reference carrier - absolute power (dBm)</li> <li>2. Lower offset A - absolute power (dBm)</li> <li>3. Upper offset A - absolute power (dBm)</li> <li>4. Lower offset B - absolute power (dBm)</li> <li>5. Upper offset B - absolute power (dBm)</li> </ol>

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.

## ACP Measurement

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

Prior to A.02.00

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## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV e1 &lt;real&gt;</code>  <code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEV e1?</code>
Example	<code>DISP:ACP:VIEW:WIND:TRAC:Y:RLEV 100</code> <code>DISP:ACP:VIEW:WIND:TRAC:Y:RLEV?</code>
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.
Preset	All Except CDMA1xEVDO: 10.00 dBm CDMA1xEVDO: -10dBm
State Saved	Saved in instrument state.
Min	-250.00 dBm
Max	250.00 dBm
Instrument S/W Revision	Prior to A.02.00

### 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 965 in the “Common Measurement Functions” section for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	<code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision &lt;rel_ampl&gt;</code>  <code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?</code>
Example	<code>DISP:ACP:VIEW:WIND:TRAC:Y:PDIV 5</code> <code>DISP:ACP:VIEW:WIND:TRAC:Y:PDIV?</code>
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SELEct</code> to set the mode.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Instrument S/W Revision	Prior to A.02.00

## Presel Center

See AMPTD Y Scale, “[Presel Center](#)” on page 977 in the “Common Measurement Functions” section for more information.

## Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 978 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 980 in the “Common Measurement Functions” section for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	<code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION TOP CENTer BOTTom</code>  <code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSITION?</code>
Example	<code>DISP:ACP:VIEW:WIND:TRAC:Y:RPOS CENT</code> <code>DISP:ACP:VIEW:WIND:TRAC:Y:RPOS?</code>
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SELEct</code> to set the mode.
Preset	TOP
State Saved	Saved in instrument state.
Range	Top Ctr Bot
Instrument S/W Revision	Prior to A.02.00

## Auto Scaling

Toggles the Auto Scaling function between On and Off.

<b>Remote Command</b>	<code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPle 0 1 OFF ON</code>  <code>:DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPle?</code>
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Example	DISP:ACP:VIEW:WIND:TRAC:Y:COUP ON DISP:ACP:VIEW:WIND:TRAC:Y:COUP?
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the mode that includes ACP measurements 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	Prior to A.02.00

## **Auto Couple**

See “[AUTO COUPLE](#)” on page 983 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>[ :SENSe]:ACPower:BANDwidth[:RESolution] &lt;bandwidth&gt; [:SENSe]:ACPower:BANDwidth[:RESolution]? [:SENSe]:ACPower:BANDwidth[:RESolution]:AUTO ON OFF 1 0 [:SENSe]:ACPower:BANDwidth[:RESolution]:AUTO?</pre>
Example	<pre>ACP:BAND 25kHz ACP:BAND? ACP:BAND:AUTO ON ACP:BAND:AUTO?</pre>
Dependencies/Couplings	The resolution bandwidth is coupled to the video bandwidth based on the video to resolution bandwidth ratio setting if AUTO is selected.
Key Path	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>This key is available only in IBW mode.</p> <p>This parameter is preset by the Meas Method selection. Preset values are as follows:</p> <pre>IBW: 100 kHz IBWR: 27 kHz FAST (WCDMA): 390 kHz</pre> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>

## 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 DVB-T/H: 39kHz DTMB: 39kHz 0
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Instrument S/W Revision	Prior to A.02.00

### Video BW

Changes the analyzer post-detection filter (VBW).

<b>Remote Command</b>	<code>[ :SENSe ] :ACPower :BANDwidth :VIDeo &lt;freq&gt;</code> <code>[ :SENSe ] :ACPower :BANDwidth :VIDeo?</code> <code>[ :SENSe ] :ACPower :BANDwidth :VIDeo :AUTO OFF   ON   0   1</code> <code>[ :SENSe ] :ACPower :BANDwidth :VIDeo :AUTO?</code>
Example	<code>ACP:BAND:VID 1kHz</code> <code>ACP:BAND:VID?</code> <code>ACP:BWID:VID:AUTO ON</code> <code>ACP:BWID:VID:AUTO?</code>
Key Path	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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 DVB-T/H: 390kHz DTMB: 390kHz SA: ON WCDMA:OFF WIMAX OFDMA: OFF TD-SCDMA: OFF DVB-T/H: ON DTMB: ON CDMA1xEVDO: OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

## RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

Key Path	<b>BW</b>
Instrument S/W Revision	Prior to A.02.00

## Filter Type

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

<b>Remote Command</b>	[ :SENSe]:ACPower:BANDwidth:SHAPE GAUSSian FLATtop [ :SENSe]:ACPower:BANDwidth:SHAPE?
Example	ACP:BAND:SHAP GAUS ACP:BAND:SHAP?
Key Path	<b>BW, RBW Control</b>

## ACP Measurement BW

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Instrument S/W Revision	Prior to A.02.00

### Filter BW

Selects a Gaussian filter based on its  $-3$  dB (Normal) bandwidth or its  $-6$  dB bandwidth.

<b>Remote Command</b>	[ :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.
Key Path	<b>BW, RBW Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	DB3
State Saved	Saved in instrument state.
Range	$-3$ dB (Normal)  $-6$ dB
Instrument S/W Revision	Prior to A.02.00

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## **Cont**

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987 in the section "Common Measurement Functions" for more information.

## **FREQ Channel**

See “[FREQ Channel](#)” on page 989 in the section "Common Measurement Functions" for more information.

## **Input/Output**

See “[Input/Output](#)” on page 995 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB



Notes	<p>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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> appears on the Active Function area.</p> <p>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.</p> <p>Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>
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	Prior to A.02.00

### 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**.

<b>Remote Command</b>	<pre>:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X &lt;freq&gt; :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X ?</pre>
Example	<pre>CALC:ACP:MARK3:X 0 CALC:ACP:MARK3:X?</pre>
MIN/MAX/DEF Support	Yes
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	The query returns the marker's absolute X Axis value if the control mode is <b>Normal</b> , or the offset from the marker's reference marker if the control mode is <b>Delta</b> . If the marker is <b>Off</b> 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

Instrument S/W Revision

Prior to A.02.00

## 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.

<b>Remote Command</b>	: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?
MIN/MAX/DEF Support	Yes
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is <b>Normal</b> , or the offset from the marker's reference marker in trace points if the control mode is <b>Delta</b> . 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 <b>Off</b> 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	-9.9E+37
Max	9.9E+37
Instrument S/W Revision	Prior to A.02.00

## Marker Y Axis Value (Remote Command only)

Returns the marker Y axis value in the current marker Y axis unit.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:Y ?
Example	CALC:ACP:MARK11:Y?

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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
Instrument S/W Revision	Prior to A.02.00

## Properties

Accesses the marker properties menu.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REference <integer> :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REference?
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Example	CALC:ACP:MARK2:REF 6 CALC:ACP:MARK2:REF?
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Key Path	<b>Marker, Properties</b>
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Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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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."
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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.

## ACP Measurement Marker

Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe 1 2 3  :CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?
Example	CALC:ACP:MARK2:TRAC 2 CALC:ACP:MARK2:TRAC?
Dependencies/Couplings	This is not affected by Auto Coupling.  Sending the remote command causes the addressed marker to become selected.
Key Path	<b>Marker, Properties</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> 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	All Markers Off
State Saved	Saved in instrument state.
Range	1 2 3
Instrument S/W Revision	Prior to A.02.00

## 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).

<b>Remote Command</b>	:CALCulate:ACPower:MARKer:COUple[:STATe] ON OFF 1 0 :CALCulate:ACPower:MARKer:COUple[:STATe]?
Example	CALC:ACP:MARK:COUP ON
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## Marker All Off

Turns all active markers off.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer:AOFF
Example	CALC:ACP:MARK:AOFF
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## **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	Prior to A.02.00

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## 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	Prior to A.02.00

## **Meas**

See “[Meas](#)” on page [1057](#) 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSe ] :ACPower :AVERage :COUNT <integer> [ :SENSe ] :ACPower :AVERage :COUNT? [ :SENSe ] :ACPower :AVERage [ :STATe ] OFF   ON   0   1 [ :SENSe ] :ACPower :AVERage [ :STATe ] ?
-----------------------	--

Example	ACP:AVER:COUN 250 ACP:AVER:COUN? ACP:AVER OFF ACP:AVER?
---------	--

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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
Instrument S/W Revision	Prior to A.02.00

### Avg Mode

Enables you to set the averaging mode. This determines the averaging action after the specified number

## ACP Measurement Meas Setup

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.

<b>Remote Command</b>	<code>[ :SENSe ] :ACPower :AVERage :TCONtrol EXPonential   REPEAT</code> <code>[ :SENSe ] :ACPower :AVERage :TCONtrol ?</code>
Example	ACP:AVER:TCON EXP ACP:AVER:TCON?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	Prior to A.02.00

## Carrier Setup

Accesses a menu that contains Carriers, Ref Carrier, Ref Car Freq, Ref Car Pwr and Configure Carriers.

Key Path	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

## Carriers

Specifies the number of carriers to be measured.

Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB
<b>Remote Command</b>	<code>[ :SENSe ] :ACPower :CARRier [ 1 ]   2 :COUNT &lt;integer&gt;</code> <code>[ :SENSe ] :ACPower :CARRier [ 1 ]   2 :COUNT ?</code>
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
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSe]:ACPpower:CARRier[1] 2:RCARrier <integer> [ :SENSe]:ACPpower:CARRier[1] 2:RCARrier? [ :SENSe]:ACPpower:CARRier[1] 2:RCARrier:AUTO OFF ON 0 1 [ :SENSe]:ACPpower:CARRier[1] 2:RCARrier:AUTO?
-----------------------	---

Example	ACP:CARR:RCAR 1 ACP:CARR:RCAR? ACP:CARR:RCAR:AUTO OFF ACP:CARR:RCAR:AUTO?
---------	--

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.
------------------------	---

Key Path	<b>Meas Setup, Carrier Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB
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.

## ACP Measurement Meas Setup

Preset	Auto determined
State Saved	Saved in instrument state.
Min	1
Max	Number of available carriers
Instrument S/W Revision	Prior to A.02.00

### Ref Car Freq

Sets the reference carrier frequency.

<b>Remote Command</b>	<code>[ :SENSe ] :ACPower :CARRier [ 1 ]   2 :RCFRequency &lt;freq&gt;</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	<code>ACP:CARR:RCFR 250 MHz</code> <code>ACP:CARR:RCFR?</code> <code>ACP:CARR:RCFR:AUTO OFF</code> <code>ACP:CARR:RCFR:AUTO?</code>
---------	--

Dependencies/Couplings	<p>Coupled to the Center Frequency.</p> <p>If the center frequency changes, the Ref Carrier Frequency is calculated using the following three steps;</p> $\text{Ref Freq1} = \text{Ctr Freq} - (\text{Total of all Carrier Widths} / 2)$ $\text{Ref Freq2} = \text{Ref Freq1} + (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ref Freq} = \text{Ref Freq2} + (0.5 * \text{Carrier Width of Ref Carrier})$ <p>If reference carrier frequency changes the Center Frequency is calculated using the following three steps;</p> $\text{Ctr Freq1} = \text{Ref Freq} - (0.5 * \text{Carrier Width of Ref Carrier})$ $\text{Ctr Freq2} = \text{Ctr Freq1} - (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ctr Freq} = \text{Ctr Freq2} + (\text{Total of all Carrier Widths} / 2)$ <p>This ensures that the carriers are always centered on the screen.</p> <p>If there is only one carrier present the Reference Carrier Frequency will be the same as the Center Frequency.</p>
------------------------	---

Key Path	<b>Meas Setup, Carrier Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB

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.
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
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSE]:ACPpower:CARRier[1]   2[:POWER] <real> [ :SENSE]:ACPpower:CARRier[1]   2[:POWER]? [ :SENSE]:ACPpower:CARRier[1]   2:AUTO[:STATE] OFF ON 0 1 [ :SENSE]:ACPpower:CARRier[1]   2:AUTO[:STATE]?
-----------------------	--

Example	ACP:CARR 10 ACP:CARR? ACP:CARR:AUTO OFF ACP:CARR:AUTO?
---------	---

Dependencies/Couplings	See Notes
Key Path	<b>Meas Setup, Carrier Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB

## ACP Measurement Meas Setup

Notes	<p>Although the default value is defined, the value is recalculated by the measurement result just after measurement.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.</p> <p>This key is available only when the Meas Type is TPRef.</p>
Preset	0.0
	ON
State Saved	Saved in instrument state.
Min	-200 dBm
Max	200 dBm
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>[ :SENSE]:ACPower:CARRIER[1] 2:CPSD &lt;real&gt;</pre> <pre>[ :SENSE]:ACPower:CARRIER[1] 2:CPSD?</pre>
Example	<pre>ACP:CARR:CPSD 25</pre> <pre>ACP:CARR:CPSD?</pre>
Dependencies/Couplings	<p>This key is available only when the Meas Type is PSDRef.</p> <p>The value of PSD Ref is automatically converted when PSD Unit is changed.</p>
Key Path	<b>Meas Setup, Carrier Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB
Notes	<p>Although the default value is defined, the value is recalculated by the measurement result just after measurement.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SELEct to set the mode.</p>
Preset	0.0
State Saved	Saved in instrument state.
Min	-999
Max	999
Instrument S/W Revision	Prior to A.02.00

## Configure Carriers

Accesses a menu that contains Carrier, Carrier Pwr Present, Carrier Width and Carrier Integ BW parameters.

Key Path	<b>Meas Setup, Carrier Setup</b>
Instrument S/W Revision	Prior to A.02.00

**Carrier** Selects the carrier to configure for the current measurement.

Dependencies/Couplings	Max value is the number of available carriers, so this value might change when the number of carriers is changed.
Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB
Preset	1
State Saved	No
Min	1
Max	Number of available carriers
Instrument S/W Revision	Prior to A.02.00

**Carrier Coupling** Couples carrier settings to carrier #1. The coupled parameters are Carrier Power Present, Carrier Spacing, Measurement Noise Bandwidth, Method and Filter Alpha.

<b>Remote Command</b>	[ :SENSE]:ACPpower:CARRIER[1] 2:LIST:COUPLE OFF ON 0 1, ... [ :SENSE]:ACPpower:CARRIER[1] 2:LIST:COUPLE?
Example	ACP:CARR:LIST:COUP OFF ACP:CARR:LIST:COUP?
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.
Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB

## ACP Measurement Meas Setup

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.
Preset	ON
State Saved	Saved in instrument state.
Range	Couple Man
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	<code>[ :SENSE]:ACPpower:CARRIER[1] 2:LIST:PPresent YES NO, ...</code> <code>[ :SENSE]:ACPpower:CARRIER[1] 2:LIST:PPresent?</code>
Example	ACP:CARR2:LIST:PPR YES ACP:CARR2:LIST:PPR?
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.
Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB
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.
Preset	YES



State Saved	Saved in instrument state.
Range	Yes No
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	<code>[ :SENSe ] :ACPpower :CARRier [ 1 ]   2 :LIST :WIDTh &lt;bandwidth&gt; , ...</code> <code>[ :SENSe ] :ACPpower :CARRier [ 1 ]   2 :LIST :WIDTh ?</code>
Example	ACP:CARR2:LIST:WIDT 25kHz ACP:CARR2:LIST:WIDT?
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.
Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB
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.
Preset	SA, WCDMA: 5 MHz WIMAX OFDMA: 10MHz C2K: 1.25MHz 1xEVDO: 1.25MHz TD-SCDMA: 1.6MHz DVB-T/H: 8MHz DTMB: 8MHz
State Saved	Saved in instrument state.
Min	0 Hz
Max	1 GHz

## ACP Measurement Meas Setup

Instrument S/W Revision      Prior to A.02.00

**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.

<b>Remote Command</b>	<pre>[ :SENSe]:ACPower:CARRier[1]   2:LIST:BANDwidth[:INTEgrati on] &lt;freq&gt;, ...  [:SENSe]:ACPower:CARRier[1]   2:LIST:BANDwidth[:INTEgrati on]?</pre>
Example	<pre>ACP:CARR2:LIST:BAND 25kHz ACP:CARR2:LIST:BAND?</pre>
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.
Key Path	<b>Meas Setup, Carrier Setup, Configure Carriers</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>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.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>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.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>
Preset	<pre>SA: 2 MHz WCDMA: 3.84 MHz WIMAX OFDMA: 10MHz C2K: 1.23MHz TD-SCDMA: 1.28MHz 1xEVDO: 1.23MHz DVB-T/H: 7.61MHz DTMB: 7.56MHz</pre>
State Saved	Saved in instrument state.
Min	10 Hz

Max 1 GHz  
Instrument S/W Revision Prior to A.02.00

**Method** Accesses the carrier configuration method settings.

**Remote Command** [:SENSe]:ACPower:CARRier[1]|2:LIST:METHod IBW|RRC, ...  
[:SENSe]:ACPower:CARRier[1]|2:LIST:METHod?

Example ACP:CARR2:LIST:METH RRC  
ACP:CARR2:LIST:METH?

Key Path **Meas Setup, Carrier Setup, Configure Carriers**

Mode SA, WCDMA, TD-SCDMA, DVB-T/H, DTMB

Notes You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.

Preset SA: IBW  
WCDMA: RRC  
WIMAX OFDMA: IBW  
TD-SCDMA: RRC  
DVB-T/H: IBW  
DTMB: RRC

State Saved Saved in instrument state.

Range IntegBW|RRC Weight

Instrument S/W Revision Prior to A.02.00

**Filter Alpha** Inputs the alpha value for the filter used in the current carrier configuration.

**Remote Command** [:SENSe]:ACPower:CARRier[1]|2:LIST:FILTer:ALPHa <real>, ...  
[:SENSe]:ACPower:CARRier[1]|2:LIST:FILTer:ALPHa?

Example ACP:CARR2:LIST:FILT:ALPH 0.5  
ACP:CARR2:LIST:FILT:ALPH?

Key Path **Meas Setup, Carrier Setup, Configure Carriers**

Mode SA, WCDMA, TD-SCDMA, DVB-T/H, DTMB

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

## ACP Measurement Meas Setup

State Saved	Saved in instrument state.
Min	0.01
Max	1.0
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

### Offset

Selects the offset to configure.

Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	A
State Saved	Saved in instrument state.
Range	A B C D E F
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>[ :SENSe]:ACPower:OFFSet[1] 2:LIST[:FREQuency] &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;  [: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>
Dependencies/Couplings	Changing Offset Frequency might affect the Span. See the Span key section for details.
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>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.</p> <p>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.</p> <p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>

## ACP Measurement Meas Setup

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 DVB-T/H: 8MHz, 16MHz, 0Hz, 0Hz, 0Hz, 0Hz  0Hz, 0Hz, 0Hz, 0Hz, 0Hz, 0Hz DTMB: 8MHz, 16MHz, 24MHz, 32MHz, 0Hz, 0Hz  0Hz, 0Hz, 0Hz, 0Hz, 0Hz, 0Hz 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 DVB-T/H: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF DTMB: 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
Instrument S/W Revision	Prior to A.02.00

### 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."

<b>Remote Command</b>	[:SENSe]:ACP:Power:OFFSet[1] 2:LIST:BANDwidth[:INTEgratio n] <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>, <bandwidth>  [:SENSe]:ACP:Power:OFFSet[1] 2:LIST:BANDwidth[:INTEgratio n]?
Example	ACP:OFFS2:LIST:BAND 2MHz,2MHz,2MHz,2MHz,2MHz,2MHz ACP:OFFS2:LIST:BAND?
Dependencies/Couplings	Changing Offset Integ BW might affect to the Span. See Span section for details.
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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.
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, 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, 30KHz  DVB-T/H: 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz, 7.61MHz  DTMB: 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz, 7.56MHz
State Saved	Saved in instrument state.
Min	10 Hz
Max	1 GHz

**ACP Measurement  
Meas Setup**

Instrument S/W Revision            Prior to A.02.00

**Offset BW**

Accesses the offset bandwidth menu.

Key Path                                **Meas Setup, Offset/Limit**

Instrument S/W Revision            Prior to A.02.00

**Res BW** Sets the resolution bandwidth. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

**Remote Command**

```
[ :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?
```

**Example**

```
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?
```

**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.

Key Path                                **Meas Setup, Offset/Limits**

Mode                                    SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB

**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.



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 DVB-T/H: 39KHz, 39KHz, 39KHz, 39KHz,39KHz, 39KHz 39KHz, 39KHz, 39KHz, 39KHz, 39KHz, 39KHz DTMB: 39KHz, 39KHz, 39KHz, 39KHz,39KHz, 39KHz 39KHz, 39KHz, 39KHz, 39KHz, 39KHz, 39KHz 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Instrument S/W Revision	Prior to A.02.00

**Video BW** Enables you to change the analyzer post-detection filter (VBW).

<b>Remote Command</b>	[ :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?
Key Path	<b>Meas Setup, Offset/Limit, Offset BW</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB

## ACP Measurement Meas Setup

Notes	<p>The values shown in this table reflect the conditions after a Mode Preset.</p> <p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode.</p> <p>.</p>
Preset	<p>SA: 22kHz, 22kHz, 22kHz, 22kHz, 22kHz, 22kHz</p> <p>WCDMA, WIMAX OFDMA: 1MHz, 1MHz, 1MHz, 1MHz, 1MHz, 1MHz</p> <p>C2K: 150KHz, 150KHz, 150KHz, 150KHz, 150KHz, 150KHz  150KHz, 150KHz, 150KHz, 150KHz, 150KHz</p> <p>TD-SCDMA: 300kHz, 300kHz, 300kHz, 300kHz, 300kHz, 300kHz</p> <p>1xEVDO: 30KHz, 300KHz, 300KHz, 300KHz, 300KHz, 300KHz   30KHz, 300KHz, 300KHz, 300KHz, 300KHz</p> <p>DVB-T/H: 390KHz, 390KHz, 390KHz, 390KHz,390KHz, 390KHz 390KHz, 390KHz, 390KHz, 390KHz, 390KHz</p> <p>DTMB: 390KHz, 390KHz, 390KHz, 390KHz,390KHz, 390KHz 390KHz, 390KHz, 390KHz, 390KHz, 390KHz</p> <p>ON, ON, ON, ON, ON, ON</p>
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

**RBW Control** Accesses the resolution bandwidth control menu.

Key Path	<b>Meas Setup, Offset/Limit, Offset BW</b>
Instrument S/W Revision	Prior to A.02.00

**Filter Type** Selects the type of bandwidth filter that is used.

<b>Remote Command</b>	<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>
Dependencies/Couplings	See the description above
Key Path	<b>Meas Setup, Offset/Limit, Offset BW, RBW Control</b>

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	GAUSSian, GAUSSian, GAUSSian, GAUSSian, GAUSSian, GAUSSian
State Saved	Saved in instrument state.
Range	GAUSSian FLATop
Instrument S/W Revision	Prior to A.02.00

**Filter BW** Selects a Gaussian filter based on its –3 dB (Normal) bandwidth or its –6 dB bandwidth.

<b>Remote Command</b>	[ :SENSe ] :ACP:Power:OFFSet[1]   2:LIST:BANDwidth:TYPE DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6, DB3 DB6 [ :SENSe ] :ACP:Power:OFFSet[1]   2:LIST:BANDwidth:TYPE?
Example	ACP:OFFS2:LIST:BAND:TYPE DB3,DB3,DB3,DB3,DB3,DB3 ACP:OFFS2:LIST:BAND:TYPE?
Dependencies/Couplings	Grayed out unless the Gaussian filter type is selected
Key Path	<b>Meas Setup, Offset/Limit, Offset BW, RBW Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	DB3, DB3, DB3, DB3, DB3, DB3
State Saved	Saved in instrument state.
Range	–3 dB (Normal)  –6 dB
Instrument S/W Revision	Prior to A.02.00

### 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.

## ACP Measurement Meas Setup

The query returns the six (6) sets of real numbers that are the current absolute amplitude test limits.

<b>Remote Command</b>	<pre>[ :SENSe]:ACPower:OFFSet[1] 2:LIST:ABSolute &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;  [:SENSe]:ACPower:OFFSet[1] 2:LIST:ABSolute?</pre>
Example	<pre>ACP:OFFS2:LIST:ABS -10,-10,-10,-10,-10,-10  ACP:OFFS2:LIST:ABS?</pre>
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SELEct to set the mode.</p>
Preset	<pre>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  DVB-T/H: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm  DTMB: 11.14 dBm, 11.14dBm, 11.14 dBm, 11.14 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm</pre>
State Saved	Saved in instrument state.
Min	-200.0 dBm
Max	50.0 dBm
Instrument S/W Revision	Prior to A.02.00

### 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).

<b>Remote Command</b>	<pre>[ :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?</pre>
Example	<pre>ACP:OFFS2:LIST:TEST ABS,ABS,ABS,ABS,ABS,ABS ACP:OFFS2:LIST:TEST?</pre>
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>
Preset	<pre>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 DVB-T/H: REL, REL, REL, REL, REL, REL DTMB: OR,AND, AND,AND, REL, REL CDMA1xEVDO: REL, REL, ABS, REL, REL, REL REL, REL, ABS, REL, REL, REL</pre>
State Saved	Saved in instrument state.
Range	AND OR Absolute Relative
Instrument S/W Revision	Prior to A.02.00

### 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

## ACP Measurement Meas Setup

(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).

<b>Remote Command</b>	<code>[:SENSe]:ACP:Power:OFFSet[1] 2:LIST:RCARrier &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;</code> <code>[:SENSe]:ACP:Power:OFFSet[1] 2:LIST:RCARrier?</code>
Example	<code>ACP:OFFS2:LIST:RCAR 0,0,0,0,0</code> <code>ACP:OFFS2:LIST:RCAR?</code>
Dependencies/Couplings	None
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<code>:CALCulate:ACP:Power:OFFSet[1] 2:LIST:LIMit:POSitive[:UPPer]:DATA</code> and <code>:CALCulate:ACP:Power:OFFSet[1] 2:LIST:LIMit:NEGative[:UPPer]:DATA</code> 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 <code>:INSTrument:SELect</code> to set the mode.
Preset	SA: <code>-45, -60, 0, 0, 0, 0 -45, -60, 0, 0, 0, 0</code> WCDMA: <code>-44.2, -49.2, -49.2, -49.2, -49.2, -49.2 -32.2, -42.2, -42.2, -42.2, -42.2, -42.2</code> C2K: <code>0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0</code> WIMAX OFDMA: <code>-50,-60,0,0,0,0</code> TD-SCDMA: <code>-40, -45, -45, -45, -45, -45 -33, -43, -43, -43, -43, -43</code> 1xEVDO: <code>-45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55</code> DVB-T/H: <code>-60, -60, 0, 0, 0, 0 0, 0, 0, 0, 0, 0</code> DTMB: <code>-45, -60, -60, -60, 50, 50 0, 0, 0, 0, 0, 0</code>
State Saved	Saved in instrument state.
Min	-150
Max	50.0
Instrument S/W Revision	Prior to A.02.00

## 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).

<b>Remote Command</b>	<pre>[:SENSe]:ACP:OFFSet[1] 2:LIST:RPSDensity &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;  [:SENSe]:ACP:OFFSet[1] 2:LIST:RPSDensity?</pre>
Example	<pre>ACP:OFFS2:LIST:RPSD 10,10,10,10,10,10 ACP:OFFS2:LIST:RPSD?</pre>
Key Path	<b>Meas Setup, Offset/Limit</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode.</p>
Preset	<pre>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  DVB-T/H: -60dB, -60dB, 0 dB, 0 dB, 0 dB, 0 dB 0dB, 0dB, 0 dB, 0 dB, 0 dB, 0 dB  DTMB: 50dB, 50dB, 50dB, 50dB, 50dB, 50dB 0dB, 0dB, 0 dB, 0 dB, 0 dB, 0 dB</pre>
State Saved	Saved in instrument state.
Min	-150.0 dB

## ACP Measurement Meas Setup

Max	50.0 dB
Instrument S/W Revision	Prior to A.02.00

### Carrier Result

Allows you to view and scroll through the carrier power results.

Dependencies/Couplings	This key will be grayed out if there is only one carrier.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	1
State Saved	No
Min	1
Max	Number of carriers.
Instrument S/W Revision	Prior to A.02.00

### PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

Key Path	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

### 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.**

<b>Remote Command</b>	[ :SENSe ] :ACPower:FREQuency:SYNTHeSis:AUTO[ :STATe ] OFF ON 0 1 [ :SENSe ] :ACPower:FREQuency:SYNTHeSis:AUTO[ :STATe ]?
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Example	ACP:FREQ:SYNT:AUTO 1 ACP:FREQ:SYNT:AUTO?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA. 1xEVDO, DVB-T/H, DTMB
Preset	ON
State Saved	Saved in instrument state.
Range	Auto Man
Readback Text	The “Auto” is underlined when Auto is selected, otherwise the Man is underlined.
Instrument S/W Revision	Prior to A.02.00

### PhNoise Opt State

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

<b>Remote Command</b>	[ :SENSe ] :ACPower :FREQuency :SYNTHeSis [ :STATe ] 1   2   3 [ :SENSe ] :ACPower :FREQuency :SYNTHeSis [ :STATe ] ?
Example	ACP:FREQ:SYNT 1 ACP:FREQ:SYNT?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA. 1xEVDO, DVB-T/H, DTMB
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	Best Phase Noise at offset < 20 kHz Best Phase Noise at offset > 30 kHz Fast Tuning
Readback Text	f < 20 kHz   f > 30 kHz   Fast Tuning, also the Man must be underlined.
Instrument S/W Revision	Prior to A.02.00

### Meas Method

Sets the desired method to measure ACP.

## ACP Measurement Meas Setup

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.

Fast (in CDMA2K mode or SA mode with CDMA2K radio standard selected) – This provides faster measurement using FFT method with the limited parameter flexibility. When this is selected, CDMA2K preset offsets are given and control of follows are grayed out.

BW menu, Sweep/Control menu except Pause/Resume, Trace/Detector menu, Carrier Setup, Offset Limit, RRC Weighting, Filter Alpha and Noise Correction softkeys in Meas Setup menu

In the TD-SCDMA mode, only the Integration BW method is available. Therefore, the Meas Method key is not displayed in the TD-SCDMA mode.

<b>Remote Command</b>	[ :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.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB

Notes	<p>In the TDSCDMA mode, only the IBW method is available to use. Therefore, the measure method key is not displayed in the TD-SCDMA mode.</p> <p>CDMA1xEVDO mode only supports RBW and Integration BW method.</p> <p>C2K mode only supports RBW, Integration BW and FAST method.</p> <p>FAST mode is only supported for WCDMA and C2K signal. You must be in the WCDMA or C2K mode or SA mode with 3GPP WCDMA or CDMA2K radio standard. Otherwise a setting conflict error message will be reported.</p> <p>Supporting FAST mode in C2K is available with the instrument version A.02.00 or later</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p>
Preset	<p>SA: IBW</p> <p>WCDMA: IBW</p> <p>C2K: RBW</p> <p>WIMAX OFDMA: IBW</p> <p>1xEVDO: IBW</p> <p>DVB-T/H: IBW</p> <p>DTMB: IBW</p>
State Saved	Saved in instrument state.
Range	Integration BW Filtered IBW (max dynamic range) RBW Fast
Readback Text	IBW Filtered IBW RBW Fast
Instrument S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

## 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.

<b>Remote Command</b>	<pre>[ :SENSE ] :ACPower :TYPE TPref   PSDRef [ :SENSE ] :ACPower :TYPE?</pre>
Example	<pre>ACP:TYPE PSDR ACP:TYPE?</pre>
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB

## ACP Measurement Meas Setup

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	Prior to A.02.00

### PSD Ref

Sets the unit bandwidth for Power Spectral Density. The available units are dBm/Hz and dBm/MHz.

<b>Remote Command</b>	: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).
Key Path	<b>Meas Setup</b>
Mode	A, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	DBMHZ
State Saved	Saved in instrument state.
Range	dBm/Hz dBm/MHz
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	:CALCulate:ACPowEr:LIMit:STATe OFF ON 0 1 :CALCulate:ACPowEr:LIMit:STATe?
Example	CALC:ACP:LIM OFF CALC:ACP:LIM?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB

Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: OFF WCDMA: ON C2K: ON WIMAX OFDMA: OFF TD-SCDMA: ON 1xEVDO: ON DVB-T/H: OFF DTMB: ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## Offset RRC Weighting

Allows you to turn RRC filtering of the carriers and all adjacent channels on or off. The  $\alpha$  value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

<b>Remote Command</b>	[ :SENSE ] :ACPpower :FILTer [ :RRC ] [ :STATe ] OFF   ON   0   1 [ :SENSE ] :ACPpower :FILTer [ :RRC ] [ :STATe ] ?
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Example	ACP:FILT OFF ACP:FILT?
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Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, TD-SCDMA, DVB-T/H, DTMB

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.
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Preset	SA: OFF WCDMA: ON C2K: NO WIMAX OFDMA: OFF TD-SCDMA: ON DVB-T/H: OFF DTMB: ON
State Saved	Saved in instrument state.

## ACP Measurement Meas Setup

Range	On Off
Instrument S/W Revision	Prior to A.02.00

### Offset Filter Alpha

Sets the alpha value for the RRC Filter.

<b>Remote Command</b>	<code>[ :SENSE]:ACPower:FILTer[:RRC]:ALPHA &lt;real&gt;</code> <code>[ :SENSE]:ACPower:FILTer[:RRC]:ALPHA?</code>
Example	ACP:FILT:ALPH 0.5 ACP:FILT:ALPH?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, TD-SCDMA, DVB-T/H, DTMB
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 DVB-T/H: 0.22 DTMB: 0.05
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Instrument S/W Revision	Prior to A.02.00

### Meas Preset

Restores all the measurement parameters to their default values.

<b>Remote Command</b>	<code>:CONFigure:ACPower</code>
Example	CONF:ACP
Dependencies/Couplings	Selecting Meas Preset will restore all measurement parameters to their default values.
Key Path	<b>Meas Setup</b>

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :SENSe]:ACPoweR:CORRection:NOISe[:AUTO] OFF ON 0 1 [:SENSe]:ACPoweR:CORRection:NOISe[:AUTO]?
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Example	ACP:CORR:NOIS OFF ACP:CORR:NOIS?
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Key Path	<b>Meas Setup</b>
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Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	Prior to A.02.00

## **Mode**

See “[Mode](#)” on page 1075 in the section "Common Measurement Functions" for more information.



## **Mode Setup**

See “[Mode Setup](#)” on page 1089 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Peak Search

Places the selected marker on the trace point with the maximum y-axis value.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum
Example	CALC:ACP:MARK2:MAX
Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## Next Peak

Moves the selected marker to the peak that has the next highest amplitude.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:NEXT
Example	CALC:ACP:MARK2:MAX:NEXT
Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker that meets all enabled peak criteria.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:RIGHT
Example	CALC:ACP:MARK2:MAX:RIGH
Key Path	<b>Peak Search</b>

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker that meets all enabled peak criteria.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MAXimum:LEFT
Example	CALC:ACP:MARK2:MAX:LEFT
Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Peak Search</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:PTPeak
Example	CALC:ACP:MARK:PTP
Dependencies/Couplings	This key is not available (key is grayed out) when <b>Coupled Markers</b> is on.
Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	Turns on the Marker $\Delta$ active function.
Instrument S/W Revision	Prior to A.02.00

## Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

<b>Remote Command</b>	:CALCulate:ACPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MINimum
Example	CALC:ACP:MARK:MIN
Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Instrument S/W Revision	Prior to A.02.00

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## **Recall**

See [“Recall” on page 1103](#) in the section "Common Measurement Functions" for more information.

## **Restart**

See “[Restart](#)” on page 1127 in the section "Common Measurement Functions" for more information.

---

## **Save**

See “[Save](#)” on page 1129 in the section "Common Measurement Functions" for more information.

## **Single**

See “[Single \(Single Measurement/Sweep\)](#)” on page 1155 in the section "Common Measurement Functions" for more information.



---

## **Source**

See “[Source](#)” on page 1157 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>[ :SENSe ] :ACPpower:FREQuency:SPAN &lt;freq&gt;</code> <code>[ :SENSe ] :ACPpower:FREQuency:SPAN?</code>
Example	ACP:FREQ:SPAN 25MHz ACP:FREQ:SPAN?
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: $\text{Span} = (\text{Upper Carrier Freq} + (\text{max offset IBW} * (1 + \alpha)) / 2) - (\text{Lower Carrier Freq} - (\text{max offset IBW} * (1 + \alpha)) / 2)$
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 8 MHz WCDMA: 24.6848 MHz WIMAX OFDMA: 50MHz C2K: 4.5 MHz TD-SCDMA: 8MHz 1xEVDO: 4.05 MHz DVB-T/H: 40MHz DTMB: 72MHz
State Saved	Saved in instrument state.

Min	10 Hz
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
Instrument S/W Revision	Prior to A.02.00

## Full Span

Changes the span to show the full frequency range of the spectrum analyzer.

<b>Remote Command</b>	[ :SENSE ] :ACPpower :FREQuency :SPAN :FULL
Example	ACP:FREQ:SPAN:FULL
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	Prior to A.02.00

## Last Span

Changes the span to the previous span setting. If no previous span value exists, then the span will remain unchanged.

<b>Remote Command</b>	[ :SENSE ] :ACPpower :FREQuency :SPAN :PREVIOUS
Example	ACP:FREQ:SPAN:PREV
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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	Prior to A.02.00

## 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 1161 in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	Prior to A.02.00

### 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

<b>Remote Command</b>	[:SENSe]:ACPpower:SWEep:TIME <time>
	[:SENSe]:ACPpower:SWEep:TIME?
	[:SENSe]:ACPpower:SWEep:TIME:AUTO OFF ON 0 1
	[:SENSe]:ACPpower:SWEep:TIME:AUTO?

Example	ACP:SWE:TIME 50ms
	ACP:SWE:TIME?
	ACP:SWE:TIME:AUTO OFF
	ACP:SWE:TIME:AUTO?

Dependencies/Couplings	When you manually change the Sweep Time, this state automatically goes to 'Man'.
Key Path	<b>Sweep/Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
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
Preset	SA: Automatically calculated WCDMA: 29 ms WIMAX OFDMA: Automatically calculated C2K: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: Automatically calculated DVB-T/H: Automatically calculated DTMB: Automatically calculated SA: ON WCDMA: OFF C2K: OFF (method IBW) WIMAX OFDMA: ON TD-SCDMA: ON DVB-T/H: ON DTMB: ON
State Saved	Saved in instrument state.
Min	1 ms
Max	4000 s
Instrument S/W Revision	Prior to A.02.00

## Sweep Setup

Accesses the sweep setup menu.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

<b>Remote Command</b>	[ :SENSe ] :ACPpower :SWEep :TIME :AUTO :RULes NORMal   ACCuracy [ :SENSe ] :ACPpower :SWEep :TIME :AUTO :RULes?
Example	ACP:SWE:TIME:AUTO:RUL NORM ACP:SWE:TIME:AUTO:RUL?
Key Path	<b>Sweep/Control, Sweep Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	Set to Norm when Auto Couple is pressed or sent remotely.
Preset	SA, WCDMA, C2K, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB: ACCuracy WIMAX OFDMA: NORMal
State Saved	Saved in instrument state.
Range	Norm Accy
Instrument S/W Revision	Prior to A.02.00

## 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 1162](#) in “Common Measurement Functions” for more details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## 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 1162](#) in “common Measurement Functions” for more details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## Points

Sets the number of points per sweep, from 1 to 20001. The sweep time resolution setting will depend on the number of points selected.

<b>Remote Command</b>	[ :SENSe ] :ACPower :SWEep :POINTs <integer> [ :SENSe ] :ACPower :SWEep :POINTs?
Example	ACP:SWE:POIN 500 ACP:SWE:POIN?
Dependencies/Couplings	Whenever the number of sweep points changes, the sweep time is re-quantized.
Key Path	<b>Sweep/Control</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	Whenever the number of sweep points changes: <ul style="list-style-type: none"> <li>• All trace data is erased</li> <li>• Any traces with Update Off will also go to Display Off (like going from View to Blank in the older analyzers)</li> <li>• Sweep time is re-quantized</li> <li>• Any limit lines that are on will be updated</li> <li>• If averaging/hold is on, averaging/hold starts over</li> </ul>
Preset	1001 DVB-T/H:2001 DTMB: 2001
State Saved	Saved in instrument state.
Min	1
Max	20001
Instrument S/W Revision	Prior to A.02.00

## Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>: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?</pre>
Example	<pre>TRAC:ACP:TYPE MINH TRAC:ACP:TYPE?</pre>
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.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<pre>WRITE = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold</pre>
Preset	AVERAge
State Saved	Saved in instrument state.
Range	WRITE AVERAge MAXHold MINHold
Instrument S/W Revision	Prior to A.02.00



## 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	<b>Detector</b>
Instrument S/W Revision	Prior to A.02.00

## 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

<b>Remote Command</b>	[ :SENSE]:ACPpower:DETECTOR[:FUNCTION] AVERage NEGative NORMal POSitive SAMPle  [:SENSE]:ACPpower:DETECTOR[:FUNCTION]?
Example	ACP:DET NORM ACP:DET?
Dependencies/Couplings	When Detector setting is "Auto" (:SENSE]:ACPpower: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.
Key Path	<b>Trace/Detector</b>

## ACP Measurement Trace/Detector

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Notes	<p>When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.</p> <p>The detector choices are:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• The Average detector determines the average of the signal within the data range. The averaging method is Power (RMS).</li> <li>• The Peak detector determines the maximum of the signal within the data range.</li> <li>• The Sample detector indicates the instantaneous level of the signal at the center of the data represented by each display point.</li> <li>• The Negative Peak detector determines the minimum of the signal within the data range.</li> </ul> <p>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.</p> <p>When a detector selection is made, the menu returns to the previous menu.</p>
Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	Prior to A.02.00

### Auto

Sets the detector for the currently selected trace to auto.

<b>Remote Command</b>	<pre>[ :SENSe ] :ACPower :DETECTOR :AUTO ON OFF   1   0 [ :SENSe ] :ACPower :DETECTOR :AUTO?</pre>
Example	<pre>ACP:DET:AUTO 1 ACP:DET?</pre>
Dependencies/Couplings	<p>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.</p>
Key Path	<b>Trace/Detector</b>

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF
Instrument S/W Revision	Prior to A.02.00

### Select Trace (front panel 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	Prior to A.02.00

### View / Blank

Dependencies/Couplings	<p>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):</p> <p>Trace On: Update and Display both On</p> <p>View: Update Off and Display On (Not implemented)</p> <p>Blank: Update Off and Display Off</p> <p>Background: Update On, Display Off (Not implemented)</p> <p>See tables below for detail on the SCPI to control these two variables.</p> <p>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 (<b>Update On and Display On</b>), even if that trace type was already selected.</p>
------------------------	---

Key Path	Trace/Detector
Mode	SA
Notes	No SCPI. Front panel only.
Preset	Trace On
State Saved	Saved in instrument state.

## ACP Measurement Trace/Detector

Range	Trace On Blank
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	:TRACe[1] 2 3:ACPower:UPDate[:STATE] ON OFF 0 1 :TRACe[1] 2 3:ACPower:UPDate[:STATE]?
Example	TRAC:ACP:UPD ON TRAC:ACP:UPD?
Dependencies/Couplings	Whenever you set <b>Update</b> to <b>On</b> for any trace, the <b>Display</b> is set to <b>On</b> for that trace.
Key Path	<b>Trace/Detector</b>
Preset	1 0 0 ( <b>On</b> for Trace 1; <b>Off</b> for 2 &3)
State Saved	Saved in instrument state.
Range	0 1
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	:TRACe[1] 2 3:ACPower:DISPlay[:STATE] ON OFF 0 1 :TRACe[1] 2 3:ACPower:DISPlay[:STATE]?
Example	TRAC:ACP:DISP ON TRAC:ACP:DISP?
Dependencies/Couplings	Whenever you set <b>Update</b> to <b>On</b> for any trace, the <b>Display</b> is set to <b>On</b> for that trace.
Key Path	<b>Trace/Detector</b>
Preset	1 0 0 ( <b>On</b> for Trace 1; <b>Off</b> for 2 &3)
State Saved	Saved in instrument state.
Range	0 1
Instrument S/W Revision	Prior to A.02.00

## Trigger

Accesses a menu functions that enable you to select and control the trigger source for the current measurement. See [“Trigger” on page 1179](#) in the "Common Measurement Functions" section for more information.

Key Path	Front-panel key
Instrument S/W Revision	Prior to A.02.00

## 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:

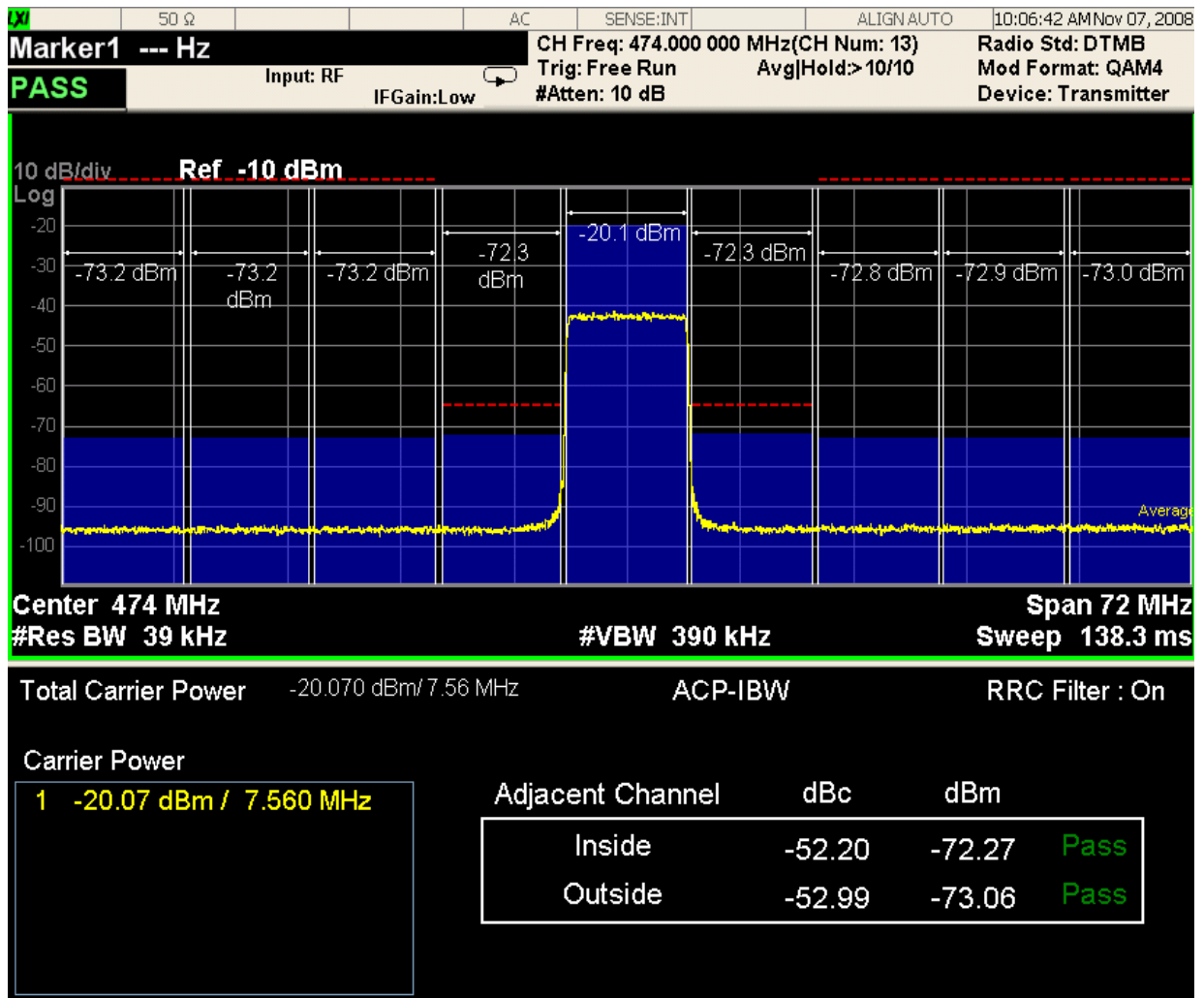
“Spectrum Window” on page 680

“Results Window” on page 680



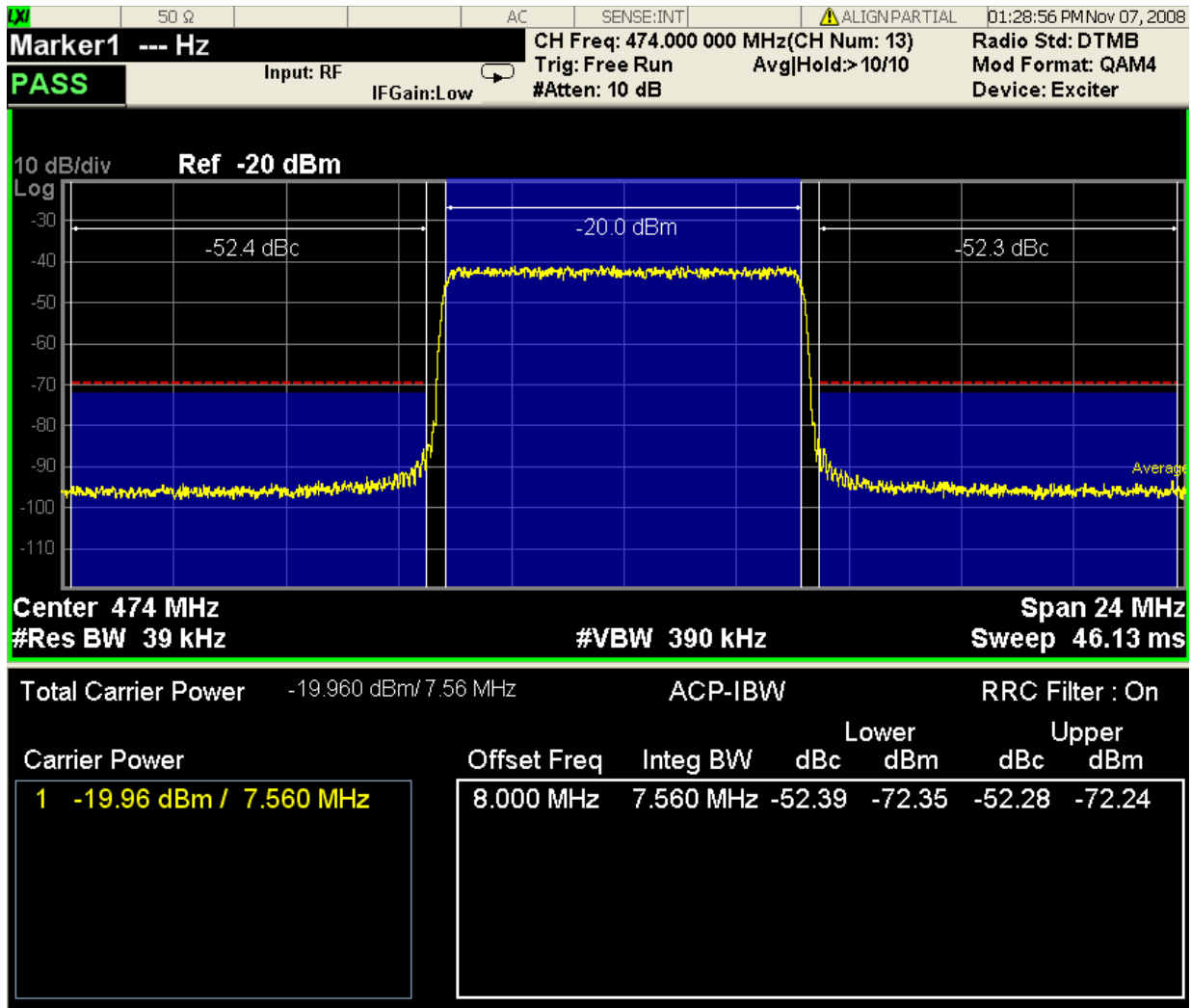
This is for DTMB transmitter and DTMB exciter:

DTMB Transmitter:



ACP Measurement  
View/Display

DTMB Exciter:



### 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  $T = 1/(\text{Offset Integ Bw})$ .

### **Inside Adjacent Channel Power**

ACP Measurement  
View/Display

This result is only valid for DTMB transmitter. It contains two parts: Relative Power and Absolute Power. The power is calculated by integrating across the bandwidth (Integ Bw) at the frequency Offset A.

Inside Absolute Power = MAX (PLower Offset A, PUpper Offset A);

Inside Relative Power = Inside Absolute Power – Carrier Power;

**Outside Adjacent Channel Absolute Power**

This result is only valid for DTMB transmitter. It contains two parts: Relative Power and Absolute Power. The power is the Root-Mean-Square of the power calculated by integrating across the bandwidth (Integ Bw) at frequency Offset B, C and D.

$$Outside\ Absolute\ Power = \sqrt{\frac{P_{LowerOffsetB}^2 + P_{UpperOffsetB}^2 + P_{LowerOffsetC}^2 + P_{UpperOffsetC}^2 + P_{LowerOffsetD}^2 + P_{UpperOffsetD}^2}{6}}$$

Outside Relative Power = Outside Absolute Power – Carrier Power;

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

**Display**

Accesses a menu of functions that enable you to set the display parameters.

See “Display” on page 1233 in the "Common Measurement Functions" section for more information.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

**Bar Graph**

Turns the Bar Graph On and Off.

<b>Remote Command</b>	: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?
---------	---

Dependencies/Couplings When the method is RBW, this key is always set to On and grayed out.

Key Path	<b>View/Display</b>
----------	---------------------

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB
------	--

Notes	You must be in the mode that includes ACP measurements 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	Prior to A.02.00

ACP Measurement  
View/Display

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 687](#). For measurement results and views, see [“View/Display” on page 722](#).

This topic contains the following sections:

[“Measurement Commands for Power Stat CCDF” on page 685](#)

[“Remote Command Results for Power Stat CCDF” on page 686](#)

## 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 1057](#).

**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: <ol style="list-style-type: none"> <li>1. Average input power (in dBm)</li> <li>2. Probability at the average input power level (in %)</li> <li>3. Power level that has 10% of the power</li> <li>4. Power level that has 1% of the power</li> <li>5. Power level that has 0.1% of the power</li> <li>6. Power level that has 0.01% of the power</li> <li>7. Power level that has 0.001% of the power</li> <li>8. Power level that has 0.0001% of the power</li> <li>9. Peak power (in dB)</li> <li>10.Count</li> </ol>
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: <ol style="list-style-type: none"> <li>1. Probability at 0.0 dB power</li> <li>2. Probability at 0.01 dB power</li> <li>3. Probability at 0.02 dB power</li> <li>...</li> <li>1. Probability at 49.9 dB power</li> <li>2. Probability at 50.0 dB power</li> </ol>
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: <ol style="list-style-type: none"> <li>1. Probability at 0.0 dB power</li> <li>2. Probability at 0.01 dB power</li> <li>3. Probability at 0.02 dB power</li> <li>...</li> <li>1. Probability at 49.9 dB power</li> <li>2. Probability at 50.0 dB power</li> </ol>

- 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:

**Equation 10-1**      
$$P = (I^2 + Q^2) / Z_0$$

(Where I&Q are the quadrature voltage components of the waveform and Zo 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

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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 965 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

### 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 971 in the “Common Measurement Functions” for more information.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

### 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 977 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00



## 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 978 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	<b>AMPTD/Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## Internal Preamp

Accesses a menu of functions that enable you to control the internal preamplifiers.

See AMPTD Y Scale, “[Internal Preamp](#)” on page 980 in the “Common Measurement Functions” section for more information.

This is only available when the selected input is RF.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## **Auto Couple**

See “[AUTO COUPLE](#)” on page 983 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Info BW

Allows you to enter a frequency value to set the channel bandwidth that will be used for data acquisition.

Key Path	<b>BW</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :SENSE]:PStatistic:BANDwidth <freq> [ :SENSE]:PStatistic:BANDwidth?
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 DVB-T/H, DTMB: 8 MHz
State Saved	Saved in instrument state.
Min	10.0 kHz
Max	Hardware Dependent: No Option = 10 MHz Option B25 = 25 MHz
Instrument S/W Revision	Prior to A.02.00

## **Cont**

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987 in the section "Common Measurement Functions" for more information.

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## **FREQ Channel**

See “[FREQ Channel](#)” on page 989 in the section "Common Measurement Functions" for more information.

## **Input/Output**

See “[Input/Output](#)” on page 995 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Select Marker

Accesses a menu that allows you to select one of 12 markers for control and function

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Marker</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	: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?

## Power Stat CCDF Measurement Marker

Notes	<p>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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> appears on the Active Function area.</p> <p>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.</p> <p>Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p>
Preset	OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	Prior to A.02.00

### 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, DVB-T/H, DTMB
<b>Remote Command</b>	<pre>:CALCulate:PSTatic:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:X &lt;rel_amp1&gt;</pre> <pre>:CALCulate:PSTatic: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	<p>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.</p> <p>The query returns the marker's absolute X Axis value if the control mode is <b>Normal</b>, or the offset from the marker's reference marker if the control mode is <b>Delta</b>. The query is returned in the fundamental units for the current marker X Axis scale: Hz for <b>Frequency</b> and <b>Inverse Time</b>, seconds for <b>Period</b> and <b>Time</b>. If the marker is <b>Off</b> the response is not a number.</p>
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  
 Instrument S/W Revision Prior to A.02.00

### 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, DVB-T/H, DTMB

**Remote Command** :CALCulate:PStatistic: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

Instrument S/W Revision Prior to A.02.00

### Properties

Accesses the marker properties menu.

Key Path **Marker**  
 Instrument S/W Revision Prior to A.02.00

### 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 Prior to A.02.00

### 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, DVB-T/H, DTMB

## Power Stat CCDF Measurement Marker

<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

### Marker Trace

Assigns the specified marker to the designated trace. The trace choices are: Measured, Gaussian, or Reference.

Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## **All Markers Off**

Turns off all markers.

Key Path	<b>Marker, More</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	:CALCulate:PStatistic:MARKer:AOFF
Example	CALC:PST:MARK:AOFF
Instrument S/W Revision	Prior to A.02.00

## 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	Prior to A.02.00

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## **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	Prior to A.02.00

## **Meas**

See “[Meas](#)” on page 1057 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :SENSE]:PStatistic:COUNTs <integer> [ :SENSE]:PStatistic:COUNTs?
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
Default Unit	Kpt
Instrument S/W Revision	Prior to A.02.00

## Meas Cycles

Set the number of measurement cycles to calculate power statistic data. This number couples to Counts. The Counts value is  $(\text{MeasCycles} * \text{Sampling Frequency} * \text{MeasInterval})$ .

When the counts value cannot be divided by  $(\text{Sampling Frequency} * \text{MeasInterval})$ , this value is

Power Stat CCDF Measurement  
Meas Setup

displayed as a decimal fraction.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :SENSE]:PStatistic:SWEep:CYCLes <integer> [ :SENSE]:PStatistic:SWEep:CYCLes?
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.
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :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).  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 Trigger Source is RFBurst, this button is grayed.



Preset	Others: 1.0 ms TD-SCDMA: 1 slot
Min	Others: 50.0 us TD-SCDMA: 1 slot
Max	Others: 10.0 ms TD-SCDMA: 9 slot
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	1xEV-DO
<b>Remote Command</b>	[ :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
Instrument S/W Revision	Prior to A.02.00

### Meas Offset (CDMA and 1xEVDO Only)

Sets the value of time to be used as the measurement interval start.

Key Path	<b>Meas Setup</b>
Mode	CDMA1xEVDO
<b>Remote Command</b>	[ :SENSE]:PStatistic:SWEep:OFFSet <time> [ :SENSE]:PStatistic:SWEep:OFFSet?
Example	PST:SWE:OFFS 2 ms PST:SWE:OFFS?

## Power Stat CCDF Measurement Meas Setup

Preset	325.52 us
State Saved	true
Min	1.0 us
Max	10.0 ms
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup, More, IF Gain</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :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	<p>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.</p> <p>The Auto selection sets IF Gain On under any of the following conditions:</p> <ul style="list-style-type: none"> <li>• the input attenuator is set to 0 dB</li> <li>• the preamp is turned on,</li> <li>• the Max Mixer Level is –20 dBm or lower.</li> </ul> <p>For other settings, Auto sets IF Gain to Off.</p>
Preset	OFF
State Saved	Saved in instrument state.
Range	Auto Man
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup, More, IF Gain</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[: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	Prior to A.02.00

### Meas Preset

Restores all measurement settings to their default values.

Key Path	<b>Meas Setup, More</b>
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## Power Stat CCDF Measurement Meas Setup

Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	:CONFigure:PStatistic
Example	CONF:PST
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DVB-T/H mode, DTMB 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	Prior to A.02.00

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## **Mode**

See “[Mode](#)” on page [1075](#) in the section "Common Measurement Functions" for more information.

## **Mode Setup**

See “[Mode Setup](#)” on page 1089 in the section "Common Measurement Functions" for more information.

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## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## **Recall**

See “[Recall](#)” on page 1103 in the section "Common Measurement Functions" for more information.



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## **Restart**

See “Restart” on page 1127 in the section "Common Measurement Functions" for more information.

## **Save**

See “[Save](#)” on page 1129 in the section "Common Measurement Functions" for more information.

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## **Single**

See “[Single \(Single Measurement/Sweep\)](#)” on page 1155 in the section "Common Measurement Functions" for more information.

## **Source**

See “[Source](#)” on page 1157 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Scale/Div

Enables you to enter a time value to change the horizontal scale.

Key Path	<b>Power Statistic CCDF - Span X Scale</b>
Key Path	<b>Span X Scale</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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 1162](#) in the “Common Measurement Functions” section for details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	:CALCulate:PStatistic:StORe:REFeRence
Example	CALC:PST:STOR:REF
Instrument S/W Revision	Prior to A.02.00

### Ref Trace

Toggles the reference trace display between On and Off.

Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :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	Prior to A.02.00

## Gaussian Line

Toggles the Gaussian trace display between On and Off.

Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB
<b>Remote Command</b>	[ :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	Prior to A.02.00



## Trigger

Accesses a menu of functions that enable you to select and control the trigger source for the current measurement. See [“Trigger” on page 1179](#) in the "Common Measurement Functions" section for more information.

## View/Display

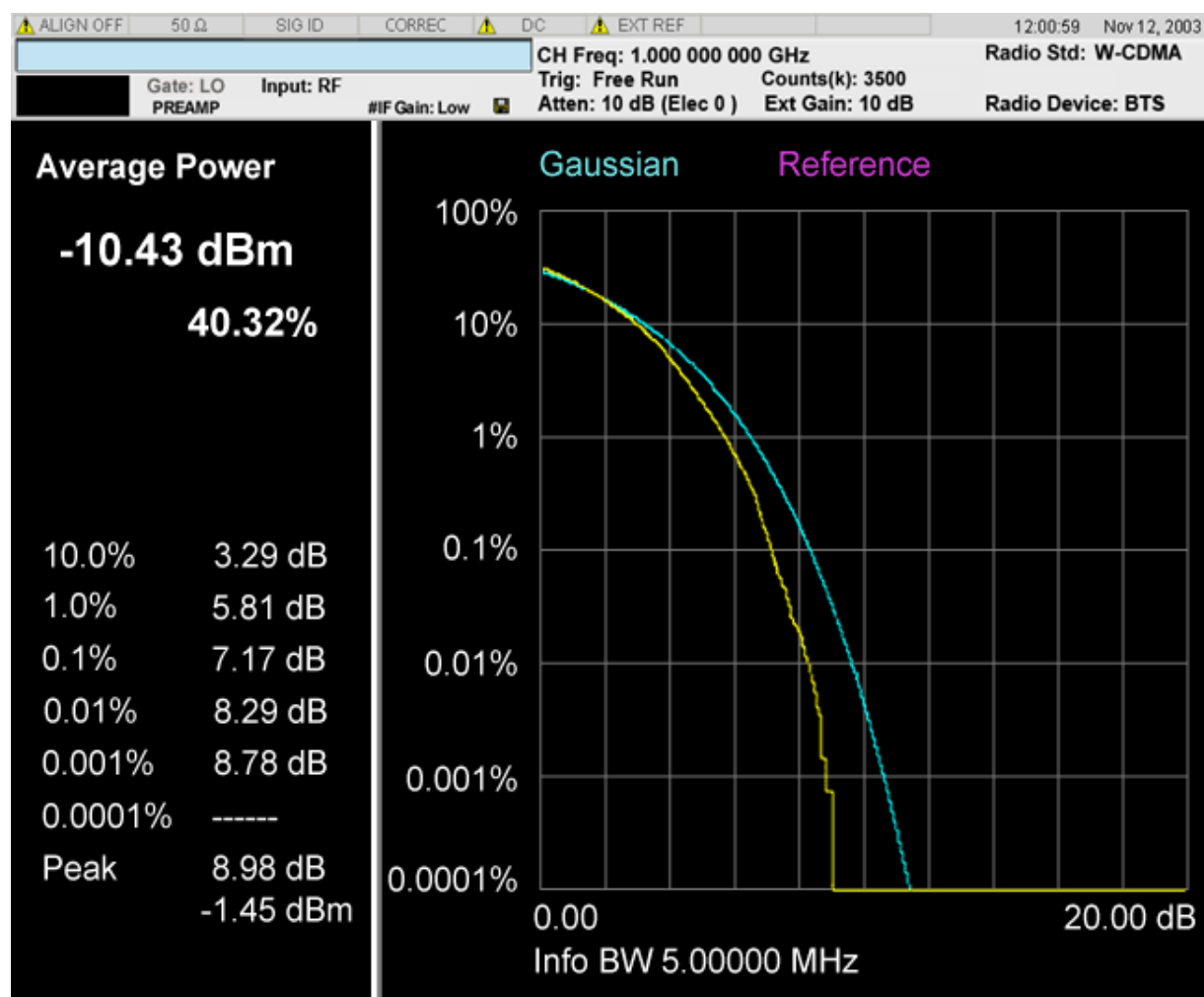
Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

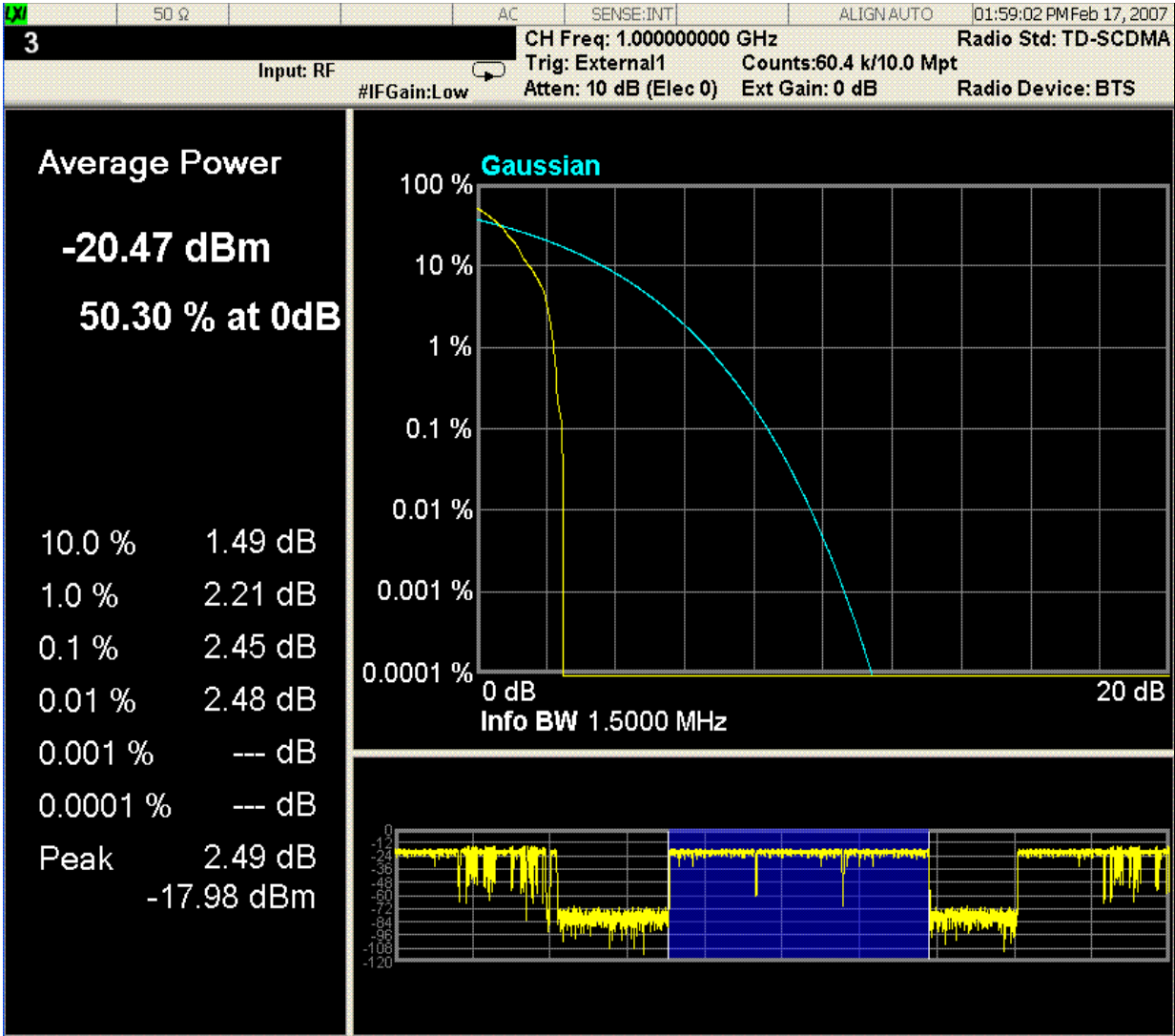
The Power Stat CCDF measurement consists of single view. This is common for both Uplink (MS) and Downlink (BTS). The view consists of the following windows: Metrics (left) and graph display (right).

“Metrics window” on page 724

“Graph window” on page 724

“Wave window (TD-SCDMA only)” on page 724





### 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	<p>Yellow: Series of 5001 floating the current measured power stat trace. (n=2) Initially all markers refer this trace.</p> <p>Light Blue: Series of 5001 floating point numbers (in percent) that represent the Gaussian trace. (n=3)</p> <p>Violet: series of 5001 floating point numbers (in percent) that represent the user-definable reference trace. (n=4)</p> <p>The Gaussian and Reference trace/line can be removed using the features under the Trace/Detector key</p>

### 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 "Slot View", refer to section “Slot View (TD-SCDMA only)” on page 725.

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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Display

Accesses a menu of functions that enable you to set the display parameters...

See “Display” on page 1233 in the "Common Measurement Functions" section for more information.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>View/Display</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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	Prior to A.02.00

Power Stat CCDF Measurement  
**View/Display**

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” on page 729](#). For measurement results and views, see [“View/Display” on page 775](#).

This topic contains the following sections.

[“Measurement Commands for Burst Power \(Transmit Power\)” on page 727](#)

[“Remote Command Results for Burst Power \(Transmit Power\)” on page 728](#)

## 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 1057](#).

## 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	<p>Returns the following comma-separated scalar results:</p> <ol style="list-style-type: none"> <li>1. Sample time is a floating point number representing the time between samples when using the trace queries (n=0, 2, etc.).</li> <li>2. 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.</li> <li>3. 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.</li> <li>4. 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.).</li> <li>5. Threshold value is the absolute threshold level (in dBm) above which the power is calculated when Meas Method is set to Above Threshold.</li> <li>6. Threshold points is the number of points that were above the threshold and were used to calculate Mean Transmit Power when <a href="#">“Meas Method” on page 753</a> is set to Above Threshold. If <a href="#">“Meas Method” on page 753</a> is set to Measured Burst Width, Measured Pts is returned.</li> <li>7. Maximum value is the maximum peak level of the most recently acquired trace data (in dBm).</li> <li>8. Minimum value is the minimum peak level of the most recently acquired trace data (in dBm).</li> <li>9. 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.</li> <li>10. Measured width is the time length that is used to calculate Mean Transmit Power when <a href="#">“Meas Method” on page 753</a> is set to Measured Burst Width. If <a href="#">“Meas Method” on page 753</a> is set to Above Threshold, this value is zero.</li> <li>11. 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.</li> </ol>
2	<p>Returns comma-separated trace points of the Measure Trace data.</p> <p>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.</p>



- 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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 “[Amplitude Y Scale \(AMPTD Y Scale\)](#)” on page 965 for more information.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Y Ref Value

Sets the absolute power reference.

Key Path	<b>AMPTD Y Scale</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

### 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 965 for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## Scale/Division

Enables you to enter a numeric value to change the vertical display sensitivity.

Key Path	<b>AMPTD Y Scale</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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 Auto Scaling automatically changes to Off.
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.1 dB
Max	20.00 dB
Instrument S/W Revision	Prior to A.02.00

## Presel Center (Measurement Global)

Operation of this key is identical across several measurements. For details about this key, see Presel Center “[Presel Center](#)” on page 977.

## Presel Adjust (Measurement Global)

Operation of this key is identical across several measurements. For details about this key, see “[Preselector Adjust](#)” on page 978.

## 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

## Burst Power (Transmit Power) AMPTD Y Scale

measurement.

See “[Internal Preamp](#)” on page 980 for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

### Ref Position

Enables you to set the display reference position to either, Top, Center or Bottom.

Key Path	<b>AMPTD Y Scale, More</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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	Prior to A.02.00

### Auto Scaling

Allows you to toggle the Y axis auto scaling function between On and Off.

Key Path	<b>AMPTD Y Scale, More</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUP le 0 1 OFF ON  :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUP le?
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 “ <a href="#">Y Ref Value</a> ” on page 730 or “ <a href="#">Scale/Division</a> ” on page 731, this parameter automatically is set to ‘Off’.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## **Auto Couple**

Operation of this key is identical across several measurements. For details about this key, see “[AUTO COUPLE](#)” on page 983.

---

## 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	<b>Front panel key</b>
Mode	SA, GSM
Instrument S/W Revision	Prior to A.02.00

## 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	<b>BW</b>
Mode	SA, GSM
<b>Remote Command</b>	[ :SENSE]:TXPower:BANDwidth[:RESolution] <bandwidth> [ :SENSE]:TXPower:BANDwidth[:RESolution]?
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
Instrument S/W Revision	Prior to A.02.00

## RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

## Burst Power (Transmit Power) BW

### 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	<b>BW</b>
Mode	SA, GSM
<b>Remote Command</b>	[ :SENSe]:TXPower:BANDwidth:TYPE GAUSSian FLATtop [ :SENSe]:TXPower:BANDwidth:TYPE?
Example	TXP:BAND:TYPE GAUS TXP:BAND:TYPE?
Notes	<p>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.</p> <p>FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy.</p> <p>GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response.</p> <p>You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.</p>
Preset	GAUSSian
State Saved	Saved in instrument state.
Range	Gaussian (Normal) Flattop
Instrument S/W Revision	Prior to A.02.00



## **Cont (Continuous)**

Operation of this key is identical across several measurements. For details about this key, see “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987.

## **FREQ/Channel (Frequency or Channel)**

Operation of this key is identical across several measurements. For details about this key, see [“FREQ Channel”](#) on page 989.

## **Input/Output**

Operation of this key is identical across several measurements. For details about this key, see [“Input/Output” on page 995](#).

---

## 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 1051.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Marker</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE POSITION DELTA OFF :CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:MODE?
Example	CALC:TXP:MARK:MODE OFF CALC:TXP:MARK:MODE?
Notes	If the selected marker is Off, pressing <b>Marker</b> sets it to Normal and places it at the center of the screen on the trace determined by the <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> 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
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Marker, Normal</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	: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 <b>Normal</b> , or the offset from the marker’s reference marker if the control mode is <b>Delta</b> . The query is returned in the fundamental units for the current marker X Axis scale: Hz for <b>Frequency</b> and <b>Inverse Time</b> , seconds for <b>Period</b> and <b>Time</b> . If the marker is <b>Off</b> 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
Instrument S/W Revision	Prior to A.02.00

## 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

## Burst Power (Transmit Power) Marker

setting the value of the marker.

Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	: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 <b>Normal</b> , or the offset from the marker's reference marker in trace points if the control mode is <b>Delta</b> . If the marker is <b>Off</b> 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
Instrument S/W Revision	Prior to A.02.00

### 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
------	-------------------

<b>Remote Command</b>	: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 <b>Off</b> 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
Instrument S/W Revision	Prior to A.02.00

## Properties

Accesses a menu that enables you to set marker properties and to access the marker trace menu.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker, Properties</b>
Mode	GSM, SA, TD-SCDMA
Instrument S/W Revision	Prior to A.02.00

## Relative To

Selects the marker that the selected marker will be relative to (its reference marker).

Key Path	<b>Marker, Properties</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence <integer>  :CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:REFerence?
Example	CALC:TXP:MARK:REF 10  CALC:TXP:MARK:REF?

## Burst Power (Transmit Power) Marker

Notes	<p>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.”</p> <p>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.</p> <p>When queried a single value will be returned (the specified marker numbers relative marker).</p>
Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Instrument S/W Revision	Prior to A.02.00

### Marker Trace

Assigns the specified marker to the designated trace.

Key Path	<b>Marker, Properties</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	<pre>:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe RFENvelope MAXHold MINHold</pre> <pre>:CALCulate:TXPower:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12:TRACe?</pre>
Example	<pre>CALC:TXP:MARK:TRAC MAXH</pre> <pre>CALC:TXP:MARK:TRAC?</pre>
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	<p>If Detector/Max Hold Trace is Off, Max Hold is grayed out and MAXHold parameter is not available.</p> <p>If Detector/Min Hold Trace is Off, Min Hold is grayed out and MINHold parameter is not available.</p>
Preset	RFENvelope
State Saved	Saved in instrument state.
Range	RF Envelope Max Hold RF Envelope Min Hold RF Envelope
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Marker, More</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	: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	Prior to A.02.00

## All Markers Off

Turns off all markers.

Key Path	<b>Marker, More</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	: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	Prior to A.02.00

## **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
Instrument S/W Revision	Prior to A.02.00

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## **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	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

## **Meas**

Operation of this key is identical across several measurements. For details about this key, see [“Meas” on page 1057](#).

## 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	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	[ :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
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	[ :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
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Mode	SA, GSM
<b>Remote Command</b>	[ :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 <a href="#">“Max Hold Trace” on page 772</a> or and <a href="#">“Min Hold Trace” on page 772</a> . 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
Instrument S/W Revision	Prior to A.02.00

## TD-SCDMA Mode

Key Path	<b>Meas Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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)
Instrument S/W Revision	Prior to A.02.00

## Threshold Lvl

When Meas Method is set to Above Threshold Lvl, the mean carrier power is calculated based on the

**Burst Power (Transmit Power)**  
**Meas Setup**

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 state is controlled by the On/Off state of the 'Display Line' under the View/Display menu.

Key Path	<b>Meas Setup</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	[ :SENSe]:TXPower:THReshold <real> [ :SENSe]:TXPower:THReshold? [ :SENSe]:TXPower:THReshold:TYPE ABSolute RELative [ :SENSe]:TXPower:THReshold:TYPE?
Example	TXP:THR 0 TXP:THR?
Example	TXP:THR:TYPE ABS TXP:THR:TYPE?
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	GSM: -20.0 SA: -30.0 TD-SCDMA : -60.0 RELative
State Saved	Saved in instrument state.
Min	-100
Max	GSM, SA: Relative : 0dB Absolute : 100dBm TD-SCDMA: Relative : 0dB Absolute : 60dBm
Instrument S/W Revision	Prior to A.02.00



## 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	<b>Meas Setup</b>
Mode	SA, GSM
<b>Remote Command</b>	[ :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
Instrument S/W Revision	Prior to A.02.00

TD-SCDMA mode

Key Path	<b>Meas Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSe ] :TXPower :METHod THReshold   BWIDth   SINGLE [ :SENSe ] :TXPower :METHod?
Example	TXP:METH BWID TXP:METH?

## Burst Power (Transmit Power) Meas Setup

Preset	SINGLE
State Saved	Saved in instrument state.
Range	Threshold Lvl Measured Burst Width Single TimeSlot
Instrument S/W Revision	Prior to A.02.00

### 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).

Key Path	<b>Meas Setup</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	[ :SENSE ] :TXPower :BURSt :WIDTh <time> [ :SENSE ] :TXPower :BURSt :WIDTh? [ :SENSE ] :TXPower :BURSt :AUTO ON OFF 1 0 [ :SENSE ] :TXPower :BURSt :AUTO?
Example	TXP:BURS:WIDT 10 TXP:BURS:WIDT? TXP:BURS:AUTO 1 TXP:BURS:AUTO?
Example	TXP:BURS:AUTO 0 TXP:BURS:AUTO? TXP:BURS:AUTO 1 TXP:BURS:AUTO?
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	<p>Burst Width will be grayed out if Meas Method is set to ‘Above Threshold Lvl’.</p> <p>SA, GSM</p> <p>Max value depends on Sweep Time, Res BW and RBW filter type.</p> <p><b>TD-SCDMA:</b></p> <p>If the measure method is not “Measured Burst Width”, this key will be grayed out.</p> <p>The default value is depending on the Burst type:</p> <p>If Burst Type = Traffic, Burst Width = 662.5us</p> <p>If Burst Type = Downlink Pilot, Burst Width = 50us</p> <p>If Burst Type = Uplink Pilot, Burst Width = 100us</p>
Preset	<p>SA, GSM: 255.6 us</p> <p>TD-SCDMA: 662.5us</p> <p>ON</p>
State Saved	Saved in instrument state.
Min	100.0 ns
Max	50 s
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

## IF Gain Auto

Activates the auto rules for IF Gain.

Key Path	<b>Meas Setup, More, IF Gain</b>
Mode	SA, GSM
<b>Remote Command</b>	<p>[ :SENSE] :TXPower : IF : GAIN : AUTO [ : STATE ] OFF   ON   0   1</p> <p>[ :SENSE] :TXPower : IF : GAIN : AUTO [ : STATE ] ?</p>

## Burst Power (Transmit Power) Meas Setup

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.
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
Instrument S/W Revision	Prior to A.02.00

### IF Gain State

Selects the range of the IF Gain.

Key Path	<b>Meas Setup, More, IF Gain</b>
Mode	SA, GSM
<b>Remote Command</b>	[ :SENSe ] :TXPower : IF : GAIN [ :STATe ] ON   OFF   1   0 [ :SENSe ] :TXPower : IF : GAIN [ :STATe ] ?
Example	TXP:IF:GAIN ON TXP:IF:GAIN?
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 "IF Gain Auto" on page 755 to OFF (Man).
Preset	OFF
State Saved	Saved in instrument state.
Range	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup, More</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSe ] :TXPower :SWEp:TIME <integer> [ :SENSe ] :TXPower :SWEp: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
Instrument S/W Revision	Prior to A.02.00

## Meas Preset

Returns parameters for this measurement to those set by the factory.

Key Path	<b>Meas Setup, More</b>
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## Burst Power (Transmit Power) Meas Setup

Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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.
Instrument S/W Revision	Prior to A.02.00

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## **Mode**

Operation of this key is identical across several measurements. For details about this key, see [“Mode” on page 1075](#).

## **Mode Setup**

Operation of this key is identical across several measurements. For details about this key, see [“Mode Setup”](#) on page 1089.



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## 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	<b>Peak Search</b>
Mode	GSM, SA, TD-SCDMA
<b>Remote Command</b>	: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	Prior to A.02.00

## **Recall**

Operation of this key is identical across several measurements. For details about this key, see [“Recall” on page 1103](#).

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## **Restart**

Operation of this key is identical across several measurements. For details about this key, see [“Restart” on page 1127](#).

## **Save**

Operation of this key is identical across several measurements. For details about this key, see [“Save” on page 1129](#).

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## **Single**

Operation of this key is identical across several measurements. For details about this key, see [“Single \(Single Measurement/Sweep\)”](#) on page 1155.

## Source

Operation of this key is identical across several measurements. For details about this key, see “[Source](#)” on page 1157.

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## SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Ref Value

Enables you to set the display X reference value.

Key Path	<b>SPAN X Scale</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEV e1 <time>  :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEV e1?
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 <a href="#">“Auto Scaling” on page 769</a> is On, this value is automatically determined by the measurement result. When you set a value manually, <a href="#">“Auto Scaling” on page 769</a> automatically changes to Off.
Preset	0 s
State Saved	Saved in instrument state.
Min	-10.0 s
Max	10.00 s
Instrument S/W Revision	Prior to A.02.00

### Scale/Div

Enables you to set the display X scale/division value.

Key Path	<b>SPAN X Scale</b>
Mode	SA, GSM, TD-SCDMA

## Burst Power (Transmit Power) SPAN X Scale

<b>Remote Command</b>	: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 “Auto Scaling” on page 769 is on, this value is automatically determined by the measurement result. When you set a value manually, “Auto Scaling” on page 769 automatically changes to Off.
Preset	64.0 us
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Instrument S/W Revision	Prior to A.02.00

## Ref Position

Enables you to set the display X reference position to Left, Center or Right.

Key Path	<b>SPAN X Scale</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00



## Auto Scaling

Enables you to toggle the X auto scaling function between On and Off.

Key Path	<b>SPAN X Scale</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPl le 0 1 OFF ON  :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPl 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 X Scale/Div manually, X Auto Scaling automatically changes to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## 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 1161.

Key Path	<b>Front panel key</b>
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	Prior to A.02.00

### Sweep Time (for SA mode)

Sets the sweep time to capture and show on screen.

Key Path	<b>Sweep/Control</b>
Mode	SA
<b>Remote Command</b>	[ :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
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Sweep/Control</b>
Mode	GSM
<b>Remote Command</b>	[ :SENSe ] :TXPower :SWEep :TIME <integer> [ :SENSe ] :TXPower :SWEep :TIME?
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
Instrument S/W Revision	Prior to A.02.00

## **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	<b>Sweep/Control</b>
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	Prior to A.02.00

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## Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Max Hold Trace

This key enables you to select visible/invisible Max Hold Trace.

Key Path	<b>Trace/Detector</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ] ON OFF 1 0  :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ]?
Example	:DISP:TXP:VIEW:WIND:TRAC:MAXH ON  :DISP:TXP:VIEW:WIND:TRAC:MAXH?
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 MAXimum forces this parameter to ON.
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

### Min Hold Trace

This key enables you to select visible/invisible Min Hold Trace.

Key Path	<b>Trace/Detector</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	:DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ] ON OFF 1 0  :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ]?

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	Prior to A.02.00

## **Trigger**

Operation of this key is identical across several measurements. For details about this key, see [“Trigger” on page 1179](#).

## 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.

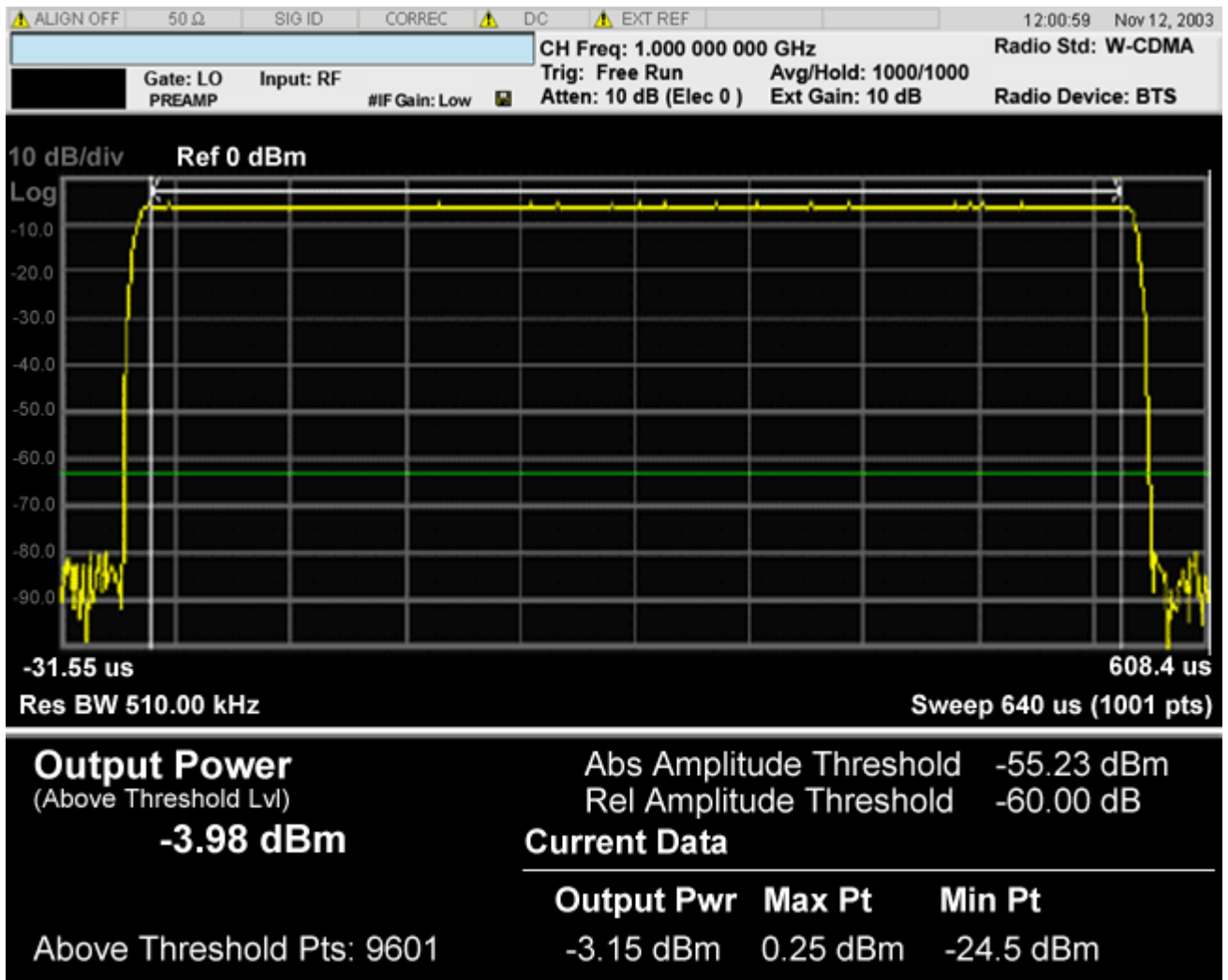
This measurement consists of one view, which consists of two windows.

“RF Envelope view for TX Power Measurement (Above Threshold)” on page 775

“RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)” on page 776

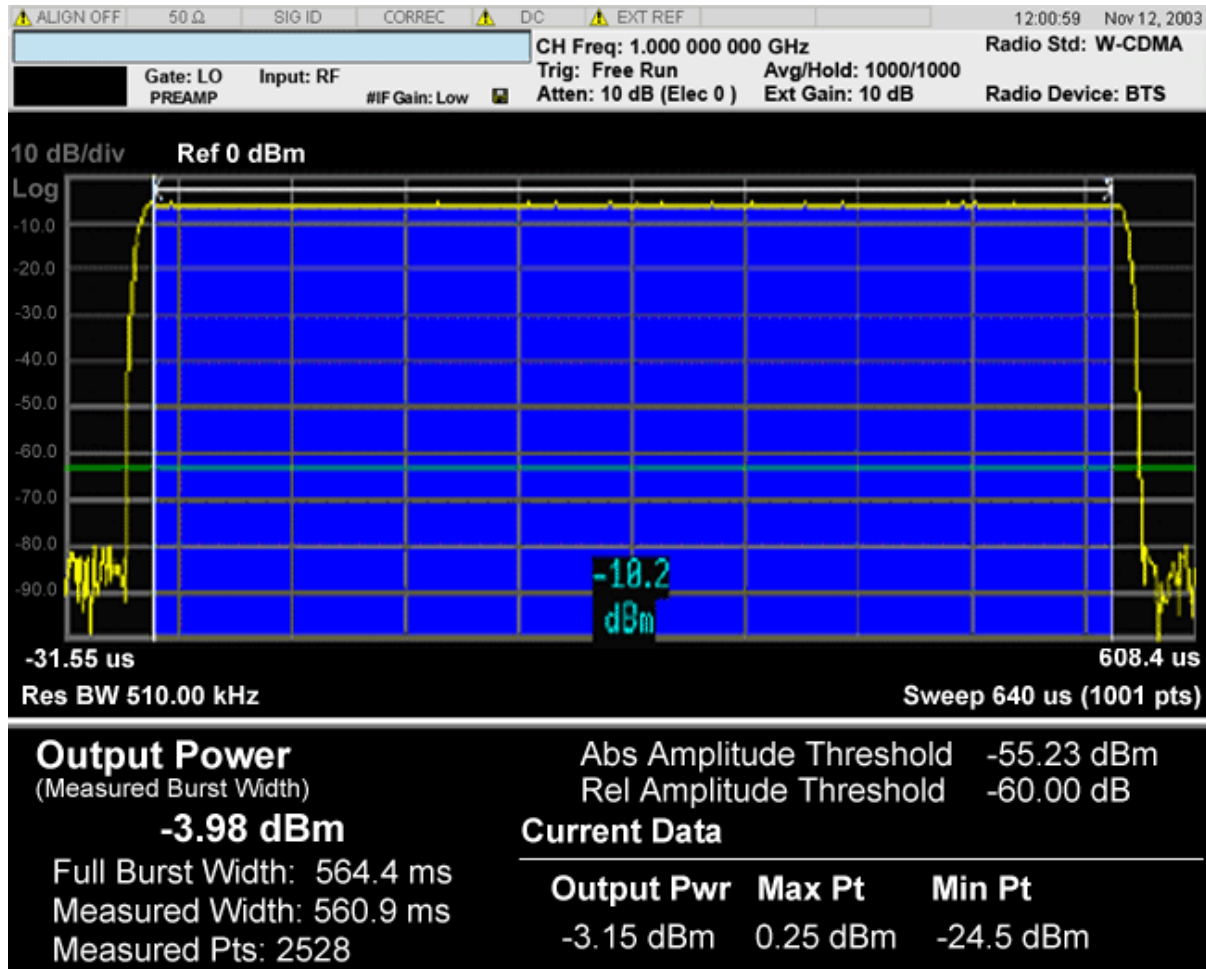
“RF Envelope view with Bar Graph for TX Power Measurement (Single Time Slot)” on page 777

### RF Envelope view for TX Power Measurement (Above Threshold)



Burst Power (Transmit Power)  
View/Display

RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)







**Burst Power (Transmit Power)**  
**View/Display**

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 <a href="#">“Threshold Lvl” on page 751</a> .	
Measured Width	n=1 10th	999.9 us
	Time length that is used to calculate Mean Transmit Power when <a href="#">“Meas Method” on page 753</a> is Measured Burst Width. If <a href="#">“Meas Method” on page 753</a> 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 <a href="#">“Meas Method” on page 753</a> 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	<b>Front panel key</b>	
Mode	SA, GSM, TD-SCDMA	
Instrument S/W Revision	Prior to A.02.00	

## 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 1233](#).

Key Path	<b>View/Display</b>
Mode	SA, GSM, TD-SCDMA
Instrument S/W Revision	Prior to A.02.00

## Bar Graph

Enables you to select visible/invisible Bar Graph.

Key Path	<b>View/Display</b>
Mode	SA, GSM, TD-SCDMA
<b>Remote Command</b>	: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	Prior to A.02.00

Burst Power (Transmit Power)  
**View/Display**

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 846](#).

This topic contains the following sections:

[“Measurement Commands for Spurious Emissions” on page 781](#)

[“Remote Command Results for Spurious Emissions Measurement” on page 781](#)

## 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 1057](#).

## 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)

## Spurious Emissions Measurement

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

Prior to A.02.00

## AMPTD Y Scale

AMPTD Y Scale opens a menu of functions that enable you to modify the Amplitude parameters.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>AMPTD/Y Scale</b>
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA,C2k, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	:DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel < real>  :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
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, DVB-T/H 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
Instrument S/W Revision	Prior to A.02.00

## 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 965 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>AMPTD/Y Scale</b>
Mode	SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, DVB-T/H
<b>Remote Command</b>	: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, DVB-T/H 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
Instrument S/W Revision	Prior to A.02.00

## Presel Center

See AMPTD Y Scale, “Presel Center” on page 977 in the “Common Measurement Functions” section for more information.



## Presel Adjust

See AMPTD Y Scale, “[Preselector Adjust](#)” on page 978 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 980 under AMPTD Y Scale in the "Common Measurement Functions" section for more information.

Key Path	<b>AMPTD Y Scale</b>
Instrument S/W Revision	Prior to A.02.00

## Auto Scaling

Toggles the Auto Scaling function between On and Off.

Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H
<b>Remote Command</b>	: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?
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 Ref Level = Absolute Limit + (2 * 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

Spurious Emissions Measurement  
**AMPTD Y Scale**

Instrument S/W Revision

Prior to A.02.00

## **Auto Couple**

See “**AUTO COUPLE**” on page 983 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

Prior to A.02.00

## **Cont**

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987 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

Prior to A.02.00

## **Input/Output**

See “[Input/Output](#)” on page 995 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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	<p>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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> appears on the Active Function area.</p> <p>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.</p> <p>Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p> <p>You must be in the cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.</p>
Dependencies/Couplings	No
Preset	=OFF
State Saved	Saved in instrument state.
Range	Normal Delta Off
Instrument S/W Revision	Prior to A.02.00

### 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, DVB-T/H
<b>Remote Command</b>	<pre>:CALCulate:SPURious:MARKer[1] 2 3 4 5 6 7 8 9 10 11 12: X &lt;freq&gt;  :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	<p>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.</p> <p>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.</p>
Preset	1 GHz
State Saved	No
Min	-9.9E+37

## Spurious Emissions Measurement Marker

Max	9.9E+37
Instrument S/W Revision	Prior to A.02.00

### 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, DVB-T/H
<b>Remote Command</b>	: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 <b>Normal</b> , or the offset from the reference marker in trace points if the control mode is <b>Delta</b> . 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 <b>Off</b> the response is not a number.
Preset	300
State Saved	No
Min	-9.9E+37
Max	9.9E+37
Instrument S/W Revision	Prior to A.02.00

### 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, DVB-T/H
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

## Properties

Accesses the Properties menu to set certain properties of the selected marker.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Marker, Properties</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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.

## Spurious Emissions Measurement Marker

Preset	2 3 4 5 6 7 8 9 10 11 12 1
State Saved	Saved in instrument state.
Min	1
Max	12
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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
Instrument S/W Revision	Prior to A.02.00

### All Markers Off

Turns off all markers.

Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	:CALCulate:SPURious:MARKer:AOFF
Example	CALC:SPUR:MARK:AOFF
Instrument S/W Revision	Prior to A.02.00

## **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	Prior to A.02.00

## **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	Prior to A.02.00

---

## **Meas**

See “[Meas](#)” on page 1057 in the section "Common Measurement Functions" for more information.

---

## Meas Setup

Displays the measurement setup menu for the currently selected measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA, DVB-T/H
<b>Remote Command</b>	<pre>[ :SENSe]:SPURious:AVERAge:COUNT &lt;integer&gt; [ :SENSe]:SPURious:AVERAge:COUNT? [ :SENSe]:SPURious:AVERAge[:STATe] ON OFF 1 0 [ :SENSe]:SPURious:AVERAge[:STATe]?</pre>
Example	<pre>SPUR:AVER:COUN 2500 SPUR:AVER:COUN? SPUR:AVER ON SPUR:AVER?</pre>
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H 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
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H
<b>Remote Command</b>	[ :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, DVB-T/H 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	Prior to A.02.00

## 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

## 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



<b>Remote Command</b>	<pre>[ :SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;  [: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, DVB-T/H, 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 00E+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,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  DVB-T/H: 9kHz, 174MHz, 400MHz, 790MHz, 862MHz, 1GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz, 1.5GHz</pre>
State Saved	Saved in instrument state.
Min	-80 MHz
Max	<pre>Hardware Dependent: Option 503: 3699999990 Option 508: 8499999990 Option 513: 13799999990 Option 526: 26999999990</pre>
Instrument S/W Revision	Prior to A.02.00



Min	-79999990
Max	Hardware Dependent: Option 503: 3.7 GHz Option 508: 8.5 GHz Option 513: 13.8 GHz Option 526: 27.0 GHz
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
Remote Command	<pre>[ :SENSE]:SPURious[:RANGE][:LIST]:BANDwidth[:RESolution] &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;, &lt;freq&gt;  [: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	<pre>SPUR:BWND 1kHz,10kHz,100kHz,1MHz,1MHz,1MHz,1MHz, 3MHz,3MHz,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, OFF, OFF, ON, ON  SPUR:BWID:AUTO?</pre>





## Spurious Emissions Measurement Meas Setup

under certain conditions. The **Filter Type** menu gives you control over these parameters.

Key Path	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	<pre>[ :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</pre> <pre>[ :SENSe ] : SPURious [ :RANGe ] [ :LIST ] : BANDwidth : SHAPe?</pre>
Example	<pre>SPUR:BAND:SHAP GAUS, GAUS, GAUS, GAUS, GAUS, GAUS, FLAT, FLAT, FLAT, FLAT, FLAT, GAUS, GAUS, GAUS, GAUS, GAUS, FLAT, FLAT, GAUS, GAUS</pre> <pre>SPUR:BAND:SHAP?</pre>
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	Prior to A.02.00

### 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 returns 20 values.

Key Path	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H





## Spurious Emissions Measurement Meas Setup

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	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	<pre> :CALCulate:SPURious[:RANGe][:LIST]:LIMit:ABSolute[:UPPe r]:DATA:STOP &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;, &lt;ampl&gt;  :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? </pre>
Example	<pre> 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 CALC:SPUR:LIM:ABS:DATA:STOP:AUTO? </pre>



## Spurious Emissions Measurement Meas Setup

<b>Remote Command</b>	<pre>[ :SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;, &lt;rel_ampl&gt;  [: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, 20  SPUR:PEAK:EXC?</pre>
Preset	<pre>+6.00000000E+000,+6.00000000E+000,+6.00000000E+000,+6.00000000E+ 000,+6.00000000E+000,+6.00000000E+000,+6.00000000E+000,+6.000000 00E+000,+6.00000000E+000,+6.00000000E+000,+6.00000000E+000,+6.00 000000E+000,+6.00000000E+000,+6.00000000E+000,+6.00000000E+000,+ 6.00000000E+000,+6.00000000E+000,+6.00000000E+000,+6.00000000E+0 00,+6.00000000E+000</pre>
State Saved	Saved in instrument state.
Min	0.0 dB
Max	100.0 dB
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	<pre>[ :SENSe]:SPURious[:RANGe][:LIST]:PEAK:THREshold &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;  [:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THREshold?</pre>
Example	<pre>SPUR:PEAK:THR 0,0,0  SPUR:PEAK:THR?</pre>











**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 601 and a maximum of 20001.

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	<b>Meas Setup, Range Table</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	<pre>[ :SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts &lt;integer&gt; [ :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?</pre>
Example	<pre>SPUR:SWE:POIN 1001,1001,1001 SPUR:SWE:POIN? SPUR:SWE:POIN:AUTO ON,ON,ON SPUR:SWE:POIN:AUTO?</pre>
Notes	:



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	Prior to A.02.00

**IF Gain State** Selects the range of IF Gain.

**Remote Command:** [ :SENSE ] :SPURious:IF:GAIN[ :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, 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:IF:GAIN[ :STATE ] ?

**Example:** SPUR:IF:GAIN ON,ON  
 SPUR:IF: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:	Low Gain (Best for Large Signals) High Gain (Best Noise Level)
Instrument S/W Revision:	Prior to A.02.00

## 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

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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 SA remains set to last range checked with an active trace 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	[ :SENSe]:SPURious:TYPE EXAMine FULL [ :SENSe]:SPURious:TYPE?
Example	SPUR:TYPE FULL SPUR:TYPE?
Preset	EXAMine
State Saved	Saved in instrument state.
Range	Examine Full
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA, DVB-T/H
<b>Remote Command</b>	[:SENSe]:SPURious:SPUR <integer> [:SENSe]:SPURious:SPUR?
Example	SPUR:SPUR 55 SPUR:SPUR?
Preset	1
State Saved	No
Min	1
Max	200
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	[:SENSe]:SPURious:REPT:MODE ALL LIMTest [:SENSe]:SPURious:REPT:MODE?
Example	SPUR:REPT:MODE LIMT SPUR:REPT:MODE?
Preset	ALL
State Saved	Saved in instrument state.
Range	All Limit Test
Instrument S/W Revision	Prior to A.02.00

## Meas Preset

Restores all measurement parameters to their default values.

Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	:CONFigure:SPURious
Example	CONF:SPUR
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

## Category A (for TD-SCDMA only)

Sets the range parameters to meet the requirement of the BS mandatory spurious emissions limits (Category A).

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	<b>Meas Setup, Range Preset</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSE ] :SPURious:CATegory:A
Example	SPUR:CAT:A
Dependencies/Couplings	This key is grayed out when the radio device is MS.

Instrument S/W Revision                      Prior to A.02.00

**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

<b>Band</b>	<b>Maximum Level</b>	<b>Measurement Bandwidth</b>	<b>Note</b>
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 Fl –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			

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$F_c2 + 19,2 \text{ MHz}$  or  $F_u + 10 \text{ MHz}$  whichever is the lower       $-30 \text{ dBm}$        $1 \text{ MHz}$       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	<b>Meas Setup, Range Preset</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSE]:SPURious:CATegory:B
Example	SPUR:CAT:B
Dependencies/Couplings	This key is grayed out when the radio device is MS.
Instrument S/W Revision	Prior to A.02.00

### Mobile (for TD-SCDMA only)

Sets the range parameters to meet the requirement of both the MS general and additional spurious emissions limits.

#### 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	<b>Meas Setup, Range Preset</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSe ] : SPURious : CATegory : MS
Example	SPUR:CAT:MS
Notes	The former command “[:SENSe]:SPURious:CATegory:MOBile” is still supported.
Dependencies/Couplings	This key is grayed out when the radio device is BTS.
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Freq Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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.

## Spurious Emissions Measurement Meas Setup

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 in equation for Fl, Fc1, Fc2 and Fu is satisfied: $F_l + 0.8\text{MHz} \leq F_{c1} \leq F_{c2} \leq F_u - 0.8\text{MHz}$ ;  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
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Freq Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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.
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
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Freq Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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: $Fl + 0.8MHz \leq Fc1 \leq Fc2 \leq Fu - 0.8 MHz$ ;
Preset	2.010 GHz
State Saved	Saved in instrument state.
Min	1.011 GHz
Max	See Coupling
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Freq Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :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: $Fl + 0.8MHz \leq Fc1 \leq Fc2 \leq Fu - 0.8 MHz$ ;
Preset	2.025 GHz

## Spurious Emissions Measurement Meas Setup

State Saved	Saved in instrument state.
Min	See Coupling
Max	3.689 GHz
Instrument S/W Revision	Prior to A.02.00

**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	<b>Meas Setup, Freq Setup</b>
Mode	TD-SCDMA
<b>Remote Command</b>	[ :SENSE]:SPURious:CARRier:FREQuency:MS <freq> [ :SENSE]:SPURious:CARRier:FREQuency:MS?
Example	SPUR:CARR:FREQ:MS 2GHz SPUR:CARR:FREQ:MS?
Notes	You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode.  The former SCPI commands “[:SENSE]:SPURious:CARRier:FREQuency:MOBil <freq>” and “[:SENSE]:SPURious:CARRier:FREQuency:MOBil?” are still supported.
Dependencies/Couplings	This key is grayed out when the radio device is BTS.
Preset	2.0204 GHz
State Saved	Saved in instrument state.
Min	1.005 GHz
Max	3.695 GHz
Instrument S/W Revision	Prior to A.02.00

### CH Mean Power (for DVB-T/H only)

Set the mean power of the signal channel. The enter value is used to calculate the limit parameter which is different according as the different mean power of the transmitter. This key only shows up in the DVB-T/H.

Category A (mean power < 25W)

Freq Range	Limit	RBW	Note
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9kHz~174MHz	-36dBm	100kHz	Required by EN302-296 Chapter 4.2.1 for DVB-T transmitter.
174MHz~400MHz	-82dBm	4kHz	
400MHz~790MHz	-36dBm	100kHz	
790MHz~862MHz	-76dBm	4kHz	
862MHz~1GHz	-36dBm	100kHz	
> 1GHz	-30dBm	100kHz	

Category B (25W<mean power<=1000W)

Freq Range	Limit	RBW	Note
9kHz~174MHz	-36dBm	100kHz	Required by EN302-296 Chapter 4.2.1 for DVB-T transmitter.
174MHz~400MHz	-126dBc	4kHz	
400MHz~790MHz	-36dBm	100kHz	
790MHz~862MHz	-120dBc	4kHz	
862MHz~1GHz	-36dBm	100kHz	
> 1GHz	-30dBm	100kHz	

Category C (mean power > 1000W)

Freq Range	Limit	RBW	Note
9kHz~174MHz	-36dBm	100kHz	Required by EN302-296 Chapter 4.2.1 for DVB-T transmitter.
174MHz~400MHz	-66dBm	4kHz	
400MHz~790MHz	-36dBm	100kHz	
790MHz~862MHz	-60dBm	4kHz	
862MHz~1GHz	-36dBm	100kHz	
> 1GHz	-30dBm	100kHz	

<b>Key Path</b>	<b>Meas Setup</b>
Mode	DVB-T/H
<b>Remote Command</b>	[ :SENSE]:SPURious:CARRier:POWer <real> [ :SENSE]:SPURious:CARRier:POWer?
Example	SPUR:CARR:POW -30.00 dBm SPUR:CARR:POW?

## Spurious Emissions Measurement Meas Setup

Dependencies/Couplings	When the mean power of the signal channel is between 25 watt and 1000 watt, the measurement uses the current enter value as the reference to calculate the limit parameters.
Preset	-30.00 dBm
State Saved	Saved in instrument state.
Min	-250.0 dBm
Max	250.0 dBm
Instrument S/W Revision	A.02.00

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## **Mode**

See “[Mode](#)” on page [1075](#) in the section "Common Measurement Functions" for more information.

## **Mode Setup**

See “[Mode Setup](#)” on page 1089 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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	Prior to A.02.00

## Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the current marker value.

Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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	Prior to A.02.00

## 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	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H

## Spurious Emissions Measurement Peak Search

<b>Remote Command</b>	: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	Prior to A.02.00

### 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	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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	Prior to A.02.00

### 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	<b>Peak Search</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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 $\Delta$
Dependencies/Couplings	This key is not available (key is grayed out) when <b>Coupled Markers</b> is on.

Instrument S/W Revision      Prior to A.02.00

## Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

Key Path	<b>Peak Search</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	: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	Prior to A.02.00

## **Recall**

See “[Recall](#)” on page 1103 in the section "Common Measurement Functions" for more information.

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## **Restart**

See “Restart” on page 1127 in the section "Common Measurement Functions" for more information.

## **Save**

See “[Save](#)” on page 1129 in the section "Common Measurement Functions" for more information.

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## **Single**

See “[Single \(Single Measurement/Sweep\)](#)” on page 1155 in the section "Common Measurement Functions" for more information.

## **Source**

See “[Source](#)” on page 1157 in the section "Common Measurement Functions" for more information.



## **Span X Scale**

Span X Scale is unavailable in the Spurious Emissions measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Sweep/Control

Accesses the Sweep/Control menu keys used to set up and control the sweep time and source.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Sweep Setup

Sets the sweep functions that control the sweep state and time.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Sweep/Control, Sweep Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H
<b>Remote Command</b>	[ :SENSE ] : SPURious : SWEep : TIME : AUTO : RULEs NORMal   ACCuracy [ :SENSE ] : SPURious : SWEep : TIME : AUTO : RULEs ?
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 Accey
Instrument S/W Revision	Prior to A.02.00

## **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” on page 1162](#) in the "Common Measurement Functions" section for more information.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## Trace/Detector

Trace/Detector is unavailable in the Spurious Emissions measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Trigger

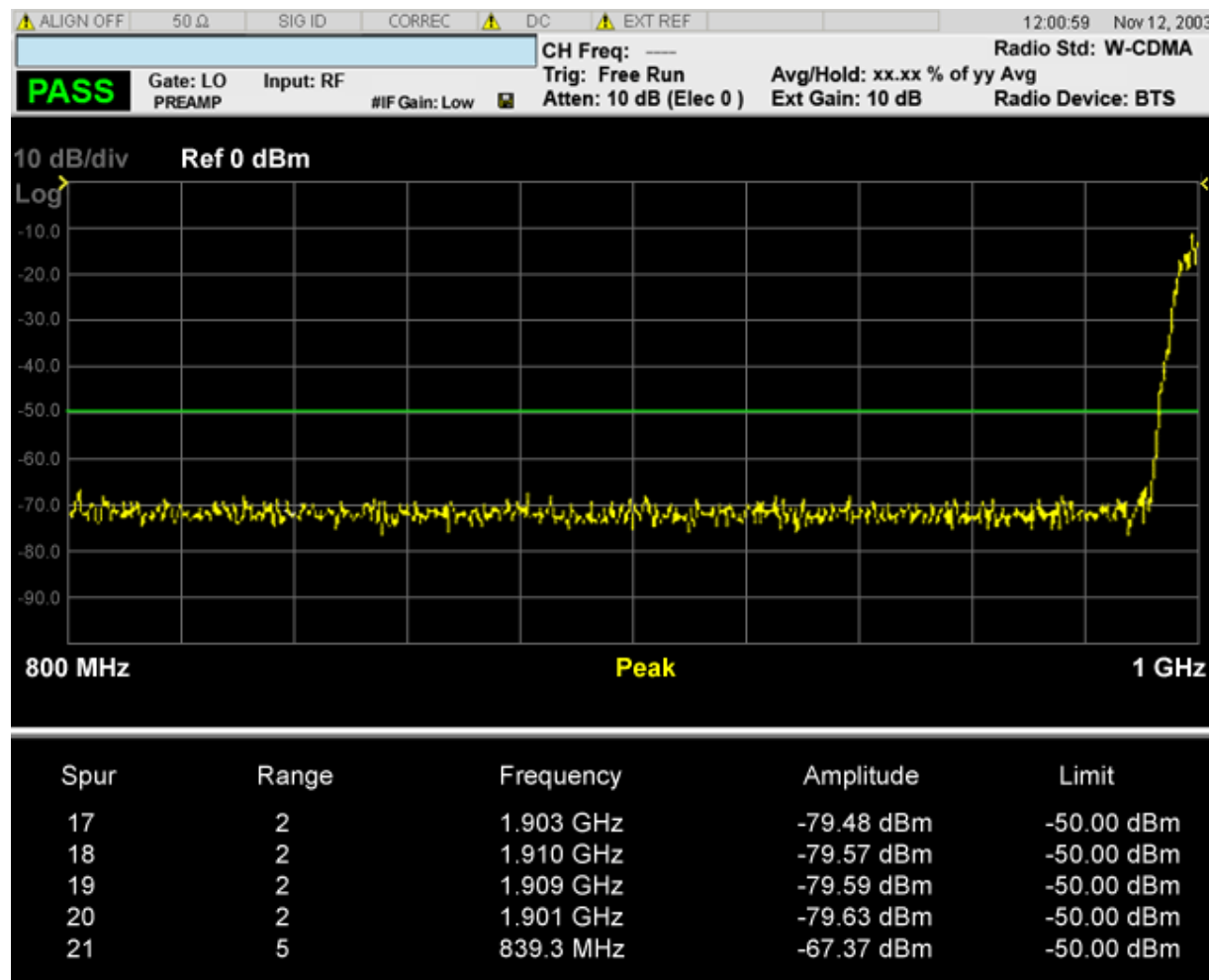
Accesses the Trigger menu which contains keys to control the 1-of-N selection of the Trigger source.

The trigger functions let you select the trigger settings for a sweep or measurement.

See [“Trigger” on page 1179](#) 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	Prior to A.02.00		

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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Display

Accesses a menu of functions that enable you to set the display parameters.

See [“Display” on page 1233](#) in the "Common Measurement Functions" section for more information.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00





The spectrum emission mask measures spurious signal levels in up to six pairs of offset frequencies and relates them to the carrier power. For measurement results and views, see [“View/Display” on page 924](#).

This topic contains the following sections:

[“Measurement Commands for Spectrum Emission Mask” on page 849](#)

[“Remote Command Results for Spectrum Emission Mask Measurement” on page 849](#)

## 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 1057](#).

## Remote Command Results for Spectrum Emission Mask Measurement

**Command**

**Return Value**

## Spectrum Emission Mask Measurement

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]?		<ol style="list-style-type: none"><li>1. Reserved for the future use, returns -999.0</li><li>2. Absolute power at the center frequency (reference) area (dBm)</li><li>3. Reserved for the future use, returns -999.0</li><li>4. Reserved for the future use, returns -999.0</li><li>5. Peak frequency in the center frequency (reference) area (Hz)</li><li>6. Reserved for the future use, returns -999.0</li><li>7. Reserved for the future use, returns -999.0</li><li>8. Reserved for the future use, returns -999.0</li><li>9. Reserved for the future use, returns -999.0</li><li>10. Reserved for the future use, returns -999.0</li><li>11. Relative integrated power on the negative offset A (dBc)</li><li>12. Absolute integrated power on the negative offset A (dBm)</li><li>13. Relative peak power on the negative offset A (dBc)</li><li>14. Absolute peak power on the negative offset A (dBm)</li><li>15. Peak power offset frequency from the center frequency in the negative offset A (Hz)</li><li>16. Relative integrated power on the positive offset A (dBc)</li><li>17. Absolute integrated power on the positive offset A (dBm)</li><li>18. Relative peak power on the positive offset A (dBc)</li><li>19. Absolute peak power on the positive offset A (dBm)</li><li>20. Peak power offset frequency from the center frequency in the positive offset A (Hz)</li><li>21. Relative integrated power on the negative offset B (dBc)</li><li>...</li><li>69. Absolute peak power on the positive offset F (dBm)</li><li>70. Peak power offset frequency from the center frequency in the positive offset F (Hz)</li></ol>

- 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 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

Prior to A.02.00

## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	All except CDMA1xEVDO:10.0 dBm CDMA1xEVDO: -10.0dBm
State Saved	Saved in instrument state.
Min	-250 dBm
Max	250 dBm
Instrument S/W Revision	Prior to A.02.00

## 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 965 in the “Analyzer Setup Functions” section for more information.

Key Path	<b>AMPTD Y Scale, Attenuation</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	: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?
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.
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Instrument S/W Revision	Prior to A.02.00

## Presel Center

See AMPTD Y Scale, “Presel Center” on page 977 in the “Common Measurement Functions” section

for more information.

## Presel Adjust

See AMPTD Y Scale, “Preselector Adjust” on page 978 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 980 in the “Analyzer Setup 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.

<b>Remote Command</b>	<code>:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSi tion TOP CENTer BOTTom</code>  <code>:DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSi tion?</code>
Example	<code>DISP:SEM:VIEW:WIND:TRAC:Y:RPOS BOTT</code>  <code>DISP:SEM:VIEW:WIND:TRAC:Y:RPOS?</code>
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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	Prior to A.02.00

## 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.

<b>Remote Command</b>	<pre>: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?</pre>
Example	<pre>DISP:SEM:VIEW:WIND:TRAC:Y:COUP OFF  DISP:SEM:VIEW:WIND:TRAC:Y:COUP?</pre>
Dependencies/Couplings	<p>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.</p> <p>When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.</p>
Key Path	<b>AMPTD Y Scale</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA, DTMB mode, DVB-T/H 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	Prior to A.02.00

## **Auto Couple**

See “**AUTO COUPLE**” on page 983 in the section "Common Measurement Functions" for more information.



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## **BW**

This key is unavailable for this measurement. The BW key will display a blank key menu when pressed.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## **Cont**

See “[Cont \(Continuous Measurement/Sweep\)](#)” on page 987 in the section "Common Measurement Functions" for more information.

## **FREQ Channel**

See “[FREQ Channel](#)” on page 989 in the section "Common Measurement Functions" for more information.

## **Input/Output**

See “[Input/Output](#)” on page 995 in the section "Common Measurement Functions" for more information.

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## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Select Marker

Displays 12 markers available for selection.

Key Path	<b>Marker</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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 <b>Marker Trace</b> rules. At the same time, <b>Marker X Axis Value</b> 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.

## Spectrum Emission Mask Measurement Marker

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	Prior to A.02.00

### 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**.

<b>Remote Command</b>	: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?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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 <b>Normal</b> . The query is returned in the fundamental units for the current marker X Axis scale. If the marker is <b>Off</b> 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
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	: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?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is <b>Normal</b> . 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 <b>Off</b> 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 he 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
Instrument S/W Revision	Prior to A.02.00

### Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

<b>Remote Command</b>	: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?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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

Instrument S/W Revision      Prior to A.02.00

## 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).

<b>Remote Command</b>	:CALCulate:SEMask:MARKer:COUple[:STATe] ON OFF 1 0 :CALCulate:SEMask:MARKer:COUple[:STATe]?
Example	CALC:SEM:MARK:COUP ON CALC:SEM:MARK:COUP?
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Instrument S/W Revision	Prior to A.02.00

## All Markers Off

Turns all active markers off in all views.

<b>Remote Command</b>	:CALCulate:SEMask:MARKer:AOFF
Example	CALC:SEM:MARK:AOFF
Key Path	<b>Marker</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Instrument S/W Revision	Prior to A.02.00



## **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	Prior to A.02.00

## 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	Prior to A.02.00

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## **Meas**

See “[Meas](#)” on page 1057 in the section "Common Measurement Functions" for more information.

## Meas Setup

Displays the setup menu for the currently selected measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>[ :SENSE ] :SEMAsk :AVERAge :COUNT &lt;integer&gt;</code> <code>[ :SENSE ] :SEMAsk :AVERAge :COUNT?</code> <code>[ :SENSE ] :SEMAsk :AVERAge [ :STATe ] ON   OFF   1   0</code> <code>[ :SENSE ] :SEMAsk :AVERAge [ :STATe ] ?</code>
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Example	<code>SEM:AVER:COUN 100</code> <code>SEM:AVER:COUN?</code> <code>SEM:AVER ON</code> <code>SEM:AVER?</code>
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Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk :TYPE PSDRef   TPreF   SPRef [ :SENSE ] :SEMAsk :TYPE ?
Example	SEM:TYPE PSDR SEM:TYPE?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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, DTMB, DVB-T/H: TPreF WIMAX OFDMA: SPRef
State Saved	Saved in instrument state.
Range	Total Pwr Ref PSD Ref Spectrum Peak Ref
Instrument S/W Revision	Prior to A.02.00

## 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

## Integ BW

Specifies the integration bandwidth used to calculate the power in the reference channel.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk :BANDwidth[1]   2:INTEgration <bandwidth> [ :SENSE ] :SEMAsk :BANDwidth[1]   2:INTEgration?
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## Spectrum Emission Mask Measurement Meas Setup

Example	SEM:BAND:INT 10 MHz SEM:BAND:INT?
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.
Key Path	<b>Meas Setup, Ref Chan</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
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 DTMB: 7.56MHz DVB-T/H: 7.61MHz
State Saved	Saved in instrument state.
Min	100.0 kHz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

### Span

Specifies the span used to calculate the power in the reference channel.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk:FREQuency[ 1 ]   2 :SPAN <freq> [ :SENSE ] :SEMAsk:FREQuency[ 1 ]   2 :SPAN?
Example	SEM:FREQ:SPAN 3MHz SEM:FREQ:SPAN?
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.

Key Path	<b>Meas Setup, Ref Chan</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
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 DTMB: 10MHz DVB-T/H: 10MHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :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?
---------	--

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
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## Spectrum Emission Mask Measurement Meas Setup

Key Path	<b>Meas Setup, Ref Chan</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	Automatically calculated  ON
State Saved	Saved in instrument state.
Min	1 ms
Max	10 s
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[: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?
Example	SEM:BAND 100 kHz SEM:BAND? SEM:BAND:AUTO ON SEM:BAND:AUTO?
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.
Key Path	<b>Meas Setup, Ref Chan</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H



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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Preset	SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 100 kHz TD-SCDMA: 30 kHz 1xEVDO: 30.0KHz DTMB: 3.9kHz DVB-T/H: 3.9kHz OFF
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Instrument S/W Revision	Prior to A.02.00

### 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.

**Remote Command**

```
[ :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?
```

**Example**

```
SEM:BAND:VID 100 kHz
SEM:BAND:VID?
SEM:BAND:VID:AUTO ON
SEM:BAND:VID:AUTO?
```

**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.

**Key Path**                    **Meas Setup, Ref Chan**

## Spectrum Emission Mask Measurement Meas Setup

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 30 kHz TD-SCDMA: 300 kHz 1xEVDO: 300.0kHz DTMB: 39kHz DVB-T/H: 39kHz ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk:BA NDwidth[1]   2:VIDEo:RATio <real> [ :SENSE ] :SEMAsk:BA NDwidth[1]   2:VIDEo:RATio [ :SENSE ] :SEMAsk:BA NDwidth[1]   2:VIDEo:RATio:AUTO OFF   ON   1   0 [ :SENSE ] :SEMAsk:BA NDwidth[1]   2:VIDEo:RATio:AUTO?
Example	SEM:BA ND:VID:RAT 0.1 SEM:BA ND:VID:RAT? SEM:BA ND:VID:RAT:AUTO ON SEM:BA ND:VID:RATIO:AUTO?
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.
Key Path	<b>Meas Setup, Ref Chan</b>

Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA mode, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.
Preset	SA, WCDMA, C2K: 1.0 WIMAX OFDMA: 0.3 TD-SCDMA: 10 1xEVDO: 10.0 DTMB: 10 DVB-T/H: 10 OFF
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Instrument S/W Revision	Prior to A.02.00

## Power Ref

Sets the power reference in the carrier that will be used to compute the relative values for the offsets.

Key Path	<b>Meas Setup Ref Chan</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :SENSE]:SEMAsk:CARRier[:POWER] <real> [ :SENSE]:SEMAsk:CARRier[:POWER]? [ :SENSE]:SEMAsk:CARRier:AUTO[:STATE] OFF ON 1 0 [ :SENSE]:SEMAsk:CARRier:AUTO[:STATE]?
-----------------------	--

## Spectrum Emission Mask Measurement Meas Setup

Example	SEM:CARR 100dBm SEM:CARR? SEM:CARR:AUTO OFF SEM:CARR:AUTO?
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.
Key Path	<b>Meas Setup, Ref Chan, Power Ref</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H 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.
Preset	Measured carrier reference power
State Saved	Saved in instrument state.
Min	-200 dBm
Max	200 dBm
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSe ] :SEMAsk :CARRier :CPSD <real> [ :SENSe ] :SEMAsk :CARRier :CPSD?
Example	SEM:CARR:CPSD -80 SEM:CARR:CPSD?
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.
Key Path	<b>Meas Setup, Ref Chan, Power Ref</b>
Mode	SA, WCDMA, C2K , WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H

Notes	<p>Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRUMENT:SElect to set the mode.</p>
Preset	Measured carrier PSD reference power
State Saved	Saved in instrument state.
Min	-200
Max	200
Instrument S/W Revision	Prior to A.02.00

### 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

<b>Remote Command</b>	<pre>[ :SENSe ] :SEMAsk :CARRier :PEAK [ :POWer ] &lt;real&gt; [ :SENSe ] :SEMAsk :CARRier :PEAK [ :POWer ] ?</pre>
Example	<pre>SEM:CARR:PEAK -80 SEM:CARR:PEAK:POWER?</pre>
Dependencies/Couplings	<p>See Couplings</p> <p>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.</p>
Key Path	<b>Meas Setup, Ref Chan, Power Ref</b>
Mode	SA, WCDMA, C2K , WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRUMENT:SElect to set the mode.</p>
Preset	Measured carrier Spectrum Peak reference power
State Saved	Saved in instrument state.

## Spectrum Emission Mask Measurement Meas Setup

Min	-200
Max	200
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Meas Setup, Offsets/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Preset	A
Range	A B C D E F
Instrument S/W Revision	Prior to A.02.00

### Start Freq

Specifies the start frequency for the currently selected offset and enables you to toggle this function On or Off for each offset.

<b>Remote Command</b>	<pre>[ :SENSe]:SEMask:OFFSet[1] 2:LIST:FREQuency:START &lt;freq&gt;,&lt;freq&gt;,&lt;freq&gt;,&lt;freq&gt;,&lt;freq&gt;,&lt;freq&gt;  [: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>
Dependencies/Couplings	<p>Coupled to Stop Freq. Start cannot go above the stop freq less 100Hz. Similarly Stop freq cannot go below Start Freq plus 100Hz.</p> <p>If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W.</p>
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.</p>

## Spectrum Emission Mask Measurement Meas Setup

Preset	<p>SA: 2.515 MHz, 2.715 MHz, 3.515 MHz, 4.00 MHz, 8.00 MHz, 12.50 MHz</p> <p>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</p> <p>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</p> <p>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</p> <p>TD-SCDMA: 815kHz,1015kHz,1815kHz,2.3MHz, ,2.3MHz,,2.3MHz  815kHz,1815kHz,2.9MHz, 2.9MHz,2.9MHz,2.9MHz</p> <p>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</p> <p>DTMB: 3.8MHz, 4.2MHz, 6MHz, 12MHz, 12MHz, 12MHz</p> <p>DVB-T/H: 3.81MHz, 4.2MHz, 6MHz, 12MHz, 12MHz, 12MHz</p> <p>SA: ON, ON, ON, ON, ON, OFF</p> <p>WCDMA: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, OFF, OFF</p> <p>C2K: ON, ON, ON, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF</p> <p>WIMAX OFDMA: ON, ON, ON, OFF, OFF, OFF ON, ON, ON, OFF, OFF, OFF</p> <p>TD-SCDMA: ON, ON, ON, ON, OFF, OFF ON, ON, ON, OFF, OFF, OFF</p> <p>1xEVDO: ON, ON, ON, OFF, OFF, OFF  ON, ON, OFF, OFF, OFF, OFF</p> <p>DTMB: ON, ON, ON, OFF, OFF, OFF</p> <p>DVB-T/H: ON, ON, ON, OFF, OFF, OFF</p>
State Saved	Saved in instrument state.
Min	0 Hz
Max	Stop Freq minus (-) 100 Hz (for that offset)
Instrument S/W Revision	Prior to A.02.00

### Stop Freq

Specifies the stop frequency for the currently selected offset.

#### 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?
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.  If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W.
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
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 DTMB: 4.2MHz, 6MHz, 12MHz, 12MHz, 12MHz, 12MHz DVB-T/H: 4.2MHz, 6MHz, 12MHz, 12MHz, 12MHz, 12MHz
State Saved	Saved in instrument state.
Min	Start Freq plus (+) 100 Hz (for that offset)
Max	500 MHz
Instrument S/W Revision	Prior to A.02.00

## Sweep Time

Specifies the sweep time for the currently selected offset and enables you to toggle this function On or Off for each offset.

<b>Remote Command</b>	<pre>[ :SENSE]:SEMask:OFFSet[1] 2:LIST:SWEep:TIME &lt;time&gt;,&lt;time&gt;,&lt;time&gt;,&lt;time&gt;,&lt;time&gt;,&lt;time&gt;  [ :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  [ :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>
Dependencies/Couplings	<p>When the sweep time is set manually, Mode coupling is set to MANual</p> <p>If the current mode is DVB-T/H, this value will be modified automatically according to the output power of the transmitter which is less or more than 25W.</p>
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.</p>
Preset	<p>Automatically calculated</p> <p>ON,ON,ON,ON,ON,ON</p>
State Saved	Saved in instrument state.
Min	1 ms
Max	10 s
Instrument S/W Revision	Prior to A.02.00

## 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

<b>Remote Command</b>	<pre>[ :SENSE ] :SEMask:OFFSet[ 1 ]   2 :LIST:SIDE BOTH NEGative POSitive,BOTH NEGative POSitive,BOTH NEGa tive POSitive,BOTH NEGative POSitive,BOTH NEGative POSi tive,BOTH NEGative POSitive  [ :SENSE ] :SEMask:OFFSet[ 1 ]   2 :LIST:SIDE?</pre>
Example	<pre>SEM:OFFS:LIST:SIDE BOTH SEM:OFFS:LIST:SIDE?</pre>
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.</p>
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	Prior to A.02.00

### 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

$$(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset}),$$

## Spectrum Emission Mask Measurement Meas Setup

where N is the multiplier, this setting will automatically be changed to manual.

<b>Remote Command</b>	<pre>[ :SENSe]:SEMask:OFFSet[1]   2:LIST:BANDwidth[:RESolution] &lt;bandwidth&gt;, &lt;bandwidth&gt;, &lt;bandwidth&gt;, &lt;bandwidth&gt;, &lt;bandwidth&gt;, &lt;bandwidth&gt;  [:SENSe]:SEMask:OFFSet[1]   2:LIST:BANDwidth[:RESolution] ?  [: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  [:SENSe]:SEMask:OFFSet[1]   2:LIST:BANDwidth[:RESolution] :AUTO?</pre>
Example	<pre>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?</pre>
Dependencies/Couplings	<p>Coupled to Start and Stop offset and Meas BW multiplier. This parameter must adhere to the rule <math>(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset})</math>, 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.</p>
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO modeDTMB, DVB-T/H
Notes	<p>Comma separated list of 6 values. Sub op code OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.</p>

Preset	<p>SA: 30.0 kHz, 30.0 kHz, 30.0 kHz, 1.00 MHz, 1.00 MHz, 1.00 MHz</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>DTMB: 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz</p> <p>DVB-T/H: 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz, 3.9kHz</p> <p>OFF, OFF, OFF, OFF, OFF, OFF OFF, OFF, OFF, OFF, OFF, OFF</p>
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<pre>[ :SENSe ] :SEMask :OFFSet [ 1 ]   2 :LIST :BANDwidth :IMULti &lt;integer&gt; , &lt;integer&gt; , &lt;integer&gt; , &lt;integer&gt; , &lt;integer&gt; , &lt;inte ger&gt;</pre> <pre>[ :SENSe ] :SEMask :OFFSet [ 1 ]   2 :LIST :BANDwidth :IMULti?</pre>
Example	<pre>SEM:OFFS2:LIST:BAND:IMUL 1,1,1,1,1,1</pre> <pre>SEM:OFFS2:LIST:BAND:IMUL?</pre>
Dependencies/Couplings	This parameter must adhere to the rule (N x Res BW) <= (Stop freq of the offset - Start freq of the offset), where N is the multiplier. If the Res Bw is changed, the multiplier will be changed to ensure this.

## Spectrum Emission Mask Measurement Meas Setup

Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SELEct to set the mode.
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 DTMB: 1, 1, 1, 1, 1, 1 DVB-T/H: 1, 1, 1, 1, 1, 1
State Saved	Saved in instrument state.
Min	1
Max	1000
Instrument S/W Revision	Prior to A.02.00

### Video BW

Changes the analyzer post-detection filter.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk:OFFSet [ 1 ]   2 :LIST:BA NDwidth:VIDeo <freq> , <freq> , <freq> , <freq> , <freq> , <freq>  [ :SENSE ] :SEMAsk:OFFSet [ 1 ]   2 :LIST:BA NDwidth:VIDeo?  [ :SENSE ] :SEMAsk:OFFSet [ 1 ]   2 :LIST:BA NDwidth: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:BA NDwidth:VIDeo:AUTO?
Example	SEM:OFFS2:LIST:BA ND:VID 3.00 kHz, 3.00 kHz, 3.00 kHz, 100.0 kHz,100.0 kHz, 100.0 kHz  SEM:OFFS2:LIST:BA ND:VID?  SEM:OFFS2:LIST:BA ND:VID:AUTO ON, ON, ON, ON, ON, ON  SEM:OFFS2:LIST:BA ND:VID:AUTO?
Key Path	<b>Meas Setup, Offset/Limits</b>

Mode	SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	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  DTMB: 39kHz, 39kHz, 39kHz, 39kHz, 39kHz, 39kHz  DVB-T/H: 39kHz, 39kHz, 39kHz, 39kHz, 39kHz, 39kHz  ON, ON, ON, ON, ON, ON ON, ON, ON, ON, ON, ON
State Saved	Saved in instrument state.
Min	1 Hz
Max	50 MHz
Instrument S/W Revision	Prior to A.02.00

## VBW/RBW

Selects the ratio between the video and resolution bandwidths.

<b>Remote Command</b>	[ :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?

## Spectrum Emission Mask Measurement Meas Setup

Example	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?
Key Path	<b>Meas Setup, Offset/Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	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 DTMB: 10, 10, 10, 10, 10, 10 DVB-T/H: 10, 10, 10, 10, 10, 10 OFF, OFF, OFF, OFF, OFF, OFF OFF, OFF, OFF, OFF, OFF, OFF
State Saved	Saved in instrument state.
Min	0.00001
Max	3000000
Instrument S/W Revision	Prior to A.02.00

### Limits

Accesses a menu that enables you to set the power limits for start and stop frequencies of the selected offsets.

Key Path	<b>Meas Setup</b>
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	<pre>[ :SENSE ] :SEMask :OFFSet [ 1 ]   2 :LIST :STARt :ABSolute &lt;real&gt; , &lt;real&gt; , &lt;real&gt; , &lt;real&gt; , &lt;real&gt; , &lt;real&gt;  [ :SENSE ] :SEMask :OFFSet [ 1 ]   2 :LIST :STARt :ABSolute?</pre>
Example	<pre>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?</pre>
Dependencies/Couplings	<p>Coupled to Abs Stop if coupling set to “Couple”, that is, the Start value is equal to the Stop value.</p> <p>If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W.</p>
Key Path	<b>Meas Setup, Offset/Limits, Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.</p>
Preset	<pre>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  DTMB: -14.0dBm, -14.0dBm, -26.0dBm, -13.0dBm, -13.0dBm, -13.0dBm  DVB-T/H: 11.2dBm, -29dBm, -41dBm, -66dBm, -82dBm, -82dBm</pre>
State Saved	Saved in instrument state.
Min	-200 dBm
Max	50 dBm

## Spectrum Emission Mask Measurement Meas Setup

Instrument S/W Revision      Prior to A.02.00

**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.

<b>Remote Command</b>	<pre>[ :SENSe]:SEMask:OFFSet[1]   2:LIST:STOP:ABSolute &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;, &lt;real&gt;  [: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?</pre>
Example	<pre>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?</pre>
Dependencies/Couplings	<p>Coupled to Abs Start if coupling set to “Couple”, that is, the Stop value is equal to the Start value.</p> <p>If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W.</p>
Key Path	<b>Meas Setup, Offset/Limits, Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.</p>

Preset	<p>SA, WIMAX OFDMA: -14.00 dBm, -26.00 dBm, -26.00 dBm, -13.00 dBm, -13.00 dBm, -13.00 dBm</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>DTMB: -14.0dBm, -26.0dBm, -26.0dBm, -13.0dBm, -13.0dBm, -13.0dBm</p> <p>DVB-T/H: -29dBm, -41dBm, -66dBm, -82dBm, -82dBm, -82dBm</p> <p>SA,WIMAX OFDMA: ON, OFF, ON, ON, ON, ON</p> <p>WCDMA: ON, OFF, ON, ON, ON, ON ON, ON, ON, ON, ON, ON</p> <p>C2K: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF</p> <p>TD-SCDMA: ON, OFF, ON, ON, ON, ON ON, ON, ON, ON, ON, ON</p> <p>1xEVDO: ON, ON, ON, ON, ON, OFF  ON, ON, ON, ON, ON, OFF</p> <p>DTMB: ON, OFF, ON, ON, ON, ON</p> <p>DVB-T/H: OFF, OFF, OFF, OFF, OFF, OFF</p>
State Saved	Saved in instrument state.
Min	-200 dBm
Max	50 dBm
Instrument S/W Revision	Prior to A.02.00

**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.

**Remote Command**

```
[: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?
```

## Spectrum Emission Mask Measurement Meas Setup

Example	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?
Dependencies/Couplings	Coupled to Rel Stop is coupling set to “Couple”, that is, Start is made the same as Stop.  If the current mode is DVB-T/H, this value will be modified automatically according to the limit type the output power of the transmitter which is less or more than 25W.
Key Path	<b>Meas Setup, Offset/Limits, Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SELEct to set the mode.
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 -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  DTMB: -32.8dB, -83dB, -95dB, -120dB, -120dB, -120dB  DVB-T/H: -30dB, -30dB, -30dB, -30dB, -30dB, -30dB
State Saved	Saved in instrument state.
Min	-200 dB
Max	50 dB
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	<pre>[:SENSe]:SEMask:OFFSet[1] 2:LIST:STOP:RCARrier &lt;rel_ampl&gt;,&lt;rel_ampl&gt;,&lt;rel_ampl&gt;,&lt;rel_ampl&gt;,&lt;rel_ampl&gt;, &lt;rel_ampl&gt;  [: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>
Dependencies/Couplings	<p>Coupled to Rel Start if coupling set to “Couple”, that is, Start is made the same as Stop.</p> <p>If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W.</p>
Key Path	<b>Meas Setup, Offset/Limits, Limits</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	<p>See the following table for the default values for each Radio Standard.</p> <p>Comma separated list of 6 values. OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTRument:SElect to set the mode.</p>

## Spectrum Emission Mask Measurement Meas Setup

Preset	<p>SA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB</p> <p>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</p> <p>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</p> <p>WIMAX OFDMA: -25 dB, -32 dB, -50 dB, -50 dB, -50 dB, -50 dB</p> <p>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</p> <p>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</p> <p>DTMB: -83dB, -95dB, -120dB, -120dB, -120dB, -120dB</p> <p>DVB-T/H: -73dB, -85dB, -110dB, -126dB, -126dB, -126dB</p> <p>SA: ON, ON, ON, ON, ON, ON</p> <p>WCDMA: ON, ON, ON, ON, ON, ON OFF, OFF, OFF, ON, ON, ON</p> <p>C2K: ON, ON, ON, ON, ON, OFF ON, ON, ON, ON, ON, OFF</p> <p>WIMAX OFDMA: OFF, OFF, OFF, ON, ON, ON  OFF, OFF, OFF, ON, ON, ON</p> <p>TD-SCDMA: ON, OFF, ON, ON, ON, ON OFF, OFF, ON, ON, ON, ON</p> <p>1xEVDO: ON, ON, ON, ON, ON, OFF  ON, ON, ON, ON, ON, OFF</p> <p>DTMB: OFF, OFF, OFF, OFF, OFF, OFF</p> <p>DVB-T/H: ON, ON, ON, ON, ON, ON</p>
State Saved	Saved in instrument state.
Min	-200 dB
Max	50 dB
Instrument S/W Revision	Prior to A.02.00

**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



## 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  $\alpha$  value (rolloff) for the filter is set to the value of the Filter Alpha parameter.

<b>Remote Command</b>	<code>[ :SENSe ] :SEMAsk :FILTeR [ :RRC ] [ :STATe ] OFF   ON   0   1</code> <code>[ :SENSe ] :SEMAsk :FILTeR [ :RRC ] [ :STATe ] ?</code>
Example	SEM:FILT ON SEM:FILT?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DTMB, DVB-T/H
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, DVB-T/H: OFF WCDMA, TD-SCDMA, DTMB: ON
State Saved	Saved in instrument state.
Range	RRCWeight IntegBW
Instrument S/W Revision	Prior to A.02.00

## Filter Alpha

Sets the alpha value for the RRC Filter.

<b>Remote Command</b>	<code>[ :SENSe ] :SEMAsk :FILTeR [ :RRC ] :ALPHa &lt;real&gt;</code> <code>[ :SENSe ] :SEMAsk :FILTeR [ :RRC ] :ALPHa ?</code>
Example	SEM:FILT:ALPH 0.3 SEM:FILT:ALPH?
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DTMB, DVB-T/H
Notes	For the CDMA2K and CDMA1xEVDO mode, this key is not available. You must be in the Spectrum Analysis mode, DTMB mode, DVB-T/H mode, W-CDMA mode or TD-SCDMA mode to use this command. Use :INSTRument:SElect to set the mode.



Preset	0.22 DTMB: 0.05
State Saved	Saved in instrument state.
Min	0.01
Max	1.0
Instrument S/W Revision	Prior to A.02.00

## Meas Preset

Restores all the measurement parameters to their default values.

<b>Remote Command</b>	:CONFigure:SEMask
Example	CONF:SEM
Dependencies/Couplings	Selecting Meas Preset will restore all measurement parameters to their default values.
Key Path	<b>Meas Setup</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :SENSe]:SEMask:LIMits STD MAN [ :SENSe]:SEMask:LIMits?
Example	SEM:LIM STD SEM:LIM?

## Spectrum Emission Mask Measurement Meas Setup

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.
Key Path	<b>Meas Setup</b>
Mode	TD-SCDMA
Notes	You must be in the TD-SCDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	MAN
State Saved	Saved in instrument state.
Range	STD   MAN
Instrument S/W Revision	Prior to A.02.00

### Limits Type (Only for DVB-T/H)

The key “Limits Type” is only displayed in the DVB-T/H mode. The mask lines could be drawn in three different ways, according to the non-critical case standard in ETSI 302–296 when the key’s value is “Non-Critical”; according to the critical case standard in ETSI 302–296 when the key’s value is “Critical”; or by the user-defined specifications listed in the Offset/Limits menu when the key’s value is “Manual”.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk:LIMits:TYPE MANual  NONCritical  CRITICAL [ :SENSE ] :SEMAsk:LIMits:TYPE?
Example	SEM:LIM:TYPE NONC SEM:LIM:TYPE?

Dependencies/Couplings

1. When current radio bandwidth is 5MHz or 6MHz, this key only has one option: Manual. The “Non-Critical” and “Critical” keys will be grayed out. So the default value is Manual after measurement preset.
  2. When current radio bandwidth is 7MHz or 8MHz, this key has three options: Manual, Non-Critical and Critical. The default value is Non-Critical after measurement preset.
1. When the value of the “Limit Type” key is Non-Critical, the parameters displayed on the Offset/Limits panel will be modified automatically depending on the carrier power, according to the Non-critical case limits definition in ETSI 302–296, and the keys under the Offset/Limit except “Offset”, “Offset Side” and “Limits” will be grayed out. Meanwhile all the keys displayed on the “Limits” panel will be grayed out as well.
  2. When the value of the “Limit Type” key is Critical, the parameters displayed on the Offset/Limits panel will be modified automatically depending on the carrier power, according to the critical case limits definition in ETSI 302–296, and the keys under the Offset/Limit except “Offset”, “Offset Side” and “Limits” will be grayed out. Meanwhile all the keys displayed on the “Limits” panel will be grayed out as well.

When the value of the “Limit Type” key is Manual, all of the previous manual specifications will be restored, and the keys which previously grayed out will be enabled again.

Key Path

**Meas Setup**

Mode

DVB-T/H

Notes

You must be in the DVB-T/H mode to use this command. Use :INSTrument:SElect to set the mode.

Preset

NONCritical (if current radio bandwidth is 7MHz or 8MHz)  
Manual (if current radio bandwidth is 5MHz or 6MHz)

State Saved

Saved in instrument state.

Range

Manual|Non-Critical|Critical

Instrument S/W Revision

A.02.00

## **Mode**

See “[Mode](#)” on page 1075 in the section "Common Measurement Functions" for more information.

## **Mode Setup**

See “[Mode Setup](#)” on page 1089 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	Prior to A.02.00

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## **Recall**

See [“Recall” on page 1103](#) in the section "Common Measurement Functions" for more information.

## **Restart**

See “Restart” on page 1127 in the section "Common Measurement Functions" for more information.



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## **Save**

See “[Save](#)” on page 1129 in the section "Common Measurement Functions" for more information.

## **Single**

See “[Single \(Single Measurement/Sweep\)](#)” on page 1155 in the section "Common Measurement Functions" for more information.

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## **Source**

See “[Source](#)” on page 1157 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	Prior to A.02.00

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## 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 1161](#) in the "Common Measurement Functions" section for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## 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 1162](#) in “Common Measurement Functions” for more details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## 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 1162](#) in “common Measurement Functions” for more details.

Key Path	<b>Sweep/Control</b>
Instrument S/W Revision	Prior to A.02.00

## Trace/Detector

Accesses a menu of functions that enable you to control trace and detector for the current measurement.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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).

<b>Remote Command</b>	:TRACe:SEMask:TYPE WRITe   AVERAge   MAXHold   MINHold :TRACe:SEMask:TYPE?
Example	TRAC:SEM:TYPE MINH TRAC:SEM:TYPE?
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.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold
Preset	AVERAge
State Saved	Saved in instrument state.
Range	WRITe   AVERAge   MAXHold   MINHold
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Trace/Detector</b>
Instrument S/W Revision	Prior to A.02.00

### Chan Detector Selection

Selects the detector mode for the reference channel.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk :DETector :CARRier [ :FUNCTION ] AVERAge   NEGAtive   NORMAl   POSitive   SAMPlE  [ :SENSE ] :SEMAsk :DETector :CARRier [ :FUNCTION ]?
Example	SEM:DET:CARR NEG  SEM:DET:CARR?
Dependencies/Couplings	See Couplings in the Trace Type section.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	AVERAge
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	Prior to A.02.00

### Chan Detector Auto

Sets the detector to the default detection mode for the reference channel. This mode is dependent upon

## Spectrum Emission Mask Measurement Trace/Detector

the current reference channel conditions.

<b>Remote Command</b>	<code>[ :SENSe ] :SEMAsk:DETEctor:CARRier:AUTO ON OFF 1 0</code> <code>[ :SENSe ] :SEMAsk:DETEctor:CARRier:AUTO?</code>
Example	<code>SEM:DET:CARR:AUTO OFF</code> <code>SEM:DET:CARR:AUTO?</code>
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	See Couplings in the Trace Type section.  You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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	Prior to A.02.00

### 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	<b>Trace/Detector</b>
Instrument S/W Revision	Prior to A.02.00



## Offset Detector Selection

Selects the detector mode for the offsets.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk :DETector :OFFSet [ :FUNction ] AVERAge   NEGAtive   NORMAl   POSitive   SAMPlE  [ :SENSe ] :SEMAsk :DETector :OFFSet [ :FUNction ] ?
Example	SEM:DET:OFFS AVER  SEM:DET:OFFS?
Dependencies/Couplings	See Couplings in the Trace Type section.
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode.
Preset	SA, WCDMA, C2K, 1xEVDO, DTMB, DVB-T/H: POSitive  WIMAX OFDMA, TD-SCDMA
State Saved	Saved in instrument state.
Range	Normal Average Peak Sample Negative Peak
Instrument S/W Revision	Prior to A.02.00

## 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.

<b>Remote Command</b>	[ :SENSE ] :SEMAsk :DETector :OFFSet :AUTO ON   OFF   1   0  [ :SENSe ] :SEMAsk :DETector :OFFSet :AUTO ?
Example	SEM:DET:OFFS:AUTO OFF  SEM:DET:OFFS:AUTO?
Key Path	<b>Trace/Detector</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H

## 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, DTMB mode, DVB-T/H 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	Prior to A.02.00

## **Trigger**

Accesses a menu that enables you to select and control the trigger source for the current measurement.

See [“Trigger” on page 1179](#) 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 924](#)

[“Views Selection by Number \(SCPI Only\)” on page 924](#)

### View Selection by name (SCPI only)

<b>Remote Command</b>	:DISPlay:SEMask:VIEW[:SElect] APFReq RPFReq IPOWER :DISPlay:SEMask:VIEW[:SElect]?
Example	DISP:SEM:VIEW IPOW DISP:SEM:VIEW?
Dependencies/Couplings	In the SA mode, when "Radio Standard" is set to WLAN, IPOWer is not available and the key is grayed out.
Key Path	<b>View/Display</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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, DTMB, DVB-T/H: APFReq WIMAX OFDMA: RPFReq
State Saved	Saved in instrument state.
Range	Abs Pwr & Freq  Rel Pwr & Freq Integrated Power
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	:DISPlay:SEMask:VIEW:NSElect <integer> :DISPlay:SEMask:VIEW:NSElect?
Example	DISP:SEM:VIEW:NSEL 2 DISP:SEM:VIEW:NSEL?
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
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, DTMB mode, DVB-T/H 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, DTMB, DVB-T/H: 1 WIMAX OFDMA: 2
State Saved	Saved in instrument state.
Min	1
Max	3
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Display

Accesses a menu of functions that enable you to set the display parameters.

See “[Display](#)” on page 1233 in the "Common Measurement Functions" section for more information.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

## Abs Pwr Freq

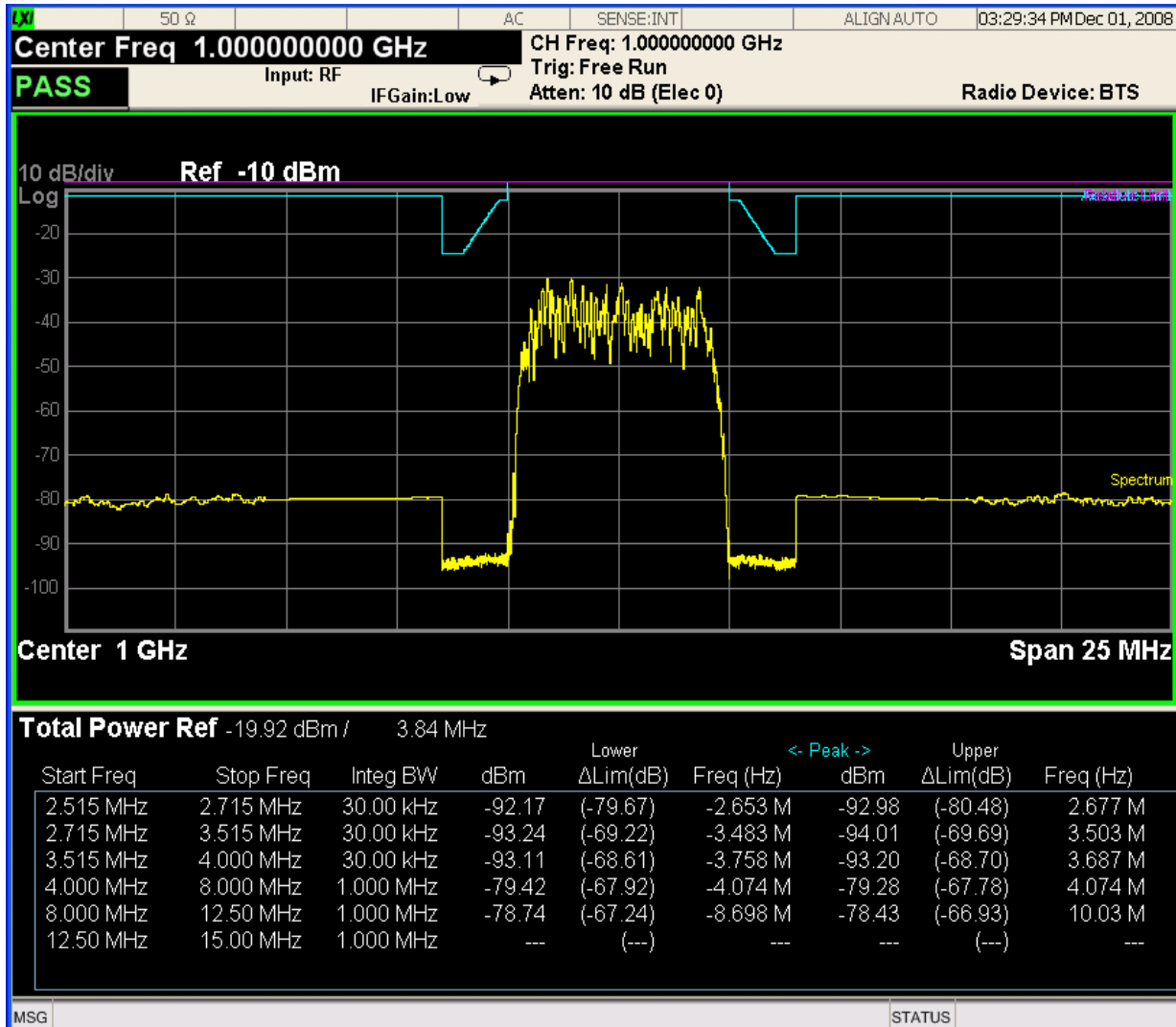
### Abs Peak Pwr & Freq (Total Pwr Ref)

This view consists of the following two windows:

“[Trace Window](#)” on page 927

Spectrum Emission Mask Measurement  
View/Display

“Results Window” on page 927



## 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
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower Peak(dBm)	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 Peak(dBm)	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

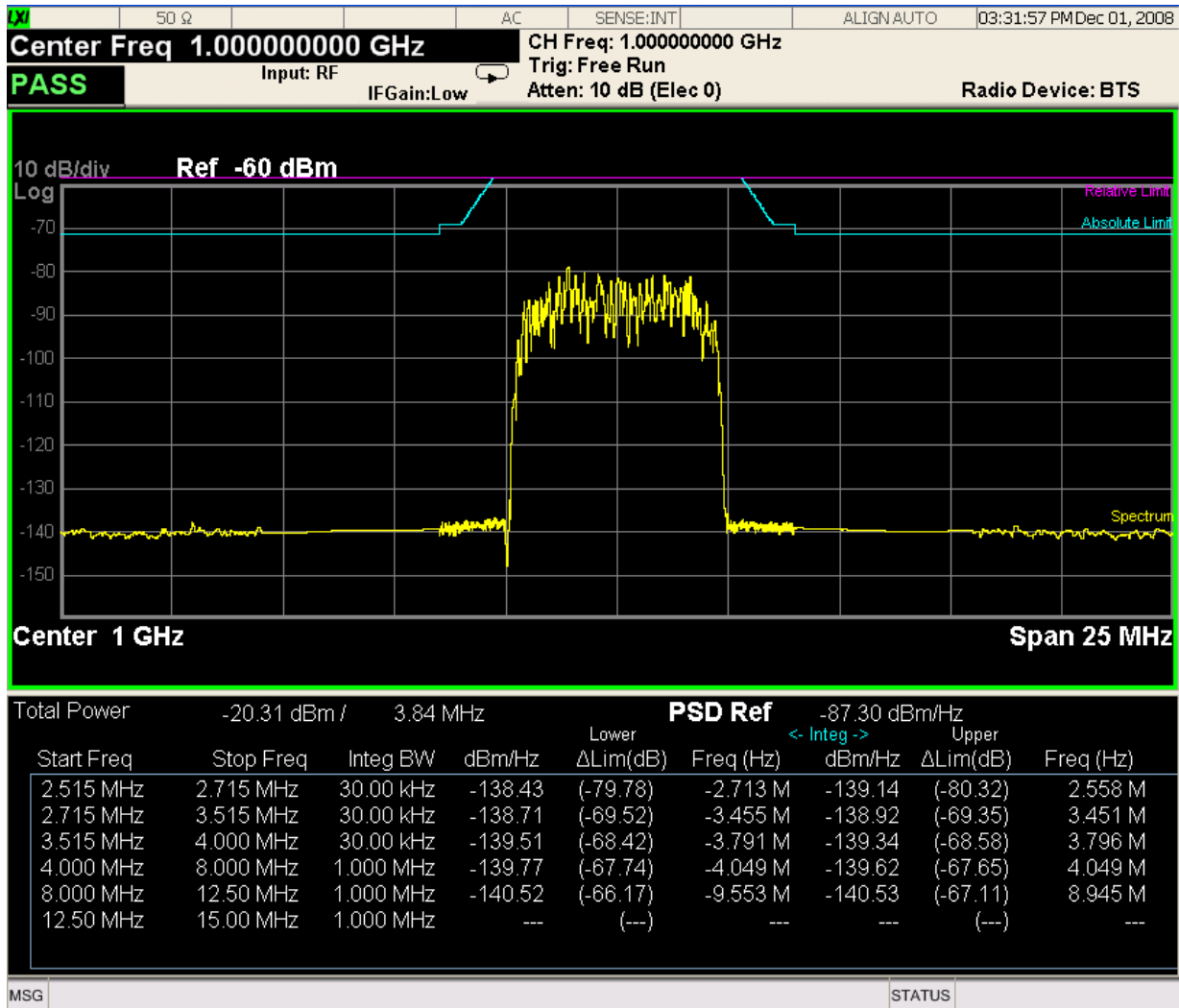
## Abs Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

[“Trace Window” on page 929](#)

[“Results Window” on page 929](#)

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	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 power spectrum density 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 power spectrum density 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

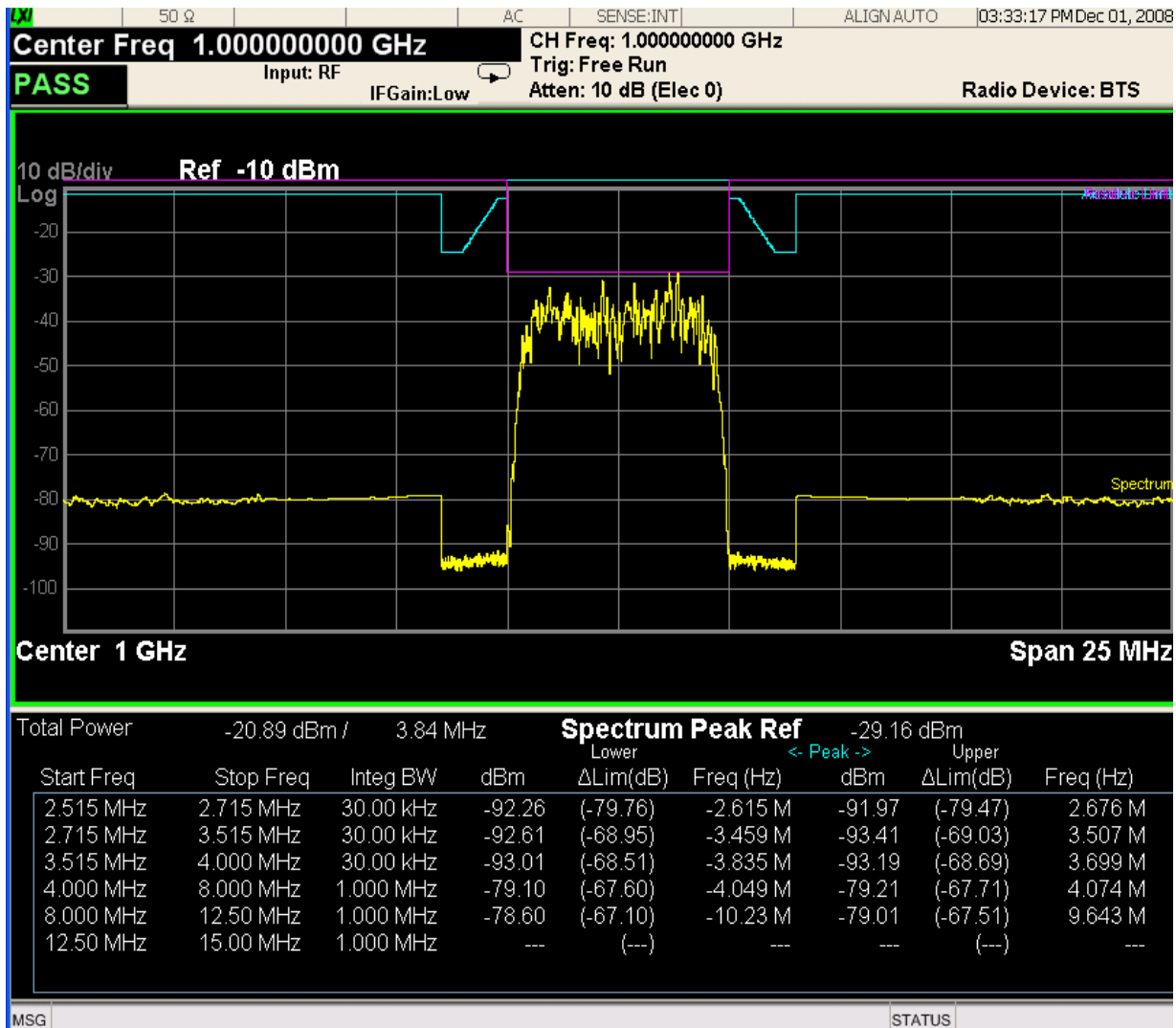
## Abs Peak Pwr & Freq (Spectrum Pk Ref)

This view consists of the following two windows:

“Trace Window” on page 929

“Results Window” on page 929

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	Absolute power at the reference area. Channel Integration Bandwidth
Spectrum Peak Ref	n=5 1st element Spectrum peak power 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)	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)	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	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

## Rel Pwr Freq

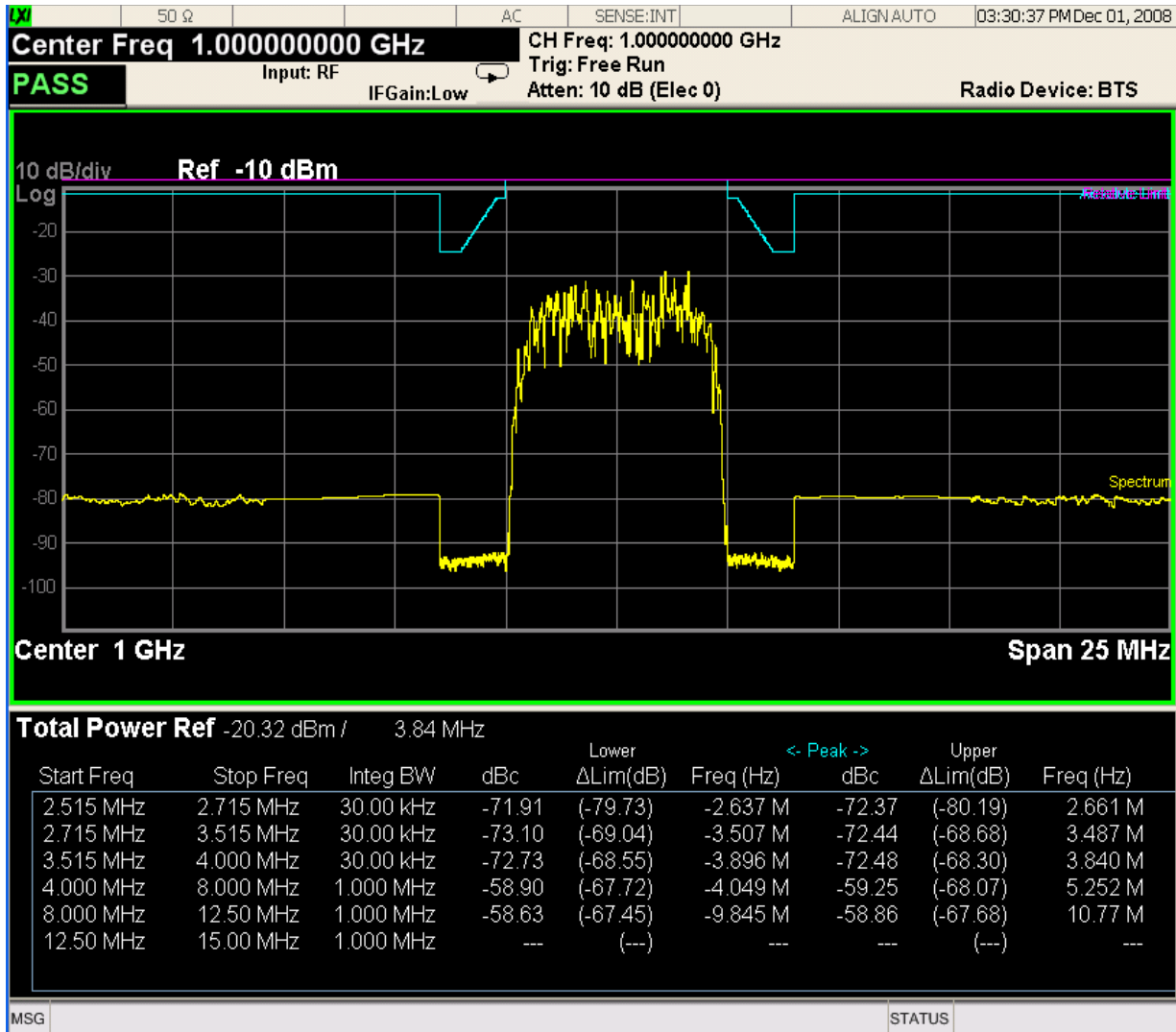
### Rel Peak Pwr & Freq (Total Pwr Ref)

This view consists of the following two windows:

“Trace Window” on page 933

“Results Window” on page 933

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
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower Peak(dBc)	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 Peak(dBc)	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

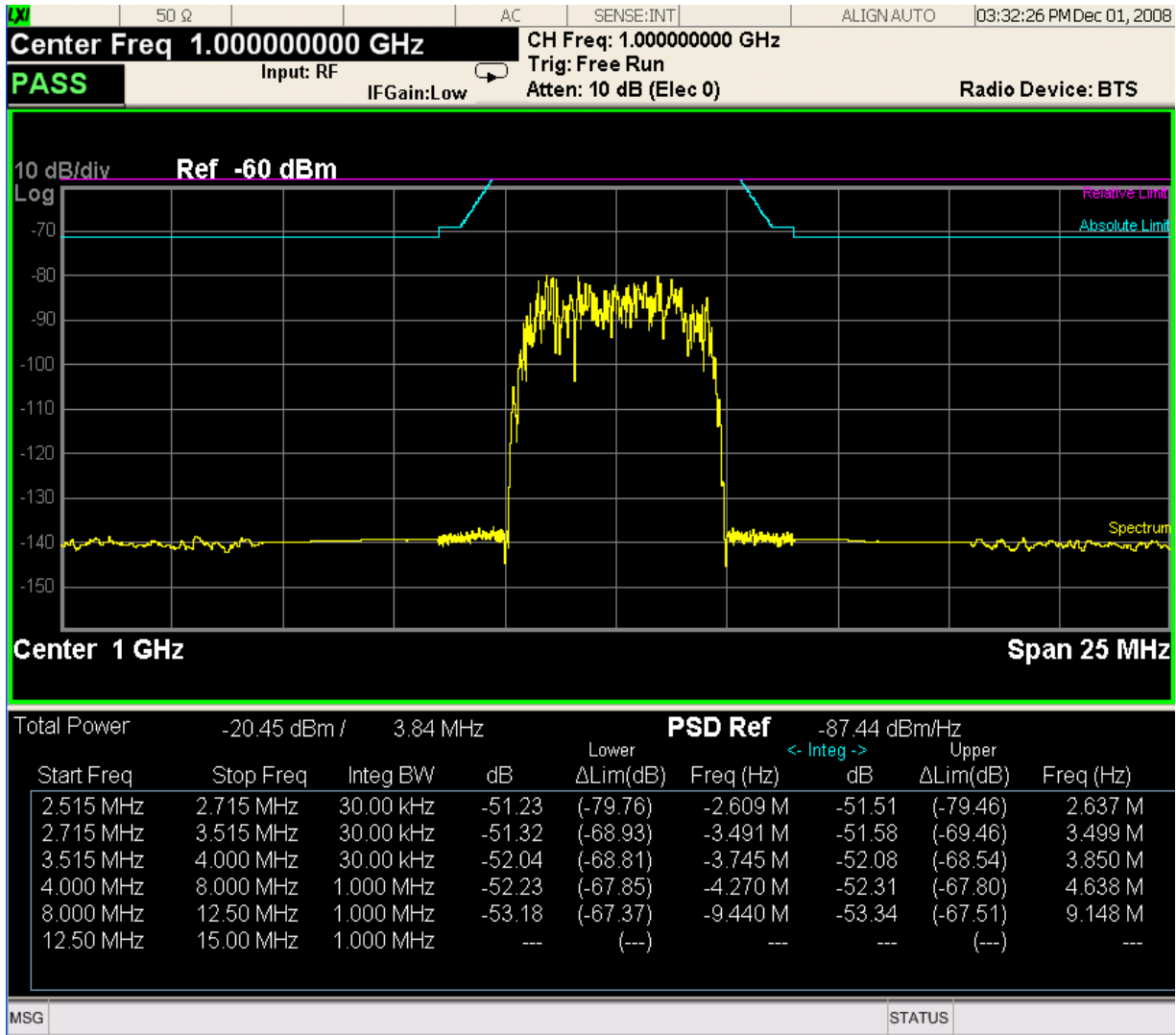
## Rel Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

[“Trace Window” on page 935](#)

[“Results Window” on page 935](#)

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	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 power spectrum density 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 power spectrum density 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

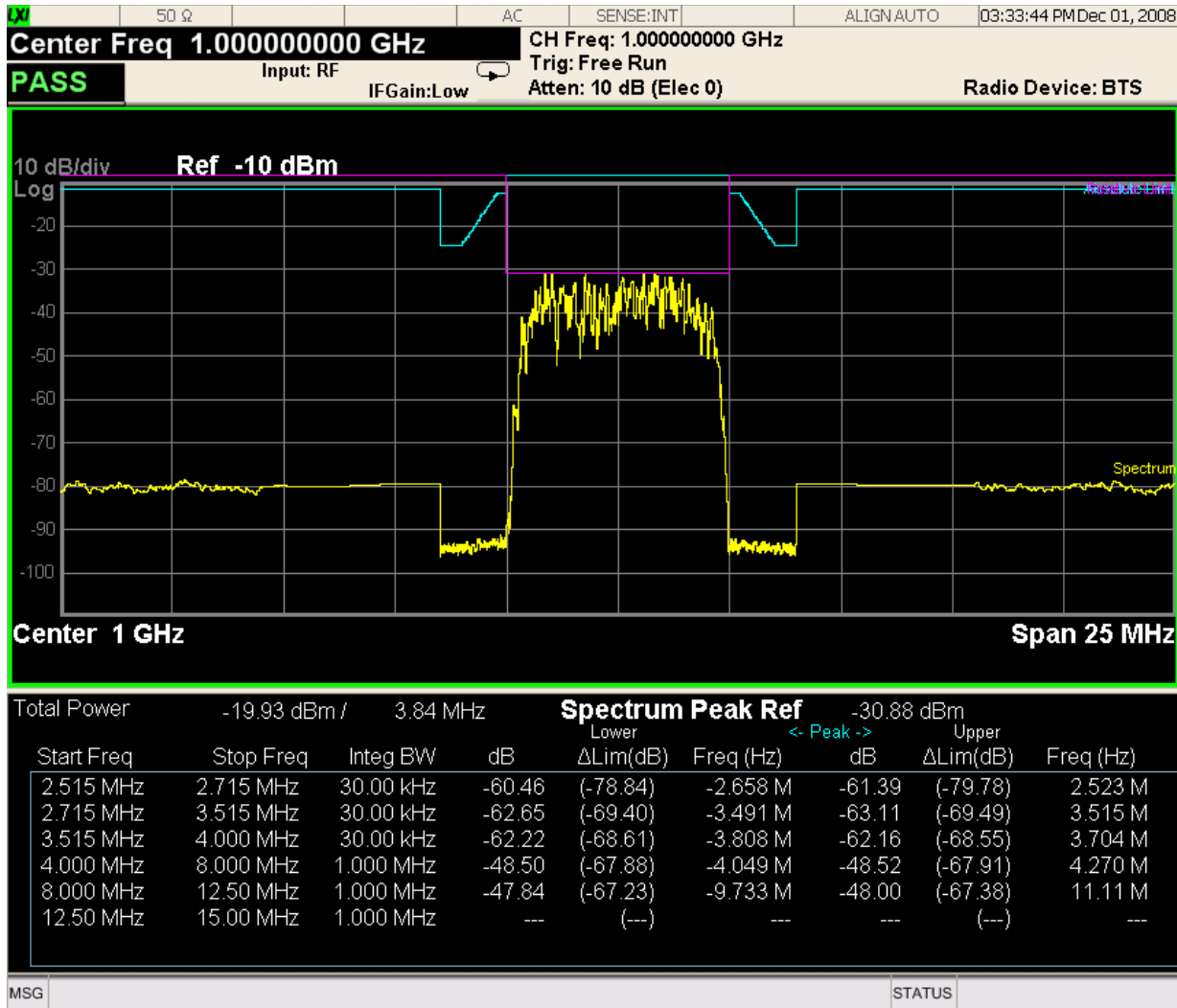
## Rel Peak Pwr & Freq (Spectrum Pk Ref)

This view consists of the following two windows:

“Trace Window” on page 933

“Results Window” on page 933

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	Absolute power at the reference area. Channel Integration Bandwidth
Spectrum Peak Ref	n=5 1st element Spectrum peak power 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 Peak(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 Peak(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	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

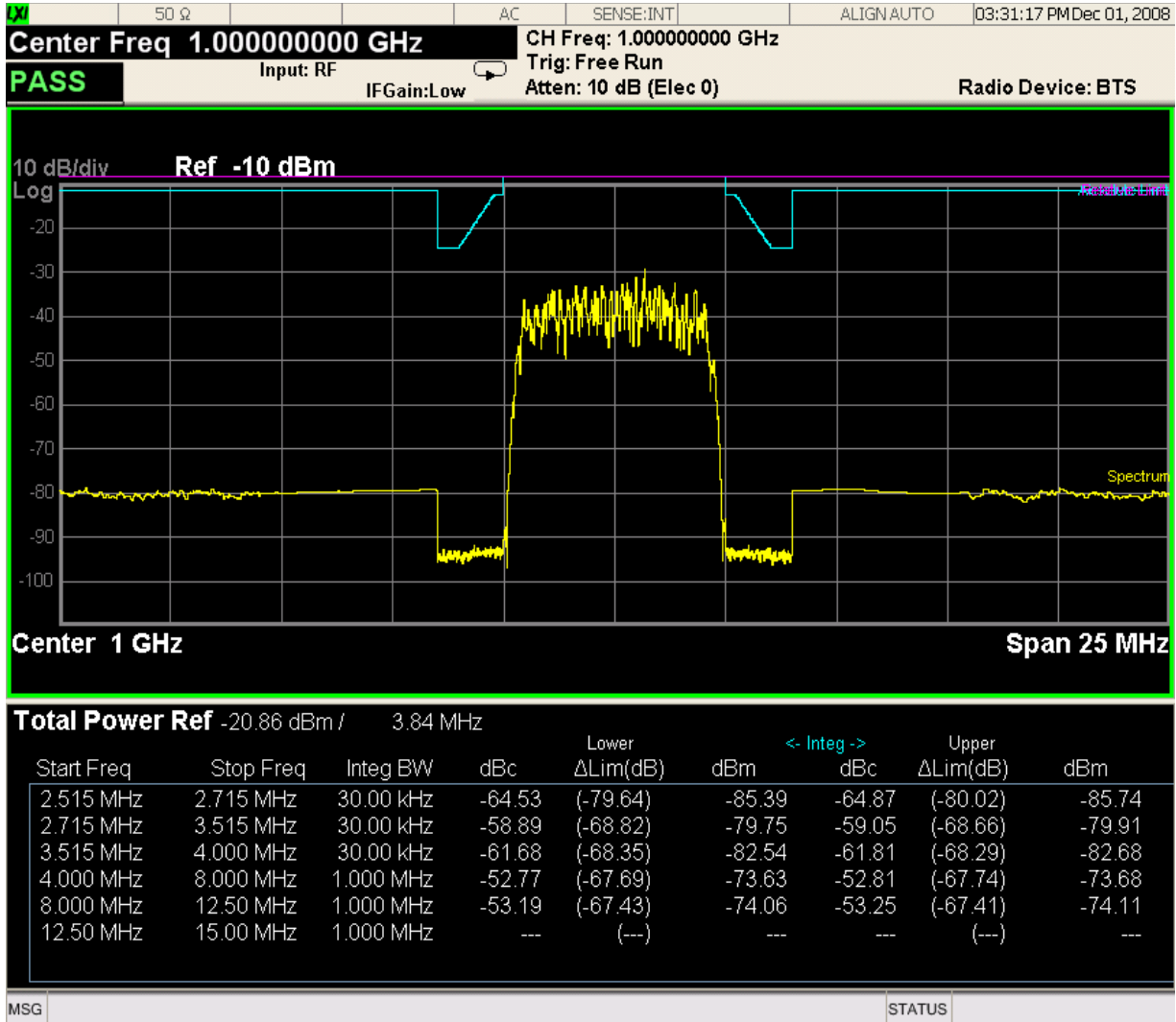
## Integrated Power

### Integrated Power (Total Pwr Ref)

“Trace Window” on page 939

“Results Window” on page 939

Spectrum Emission Mask Measurement  
View/Display



## Trace Window

Corresponding Trace      yellow - Combined trace from carrier and each offset

## Results Window

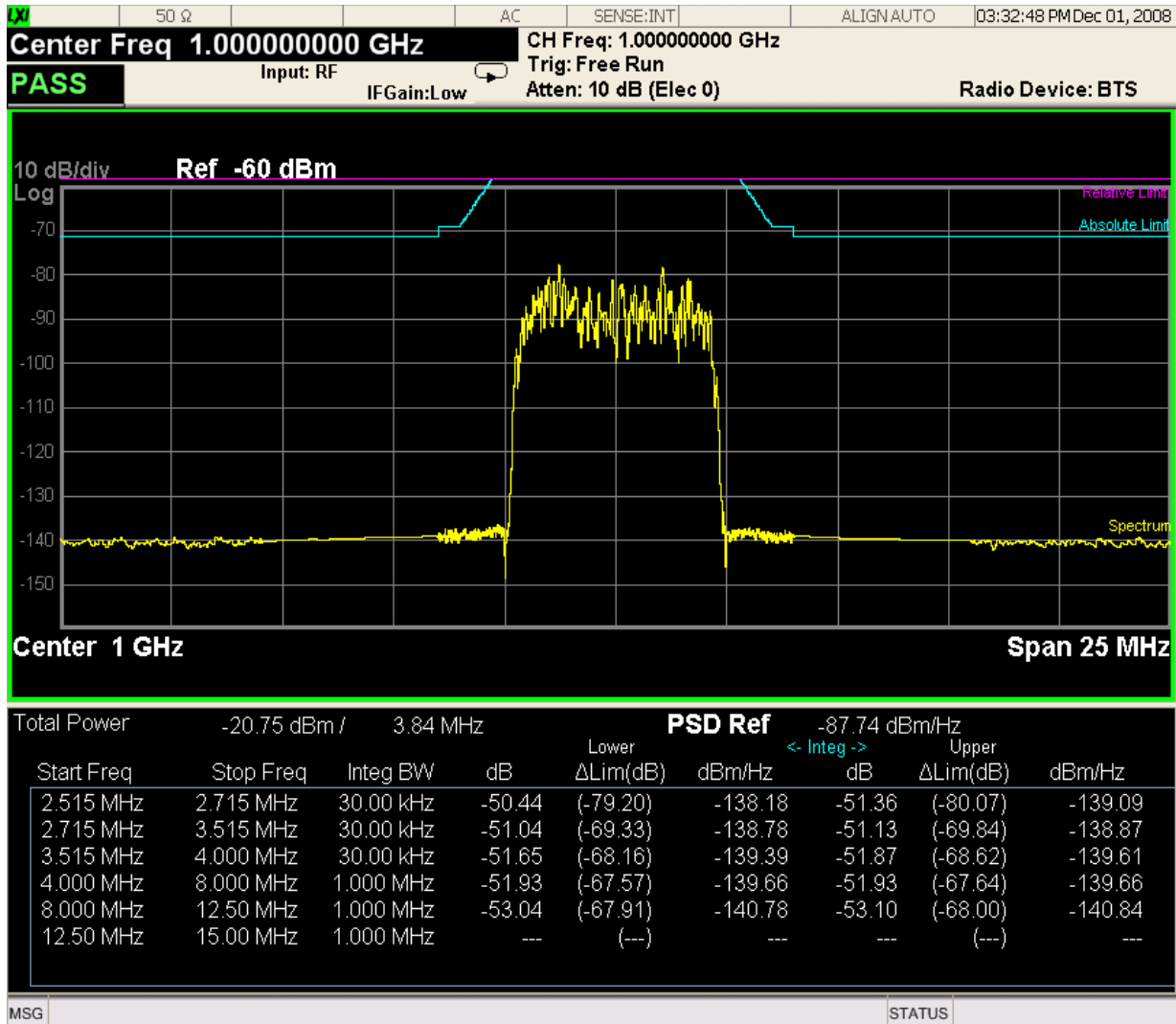
Name	Corresponding Results
Total Pwr Ref	n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower Integ(dBc)	Relative integrated power on the negative offset
Lower Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the negative offset
Lower Integ(dBm)	Absolute integrated power on the negative offset
Upper Integ(dBc)	Relative integrated power on the positive offset
Upper Lim(dB)	Minimum margin from limit line which is decided by Fail Mask setting on the positive offset
Upper Integ(dBm)	Absolute integrated power on the positive offset

## Integrated Power (PSD Ref)

[“Trace Window” on page 941](#)

[“Results Window” on page 941](#)

Spectrum Emission Mask Measurement  
View/Display



## Trace Window

Corresponding Trace      yellow - Combined trace from carrier and each offset

## Results Window

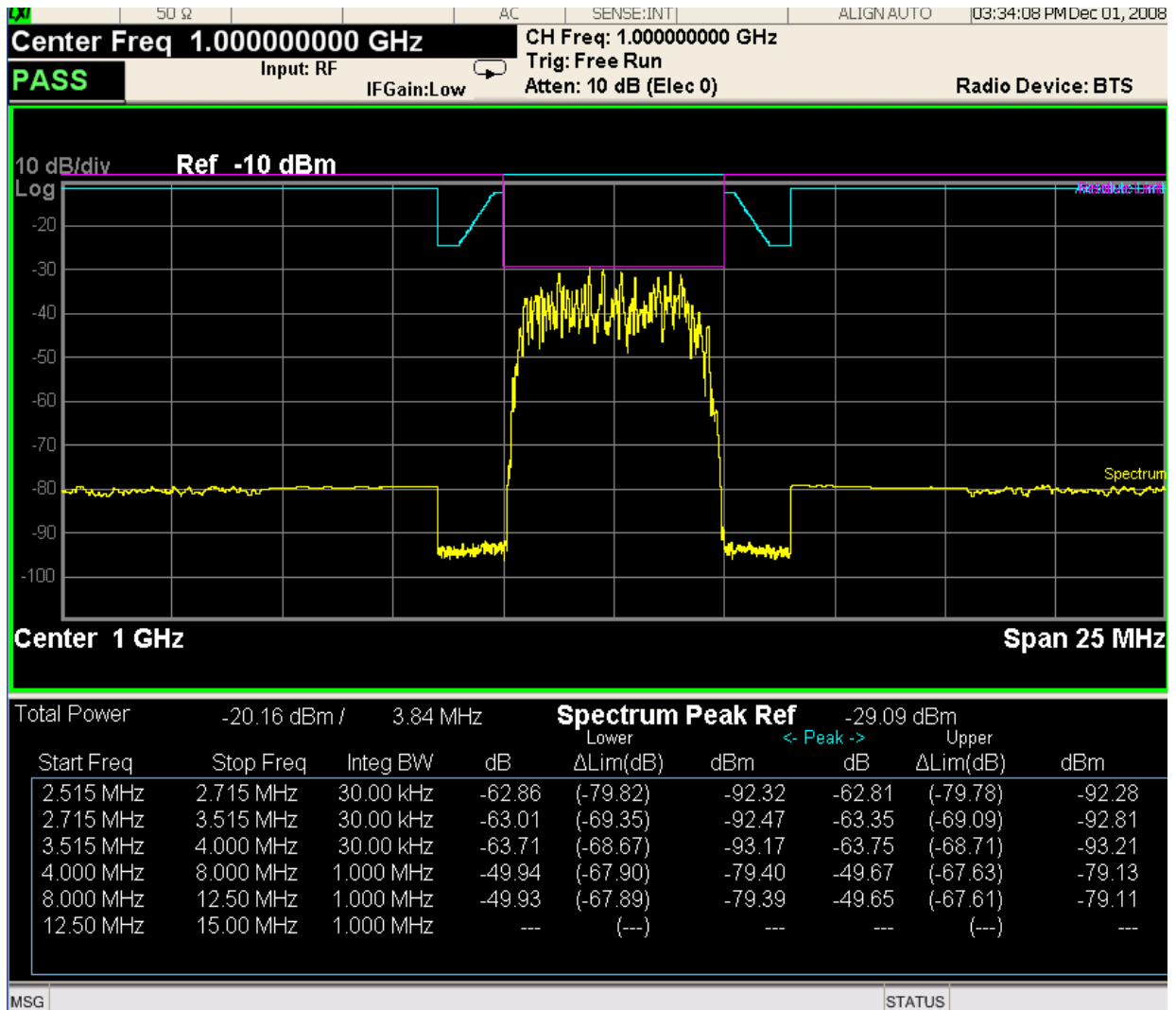
Name	Corresponding Results
Total Pwr	n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth
PSD Ref	n=5 1st element Power spectral density reference at the reference area
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower(dB)	Relative power spectrum density 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 power spectrum density of the negative offset
Upper(dB)	Relative power spectrum density 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 power spectrum density of the negative offset

## Integrated Power (Spectrum Pk Ref)

[“Trace Window” on page 939](#)

[“Results Window” on page 939](#)

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	Absolute power at the reference area. Channel Integration Bandwidth
Spectrum Peak Ref	n=5 1st element Peak power at the reference area
Start(Hz)	Start frequency for offset
Stop(Hz)	Stop frequency for offset
Meas BW(Hz)	Measurement bandwidth for offset
Lower Peak(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 Peak(dBm)	Absolute peak power on minimum margin point of the negative offset
Upper Peak(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 Peak(dBm)	Absolute peak power on minimum margin point of the positive offset

Key Path                            **View/Display**

Instrument S/W Revision        Prior to A.02.00

## Limit Lines

Toggles the limit lines display function for the spectrum emission mask measurements On and Off.

**Remote Command**            :CALCulate:SEMask:LLINe:STATe ON|OFF|1|0  
                                      :CALCulate:SEMask:LLINe:STATe?

Example                            CALC:SEM:LLIN:STAT OFF  
                                      CALC:SEM:LLIN:STAT?

## Spectrum Emission Mask Measurement View/Display

Key Path	<b>View/Display</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB, DVB-T/H
Notes	You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB mode, DVB-T/H 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	Prior to A.02.00



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. For more information, see [“List Sweep Measurement Description” on page 945](#).

#### Remote Commands:

:CONFigure:LIST

:INITiate:LIST

:FETCh:LIST?

:READ:LIST?

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.

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.

---

Instrument Software  
Revision:

Prior to A.02.00

### List Sweep Measurement Description

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

## List Sweep

over GPIB (IEEE-488) puts it in remote operation, or you can send the `SYSTEM:KLOCK ON` command.

Instrument Software Revision	Prior to A.02.00
Key Path	<b>Meas</b>
Mode	SA

## 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.

<b>Remote Command:</b>	[ :SENSE ] :LIST:FREQuency <freq>{ , <freq> } [ :SENSE ] :LIST:FREQuency?
Preset:	Current center frequency value from previous measurement
State Saved:	Saved in State
Range:	Same as center frequency range.
Example:	LIST:FREQ 1GHz,1.5GHz,2GHz,2.5GHz Sets a list of 4 frequencies.
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the frequency list.

<b>Remote Command:</b>	[ :SENSE ] :LIST:FREQuency:POINts?
Example:	LIST:FREQ:POIN?
Instrument Software Revision:	Prior to A.02.00

## 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:** `[ :SENSe ] :LIST:ATTenuation <power>{ , <power> }`  
`[ :SENSe ] :LIST:ATTenuation?`

**Preset:** Current mechanical attenuation value from previous measurement

**State Saved:** Saved in State

**Range:** Same as the mechanical attenuator range.

**Dependencies/Couplings:** If the requested setting is not valid, it is ignored and the previous setting is retained.

**Example:** `LIST:ATT 10DB`

**Instrument Software Revision:** Prior to A.02.00

The following command queries the analyzer for the number of points in the mechanical attenuation list.

**Remote Command:** `[ :SENSe ] :LIST:ATTenuation:POINTs?`

**Example:** `LIST:ATT:POIN?`

**Instrument Software Revision:** Prior to A.02.00

---

## 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.

<b>Remote Command:</b>	<code>[ :SENSe]:LIST:EATTenuation &lt;power&gt;{, &lt;power&gt;}</code> <code>[ :SENSe]:LIST:EATTenuation?</code>
Preset:	Current electronic attenuation value from previous measurement
State Saved:	Saved in State
Range:	Same as the electronic attenuator range.
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.
Example:	<code>LIST:EATT 10DB</code>
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the electronic attenuation list.

<b>Remote Command:</b>	<code>[ :SENSe]:LIST:EATTenuation:POINTs?</code>
Example:	<code>LIST:EATT:POIN?</code>
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:BANDwidth BWIDth:RESolution:TYPE &lt;type&gt; {, &lt;type&gt;}</code> <code>[ :SENSe ] :LIST:BANDwidth BWIDth:RESolution:TYPE?</code>
Preset:	Current RBW Type setting from previous measurement
State Saved:	Saved in State
Range:	Same as the RBW Types available in previous measurement.
Example:	LIST:BAND:RES:TYPE GAUS For this example, Types from Swept SA measurement include: GAUSsian FLATop EMI
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the RBW Type list.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:BANDwidth BWIDth:RESolution:TYPE:POINTs?</code>
Example:	LIST:BAND:RES:TYPE:POIN?
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSe]:LIST:BANDwidth BWIDth:RESolution &lt;freq&gt;{, &lt;freq&gt;}</code> <code>[ :SENSe]:LIST:BANDwidthBWIDth:RESolution?</code>
Preset:	Current RBW value from previous measurement
State Saved:	Saved in State
Range:	Same as the RBW values available in the previous measurement.
Example:	<code>LIST:BAND:RES 100KHZ</code>
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the RBW list.

<b>Remote Command:</b>	<code>[ :SENSe]:LIST:BANDwidthBWIDth:RESolution:POINTs?</code>
Example:	<code>LIST:BAND:RES:POIN?</code>
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:BANDwidth BWIDth:VIDeo &lt;freq&gt;{, &lt;freq&gt;}</code> <code>[ :SENSe ] :LIST:BANDwidth BWIDth:VIDeo?</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.
Example:	<code>LIST:BAND:VID 10KHZ</code>
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the VBW list.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:BANDwidth BWIDth:VIDeo:POINTs?</code>
Example:	<code>LIST:BAND:VID:POIN?</code>
Instrument Software Revision:	Prior to A.02.00



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## 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.

<b>Remote Command:</b>	[ :SENSE ] :LIST :SWEep :TIME <time> { , <time> } [ :SENSE ] :LIST :SWEep :TIME ?
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.
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the sweep time list.

<b>Remote Command:</b>	[ :SENSE ] :LIST :SWEep :TIME :POINTs ?
Example:	LIST:SWE:TIME:POIN?
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSE ] :LIST:TRIGger:DElay &lt;time&gt;{ , &lt;time&gt; }</code> <code>[ :SENSE ] :LIST:TRIGger:DElay?</code>
Preset:	0 seconds
State Saved:	Saved in State
Range:	Same as the Trigger Delay range for EXTERNAL1 trigger.
Example:	<code>LIST:TRIG:DEL 0.01S</code>
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the number of points in the trigger delay list.

<b>Remote Command:</b>	<code>[ :SENSE ] :LIST:TRIGger:DElay:POINts?</code>
Example:	<code>LIST:TRIG:DEL:POIN?</code>
Instrument Software Revision:	Prior to A.02.00

---

## Phase Noise Optimization (Remote Command Only)

This command defines a list of analyzer phase noise optimization settings at which the measurements are made.

<b>Remote Command:</b>	<pre>[ :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?</pre>
Preset:	Fast Tuning
State Saved:	Saved in instrument state.
Min:	1
Max:	3
Range:	Fast Tuning (3) Best Phase Noise for offsets <20kHz (2) Best Phase Noise for offsets >30kHz (1)
Example:	<pre>LIST:FREQ:SYNT:AUTO OFF LIST:FREQ:SYNT 2</pre>
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:DETEctor &lt;type&gt;{, &lt;type&gt;}</code> <code>[ :SENSe ] :LIST:DETEctor?</code>
Preset:	LAVG
State Saved:	Saved in State
Range:	LAVG   VAVG   RMS   NEGative   POSitive   SAMPlE   PKAV   PRMS   DAVG
Remote Command Notes:	<ul style="list-style-type: none"><li>• LAVG : average detector. Average detected on the log scale.</li><li>• VAVG : average detector. Average detected on the voltage scale.</li><li>• RMS: average detector. Average detected on the power (rms) scale.</li><li>• NEGative: negative peak detector.</li><li>• POSitive: positive peak detector.</li><li>• SAMPlE: sample detector.</li><li>• 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).</li><li>• 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).</li><li>• DAVG: Dual Avg 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.</li></ul>
Example:	LIST:DET POS
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the detector list length.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:DETEctor:POINts?</code>
Example:	LIST:DET:POIN?
Instrument Software Revision:	Prior to A.02.00

## 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?`

Preset: IMMEDIATE

State Saved: Saved in State

SCPI Status Bits/OPC: The trigger bit is set and cleared at each measurement point.

Dependencies:

- 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.

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.

Example: `LIST:TRIG:SOUR EXT2`

Instrument Software Revision: Prior to A.02.00

The following command queries the analyzer for the trigger source list length.

**Remote Command:** `[ :SENSe ] :LIST:TRIGger:SOURce:POINTs?`

Remote Command Notes: Only one trigger source selection is allowed.

Example: `LIST:TRIG:SOUR:POIN?`

Instrument Software Revision: Prior to A.02.00

## 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.

<b>Remote Command:</b>	[ :SENSe ] :LIST:TRIGger:HOLDoff <time> [ :SENSe ] :LIST:TRIGger:HOLDoff?
Preset:	0.0 s
State Saved:	Saved in State
Min:	0 s
Max:	100 s
Example:	LIST:TRIG:HOLD 100MS
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the trigger holdoff list length.

<b>Remote Command:</b>	[ :SENSe ] :LIST:TRIGger:HOLDoff:POINts?
Remote Command Notes:	Only one trigger holdoff selection is allowed.
Example:	LIST:TRIG:HOLD:POIN?
Instrument Software Revision:	Prior to A.02.00

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## Trigger Level (Remote Command Only)

Sets the value at which the selected trigger input will trigger a new sweep.

<b>Remote Command:</b>	[ :SENSe ] :LIST:TRIGger:LEVel <ampl> [ :SENSe ] :LIST:TRIGger:LEVel?
Preset:	1.2 V
State Saved:	Saved in State
Min:	-5 V
Max:	5 V
Example:	LIST:TRIG:LEV 0.4V
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the trigger level list length.

<b>Remote Command:</b>	[ :SENSe ] :LIST:TRIGger:LEVel:POINts?
Remote Command Notes:	Only one trigger level selection is allowed.
Example:	LIST:TRIG:LEV:POIN?
Instrument Software Revision:	Prior to A.02.00

## 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.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:TRIGger:SLOPe POSitive NEGative</code> <code>[ :SENSe ] :LIST:TRIGger:SLOPe?</code>
Preset:	POSitive
State Saved:	Saved in State
Range:	Same as the Sweep Time range available in the previous measurement.
Example:	LIST:TRIG:SLOP NEG
Instrument Software Revision:	Prior to A.02.00

The following command queries the analyzer for the trigger slope list length.

<b>Remote Command:</b>	<code>[ :SENSe ] :LIST:TRIGger:SLOPe:POINTs?</code>
Remote Command Notes:	Only one trigger slope selection is allowed.
Example:	LIST:TRIG:SLOP:POIN?
Instrument Software Revision:	Prior to A.02.00



## 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.

<b>Remote Command:</b>	<pre>[ :SENSe ] :LIST:SEQuence &lt;value&gt; { , &lt;value&gt; } [ :SENSe ] :LIST:SEQuence? [ :SENSe ] :LIST:SEQuence:AUTO ON1 [ :SENSe ] :LIST:SEQuence:AUTO?</pre>
Preset:	Ascending order: 1 through N
Range:	Depends on the number of frequency points in your list.
Remote Command Notes:	<p>LIST:SEQ: defines a sequence for stepping through the list.</p> <p>LIST:SEQ:AUTO: when on, the sequence is set to 1 through N, where N is the longest list.</p>
Example:	LIST:SEQ 1,2,4,3
Instrument Software Revision:	Prior to A.02.00

The following command returns the number of points currently in the sequence list.

<b>Remote Command:</b>	[ :SENSe ] :LIST:SEQuence:POINts?
Example:	LIST:SEQ:POIN?
Instrument Software Revision:	Prior to A.02.00

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.

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**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 113](#) for further instructions about printing.

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## Amplitude Y Scale (AMPTD 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 specific to that measurement.

The Amplitude key activates the Amplitude menu and selects Reference Level as the active function.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. All parameters in the Attenuation menus are Meas Global, meaning they are common to all the measurements and are unaffected by Meas Preset.

Dependencies/Couplings	In measurements which support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case.
Key Path	<b>AMPTD Y Scale</b>
Readback Line	Contains a summary in [ ] brackets of the total attenuation from the menu below, which 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.
Instrument S/W Revision	Prior to A.02.00

### 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 Preamp 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.

<b>Remote Command:</b>	[ :SENSe]:POWer[:RF]:ATTenuation <rel_ampl>
	[ :SENSe]:POWer[:RF]:ATTenuation?
	[ :SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1
	[ :SENSe]:POWer[:RF]:ATTenuation:AUTO?

## Amplitude Y Scale (AMPTD Y Scale)

Example:	POW:ATT 20 Sets the attenuator to manual mode, and sets the value to 20 dB.
Dependencies/Couplings:	<p>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.</p> <p>When the Input Attenuator is in 'auto', it uses the following algorithm to determine a value:</p> $\text{Atten} = \text{ReferenceLevel} + \text{PreAmpGain} + \text{ExternalGain} - \text{RefLevelOffset} - \text{MaxMixerLevel} + \text{IF Gain}.$ <p>Limit this 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.</p> <p>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).</p> <p>The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending in a fairly complex fashion on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p>
Preset:	Auto
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:	<b>AMPTD Y Scale, Attenuation</b>
Instrument S/W Revision:	Prior to A.02.00

### 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 Preamp 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 Preamp is unavailable.

Preset: OFF  
 State Saved: Saved in instrument state.  
 Key Path: **AMPTD Y Scale, Attenuation**  
 Instrument S/W Revision: Prior to A.02.00

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 knob, 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 Elect 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 Elect Atten set to 0 dB. New total attenuation does not equal value before Elec Atten enabled.

## Amplitude Y Scale (AMPTD Y Scale)

- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elect 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
- 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

<b>Remote Command:</b>	<code>[ :SENSe]:POWer[:RF]:EATTenuation &lt;rel_amp&gt;</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:	<b>AMPTD Y Scale, Attenuation</b>
Instrument S/W Revision:	Prior to A.02.00

### Adjust Atten for Min Clip

This function is similar to the "Optimize Ref Level" function in some measurements in the Agilent PSA and ESA analyzers. 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.

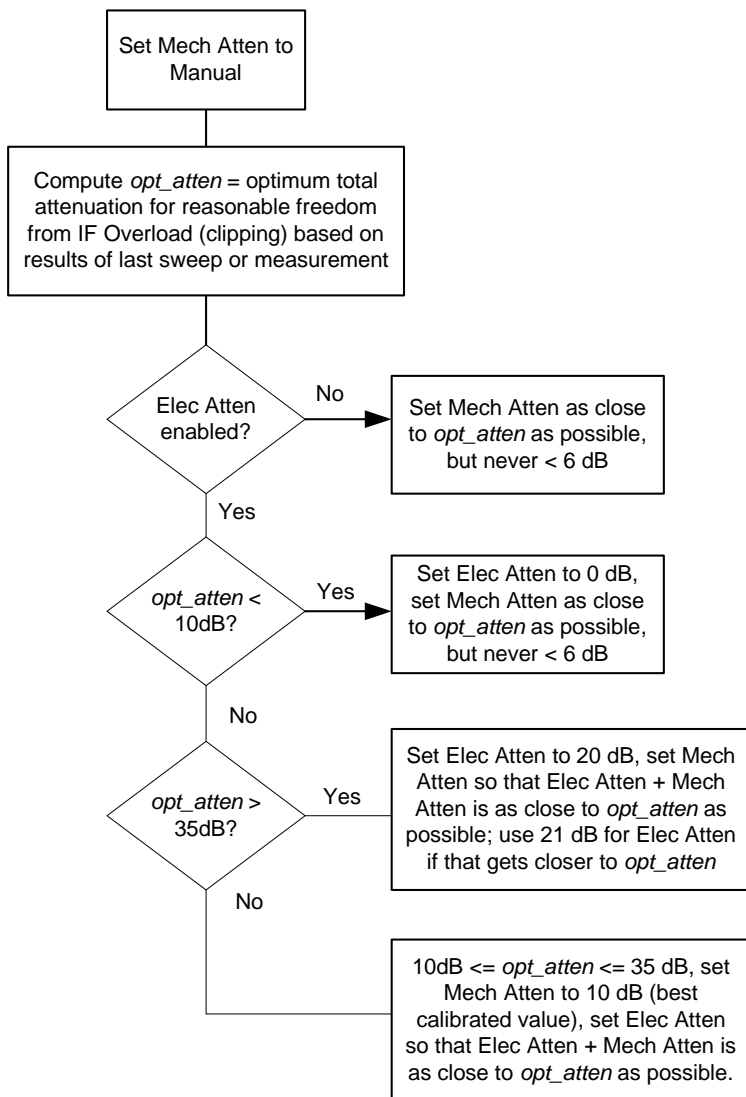
This is a "one-time" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

<b>Remote Command:</b>	<code>[ :SENSe]:POWer[:RF]:RANGe:OPTimize IMMEDIATE</code>
Key Path:	<b>AMPTD Y Scale, Attenuation</b>
Instrument S/W Revision:	Prior to A.02.00



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 Y Scale, Attenuation**

## Amplitude Y Scale (AMPTD Y Scale)

Instrument S/W Revision: Prior to A.02.00

**Remote Command:** [ :SENSe ] :POWer [ :RF ] :RANGe:AUTO ON|OFF|1|0  
[ :SENSe ] :POWer [ :RF ] :RANGe:AUTO?

Remote Command Notes: ON aliases to "Elec Atten Only"  
OFF aliases to "Off"  
The query returns true if not "Off"

Instrument S/W Revision: Prior to A.02.00

### Off

Example: :POW:RANGe:OPT:ATT OFF

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

### Elec Atten Only

Example: :POW:RANGe:OPT:ATT ELEC

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

### Mech + Elec Atten

Example: :POW:RANGe:OPT:ATT COMB

Key Path: **AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip**

Instrument S/W Revision: Prior to A.02.00

### Mech Atten Step

This controls what step size is used when making adjustments to the Input Attenuation.

**Remote Command:** [ :SENSe ] :POWer [ :RF ] :ATTenuation:STEP [ :INCRement ] 10 dB |  
2 dB  
[ :SENSe ] :POWer [ :RF ] :ATTenuation:STEP [ :INCRement ] ?

Example: POW:ATT:STEP 2

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:	<b>AMPTD Y Scale, Attenuation</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	[ :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:	<b>AMPTD Y Scale, Attenuation</b>
Default Unit:	Depends on the current selected Y axis unit, see Swept SA discussion of Y Axis Unit
Instrument S/W Revision:	Prior to A.02.00

### 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

## Amplitude Y Scale (AMPTD Y Scale)

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
18 dB	0.0884	0.125	0.25	-8	0.127 V Peak

Restriction and Notes	Visible only when the selected input is I/Q.
Key Path	<b>AMPTD Y Scale</b>
State Saved	No
Readback Text	When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "[<range value>]" When Range is Man and I & Q are different: "[I: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition.
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	[ :SENSe ] :VOLTage :IQ :RANGe :AUTO OFF   ON   0   1 [ :SENSe ] :VOLTage :IQ :RANGe :AUTO?
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: YMax = max(abs(top), abs(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. VOLT:IQ:RANG:AUTO OFF
Key Path	<b>AMPTD Y Scale, Range</b>
Preset	ON
State Saved	Saved in instrument state.
Range	Auto   Man
Instrument S/W Revision	Prior to A.02.00

This is an alternate form of the SCPI command to match the POWER form of the I Range and Q Range SCPI.

<b>Remote Command:</b>	[ :SENSE ] :POWER : IQ :RANGE :AUTO OFF   ON   0   1 [ :SENSE ] :POWER : IQ :RANGE :AUTO ?
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:	Prior to A.02.00

### 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 976](#).

<b>Remote Command</b>	[ :SENSE ] :VOLTage : IQ [ : I ] :RANGE [ :UPPER ] <voltage> [ :SENSE ] :VOLTage : IQ [ : I ] :RANGE [ :UPPER ] ?
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
Key Path	<b>AMPTD Y Scale, Range</b>

## Amplitude Y Scale (AMPTD Y Scale)

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
Instrument S/W Revision	Prior to A.02.00

This is an alternate form of the SCPI command to allow entry as a power.

<b>Remote Command:</b>	<code>[ :SENSe ] :POWer :IQ [ : I ] :RANGe [ :UPPer ] &lt;amp;gt;</code> <code>[ :SENSe ] :POWer :IQ [ : I ] :RANGe [ :UPPer ] ?</code>
Preset:	10.0 dBm
Range:	-20 dBm to 10 dBm
Min:	-20 dBm
Max:	10 dBm
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:	Prior to A.02.00

## Q Range

Bring up the Q Range menu.

Key Path	<b>AMPTD Y Scale, Range</b>
Readback Text	Q Same as I   1 V Peak   0.5 V Peak   0.25 V Peak   0.125 V Peak  When Q Same as I is On, the readback is "Q Same as I", otherwise it is the Q Range value.
Instrument S/W Revision	Prior to A.02.00

**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 need 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.

<b>Remote Command</b>	[ :SENSe ] :VOLTage   POWer:IQ:MIRRored OFF   ON   0   1 [ :SENSe ] :VOLTage   POWer:IQ:MIRRored?
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
Key Path	<b>AMPTD Y Scale, Range, Q Range</b>
Preset	On
State Saved	Saved in instrument state.
Range	On   Off
Readback Text	"Q Same as I" when On, otherwise none.
Instrument S/W Revision	Prior to A.02.00

**Q Range Value** This is the internal gain range for the Q channel. See [“I/Q Gain Ranges” on page 976](#). 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.

<b>Remote Command</b>	[ :SENSe ] :VOLTage:IQ:Q:RANGE[ :UPPer ] <voltage> [ :SENSe ] :VOLTage:IQ:Q:RANGE[ :UPPer ]?
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
Key Path	<b>AMPTD Y Scale, Range</b>
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
Instrument S/W Revision	Prior to A.02.00

## Amplitude Y Scale (AMPTD Y Scale)

This is an alternate form of the SCPI command to allow entry as a power.

<b>Remote Command:</b>	<code>[ :SENSe ] :POWer :IQ :Q :RANGe [ :UPPer ] &lt;ampl&gt;</code> <code>[ :SENSe ] :POWer :IQ :Q :RANGe [ :UPPer ] ?</code>
Preset:	10.0 dBm
Range:	-20 dBm to 10 dBm
Min:	-20 dBm
Max:	10 dBm
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 (1 V Peak, 0.5 V Peak, 0.25 V Peak, and 0.125 V 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:	Prior to A.02.00

### I/Q Gain Ranges

**1 V Peak** Set the channel gain state to 1 Volt Peak.

Key Path	<b>AMPTD Y Scale, I Range   Q Range</b>
Instrument S/W Revision	Prior to A.02.00

**0.5 V Peak** Set the channel gain state to 1 Volt Peak.

Key Path	<b>AMPTD Y Scale, I Range   Q Range</b>
Instrument S/W Revision	Prior to A.02.00

**0.25 V Peak** Set the channel gain state to 1 Volt Peak.

Key Path	<b>AMPTD Y Scale, I Range   Q Range</b>
Instrument S/W Revision	Prior to A.02.00



**0.125 V Peak** Set the channel gain state to 1 Volt Peak.

Key Path	<b>AMPTD Y Scale, I Range   Q Range</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

The value displayed on the **Presel Adjust** key will change to reflect the new preselector tuning (see **Presel Adjust**, below).

A number of considerations should be observed to ensure proper operation:

If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.

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, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated

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 analyzer 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.

<b>Remote Command:</b>	[ :SENSe ] :POWer [ :RF ] :PCENter
Example:	POW:PCEN

## Amplitude Y Scale (AMPTD Y Scale)

- 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 0.5001 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 Y Scale**

SCPI Status Bits/OPC  
Dependencies:

The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.

Instrument S/W Revision: Prior to A.02.00

## 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:	<ul style="list-style-type: none"> <li>• Grayed out if microwave preselector is off (see <b>Input/Output, Microwave Preselector On/Off</b>)</li> <li>• Grayed out if entirely in Band 0.</li> <li>• 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.</li> </ul>
Preset:	0 MHz
State Saved:	The <b>Presel Adjust</b> value set by <b>Presel Center</b> , or by manually adjusting <b>Presel Adjust</b> , is not saved in Instrument State, and does not survive Preset or power cycle.
Min:	-500 MHz
Max:	500 MHz
Key Path:	<b>AMPTD Y Scale</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00
<b>Remote Command:</b>	<pre>[ :SENSE ] : POWER [ :RF ] : PADJust : PRESelector MWAVE   MMWave   EXTernal  [ :SENSe ] : POWER [ :RF ] : PADJust : PRESelector?</pre>
Remote Command Notes:	<pre>[ :SENSe ] : POWER [ :RF ] : PADJust : PRESelector MWAVE   MMWave   EXTernal</pre> <p>where: MWAVE = 3–26 GHz MMWave = 26–50 GHz EXTernal = External</p> <p>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.</p> <p>The command form is a NOP</p> <p>The query will return MWAVE</p>

## Amplitude Y Scale (AMPTD Y Scale)

Instrument S/W Revision: Prior to A.02.00

### 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 Y Scale**

Instrument S/W Revision: Prior to A.02.00

**Remote Command:** [ :SENSe ] :POWer [ :RF ] :GAIN :BAND LOW | FULL  
[ :SENSe ] :POWer [ :RF ] :GAIN :BAND ?

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 Y Scale, Internal Preamp**

Instrument S/W Revision: Prior to A.02.00

### Off

Turns the internal preamp off

Example: :POW:GAIN OFF

Key Path: **AMPTD Y Scale, Internal Preamp**  
 Readback: Off  
 Instrument S/W Revision: Prior to A.02.00

**Low Band**

Sets the internal preamp to use only the low band (0–3.6 GHz)

Example: :POW:GAIN ON  
 :POW:GAIN:BAND LOW

Key Path: **AMPTD Y Scale, Internal Preamp**  
 Readback: Low Band  
 Instrument S/W Revision: Prior to A.02.00

**Full Range**

Sets the internal preamp to use its full range. The low band (0–3.6 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 Y Scale, Internal Preamp**  
 Readback: Full Range  
 Instrument S/W Revision: Prior to A.02.00

## Amplitude Y Scale (AMPTD Y Scale)

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## 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.

Key Path: **Front-panel key**

Instrument S/W Revision: Prior to A.02.00

## AUTO COUPLE



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## 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	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

**BW**

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## 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.

<b>Remote Command:</b>	: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:	<b>Front-panel key</b>
Instrument S/W Revision:	Prior to A.02.00

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.

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## 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 do not change as you go from measurement to measurement; they are the same for all measurements that support them. Other keys in the Frequency menu (such as those in the Swept SA measurement) typically apply only to that measurement.

Key Path	<b>Front panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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 991

See “I/Q Center Freq” on page 992

See “Center Frequency Presets” on page 991

<b>Remote Command</b>	<code>[ :SENSe ] :FREQuency:CENTer &lt;freq&gt;</code> <code>[ :SENSe ] :FREQuency:CENTer?</code>
Default Unit	Hz
Dependencies/Couplings	<p>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</p> <p>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.</p> <p>If the electrical attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be &gt;3.6GHz 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.</p>
Example	<code>FREQ:CENT 50 MHz</code> <code>FREQ:CENT UP</code> changes the center frequency to 150 MHz if you use <code>FREQ:CENT:STEP 100 MHz</code> to set the center frequency step size to 100 MHz <code>FREQ:CENT?</code>
Key Path	<b>FREQ Channel</b>
Mode	BASIC, GSM, WIMAXOFDMA, WCDMA
Scope	Meas Global
Notes	<p>This command sets either the RF or I/Q Center Frequency depending on the selected input.</p> <p>For RF input it is equivalent to <code>FREQ:RF:CENT</code></p> <p>For I/Q input it is equivalent to <code>FREQ:IQ:CENT</code></p> <p>Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)</p>
Preset	Depends on instrument maximum frequency, mode, measurement, and selected input.
State Saved	Saved in State

Min	Depends on instrument maximum frequency, mode, measurement, and selected input.  See <a href="#">REF T_CF_CFPresets \h \* MERGEFORMAT</a> - and <a href="#">REF T_RFCF_MoreInformation \h \* MERGEFORMAT</a> - and <a href="#">REF T_IQCF_MoreInformation \h \* MERGEFORMAT</a> -
Max	Depends on instrument maximum frequency, mode, measurement, and selected input.  See <a href="#">REF T_CF_CFPresets \h \* MERGEFORMAT</a> - and <a href="#">REF T_RFCF_MoreInformation \h \* MERGEFORMAT</a> - and <a href="#">REF T_IQCF_MoreInformation \h \* MERGEFORMAT</a> -
Status Bits/OPC Dependencies	non-overlapped
Instrument S/W Revision	Prior to A.02.00

### 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).

<b>Remote Command</b>	[ :SENSE ] :FREQuency:RF:CENTer <freq> [ :SENSe ] :FREQuency:RF:CENTer?
Example	FREQ:RF:CENT 30 MHz
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.
Preset	See table above

## FREQ Channel

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
Instrument S/W Revision	Prior to A.02.00

### 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).

<b>Remote Command</b>	<code>[ :SENSE ] :FREQuency: IQ:CENTer &lt;freq&gt;</code> <code>[ :SENSE ] :FREQuency: IQ:CENTer?</code>
Example	FREQ:IQ:CENT: 30 MHz
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
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>[ :SENSE ] :FREQuency:CENTer:STEP[ :INCRement ] &lt;freq&gt;</code> <code>[ :SENSE ] :FREQuency:CENTer:STEP[ :INCRement ]?</code> <code>[ :SENSE ] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1</code> <code>[ :SENSE ] :FREQuency:CENTer:STEP:AUTO?</code>
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Default Unit	Hz
Dependencies/Couplings	<p>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 <math>-3</math> dB RBW value.</p> <p>Span, RBW, Center frequency</p> <p>If the electrical attenuator is enabled, any attempt to change the value of the center frequency <math>&gt;3.6</math>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.</p>
Example	<p>FREQ:CENT:STEP:AUTO ON</p> <p>FREQ:CENT:STEP 500 MHz</p> <p>FREQ:CENT UP increases the current center frequency value by 500 MHz</p> <p>FREQ:CENT:STEP?</p> <p>FREQ:CENT:STEP:AUTO?</p>
SCPI Status Bits/OPC Dependencies	non-overlapped
Key Path	<b>FREQ Channel</b>
Mode	SA, TDSCDMA, ADEMOD, VSA, WCDMA
Notes	Preset and Max values are dependant on Hardware Options (503, 508, 513, 526)
Preset	<p>Auto</p> <p>ADEMOD: 1 MHz</p> <p>ON</p>
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 $\pm 27$ GHz)
Max	the maximum frequency of the instrument. (i.e. 27 GHz max freq instrument has a CF step range of $\pm 27$ GHz)
Instrument S/W Revision	Prior to A.02.00



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## 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. In general, these are functions associated with external connections to the analyzer, either to the inputs or the outputs. Since these connections tend to be fairly stable within a given setup, in general the input/output settings do not change when you Preset the analyzer.

Other functions related to the input/output connections, but which tend to change on a measurement by measurement basis, can be found under **Trig** and **Amplitude**. In addition, some of the digital I/O bus configurations can be found under **System**.

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**NOTE** The functions in the Input/Output menu are "global" (common) to all Modes (applications). But individual Input/Output functions only appear in a Mode if they apply to that Mode. Functions that apply to a Mode but not to all measurements in the Mode may be grayed out in some measurements.

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The Input Port selection is the first menu under Input/Output:

<b>Remote Command:</b>	[ :SENSe ] :FEED RF   AIQ   IQ   IONLY   QONLY   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
Key Path:	<b>Front-panel key</b>
Instrument S/W Revision:	Prior to A.02.00

### Input/Output variables - Preset behavior

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.

## Input/Output

### RF Input

Selects the front panel RF input port to be the analyzer signal input. If RF is already selected, pressing this key accesses the RF input setup functions.

Example:	<code>[ :SENSE ] : FEED RF</code>
Key Path:	<b>Input/Output</b>
Readback:	The current input impedance settings are Readback to this key i.e. "XX, ZZ" where XX is AC or DC and ZZ is 50 or 75
Instrument S/W Revision:	Prior to A.02.00

### 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, dB $\mu$ V, dB $\mu$ A, 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.

<b>Remote Command:</b>	<code>[ :SENSE ] : CORREction : IMPedance [ : INPut ] [ : MAGNitude ] 50   75</code> <code>[ : SENSE ] : CORREction : IMPedance [ : INPut ] [ : MAGNitude ] ?</code>
Example:	<code>CORR:IMP 75</code> sets the input impedance correction to 75 ohms. <code>CORR:IMP?</code>
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:	<b>Input/Output, RF Input</b>
Readback:	50 or 75. Current setting reads back to the RF key.
Instrument S/W Revision:	Prior to A.02.00

## 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 Input**

Instrument S/W Revision:         Prior to A.02.00

## 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 IONLy will set the I/Q path to I Only [:SENSe]:FEED QONLy 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
Key Path	<b>Input/Output</b>
Mode	BASIC, CDMA2K, EDGE GSM, TDSCDMA, VSA89601, WIMAX OFDMA
Instrument S/W Revision	Prior to A.02.00

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 $\Omega$  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  $\Omega$  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 $\Omega$  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

Selects 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 N9020A 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. With option S40, the available bandwidth becomes 40 MHz, giving 40 MHz each to I and Q, that is 80 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.

<b>Remote Command</b>	<code>[ :SENSe ] :FEED:IQ:TYPE IQ   IONLY   QONLY</code> <code>[ :SENSe ] :FEED:IQ:TYPE?</code>
Example	Set the input to be both the I and Q channels, combined as $I + j * Q$ . <code>FEED:IQ:TYPE IQ</code>
Key Path	<b>Input/Output, I/Q</b>
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
Readback Text	I+jQ   I Only   Q Only
Instrument S/W Revision	Prior to A.02.00



**Remote Command:** :INPut[1]:IQ:TYPE IQ|I|Q  
 :INPut[1]:IQ:TYPE?  
 Preset: IQ  
 Instrument S/W Revision: Prior to A.02.00

**I+jQ** Sets the signal input to be both the I and Q channels. The I and Q channel data will be combined as  $I + j * Q$ .

Example Set the input to be both the I and Q channels, combined as  $I + j * Q$ .  
 FEED:IQ:TYPE IQ

Key Path **Input/Output, I/Q, I/Q Path**

Instrument S/W Revision Prior to A.02.00

**I Only** Sets 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.

Example Set the input to be only the I channel.  
 FEED:IQ:TYPE IONL

Key Path **Input/Output, I/Q, I/Q Path**

Instrument S/W Revision Prior to A.02.00

**Q Only** Sets 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.

Example Set the input to be only the Q channel.  
 FEED:IQ:TYPE QONL

Key Path **Input/Output, I/Q, I/Q Path**

Instrument S/W Revision Prior to A.02.00

## I Setup

Accesses the channel setup parameters for the I channel.

Key Path **Input/Output, I/Q**

Instrument S/W Revision Prior to A.02.00

**I Differential Input** Selects differential input on or off for the I channel. For differential input (also

## Input/Output

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.

<b>Remote Command</b>	<code>:INPut:IQ[:I]:DIFFerential OFF ON 0 1</code> <code>:INPut:IQ[:I]:DIFFerential?</code>
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 <code>INP:IQ:DIFF ON</code>
Key Path	<b>Input/Output, I/Q, I Setup</b>
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
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command:</b>	<code>:INPut[1]:IQ:BALanced[:STATe] OFF ON 0 1</code> <code>:INPut[1]:IQ:BALanced[:STATe]?</code>
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:	Prior to A.02.00

**I Input Z** Selects 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.

<b>Remote Command</b>	: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 $\Omega$ , HIGH = 1 M $\Omega$
Example	Set the I channel input impedance to 1 M $\Omega$ INP:IQ:IMP HIGH
Key Path	<b>Input/Output, I/Q, I Setup</b>
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 $\Omega$   1 M $\Omega$
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	[ :SENSE]:CORRection:IQ[:I]:SKEW <seconds> [ :SENSE]:CORRection:IQ[:I]:SKEW?
Example	Delay the data for the I channel by 10 ns. CORR:IQ:SKEW 10 ns
Key Path	<b>Input/Output, I/Q, I Setup</b>
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
Instrument S/W Revision	Prior to A.02.00

**I Probe** Accesses the probe setup parameters for the I channel. See [“I/Q Probe Setup” on page 1007](#).

Key Path	<b>Input/Output, I/Q, I Setup</b>
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## Input/Output

State Saved	No
Readback Text	[<I port probe id> This is reporting the type of probe sensed on the I port. There is no parameter for overriding what is sensed.
Instrument S/W Revision	Prior to A.02.00

**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 = 50 $\Omega$   
B50: Differential Input = On, Input Z = 50 $\Omega$   
U1M: Differential Input = Off, Input Z = 1 M $\Omega$   
B1M: Differential Input = On, Input Z = 1 M $\Omega$

This command is for backwards compatibility. It combines the Input Z (50 $\Omega$  or 1 M $\Omega$ ) 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: Prior to A.02.00

## Q Setup

Accesses the channel setup parameters for the Q channel.

Key Path	<b>Input/Output, I/Q</b>
Readback Text	When Q Same as I is On the readback is "Q Same as I".
Instrument S/W Revision	Prior to A.02.00

**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 need 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.

<b>Remote Command</b>	:INPut:IQ:MIRROred OFF ON 0 1 :INPut:IQ:MIRROred?
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
Key Path	<b>Input/Output, I/Q, Q Setup</b>
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
Readback Text	"Q Same as I" when On, otherwise none.
Instrument S/W Revision	Prior to A.02.00

**Q Differential Input** Selects 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 called single-ended or unbalanced input), the analyzer uses only the Q port.

<b>Remote Command</b>	:INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential?
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## Input/Output

Dependencies/Couplings	<p>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).</p> <p>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.</p>
Restriction and Notes	<p>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.</p>
Example	<p>Put the Q channel in Differential Input mode</p> <p>INP:IQ:Q:DIFF ON</p>
Key Path	<b>Input/Output, I/Q, Q Setup</b>
Preset	Off
State Saved	On
	<p>This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults-&gt;All"</p>
Range	Off   On
Instrument S/W Revision	Prior to A.02.00

**Q Input Z** Selects 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.

<b>Remote Command</b>	<pre>:INPut [ 1 ] : IQ : Q : IMPedance LOW   HIGH :INPut [ 1 ] : IQ : Q : IMPedance?</pre>
Dependencies/Couplings	<p>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.</p> <p>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.</p>
Remote Command Notes	LOW = 50 $\Omega$ , HIGH = 1 M $\Omega$
Example	<p>Set the Q channel input impedance to 1 M<math>\Omega</math></p> <p>INP:IQ:Q:IMP HIGH</p>
Key Path	<b>Input/Output, I/Q, Q Setup</b>
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 $\Omega$   1 M $\Omega$
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	[ :SENSE ] :CORREction:IQ:Q:SKEW <seconds> [ :SENSE ] :CORREction:IQ:Q:SKEW?
Example	Delay the data for the Q channel by 10 ns. CORR:IQ:Q:SKEW 10 ns
Key Path	<b>Input/Output, I/Q, Q Setup</b>
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
Instrument S/W Revision	Prior to A.02.00

**Q Probe** Accesses the probe setup parameters for the Q channel. See [“I/Q Probe Setup” on page 1007](#).

Key Path	<b>Input/Output, I/Q, Q Setup</b>
State Saved	No
Readback Text	[<Q port probe id>] This is reporting the type of probe sensed on the Q port. There is no parameter for overriding what is sensed.
Instrument S/W Revision	Prior to A.02.00

### I/Q Probe Setup

The set of I/Q probe setup parameters 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".

## Input/Output

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe type "Unknown" is used, and this is also 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 have 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 1039](#)).

**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 are 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.

<b>Remote Command</b>	<code>[ :SENSe]:CORRection:IQ:I Q:ATTenuation:RATio &lt;real&gt;</code> <code>[ :SENSe]:CORRection:IQ:I Q:ATTenuation:RATio?</code>
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>
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>
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
Instrument S/W Revision	Prior to A.02.00

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

<b>Remote Command:</b>	<code>[ :SENSe]:CORRection:IQ:I Q:ATTenuation &lt;rel_amp&gt;</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: Prior to A.02.00

**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.

<b>Remote Command</b>	:INPut:OFFSet:I Q <voltage> :INPut:OFFSet:I Q?
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:OFFS:I -0.5
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>
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
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q?
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
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>
Preset	DC
State Saved	Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore.

## Input/Output

Range	DC   AC 1.7 Hz LFR1   AC 0.14 Hz LFR2
Readback Text	DC   LFR1   LFR2
Instrument S/W Revision	Prior to A.02.00

**DC** Turns off low frequency rejection, allowing signals down to DC.

Example	Turn off low frequency rejection on the I channel INP:COUP:I DC
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>
Instrument S/W Revision	Prior to A.02.00

**LFR1** Turns on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Example	Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>
Instrument S/W Revision	Prior to A.02.00

**LFR2** Turns on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Example	Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>
Instrument S/W Revision	Prior to A.02.00

**Calibrate** Starts 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 1039](#).

Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe, Coupling</b>
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Readback Text	The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM
Instrument S/W Revision	Prior to A.02.00

**Clear Calibration** Clears 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.

<b>Remote Command</b>	:CALibration:IQ:PROBe:I Q:CLEAr
Example	Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE
Key Path	<b>Input/Output, I/Q, I Setup   Q Setup, I Probe   Q Probe</b>
Instrument S/W Revision	Prior to A.02.00

## Reference Z

Sets 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 1002).

<b>Remote Command</b>	:INPut:IMPedance:REFErence <integer> :INPut:IMPedance:REFErence?
Example	Set the I/Q reference impedance to 50 $\Omega$ INP:IMP:REF 50
Key Path	<b>Input/Output, I/Q</b>
Preset	50 $\Omega$
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 $\Omega$ to 1 M $\Omega$

## Input/Output

Instrument S/W Revision      Prior to A.02.00

### RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator "off" (meaning switches back to the selected input). When one of the calibrator signals is selected, the analyzer routes that signal (an internal amplitude reference) to the analyzer, while leaving the main input selection menu (RF or I/Q) unchanged.

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:**      [:SENSe]:FEED:AREference REF50|REF4800|COMB|OFF  
[:SENSe]:FEED:AREference?

**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.

The 4.8 GHz internal reference is only available in some models, and only with options 507, 508, 513, and 526.

**Preset:**      OFF

**State Saved:**      Saved in State

**Key Path:**      **Input/Output**

**Readback:**      Off, 50 MHz, 4.8 GHz or Comb

**Instrument S/W Revision:**      Prior to A.02.00

### 50 MHz

Selects the 50 MHz internal reference as the input signal.

**Key Path**      **Input/Output, RF Calibrator**

**Readback**      50 MHz

**Instrument S/W Revision**      Prior to A.02.00

## 4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

Dependencies/Couplings:	This key is blank (unavailable) in MXA with frequency option 503, and in EXA
Key Path:	<b>Input/Output, RF Calibrator</b>
Readback:	4.8 GHz
Instrument S/W Revision:	Prior to A.02.00

## Comb

Selects the 300 MHz comb modulated signal as the input signal.

Key Path	<b>Input/Output, RF Calibrator</b>
Readback	Comb
Instrument S/W Revision	Prior to A.02.00

## Off

Switches the input back to the selected input (RF, Ext Mix or I/Q)

Key Path	<b>Input/Output, RF Calibrator</b>
Readback	Off
Instrument S/W Revision	Prior to A.02.00

## 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.

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<b>NOTE</b>	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.
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## Input/Output

In the Spectrum Analyzer mode, a Preamp 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 Preamp. Similarly in some of the digital communications applications, Ext Preamp will be grayed out and you would have a choice of MS or BTS.

**Dependencies/Couplings:** The Ext Preamp, 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**

**Readback:** 1-of-N selection | [variable]

**Instrument S/W Revision:** Prior to A.02.00

### Ext Preamp

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 Preamp 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 Preamp 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:** [:SENSe]:CORRection:SA[:RF]:GAIN <rel\_amp>

[:SENSe]:CORRection:SA[:RF]:GAIN?

**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:	<b>Input/Output, External Gain</b>
Readback:	Preamp Gain, <Ext Gain value> dB
Instrument S/W Revision:	Prior to A.02.00

**MS**

Sets an external gain/attenuation value for MS (Mobile Station) tests.

<b>Remote Command:</b>	[ :SENSE ] :CORRection:MS[ :RF ] :GAIN <rel_ampl> [ :SENSE ] :CORRection:MS[ :RF ] :GAIN?
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:	-100 dB
Max:	100 dB
Key Path:	<b>Input/Output, External Gain</b>
Readback:	MS, <Ext Gain value> dB
Instrument S/W Revision:	Prior to A.02.00

**BTS**

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

<b>Remote Command:</b>	[ :SENSE ] :CORRection:BTS[ :RF ] :GAIN <rel_ampl> [ :SENSE ] :CORRection:BTS[ :RF ] :GAIN?
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.

## Input/Output

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:	-100 dB
Max:	100 dB
Key Path:	<b>Input/Output, External Gain</b>
Readback:	BTS, <Ext Gain value> dB
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>[ :SENSE]:CORRection:IQ:I:GAIN &lt;rel_ampl&gt;</code> <code>[ :SENSE]:CORRection:IQ:I:GAIN?</code>
Restriction and Notes	Not available unless option BBA is installed
Example	Set the I Ext Gain to 10 dB <code>CORR:IQ:I:GAIN 10</code> Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:I:GAIN -10</code>
Key Path	<b>Input/Output, External Gain</b>
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
Readback Text	I Gain, <I Ext Gain> dB
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	<code>[ :SENSe]:CORRection:IQ:Q:GAIN &lt;rel_ampl&gt;</code> <code>[ :SENSe]:CORRection:IQ:Q:GAIN?</code>
Restriction and Notes	Not available unless option BBA is installed
Example	Set the Q Ext Gain to 10 dB <code>CORR:IQ:Q:GAIN 10</code> Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:Q:GAIN -10</code>
Key Path	<b>Input/Output, External Gain</b>
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
Readback Text	Q Gain, <I Ext Gain> dB
Instrument S/W Revision	Prior to A.02.00

## 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, including Input Corrections and Data (described in the Corrections section).

Example:	<code>:SYST:DEF INP</code> 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 <code>:SYSTem:DEFAult INPut:</code> command.
Key Path:	<b>Input/Output</b>
Instrument S/W Revision:	Prior to A.02.00

## 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

## Input/Output

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.

<b>Remote Command:</b>	[ :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:	<b>Input/Output</b>
Readback:	Variable
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Input/Output, Data Source</b>
Readback:	Inputs
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Input/Output, Data Source</b>
Readback:	Stored Data
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Input/Output, Data Source</b>
Readback:	Recorded Data
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	[ :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:	<b>Input/Output, Data Source</b>
Instrument S/W Revision:	Prior to A.02.00

## Input/Output

### 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.

<b>Remote Command</b>	[ :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.
Key Path	<b>Input/Output, Data Source</b>
Mode	VSA
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command:</b>	[ :SENSE ] :RECORDing:ABORT
Example:	REC:ABOR
Key Path:	<b>Input/Output, Data Source</b>
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:	Prior to A.02.00

### Record Length

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.

<b>Remote Command</b>	[ :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.
Key Path	<b>Input/Output, Data Source</b>
Mode	VSA
Preset	50 Records, Manual
State Saved	No
Min	0
Max	Depends on memory available
Readback	<value><Seconds Points Records>
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	<code>[ :SENSe ] :RECOrding :LENGth :VALue?</code>
Example	REC:LENG:VAL?
Remote Command Notes	Query Only  Returns the first (numeric) parameter of the most recent [:SENSe]:RECOrding:LENGth command.
Mode	VSA
Preset	50 Records
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	<code>[ :SENSe ] :RECOrding :LENGth :UNIT?</code>
Example	REC:LENG:UNIT?
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.
Mode	VSA
Preset	RECOrding
Instrument S/W Revision	Prior to A.02.00

### Corrections

This key accesses the Amplitude Corrections menu.

Amplitude Corrections arrays can be entered by you, sent over SCPI, or loaded from a file. They allow a user to correct the response of the analyzer for various use cases. The X-series supports four separate Corrections arrays, each of which can contain up to 2000 points. They can be turned on and off individually and any or all can be on at the same time.

Trace data is in absolute units and corrections data is in relative units, but we want to be able to display trace data at the same time as corrections data. Therefore we establish a reference line to be used while building or editing a Corrections table. The reference line is halfway up the display and represents 0 dB of correction. It is labeled "0 dB CORREC". It is drawn in blue (0,0,255) and is three pixels high.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction to be applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it.

In zero span, where the frequency is always the center frequency of the analyzer, we apply the (interpolated) correction for the center frequency to all points in the trace. In the event where there are two correction amplitudes at the center frequency, we apply the first one in the table.

Note that the corrections are applied as the data is taken; therefore, a trace in **View** (Update Off) will not be affected by changes made to the corrections table after the trace is put in **View**.

Key Path	<b>Input/Output, Corrections</b>
Mode	SA, DVB-T/H, DTMB
Measurement	Swept SA
Preset	Corrections arrays are reset (deleted) by Restore Input/Output Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.
Dependencies/Couplings	Amplitude correction may not be available in all modes; if a mode does not support amplitude correction, the Corrections key should be blanked while in that mode. If an application supports corrections but the current measurement does not, then the key should be grayed out in that measurement.  This key will not appear unless the proper Option is present in your instrument.
Instrument S/W Revision	A.02.00

### Select Correction

Specifies the selected correction. The term "selected correction" is used throughout this document to specify which correction will be affected by the functions.

Key Path	<b>Input/Output, Corrections</b>
Mode	SA

Preset	Set to Correction 1 by Restore Input/Output Defaults
Readback	Correction 1 Correction 2 Correction 3 Correction 4
Instrument S/W Revision	A.02.00

### Correction On/Off

Turning the Selected Correction on allows the values in it to be applied to the data. This also automatically turns on "Apply Corrections" (sets it to ON), otherwise the correction would not take effect.

A new sweep is initiated if an amplitude correction is switched on or off. Note that changing, sending or loading corrections data does NOT directly initiate a sweep, however in general these operations will turn corrections on, which DOES initiate a sweep.

**Remote Command:** [ :SENSe ] :CORRection:CSET[ 1 ] | 2 | 3 | 4 [ :STATe ] ON | OFF | 1 | 0  
[ :SENSe ] :CORRection:CSET[ 1 ] | 2 | 3 | 4 [ :STATe ] ?

Example: SENS:CORR:CSET1 ON

Dependencies/Couplings: This command will generate an "Option not available" error unless the proper Option is present in your instrument.

Turning this on automatically turns on "Apply Corrections"

Only the first correction array (Correction 1) supports antenna units. When this array is turned on, and it contains an Antenna Unit other than "None", the Y Axis Unit of the analyzer is forced to that Antenna Unit. All other Y Axis Unit choices are grayed out.

Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include .ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated.

Preset:	Not affected by Preset. Set to OFF by <b>Restore Input/Output Defaults</b>
State Saved:	Saved in State
Key Path:	<b>Input/Output, Corrections</b>
Instrument S/W Revision:	A.02.00

### Properties

Accesses a menu that lets you set the properties of the selected correction.

Key Path	<b>Input/Output, Corrections</b>
Instrument S/W Revision	A.02.00

**Select Correction** Specifies the selected correction. The term "selected correction" is used throughout

## Input/Output

this document to specify which correction will be affected by the functions.

Key Path	<b>Input/Output, Corrections, Properties</b>
Preset	Set to Correction 1 by Restore Input/Output Defaults
Readback	Correction 1 Correction 2 Correction 3 Correction 4
Instrument S/W Revision	A.02.00

**Antenna Unit** For devices (like antennae) which make measurements of field strength or flux density, the correction array should contain within its values the appropriate conversion factors such that, when the data on the analyzer is presented in dB $\mu$ V, the display is calibrated in the appropriate units. The "Antenna Unit" used for the conversion is contained within the corrections array database. It may be specified by you or loaded in from an external file or SCPI.

When an array with an Antenna Unit other than "None" is turned on, the Y Axis Unit of the analyzer is forced to that unit. When this array is turned on, and it contains an Antenna Unit other than "None", the Y Axis Unit of the analyzer is forced to that Antenna Unit., and all other Y Axis Unit choices are grayed out.

Antenna Unit does not appear in all Modes that support Corrections. Only the modes listed in the Mode row of the table below support Antenna Units.

<b>Remote Command</b>	<code>[ :SENSe]:CORRection:CSET[1] 2 3 4:ANTenna[:UNIT] GAUSS PTESla UVM UAM NOConversion [:SENSe]:CORRection:CSET[1] 2 3 4:ANTenna[:UNIT]?</code>
Example	CORR:CSET:ANT GAUS
Dependencies/Couplings	Only the first correction array (Correction 1) supports antenna units.  Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated.

Key Path	<b>Input/Output, Corrections, Properties</b>
Mode	SA
Preset	Unaffected by Preset. Set to NOC by Restore Input/Output Defaults
State Saved	Saved in State
Instrument S/W Revision	A.02.00

**dB $\mu$ V/m** Sets the antenna unit to dB $\mu$ V/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dB $\mu$ V/m and all other Y Axis Unit selections will be grayed out.

Example:	:CORR:CSET2:ANT UVM
Key Path:	<b>Input/Output, Corrections, Properties, Antenna Unit</b>



Readback: "dB $\mu$ V/m"  
 Instrument S/W Revision: A.02.00

**dB $\mu$ A/m** Sets the antenna unit to dB $\mu$ A/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dB $\mu$ A/m and all other Y Axis Unit selections will be grayed out.

Example: :CORR:CSET2:ANT UVA  
 Key Path: **Input/Output, Corrections, Properties, Antenna Unit**  
 Readback: " dB $\mu$ A/m"  
 Instrument S/W Revision: A.02.00

**dBpT** Sets the antenna unit to dBpT. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBpT and all other Y Axis Unit selections will be grayed out.

Example: :CORR:CSET3:ANT PTES  
 Key Path: **Input/Output, Corrections, Properties, Antenna Unit**  
 Readback: "dBpT"  
 Instrument S/W Revision: A.02.00

**dBG** Sets the antenna unit to dBG. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBG and all other Y Axis Unit selections will be grayed out.

Example: :CORR:CSET:ANT GAUS  
 Key Path: **Input/Output, Corrections, Properties, Antenna Unit**  
 Readback: " dBG"  
 Instrument S/W Revision: A.02.00

**None** Selects no antenna unit for this Correction set. Thus no Y Axis unit will be forced.

Example: :CORR:CSET4:ANT NOC  
 Key Path: **Input/Output, Corrections, Properties, Antenna Unit**  
 Readback: "None"  
 Instrument S/W Revision: A.02.00

**Frequency Interpolation** This setting controls how the correction values per-bucket are calculated. We interpolate between frequencies in either the logarithmic or linear scale.

## Input/Output

This setting is handled and stored individually per correction set.

<b>Remote Command:</b>	<code>[ :SENSE]:CORREction:CSET[1] 2 3 4:X:SPACing LINear LOGarithmic [ :SENSE]:CORREction:CSET[1] 2 3 4:X:SPACing?</code>
Example:	<code>CORR:CSET:X:SPAC LIN</code>
Preset:	Unaffected by Preset. Set to Linear by Restore Input/Output Defaults
State Saved:	Saved in State
Key Path:	<b>Input/Output, Corrections, Properties</b>
Instrument S/W Revision:	A.02.00

**Description** Sets an ASCII description field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to be in a screen dump.

<b>Remote Command:</b>	<code>[ :SENSE]:CORREction:CSET[1] 2 3 4:DESCription "text" [ :SENSE]:CORREction:CSET[1] 2 3 4:DESCription?</code>
Example:	<code>:CORR:CSET1:DESC "11941A Antenna correction"</code>
Remote Command Notes:	45 chars max; may not fit on display if max chars used
Preset:	Unaffected by Preset. Set to empty by <b>Restore Input/Output Defaults</b>
State Saved:	Saved in State
Key Path:	<b>Input/Output, Corrections, Properties</b>
Instrument S/W Revision:	A.02.00

**Comment** Sets an ASCII comment field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to be in a screen dump.

<b>Remote Command:</b>	<code>[ :SENSE]:CORREction:CSET[1] 2 3 4:COMMeNT "text" [ :SENSE]:CORREction:CSET[1] 2 3 4:COMMeNT?</code>
Example:	<code>:CORR:CSET1:COMM "this is a comment"</code>
Remote Command Notes:	45 chars max; may not fit on display if max chars used
Preset:	Unaffected by Preset. Set to empty by <b>Restore Input/Output Defaults</b>
State Saved:	Saved in State
Key Path:	<b>Input/Output, Corrections, Properties</b>
Instrument S/W Revision:	A.02.00

**Edit**

Invokes the integrated editing facility for this correction set.

When entering the menu, the editor window turns on, the selected correction is turned **On**, **Apply Corrections** is set to **On**, the amplitude scale is set to **Log**, and the Amplitude Correction (“Ampcor”) trace is displayed. The actual, interpolated correction trace is shown in green for the selected correction. Note that since the actual interpolated correction is shown, the correction trace may have some curvature to it. This trace represents only the correction currently being edited, rather than the total, accumulated amplitude correction for all amplitude corrections which are currently on, although the total, accumulated correction for all corrections which are turned on is still applied to the data traces.

Because corrections data is always in dB, but the Y-axis of the analyzer is in absolute units, it is necessary to establish a reference line for display of the Corrections data. The reference line is halfway up the display and represents 0 dB of correction. It is labeled “0 dB CORREC”. It is drawn in blue.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction to be applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it. By definition all points are connected. If a gap is desired for corrections data, enter 0 dB.

Note that a well-designed Corrections array should start at 0 dB and end at 0 dB. This is because whatever the high end point is will be extended to the top frequency of the instrument, and whatever the low end point is will be extended down to 0 Hz. So for a Corrections array to have no effect outside its range, you should start and end the array at 0 dB.

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**NOTE** The table editor will only operate properly if the analyzer is sweeping, because its updates are tied to the sweep system. Thus, you should not try to use the editor in single sweep, and it will be sluggish during compute-intensive operations like narrow-span FFT sweeps.

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When exiting the edit menu (by using the **Return** key or by pressing an instrument front-panel key), the editor window turns off and the Ampcor trace is no longer displayed; however, **Apply Corrections** remains **On**, any correction that was on while in the editor remains on, and the amplitude scale returns to its previous setting.

Corrections arrays are not affected by Preset, because they are in the Input/Output system. They also survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.

Key Path	<b>Input/Output, Corrections</b>
Instrument S/W Revision	A.02.00

**Navigate** Lets you move through the table to edit the desired point

Key Path	<b>Input/Output, Corrections, Edit</b>
Notes	There is no value readback on the key
Instrument S/W Revision	A.02.00

## Input/Output

**Frequency** Lets you edit the frequency of the current row.

Key Path	<b>Input/Output, Corrections, Edit</b>
Notes	There is no value readback on the key
Instrument S/W Revision	A.02.00

**Amplitude** Lets you edit the Amplitude of the current row.

Key Path	<b>Input/Output, Corrections, Edit</b>
Notes	There is no value readback on the key
Instrument S/W Revision	A.02.00

**Insert Point Below** Pressing this key inserts a point below the current point. The new point is a copy of the current point. And becomes the current point. The new point is not yet entered into the underlying table, and the data in the row is displayed in Light Gray.

Key Path	<b>Input/Output, Corrections, Edit</b>
Instrument S/W Revision	A.02.00

**Delete Point** This is an immediate action key. It will immediately delete the currently-selected point, whether or not that point is being edited, and select Navigate. The point following the currently-selected point (or the point preceding if there is none) will be selected.

Key Path	<b>Input/Output, Corrections, Edit</b>
Instrument S/W Revision	A.02.00

**Scale X Axis** Matches the X Axis to the selected Correction, as well as possible. Sets the Start and Stop Frequency to contain the minimum and maximum Frequency of the selected Correction. The range between Start Frequency and Stop Frequency is 12.5% above the range between the minimum and maximum Frequency so that span exceeds this range by one graticule division on either side. If in zero-span, or there is no data in the Ampcor table, or the frequency range represented by the table is zero, no action is taken. Standard clipping rules apply, if the value in the table is outside the allowable range for the X axis.

Key Path	<b>Input/Output, Corrections, Edit</b>
Instrument S/W Revision	A.02.00

### Delete Correction

Deletes the correction values for this set. When this key is pressed a prompt is placed on the screen that says "Please press Enter or OK key to delete correction. Press ESC or Cancel to close this dialog." The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message

“Correction deleted” appears in the MSG line.

<b>Remote Command:</b>	[ :SENSe]:CORRection:CSET[1] 2 3 4:DELeTe
Example:	CORR:CSET:DEL CORR:CSET1:DEL CORR:CSET4:DEL
Key Path:	<b>Input/Output, Corrections</b>
Instrument S/W Revision:	A.02.00

### Apply Corrections

Applies amplitude corrections which are marked as ON to the measured data. If this is set to NO, then no amplitude correction sets will be used, regardless of their individual on/off settings. If set to YES, then the corrections that are marked as ON (see [“Correction On/Off” on page 1023](#)) will be used.

<b>Remote Command:</b>	[ :SENSe]:CORRection:CSET:ALL[ :STATe] ON OFF 1 0 [ :SENSe]:CORRection:CSET:ALL[ :STATe]?
Example:	SENS:CORR:CSET:ALL OFF  This command makes sure that no amplitude corrections are applied, regardless of their individual on/off settings.
Preset:	Not affected by Preset. Set to OFF by Restore Input/Output Defaults
State Saved:	Saved in state
Key Path:	<b>Input/Output, Corrections</b>
Instrument S/W Revision:	A.02.00

### Delete All Corrections

Erases all correction values for all 4 Amplitude Correction sets.

When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete all corrections. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter; if so, after the deletion, the informational message “All Corrections deleted” appears in the MSG line.

<b>Remote Command:</b>	[ :SENSe]:CORRection:CSET:ALL:DELeTe
Example:	CORR:CSET:ALL:DEL
Key Path:	<b>Input/Output, Corrections</b>
Instrument S/W Revision:	A.02.00

### Remote Correction Data Set Commands

**Set (Replace) Data (Remote Command Only)** The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas.

The values sent in the command will totally replace all existing correction points in the specified set.

An Ampcor array can contain 2000 points maximum.

**Remote Command:** `[ :SENSe]:CORRection:CSET[1]|2|3|4:DATA <freq>, <ampl>, .  
. . .`

`[ :SENSe]:CORRection:CSET[1]|2|3|4:DATA?`

Example: `CORR:CSET1:DATA 10000000,-1.0,20000000,1.0`

This defines two correction points at (10 MHz, -1.0 dB) and (20 MHz, 1.0 dB) for correction set 1.

Preset: Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle)

State Saved: Saved in state

Min: Freq: 0 Hz  
Amptd: -1000 dBm

Max: Freq: 1 THz  
Amptd: +1000 dBm

Instrument S/W Revision: A.02.00

**Merge Correction Data (Remote Command Only)** The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas. The difference between this command and Set Data is that this merges new correction points into an existing set.

Any new point with the same frequency as an existing correction point will replace the existing point's amplitude with that of the new point.

An Ampcor array can contain 2000 total points, maximum.

**Remote Command:** `[ :SENSe]:CORRection:CSET[1]|2|3|4:DATA:MERGe <freq>,  
<ampl>,. . .`

Example: `CORR:CSET1:DATA:MERGE 15000000,-5.0,25000000,5.0`

This adds two correction points at (15 MHz, -5.0 dB) and (25 MHz, 5.0 dB) to whatever values already exist in correction set 1.

Preset: Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle)

Min: Freq: 0 Hz  
Amptd: -1000 dBm

Max:	Freq: 1 THz Amptd: +1000 dBm
Instrument S/W Revision:	A.02.00

## 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.

<b>Remote Command:</b>	[ :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:	<b>Input/Output</b>
SCPI Status Bits/OPC Dependencies:	STATus:QUEStionable:FREQuency bit 2 set if unlocked.
Instrument S/W Revision:	Prior to A.02.00
<b>Remote Command:</b>	[ :SENSe]:ROSCillator:SOURce?

## Input/Output

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: Prior to A.02.00

**Remote Command:** [:SENSe]:ROSCillator:SOURce INTernal|EXTernal

Instrument S/W Revision: Prior to A.02.00

### 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**

Readback: Sense

Instrument S/W Revision: Prior to A.02.00

### Internal

The internal reference is used.

Example: :ROSC:SOUR:TYPE INT

Key Path: **Input/Output, Freq Ref In**

Readback: Internal

Instrument S/W Revision: Prior to A.02.00

### External

The external reference is used.

Example: :ROSC:SOUR:TYPE EXT

Key Path: **Input/Output, Freq Ref In**

Readback: External



Instrument S/W Revision: Prior to A.02.00

### 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.

For the instrument to stay locked, the value entered must be within 5 ppm of the actual external reference 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.

<b>Remote Command:</b>	[ :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:	<b>Input/Output, Freq Ref In</b>
Default Unit:	Hz
Instrument S/W Revision:	Prior to A.02.00

### External Ref Coupling

Only appears with option ERC installed and licensed.

This function lets you couple the sweep system of the analyzer to the state of the External Reference. If **Normal** is selected, data acquisition proceeds regardless of the state of the External Reference. When you select **Ext Ref Out Of Range Stops Acquisition**, the data acquisition (sweep or measurement) stops when either the "521, External ref out of range" or the "503, Frequency Reference unlocked" error is asserted. Note that this will only take place if the **Freq Ref In** selection is **External**.

With the acquisition stopped, the data display will stop updating (even if this occurs in the middle of a sweep or measurement) and no data will be returned to a READ? or MEASure? query; that is to say, these queries will not complete because the analyzer will not respond to them. Furthermore, no response will be generated to a \*WAI? or \*OPC? query.

## Input/Output

Proper SCPI sequences are shown below, which will always fail to return if the acquisition stops during the requested sweep or measurement. Note that, for predictable operation of this function, it is best to operate the analyzer in single measurement mode (INIT:CONT OFF), because if operating in continuous mode, the analyzer may respond to the above queries even after the acquisition stops, with data left over from the previous acquisition.

```
:INIT:CONT OFF
```

```
:INIT:IMM;*OPC?
```

```
--
```

```
:INIT:CONT OFF
```

```
:INIT:IMM;*WAI?
```

```
--
```

```
:INIT:CONT OFF
```

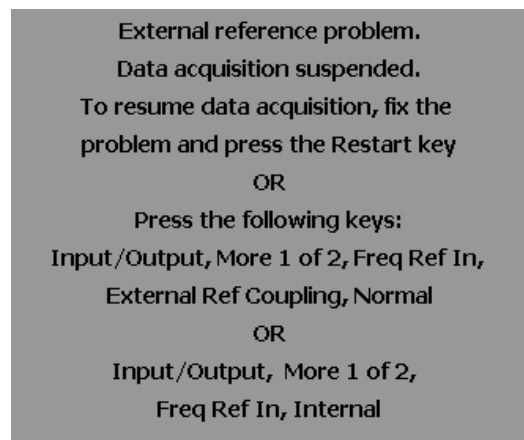
```
:READ?
```

```
--
```

```
:INIT:CONT OFF
```

```
:MEASure?
```

When the acquisition ceases, in addition to the error condition(s) described above, an error message will be generated informing you that the acquisition has ceased due to an invalid external reference. This message will stay on the screen while the acquisition is suspended.



```
External reference problem.  
Data acquisition suspended.  
To resume data acquisition, fix the  
problem and press the Restart key  
OR  
Press the following keys:  
Input/Output, More 1 of 2, Freq Ref In,  
External Ref Coupling, Normal  
OR  
Input/Output, More 1 of 2,  
Freq Ref In, Internal
```

If you press the Restart key this message will be taken off the screen and a new acquisition will be attempted; if the External Reference problem persists the message will go right back up. You can also take the message down by changing back to the **Normal** setting of Sweep/Ext Ref Coupling, or by pressing **Freq Ref In, Internal**, or **Freq Ref In, Sense**, or **Restore Input/Output Defaults**.

The setting of **External Ref Coupling** is persistent across power-cycling and is not reset with **Preset**. It is reset to the default state (**Normal**) when **Restore Input/Output Defaults** is invoked, which will also restart normal data acquisition.

The detection of invalid external reference is under interrupt processing. If the external reference

becomes invalid then returns to valid in too short a time, no error condition will be detected or reported and therefore the acquisition will not be stopped.

<b>Remote Command</b>	<code>[ :SENSe]:ROSCillator:COUPling NORMAl NACQuisition</code> <code>[ :SENSe]:ROSCillator:COUPling?</code>
Mode	All
Preset	This setting is persistent: it survives power-cycling or Preset and is reset with Restore Input/Output defaults.
State Saved	Not saved in State
Readback	Normal Stop Acq
Key Path:	<b>Input/Output, Freq Ref In</b>
Instrument S/W Revision	A.02.00

## Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

Key Path	<b>Input/Output</b>
Instrument S/W Revision	Prior to A.02.00

## 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 connectors.

<b>Remote Command:</b>	<code>:TRIGger TRIGger1 TRIGger2[:SEQuence]:OUTPut</code> <code>HSWP MEASuring MAIN GATE GTRigger OEVEN</code> <code>:TRIGger TRIGger1 TRIGger2[:SEQuence]:OUTPut?</code>
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:	<b>Input/Output, Output Config</b>
Instrument S/W Revision:	Prior to A.02.00

## Input/Output

**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:            Prior to A.02.00

**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**

Readback:                            Sweeping

Instrument S/W Revision:            Prior to A.02.00

**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**

Readback:                            Measuring

Instrument S/W Revision:            Prior to A.02.00

**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**

Readback:                            Main Trigger

Instrument S/W Revision:            Prior to A.02.00

**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**  
 Readback: Gate Trigger  
 Instrument S/W Revision: Prior to A.02.00

**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**  
 Readback: Gate  
 Instrument S/W Revision: Prior to A.02.00

**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**  
 Readback: Odd/Even  
 Instrument S/W Revision: Prior to A.02.00

**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**  
 Readback: Off  
 Instrument S/W Revision: Prior to A.02.00

## 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 Prior to A.02.00

## Input/Output

**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.

<b>Remote Command</b>	:OUTPut:DBUS[1][:STATE] ON OFF 1 0 :OUTPut:DBUS[1][:STATE]?
Example	OUTP:DBUS ON
Key Path	<b>Input/Output, Output Config, Digital Bus</b>
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.
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command</b>	:OUTPut:IQ:OUTPut IQ1 IQ250 OFF :OUTPut:IQ:OUTPut?
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
Key Path	<b>Input/Output, Output Config</b>
Preset	Off
State Saved	Saved in instrument state.
Range	1 kHz Square Wave 250 kHz Square Wave Off
Readback Text	1 kHz 250 kHz Off
Instrument S/W Revision	Prior to A.02.00

**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	<b>Input/Output, Output Config, I/Q Cal Out</b>
Readback	I/Q 1kHz

Instrument S/W Revision      Prior to A.02.00

**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**

Readback      I/Q 250kHz

Instrument S/W Revision      Prior to A.02.00

**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**

Readback      Off

Instrument S/W Revision      Prior to A.02.00

## 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.

**Remote Command**      :CALibration:IQ:ISOLation

Restriction and Notes      All front panel I/Q ports must not be connected to anything.

Remote Command Notes      All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command.

Example      CAL:IQ:ISOL

Key Path      **Input/Output, I/Q, I/Q Cable Calibration**

State Saved      No.

Instrument S/W Revision      Prior to A.02.00

## Input/Output

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 1050).

Key Path **Input/Output, I/Q, I/Q Cable Calibration**

Instrument S/W Revision Prior to A.02.00

### I/Q Isolation Calibration Time (Remote Only)

Return the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

**Remote Command:** :CALibration:IQ:ISOLation:TIME?

Example: :CAL:IQ:ISOL:TIME?

Restriction and Notes: This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.

Instrument S/W Revision: A.02.00

### 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.

Key Path	<b>Input/Output, I/Q, I/Q</b>
Instrument S/W Revision	Prior to A.02.00

**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	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the I port calibration.

<b>Remote Command</b>	:CALibration:IQ:FLATness:I
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	CAL:IQ:FLAT:I
Key Path	<b>Input/Output, I/Q, I/Q Cable Calibration</b>
State Saved	No.
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 <a href="#">“Exit Confirmation” on page 1050</a> ).
-------	---

## Input/Output

Key Path **Input/Output, I/Q, I/Q Cable Calibration**

Instrument S/W Revision Prior to A.02.00

**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.

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.

Key Path **Input/Output, I/Q, I/Q Cable Calibration**

Instrument S/W Revision Prior to A.02.00

**Next** Perform the I-bar port calibration.

**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

Key Path **Input/Output, I/Q, I/Q Cable Calibration**

State Saved No

Instrument S/W Revision Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 1050](#)).

Key Path **Input/Output, I/Q, I/Q Cable Calibration**

Instrument S/W Revision Prior to A.02.00

**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.

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.
Key Path	<b>Input/Output, I/Q, I/Q Cable Calibration</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the Q port calibration.

<b>Remote Command</b>	: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
Key Path	<b>Input/Output, I/Q, I/Q Cable Calibration</b>
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 <a href="#">“Exit Confirmation” on page 1050</a> ).
Key Path	<b>Input/Output, I/Q, I/Q Cable Calibration</b>
Instrument S/W Revision	Prior to A.02.00

**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.

## Input/Output

**Back** Return to the prior step in the calibration procedure.

**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.

**Key Path** **Input/Output, I/Q, I/Q Cable Calibration**

**Instrument S/W Revision** Prior to A.02.00

**Next** Perform the Q-bar port calibration.

**Remote Command** :CALibration:IQ:FLATness:QBAR

**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** CAL:IQ:FLAT:QBAR

**Key Path** **Input/Output, I/Q, I/Q Cable Calibration**

**State Saved** No

**Instrument S/W Revision** Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

**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 1050).

**Key Path** **Input/Output, I/Q, I/Q Cable Calibration**

**Instrument S/W Revision** Prior to A.02.00

**I/Q Cable Calibration Time (Remote Command Only)** Return the last date and time that the I/Q Cable Calibration was performed for a specific port. This is a remote query command only.

**Remote Command:** :CALibration:IQ:FLATness:I|IBAR|Q|QBAR:TIME?

**Example:** :CAL:IQ:FLAT:I:TIME?

Restriction and Notes: This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.

Instrument S/W Revision: A.02.00

## 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 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.

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 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 relevant port will be displayed. For passive probes with Differential On, any calibration that is 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 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 will show a diagram of the required connections.

**Show Adapter** Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter"](#)

## Input/Output

Screen” on page 1050.

Restriction and Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Back** Return to the prior step in the calibration procedure.

Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the I port calibration.

<b>Remote Command</b>	<code>:CALibration:IQ:PROBe:I</code>
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 will survive power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:I
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 1050).
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**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 will show 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 1050.

Restriction and Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Back** Return to the prior step in the calibration procedure.

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.
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the I-bar port calibration.

<b>Remote Command</b>	:CALibration:IQ:PROBe:IBar
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 will survive power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:IB
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 <a href="#">“Exit Confirmation” on page 1050</a> ).
Key Path	<b>Input/Output, I/Q, I Setup, I Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**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 will show a diagram of

## Input/Output

the required connections.

**Show Adapter** Show a connection diagram and instructions for the probe and adapter. See “[Show Adapter Screen](#)” on page 1050.

Restriction and Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Back** Return to the prior step in the calibration procedure.

Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the Q port calibration.

<b>Remote Command</b>	<code>:CALibration:IQ:PROBe:Q</code>
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 will survive power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:Q
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 “ <a href="#">Exit Confirmation</a> ” on page 1050).
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**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 will show 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 1050.

Restriction and Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Back** Return to the prior step in the calibration procedure.

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.
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

**Next** Perform the Q-bar port calibration.

<b>Remote Command</b>	:CALibration:IQ:PROBe:QBar
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 will survive power cycles. It is not reset by any preset or restore data commands.
Example	CAL:IQ:PROB:QB
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
State Saved	No
Instrument S/W Revision	Prior to A.02.00

**Exit** Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

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 “ <a href="#">Exit Confirmation</a> ” on page 1050).
Key Path	<b>Input/Output, I/Q, Q Setup, Q Probe, Calibrate</b>
Instrument S/W Revision	Prior to A.02.00

## Input/Output

**Show Adapter Screen** When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter will be shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram will be shown.

**I/Q Probe Calibration Time (Remote Command Only)** Return the last date and time that the I/Q Probe Calibration was performed for a specific port. This is a remote query command only.

**Remote Command:** :CALibration:IQ:PROBe:I|IBAR|Q|QBAR:TIME?

Example: :CAL:IQ:PROB:I:TIME?

**Restriction and Notes:** This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. The value is specific to both the port and probe, so the value will change as probes are connected or disconnected.

Instrument S/W Revision: A.02.00

### 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 will appear to confirm that you really want to exit. A "Yes" answer will exit the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer will return 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	Prior to A.02.00

**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	Prior to A.02.00

## Marker Function

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## Marker To

Some Marker To 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	Prior to A.02.00

**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:

---

**NOTE**                      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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### Remote Measurement Functions

This section contains the following topics:

[“Measurement Group of Commands” on page 1058](#)

[“Current Measurement Query \(Remote Command Only\)” on page 1062](#)

[“Limit Test Current Results \(Remote Command Only\)” on page 1063](#)

[“Data Query \(Remote Command Only\)” on page 1063](#)

[“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 1063](#)

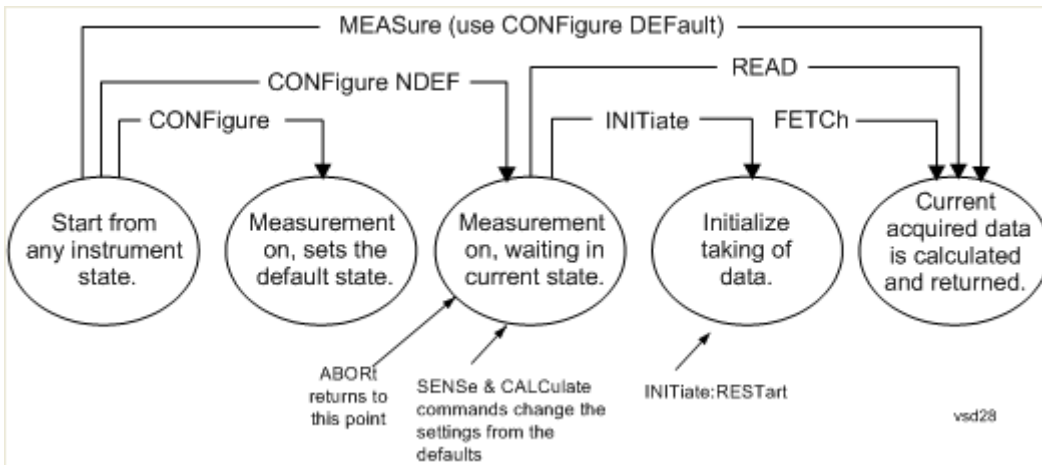
[“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 1068](#)

[“Format Data: Numeric Data \(Remote Command Only\)” on page 1070](#)

[“Format Data: Byte Order \(Remote Command Only\)” on page 1072](#)

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**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 (e.g. 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 results will be 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 will be 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.

The **CONFigure:CATalog?** query returns a quoted string of all measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

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 will 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 will be 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 will be 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 will switch 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 will change from channel power to ACP and will initiate 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 will initiate 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 will initiate 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 will switch 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 will change from channel power back to ACP and, using the previous ACP settings, will initiate 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 will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be 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)

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### Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

**Remote Command:**                      :CONFigure?

Example: CONF?  
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### 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.

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### 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.

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### 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

## Meas

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 will return 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.

---

**NOTE** 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.

---

**NOTE** 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)**

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*} \quad \text{vsd27-5}$$

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)**

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2} \quad \text{vsd27-7}$$

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).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2} \quad \text{vsd27-8}$$

where  $|X_i|$  is the magnitude of an I/Q pair,  $X$  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:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

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:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

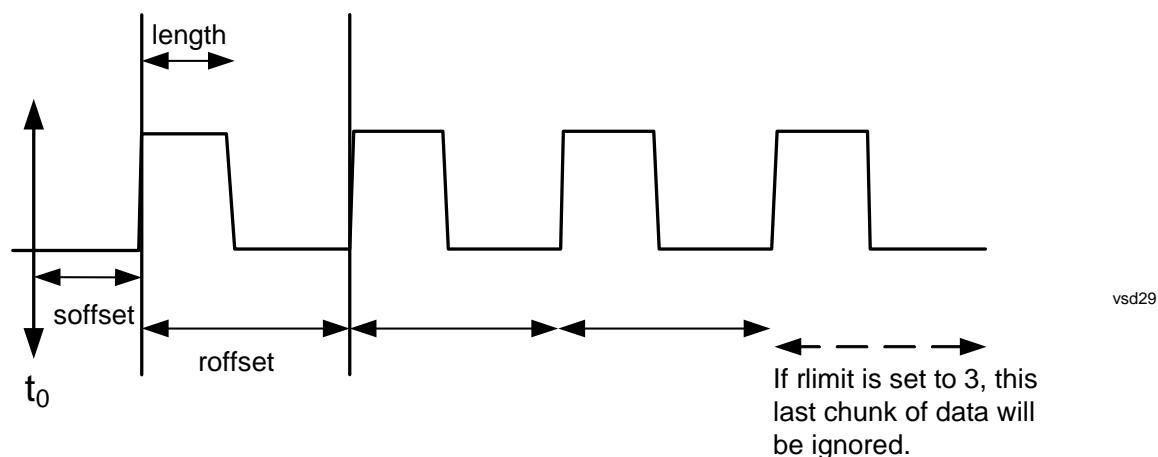
vsd27-10

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.

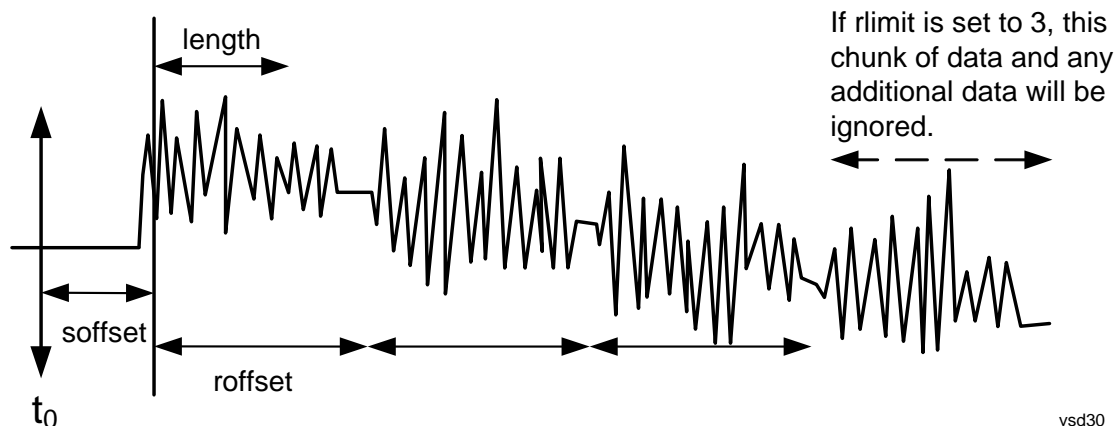
### Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



## Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<offset> - 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)
- 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.

## Meas

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: Prior to A.02.00

### 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]]?

Remote Command Notes:	<p>The query response is:</p> <p>ASCIi: ASC,8</p> <p>REAL,32: REAL,32</p> <p>REAL,64: REAL,64</p> <p>INTeger,32: INT,32</p> <p>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).</p> <p>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.</p> <p>The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.</p>
Dependencies/Couplings:	<p>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).</p> <p>Sending data to the analyzer which does not conform to the current FORMat specified, results in an error.</p>
Preset:	ASCIi
Instrument S/W Revision:	Prior to A.02.00

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.YYYYYYEsZZ

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.

<b>Remote Command:</b>	:FORMat:BORDER NORMAL   SWAPped
	:FORMat:BORDER?
Preset:	NORMal
Instrument S/W Revision:	Prior to A.02.00



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## Meas Setup

Meas Control features are unique to each Measurement. See the specific Measurement for more information.

Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Meas Setup

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## Mode

The Mode key allows you to select the available measurement applications. The application software must be licensed in order 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 application software product is ordered separately by Model Number.

---

**NOTE** 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.

---

Once an instrument mode is selected, only the commands that are valid for that mode can be executed. A list of the valid mode choices is returned with the INST:CAT? Query.

It is possible to specify the order in which the Modes appear in the Mode menu, using the Configure Applications utility (**System, Power On, Configure Applications**). It is also possible, using the same utility, to specify a subset of the available applications to load at startup time, which can significantly decrease the startup time of the analyzer. If this is done, then during runtime, if an application which is not loaded into memory is selected by you using the Mode menu or by sending SCPI commands, there will be a significant pause while the Application is loaded. During this pause a message box which says “Loading application ...” is displayed.

<b>Remote Command</b>	:INSTrument [ :SElect ] SA   BASIC   ADEMOD   NFIGURE   PNOISE   CDMA2K   TDSCDMA   VSA   VSA89 601   WCDMA   WIMAXOFDMA   EDGE 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.
Key Path	<b>Front-panel key</b>
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	Prior to A.02.00

## Mode

### 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. The modes appear in this table by NSEL number, which is not the same as their order in the Mode menu (see “Detailed List of Modes” on page 1080 for the mode order).

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/EDGE Evo	13	EDGE GSM
Phase Noise	14	PNOISE
1xEV-DO	15	CDMA1XEV
Combined WLAN	19	CWLAN
802.16 OFDMA (WiMAX/WiBro)	75	WIMAXOFDMA
Combined Fixed WiMAX	81	CWIMAXOFDM
Vector Signal Analyzer (VXA)	100	VSA
89601 VSA	101	VSA89601
LTE	102	LTE
iDEN/WiDEN/MotoTalk	103	IDEN
802.16 OFDM (Fixed WiMAX)	104	WIMAXFIXED
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
Noise Figure	219	NFIGURE
Analog Demod	234	ADEMODO
DVB-T/H	235	DVB
DTMB	236	DTMB
Remote Language Compatibility	266	RLC

**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:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	Prior to A.02.00

### 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).

<b>Remote Command:</b>	: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

## Mode

State Saved: Not saved in state, the value will be the selected application when Save is done.

Instrument S/W Revision: Prior to A.02.00

### Current Application Revision

Returns a string which is the Revision of the currently selected application (mode).

**Remote Command:** :SYSTem:APPLication[:CURRent]:REVision?

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: Prior to A.02.00

### 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: Prior to A.02.00

## 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: Prior to A.02.00

### 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: Prior to A.02.00

### 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"

## Mode

Preset:	Not affected by Preset
State Saved:	Not saved in state.
Instrument S/W Revision:	Prior to A.02.00

### Application Catalog Options

Returns a list of Options for the provided Model Number

<b>Remote Command:</b>	:SYSTem:APPLication:CATalog:OPTion? <model>
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:	Prior to A.02.00

### Detailed List of Modes

#### 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.

Example	INST:SEL SA INST:NSEL 1
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

#### 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.

Example	INST:SEL BASIC INST:NSEL 8
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	INST:SEL WCDMA INST:NSEL 9
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### GSM/EDGE/EDGE Evo

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.

Example	INST:SEL EDGEGSM INST:NSEL 13
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00

### 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

## Mode

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Example	INST:SEL WIMAXOFDMA INST:NSEL 75
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### Vector Signal Analyzer (VXA)

The 89601X Vector Signal Analyzer 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 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.

Example	INST:SEL VSA INST:NSEL 100
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	INST:SEL PNOISE or INST:NSEL 14
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

Example	INST:SEL NFIGURE Or INST:NSEL 219
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

Example	INST:SEL ADEMOM INST:NSEL 234
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

## 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.

Example	INST:SEL TDSCDMA INST:NSEL 211
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

## 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

## Mode

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Example	INST:SEL CDMA2K INST:NSEL 10
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	INST:SEL CDMA1XEV INST:NSEL 15
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	INST:SEL LTE INST:NSEL 102
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### DVB-T/H

Selects the DVB-T/H mode for measurements of digital video signals using this format. There are several power and demod 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.

Example	INST:SEL DVB INST:NSEL 235
Key Path	<b>Mode</b>

Instrument S/W Revision      A.02.00

### DTMB

Selects the DTMB mode for measurements of digital video signals using this format. There are several power and demod 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.

Example                              INST:SEL DTMB  
   INST:NSEL 236

Key Path                              **Mode**

Instrument S/W Revision      A.02.00

### Combined WLAN

Selects the CWLAN 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.

Example                              INST:SEL CWLAN  
   INST:NSEL 19

Key Path                              **Mode**

Instrument S/W Revision      A.02.00

### Combined Fixed WiMAX

Selects the Combined Fixed WiMAX 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.

Example                              INST:SEL CWIMAXOFDM  
   INST:NSEL 81

Key Path                              **Mode**

Instrument S/W Revision      A.02.00

### 802.16 OFDM (Fixed WiMAX)

Selects the 802.16 OFDM (Fixed WiMAX) mode. This mode allows modulation quality measurements of signals that comply with IEEE 802.16a–2003 and IEEE 802.16–2004 standards, with flexibility to measure nonstandard OFDM formats. Along with the typical digital demodulation measurement results,

## Mode

several additional 802.16 OFDM unique trace data formats and numeric error data results provide enhanced data analysis.

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	<b>Mode</b>
Example	INST:SEL WIMAXFIXED INST:NSEL 104
Instrument S/W Revision	A.02.00

### iDEN/WiDEN/MOTOTalk

Selects the iDEN/WiDEN/MOTOTalk mode for general purpose measurements of iDEN and iDEN-related 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.

Example	INST:SEL IDEN INST:NSEL 103
Key Path	<b>Mode</b>
Instrument S/W Revision	A.02.00

### 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.

---

**NOTE** After changing into or out of RLC mode, allow a 1 second delay before sending any subsequent commands.

---

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.

Example	INST:SEL RLC Or INST:NSEL 266
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

### 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](http://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.

Example	INST:SEL VSA89601 INST:NSEL 101
Key Path	<b>Mode</b>
Instrument S/W Revision	Prior to A.02.00

**Mode**



## Mode Setup

Mode Setup opens menu keys that allow you to configure settings that apply to all or most measurements in the Spectrum Analyzer mode. These include which radio standard and/or EMC standard is in use and how it is configured. A set of CISPR EMC presets is available as well. Additionally, selection of certain settings that apply to all Modes (e.g., Global Center Frequency) is available.

NOTE: The EMC keys require Option EMC to be installed and licensed.

Key Path **Front-panel key**  
 Instrument S/W Revision Prior to A.02.00

### Radio Standard

Allows you to specify the radio standard to be used. Spectrum Analyzer mode supports dozen of radio standards. The user can select the desired radio standard by using the Radio Std key. However, not every measurement in Spectrum Analyzer mode is available with every standard. The chart below describes which measurement is available with each radio standard.

	None	IS-95A	J-STD-008	IS-97D/98D	GSM/EDGE	3GPP W-CDMA	cdma2000 1x	NADC	PDC	Bluetooth	TETRA	FCC Part 15 Subpart F	W-LAN 802.11a	W-LAN 802.11b	W-LAN 802.11g	W-LAN HiperLAN2	DVB-T L/SECAM/NICAM	DVB-T G/PAL/NICAM	DVB-T I/PAL/NICAM	S-DMB System E	UWB Indoor	
Swept SA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Channel Power	X	X	X	X		X	X	X	X		X						X	X	X	X		
Occupied BW	X	X	X	X		X	X	X	X												X	
ACP	X	X	X	X		X	X	X	X		X										X	
Power Stat CCDF	X	X	X	X	X	X	X	X	X	X							X	X	X			
Burst Power	X	X	X		X	X	X	X	X	X												
Spurious Emission	X											X										X
Spectrum Emission Mask	X					X							X	X	X	X						

Key Path **Mode Setup**  
 Mode SA  
 Scope Meas Global

**Remote Command** [:SENSe]:RADio:STANdard[:SELEct]  
 NONE|JSTD|IS95a|IS97D|IS98D|GSM|W3GPP|CDMA2000MC1|C2000  
 1X|NADC|PDC|BLUETOOTH|TETRA|WL802DOT11A|WL802DOT11B|WL8  
 02DOT11G|HIPERLAN2|DVBTLN|DVBTPN|DVBTPN|FCC15|SDMBSE  
 |UWBINDOOR  
 [:SENSe]:RADio:STANdard[:SELEct]?

## Mode Setup

Example	RAD:STAN NONE RAD:STAN?
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	Prior to A.02.00

## Device

Allows you to specify the device to be used. This key appears in the Setup menu of most of the Radio Stds. It is a global setting that affects the Device selection, between Mobile (MS) and Base Station (BTS) settings, for all relevant Power Suite measurements.

Key Path	<b>Mode Setup, Radio Std Setup</b>
Mode	SA
Scope	Meas Global
<b>Remote Command</b>	[ :SENSe ] :RADio :STANdard :DEVice BTS  MS [ :SENSe ] :RADio :STANdard :DEVice ?
Example	RAD:STAN:DEV MS RAD:STAN:DEV?
Preset	BTS
State Saved	Saved in instrument state.
Range	BTS MS
Instrument S/W Revision	Prior to A.02.00

## IS-95A

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard IS-95A. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see “Device” on page 1090.

**J-STD-008**

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard J-STD-008. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see “Device” on page 1090.

**IS-97D/98D**

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard IS-97D/98D. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**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	<b>Mode Setup, Radio Std Setup</b>
Mode	SA
Scope	Meas Global
<b>Remote Command</b>	[ :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	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see “Device” on page 1090.

**GSM/EDGE**

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard GSM/EDGE. For the available measurements with this radio

## Mode Setup

standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

### 3GPP W-CDMA

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard 3GPP W-CDMA. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

### Cdma2000 1x

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard cdma2000–1x. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

### NADC

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard NADC. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

### PDC

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)”

key description) appropriate for industry standard PDC. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

**Bluetooth**

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard Bluetooth™. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Mode	SA
Scope	Meas Global
<b>Remote Command</b>	[ :SENSe ] :RADio :STANdard :PACKet DH1  DH3  DH5 [ :SENSe ] :RADio :STANdard :PACKet?
Example	RAD:STAN:PACK DH1 RAD:STAN:PACK?
Notes	The packet length is DH1 -> 366 s DH3 -> 1622 s DH5 -> 2870 s
Preset	DH1
State Saved	Saved in instrument state.
Range	DH1 DH3 DH5
Instrument S/W Revision	Prior to A.02.00

**TETRA**

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard TETRA. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

**Device** Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 1090](#).

## Mode Setup

### W-LAN

Accesses the W-LAN radio standards key menu to enable you to select a W-LAN standard. Selecting a W-LAN standard modifies spectrum analyzer settings for the measurement activated under the Meas menu. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Range	802.11a 802.11b 802.11g HiperLAN/2
Instrument S/W Revision	Prior to A.02.00

### DVB-T

Accesses the DVB-T key menu to enable you to select a DVB-T mask filtering standard. Selecting a DVB-T filtering standard modifies spectrum analyzer settings for the measurement activated under the Meas menu. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Range	L/SECAM/NICAM G/PAL/NICAM I/PAL/NICAM
Instrument S/W Revision	Prior to A.02.00

### FCC Part 15 Subpart F

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for unlicensed devices. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

### S-DMB System E

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for industry standard System E. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
Instrument S/W Revision	Prior to A.02.00

### UWB Indoor

Sets the specific parameters for the selected measurement (located under the “Meas (Spectrum Analyzer Mode)” key description) appropriate for UWB Indoor standard. For the available measurements with this radio standard, see the chart in section Radio Standard.

Key Path	<b>Mode Setup, Radio Std</b>
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Instrument S/W Revision      Prior to A.02.00

## 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	<b>Mode Setup</b>
Mode	SA
Scope	Meas Global
<b>Remote Command</b>	[ :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	Prior to A.02.00

## EMC Standard

Only appears with Option EMC installed and licensed.

This menu allows the user to select None (no EMI standard), CISPR (CISPR 16–1–1), and MIL (MIL–461A). Each standard has a unique way of determining the couplings between detectors and RBWs, as well as its own set of available RBW's.

Note that Auto Couple will have no effect on the EMC Standard setting.

<b>Remote Command</b>	[ :SENSe ] :EMC:STANdard[ :SELEct ] NONE CISPr MIL [ :SENSe ] :EMC:STANdard[ :SELEct ]?
Example	:EMC:STAN CISP

## Mode Setup

Dependencies/Couplings	<p>When the <b>EMC Standard</b> changes to <b>CISPR</b> or <b>MIL</b>, the <b>RBW Control</b> key is grayed out. The <b>Filter Type</b> is then always Gaussian; the <b>Filter BW</b> is chosen as appropriate for the filter and the standard (see the <b>RBW</b> key description)</p> <p>When the EMC Standard changes to None, the Filter Type is set to Gaussian and the Filter BW is set to -3 dB.</p> <p>The auto rules for detector select Peak for any trace in Auto when the EMI Standard is CISPR or MIL.</p> <p>Choosing a CISPR detector or CISPR presets automatically picks the CISPR Standard, however switching from a CISPR detector has no impact on EMC Standard</p>
Key Path	<b>Mode Setup</b>
Scope	Meas Global
State Saved	Saved in instrument state.
Instrument S/W Revision	A.02.00

**Remote Command:** [:SENSe]:BANDwidth|BWIDth[:RESolution]:MODE  
EMI|SAN|OFF  
[:SENSe]:BANDwidth|BWIDth[:RESolution]:MODE?

**Notes:** This command is mapped to the EMC:STANdard command with the following mappings: EMI=>CISPr, SAN =>None, and if the legacy command comes in with the OFF parameter, it sets EMC Standard to None and Res BW to Manual. The query returns “OFF” if Res BW in Manual, otherwise “EMI” if EMC Standard is CISPR or MIL, and “SAN” if EMC Standard is None

**Preset:** SAN  
**Instrument S/W Revision:** A.02.00

## CISPR presets

Only appears with Option EMC installed and licensed.

This key lets you easily set up the analyzer for CISPR measurements.

This topic contains the following sections:

Band Setup

Sweep Points in Band E

Number of points in band E

Key Path	<b>Mode Setup, CISPR presets</b>
<b>Remote Command</b>	[:SENSe]:FREQuency:CISPr:BAND A B C CD D E



Dependencies/Couplings	Selecting a CISPR preset will also set the EMI Standard to CISPR, perform an autocouple all, and set Y Axis Unit to dB $\mu$ V (unless dBuV is grayed out, in which case it will leave the Y Axis Unit unaffected).
Example	FREQ:CISPR:BAND A activates the CISPR preset for Band A
Instrument S/W Revision	A.02.00

**Band Setup**

Band Setup	Band A	Band B	Band C	Band D	Band C&D	Band E
Start Frequency	9kHz	150kHz	30MHz	300MHz	30MHz	1GHz
Stop Frequency	150kHz	30MHz	300MHz	1GHz	1GHz	Max freq of analyzer or 18 GHz, whichever is lower
Sweep Point	1413	6637	4503	11671	16171	See below

**Sweep Points in Band E**

Note that the Res BW auto couples to center frequency when in the CISPR EMI standard as follows:

Center Frequency	RBW
<150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
>30 MHz to 1 GHz	120 kHz
>1 GHz	1 MHz

Therefore it will be 1 MHz in band E. The number of sweep points for each band is calculated by the formula (Stop Frequency-Start Frequency)/RBW + 1 so that you get two points for every RBW width. For band E, this value is dependent on the max freq of the analyzer.

## Mode Setup

### Number of points in band E

Option	Max Analyzer Freq	Width of Band E	Number of Points
503	3.6 Ghz	2.6 GHz	5201
508	8.4 GHz	7.4 GHz	14801
513	13.2 GHz	12.2 GHz	24401
526	26.5 GHz	17 GHz	34001

### 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

For more information, see the section under the Preset key in the System section.

Key Path	Mode setup
Instrument S/W Revision	Prior to A.02.00

### 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	Prior to A.02.00

### 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	<b>Mode Setup, Global Settings</b>
Scope	Mode Global
<b>Remote Command</b>	: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	Prior to A.02.00

### 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	<b>Mode Setup, Global Settings</b>
<b>Remote Command</b>	:INSTrument:COUPle:DEFault
Example	INST:COUP:DEF
Instrument S/W Revision	Prior to A.02.00



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## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Peak Search

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## 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.

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>.
Key Path	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

### 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 have 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 option 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 <a href="#">"Open" on page 1106</a> .
Key Path	<b>Recall</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

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 do 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.

Example	*RCL 1
Key Path	<b>Recall, State</b>
Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.



Instrument S/W Revision      Prior to A.02.00

Example                            \*RCL 2

Key Path                         **Recall, State**

Readback                        Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision      Prior to A.02.00

Example                            \*RCL 3

Key Path                         **Recall, State**

Readback                        Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision      Prior to A.02.00

Example                            \*RCL 4

Key Path                         **Recall, State**

Readback                        Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision      Prior to A.02.00

Example                            \*RCL 5

Key Path                         **Recall, State**

Readback                        Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision      Prior to A.02.00

Example                            \*RCL 6

Key Path                         **Recall, State**

Readback                        Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.

Instrument S/W Revision      Prior to A.02.00

**From File\ File Open**

Brings up the File Open standard Windows® dialog and its corresponding **File Open** key menu.

## Recall

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 1122](#).

Restriction and Notes	Brings up Open dialog for recalling a State Save Type
Key Path	<b>Recall, State</b>
Instrument S/W Revision	Prior to A.02.00

**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.

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.

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**NOTE** 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.

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<b>Remote Command:</b>	: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:            Prior to A.02.00

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 have determined what you 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

## Recall

trace you were 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 option 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	<pre>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</pre>
Key Path	<b>Recall</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

### 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 do 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	<b>Recall, Trace</b>
Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Recall, Trace</b>

Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Recall, Trace</b>
Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Recall, Trace</b>
Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Recall, Trace</b>
Readback	Date and time with seconds resolution of the last Save is displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00

### 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	<b>Save, Data, Trace</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

### Open...

Pressing **Open** brings up the File Open standard Windows dialog and its corresponding File Open key menu. When you navigate to this selection, they have already determined they are recalling Trace and

## Recall

now they want to specify from which file to do the recall.

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 \*.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 1122](#).

Restriction and Notes	Brings up Open dialog for recalling a Trace Save Type
Key Path	<b>Recall, Trace</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

**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 1106](#) for details.

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.
<b>Remote Command</b>	:MMEMory:LOAD:TRACe TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6 , <filename> :MMEMory:LOAD:TRACe:REGister TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6 , <integer>

Remote Command Notes	<p>Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3,&lt;filename&gt;</p> <p>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:</p> <p>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.</p> <p>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".</p>
Example	<p>:MMEM:LOAD:TRAC TRACE2,"myState.trace" recalls the file myState.trace 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.</p> <p>:MMEM:LOAD:TRAC:REG TRACE1,2 restores the trace data in register 2 to Trace 1</p>
Key Path	<b>Recall, Trace, Open...</b>
Instrument S/W Revision	Prior to A.02.00

## 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 section [“File Open Dialog and Menu” on page 1122](#) 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:LOAD commands.
----------------------	--

## Recall

Key Path	<b>Recall</b>
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
Readback	SA: Trace 1 Trace 2 Trace 3 Trace 4 Trace 5 Trace 6 VSA: Trace to Data 1 Trace to Data 2 Trace to Data 3 Trace to Data 4 Trace to Data 5 Trace to Data 6
Instrument S/W Revision	Prior to A.02.00

### 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.
Key Path	<b>Recall, Data</b>
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
Readback	selected Trace table
Readback	SA: 1 2 3 4 5 6  VSA: Data 1 Data 2 Data 3 Data 4 Data 5 Data 6
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>Recall, Data, Trace</b>
Mode	SA VSA
Instrument S/W Revision	Prior to A.02.00

**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.
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Key Path	<b>Recall, Data (Import), Trace (to)</b>
Mode	VSA

## Recall

Instrument S/W Revision      Prior to A.02.00

### Amplitude Correction

Pressing this key selects the Amplitude Corrections as the data type to be imported with this recall request. This key brings up the Amplitude Correction Menu that allows you to select which Amplitude Correction to recall.

A set of preloaded Corrections files can be found in the directory

/My Documents/ EMC Limits and Ampcor.

Under this directory, the directory called Ampcor (Legacy Naming) contains a set of legacy corrections files, generally the same files that were supplied with older Agilent EMI analyzers, that use the legacy suffixes .ant, .oth, .usr, and .cbl, and the old 8-character file names. In the directory called Ampcor, the same files can be found, with the same suffixes, but with longer, more descriptive filenames.

Example	MMEM:LOAD:CORR 2,"MyCorrectionsData.csv"  This loads the file of corrections data (on the default file directory path) into the specified correction table of date (2).
Dependencies/Couplings	Correction 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.  This key will not appear unless the proper Option is present in your instrument.  When a correction is loaded from mass storage, it is automatically turned on. This also turns on the global "Apply Corrections" function.  Only the first correction array (Correction 1) supports antenna units.  Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include .ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated.
Key Path	<b>Recall, Data</b>
Mode	SA EDGE GSM
Preset	1  It is not part of Preset, but is reset by Restore Input/Output Defaults and survives subsequent running of the mode.
State Saved	Saved in instrument state.
Readback	1   2   3   4
Instrument S/W Revision	A.02.00

**Amplitude Correction 1, 2, 3, 4** These menu key selections let you pick which Amplitude Correction to recall; either 1, 2, 3, or 4. The default is 1. Once selected, the key returns back to the Import Data

menu and the selected Amplitude Correction number is annotated on the key. Now exactly what needs to be recalled has been selected. To trigger a recall of the selected Amplitude Correction, you must select the File Open key in the Import Data menu.

An example of using this menu is: if you select 4 and then continues on to the File Open menu, the amplitude correction table 4 will be recalled from the file selected or entered in File Name option in the File Open dialog. See [“File Open Dialog and Menu” on page 1122](#) for more details.

Antenna corrections are a particular kind of Amplitude Corrections – they are distinguished by having the Antenna Unit set to a value other than None. See the Input/Output chapter discussion of Amplitude Corrections for details on Antenna Units.

Key Path	<b>Recall, Data, Amplitude Correction</b>
Mode	SA EDGE GSM
Readback	1
Instrument S/W Revision	A.02.00

Key Path	<b>Recall, Data, Amplitude Correction</b>
Mode	SA EDGE GSM
Readback	2
Instrument S/W Revision	A.02.00

Key Path	<b>Recall, Data, Amplitude Correction</b>
Mode	SA EDGE GSM
Readback	3
Instrument S/W Revision	A.02.00

Key Path	<b>Recall, Data, Amplitude Correction</b>
Mode	SA EDGE GSM
Readback	4
Instrument S/W Revision	A.02.00

**Limit Line**

This key selects the Limit Lines as the data type to be imported with this recall request. It brings up the Limit Line Menu that lets you select which Limit Line to import the data into. This key is grayed out when SA measurements are running that do not support limit line importing.

A set of preloaded Corrections files can be found in the directory

/My Documents/ EMC Limits and Ampcor.

Under this directory, the directory called Limits (Legacy Naming) contains a set of legacy limits,

## Recall

generally the same files that were supplied with older Agilent EMI analyzers, that use the legacy suffix .lim, and the old 8-character file names. In the directory called Limits, the same files can be found, with the same suffix, but with longer, more descriptive filenames.

Example	MMEM:LOAD:LIM LLINE1,"MyLimitsFile.csv"  This loads the limit line file data (on the default file directory path) into the specified limit line.
Dependencies/Couplings	Some Measurements do not allow the use of limit lines, so the key will be grayed out.  The key will not show if no measurements in the Mode support it.  This key will not appear unless the proper Option is present in your instrument.  When a limit line is loaded from mass storage, it is automatically turned on. This allows you to see it, thus confirming the load.
Key Path	<b>Recall, Data</b>
Mode	SA
Preset	1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles
State Saved	Saved in State
Readback	selected Limit Line
Readback	1   2   3   4   5   6
Instrument S/W Revision	A.02.00

**Limit Line 1, 2, 3, 4, 5, 6** These keys let you pick which Limit Line to import the data into; either 1 or 2. The default is 1. Once selected, the key returns back to the Import Data menu and the selected Limit Line number is annotated on the key. Now you have selected exactly what needs to be imported. In order to trigger an import of the selected Limit Line, you must select the Open key in the Import Data menu.

An example of using this menu is: If you select 2 and continue to the File Open menu, the Limit Line 2 will be imported from the file selected or entered in File Name option in the File Open dialog.

Key Path	<b>Recall, Data, Limit Line</b>
Mode	SA
Instrument S/W Revision	A.02.00

## 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.
Key Path	<b>Recall, Data</b>
Mode	WCDMA
Instrument S/W Revision	Prior to A.02.00

### 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.
Key Path	<b>Recall, Data</b>
Mode	OFDMA WIMAX
Instrument S/W Revision	Prior to A.02.00

### 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"
Key Path	<b>Recall, Data (Import)</b>
Mode	VSA

## Recall

Notes	Available file types are: <ul style="list-style-type: none"><li>• CSV (Comma delimited) (*.csv)</li><li>• MAT-File (*.mat)</li><li>• MAT-File (Version 4) (*.mat)</li><li>• MAT-File (HDF5) (*.mat;*.hdf;*.h5)</li><li>• N5110A Waveform (*.bin)</li><li>• SDF (Fast) (*.sdf;*.dat)</li><li>• SDF (Export) (*.sdf;*.dat)</li><li>• Text (Tab delimited) (*.txt)</li></ul>
Instrument S/W Revision	Prior to A.02.00

### Open...

Pressing **File Open** brings up the File Open standard Windows dialog and the File Open key menu. When you navigate 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.

Restriction and Notes	Brings up Open dialog for recalling a <mode specific> Save Type
Key Path	<b>Recall, Data</b>
Instrument S/W Revision	Prior to A.02.00

**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.

**Limit Line Import:** The instrument cannot mix Limits domains (X Axis Unit must be Frequency or Time for both Limits). So when a Limits file is loaded, the analyzer will go to the Limits domain (X Axis Unit) of that file. If this changes the Limits domain from what it was before the file was loaded, all Limits data in both Limits sets will be erased before the data loads. There will be no warning if this occurs, so care should be taken to know the domain of the file you are loading.

When a Limit is loaded it will be turned ON. The Margin settings will match those when the limit was saved.

**Amplitude Correction Import:** When an amplitude correction data file is imported, the selected amplitude correction table is loaded with the data in the imported file. Also, the x axis interpolation value

for that corrections table is recalled from the file and the correction table is interpolated across the entire span. Then the selected amplitude correction table is turned on (**Amplitude Correction ON** and **Amplitude Corrections Apply** set to Yes).

When the Amplitude Correction is an Antenna correction and the Antenna Unit in the file is not None, the Y Axis Unit setting will change to match that of the file.

<b>Remote Command</b>	: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.

Mode	SA
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	: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 0.1600 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.
Key Path	<b>Recall, Data (Import), Trace (to), Open . . .</b>
Mode	VSA
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	:MMEMory:LOAD:CORRection 1 2 3 4, <filename>
Example	:MMEM:LOAD:CORR 2 "myAmpcor.csv" recalls the Amplitude Correction data from the file myAmpcor.csv on the default directory to the 2nd Amplitude Correction table, and turns on table 2.

## Recall

Dependencies/Couplings	Amplitude Correction <number> is ON, Amplitude Corrections Apply is set to Yes, Amplitude Correction <number> interpolation is recalled from the file and the interpolation occurs for that table.  This command will generate an "Option not available" error unless the proper Option is present in your instrument.
Remote Command Notes	Errors are generated if the specified file is empty or missing, or if there is a file type mismatch.

Mode	SA EDGE GSM
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	<code>:MMEMory:LOAD:LIMit LLINE1 LLINE2,&lt;filename&gt;</code>
Example	<code>:MMEM:LOAD:LIM LLINE2,"myLimitLine2.csv"</code> imports the 2nd Limit Line from the file myLimitLine2.csv in the default path.
Dependencies/Couplings	This command will generate an "Option not available" error unless the proper Option is present in your instrument.
Remote Command Notes	Errors are reported if the file is empty or missing, or if the file type does not match.

SCPI Status Bits/OPC Dependencies	Sequential - aborts the current measurement
Key Path	<b>Recall, Data, File Open</b>
Mode	SA
Readback	floppy icon in the settings bar



Instrument S/W Revision      Prior to A.02.00

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"

Key Path                                **Recall, Data, File Open**

Mode                                    WCDMA

Instrument S/W Revision                Prior to A.02.00

**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.

Key Path                                **Recall, Data (Import), Recorded Data, Open . . .**

Mode                                    VSA

Instrument S/W Revision                Prior to A.02.00

**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.

Key Path                                **Recall, Data, Zone map**

Mode                                    WIMAXOFDMA

Instrument S/W Revision                Prior to A.02.00

## Recall

### 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          Prior to A.02.00

### 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:        Prior to A.02.00

### 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.

Restriction and Notes          Pressing this key navigates you to the files and folders list in the center of the dialog.

Key Path                            **Recall, <various>, Open...**

Instrument S/W Revision        Prior to A.02.00

### 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.

Remote Command Notes        No SCPI command directly controls the sorting.

Key Path                            **Recall, <various>, Open...**

Instrument S/W Revision        Prior to A.02.00

**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.

Restriction and Notes          Files in File Open dialog are sorted immediately in the selected order

Key Path                            **Recall, <various>, Open..., Sort**

Instrument S/W Revision        Prior to A.02.00

**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.

Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Key Path	<b>Recall, &lt;various&gt;, Open..., Sort</b>
Instrument S/W Revision	Prior to A.02.00

**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.

Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Key Path	<b>Recall, &lt;various&gt;, Open..., Sort</b>
Instrument S/W Revision	Prior to A.02.00

**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.

Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Key Path	<b>Recall, &lt;various&gt;, Open..., Sort</b>
Instrument S/W Revision	Prior to A.02.00

**Ascending** This causes the display of the file list to be sorted, according to the sort criteria above, in Ascending order.

Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Key Path	<b>Recall, &lt;various&gt;, Open..., Sort</b>
Instrument S/W Revision	Prior to A.02.00

**Descending** This causes the display of the file list to be sorted, according to the sort criteria above, in Descending order.

Restriction and Notes	Files in File Open dialog are sorted immediately in the selected order
Key Path	<b>Recall, &lt;various&gt;, Open..., Sort</b>
Instrument S/W Revision	Prior to A.02.00

### Files Of Type

This menu key corresponds to the Files Of Type selection in the dialog. It follows the standard Windows

## Recall

supported Files Of 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 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, the data types available will be dependent on the current measurement and the selection you made under "Import Data". For example:

Amplitude Corrections: pull down menu shows

Amplitude Corrections (\*.csv)  
Legacy Cable Corrections (\*.cbl)  
Legacy User Corrections (\*.amp)  
Legacy Other Corrections (\*.oth)  
Legacy Antenna Corrections (\*.ant)

Limit: pull down menu shows

Limit Data (\*.csv)  
Legacy Limit Data (\*.lim)

Trace: pull down menu shows "Trace Data (\*.csv)"

Restriction and Notes	Pressing this key causes the pull down menu to list all possible file types available in this context.
-----------------------	--

Key Path	<b>Recall, &lt;various&gt;, Open...</b>
----------	---

Instrument S/W Revision	Prior to A.02.00
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## 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.

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.
-----------------------	--

Key Path	<b>Recall, &lt;various&gt;, Open...</b>
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Instrument S/W Revision	Prior to A.02.00
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## 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.

Restriction and Notes	Pressing this key causes the Open dialog to go away and auto return.
-----------------------	--

Key Path	<b>Recall, &lt;various&gt;, Open...</b>
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Instrument S/W Revision      Prior to A.02.00

## Recall

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## 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: Prior to A.02.00

**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 Dependencies:	This is an Overlapped command. 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:	Prior to A.02.00

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.



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## 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.
Key Path	<b>Save</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

### 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 <a href="#">"Save" on page 1135</a> .
Key Path	<b>Save</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

## Save

### 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
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Example	*SAV 2
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Example	*SAV 3
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Example	*SAV 4
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00

Example	*SAV 5
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00

Example	*SAV 6
Key Path	<b>Save, State</b>
Mode	All
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00

### 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.

Key Path	<b>Save, State</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

### 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).

## Save

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.

Key Path	<b>Save, State</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

**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> saved" is displayed.

<b>Remote Command</b>	: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.

Key Path	<b>Save, State, To File...</b>
Mode	All
Instrument S/W Revision	Prior to A.02.00

## 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 <a href="#">"Save" on page 1135</a> .
Key Path	<b>Save</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

### 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.

Key Path	<b>Save, Trace</b>
Mode	SA
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Save, Trace</b>
Mode	SA
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Save, Trace</b>
Mode	SA

## Save

Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Save, Trace</b>
Mode	SA
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00
Key Path	<b>Save, Trace</b>
Mode	SA
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Instrument S/W Revision	Prior to A.02.00

### 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 order to trigger a save of the selected **Trace**, you must select the **Save As** key in the Save Trace menu.

Key Path	<b>Save, Trace + State</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

### 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
Key Path	<b>Save, Trace (+State)</b>
Mode	SA
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	<pre>:MMEMory:STORe:TRACe TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6   ALL, &lt;filename &gt;  :MMEMory:STORe:TRACe:REGister TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6   ALL, &lt;integer&gt;</pre>
Example	<pre>: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</pre>
Remote Command Notes	<p>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,&lt;filename&gt;</p> <p>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).</p> <p>The range for the register parameter is 1–5</p>
Restriction and Notes	<p>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.</p> <p>Auto return to the State menu and the Save As dialog goes away.</p>
Key Path	<b>Save, Trace, Save As...</b>

## Save

Mode	SA
Instrument S/W Revision	Prior to A.02.00

### 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 1151](#) 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.
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.
Key Path	<b>Save</b>
Mode	All
Preset	<mode specific>; Is not affected by Preset, but is reset during Restore Mode Defaults and survives subsequent running of the mode.
Readback	1-of-N selection
Instrument S/W Revision	Prior to A.02.00

### 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 <a href="#">"Save" on page 1142</a>
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.
Key Path	<b>Save, Data</b>
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
Readback	selected Trace table
Readback	Swept SA: 1 2 3 4 5 6 ALL  Analog Demod Mode: RF Spectrum Demod Demod Ave Demod Max Demod Min AF Spectrum  Vector Signal Analyzer: Trace 1 Trace 2 with header Trace 2 Trace 2 with header Trace 3 Trace 3 with header Trace 4 Trace 4 with header Trace 5 Trace 5 with header Trace 6 Trace 6 with header
Instrument S/W Revision	Prior to A.02.00

**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

## Save

output to the file.

Key Path	<b>Save, Data, Trace</b>
Mode	SA Analog Demod VSA
Preset	The first trace key shown.
Instrument S/W Revision	Prior to A.02.00

**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.
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Key Path	<b>Save, Data, Trace</b>
Mode	VSA
Preset	On
Instrument S/W Revision	Prior to A.02.00

## 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 <a href="#">“Save” on page 1142</a>
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Key Path	<b>Save, Data</b>
Mode	SA ADEMOD BASIC(IQ Analyzer) CDMA2K EDGE GSM PNOISE WCDMA WIMAX OFDMA TDS CDMA
Instrument S/W Revision	Prior to A.02.00

## Amplitude Correction

Pressing this key selects the **Amplitude Corrections** as the data type to be exported with this save

request. This key brings up the Amplitude Correction Menu that allows you to select which **Amplitude Correction** to save.

Example:	MMEM:STOR:CORR 3,"MyCorrectionsFile.csv"
	This stores the specified corrections data (3) in the file MyCorrectionsFile.csv in the default directory.
Remote Command Notes:	See <a href="#">"Save" on page 1142</a>
Key Path:	<b>Save, Data</b>
Preset:	1; Is not part of Preset, but is reset by Restore Input/Output Defaults and survives subsequent running of the mode
State Saved:	Saved in instrument state.
Readback:	1   2   3   4
Dependencies/Couplings:	The key will not show if no measurements in the Mode support it. This key will not appear unless the proper Option is present in your instrument.
Instrument S/W Revision:	A.02.00

**Amplitude Correction 1, 2, 3, 4** These menu key selections let you pick which Amplitude Correction to save; either 1, 2, 3, or 4. The default is **1**. Once selected, the key returns back to the **Export Data** menu and the selected Amplitude Correction number is annotated on the key. Now exactly what needs to be saved has been selected. In order to trigger a save of the selected **Amplitude Correction**, you must select the **Save As** key in the **Export Data** menu.

An example of using this menu is: if you select 4, the Amplitude Correction table 4 will be saved to the file selected or entered in File Name option in the Save As dialog. See ["Save As . . ." on page 1151](#) for more details.

Key Path	<b>Save, Data, Amplitude Correction</b>
Readback	1
Instrument S/W Revision	A.02.00

Key Path	<b>Save, Data, Amplitude Correction</b>
Readback	2
Instrument S/W Revision	A.02.00

Key Path	<b>Save, Data, Amplitude Correction</b>
Readback	3
Instrument S/W Revision	A.02.00

Key Path	<b>Save, Data, Amplitude Correction</b>
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## Save

Readback 4  
Instrument S/W Revision A.02.00

### Limit Line

Pressing this key selects the Limit Lines as the data type to be exported with this save request. This key brings up the Limit Line Menu that allows you to select which **Limit Line** to save. This key is grayed out when SA measurements are running that do not support limit line exporting.

Example: MMEM:STOR:LIM LLINE1,"MyLimitsFile.csv"  
This stores the specified limit line data in the file MyLimitsFile.csv in the default directory.

Remote Command Notes: See ["Save" on page 1142](#)

Dependencies/Couplings: Some Measurements do not allow the use of limit lines, so the key will be grayed out.  
The key will not show if no measurements in the Mode support it.  
This key will not appear unless the proper Option is present in your instrument.

Preset: 1; not part of Preset, but is reset by Restore Mode Defaults and survives power cycles

State Saved: Saved in State

Key Path: **Save, Data**

Readback: selected Limit Line

Readback: 1|2|3|4|5|6

Instrument S/W Revision: A.02.00

**Limit Line 1, 2, 3, 4, 5, 6** These keys let you pick which Limit Line to save. The default is **1**. Once selected, the key returns back to the **Export Data** menu and the selected Limit Line number is annotated on the key. Now you have selected exactly what needs to be saved. To trigger a save of the selected Limit Line, you must select the Save As key in the Export Data menu.

An example of using this menu is: If you select 2, the Limit Line 2 will be saved in the format described in Section Limit Line Data File to the file selected or entered in **File Name** option in the **Save As** dialog.

Key Path **Save, Data, Limit Line**  
Instrument S/W Revision A.02.00

### 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 <a href="#">“Save” on page 1142</a>
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Key Path	<b>Save, Data</b>
Mode	WCDMA
Instrument S/W Revision	Prior to A.02.00

### 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 <a href="#">“Save” on page 1142</a>
Dependencies/Couplings	The key will not show if no measurements in the Mode support it.
Key Path	<b>Save, Data</b>
Mode	OFDMA WiMAX
Instrument S/W Revision	Prior to A.02.00

### 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.
Key Path	<b>Save, Data (Export)</b>
Mode	VSA

## Save

Instrument S/W Revision      Prior to A.02.00

### 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
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Key Path	<b>Save, Data</b>
----------	-------------------

Mode	All
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Instrument S/W Revision	Prior to A.02.00
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**Save** Saves the specified Data Type. This section describes any specific save behavior relevant to Data 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.

**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.

**Key Path** **Save, Data, Save As...**

**Instrument S/W Revision** Prior to A.02.00

**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.

**Mode** SA|ADEMOD|BASIC(IQ Analyzer)|CDMA2K|EDGE|GSM|PNOISE|WCDMA|WIMAX|OFDMA|TDSCDMA

**Instrument S/W Revision** Prior to A.02.00

**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

**Mode** SA

## Save

Preset	Peak Table
State Saved	Saved in State
Range	Peak Table Marker Table
Instrument S/W Revision	Prior to A.02.00

**Remote Command** :MMEMory:STORe:CORRection 1|2|3|4, <filename>

Example :MMEM:STOR:CORR 2 "myAmpcor.csv" saves just the 2nd Amplitude Correction table to the file myAmpcor.csv on the default path.

Mode	SA
Instrument S/W Revision	A.02.00

**Remote Command** :MMEMory:STORe:TRACe:DATA  
TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6|ALL, <filename  
>

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.

Mode	SA Analog Demod
Instrument S/W Revision	Prior to A.02.00

Trace Number	Analog Demod Mode: Trace Names
TRACE1	RF Spectrum
TRACE2	Demod
TRACE3	Demod Ave
TRACE4	Demod Max
TRACE5	Demod Min
TRACE6	AF Spectrum



<b>Remote Command</b>	<code>:MMEMory:STORe:TRACe:DATA TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6 , "&lt;filename&gt;" [ , CSV   TXT   SDF [ , OFF   ON   0   1 ] ]</code>
Example	<code>MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON</code>
Restriction and Notes	<p>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.</p> <p>8901X Option 205 allows export in TXT, CSV, and SDF formats.</p> <p>8901X Option 200 allows the Option 205 formats and additionally: Matlab 4, 5 and HDF5, and an N5110A compatible binary format.</p>
Remote Command Notes	<p>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.</p> <p>The optional Boolean determines if the file is saved with headers. By default the headers are saved.</p>
Mode	VSA
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	<code>:MMEMory:STORe:LIMit LLINE1   LLINE2 , &lt;filename&gt;</code>
Example	<code>:MMEM:STOR:LIM LLINE2,"myLimitLine2.csv" saves the 2nd Limit Line to the file myLimitLine2.csv in the default path.</code>
Remote Command Notes	<p>If the save is initiated via SCPI, and the file already exists, the file will be overwritten.</p> <p>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.</p>
SCPI Status Bits/OPC Dependencies	Sequential - waits for previous measurement to complete
Key Path	<b>Save, Data, To File, Save As</b>
Mode	NFIGURE
Instrument S/W Revision	A.02.00
<b>Remote Command</b>	<code>:MMEMory:STORe:CAPTured &lt;filename&gt;</code>



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: <ol style="list-style-type: none"> <li>1. file is saved with headers</li> <li>2. data is resampled to the current span before saving</li> <li>3. player position settings limit the data saved</li> </ol>
Mode	VSA
Instrument S/W Revision	Prior to A.02.00

## Screen Image

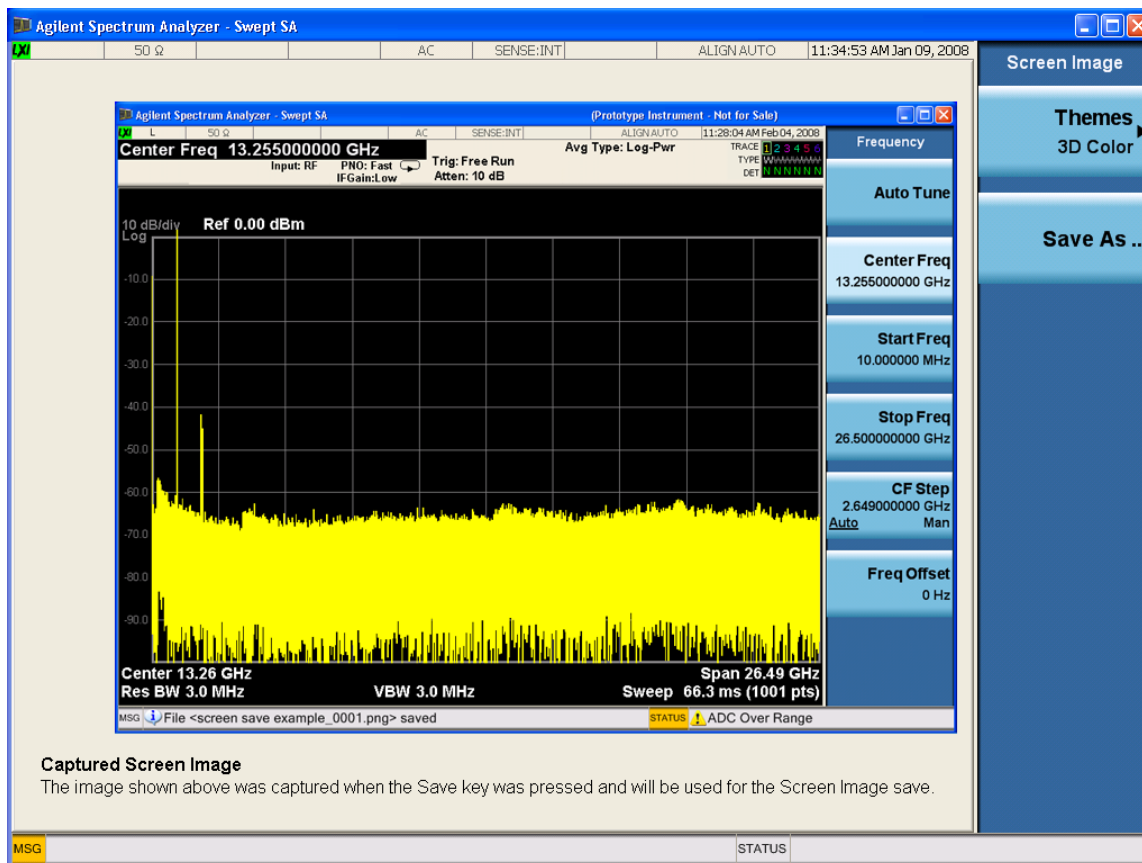
Accesses a menu of functions that enable you to specify a format and location for the saved screen image.

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.

---

**NOTE** 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.

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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 “Save” on page 1142
Key Path	<b>Save</b>
Mode	All

Instrument S/W Revision                      Prior to A.02.00

## 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.

<b>Remote Command</b>	:MMEMory:STORe:SCReen:THEME TDCoLor   TDMonochrome   FCoLoR   FMONochrome  :MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
Key Path	<b>Save, Screen Image</b>
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
Readback	3D Color   3D Mono   Flat Color   Flat Mono
Instrument S/W Revision	Prior to A.02.00

**3D Color** Selects a standard color theme with each object filled, shaded and colored as designed.

Example	MMEM:STOR:SCR:THEM TDC
Key Path	<b>Save, Screen Image, Themes</b>
Readback	3D Color
Instrument S/W Revision	Prior to A.02.00

**3D Monochrome** Selects a format that is like 3D color but shades of gray are used instead of colors.

Example	MMEM:STOR:SCR:THEM TDM
Key Path	<b>Save, Screen Image, Themes</b>
Readback	3D Mono
Instrument S/W Revision	Prior to A.02.00

**Flat Color** Selects a format that is best when the screen is to be printed on an ink printer.

Example	MMEM:STOR:SCR:THEM FCOL
Key Path	<b>Save, Screen Image, Themes</b>
Readback	Flat Color

## Save

Instrument S/W Revision      Prior to A.02.00

**Flat Monochrome** Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Example                              MMEM:STOR:SCR:THEM FMON

Key Path                              **Save, Screen Image, Themes**

Readback                              Flat Mono

Instrument S/W Revision      Prior to A.02.00

### 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 enter this dialog.

Restriction and Notes              Brings up Save As dialog for saving a Screen Image Save Type

Key Path                              **Save, Screen Image**

Instrument S/W Revision      Prior to A.02.00

**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: Prior to A.02.00

## 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 Prior to A.02.00

## 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: Prior to A.02.00

## 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.

Restriction and Notes	Pressing this key navigates you to the files and folders list in the center of the dialog.
-----------------------	--

## Save

Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00

### 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 occur.

Restriction and Notes	Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog.
Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

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.
Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

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
Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00



### 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.

Restriction and Notes	Creates a new folder in the current folder and lets you fill in the folder name using the Alpha Editor.
Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00

### 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.

Restriction and Notes	Pressing this key causes the Save As dialog to go away and auto return.
Key Path	<b>Save, &lt;various&gt;, Save As...</b>
Instrument S/W Revision	Prior to A.02.00

Save

## 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 <b>Cont</b> key description.
Key Path:	<b>Front-panel key</b>
Instrument S/W Revision:	Prior to A.02.00

**Single (Single Measurement/Sweep)**

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## Source

This mode does not have any Source control functionality.

Key Path	Front-panel key
Instrument S/W Revision	Prior to A.02.00

## Source

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## 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	Prior to A.02.00

## SPAN X Scale



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## 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	Front-panel key
Instrument S/W Revision	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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:	Prior to A.02.00

## Sweep / Control

### 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: Prior to A.02.00

**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: Prior to A.02.00

### 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**  
Readback The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO.  
Instrument S/W Revision Prior to A.02.00

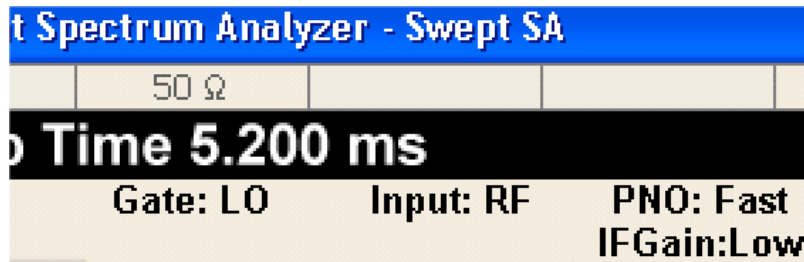
### Gate On/Off

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.



<b>Remote Command:</b>	[ :SENSe ] :SWEep:EGATe[ :STATe ] OFF ON 0 1 [ :SENSe ] :SWEep:EGATe[ :STATe ] ?
Example:	SWE:EGAT ON SWE:EGAT?
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:	<b>Sweep/Control, Gate</b>
Instrument S/W Revision:	Prior to A.02.00

### 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

## Sweep / Control

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.

**Remote Command** [ :SENSe ] :SWEep :EGATe :VIEW ON | OFF | 1 | 0  
[ :SENSe ] :SWEep :EGATe :VIEW?

**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 press 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 1167](#).

- 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 when you want to set Gate View Sweep Time.

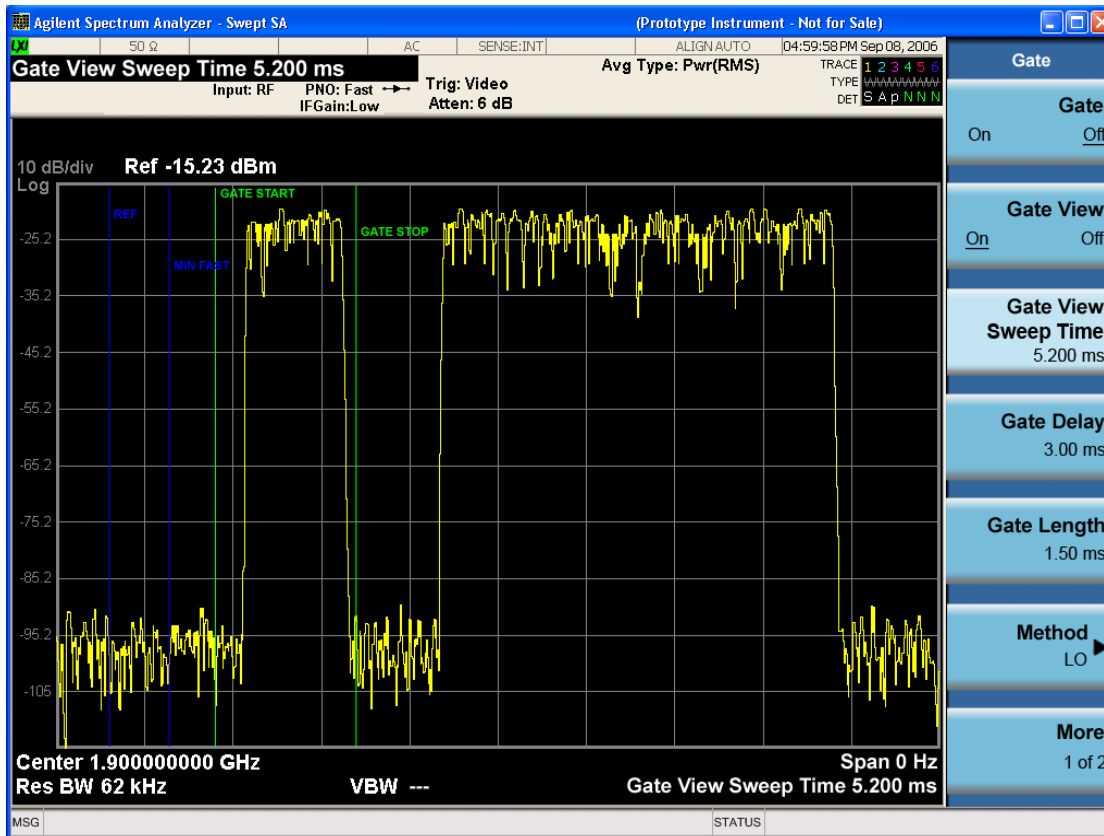
In the other measurements:

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.

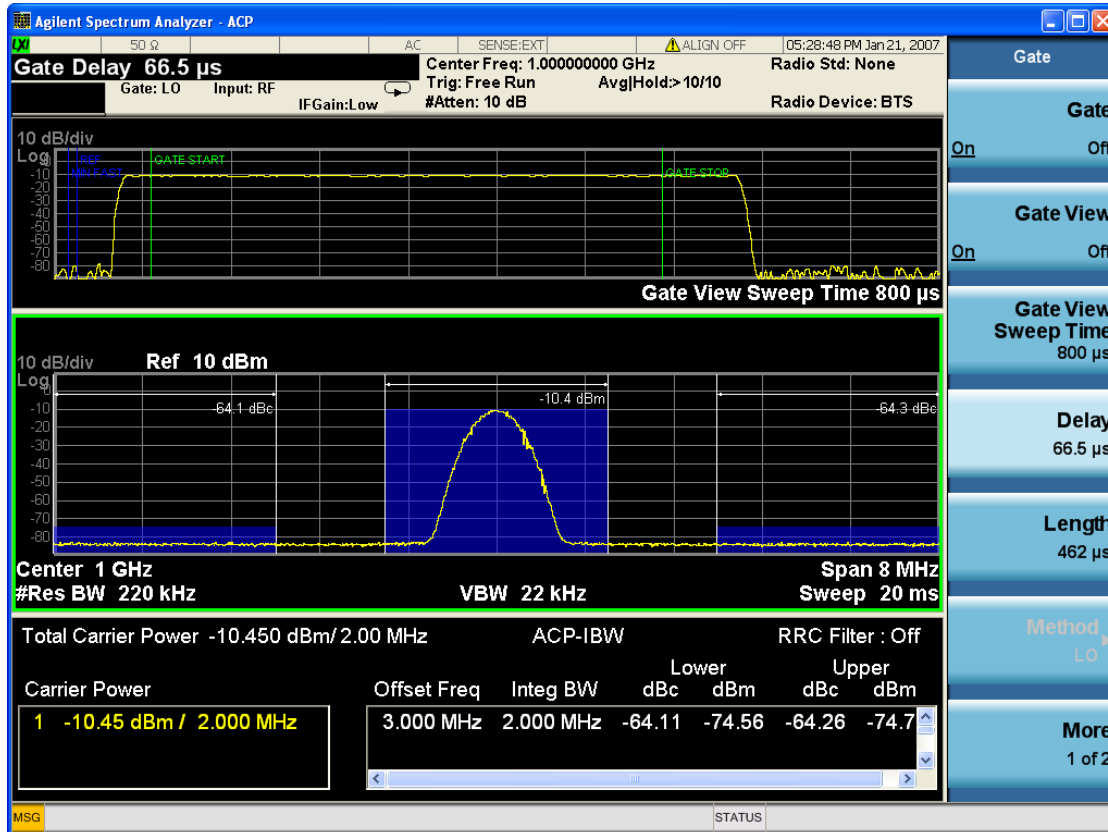
Key Path	<b>Sweep/Control, Gate</b>
Preset	OFF
State Saved	Saved in state
Range	On Off
Instrument S/W Revision	Prior to A.02.00

A sample of the Gate View screen in the Swept SA measurement is shown below:



A sample of the Gate View screen in other measurements is shown below. This example is for the ACP measurement:

## Sweep / Control



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.

- 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  $t = t_{min} + GateDelay + GateLength$ .

Preset: 519.3  $\mu$ s  
WiMAX OFDMA: 5 ms  
GSM/EDGE: 1 ms

State Saved: Saved in state

Min: 1  $\mu$ s

Max: 6000 s

Key Path: **Sweep/Control, Gate**

Instrument S/W Revision: Prior to A.02.00

## Sweep / Control

### Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

<b>Remote Command:</b>	[ :SENSe ] :SWEep :EGATe :DELay <time> [ :SENSe ] :SWEep :EGATe :DELay?
Example:	SWE:EGAT:DELay 500ms SWE:EGAT:DELay?
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:	<b>Sweep/Control, Gate</b>
Instrument S/W Revision:	Prior to A.02.00

### Gate Length

Controls the length of time that the gate is on after it opens.

<b>Remote Command:</b>	[ :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

vsd 39-1

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:	<b>Sweep/Control, Gate</b>
Instrument S/W Revision:	Prior to A.02.00

## Method

This lets you choose one of the three different types of gating.

Not all types of gating are available for all measurements.

<b>Remote Command:</b>	[ :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:	<b>Sweep/Control, Gate</b>
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Sweep/Control, Gate, Method</b>
Readback:	LO

## Sweep / Control

Instrument S/W Revision: Prior to A.02.00

**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 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**

Readback: Video

Instrument S/W Revision: Prior to A.02.00

**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**  
 Readback: FFT  
 Instrument S/W Revision: Prior to A.02.00

### 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: Prior to A.02.00

### 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

## Sweep / Control

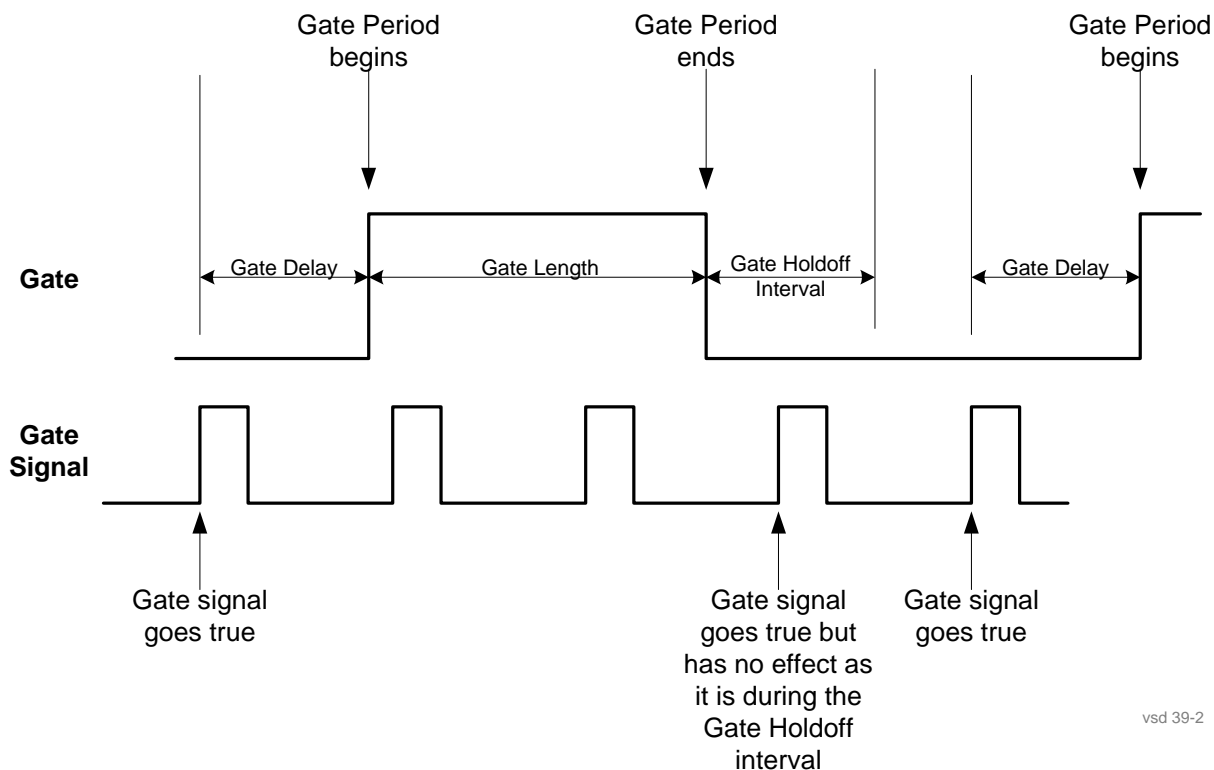
Key Path: **Sweep/Control, Gate**

Instrument S/W Revision: Prior to A.02.00

### 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, 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 the

manually set holdoff is returned to a query.

<b>Remote Command</b>	<pre>[ :SENSe ] :SWEep :EGATe :HOLDoff &lt;time&gt; [ :SENSe ] :SWEep :EGATe :HOLDoff ? [ :SENSe ] :SWEep :EGATe :HOLDoff :AUTO OFF   ON   0   1 [ :SENSe ] :SWEep :EGATe :HOLDoff :AUTO ?</pre>
Dependencies/Couplings	<p>When <b>Gate Holdoff</b> is <b>Auto</b>, the <b>Gate Holdoff</b> key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the <b>Gate Holdoff</b> key while it is in <b>Auto</b> 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 <b>Man</b>.</p> <p>Pressing the <b>Gate Holdoff</b> key, while it is in <b>Auto</b> and selected, does not change the value of <b>Gate Holdoff</b>, but causes the setting to change to <b>Man</b>. Now you can adjust the value.</p> <p>Pressing the key while it is in <b>Man</b> and selected, cause the value to change back to <b>Auto</b>.</p> <p>Pressing the key while it is in <b>Man</b> and not selected, causes the key to become selected and allows you to adjust the value.</p> <p>When <b>Method</b> is set to <b>Video</b> or <b>FFT</b>, the <b>Gate Holdoff</b> function has no effect.</p> <p>See Coupling, above</p>
Example	<pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre>
Key Path	<b>Sweep/Control, Gate</b>
Mode	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO
Preset	Auto Auto/On
State Saved	Saved in instrument state.
Min	1 $\mu$ sec
Max	1 sec
Instrument S/W Revision	Prior to A.02.00

### 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.

## Sweep / Control

You can select between uncompensated operation and two types of compensation, **Delay Until RBW Settled** and **Compensate for RBW Group Delay**.

See “[More Information](#)” on page 1174

<b>Remote Command:</b>	[ :SENSe ] :SWEep:EGATe:DELaY:COMPensatiOn:TYPE OFF SETTled GDELaY  [ :SENSe ] :SWEep:EGATe:DELaY:COMPensatiOn:TYPE?
Example:	SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE?
Scope:	Meas Global
Range:	Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay
Readback text:	Uncompensated Settled 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:	<b>Sweep/Control, Gate</b>
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. This is a non-forceful grayout, so 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:	Prior to A.02.00

### More Information

Selecting **Uncompensated** means that the actual gate delay is as you set it.

Selecting **Delay Until RBW Settled** causes the gate delay to be increased above the user 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 (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.

**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 the user 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 1163](#). 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?

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## Sweep / Control



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## 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	<b>Front-panel key</b>
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## 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 1181](#)

See [“RF Trigger Source” on page 1183](#)

See [“I/Q Trigger Source” on page 1184](#)

See [“More Information” on page 1185](#)

### 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	<p>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.</p> <p>Not all trigger sources are available for each input. See the “<a href="#">RF Trigger Source</a>” on page 1183 and “<a href="#">I/Q Trigger Source</a>” on page 1184 commands (below) for detailed information on which trigger sources are available for each input.</p> <p>Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.</p> <p>*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.</p> <p>Available ranges and presets can vary from mode to mode.</p>
SCPI Status Bits/OPC Dependencies	<p>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.</p>
Key Path	<b>Front-panel key</b>
Preset	See table below
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## 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 TriggerSource 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	

## Trigger

Meas	Mode	Preset for RF	Preset for IQ	Notes
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, 1xE V-DO, DVB-T/H	IMM	IQ not supported	
SEM	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB	SA, WCDMA, C2K, TD-SCDMA, WIMAX OFDMA: IMMediate 1xEVDO(BTS): EXTernal1	IQ not supported	
CDP	WCDMA	IMM	IMM	
RHO	WCDMA	IMM	IMM	
PCON	WCDMA	IMM	IMM	
QPSK	WCDMA, C2K, 1xEVDO	All except CDMA 1xEVDO: IMMediate CDMA 1xEVDO: EXT1	IMM	
MON	All except SA and BASIC	IMM	IQ not supported	
WAV		All except GSM/EDGE: IMMediate GSM/EDGE: RFBurst	All except GSM/EDGE: IMMediate GSM/EDGE: IQMag	
PVT	WIMAX OFDMA	RFB	IMM	
EVM	WIMAX OFDMA, DVB-T/H, DTMB	IMM	IMM	

Meas	Mode	Preset for RF	Preset for IQ	Notes
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	
Combined WCDMA	WCDMA	IMM	IQ not supported	
Combined 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?
```

## Trigger

Example:	<p>TRIG:ACP:RF:SOUR EXT1</p> <p>Selects the external 1 trigger input for the ACP measurement and the RF input</p> <p>TRIG:RF:SOUR VID</p> <p>Selects video triggering for the SANalyzer measurement and the RF input. For SAN, do not use the &lt;measurement&gt; keyword.</p>
Remote Command Notes:	<p>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.</p> <p>Not all trigger sources are available for each input. For the <b>RF Trigger Source</b>, the following trigger sources are available:</p> <ul style="list-style-type: none"><li>— IMMEDIATE - free run triggering</li><li>— VIDEO - triggers on the video signal level</li><li>— LINE - triggers on the power line signal</li><li>— EXTERNAL1 - triggers on an externally connected trigger source on the rear panel</li><li>— EXTERNAL2 - triggers on an externally connected trigger source on the front panel</li><li>— RFBURST - triggers on the bursted frame</li><li>— FRAME - triggers on the periodic timer</li><li>— IF (video) - same as video, for backwards compatibility only</li><li>— ALARM – LXI Alarm</li><li>— LAN – LXI LAN event</li></ul> <p>*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.</p> <p>Available ranges, and presets can vary from mode to mode.</p>
SCPI Status Bits/OPC Dependencies:	<p>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.</p>
Instrument S/W Revision:	Prior to A.02.00

### 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|IINPut  
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:       Prior to A.02.00

## 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

## Trigger

measurement only with 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 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.

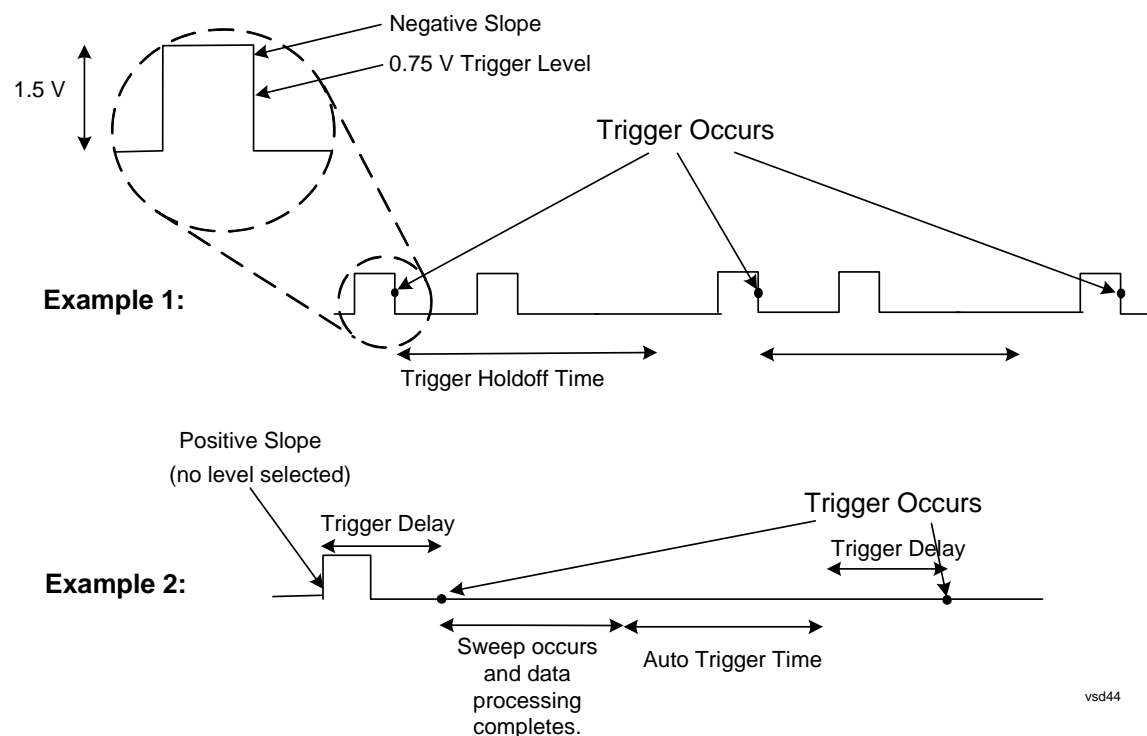
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into 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:	<b>Trigger</b>	
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:	Prior to A.02.00	

## 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.

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**NOTE** When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

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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:	<b>Trigger</b>	
Notes:	Log Plot and Spot Frequency measurements do not support Video Trigger	

## 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: Prior to A.02.00

### 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 source.

**Remote Command:** :TRIGger[:SEquence]:VIDeo:LEVel <ampl>  
:TRIGger[:SEquence]:VIDeo:LEVel?

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: **Trigger, Video**

Default Unit: depends on the current selected Y axis unit

Instrument S/W Revision: Prior to A.02.00

### 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:** :TRIGger[:SEquence]:VIDeo:SLOPe POSitive|NEGative  
:TRIGger[:SEquence]:VIDeo:SLOPe?

Example: TRIG:VID:SLOP NEG

Preset:	POSitive
State Saved:	Saved in instrument state.
Key Path:	<b>Trigger, Video</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:TRIGger[:SEquence]:VIDeo:DELAy <time> :TRIGger[:SEquence]:VIDeo:DELAy? :TRIGger[:SEquence]:VIDeo:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:VIDeo:DELAy:STATe?
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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:	<b>Trigger, Video</b>
Default Unit:	s
Instrument S/W Revision:	Prior to A.02.00

### 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.

## Trigger

**Key Path:** **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:** Prior to A.02.00

### 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:** :TRIGger[:SEquence]:LINE:SLOPe POSitive|NEGative  
:TRIGger[:SEquence]:LINE:SLOPe?

**Example:** TRIG:LINE:SLOP NEG

**Preset:** POSitive

**State Saved:** Saved in instrument state.

**Key Path:** **Trigger, Line**

**Instrument S/W Revision:** Prior to A.02.00

### 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]:LINE:DELay <time>  
:TRIGger[:SEquence]:LINE:DELay?  
:TRIGger[:SEquence]:LINE:DELay:STATe OFF|ON|0|1  
:TRIGger[:SEquence]:LINE:DELay:STATe?

**Example:** TRIG:LINE:DEL:STAT ON

TRIG:LINE:DEL 100 ms

**Preset:** Off, 1.000 us

**State Saved:** Saved in instrument state.

**Min:** -150 ms

**Max:** 500 ms

Key Path:	<b>Trigger, Line</b>
Default Unit:	S
Instrument S/W Revision:	Prior to A.02.00

## 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:	<b>Trigger</b>
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:	Prior to A.02.00
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## Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

<b>Remote Command:</b>	: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

## Trigger

Key Path: **Trigger, External 1**  
Default Unit: V  
Instrument S/W Revision: Prior to A.02.00

### 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:** :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive|NEGative  
:TRIGger[:SEquence]:EXTernal1:SLOPe?

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: **Trigger, External 1**

Instrument S/W Revision: Prior to A.02.00

### 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]:EXTernal1:DELAy <time>  
:TRIGger[:SEquence]:EXTernal1:DELAy?  
:TRIGger[:SEquence]:EXTernal1:DELAy:STATe OFF|ON|0|1  
:TRIGger[:SEquence]:EXTernal1:DELAy:STATe?

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: **Trigger, External 1**

Default Unit: s



Instrument S/W Revision: Prior to A.02.00

## 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:	<b>Trigger</b>
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: Prior to A.02.00

## Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

<b>Remote Command:</b>	: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:	<b>Trigger, External 2</b>
Default Unit:	V

## Trigger

Instrument S/W Revision: Prior to A.02.00

### 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:** :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive|NEGative  
:TRIGger[:SEquence]:EXTernal2:SLOPe?

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: **Trigger, External 2**

Instrument S/W Revision: Prior to A.02.00

### 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]:EXTernal2:DELAy <time>  
:TRIGger[:SEquence]:EXTernal2:DELAy?  
:TRIGger[:SEquence]:EXTernal2:DELAy:STATe OFF|ON|0|1  
:TRIGger[:SEquence]:EXTernal2:DELAy:STATe?

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: **Trigger, External 2**

Default Unit: s

Instrument S/W Revision: Prior to A.02.00

## 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:	<b>Trigger</b>	
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:	Prior to A.02.00	

### 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:**                         **Trigger, RF Burst**

**Default Unit:**                    Absolute: depends on the current selected Y-Axis unit  
  Relative: dB or dBc

**Instrument S/W Revision:**        Prior to A.02.00

### 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:	<b>Trigger, RF Burst</b>
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Trigger, RF Burst</b>
Default Unit:	s
Instrument S/W Revision:	Prior to A.02.00

### 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:	<b>Trigger</b>
Readback:	[Sync: <value of Sync Source>], for example, [Sync: External 1]
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: Prior to A.02.00

### 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.

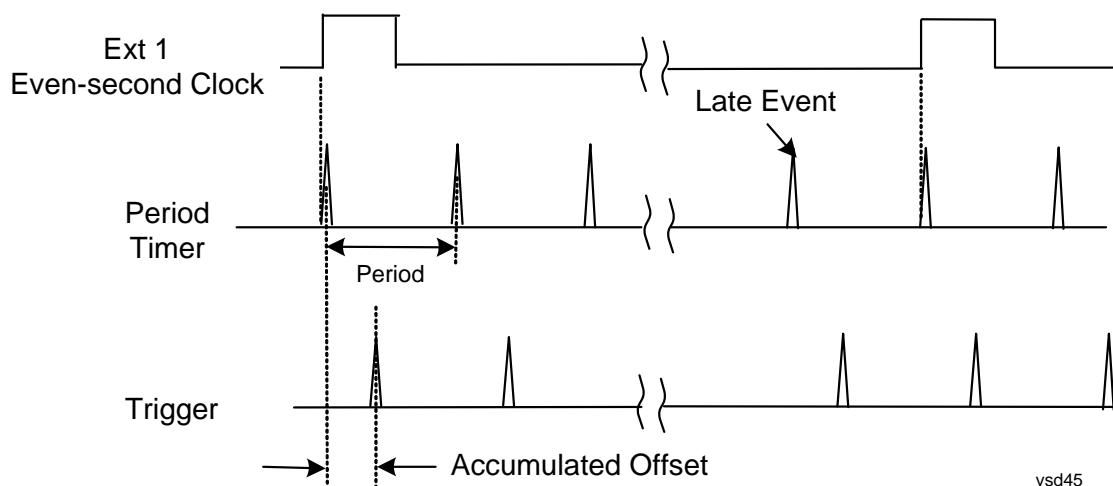
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source 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: **Trigger, Periodic Timer**

Default Unit: S

Instrument S/W Revision: Prior to A.02.00

## 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,

## Trigger

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 knob or the SCPI adjust command, serves to delay the timing of the trigger event.

<b>Remote Command:</b>	<code>:TRIGger[:SEquence]:FRAMe:OFFSet &lt;time&gt;</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:	<b>Trigger, Periodic Timer</b>
Default Unit:	S
Instrument S/W Revision:	Prior to A.02.00

**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.

<b>Remote Command:</b>	<code>:TRIGger[:SEquence]:FRAMe:ADJust &lt;time&gt;</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:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet
Example:	TRIG:FRAM:OFFS:DISP:RES
Key Path:	<b>Trigger, Periodic Timer</b>
Instrument S/W Revision:	Prior to A.02.00

### 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

## Trigger

which menu it is accessed from.

<b>Remote Command:</b>	: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:	<b>Trigger, Periodic Timer</b>
Readback:	The current setting is read back to this key and it is also Readback to the previous <b>Periodic Timer</b> trigger key.
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Trigger, Periodic Timer, Sync Source</b>
Readback:	Off
Instrument S/W Revision:	Prior to A.02.00

**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:	<b>Trigger, Periodic Timer, Sync Source</b>
Readback:	External 1
Instrument S/W Revision:	Prior to A.02.00

**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: **Trigger, Periodic Timer, Sync Source**  
 Readback: External 2  
 Instrument S/W Revision: Prior to A.02.00

**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: **Trigger, Periodic Timer, Sync Source**  
 Readback: RF Burst  
 Instrument S/W Revision: Prior to A.02.00

### 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: **Trigger, Periodic Timer**  
 Default Unit: s  
 Instrument S/W Revision: Prior to A.02.00

### 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

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duration is less than 1 ms and this value will need to be changed.

<b>Remote Command:</b>	: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
Max:	+500 ms
Key Path:	<b>Trigger, Periodic Timer</b>
Default Unit:	s
Instrument S/W Revision:	Prior to A.02.00

## 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.

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<b>NOTE</b>	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.
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Key Path	<b>Trigger</b>
Mode	SA, IQ(Basic)
Preset	ON
State Saved	Saved in instrument state.
Readback	The LXI trigger source that becomes active when this key is selected is displayed. The possible values are "LAN Event" and "Alarm"
Instrument S/W Revision	Prior to A.02.00

## 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 1204). Pressing this key when it is already selected accesses the LAN

trigger setup menu.

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**NOTE** Pressing this button causes Enabled LXI Alarm Triggers to be ignored, since the Trigger source is changed to LXI LAN Event

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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.
Key Path	<b>Trigger, LXI Trigger</b>
Mode	SA, IQ(Basic)
Preset	ON
State Saved	Saved in instrument state.
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**Disable All** Sets the Enable parameter of every member of the LXI LAN Event list to OFF.

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:LAN:DISable:ALL
Example	:TRIG:LXI:LAN:DIS:ALL
Key Path	<b>Trigger LXI Trigger, LAN Event</b>
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	: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"

## Trigger

Key Path	<b>Trigger LXI Trigger, LAN Event</b>
Mode	SA, IQ(Basic)
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
State Saved	Saved in instrument state.
Readback	Displays the value of the LXI Trigger LAN Event parameter (Enabled Disabled).
Instrument S/W Revision	Prior to A.02.00

**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" caused 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.

<b>Remote Command</b>	<code>:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection "LANEVENT", HIGH LOW RISE FALL</code>
Example	<code>:TRIG:LXI:LAN:DET "LAN0",HIGH</code>
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Key Path	<b>Trigger LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	HIGH
State Saved	Saved in instrument state.
Range	HIGH   LOW   RISE   FALL
Readback	Currently selected detection type
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	<code>:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection? "LANEVENT"</code>
Example	<code>:TRIG:LXI:LAN:DET? "LAN0"?</code>
Restriction and Notes	If a non existent LAN event is passed in the lanEvent argument, the command is ignored
Key Path	<b>Trigger LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	HIGH

State Saved	Saved in instrument state.
Range	HIGH   LOW   RISE   FALL
Readback	Currently selected detection type
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEQuence]:LXI:LAN[:SET]:DElay "LANEVENT", <time>
Example	:TRIG:LXI:LAN:DEL "LAN0",5S
Key Path	<b>Trigger, LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	:TRIGger[:SEQuence]:LXI:LAN[:SET]:DElay? "lanEvent "
Example	:TRIG:LXI:LAN:DEL? "LAN0"
Key Path	<b>Trigger, LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEQuence]:LXI:LAN[:SET]:ENABled "LANEVENT", ON OFF 1 0
Example	:TRIG:LXI:LAN:ENAB "LAN0",ON
Key Path	<b>Trigger, LXI Trigger, LAN Event, &lt;lanEvent&gt;</b>

## Trigger

Mode	SA, IQ(Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	Prior to A.02.00

**Remote Command** :TRIGger [ :SEquence ] :LXI :LAN [ :SET ] :ENABled? "LANEVENT"

Example :TRIG:LXI:LAN:ENAB? "LAN0"

Key Path **Trigger, LXI Trigger, LAN Event, <lanEvent>**

Mode	SA, IQ(Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Instrument S/W Revision	Prior to A.02.00

**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 reflect the new number of key panels in the LAN source menu.

**Remote Command** :TRIGger [ :SEquence ] :LXI :LAN :ADD "LANEVENT"

Example :TRIG:LXI:LAN:ADD "LANEVENT"

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.

Mode	SA, IQ(Basic)
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger [ :SEquence ] :LXI :LAN :REMove [ :EVENT ] "LANEVENT"
Example	:TRIG:LXI:LAN:REM "LANEVENT"
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.
Mode	SA, IQ(Basic)
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	: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.
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

**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:

## Trigger

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

**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?

Restriction and Notes The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.

Mode SA, IQ(Basic)

Preset "" (empty string)

State Saved Saved in instrument state.

Range Uppercase, Lowercase, Numeric, Symbol

Instrument S/W Revision Prior to A.02.00

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

**Remote Command** :TRIGger[:SEquence]:LXI:LAN:COUNT?

Example :TRIG:LXI:LAN:COUN?

Mode SA, IQ(Basic)

Instrument S/W Revision Prior to A.02.00

**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.

**Remote Command** :TRIGger[:SEquence]:LXI:LAN[:SET]:IDENtifier  
"LANEVENT", "identifier"  
:TRIGger[:SEquence]:LXI:LAN[:SET]:IDENtifier?  
"LANEVENT"

Example :TRIG:LXI: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.

Mode SA, IQ(Basic)

State Saved Saved in instrument state.

Range	Uppercase, Lowercase, Numeric, Symbol
Instrument S/W Revision	Prior to A.02.00

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

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:LAN[:SET]:CONFigure "lanEvent", <enable>, <detection>, <delay>,<filter>,<identifier>
Example	:TRIG:LXI:LAN:CONF "LAN0",1,FALL,0.0,"ALL","debugIdentifier"
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

## 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 1204](#)). 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.
Key Path	<b>Trigger LXI Trigger</b>
Mode	SA, IQ(Basic)
Preset	ON
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**Disable All** This key causes all Alarms in the trigger alarm list to go into the disabled state. (Enabled = OFF)

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:ALARm:DISable:ALL
Example	:TRIG:LXI:ALAR:DIS:ALL
Key Path	<b>Trigger, LXI Trigger, Alarm</b>
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

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**Alarm List** After selecting Alarm as the trigger source, you are presented with a list of possible alarms. Pressing an alarm (e.g. "ALARM0") branches to the alarm setup menu.

<b>Remote Command</b>	:TRIGger [ :SEQuence ] :LXI :ALARm :LIST?
Example	:TRIG:LXI:ALAR:LIST? Returns the complete list of Alarm events which is: "ALARM0"
Key Path	<b>Trigger, LXI Trigger, Alarm</b>
Mode	SA, IQ(Basic)
Preset	"ALARM0"
State Saved	Saved in instrument state.
Readback	Displays the value of the LXI Trigger Alarm Enabled parameter (Enabled Disabled).
Instrument S/W Revision	Prior to A.02.00

**Date/Time** Absolute alarm time sets an alarm for one specific time using the date and time of day (e.g. 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 1215](#).

The date and time the alarm is scheduled to go off is noted on the branch key.

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**NOTE** 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.

---

Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Readback	Annotated with the date and time the alarm is scheduled to go off.
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	: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	<p>"date" is a representation of the date the alarm should occur in the form of "YYYY/MM/DD" where:</p> <p>YYYY is the four digit representation of year. (for example, 2007)</p> <p>MM is the two digit representation of month. (for example. 01 to 12)</p> <p>DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year)</p> <p>"time" is a representation of the time of day the alarm should occur in the form of "HH:MM:SS.SSSSSS" where:</p> <p>HH is the two digit representation of the hour in 24 hour format</p> <p>MM is the two digit representation of minute</p> <p>SS.SSSSSS is a real representing seconds (for example 02.123456)</p>
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>
Mode	SA, IQ(Basic)
Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00
<b>Remote Command</b>	<b>:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolute? "alarmEvent"</b>
Example	<p>:TRIG:LXI:ALAR:TIME:ABS? "ALARM0"</p> <p>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)".</p>
Remote Command Notes	<p>&lt;date&gt; is a representation of the date the alarm should occur in the form of YYYY/MM/DD where:</p> <p>YYYY is the four digit representation of year. (for example, 2007)</p> <p>MM is the two digit representation of month. (for example. 01 to 12)</p> <p>DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year)</p> <p>&lt;time&gt; is a representation of the time of day the alarm should occur in the form of HH:MM:SS.SSSSSS where:</p> <p>HH is the two digit representation of the hour in 24 hour format</p> <p>MM is the two digit representation of minute</p> <p>SS.SSSSSS is a real representing seconds (for example 02.123456)</p>
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>
Mode	SA, IQ(Basic)

## Trigger

Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>
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.
Instrument S/W Revision	Prior to A.02.00

**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 "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.
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Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>
Mode	SA, IQ(Basic)
Preset	00:00:00.000000
State Saved	Saved in instrument state.
Range	00:00:00.000000 – 23:59:59.999999
Instrument S/W Revision	Prior to A.02.00

**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 1215](#)), 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 synch.

Restriction and Notes	Alarm times are settable to microsecond resolution.
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;,Time</b>
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue] "alarmEvent", <seconds>, <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME "ALARM0",123456.0 S, 0.123456
Restriction and Notes	Values representing a time in the past result in an error.
Mode	SA, IQ(Basic)
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) FractionalSeconds: 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 FractionalSeconds: 0.0 – 0.999999
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]?
Example	:TRIG:LXI:ALAR:TIME?
Restriction and Notes	Values representing a time in the past result in an error.
Mode	SA, IQ(Basic)
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) FractionalSeconds: 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 FractionalSeconds: 0.0 – 0.999999
Instrument S/W Revision	Prior to A.02.00

**Epoch Time Seconds (Remote only)** Sets the seconds portion of the LXI Alarm time. This represents the number

## Trigger

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.

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds "alarmEvent", <seconds>
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0",123456.0 S
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Mode	SA, IQ(Basic)
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
Instrument S/W Revision	Prior to A.02.00

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME:SEConds? "alarmEvent "
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0"?
Restriction and Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
Mode	SA, IQ(Basic)
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
Instrument S/W Revision	Prior to A.02.00

**Epoch Time Fraction (Remote Only)** Sets the sub-second value of the Epoch time.

<b>Remote Command</b>	:TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACti on "alarmEvent", <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0",0.123456 S
Restriction and Notes	Values representing a time in the past result in an error.
Mode	SA, IQ(Basic)
Preset	0



State Saved Saved in instrument state.

Range 0.0 – 0.999999

Instrument S/W Revision Prior to A.02.00

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACtion? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:FRAC "ALARM0"?

Restriction and Notes Values representing a time in the past result in an error.

Mode SA, IQ(Basic)

Preset 0

State Saved Saved in instrument state.

Min 0.0

Max 0.999999

Instrument S/W Revision Prior to A.02.00

**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.

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELative "alarmEvent", <seconds>

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0",60.0s

Mode SA, IQ(Basic)

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision Prior to A.02.00

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:TIME[:VALue]:RELative? "alarmEvent"

Example :TRIG:LXI:ALAR:TIME:REL "ALARM0"?

Mode SA, IQ(Basic)

Range 0.0 – 1.7976931348623157 x 10308 (Max Double)

Instrument S/W Revision Prior to A.02.00

**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>

## Trigger

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
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Instrument S/W Revision	Prior to A.02.00

**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
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	0.0 s
State Saved	Saved in instrument state.
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Instrument S/W Revision	Prior to A.02.00

**Repetitions** Sets the number of times a repeating alarm should fire once the initial alarm time has occurred.

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:REPeat  
"alarmEvent", <repetitions>

Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	1
State Saved	Saved in instrument state.
Range	1 – 2,147,483,647
Instrument S/W Revision	Prior to A.02.00

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:REPeat?  
"alarmEvent"

Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	2,147,483,647
Instrument S/W Revision	Prior to A.02.00

**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** :TRIGger[:SEquence]:LXI:ALARm[:SET]:ENABled  
"alarmEvent",ON|OFF|1|0

Example	:TRIG:LXI:ALAR:ENAB "ALARM0",ON
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	1 0
Instrument S/W Revision	Prior to A.02.00

**Remote Command** :TRIGger[:SEquence]:LXI:ALARm[:SET]:ENABled?  
"alarmEvent"

Example	:TRIG:LXI:ALAR:ENAB "ALARM0"?
Key Path	<b>Trigger, LXI Trigger, Alarm, &lt;alarmEvent&gt;</b>
Mode	SA, IQ(Basic)
Preset	OFF
State Saved	Saved in instrument state.
Range	1 0
Instrument S/W Revision	Prior to A.02.00

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

## Trigger

command.

<b>Remote Command</b>	: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
Mode	SA, IQ(Basic)
Instrument S/W Revision	Prior to A.02.00

**Count (Remote Only)** Returns the number of alarms in the LXI Trigger Alarm List.

<b>Remote Command:</b>	:TRIGger1 TRIGger[:SEquence]:LXI:ALARm:COUNT?
Example:	:TRIG:LXI:ALAR:COUN?
Instrument S/W Revision:	Prior to A.02.00

## 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.

Key Path	<b>Trigger</b>
Mode	SA, IQ(Basic)
State Saved	No
Readback	The Baseband I/Q trigger source that becomes active when this key is selected is displayed. The possible values are "I/Q Mag", "I", "Q", "Input I", "Input Q", and "Aux I/Q Mag".
Instrument S/W Revision	Prior to A.02.00

## 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.

Example	TRIG:<meas>:SOUR IQM
Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	I/Q Mag
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:IQMag:LEVel <amp1 > :TRIGger[:SEquence]:IQMag:LEVel?
Remote Command Notes	The I/Q reference impedance is used for converting between power and voltage.
Example	TRIG:IQM:LEV -30 dBm
Key Path	<b>Trigger, Baseband I/Q, I/Q Mag</b>
Preset	-25 dBm
State Saved	Saved in instrument state.
Range	-200 dBm to 100 dBm
Readback Text	<level> dBm
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEquence]:IQMag:SLOPe POSitive   NEGative :TRIGger[:SEquence]:IQMag:SLOPe?
Example	TRIG:IQM:SLOP POS
Key Path	<b>Trigger, Baseband I/Q, I/Q Mag</b>
Preset	POSitive
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:IQMag:DELay <time> :TRIGger[:SEquence]:IQMag:DELay? :TRIGger[:SEquence]:IQMag:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IQMag:DELay:STATe?
Example	TRIG:IQM:DEL 10 ms TRIG:IQM:DEL:STAT ON
Key Path	<b>Trigger, Baseband I/Q, I/Q Mag</b>

## Trigger

Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	TRIG:<meas>:SOUR IDEM
Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	I
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:IDEMod:LEVel <voltage> :TRIGger[:SEquence]:IDEMod:LEVel?
Example	TRIG:IDEM:LEV 0.5 V
Key Path	<b>Trigger, Baseband I/Q, I (Demodulated)</b>
Preset	0.25 V
State Saved	Saved in instrument state.
Range	-1 to 1 V
Readback Text	0.1 of displayed unit (V, mV, etc.)
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEquence]:IDEMod:SLOPe POSitive   NEGative :TRIGger[:SEquence]:IDEMod:SLOPe?
Example	TRIG:IDEM:SLOP POS
Key Path	<b>Trigger, Baseband I/Q, I (Demodulated)</b>
Preset	POSitive

State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:IDEMod:DELay <time> :TRIGger[:SEquence]:IDEMod:DELay? :TRIGger[:SEquence]:IDEMod:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IDEMod:DELay:STATe?
Example	TRIG:IDEM:DEL 10 ms TRIG:IDEM:DEL:STAT ON
Key Path	<b>Trigger, Baseband I/Q, I (Demodulated)</b>
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

### Q (Demodulated)

Pressing this key, when it is not selected, selects the main receiver's output Q voltage as the trigger. The Q (Demodulated) trigger condition is met when the Q voltage crosses the Q voltage trigger level.

Example	TRIG:<meas>:SOUR QDEM
Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	Q
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:QDEMod:LEVel <voltage> :TRIGger[:SEquence]:QDEMod:LEVel?
Example	TRIG:QDEM:LEV 0.5 V
Key Path	<b>Trigger, Baseband I/Q, Q (Demodulated)</b>
Preset	0.25 V

## Trigger

State Saved	Saved in instrument state.
Range	-1 to 1 V
Readback Text	0.1 of displayed unit (V, mV, etc.)
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEQuence]:QDEMod:SLOPe POSitive   NEGative :TRIGger[:SEQuence]:QDEMod:SLOPe?
Example	TRIG:QDEM:SLOP POS
Key Path	<b>Trigger, Baseband I/Q, Q (Demodulated)</b>
Preset	POSitive
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEQuence]:QDEMod:DELay <time> :TRIGger[:SEQuence]:QDEMod:DELay? :TRIGger[:SEQuence]:QDEMod:DELay:STATe OFF ON 0 1 :TRIGger[:SEQuence]:QDEMod:DELay:STATe?
Example	TRIG:QDEM:DEL 10 ms TRIG:QDEM:DEL:STAT ON
Key Path	<b>Trigger, Baseband I/Q, Q (Demodulated)</b>
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

## 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.

Example	TRIG:<meas>:SOUR IINP
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Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	Input I
Instrument S/W Revision	Prior to A.02.00

**Trigger Level** Sets a level for the Input I trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

<b>Remote Command</b>	:TRIGger[:SEquence]:IINPut:LEVel <voltage> :TRIGger[:SEquence]:IINPut:LEVel?
-----------------------	---

Example TRIG:IINP:LEV 0.5 V

Key Path	<b>Trigger, Baseband I/Q, Input I</b>
Preset	0.25 V
State Saved	Saved in instrument state.
Range	-1 to 1 V
Readback Text	0.1 of displayed unit (V, mV, etc.)
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEquence]:IINPut:SLOPe POSitive   NEGative :TRIGger[:SEquence]:IINPut:SLOPe?
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Example TRIG:IINP:SLOP POS

Key Path	<b>Trigger, Baseband I/Q, Input I</b>
Preset	POSitive
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:IINPut:DELay <time> :TRIGger[:SEquence]:IINPut:DELay? :TRIGger[:SEquence]:IINPut:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:IINPut:DELay:STATe?
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Example TRIG:IINP:DEL 10 ms  
TRIG:IINP:DEL:STAT ON

## Trigger

Key Path	<b>Trigger, Baseband I/Q, Input I</b>
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	TRIG:<meas>:SOUR QINP
Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	Input Q
Instrument S/W Revision	Prior to A.02.00

**Trigger Level** Sets a level for the Input Q trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

<b>Remote Command</b>	:TRIGger[:SEquence]:QINPut:LEVel <voltage> :TRIGger[:SEquence]:QINPut:LEVel?
Example	TRIG:QINP:LEV 0.5 V
Key Path	<b>Trigger, Baseband I/Q, Input Q</b>
Preset	0.25 V
State Saved	Saved in instrument state.
Range	-1 to 1 V
Readback Text	0.1 of displayed unit (V, mV, etc.)
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEquence]:QINPut:SLOPe Positive   NEGative :TRIGger[:SEquence]:QINPut:SLOPe?
Example	TRIG:QINP:SLOP POS
Key Path	<b>Trigger, Baseband I/Q, Input Q</b>

Preset	POSitive
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:QINPut:DELay <time> :TRIGger[:SEquence]:QINPut:DELay? :TRIGger[:SEquence]:QINPut:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:QINPut:DELay:STATe?
-----------------------	--

Example	TRIG:QINP:DEL 10 ms TRIG:QINP:DEL:STAT ON
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Key Path **Trigger, Baseband I/Q, Input Q**

Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

### 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.

Example	TRIG:<meas>:SOUR AIQM
Key Path	<b>Trigger, Baseband I/Q</b>
Readback Text	Aux I/Q Mag
Instrument S/W Revision	Prior to A.02.00

**Trigger Level** Sets a level for the I/Q magnitude trigger. When the signal crosses this level, with the chosen slope, the trigger occurs.

<b>Remote Command</b>	:TRIGger[:SEquence]:AIQMag:LEVel <ampl > :TRIGger[:SEquence]:AIQMag:LEVel?
Remote Command Notes	The I/Q reference impedance is used for converting between power and voltage.

## Trigger

Example	TRIG:AIQM:LEV -30 dBm
Key Path	<b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>
Preset	-25 dBm
State Saved	Saved in instrument state.
Range	-200 dBm to 100 dBm
Readback Text	<level> dBm
Instrument S/W Revision	Prior to A.02.00

**Trig Slope** Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

<b>Remote Command</b>	:TRIGger[:SEquence]:AIQMag:SLOPe POSitive   NEGative :TRIGger[:SEquence]:AIQMag:SLOPe?
Example	TRIG:AIQM:SLOP POS
Key Path	<b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>
Preset	POSitive
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command</b>	:TRIGger[:SEquence]:AIQMag:DELay <time> :TRIGger[:SEquence]:AIQMag:DELay? :TRIGger[:SEquence]:AIQMag:DELay:STATe OFF ON 0 1 :TRIGger[:SEquence]:AIQMag:DELay:STATe?
Example	TRIG:AIQM:DEL 10 ms TRIG:AIQM:DEL:STAT ON
Key Path	<b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>
Preset	1 us OFF
State Saved	Saved in instrument state.
Range	-2.5 s to +10 s
Instrument S/W Revision	Prior to A.02.00

**Trigger Center Frequency** This key sets the center frequency to be used by the auxiliary receiver.

<b>Remote Command</b>	:TRIGger[:SEQuence]:AIQMag:CENTer <freq> :TRIGger[:SEQuence]:AIQMag:CENTer?
Restriction and Notes	Trigger CF + 1/2 Trigger BW < Max Trigger CF – 1/2 Trigger BW > Min
Example	:TRIG:AIQM:CENT 10 MHz
Key Path	<b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>
Preset	0 Hz
State Saved	Saved in instrument state.
Range	–40 MHz to 40 MHz
Instrument S/W Revision	Prior to A.02.00

**Trigger Bandwidth** This key sets the information bandwidth used by the auxiliary receiver for the Auxiliary Channel I/Q Magnitude trigger.

<b>Remote Command</b>	:TRIGger[:SEQuence]:AIQMag:BANDwidth <freq> :TRIGger[:SEQuence]:AIQMag:BANDwidth?
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
Key Path	<b>Trigger, Baseband I/Q, Aux Channel I/Q Mag</b>
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
Instrument S/W Revision	Prior to A.02.00

## Trigger

### Auto/Holdoff

Opens up a menu that lets you adjust Auto Trigger and Trigger Holdoff parameters

Key Path	<b>Trigger</b>
Readback line	Displays a summary of the Auto Trig and Holdoff settings, in square brackets First line: Auto Off or Auto On Second Line: "Hldf" followed by: <ul style="list-style-type: none"><li>• If Holdoff is Off, readback Off</li><li>• If Holdoff On and Type = Normal, readback value</li><li>• If Holdoff On and Type = Above, readback value followed by AL</li><li>• If Holdoff On and Type = Below, readback value followed by BL</li><li>• If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal</li></ul>
Instrument S/W Revision	A.02.00

### 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.

<b>Remote Command:</b>	: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:	<b>Trigger, Auto/Holdoff</b>
Default Unit:	s
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	: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
Preset:	Off, 100 ms
State Saved:	Saved in instrument state.
Min:	0 s
Max:	0.5 s
Key Path:	<b>Trigger, Auto/Holdoff</b>
Default Unit:	s
Instrument S/W Revision:	Prior to A.02.00

### Holdoff Type

Lets you set the Trigger Holdoff Type.

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<b>NOTE</b>	Holdoff Type is not supported by all measurements. If the current measurement does not support it, this key will be blank and the Holdoff Type will be Normal. If the Holdoff Type SCPI is sent while in such a measurement, the SCPI will be accepted and the setting remembered, but it will have no effect until a measurement is in force that supports Holdoff Type.
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Trigger Holdoff Type functionality:

#### NORMAL

This is the “oscilloscope” type of trigger holdoff, and is the setting when the Holdoff Type key does not appear. In this type of holdoff, no new trigger will be accepted until the holdoff interval has expired after the previous trigger.

#### ABOVE

If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

#### BELow

If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the

## Trigger

holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

<b>Remote Command:</b>	:TRIGger[:SEquence]:HOLDoff:TYPE NORMal ABOVE BELOW :TRIGger[:SEquence]:HOLDoff:TYPE?
Example:	TRIG:HOLD:TYPE NORM
Mode:	GSM/EDGE
Preset:	All modes but GSM/EDGE: Normal GSM/EDGE: Below
State Saved:	Saved in instrument state.
Key Path:	<b>Trigger, Auto/Holdoff</b>
Instrument S/W Revision:	A.02.00

### Trigger Offset (Remote Command Only)

ESA Backwards Compatibility command

<b>Remote Command:</b>	:TRIGger[:SEquence]:OFFSet <time> :TRIGger[:SEquence]:OFFSet? :TRIGger[:SEquence]:OFFSet:STATe OFF ON 0 1 :TRIGger[:SEquence]:OFFSet:STATe?
Example:	TRIG:OFFS ON TRIG:OFFS -100 ms
Remote Command Notes:	These are ESA commands for trigger offset that allowed you to use a positive or negative delay when in zero span and in a Res BW $\geq$ 1 kHz. For ESA compatibility, X-series analyzers keep track of this offset and add it to the Trigger Delay for line, video or external whenever the value is sent to the hardware, if in Zero Span and RBW $\geq$ 1 kHz.
Preset:	Off, 0 s
State Saved:	Saved in instrument state.
Min:	-11 s
Max:	+11 s
Instrument S/W Revision:	Prior to A.02.00



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## 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	<b>Front-panel key</b>
Instrument S/W Revision	Prior to A.02.00

## Display

The **Display** menu is common to most measurements, and is used for configuring items on the display. Some **Display** menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the **System Display Settings** key apply to all measurements in all modes.

Key Path	<b>View/Display</b>
Instrument S/W Revision	Prior to A.02.00

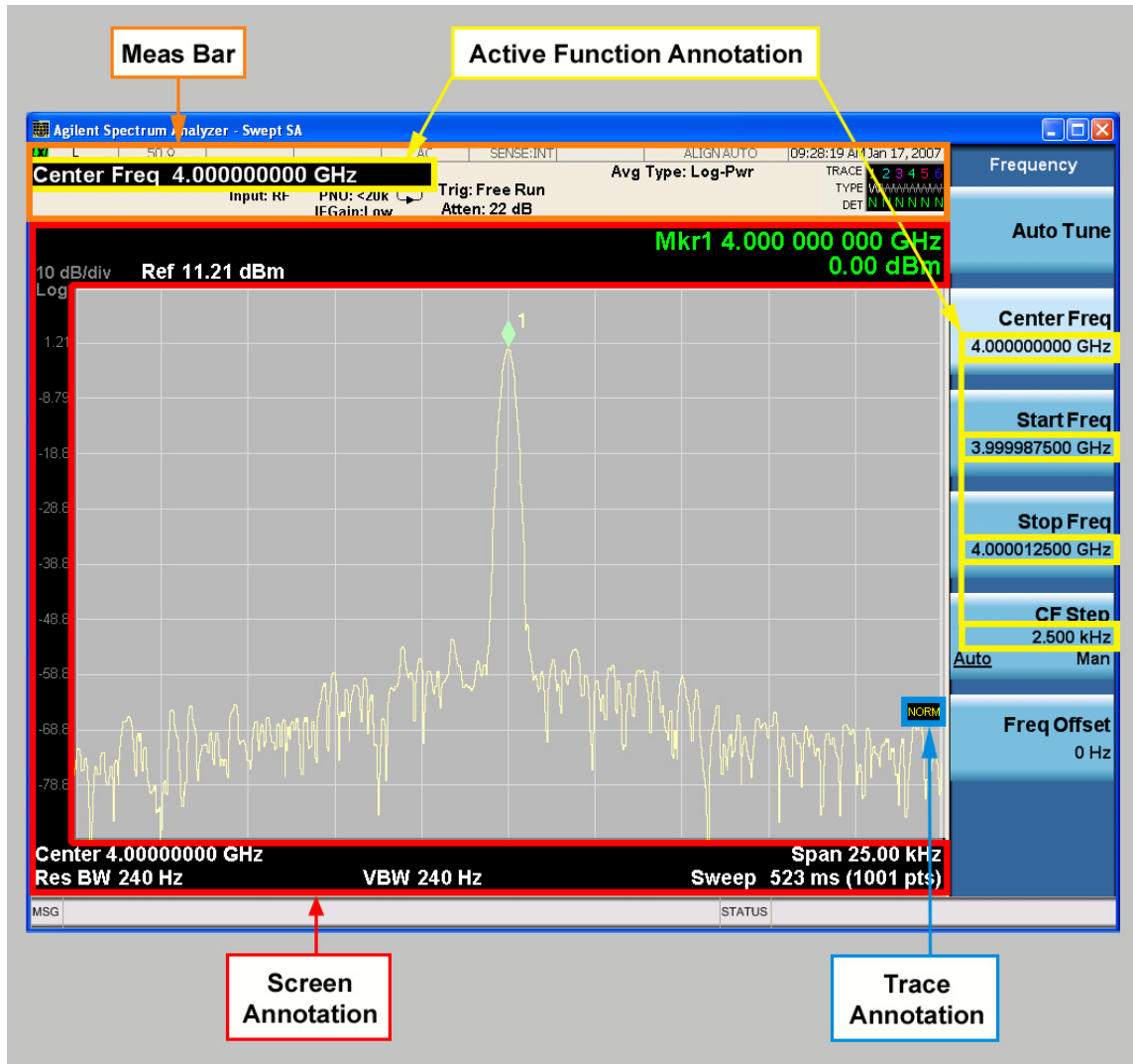
## Annotation

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 figure below. Each type of annotation can be turned on and off individually.

## View/Display



Key Path **View/Display, Display**

Instrument S/W Revision **Prior to A.02.00**

**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 <b>System Display Settings, Annotation</b> is set to Off.
State Saved:	Saved in instrument state.
Key Path:	<b>View/Display, Display, Annotation</b>
Instrument S/W Revision:	Prior to A.02.00

**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.

<b>Remote Command:</b>	:DISPlay:ANNOtation:SCREen[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:SCREen[:STATe]?
Example:	DISP:ANN:SCR OFF
Dependencies/Couplings:	Grayed out and forced to OFF when <b>System Display Settings, Annotation</b> is set to Off.
Preset:	On This should remain Off through a Preset when <b>System Display Settings, Annotation</b> is set to Off
State Saved:	Saved in instrument state.
Key Path:	<b>View/Display, Display, Annotation</b>
Instrument S/W Revision:	Prior to A.02.00

**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.

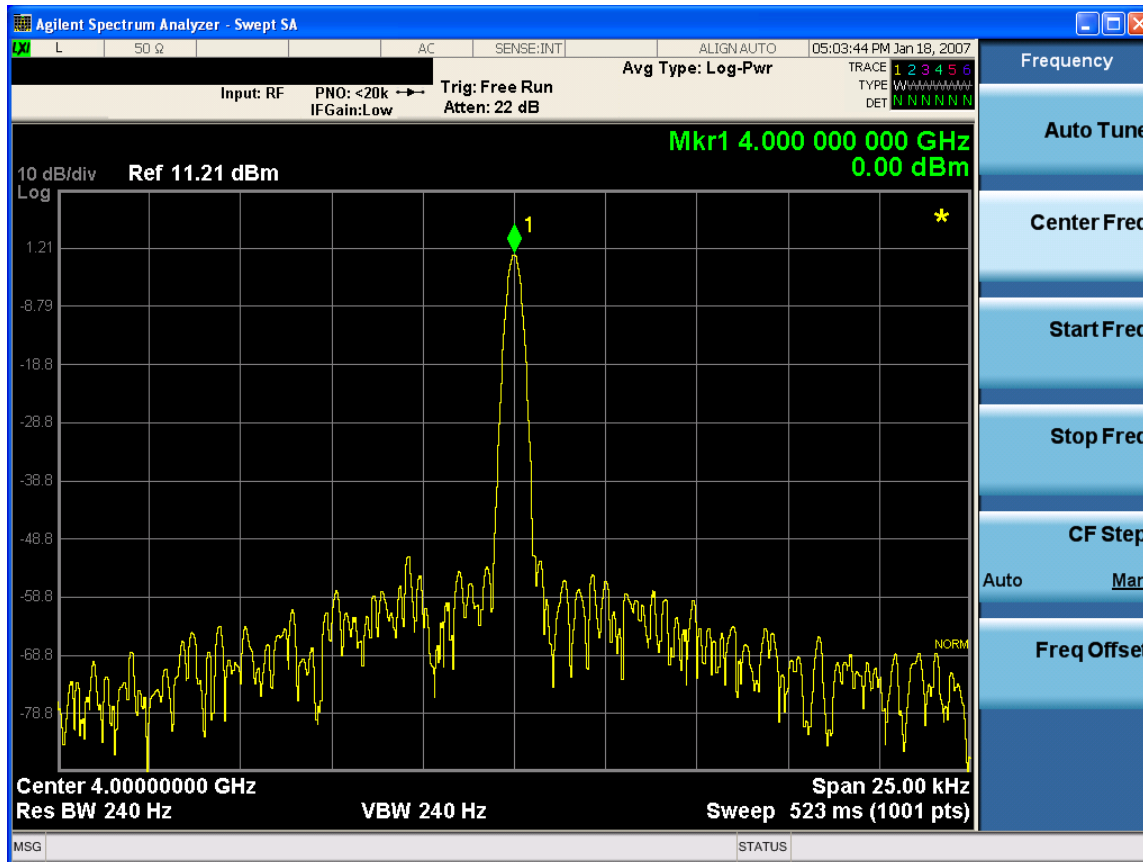
<b>Remote Command:</b>	:DISPlay:ANNOtation:TRACe[:STATe] ON OFF 1 0 :DISPlay:ANNOtation:TRACe[:STATe]?
Example:	DISP:ANN:TRAC OFF
Preset:	Off
State Saved:	Saved in instrument state.
Key Path:	<b>View/Display, Display, Annotation</b>
Instrument S/W Revision:	Prior to A.02.00

**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:**        Prior to A.02.00

**Title**

Displays menu keys that enable you to change or clear a title on your display.

Key Path	<b>View/Display, Display</b>
Instrument S/W Revision	Prior to A.02.00

**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**.

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**NOTE** 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.

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**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

Key Path	<b>View/Display, Display, Title</b>
Mode	All
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Instrument S/W Revision	Prior to A.02.00

**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.

## View/Display

Remote Command Notes:	Use the :DISPlay:ANNOtation:TITLe:DATA <string> command with an empty string.
Preset:	Performed on Preset.
Key Path:	<b>View/Display, Display, Title</b>
Instrument S/W Revision:	Prior to A.02.00

### Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

<b>Remote Command:</b>	: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:	<b>View/Display, Display</b>
Instrument S/W Revision:	Prior to A.02.00

### 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.

<b>Remote Command:</b>	:DISPlay:WINDow[1]:TRACe:Y:DLINe <amp;l> :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:	<b>View/Display, Display</b>
Default Unit:	Depends on the current selected Y axis unit
Instrument S/W Revision:	Prior to A.02.00

### 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	<b>View/Display, Display, System Display Settings</b>
Instrument S/W Revision	Prior to A.02.00

**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.

<b>Remote Command:</b>	: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:	<b>View/Display, Display, System Display Settings, Annotation</b>
Instrument S/W Revision:	Prior to A.02.00

**Theme** This key allows you to change the Display theme. This is similar to the Themes selection under

## View/Display

Page Setup and Save Screen Image. The four themes are detailed below.

<b>Remote Command:</b>	<code>:DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome</code> <code>:DISPlay:THEME?</code>
Preset:	TDColor (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	<b>View/Display, Display, System Display Settings</b>
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:	Prior to A.02.00

**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.

<b>Remote Command:</b>	<code>:DISPlay:BACKlight ON OFF</code> <code>:DISPlay:BACKlight?</code>
Preset:	ON (Set by Restore Misc Defaults)
Key Path:	<b>View/Display, Display, System Display Settings</b>
Instrument S/W Revision:	Prior to A.02.00

**On** Turns the display backlight on.

Example:	DISP:BACK ON
Key Path:	<b>View/Display, Display, System Display Settings, Backlight</b>
Readback:	On
Instrument S/W Revision:	Prior to A.02.00

**Off** Turns the display backlight off.

Example:	DISP:BACK OFF
Key Path:	<b>View/Display, Display, System Display Settings, Backlight</b>



Readback: Off  
 Instrument S/W Revision: Prior to A.02.00

**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: Prior to A.02.00

## 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:** :DISPlay:FSCreen[:STATe] OFF|ON|0|1  
 :DISPlay:FSCreen[:STATe]?  
 Preset: Off  
 State Saved: Not saved in state.  
 Key Path: **Display**  
 Instrument S/W Revision: Prior to A.02.00

## 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.)
- 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: Prior to A.02.00