Agilent X-Series
Signal Analyzer

This manual provides documentation for the following analyzers:

MXA Signal Analyzer N9020A
EXA Signal Analyzer N9010A

N9077A - XFP Single Acquisition Combined WLAN Measurement Application User's and Programmer's Reference

Agilent Technologies

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Where to Find the Latest Information

Documentation is updated periodically. For the latest information about this analyzer, including firmware upgrades, application information, and product information, see the following URLs:

http://www.agilent.com/find/mxa
http://www.agilent.com/find/exa

To receive the latest updates by email, subscribe to Agilent Email Updates:

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

Information on preventing analyzer damage can be found at:

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

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1   Using Help

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 45.

See "Navigating the Help Window Without a Mouse" on page 50 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 59.

See "Navigating the Help Window with a Mouse" on page 48 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 39.

To locate **Other Available Help Resources**, see "Locating Other Help Resources" on page 38.

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 54.

Viewing Help on a separate Computer

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

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

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

2. A file in Acrobat (PDF) format.

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

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

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

Copying the HTML Help (CHM) Files

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

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

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

- **Or**, in a special directory on the Analyzer's hard disk. The directory path is:
  `C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help`
  The illustration below shows an example listing of the HTML Help files in this directory, viewed using Windows Explorer.
  Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.
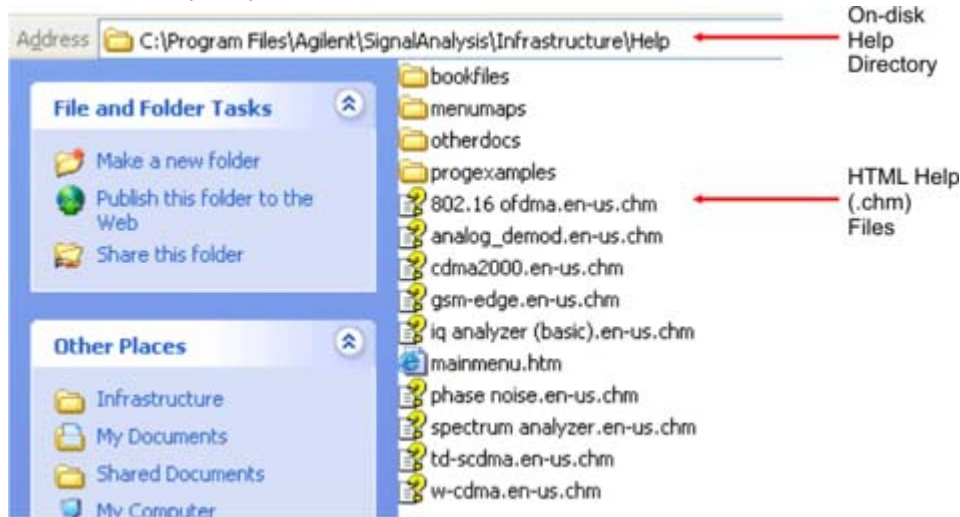
NOTE   You can open and view the HTML Help files only on a PC that has Microsoft Windows and Microsoft Internet Explorer installed.

Copying the Acrobat (PDF) Files

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

You can find the Acrobat (`.pdf`) files:

- **Either**, on the documentation CD that came with the Analyzer,
- **Or**, in a special directory on the Analyzer's hard disk. The directory path is:
  `C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles`

  — The illustration below shows an example listing of the Acrobat files in this directory, viewed using Windows Explorer.
  — The PDF versions of the help files are named `<mode>_ref.pdf`, where `<mode>` is the name of the Analyzer Mode. For example, the name of the PDF file for GSM/EDGE Mode is `gsmedge_ref.pdf`. (Note that the directory also contains other PDF documents.)
  — When you open any `<mode>_ref.pdf` document, the title page displays "`<Mode> User's and Programmer's Reference`", where `<Mode>` is the name of the Analyzer Mode described by the document.
  — Depending on which Analyzer software licenses you purchased, the content of the directory on your machine may vary.
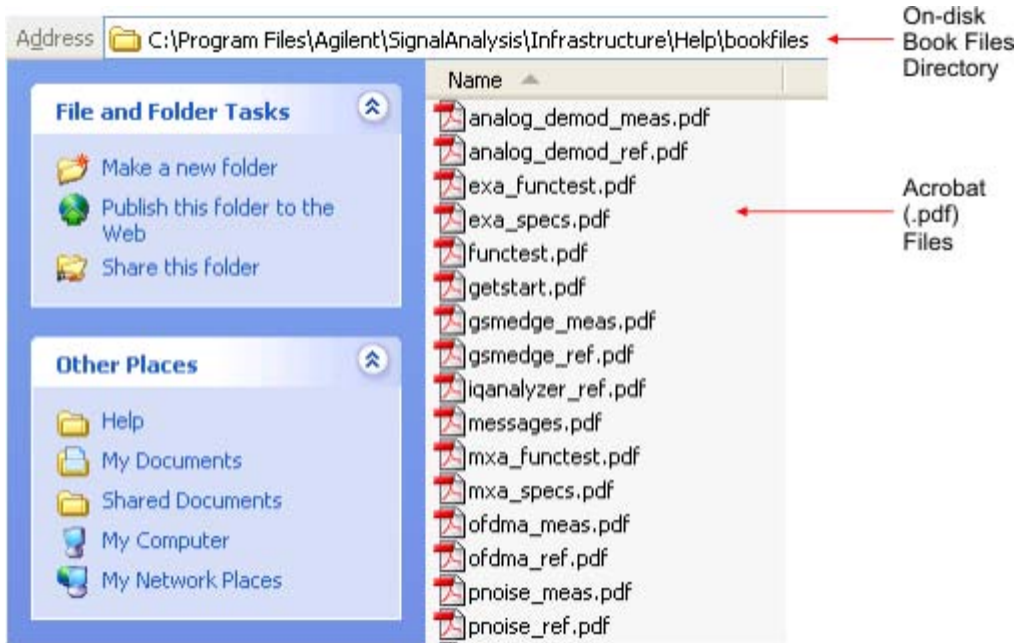
How Help is Organized

This topic contains the following sections:

"Help Contents Listing" on page 42

"System Functions" on page 42

"Key Descriptions for Each Measurement" on page 43

"Key Information for Softkeys" on page 43

"Common Measurement Functions" on page 44

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.
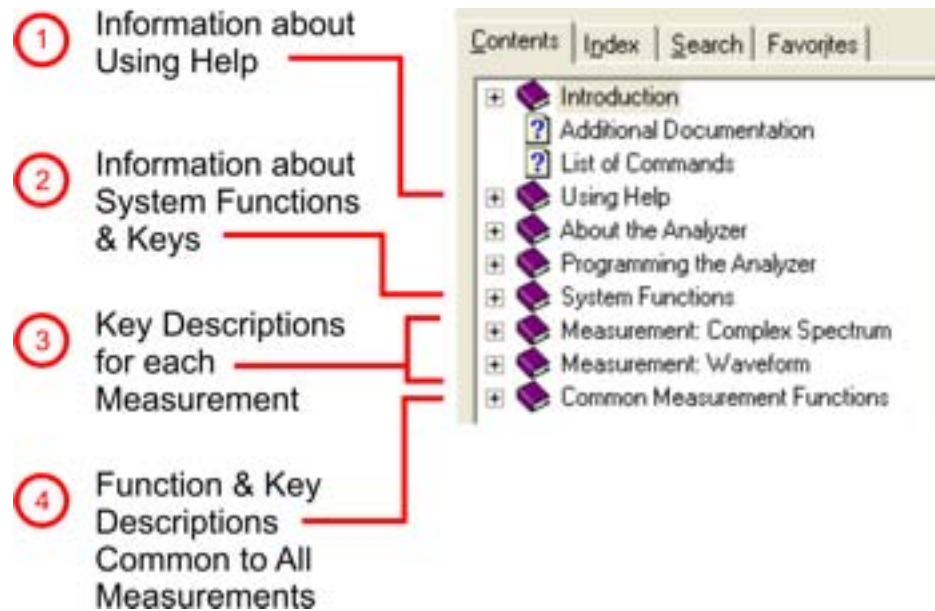
Help information is split between these sections as follows:

1. Using Help: this section.

2. System Functions. See "System Functions" on page 42 below.

3. Measurement Functions. See "Key Descriptions for Each Measurement" on page 43 below.

4. Common Measurement Functions. See "Common Measurement Functions" on page 44 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 44, 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.
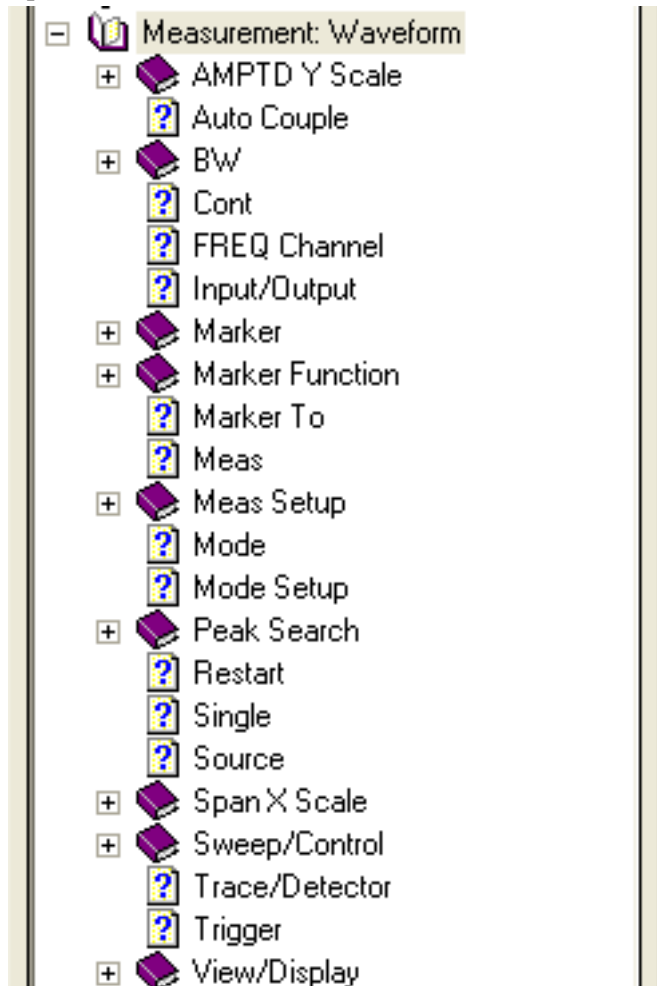
If you don't see a topic for a Front-panel key in the Measurement-specific section, then it is located in the section "System Functions" on page 42.

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

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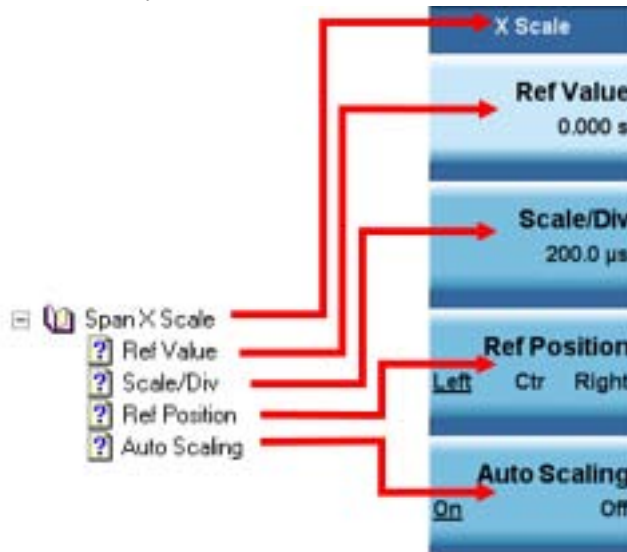
In these subsections, all softkeys are listed in the order they appear in their menu (that is, **not** in alphabetical order).

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.
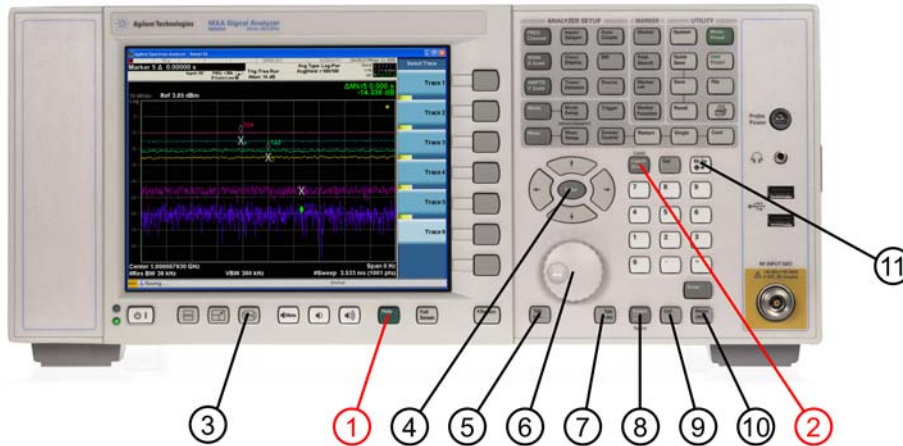
Item		Description
#	**Name**	
1	Help Key	Opens Help (displaying the topic for the last key pressed).
2	Cancel (Esc) Key	Exits Help.
3	Next Window Key	Changes the current window pane selection.
4	Arrow / Enter Keys	A central **Enter** key, surrounded by four directional arrow keys. Navigates within the Help system.
5	Backward Tab Key	Moves between controls in the Help display.
6	Knob	For future use.
7	Forward Tab Key	Moves between controls in the Help display.
8	Select / Space Key	Navigates within the Help system, in conjunction with other keys.
9	Ctrl Key	Navigates within the Help system, in conjunction with other keys. See "Navigating Windows HTML Help (CHM) Files" on page 46.
10	Alt Key	Navigates within the Help system, in conjunction with other keys. See "Navigating Windows HTML Help (CHM) Files" on page 46.
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.
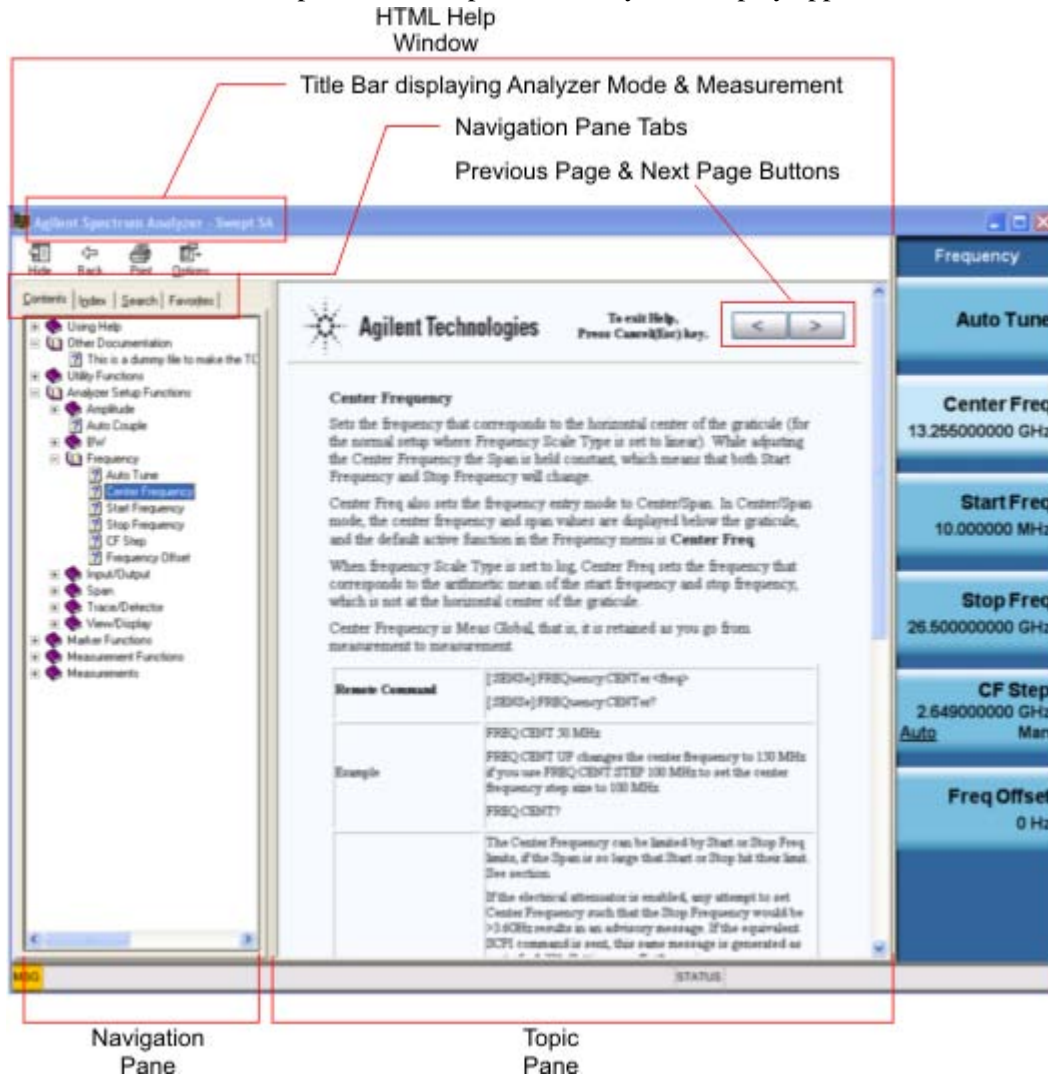
The HTML Help Window appears on top of, and to the left of, the measurement display. You can still see and use the current softkey menu when the HTML Help Window is open. However, pressing a softkey when the Help window is open displays Help for that softkey, but does **not** execute the softkey's function.

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 50.

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" on page 47

"Getting Help for a Specific Key" on page 47

"Closing the Help Window" on page 48

"Viewing Help on How to Use Help" on page 48

"Exiting Help on How to Use Help" on page 48

To locate the keys mentioned in this section, see "Front Panel Keys used by the Help System" on page 45.

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 48), then press the key, before opening Help again (if required).

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

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

For details of how to navigate within the panes of the Help window, see "Navigating Windows HTML Help (CHM) Files" on page 46.

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 52 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" on page 48.

- If you don't have a mouse and keyboard attached, see the Section "Navigating the Help Window Without a Mouse" on page 50.

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 47, 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.
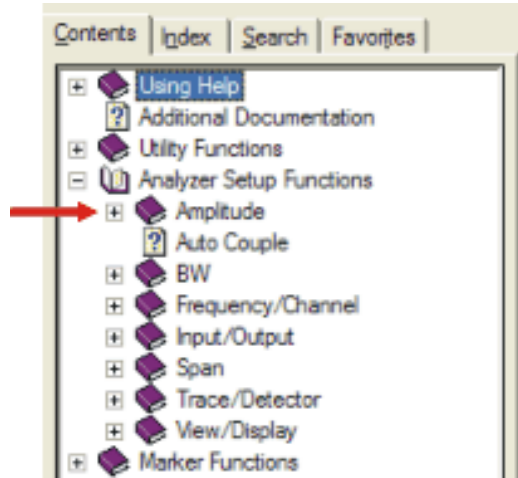
- To move to the Next or Previous Page within the Topic Pane, click the **Next Page** or **Previous Page** Keys (at the top right of the **Topic** Pane), as shown below.

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:
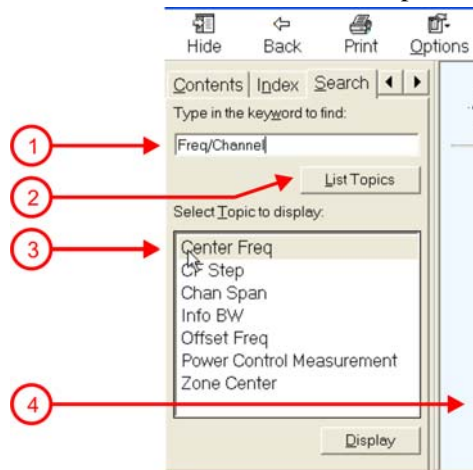
1. Type the desired topic name into the Search window as shown in the diagram above. Note that the text search is **not** case-sensitive.

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 53.

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" on page 50

"To Switch the Active Tab within the Navigation Pane" on page 50

"To Scroll up or down the list of Topics within the Contents or Index Tabs of the Navigation Pane" on page 51

"To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane" on page 51

"To Display a selected Help topic in the Topic Pane from the Contents Tab of the Navigation Pane" on page 51

"To Display a Help topic in the Topic Pane from the Index Tab of the Navigation Pane" on page 51

"To Scroll up or down within a topic in the Topic Pane" on page 51

"To Go to the Next or Previous Page in the Topic Pane" on page 52

"To Go Back or Forward: display the Previously-viewed or Next-viewed Topic in the Topic Pane" on page 52

"To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane" on page 53

"To Print the topic currently displayed" on page 53

To locate all the keys mentioned in this section, see "Front Panel Keys used by the Help System" on page 45.

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

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

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

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

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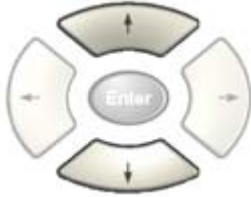
To Expand or Collapse a selected topic within the Contents Tab of the Navigation Pane With the focus in the Navigation Pane, press the **Right Arrow** key to **expand** the selected topic:

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

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

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

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

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

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

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

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

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

Press **Enter**.

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

To go **back**, **either**:

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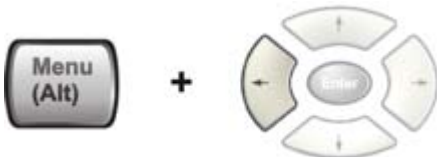
Or:

Press the **Bk Sp** key.

To go **forward**, hold down the **Alt** key, then press the **Right Arrow** key.
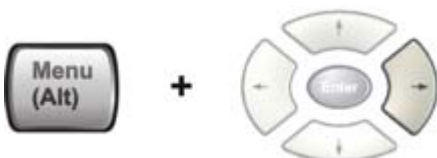
(The "Go Forward" operation has no effect unless there have been previous "Go Back" operations)

To Scroll horizontally or vertically within the Contents Tab of the Navigation Pane To scroll **horizontally**: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Left Arrow** or **Right Arrow** keys.
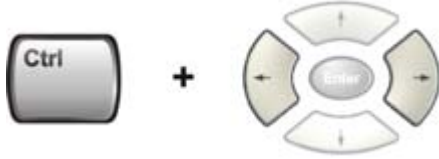
To scroll **vertically**: with the focus in the Contents Tab of the Navigation Pane, hold down the **Ctrl** key, then press either the **Up Arrow** or **Down Arrow** keys.
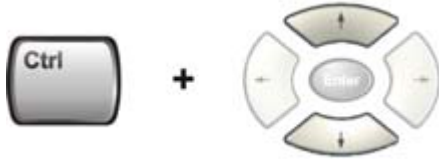
To Print the topic currently displayed Press the Front-panel **Print** key

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

• The menu options at the top of the Help Window, consisting of: **Hide**, **Back**, **Print** and **Options**.

• The functionality of the Search Tab of the Navigation Pane.

• The functionality of the Favorites Tab of the Navigation Pane.

Navigating Acrobat (PDF) Files

IMPORTANT	To navigate PDF files effectively, you must attach a mouse and keyboard to the Analyzer.
	If it is not possible to attach a mouse and keyboard to the Analyzer, you should copy the PDF file to a separate computer, then open it on that computer. Every PDF file that is present on the Analyzer's hard disk can also be found on the Documentation CD shipped with the Analyzer. For details, see "Copying the Acrobat (PDF) Files" on page 40.

Adobe Reader Window

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

Note that, unlike the HTML Help Window, the Acrobat Reader Window is **not** embedded in the Analyzer's Application window. It is a separate window, which can be resized, moved and closed independently of the Application window.
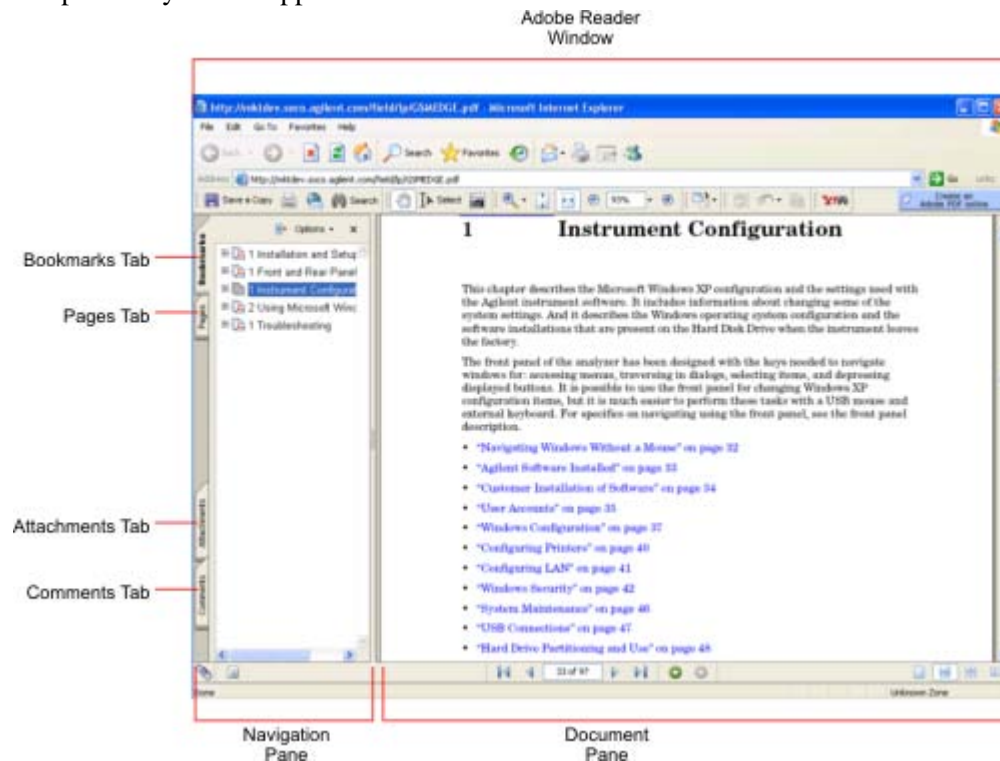
The Adobe Reader Window itself consists of two panes, as shown in the diagram above.

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

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

Navigating the Acrobat Reader Window

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

- With the Adobe Reader window open, click **Help**, **Adobe Reader Help** in the menu at the top of the screen. This opens the Help window on top of the document window.

- To close the Help window, **either** click the Red **X** at the top right of the window, **or** right-click

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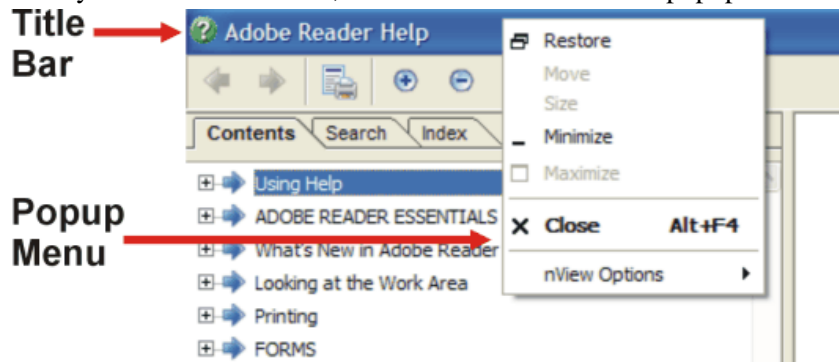
Printing Acrobat Files

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

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

1. **Either**,

   a. click on the `Print` icon in the Acrobat Reader toolbar,

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

2. The Acrobat Reader Print dialog opens, as shown below.
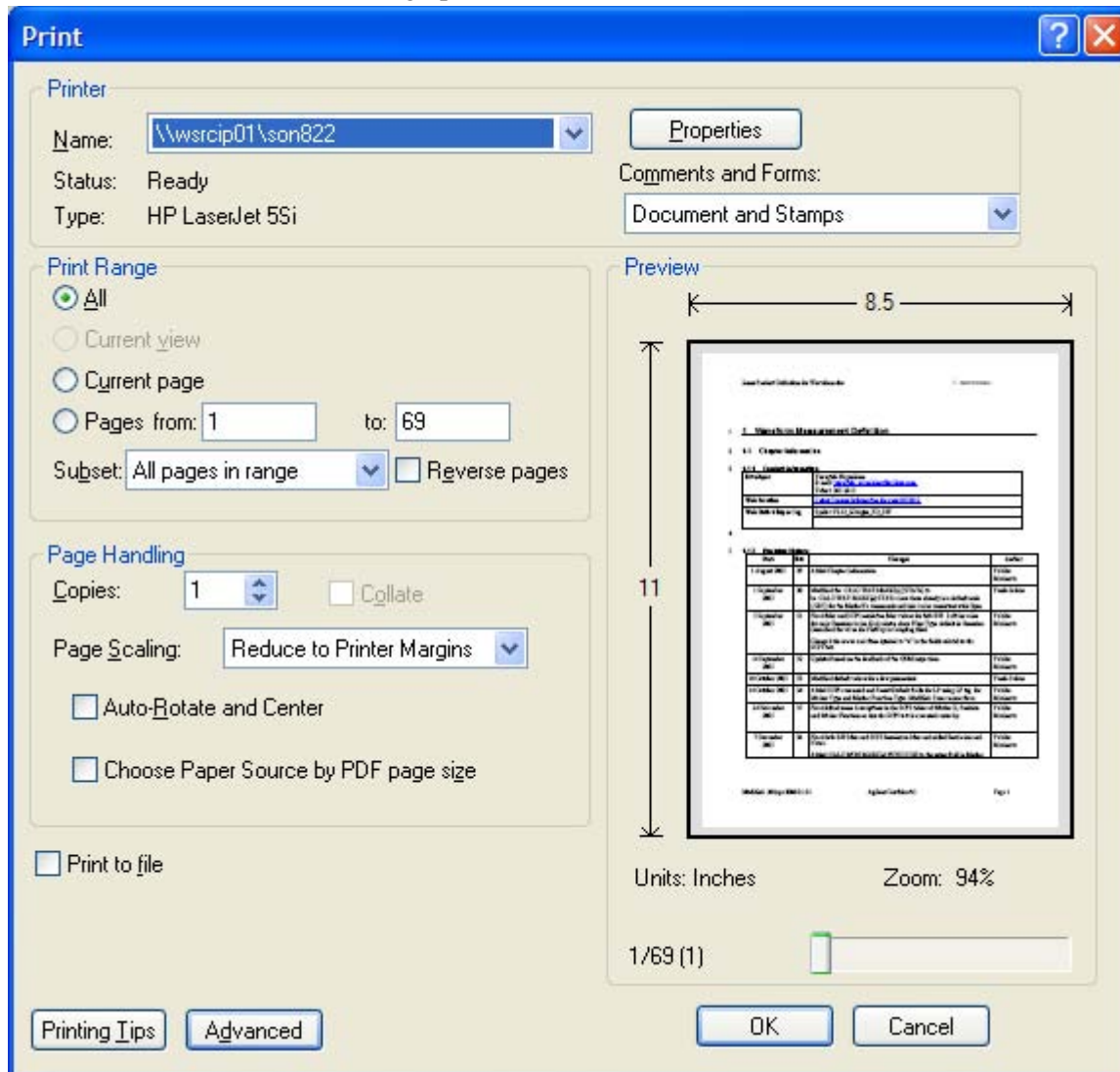
3. Choose the desired options within the Print dialog, then click `OK` to print (or click `Cancel` to cancel the printing).

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

Terms Used in This Documentation

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

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

Terms used in Key Parameter Tables

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

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

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

Context Sensitive Help not Available

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

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

- If your Analyzer has an attached Mouse and Keyboard, see the Section "Searching for a Help Topic" on page 49.

- If your Analyzer does **not** have an attached Mouse and Keyboard, see the Section "Finding a Topic without a Mouse and Keyboard" on page 59 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 60 below.

TIP	If you want to understand the organization of Help, see the Section "How Help is Organized" on page 42.

Finding a Topic without a Mouse and Keyboard

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

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

Selecting a Hyperlink without a Mouse

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

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

2   About the Analyzer

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® 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 Signal Analyzer to activate the new measurement application. See below for more information.

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

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

Viewing a License Key

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

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

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

C:\Programing Files\Agilent\Licensing

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

Obtaining and Installing a License Key

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

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

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

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

Missing and Old Measurement Application Software

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

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

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

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

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.

For CXA,

http://www.agilent.com/find/cxa/options

Select the **CXA N9000A, 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: • instrument configuration information and I/O setup, • printer setup and printing, • file management, save and recall, • instrument presets.
6	Probe Power	Supplies power for external high frequency probes and accessories.
7	Headphones Output	Headphones can be used to hear any available audio output.
8	Back Space Key	Press this key to delete the previous character when entering alphanumeric information. It also works as the Back key in Help and Explorer windows.

Item		Description
#	Name	
9	Delete Key	Press this key to delete files, or to perform other deletion tasks.
10	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive.
11	Local/Cancel/(Esc) Key	If you are in remote operation, Local: • returns instrument control from remote back to local (the front panel). • turns the display on (if it was turned off for remote operation). • can be used to clear errors. (Press the key once to return to local control, and a second time to clear error message line.) If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value. Esc works the same as it does on a PC keyboard. It: • exits Windows dialogs • clears errors • aborts printing • cancels operations.
12	RF Input	Connector for inputting an external signal. Make sure that the total power of all signals at the analyzer input does **not** exceed +30 dBm (1 watt).
13	Numeric Keypad	Enters a specific numeric value for the current function. Entries appear on the upper left of the display, in the measurement information area.
14	Enter and Arrow Keys	The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit. The arrow keys: • Increment and decrement the value of the current measurement selection. • Navigate help topics. • Navigate, or make selections, within Windows dialogs. • Navigate within forms used for setting up measurements. • Navigate within tables. NOTE The arrow keys cannot be used to move a mouse pointer around on the display.
15	Menu/ (Alt) Key	Alt works the same as a PC keyboard. Use it to change control focus in Windows pull-down menus.
16	Ctrl Key	Ctrl works the same as a PC keyboard. Use it to navigate in Windows applications, or to select multiple items in lists.
17	Select / Space Key	Select is also the Space key and it has typical PC functionality. For example, in Windows dialogs, it selects files, checks and unchecks check boxes, and picks radio button choices. It opens a highlighted Help topic.
18	Tab Keys	Use these keys to move between fields in Windows dialogs.
19	Knob	Increments and decrements the value of the current active function.
20	Return Key	Exits the current menu and returns to the previous menu. Has typical PC functionality.

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. NOTE The front-panel switch is a standby switch, **not** 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	$\overline{Q}$ Input	Input port for the $\overline{Q}$ channel when in differential mode.[a]
27	Q Input	Input port for the Q channel for either single or differential mode.[a]
28	$\overline{I}$ Input	Input port for the $\overline{I}$ channel when in differential mode.[a]
29	I Input	Input port for the I channel for either single or differential mode.[a]
30	Cal Out	Output port for calibrating the I, $\overline{I}$, Q and $\overline{Q}$ inputs and probes used with these inputs.[a]

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

Overview of key types

The keys labeled **FREQ Channel**, **System**, and **Marker Functions** are all examples of front-panel keys.

Most of the dark or light gray keys access menus of functions that are displayed along the right side of the display. These displayed key labels are next to a column of keys called menu keys.

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

If the numeric value of a menu key function can be changed, it is called an active function. The function label of the active function is highlighted after that key has been selected. For example, press **AMPTD Y Scale**. This calls up the menu of related amplitude functions. The function labeled **Ref Level** (the default selected key in the Amplitude menu) is highlighted. **Ref Level** also appears in the upper left of the display in the measurement information area. The displayed value indicates that the function is selected and its value can now be changed using any of the data entry controls.
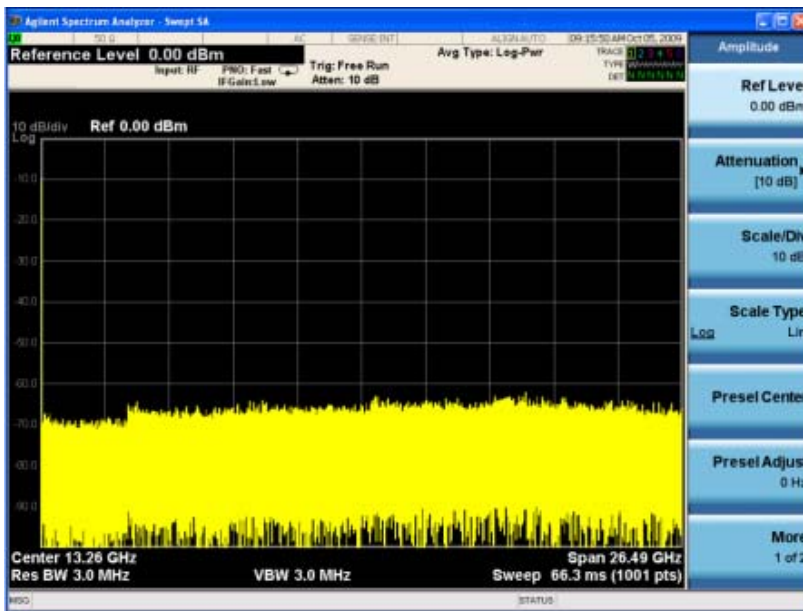
Some menu keys have multiple choices on their label, such as **On**/**Off**, **Auto**/**Man**, or **Log/Lin** (as shown above). The different choices are selected by pressing the key multiple times. For example, the Auto/Man type of key. To select the function, press the menu key and notice that Auto 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.
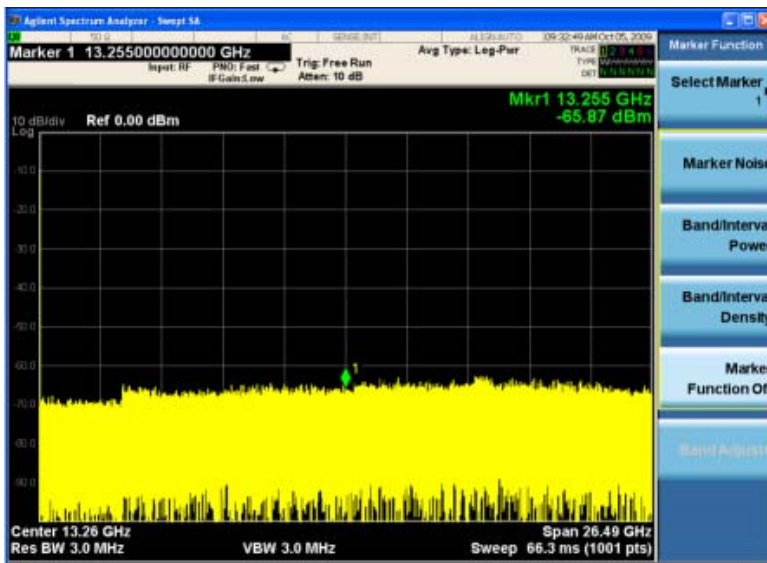
Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are 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.
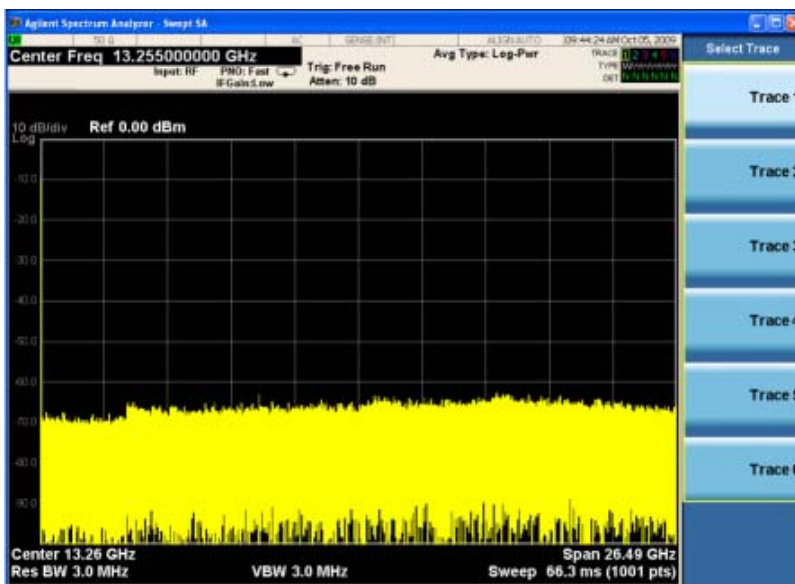
If a displayed key label shows a small solid-black arrow tip pointing to the right, it indicates that additional key menus are available. If the arrow tip is not filled in solid then pressing the key the first time selects that function. Now the arrow is solid and pressing it again brings up an additional menu of settings.
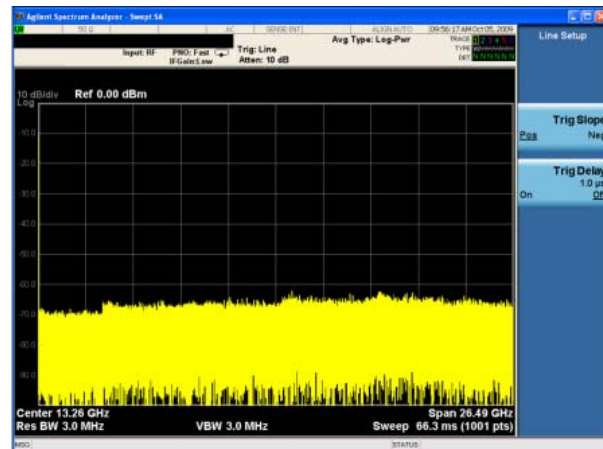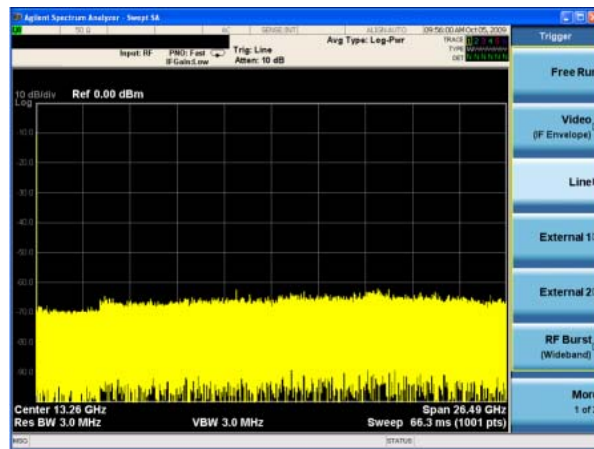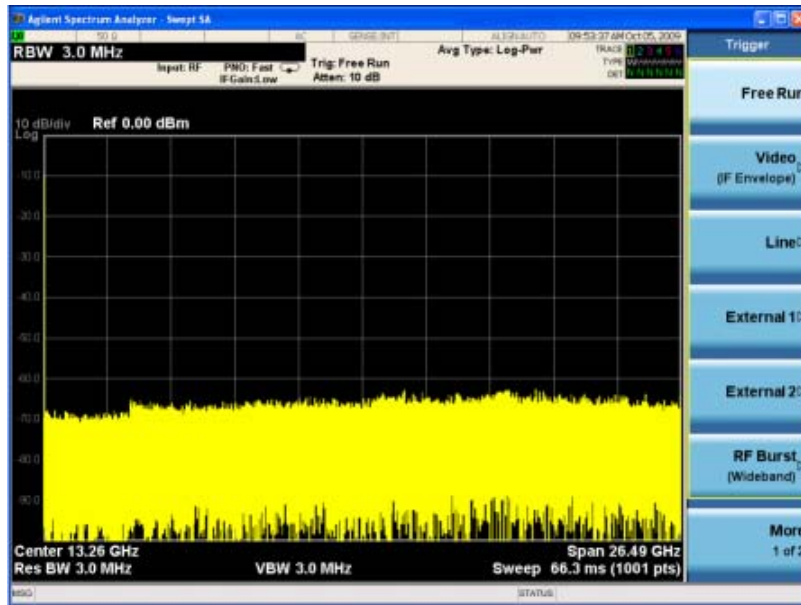
Display Annotations

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.	**Mode**
4	Measurement title - shows title information for the current measurement, or a title that you created for the measurement.	**Meas** **View/Display**, **Display**, **Title**

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

Rear-Panel Features

MXA and EXA with Option PC2

EXA

CXA

Item		Description
#	**Name**	

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

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	For PXA option YAV:
		
		    Screen Video
		    Log Video
		    Linear Video
		
		For PXA option EMC:
		
		    Demod Audio

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.

Item		Description
#	Name	
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.
19	Preselector Tune Out	Reserved for future use.
20	Aux IF Out	For PXA options: CR3 Second IF Out CRP Arbitrary IF Out ALV Log Video

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.
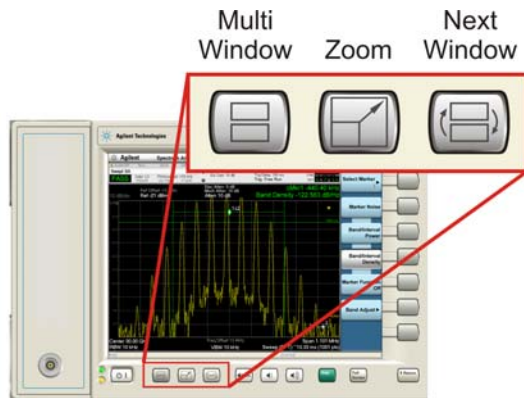
Multi-Window
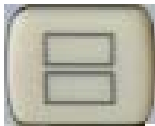
The **Multi Window** front-panel key will toggle you back and forth between the Normal View and the last Multi Window View (Zone Span, Trace Zoom or Spectrogram) that you were in, when using the Swept SA measurement of the Spectrum Analyzer Mode. It remembers which View you were in through a Preset. This "previous view" is set to Zone Span on a Restore Mode Defaults.

Key Path	**Front-panel key**
Initial 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
Initial S/W Revision	Prior to A.02.00

Next Window

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>
Initial S/W Revision	Prior to A.02.00

Selected Window

One and only one window is always selected. The selected window has the focus and all key presses are going to that window.

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

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 the user 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 precedencebecomes 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:
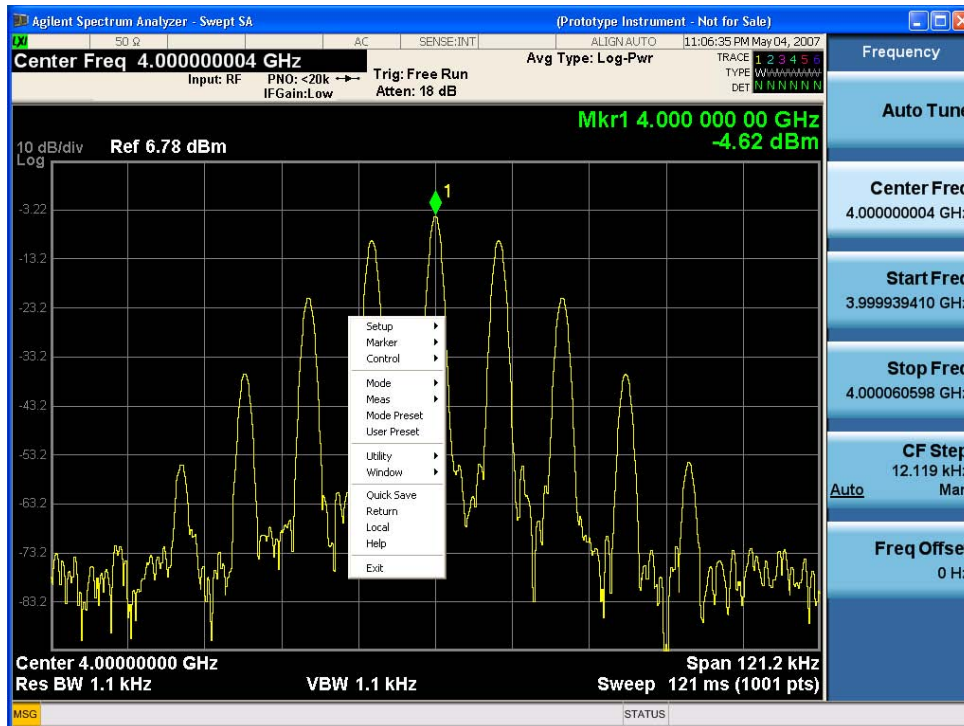
Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the "Utility" row:
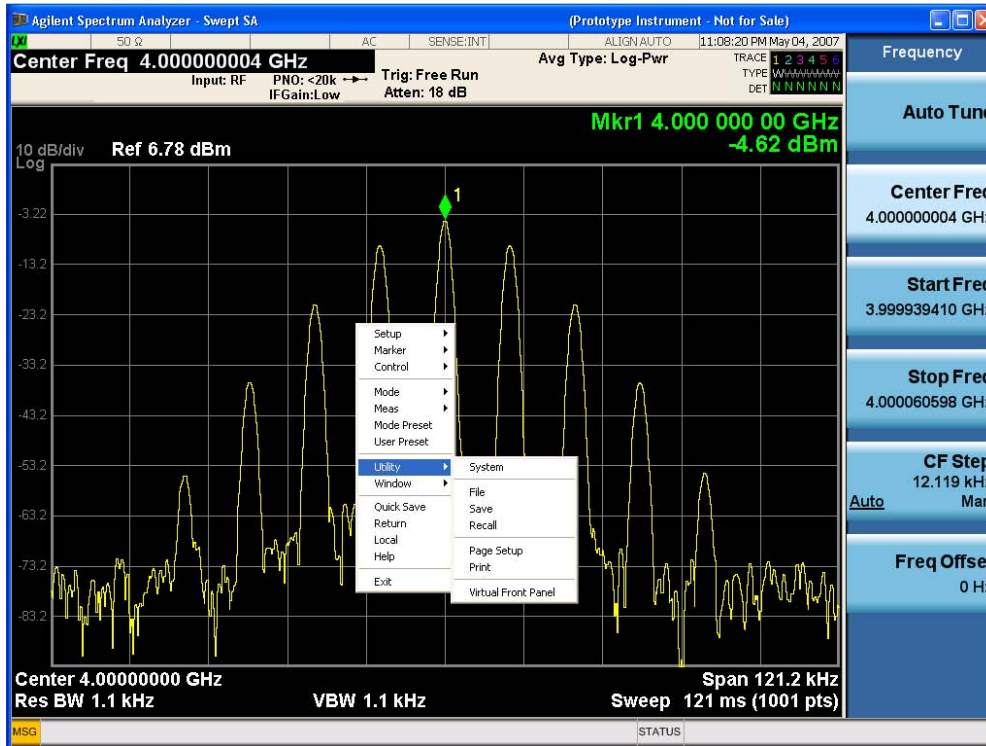
This method can be used to access any of the front-panel keys by using a mouse; as for example if you are accessing the instrument through Remote Desktop.

The array of keys thus available is shown below:
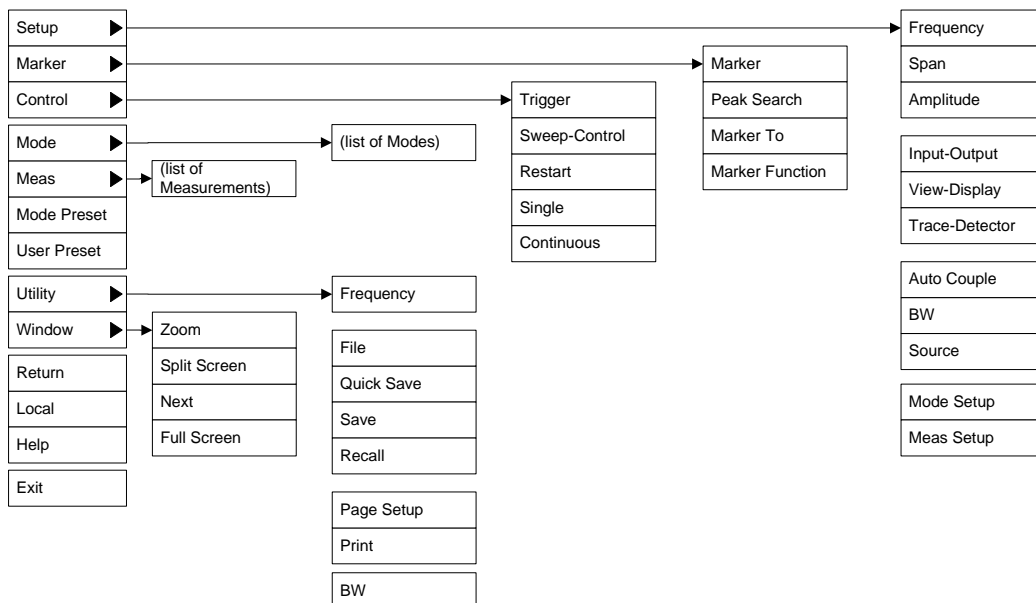
PC Keyboard

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:

Front-panel key	Key code
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+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker Function	CTRL+ALT+F
System	CTRL+SHIFT+Y
Quick Save	CTRL+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+SHIFT+E
Meas Setup	CTRL+ALT+E
Trigger	CTRL+SHIFT+T
Sweep/Control	CTRL+SHIFT+W
Restart	CTRL+ALT+R
Single	CTRL+ALT+S

Front-panel key	Key code
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

Front-panel key	Key code
Tab	Tab
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

This is a pictorial view of the table:
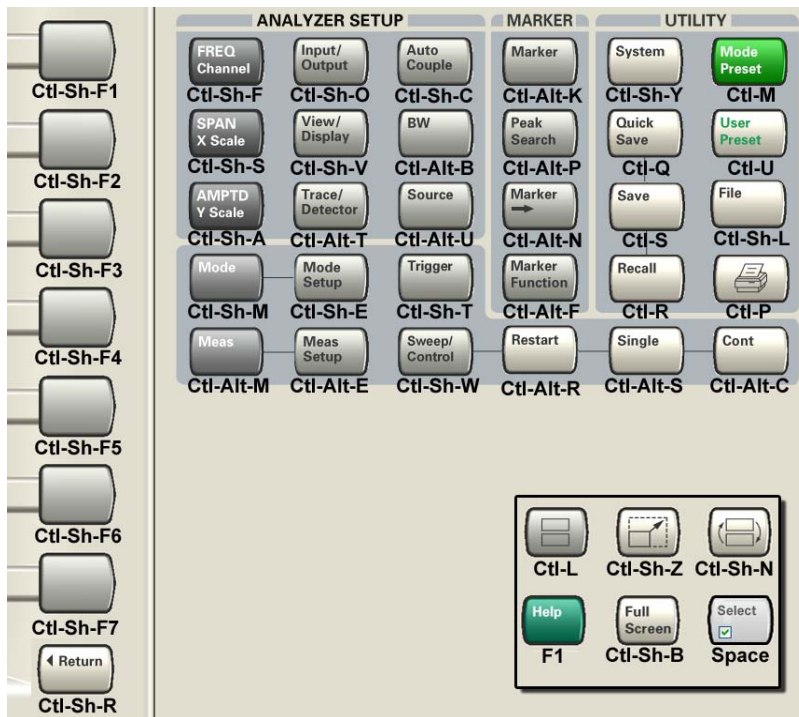
Instrument Security & Memory Volatility

If you are using the instrument in a secure environment, you may need details of how to clear or sanitize its memory, in compliance with published security standards of the United States Department of Defense, or other similar authorities.

For the X Series analyzers, this information is contained in the document "Security Features and Certificate of Volatility". This document is **not** included in the Documentation CD, or the instrument's on-disk library, but it may be downloaded from Agilent's web site.

To obtain a copy of the document, click on or browse to the following URL:

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

To locate and download the document, select Model Number "N9020A", then click "Submit". Then, follow the on-screen instructions to download the file.

3 About the Single Acquisition Combined WLAN Measurement Application

This chapter describes Single Acquisition Combined WLAN measurements made by the analyzer.

What Does the Single Acquisition Combined WLAN Measurement Application Do?

Single Acquisition Combined WLAN adopts the concept of SACM (Single Acquisition Combined Measurements). It performs as many measurements as possible on one capture.

Combined Measurement is capture centered and a traditional measurement is measurement centered. In other words, in the combined measurements, all the measurements are based on one capture, there is no switch time among different measurements and in a traditional measurement, measurement controls the capture activity, the capture will restart when the measurement is changed.

The Combined WLAN mode includes one measurement, Combined WLAN. The following measurement results are presented by this mesurement:

- Transmit Power

- Transmit Output Spectrum

- Modulation Accuracy

NOTE   Option B40 (40 MHz analysis bandwidth) is required to perform 40 MHz Modulation Accuracy measurements on 802.11n signals.
With installing this option, the frequency-hopping signal cannot be supported for any of the standard 802.11a/b/g/n.

With Option B25 (25 MHz analysis bandwidth), you can only perform 20 MHz Modulation Accuracy measurements on 802.11n signals.

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4   Programming the Analyzer

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

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.

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

Resource	Description
X-Series Programmer's Guide	Provides general SCPI programming information on the following topics: • Programming the X-Series Applications • Programming fundamentals • Programming examples Note that SCPI command descriptions for measurement applications are NOT in this book, but are in the User's and Programmer's Reference.
User's and Programmer's Reference manuals	Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that: • Each measurement application has its own User's and Programmer's Reference. • 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).
Embedded Help in your instrument	Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application. 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.
X-Series Getting Started Guide	Provides valuable sections related to programming including: • Licensing New Measurement Application Software - After Initial Purchase • Configuring instrument LAN Hostname, IP Address, and Gateway Address • Using the Windows XP Remote Desktop to connect to the instrument remotely • Using the Embedded Web Server Telnet connection to communicate SCPI This printed document is shipped with the instrument.
Agilent Application Notes	Printable PDF versions of pertinent application notes.
Agilent VISA User's Guide	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.

IEEE Common GPIB Commands

Numeric values for bit patterns can be entered using decimal or hexi-decimal representations. (that is,. 0 to 32767 is equivalent to #H0 to #H7FFF).

Calibration Query

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

See "Alignments" on page 160 for details of *CAL?.

Clear Status

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

Key Path	**No equivalent key. Related key System, Show Errors, Clear Error Queue**
Remote Command	`*CLS`
Example	*CLS Clears the error queue and the Status Byte Register.
Notes	For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem.
Status Bits/OPC dependencies	Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also.
Initial 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	**No equivalent key. Related key System, Show Errors, Clear Error Queue**
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.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	255
State Saved	Not saved in state.
Min	0
Max	255
Status Bits/OPC dependencies	Event Enable Register of the Standard Event Status Register.
Initial 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.
Notes	For related commands, see the STATus subsystem commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Standard Event Status Register (bits 0 – 7).
Initial 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
Initial S/W Revision	Prior to A.02.00

Instrument Model Number

ID? - Returns a string of the instrument identification. The string will contain the model number.

When in Remote Language compatibility mode the query will return the model number of the emulated instrument, when in any other mode the returned model number will be that of the actual hardware.

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.
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.
Initial 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 SA 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?`
Initial S/W Revision	Prior to A.02.00

Recall Instrument State

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

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

- If the state being loaded has an equal firmware revision than the revision of the instrument, the state 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.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial 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.
Notes	Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers.
Min	0
Max	127
Status Bits/OPC dependencies	The command is sequential.
Initial 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.
Notes	For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands.
Preset	0
Min	0
Max	255
Status Bits/OPC dependencies	Service Request Enable Register (all bits, 0 – 7).
Initial 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.
Notes	See related command *CLS.
Status Bits/OPC dependencies	Status Byte Register (all bits, 0 – 7).
Initial 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	**No equivalent key. See related keys Single and Restart.**
Remote Command	`*TRG`
Example	*TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings.
Notes	See related command :INITiate:IMMediate.
Initial 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.
Initial 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.
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.
Initial S/W Revision	Prior to A.02.00

5   System Functions

File

Opens a menu that enables you to access various standard and custom Windows functions. Press any other front-panel key to exit

Key Path	**Front-panel key**
Initial S/W Revision	Prior to A.02.00

File Explorer

Opens the standard Windows File Explorer.   The File Explorer opensin the My Documents directory for the current user.

The File Explorer is a separate Windows application, so to return to the analyzer once you are in the File Explorer, you may either:

Exit the File Explorer by clicking on the red X in the upper right hand corner, with a mouse
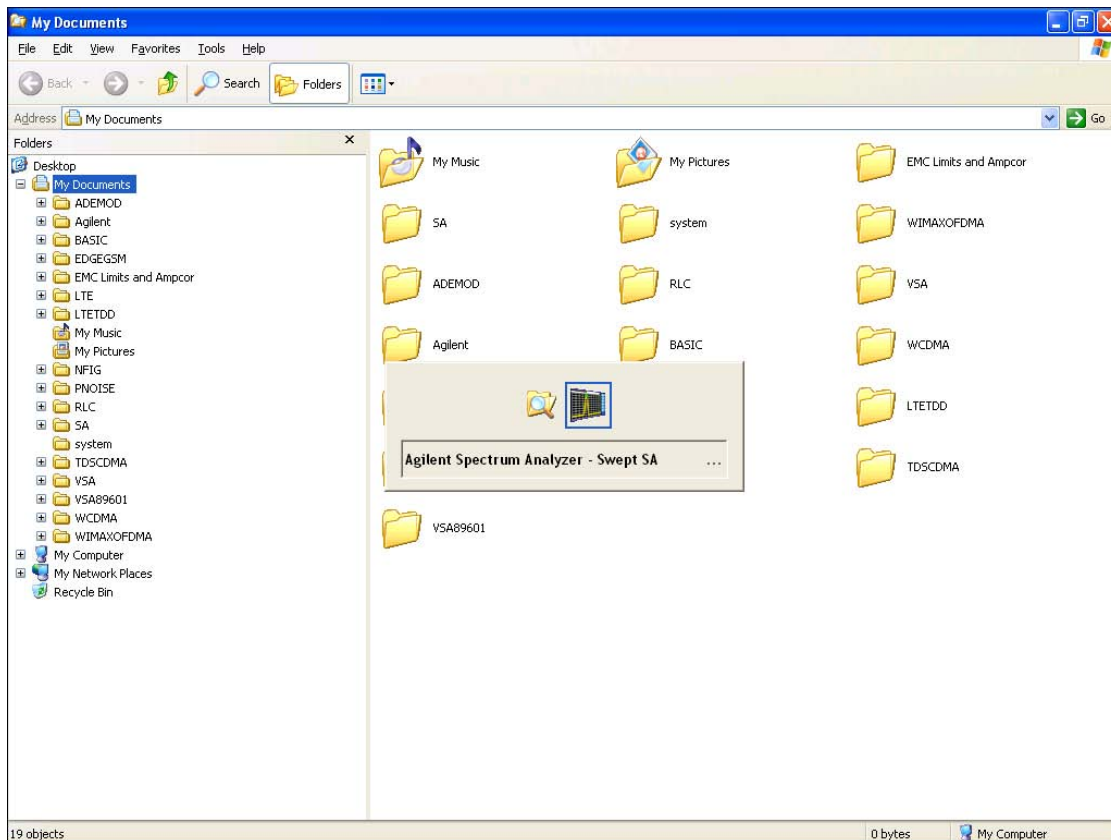
Or use Alt-Tab: press and hold the Alt key and press and release the Tab key until the Analyzer

logo is showing in the window in the center of the screen, as above, then release the Alt key.

Key Path	**File**
Initial S/W Revision	Prior to A.02.00

Page Setup

The Page Setup key brings up a Windows Page Setup dialog that allows you to control aspects of the pages sent to the printer when the PRINT hardkey is pressed.

Key Path	**File**
Initial S/W Revision	Prior to A.02.00

Paper size, the printer paper source, the page orientation and the margins are all settable. Just like any standard Windows dialog, you may navigate the dialog using front-panel keys, or a mouse. There are no SCPI commands for controlling these parameters.
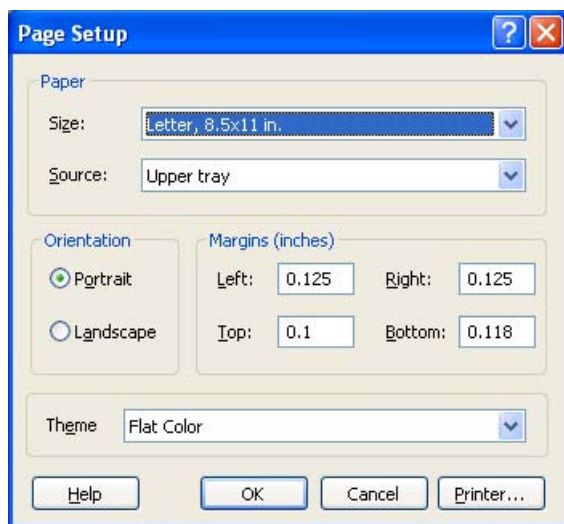
Also contained in this dialog is a drop-down control that lets you select the Theme to use when printing. For more on Themes, see information under View/Display, Display, System Display Settings, Theme. The Theme control has a corresponding SCPI command:

Parameter Name	Print Themes
Parameter Type	Enum
Mode	All

Remote Command	`:SYSTem:PRINt:THEMe TDColor|TDMonochrome|FCOLor|FMONochrome`
	
	`:SYSTem:PRINt:THEMe?`

Example	`:SYST:PRIN:THEM FCOL`

Setup	:SYSTem:DEFault MISC
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
Initial S/W Revision	Prior to A.02.00

Print

The Print key opens a Print dialog for configured printing (for example, to the printer of your choice). Refer to your Microsoft Windows Operating System manual for more information.

Maximize/Restore Down

These keys allow the Instrument Application to be maximized and then restored to its prior state. Only one of the two keys is visible at a time. When not already maximized the Maximize Application key is visible, and when maximized, the Restore Down Application key is visible and replaces the Maximize Application key.

Maximize

This key allows you to Maximize the Instrument Application which causes the analyzer display to fill the screen. Once the application is maximized, this key is replaced by the Restore Down key.

Key Path	**File**
Mode	**All**
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

Key Path	**File**
Mode	**All**
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Minimize

The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see

the Windows Desktop. You can use Alt-Tab (press and hold the Alt [Menu (Alt)] key and press and release the Tab key) to restore the analyzer display.

Key Path	**File**
Mode	**All**
Notes	No equivalent remote command for this key.
State Saved	No
Initial S/W Revision	A.05.01

Exit

This key, when pressed, will exit the Instrument Application. A dialog box is used to confirm that you intended to exit the application:
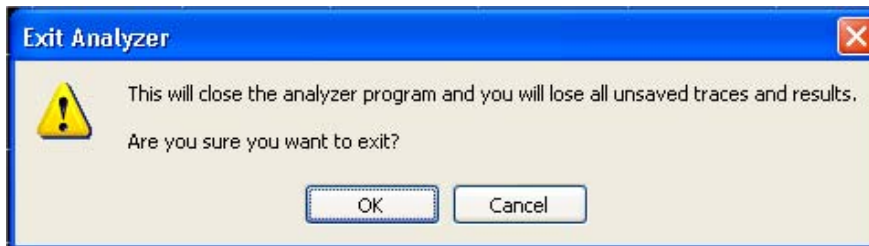
Key Path	**File**
Mode	All
Notes	The Instrument Application will close. No further SCPI commands can be sent. Use with caution!
Initial S/W Revision	Prior to A.02.00

Preset

Mode Preset

Returns the active mode to a known state.

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 Global 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.

Mode Preset does not:

- Cause a mode switch

- Affect mode persistent settings

- Affect system settings

See for more information.

Key Path	**Front-panel key**
Remote Command	:SYSTem:PRESet
Example	:SYST:PRES
Notes	*RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput.
	Clears all pending OPC bits. The Status Byte is set to 0.
Couplings	A Mode Preset aborts the currently running measurement, activates the default measurement, and. gets the mode to a consistent state with all of the default couplings set.
Initial 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 paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements 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.

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

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

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - 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

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

Key Path	**Mode Setup**
Remote Command	`:INSTrument:DEFault`
Example	:INST:DEF
Notes	Clears all pending OPC bits. The Status Byte is set to 0. A message comes up saying: "If you are sure, press key again".
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.
Initial 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 the Single measurement state. This remote command is preferred over Mode Preset remote command - :SYST:PRES, as optimal remote programming occurs with the instrument in the single measurement state.

Remote Command	`*RST`
Example	*RST
Notes	Sequential Clears all pending OPC bits and the Status Byte is set to 0.
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.
Initial S/W Revision	Prior to A.02.00

Print

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

The :HCOPy command is equivalent to pressing the PRINT key. The HCOPy:ABORt command can be used to abort a print which is already in progress. Sending HCOPy:ABORt will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORt command.

Key Path	**Front-panel key**
Remote Command	`:HCOPy[:IMMediate]`
Initial S/W Revision	Prior to A.02.00

Key Path	**SCPI command only**
Remote Command	`:HCOPy:ABORt`
Initial S/W Revision	Prior to A.02.00

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions: :

Register saves are not remembered as Saves for the purpose of the Quick Save function

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 function 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. 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 updates incrementally 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. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is 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, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does,

and so forth).

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 measurement results file as "fred.csv", then the next auto file name chosen for a measurement 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 your own file name.

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

Key Path	**Front-panel key**
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Recall

Accesses a menu that enables you to select the information that you want to recall.

The options are State, Trace and Data. (screen images can be saved, but not recalled.) The default paths for Recall are data type dependent and are the same as for the Save key.

Key Path	**Front-panel key**
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>.
Initial 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 select the source of the recall in the State menu, the recall will occur.

See "More Information" on page 106.

Key Path	**Recall**
Mode	All
Example	MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state.
Notes	See "Open" on page 108.
Initial S/W Revision	Prior to A.02.00

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with 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. If a Trace was updating and visible when the State was saved, it will come back updating and visible,and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and 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 mode) 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 willhave 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. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

Key Path	**Recall, State**
Example	*RCL 1
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, State**
Example	*RCL 2
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, State**
Example	*RCL 3
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, State**
Example	*RCL 4
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, State**
Example	*RCL 5
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, State**
Example	*RCL 6
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.
Initial S/W Revision	Prior to A.02.00

From File\ File Open

Brings up the standard Windows® File Open dialog and its corresponding key menu.

When you first enter this dialog, the State File default path is in the Look In: box in this File Open dialog. The File Open dialog is loaded with the file information related to the State Save Type. The first *.state file is highlighted. The only files that are visible are the *.state files and the Files of type is *.state, since .state is the file suffix for the State save type. For more details, refer to "File Open Dialog and Menu" on page 119.

Key Path	**Recall, State**
Notes	Brings up the Open dialog for recalling a State Save Type
Initial S/W Revision	Prior to A.02.00

Open

The recalling State function must first 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 function tries to recall as much as possible and it returns a warning message of what it did.

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.

Key Path	**Recall, State, From File…**
Remote Command	`:MMEMory:LOAD:STATe <filename>`
Example	`:MMEM:LOAD:STAT "myState.state"` recalls the file myState.state on the default path
Notes	Auto return to the State menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete.
Notes	If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. Although the trace data is included in the .state file it is not recalled. Recalling trace data 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.
Initial 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)

Selects Trace as the data type to be recalled. Trace files include the state of the mode they were saved from as well as the trace data, with internal flags to indicate which trace the user was trying to save, which may include ALL traces. They are otherwise identical to State files. Recalling **trace data** may cause a mode switch if the file selected is not for the currently active mode.

Not all modes support saving of trace data with the state, and for modes that do, not all measurements do. The Trace key is grayed out for measurements that do not support trace recall. It is blanked for modes that do not support trace recall.

This key will not actually cause the recall, since the recall feature still needs to know from which file to recall the trace and which trace to recall it into. Pressing this key will bring up the Recall Trace menu that provides you with the options of where to retrieve the trace.

For quick recalls, the Trace menu lists 5 registers to recall from or you can select a file to recall from.

Key Path	**Recall**
Mode	SA
Example	MMEM:LOAD:TRAC TRACE2,"MyTraceFile.trace"
	This loads the trace file data (on the default file directory path) into the specified trace.
	:MMEM:LOAD:TRAC:REG TRACE1,2
	restores the trace data in register 2 to Trace 1
Notes	
Initial 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.

Key Path	**Recall, Trace**
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, Trace**
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, Trace**
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, Trace**
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Recall, Trace**
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.
Initial S/W Revision	Prior to A.02.00

To Trace

Thesemenu selections let you pick which Trace to recall the saved trace into. Not all modes have the full 6 traces available. The default is the currently selected trace, selected in this menu or in the Trace/Detector, 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.To trigger a recall of the selected Trace, you must select the **Open** key in the Recall Trace menu.

Key Path	**Save, Data, Trace**
Mode	SA
Initial S/W Revision	Prior to A.02.00

Open…

Accesses the standard Windows File Open dialog and its corresponding File Open menu. When you navigate to this selection, you have already determinedyou are recalling Trace and now you 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. 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 119.

Key Path	**Recall, Trace**
Mode	SA
Notes	Brings up Open dialog for recalling a Trace Save Type
Initial S/W Revision	Prior to A.02.00

Open

The recalling Trace function must first 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, and loading the state from the saved state file to as close as possible to the context in which the save occurred. You 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 erase 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 108 "Open" on

Key Path	**Recall, Trace, Open…**

Remote Command	`:MMEMory:LOAD:TRACe`
	`TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6,<filename>`
	
	`:MMEMory:LOAD:TRACe:REGister`
	`TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6,<integer>`

Example	: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, andis set to be not updating. :MMEM:LOAD:TRAC:REG TRACE1,2 restores the trace data in register 2 to Trace 1
Notes	Auto return to the Trace menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete. Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: MMEMory:LOAD:TRACe TRACE1|TRACE2|TRACE3,<filename> The load trace command actually performs a load state, which in the Swept SA measurement includes the trace data. However it looks in the recalled state file to see how it was flagged at save time. The possibilities are: If the trace file was saved using one of the TRACE# enums, it is flagged as a single trace save file. The trace that was flagged as the one that was saved, is loaded to the trace specified. The trace is loaded with update off and display on, and none of the other traces are loaded. If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update".
Initial S/W Revision	Prior to A.02.00

Data (Import)

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.

Since the commonly exported data files are in .csv format, the data can be edited by the user 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

occurs as soon as the Open key is pressed.

Key Path	**Recall**
Mode	All
Notes	The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands.
Dependencies	If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it.
Preset	Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Trace

This key selects Trace as the data type to be imported. When pressed a second time, it brings up the Trace Menu, which lets you select the Trace into which the data will be imported.

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

Key Path	**Recall, Data**
Remote Command	`:MMEMory:LOAD:TRACe:DATA` `TRACE1｜TRACE2｜TRACE3｜TRACE4｜TRACE5｜TRACE6,<filename>`
Example	:MMEM:LOAD:TRAC DATA TRACE2,"myTrace2.csv" imports the 2nd trace from the file myTrace2.csv in the current path. The default path is My Documents\SA\data\traces
Notes	For VSA Mode: The Open...dialog box has the following filter options when you are recalling trace data: • CSV (Comma delimited) (*.csv) • SDF (Fast) (*.sdf;*.dat) • Text (Tab delimited) (*.txt) • MAT-File (*.mat) • MAT-File (Version 4) (*.mat) • MAT-File (HDF5) (*.mat;*.hdf;*.h5) • N5110A Waveform (*.bin) The file format recalled depends on selection.
Dependencies	Trace data is not available from all Measurements. When unavailable, the key will be grayed out. The key will not show if no measurements in the Mode support it. If any error occurs while trying to load a file manually (as opposed to during remote operation), the analyzer returns to the Import Data menu and the File Open dialog goes away.
Couplings	When a trace is imported, **Trace Update** is always turned OFF for that trace and **Trace Display** is always turned ON.
Readback	Other than VSA: 1|2|3|4|5|6 VSA: Data 1|Data 2|Data 3|Data 4|Data 5|Data 6
Initial S/W Revision	Prior to A.02.00

Trace 1, 2, 3, 4, 5, 6

Enables you to select which Trace to import the data into either 1, 2, 3, 4, 5 or 6. The default is the currently selected trace, which was selected in this menu or in the Trace/Det, Export Data, Recall Trace, or Save Trace menus. The exception is, 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. To trigger an 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	**Recall, Data, Trace**
Initial 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 the 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.

Key Path	**Recall, Data (Import), Trace (to)**
Example	MMEM:LOAD:TRAC:DATA D1,"TRC1.TXT",TXT
	This command explicitly puts the data in the specified trace.
Mode	VSA
Initial S/W Revision	Prior to A.02.00

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

Key Path	**Recall, Data**
Example	MMEM:LOAD:CAPT "MyCaptureData.bin"
	This loads the file of capture data (on the default file directory path) into the instrument.
Mode	WCDMA
Dependencies	Capture buffer data is not available from all Measurements. When unavailable, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Initial S/W Revision	Prior to A.02.00

Mask

NOTE   This key is only valid on Spectrum Emission Mask and ACP measurements.

Recalls a preset mask file that will be provided by the XSA FW installer package. You can select one provided preset mask file from the list. Unlike in the case of the normal state file, the preset mask file contains the configuration for Carrier, Offset, Limit settings and preset profile BW only. When importing a preset mask file, it uses the XSA Recall function and overwrites the set of values with the contents of preset mask file. The other set of values that are not specified by the preset mask file are not changed. The file type is a binary file format and you cannot change or create the preset mask file. This feature

applies for Spectrum Emission Mask, and ACP measurements and will be grayed out when any other measurement is selected.

File type: The file type is a binary file.

File location: The preset mask file is located in "My Documents\<mode>\data\masks". The location "My Documents" is an alias to a directory and its place is dependant upon which user is logged in. At XSA start up, XSA will overwrite all of the limit mask files to the current user's "My Documents\<mode>\data\masks" each time.

File Name: The file name is decided by following naming rules. Each specific keyword is connected with underscore.

<Direction>_<Bandwidth>_<Measurement>_<Condition>.mask

Where

<Direction>: This term means that the limit mask file is for which Direction, Downlink or Uplink.

<Bandwidth>: This term means that the limit mask file is for which Bandwidth.

<Measurement>: This term means that the limit mask file is applied on which measurement. It is SEM, ACP or Mode. Mode means it overwrites the values of some parameters in both ACP, and SEM measurement.

<Condition>: This term means that the limit mask file is applied on which condition. It is depends on the measurement. For example, in case of Spectrum Emission Mask measurement, CategoryB might be fine. In case of ACP, NS_02, etc.

File extension: The extension of the preset mask file is "mask" since it needs to distinguish between the state file and preset mask file.

When you press the open key under the Data menu, "My Documents\<mode>\data\masks" is opened. You can select one mask file. When you change the Bandwidth or Direction, all Power Suite measurement parameters are reset to the hard coded preset parameters in each case. Thus, you must recall the appropriate preset mask file again after the change.

You cannot read the contents of the provided preset mask file since its file is a binary file. Detailed contents of the file are provided by a PDF format file located in the same directory as preset mask file.

The set of variables in the following table are imported to the ACP measurement.

Offset	Start Freq (MHz)	Stop Freq (MHz)	Res BW (Hz)	Meas BW	Rel Start	Rel Stop	Fail Mask
A	5	7.14	30k	1	–8	–25	Rel
B	7.14	10.57	30k	1	–25	–27	Rel
C	10.57	20	30k	1	–27	–50	Rel
D	20	25	30k	1	–50	–50	Rel
E	25	30	30k	1	–50	–50	Rel

Key Path	**Recall, Data**
Mode	LTE, LTETDD
Remote Command	`:MMEMory:LOAD:MASK <string>`
Example	MMEM:LOAD:MASK "File location path and filename"
Notes	Set of parameters related to Limit, Carrier and Offset are overwritten by contents of the Preset mask file.
Instrument S/W Revision	A.02.00

Zone map

A map file contains zone definitions that 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.

Key Path	**Recall, Data**
Example	MMEM:LOAD:ZMAP "MyZonemapFile.omf" This loads the file of zone map data (on the default file directory path) into the custom map.
Mode	OFDMA WIMAX
Dependencies	Zone map data is not available from all Measurements. When unavailable, the key will be grayed out. The key will not show if no measurements in the Mode support it.
Initial 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.

Key Path	**Recall, Data (Import)**
Example	MMEM:LOAD:REC "MyRecording.sdf"
Mode	VSA

Notes	Available file types are:
	• CSV (Comma delimited) (*.csv)
	• MAT-File (*.mat)
	• MAT-File (Version 4) (*.mat)
	• MAT-File (HDF5) (*.mat;*.hdf;*.h5)
	• N5110A Waveform (*.bin)
	• SDF (Fast) (*.sdf;*.dat)
	• SDF (Export) (*.sdf;*.dat)
	• Text (Tab delimited) (*.txt)
Initial S/W Revision	Prior to A.02.00

Open…

Accesses the standard Windows File Open dialog and the File Open key menu. When you navigate to this selection, you have already determinedyou are recalling a specific Data Type and now you want to specify which file to open.

When you first enter this dialog, the path in the Look In: field depends on which import data type you selected.

The only files that are visible are those specific to the file type being recalled.

Key Path	**Recall, Data**
Notes	The key location is mode-dependent and will vary.
	Brings up Open dialog for recalling a <mode specific> Save Type
Initial 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:

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.

Initial S/W Revision	Prior to A.02.00

Open

This selection and the **Enter** key, when a filename has been selected or specified,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.

Notes	Advisory Event "File <file name> recalled" after recall is complete.
Initial 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 hereyoucan get information about the file.

Key Path	**Recall, <various>, Open…**
Notes	Pressing this key navigates you to the files and folders list in the center of the dialog.
Initial S/W Revision	Prior to A.02.00

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately.

Key Path	**Recall, <various>, Open…**
Notes	No SCPI command directly controls the sorting.
Initial S/W Revision	Prior to A.02.00

By Date

Accesses a menu that enables you to sort the list of files within the scope of the File Open dialog in ascending or descending data order. The date is the last data modified.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in the File Open dialog are sorted immediately in the selected order
Initial S/W Revision	Prior to A.02.00

By Name

Accesses a menu that enables you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on the filename.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in the File Open dialog are sorted immediately in the selected order
Initial S/W Revision	Prior to A.02.00

By Extension

Accesses a menu that enables you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on the file extension for each file.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in the File Open dialog are sorted immediately in the selected order
Initial S/W Revision	Prior to A.02.00

By Size

Accesses a menu that enables you to sort the list of files within the scope of the File Open dialog in ascending or descending order based on file size.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in File Open dialog are sorted immediately in the selected order
Initial 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, in ascending order.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in File Open dialog are sorted immediately in the selected order
Initial 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, in descending order.

Key Path	**Recall, <various>, Open…, Sort**
Notes	Files in File Open dialog are sorted immediately in the selected order
Initial 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 supported Files Of Type behavior. It shows the current file suffix that corresponds to the type of file the user has selected to save. Ifyou 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 younavigated 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)

Key Path	**Recall, <various>, Open…**
Notes	Pressing this key causes the pull down menu to list all possible file types available in this context.
Initial S/W Revision	Prior to A.02.00

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 directs the file and folder list to navigate up one level in the directory structure.

Key Path	**Recall, <various>, Open…**
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.
Initial S/W Revision	Prior to A.02.00

Cancel

Cancels the current File Open request. It follows the standard Windows supported Cancel behavior.

Key Path	**Recall, <various>, Open…**
Notes	Pressing this key causes the Open dialog to go away and auto return.
Initial S/W Revision	Prior to A.02.00

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.

Key Path	Front-panel key
Mode	All
Notes	No remote command for this key specifically.
Initial 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.

For rapid saving, the State menu lists registers to save to, or you can select a file to save to. Once they select he destination of the save in the State menu, the save will occur.

Key Path	**Save**
Mode	All
Example	MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory.
Notes	See "Save" on page 129.
Initial S/W Revision	Prior to A.02.00

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 the user in the My Documents\System folder.

Key Path	**Save, State**
Mode	All
Example	*SAV 1
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, State**
Mode	All
Example	*SAV 2
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, State**
Mode	All
Example	*SAV 3
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, State**
Mode	All
Example	*SAV 4
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, State**
Mode	All
Example	*SAV 5
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, State**
Mode	All
Example	*SAV 6
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial 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	**Save, State**
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial 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 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 softkey. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

When you first enter this dialog, the path in the **Save In:** field depends on the data type. The only files that are visible are the *.state files and the Save As type is *.state, since .state is the file suffix for the State Save Type.

Key Path	**Save, State**
Mode	All

Notes	Brings up Save As dialog for saving a State Save Type
Initial 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.

Key Path	**Save, State, To File…**
Mode	All
Remote Command	`:MMEMory:STORe:STATe <filename>`
Example	:MMEM:STOR:STAT "myState.state" saves the file myState.state on the default path
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 an 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.
Backwards Compatibility SCPI	For a backwards compatibility only, the following parameters syntax is supported: :MMEMory:STORe:STATe 1,<filename> The "1" is just ignored. The command is sequential.
Initial 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 accesses the Save Trace menu that provides the user 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.

Key Path	Save
Mode	SA
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
Notes	See "Save" on page 129.
Initial 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 the user in the My Documents\System folder.

Key Path	Save, Trace
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.
Initial S/W Revision	Prior to A.02.00

Key Path	Save, Trace
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.
Initial S/W Revision	Prior to A.02.00

Key Path	Save, Trace
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.

Initial S/W Revision	Prior to A.02.00

Key Path	**Save, Trace**
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.
Initial S/W Revision	Prior to A.02.00

Key Path	**Save, Trace**
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.
Initial S/W Revision	Prior to A.02.00

From Trace

Accesses a menu that enables you to select the trace to be saved. Once a trace is selected, the key returns 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. To trigger a save of the selected **Trace**, you must select the **Save As** key in the Save Trace menu.

Key Path	**Save, Trace + State**
Mode	SA
Initial 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 softkey. 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.

Key Path	**Save, Trace (+State)**
Mode	SA
Notes	Brings up the Save As dialog for saving a Trace Save Type
Initial 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.

Key Path	**Save, Trace, Save As…**
Mode	SA

Remote Command	`:MMEMory:STORe:TRACe TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6|ALL,<filename>`
	
	`:MMEMory:STORe:TRACe:REGister TRACE1|TRACE2|TRACE3|TRACE4|TRACE5|TRACE6|ALL,<integer>`

Example	:MMEM:STOR:TRAC TRACE1,"myState.trace" saves the file myState.trace on the default path and flags it as a "single trace" file with Trace 1 as the single trace (even though all of the traces are in fact stored). :MMEM:STOR:TRAC ALL,"myState.trace" saves the file myState.trace on the default path and flags it as an "all traces" file :MMEM:STOR:TRAC:REG TRACE1,2 stores trace 1 data in trace register 2
Notes	Some modes and measurements do not have available all 6 traces. The Phase Noise mode command, for example, is: MMEMory:STORe:TRACe TRACE1|TRACE2|TRACE3|ALL,<filename> This command actually performs a save state, which in the Swept SA measurement includes the trace data. However it flags it (in the file) as a "save trace" file of the specified trace (or all traces). The range for the register parameter is 1–5 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.

Initial S/W Revision	Prior to A.02.00

Data (Export)

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.

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.

Key Path	**Save**
Mode	All
Notes	The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary.
	No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.
Dependencies	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 at all if there are no measurements in the Mode that support it.
Preset	Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults
Readback	The data type that is currently selected
Initial S/W Revision	Prior to A.02.00

Trace

Enables you to select Traces as the data type to be exported. Pressing this key when it is already selected brings up the Trace menu, which allows you to select which Trace to save.

The trace file contains "meta" data, which describes the current state of the analyzer.

Key Path	**Save, Data**
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 current path. The default path is My Documents\SA\data\traces
	VSA Example: MMEM:STOR:TRAC:DATA TRACE1,"Trc1.txt",TXT,ON
Notes	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 SCPI.
Dependencies	Trace data is not available from all Measurements. When unavailable, the key will be grayed out. The key will not show if no measurements in the Mode support it.
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

Enables you to select 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. The exception is, if you have chosen All then it remains chosen until you specifically change it to a single trace.

To trigger a save of the selected trace, you must select the Save As key in the Export Data menu.

Some measurements have an "ALL" selection. This saves all six traces in one .csv file with the x-axis data in the first column and the individual trace data in succeeding columns. The header data and x-axis data in this file reflect the current settings of the measurement. Note that any traces which are in View or Blank may have different x-axis data than the current measurement settings, but this data will not be output to the file.

Key Path	**Save, Data, Trace**
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.

Key Path	**Save, Data, Trace**
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.
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.

Key Path	**Save, Data**
Example	MMEM:STOR:RES "MyResultsFile.xml"
	This stores the measurement results data in the file MyResultsFile.xml in the default directory.
Mode	SA|ADEMOD|BASIC(IQ Analyzer)|CDMA2K|GSMEDGE|PNOISE|WCDMA|WIMAXOFDMA|TDSCDMA
Notes	The key will not show if no measurements in the Mode support it.
Instrument S/W Revision	Prior to A.02.00

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data (unprocessed).

Key Path	**Save, Data**
Example	MMEM:STOR:CAPT "MyCaptureData.bin"
	This stores the capture data in the file MyCaptureData.bin in the default directory.
Mode	WCDMA
Notes	The key will not show if no measurements in the Mode support it.
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.

Key Path	**Save, Data**
Example	MMEM:STOR:ZMAP "MyZonemapFile.omf" This stores the zone map data in the file MyZonemapFile.omf in the default directory.
Mode	OFDMA WiMAX
Notes	The key will not show if no measurements in the Mode support it.
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.

Key Path	**Save, Data (Export)**
Example	MMEM:STOR:REC "MyRecording.sdf",SDF,ON,ON,OFF
Mode	VSA
Notes	Grayed out unless there is recorded data in the buffer.
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

Key Path	**Save, Data**
Mode	All
Notes	The key location is mode-dependent and will vary.
	Brings up the Save As dialog for saving a <mode specific> Save Type
Initial S/W Revision	Prior to A.02.00

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 appear that allows you to replace the existing file by selecting **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 softkey annotation is updated with the date the time and an advisory message that the file was saved appears in the message bar.

Key Path	**Save, Data, Save As…**
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.
Initial 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 that 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 the user asks for a Screen Image save. When the Screen Image softkey is pressed, a "thumbnail" of the captured image is displayed, as shown below:
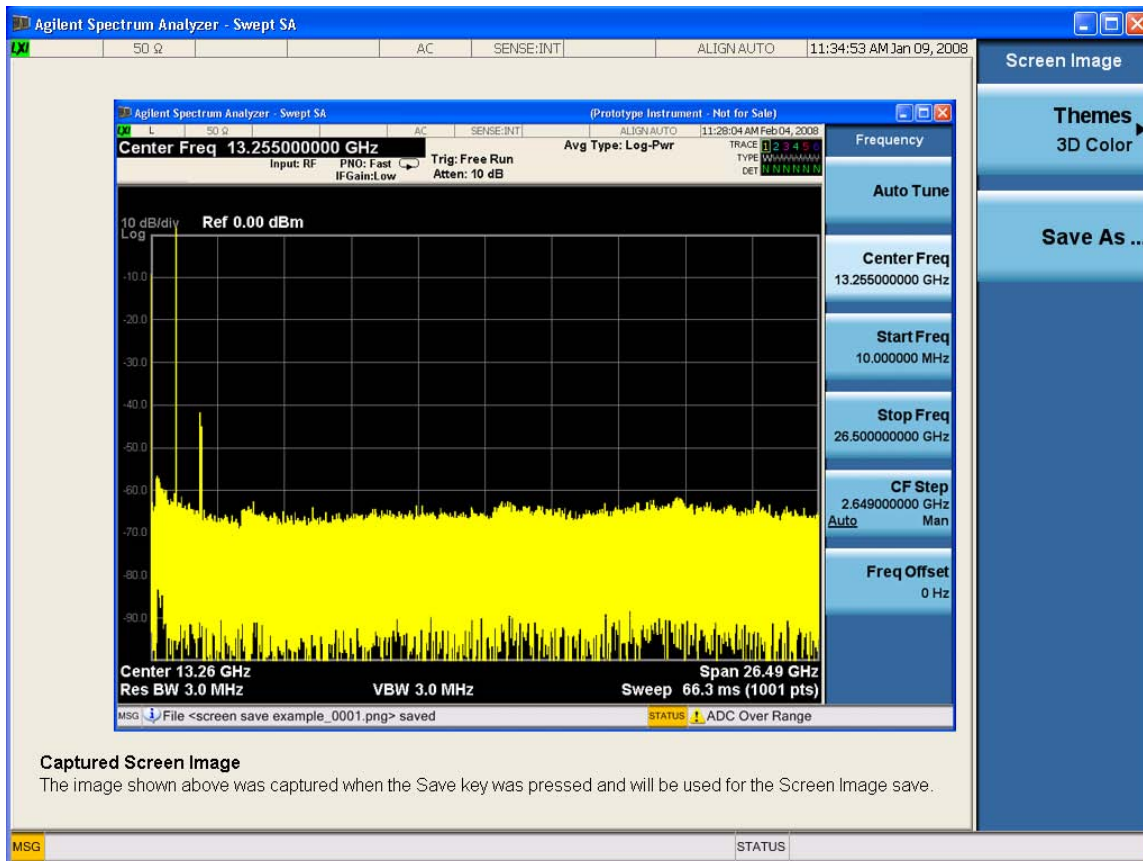
When you continue on into the **Save As** menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the **Save** menus.

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 softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

Key Path	Save

Mode	All
Example	MMEM:STOR:SCR "MyScreenFile.png"
	This stores the current screen image in the file MyScreenFile.png in the default directory.
Notes	See
Initial S/W Revision	Prior to A.02.00

Themes

Accesses a menu of functions 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 choose between themes to be used when saving the screen image.

Key Path	**Save, Screen Image**
Remote Command	:MMEMory:STORe:SCReen:THEMe TDColor|TDMonochrome|FCOLor|FMONochrome
	:MMEMory:STORe:SCReen:THEMe?
Example	:MMEM:STOR:SCR:THEM TDM
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
Initial S/W Revision	Prior to A.02.00

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

Key Path	**Save, Screen Image, Themes**
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial 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.

Key Path	**Save, Screen Image, Themes**
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono

Initial 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.

Key Path	**Save, Screen Image, Themes**
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial 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.

Key Path	**Save, Screen Image, Themes**
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial 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.

Key Path	**Save, Screen Image**
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial 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.

Key Path	**Save, Screen Image, Save As…**
Remote Command	`:MMEMory:STORe:SCReen <filename>`
Example	:MMEM:STOR:SCR "myScreen.png"
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.
Initial S/W Revision	Prior to A.02.00

Save As . . .

Accesses a standard Windows dialog 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 has 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**.

Initial 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 appears with corresponding menu keys that allowyou 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.

Notes	If the file already exists, the File Exist dialog appears 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.
Initial 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.

Key Path	**Save, <various>, Save As…**
Notes	Pressing this key enables you to navigate to the files and folders list in the center of the dialog.
Initial S/W Revision	Prior to A.02.00

File Name

Accesses the Alpha Editor. 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** key and a **Done** key. The **Done** 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.

Key Path	**Save, <various>, Save As…**
Notes	Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog.
Initial 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.

Key Path	**Save, <various>, Save As…**
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.

Initial 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.

Key Path	**Save, <various>, Save As…**
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
Initial 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.

Key Path	**Save, <various>, Save As…**
Notes	Creates a new folder in the current folder and lets the user fill in the folder name using the Alpha Editor.
Initial 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.

Key Path	**Save, <various>, Save As…**
Notes	Pressing this key causes the Save As dialog to go away and auto return.
Initial S/W Revision	Prior to A.02.00

Mass Storage Catalog (Remote Command Only)

Remote Command:	:MMEMory:CATalog? [<directory_name>]
Notes:	The string must be a valid logical path.
	Query disk usage information (drive capacity, free space available) and obtain a list of files and directories in a specified directory in the following format:
	<numeric_value>,<numeric_value>,{<file_entry>}
	It shall return two numeric parameters and as many strings as there are files and directories. The first parameter shall indicate the total amount of storage currently used in bytes. The second parameter shall indicate the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> shall indicate the name, type, and size of one file in the directory list:
	<file_name>,<file_type>,<file_size>
	As windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. In case of directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Remote Command:	:MMEMory:CDIRectory [<directory_name>]
	:MMEMory:CDIRectory?
Notes:	The string must be a valid logical path.
	Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
	At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
	Query returns full path of the default directory.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Remote Command:	:MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes:	The string must be a valid logical path.
	Copies an existing file to a new file or an existing directory to a new directory.
	Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
	The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

Mass Storage Delete   (Remote Command Only)

Remote Command:	:MMEMory:DELete <file_name>[,<directory_name>]
Notes:	The string must be a valid logical path.
	Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

Remote Command:	:MMEMory:DATA <file_name>, <data>
	:MMEMory:DATA? <file_name>
Notes:	The string must be a valid logical path.
	The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.
	The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Make Directory (Remote Command Only)

Remote Command:	:MMEMory:MDIRectory <directory_name>
Notes:	The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Move (Remote Command Only)

Remote Command:	:MMEMory:MOVE <string>,<string>[,<string>,<string>]
Notes:	The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory. Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.
Initial S/W Revision:	Prior to A.02.00

Mass Storage Remove Directory (Remote Command Only)

Remote Command:	:MEMMory:RDIRectory <directory_name>
Notes:	The string must be a valid logical path. Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.
Initial S/W Revision:	Prior to A.02.00

System

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

Key Path	**Front-panel key**
Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.02.00

Show

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

Key Path	**System**
Mode	All

Remote Command	`:SYSTem:SHOW`
	`OFF|ERRor|SYSTem|HARDware|LXI|HWSTatistics|ALIGnment|SOFTware|CAPPlication`
	`:SYSTem:SHOW?`

Example	:SYST:SHOW SYST
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|CAPPlication
Initial 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 key 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 (unlabelled) - 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	**System, Show**
Mode	All
Remote Command	:SYSTem:ERRor[:NEXT]?
Example	:SYST:ERR?
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
Initial 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	**System, Show, Errors**
Initial S/W Revision	Prior to A.02.00

Previous Page

See .

Key Path	**System, Show, Errors**
Initial 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 shows a number in [square brackets]. This is the number of currently open status items.

Key Path	**System, Show, Errors**
Initial S/W Revision	Prior to A.02.00

Status

See "History" on page 146

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	**System, Show, Errors**
Mode	All

Remote Command	`:SYSTem:ERRor:VERBose OFF|ON|0|1`
	
	`:SYSTem:ERRor:VERBose?`

Example	:SYST:ERR:VERB ON
Preset	OFF
Preset	This is unaffected by Preset but is set to OFF on a "Restore System Defaults->Misc"
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

Refresh

When pressed, refreshes the Show Errors display.

Key Path	**System, Show, Errors**
Initial S/W Revision	Prior to A.02.00

Clear Error Queue

This clears all errors in all error queues.

Note the following:

Clear Error Queue does not affect the current status conditions.

Mode Preset does not clear the error queue.

Restore System Defaults will clear all error queues.

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

Switching modes does not affect any error queues.

Key Path	**System, Show, Errors**
Initial 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       Precison Frequency Reference
N9020A-P03       Preamp 3.6 GHz

N9060A-2FP       Spectrum Analysis Measurement Suite   1.0.0.0
N9073A-1FP       WCDMA                                 1.0.0.0
N9073A-2FP       WCDMA with HSDPA                      1.0.0.0
```

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

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

Hardware Information
MXA Signal Analyzer
Product Number: N9020A
Serial Number: US46220107
Firmware Revision: A.01.14

Assembly Name	Part #	Serial #	Matl Rev	Rev	OF Rev	Hw Id	Misc
Analog IF	E441060104	78060200131	003	0	C	15	
YIG Tuned Filter	50877305	11061500550	005	0	A	11	
Digital IF	E441060105	78060100559	003	0	F	14	
Front End Controller	E441060101	78060100147	004	2	A	8	
Low Band Switch	E441060170	78060800346	005	1	A	10	
LO Synthesizer	E441060102	78060100226	003	3	G	2	
Reference	E441060108	78060300420	004	1	C	16	
Front End	E441060154	13062800820	010	2	B	9	

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

Key Path	**System, Show**
Mode	All
Example	SYST:SHOW HARD
Initial S/W Revision	Prior to A.02.00

LXI

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

Key Path	**System, Show**
Initial 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**
Initial S/W Revision	Prior to A.02.00

Next Page

See "Next Page" on page 145.

Key Path	**System, Show, Errors**
Initial S/W Revision	Prior to A.02.00

Previous Page

See "Next Page" on page 145

Key Path	**System, Show, Errors**
Initial 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:EVENt:LOG:CIRCular[:ENABle] ON|OFF|1|0 :LXI:EVENt:LOG:CIRCular[:ENABle]?
Example	:LXI:EVEN:LOG:CIRC 1
Preset	ON

Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing **System, Restore Defaults, Misc.**
State Saved	Saved in instrument state.
Range	OFF|ON|0|1
Initial S/W Revision	Prior to A.02.00

Clear

Clears the event log of all entries.

Key Path	**System, Show, LXI, LXI Event Log**
Remote Command	:LXI:EVENt:LOG:CLEar
Example	:LXI:EVEN:LOG:CLE
Initial S/W Revision	Prior to A.02.00

Size

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

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

Enabled

Enables and disables the logging of LXI Events.

Key Path	**System, Show, LXI, LXI Event Log**
Remote Command	:LXI:EVENt:LOG:ENABle ON|OFF|1|0
	:LXI:EVENt:LOG:ENABle?
Example	:LXI:EVEN:LOG:ENAB ON
Preset	ON

Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing **System, Restore Defaults, Misc.**
State Saved	Saved in instrument state.
Range	ON|OFF|0|1
Initial 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
Initial 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?
Initial 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.
Initial 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.
Initial 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:ENTtry? 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
Initial S/W Revision	Prior to A.02.00

Power On

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	**System**
Mode	All
Remote Command	`:SYSTem:PON:TYPE MODE|USER|LAST|PRESet`
	`:SYSTem:PON:TYPE?`
Example	:SYST:PON:TYPE MODE
Preset	MODE
Preset	This is unaffected by a Preset but is set to Mode on a "Restore System Defaults->All"
State Saved	No
Initial 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 performs a Restore Mode Defaults to all modes in the instrument and also performs a Restore Input/Output Defaults.

Persistent parameters (such as Amplitude Correction tables or Limit tables) are not affected at poweron,

even though they are normally cleared by Restore Input/Output Defaults and/or Restore Mode Defaults.

Key Path	**System, Power On**
Mode	All
Example	SYST:PON:TYPE MODE
Readback Text	Defaults
Initial 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.

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

Key Path	**System, Power On**
Mode	All
Example	SYST:PON:TYPE USER
Readback Text	User Preset
Initial 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.

NOTE	An instrument could never power up for the first time in Last.
	If line power to the analyzer is interrupted, for example by pulling the line cord plug or by switching off power to a test rack, Power On Last State will not work properly.

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

Notes	Power on Last State only works if the user has done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the :SYSTem:PDOWn command.
Readback Text	Last State
Initial S/W Revision	Prior to A.02.00

Power On Application

Accesses a menu that lists the available Modes and lets you select which Mode is to be the power-on application.

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

Key Path	**System, Power On**
Mode	All
Remote Command	:SYSTem:PON:MODE SA|BASIC|ADEMOD|NFIGURE|PNOISE|CDMA2K|TDSCDMA|VSA|VSA89 601|WCDMA|WIMAXOFDMA :SYSTem:PON:MODE?
Example	SYST:PON:MODE SA
Notes	The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument.
Preset	SA
Preset	This is unaffected by a Preset but is set on a "Restore System Defaults->All" to SA.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Configure Applications

The Configure Applications utility lets you do two things:

1. specify a subset of the available applications (Modes) to preload into memory at startup time

2. specify the order in which the Modes appear in the Mode menu

There are several reasons you might want to specify a subset of the available applications (Modes) to preload:

- During runtime, if a Mode which is not preloaded is selected by the user, there will be a pause while the Application is loaded. Configure Applications lets you decide whether you want that delay at startup of the analyzer program or the first time you select the Mode.

- 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 into memory, if you have more licensed than can fit.

The Configure Applications utility can be used to select applications for preload and/or to determine how many applications can fit in memory at one time. This utility consists of a window with instructions, a set of "Select Application" checkboxes, a "fuel bar" style memory guage, and softkeys that help you set up your configuration.

Preloading Applications

During operation of the analyzer, you select applications from the Mode menu. After startup of the analyzer program, the first time you select a particular application that application must be loaded into memory. Once loaded, the application stays loaded, so the next time you select it during a session, there is no delay. During runtime, if an application which is not yet loaded into memory is selected using the Mode menu or sending SCPI commands, there will be a pause while the Application is loaded. During this pause a message which says "Loading application, please wait …" is displayed.

You can use the Configure Applications utility to choose applications to "preload" at startup, to eliminate the runtime delay; if you do this, the delay will instead increase the time it takes to start up the analyzer program, but for many users this is preferable to having to wait the first time they select an application. Asking for an application to be preloaded will cause it to be loaded into the analyzer's memory when the analyzer program starts up. Once it is loaded into memory, it cannot be unloaded without exiting and restarting the analyzer program.

Virtual memory usage

There are more applications available for the X-Series than can fit into memory at any one time, so the Configure Applications utility includes a memory tracker that serves two purposes:

1. It will not let you preload more applications than will fit into memory at once.

2. You can determine how many of your favorite applications can reside in memory at one time.

The utility provides a graphical representation of the amount of memory (note that the memory in question here is Virtual memory and is a limitation imposed by the oprating system, not by the amount of physical memory you have in your analyzer). You select applications to preload by checking the boxes on the left. Checked applications preload at startup. The colored fuel bar indicates the total memory required when all the checked applications are loaded (either preloaded or selected during runtime).

Here is what the fuel bar colors mean:

RED: the applications you have selected cannot all fit into the analyzer's memory. You must deselect applications until the fuel bar turns yellow.

YELLOW: the applications you have selected can all fit into the analyzer's memory, but there is less than 10% of the memory left, probably not enough to load any other applications, either via preload or by selecting a Mode while the analyzer is running..

GREEN: The indicator is green when <90% of the memory limit is consumed. This means the applications you have selected can all fit into the analyzer's memory with room to spare. You will likely be able to load one or more other applications without running out of memory.

Access to Configure Applications utility

You may, at any time, manually call up the Configure Applications utility by pressing **System, Power On, Configure Applications**, to find a configuration that works best for you, and then restart the analyzer program.

The utility may also be called if, during operation of the analyzer, you attempt to load more applications than can fit in memory at once.

A version of the utility also runs the first time you power up the analyzer after purchasing it from Agilent. In this case the utility automatically configures preloads so that as many licensed applications as possible are preloaded while keeping the total estimated virtual memory usage below the limit. This auto-configuration only takes place at the very first run, and after analyzer software upgrades.

Key Path	**System, Power On**
Example	:SYST:SHOW CAPP Displays the Config Applications screen
Initial S/W Revision	A.02.00

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	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00

Deselect All

Clears the 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.

Key Path	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00

Move Up

The application list is the order in which applications appear in the Mode Menu. This key enables you to shift the selected application up in the list, thus moving the selected application earlier in the Mode Menu.

Key Path	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00

Move Down

The application list is the order in which applications appear in the Mode Menu. This key enables you to shift the selected application down in the list, thus moving the selected application later in the Mode

Menu.

Key Path	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00

Select/Deselect

Toggles the currently highlighted application in the list.

Key Path	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00

Save Changes and Exit

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

After saving your changes, the analyzer asks you if you would like it to restart so that your changes can take effect (see dialog box, below). If you choose not to restart, no memory will be released until the next time you shut down and restart the analyzer.

Key Path	**System, Power On, Configure Applications**
Remote Command	:SYSTem:PUP:PROCess
Example	:SYST:PUP:PROC This is the SCPI command for restarting the analyzer. You must Wait after this command for the instrument application to restart
Notes	The softkey will be grayed-out when the virtual memory of the selected applications exceeds 100% of the limit.
Notes	You cannot use *WAI or *OPC? to synchronize operation after a restart. 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.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Exit Without Saving

Pressing this key will exit the Configure Applications utility without saving your changes.

Key Path	**System, Power On, Configure Applications**
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Configure Applications - Instrument boot-up

At start-up of the analyzer programa dialog box similar to the one under the **System, Power On, Configure Applications** key will be displayed allowing you to choose which licensed applications are to be loaded. This dialog will only be displayed if the memory required to pre-load all of the licensed applications exceeds the Virtual Memory available.

Configure Applications - Windows desktop

The Configure Applications Utility may be run from the Windows Desktop. The utility is launched by

double-clicking the icon on the desktop, which brings-up a dialog box similar to the one under the **System, Power On, Configure Applications** key, allowing you to choose which licensed applications are to be loaded whne the analyzer program starts up. This dialog box has mouse buttons on it which do the job that the softkeys normally do in the **System, Power On, Configure Applications** menu.

Configure Applications - Remote Commands

The following topics provide details on the using remote commands to configure the list of applications want to load into the instrument memory or query the Virtual Memory utilization for your applications.

- "Configuration list (Remote Command Only)" on page 158
- "Configuration Memory Available (Remote Command Only)" on page 159
- "Configuration Memory Total (Remote Command Only)" on page 159
- "Configuration Memory Used (Remote Command Only)" on page 159
- "Configuration Application Memory (Remote Command Only)" on page 160

Configuration list (Remote Command Only)

This remote command is used to set or query the list of 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. When this occurs, the existing applications load list is unchanged.
Preset	Not affected by Preset
State Saved	Not saved in instrument state
Initial 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
Initial 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
Initial 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
Initial 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 in Meas Common section 13.3
	Value returned will be 0 (zero) if the name provided is invalid.
Preset	Not affected by Preset
Initial S/W Revision	Prior to A.02.00

Restore Power On Defaults

This selection causes the Power On Type and Power On Application settings 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. The Power On key, under the Restore System Defaults menu, causes the same action.
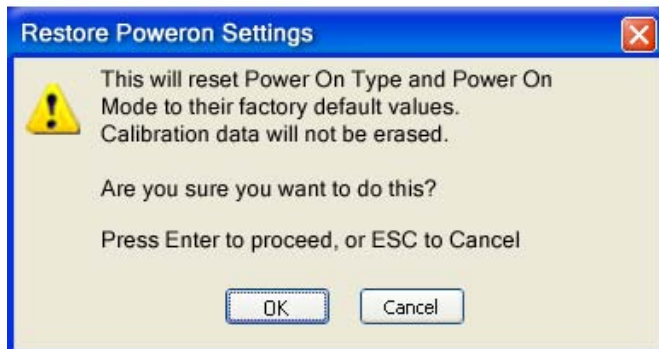
If you press any key other than OK or Enter, it is construed as a Cancel, because the only path that will actually cause the reset to be executed is through OK or Enter.

Key Path	**System, Power On**
Example	:SYST:DEF PON
Initial 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 specifications to be impacted.

ALIGN PARTIAL

Key Path	**System**
Initial 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	**System, Alignments**
Mode	All
Remote Command	:CALibration:AUTO ON|PARTial|OFF
	:CALibration:AUTO?
Example	:CAL:AUTO ON
Notes	While Auto Align is executing, bit 0 of Status Operation register is set.
Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Preset	ON
Preset	This is unaffected by Preset but is set to ON upon a "Restore System Defaults->Align".
State Saved	No
Status Bits/OPC dependencies	When Auto Align is executing, bit 0 in the Status Operational register is set.
Initial S/W Revision	Prior to A.02.00

Normal

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

Example	:CAL:AUTO PART
Notes	Auto Align Partial begins the elapsed time counter for Auto Align Off time.
Readback Text	Partial
Initial S/W Revision	Prior to A.02.00

Off

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

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

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

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

Key Path	**System, Alignments, Auto Align**
Mode	All
Example	:CAL:AUTO OFF
Notes	Auto Align Off begins the elapsed time counter for Auto Align Off time.
Couplings	Auto Align is set to Off if Restore Align Data is invoked.
Readback Text	Off
Initial 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	**System, Alignments, Auto Align**
Mode	All

Remote Command	`:CALibration:AUTO:MODE ALL|NRF`
	
	`:CALibration:AUTO:MODE?`

Example	:CAL:AUTO:MODE NRF
Preset	ALL
Preset	This is unaffected by Preset but is set to ALL on a "Restore System Defaults->Align".
State Saved	No
Readback Text	RF or NRF
Initial 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	**System, Alignments, Auto Align**
Mode	All

Remote Command	`:CALibration:AUTO:ALERt TTEMperature|DAY|WEEK|NONE`
	
	`:CALibration:AUTO:ALERt?`

Example	:CAL:AUTO:ALER TTEM
Notes	The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register.
Preset	TTEMperature
Preset	This is unaffected by Preset but is set to TTEMperature on a "Restore System Defaults->Align".
State Saved	No
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.
Initial 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	**System, Alignments, Auto Align, Alert**
Mode	All
Example	:CAL:AUTO:ALER TTEM
Readback Text	Time & Temp
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial 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".

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	**System, Alignments, Auto Align, Alert**
Mode	All
Example	:CAL:AUTO:ALER DAY
Readback Text	24 hours
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial 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	**System, Alignments, Auto Align, Alert**
Mode	All
Example	:CAL:AUTO:ALER WEEK
Readback Text	7 days
Status Bits/OPC dependencies	Bit 14 is set in the Status Questionable Calibration register.
Initial 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	**System, Alignments, Auto Align, Alert**
Mode	All
Example	:CAL:AUTO:ALER NONE
Initial 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	**System, Alignments**
Initial 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).

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

Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`*CAL?`
Example	`*CAL?`
Notes	*CAL? returns 0 if successful
	*CAL? returns 1 if failed
	:CALibration[:ALL]? is the same as *CAL?
	See additional remarks described with :CALibration[:ALL]?
	Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings
Initial 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 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	**System, Alignments, Align Now**
Mode	All
Remote Command	`:CALibration:NRF`
	`:CALibration:NRF?`
Example	`:CAL:NRF`

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".
Couplings	Initializes the time for the Last Align Now, All Time.
	Records the temperature for the Last Align Now, All Temperature.
Status Bits/OPC dependencies	Bits 12 or 14 may be set in the Status Questionable Calibration register.
Initial 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	**System, Alignments, Align Now**
Mode	All

Remote Command	:CALibration:RF
	:CALibration:RF?
Example	:CAL:RF
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.
	An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, RF Time.
	Records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial 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:

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	**System, Alignments**
Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	:SYSTem:PON:TIME?
Example	:SYST:PON:TIME?
Notes	Value is the time since the most recent start-up in seconds.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	:CALibration:TEMPerature:CURRent?

Example	:CAL:TEMP:CURR?
Notes	Value is in degrees Centigrade.
	Value is invalid if using default alignment data (Align Now, All required)
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	`:CALibration:TIME:LALL?`
Example	:CAL:TIME:LALL?
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
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	`:CALibration:TEMPerature:LALL?`
Example	:CAL:TEMP:LALL?
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
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	`:CALibration:TIME:LRF?`
Example	:CAL:TIME:LRF?
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
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**

Mode	All
Remote Command	:CALibration:TEMPerature:LRF?
Example	:CAL:TEMP:LRF?
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
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	:CALibration:TIME:LPReselector?
Example	:CAL:TIME:LPR?
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.
Dependencies	In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	:CALibration:TEMPerature:LPReselector?
Example	:CAL:TEMP:LPR?
Notes	Value is in degrees Centigrade at which the last successful Characterize Preselector was executed.
Dependencies	In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Key Path	**Visual annotation in the Show Alignment Statistics screen**
Mode	All
Remote Command	:CALibration:AUTO:TIME:OFF?
Example	:CAL:AUTO:TIME:OFF?

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
Initial 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:
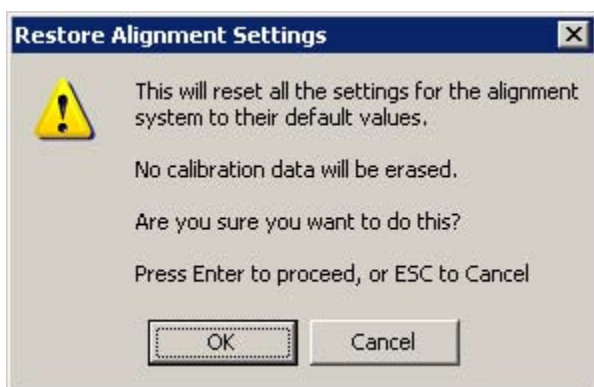
The parameters affected are:

Parameter	Setting
Timebase DAC	Calibrated
Timebase DAC setting	Calibrated value
Auto Align State	Normal (if the instrument is not operating with default alignment data, Off otherwise)
Auto Align All but RF	Off
Auto Align Alert	Time & Temperature

Key Path	**System, Alignments**
Mode	All
Example	:SYST:DEF ALIG
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.
Initial 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 a USB memory device or Mapped Network Drive to backup the alignment data to storage outside of the instrument.

Backup or Restore Align Data…

Opens the utility for backing-up or restoring the alignment data.

Key Path	**System, Alignments**
Initial S/W Revision	A.02.00

Key Path	**System, Alignments**
Mode	All
Remote Command	`:CALibration:DATA:DEFault`
Example	`:CAL:DATA:DEF`
Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition "Align Now, All required" is set.
Initial S/W Revision	Prior to A.02.00

Alignment Data Wizard

The Backup or Restore Alignment Data wizard will guide 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.
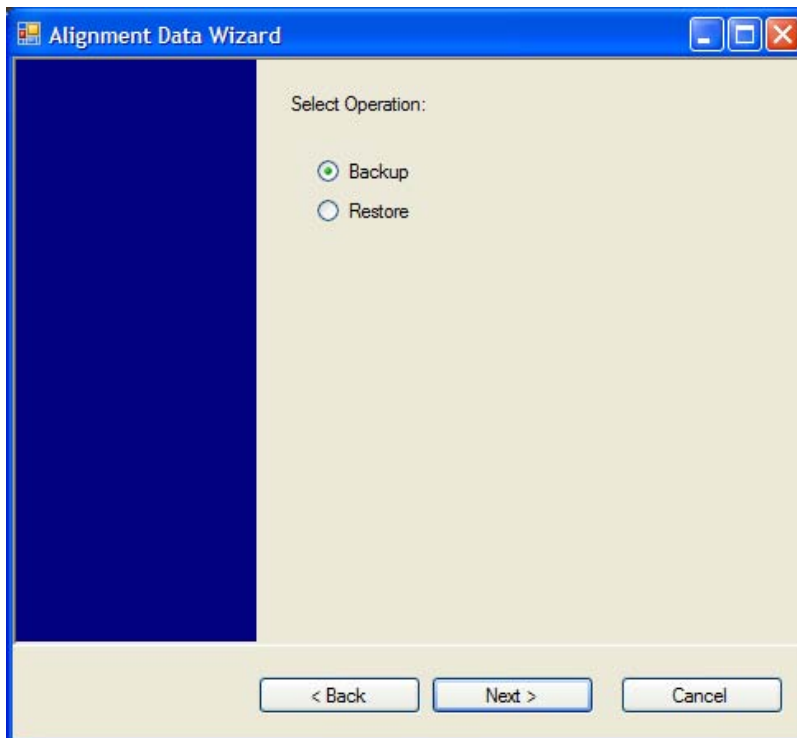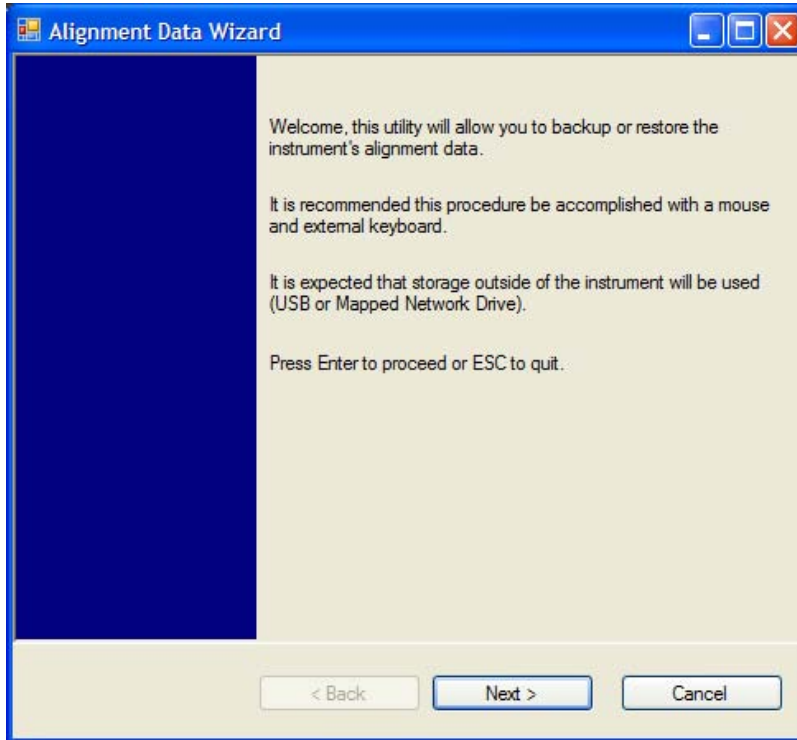
The backup screen will indicate the approximate amount of space required to contain the backup file.

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

For the N9030A the default backup location will be the internal F: drive which is a solid-state memory device

located internally on the instrument.
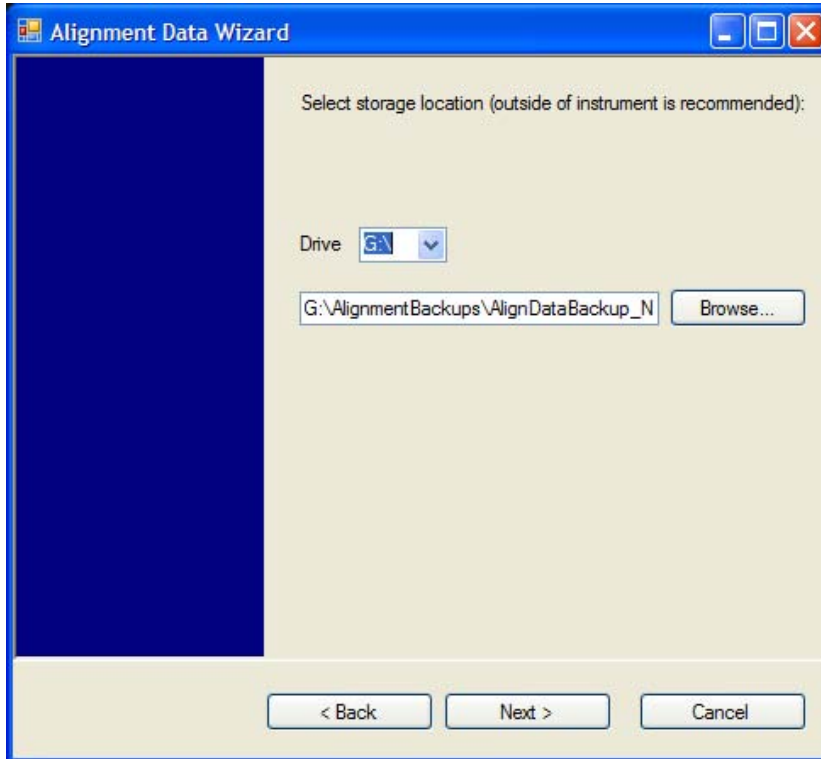
Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down is populated with connected drives which provide the user with write access. If there are many unreachable network drives connected to the instrument, this step can take 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, the user will be prompted to create a new folder if the chosen path does not yet exist.
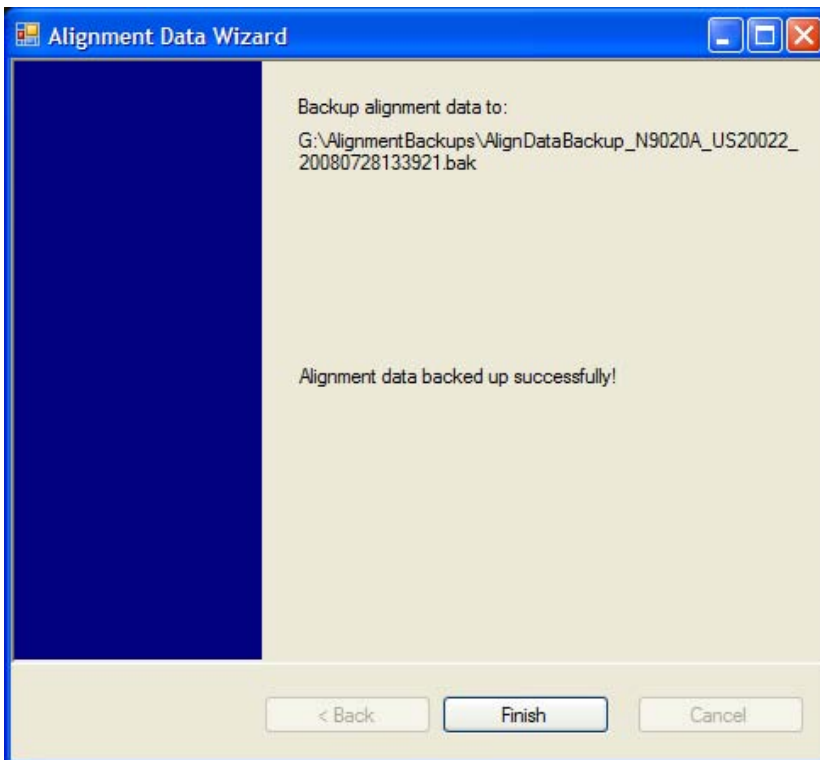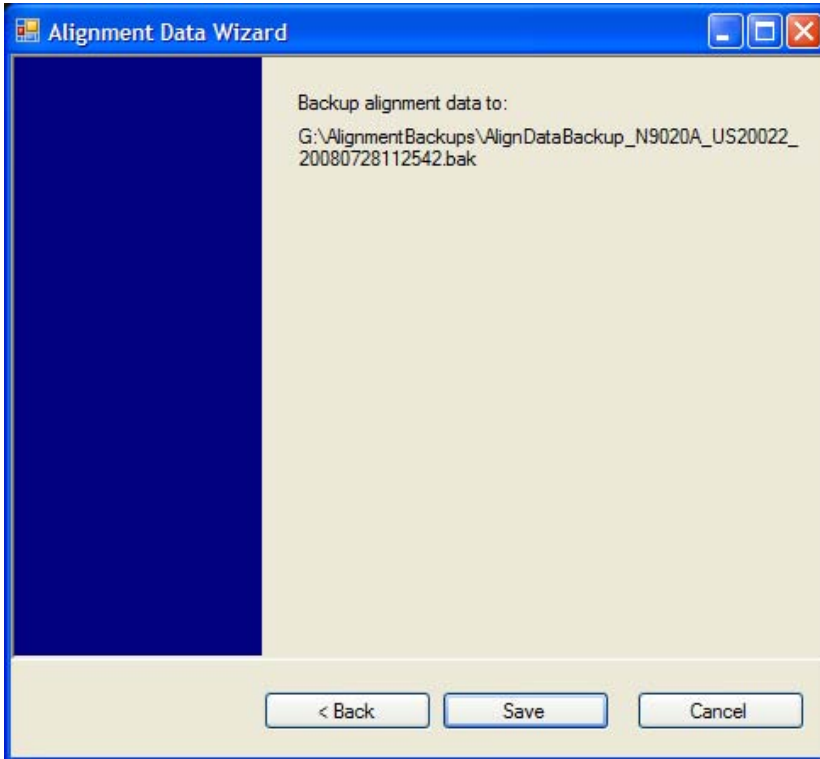
The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.

If the serial number information in the backup file being restored is different from that of the instrument, the

following message appears (the serial number shown are examples):
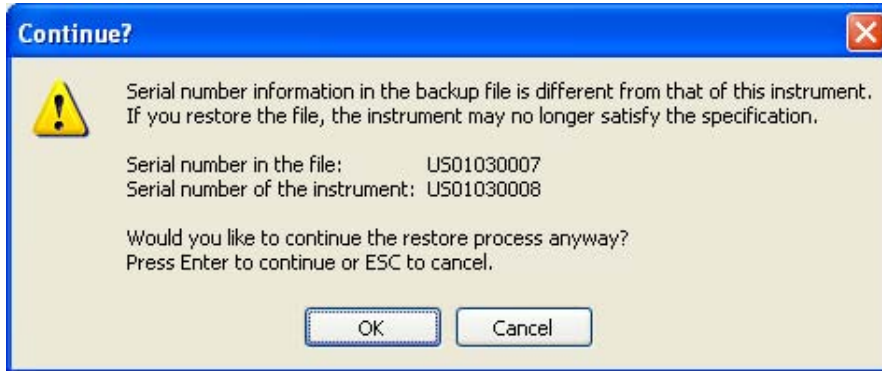
For the N9030A, the default restore location will be the internal F: drive which is a solid-state memory device located internally on the instrument. The default restore file will be the most recent file that matches the default backup file name format: AlignDataBackup_N9030A_<serial number>_<date>.bak
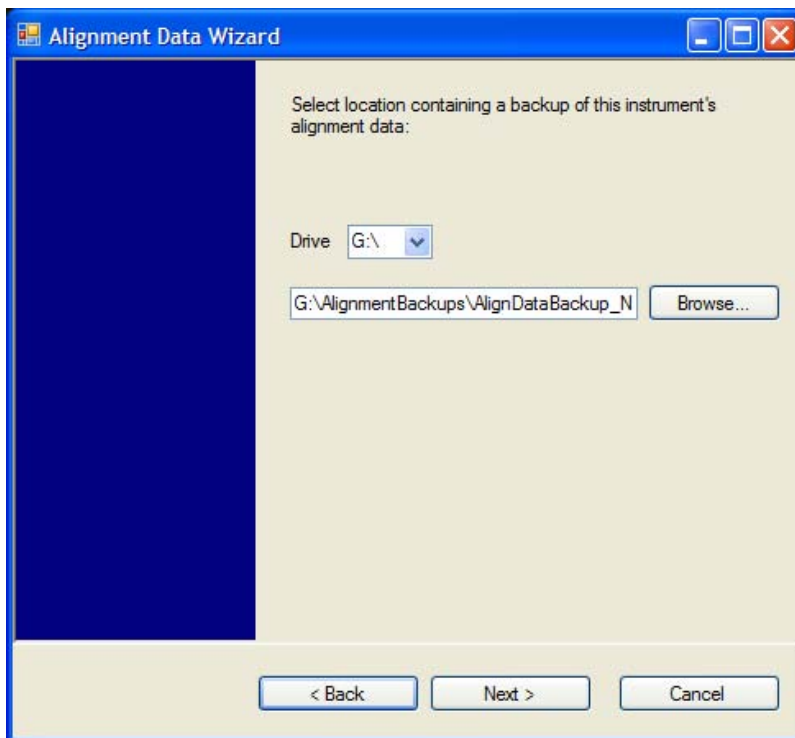
Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down is populated with connected drives which provide the user with read access. The path defaults to the AlignBackups folder. The most recent *.bak file in the folder will also be selected by default.

Restore alignment data from:

G:\AlignmentBackups\AlignDataBackup_N9020A_US20022_
20080728133921.bak

< Back   Restore   Cancel

Restore alignment data from:

G:\AlignmentBackups\AlignDataBackup_N9020A_US20022_
20080728133921.bak

Alignment data restored successfully!

< Back   Finish   Cancel
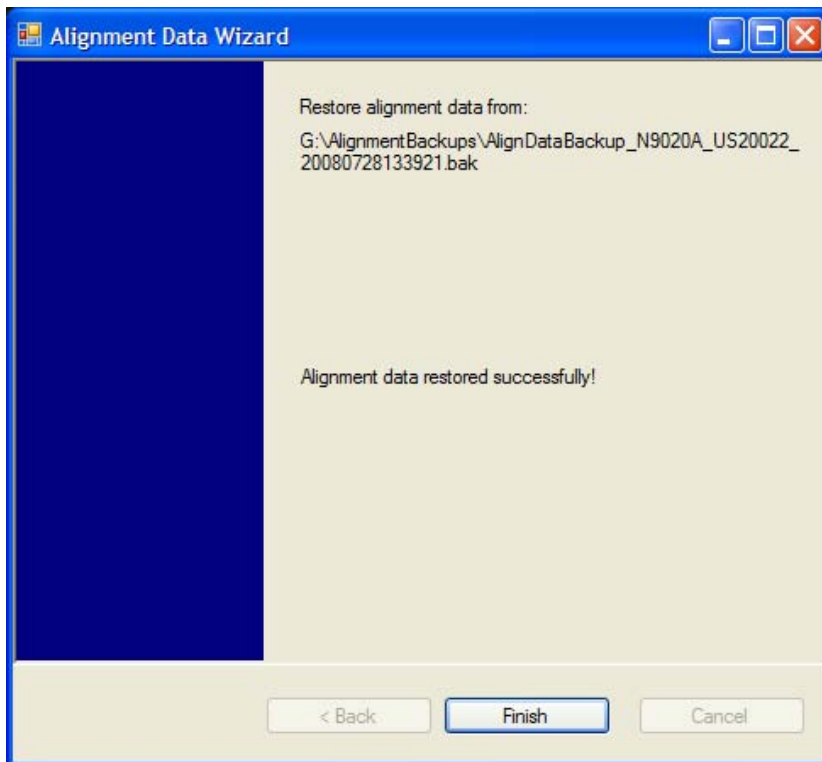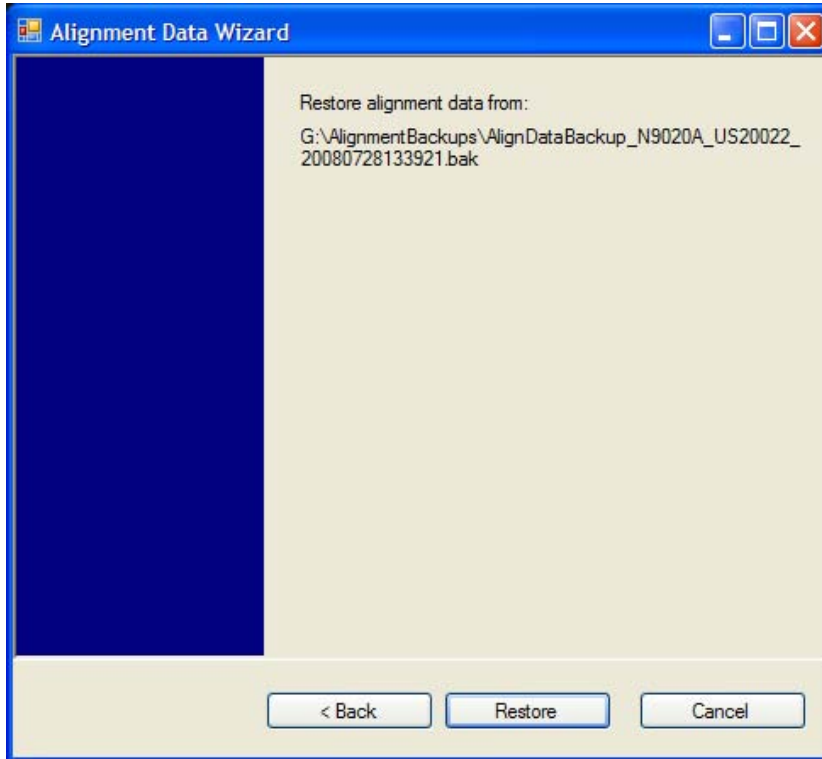
Perform Backup (Remote Command Only)

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"`
Initial 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 "`
Initial S/W Revision	A.02.00

Advanced

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

Key Path	**System, Alignments**
Initial 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 generate the Error Condition message "Characterize Preselector failure" and set bit 3 in the STATus:QUEStionable:CALibration:EXTended:FAILure status register. Successful completion of **Characterize Preselector** will clear this Condition. 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 survives across the power cycle as this operation is performed infrequently.

NOTE	**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. However, since the old characterization data is purged at the beginning of the characterization, you now have an uncharacterized preselctor. You should re-execute this function and allow it to finish before making any further preselected measurements.

Key Path	**System, Alignments, Advanced**
Mode	All
Remote Command	:CALibration:YTF :CALibration:YTF?
Example	:CAL:YTF
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 generate the Error Condition message "Characterize Preselector failed" and set bit 9 in the Status Questionable Calibration register. For Option 507, 508, 513, and 526 only.
Dependencies	This key does not appear in models that do not contain preselectors. In these models the SCPI command is accepted without error but no action is taken.
Couplings	Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature.

Initial 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	**System, Alignments**
Mode	All
Remote Command	:CALibration:FREQuency:REFerence:MODE CALibrated|USER :CALibration:FREQuency:REFerence:MODE?
Example	:CAL:FREQ:REF:MODE CAL
Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Preset	CAL
Preset	This is unaffected by Preset but is set to CALibrated on a "Restore System Defaults->Align".
State Saved	No
Initial 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	**System, Alignments, Timebase DAC**
Mode	All
Example	:CAL:FREQ:REF:MODE CAL
Readback Text	[xxx] < where xxx is the calibrated value
Initial 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	**System, Alignments, Timebase DAC**
Mode	All
Example	:CAL:FREQ:REF:MODE USER
Readback Text	xxx < where xxx is the Timebase DAC setting
Initial S/W Revision	Prior to A.02.00

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

I/O Config

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

Key Path	**System**

Initial 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**
Initial 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
Notes	Changing the Address on the GPIB port requires all further communication to use the new address.
Preset	18
Preset	This is unaffected by Preset but is set to 18 on a "Restore System Defaults->Misc"
State Saved	No
Range	0 to 30
Initial 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. 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. 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.

Key Path	**System, I/O Config, GPIB**
Mode	All
Scope	Mode Global
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
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	OFF
Preset	This is unaffected by Preset but is set to OFF on a "Restore System Defaults->Misc"
State Saved	No
Range	Disabled|Enabled
Initial S/W Revision	A.02.00

Disabled

Disables 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
Initial S/W Revision	A.02.00

Enabled

Enables the GPIB Controller capability.

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

SCPI LAN

Activates a menu for identifying and changing the SCPI over a LAN configuration. There are a number of different ways to send SCPI remote commands to the instrument over LAN. It can be a problem to have multiple users simultaneously accessing the instrument over the LAN. These keys limit that

somewhat by disabling the telnet, socket, and/or SICL capability.

Key Path	**System, I/O Config**
Initial 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	**System, I/O Config, SCPI LAN**
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	ON
Preset	This is unaffected by Preset but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On | Off
Initial 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	**System, I/O Config, SCPI LAN**
Mode	All
Remote Command	`:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF|ON|0|1`
	`:SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?`
Example	:SYST:COMM:LAN:SCPI:SOCK:ENAB OFF
Preset	ON
Preset	This is unaffected by a Preset but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On | Off
Initial 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. The user must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string "DCL " to the instrument.

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

Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTrol?
Example	:SYST:COMM:LAN:SCPI:SOCK:CONT?
Preset	This is unaffected by Preset or "Restore System Defaults->Misc".
State Saved	No
Range	0 to 65534
Initial 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	**System, I/O Config, SCPI LAN**
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	ON
Preset	This is unaffected by Preset, but is set to ON with a "Restore System Defaults->Misc"
State Saved	No
Range	On | Off
Initial S/W Revision	Prior to A.02.00

Reset Web Password

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

Selecting Reset web password brings up a control for resetting the password as the user desires, or to the factory default. A 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.

Key Path	**System, I/O Config**
Mode	All
Initial S/W Revision	Prior to A.02.00

LXI

Opens a menu that allows you to access the various LXI configuration properties.

Key Path	**System, I/O Config**
Initial S/W Revision	Prior to A.02.00

LAN Reset

Resets the LAN connection.

Key Path	**System, I/O Config, LXI**
Initial 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).

Key Path	**System, I/O Config, LXI**
Remote Command	:LXI:EVENt:DOMain <intDomain> :LXI:EVENt:DOMain?
Example	:LXI:EVEN:DOM 128 :LXI:EVEN:DOM?
Preset	0
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
Initial 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	**System, I/O Config, LXI**

Initial 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	**System, I/O Config, LXI, LXI Output LAN Events**
Remote Command	`:LXI:EVENt[:OUTPut]:LAN:DISable:ALL`
Example	:LXI:EVEN:LAN:DIS:ALL
Initial 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	**System, I/O Config, LXI, LXI Output LAN Events**
Remote Command	`:LXI:EVENt[:OUTPut]:LAN:LIST?`
Example	:LXI:EVEN:LAN:LIST? Returns the complete list of Output LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", OperationComplete", "Recalling"
Preset	"LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", Measuring", Sweeping", OperationComplete", "Recalling"
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.
Readback Text	Displays the value of the LXI Output LAN Event Enabled parameter (Enabled | Disabled). Also displays the value of the LXI Output LAN Event Source parameter (WaitingForTrig | Sweeping | Measuring | OpComplete | Recalling)
Initial 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:EVEN:LAN:ADD "LANEVENT"
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
Initial 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:EVEN:LAN:REM "LANEVENT"
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
Initial 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
Example	:LXI:EVEN:LAN:REM:ALL
Notes	Only LAN Events added with the Add command are removed.
	Default events cannot be removed.

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

Remote Command	`:LXI:EVENt[:OUTPut]:LAN[:SET]:SOURce "LANEVENT", "SourceEvent"`
	
	`:LXI:EVENt[:OUTPut]:LAN[:SET]:SOURce? "LANEVENT"`

Example	:LXI:EVEN:LAN:SOUR "LANEVENT","WaitingForTrigger"
Notes	The maximum length of the string is 45 characters.
Preset	"Sweeping" (The Output LAN Events "WaitingForTrigger", "Sweeping", "Measuring", "OperationComplete", and "Recalling" all have default source parameters that match their names)

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
Initial 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"
Notes	The maximum length of the string is 45 characters.
Preset	"ALL"
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
Initial 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]**

Remote Command	`:LXI:EVENt[:OUTPut]:LAN[:SET]:DRIVe "LANEVENT", OFF|NORMal|WOR`
	
	`:LXI:EVENt[:OUTPut]:LAN[:SET]:DRIVe? "LANEVENT"`

Example	:LXI:EVEN:LAN:DRIV "LANEVENT",WOR
Preset	NORMal
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
Initial S/W Revision	Prior to A.02.00

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

Instrument Event Edge	Slope Parameter	Drive Parameter	Action
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	POSitive
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
Initial 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	**System, I/O Config, LXI, LXI Output LAN Events, LAN[n]**
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	0.0 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)
Initial 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	**System, I/O Config, LXI, LXI Output LAN Events, LAN[n]**
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	OFF
Preset	Not affected by a Preset. The default value of "OFF" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	OFF|ON|0|1
Initial 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?
Initial S/W Revision	Prior to A.02.00

Configure (Remote Command Only)

Allows the configuration of some 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"
Initial 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
Initial 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"
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
Initial S/W Revision	Prior to A.02.00

System IDN Response

This key allows you to specify a response to the *IDN? query, or to return the analyzer to the Factory response if you have changed it.

To choose the factory-set response, press the **Factory** key.

To specify your own response, press the **User** key, and enter your desired response.

Key Path	**System, I/O Config**
Mode	All
Remote Command	:SYSTem:IDN <string> :SYSTem:IDN?
Notes	• This affects the response given in all Modes of the Analyzer, unless the current Mode has also specified a custom response, in which case the current Mode's custom IDN response takes precedence over the System's, but only while that Mode is the current Mode.. • It survives shutdown and restart of the software and therefore survives a power cycle • Null string as parameter restores the Factory setting
Preset	This is unaffected by Preset but is set to the original factory setting on a "Restore System Defaults->Misc"
State Saved	No
Initial S/W Revision	A.06.00

Factory

This key selects the factory setting, for example:

 "Agilent Technologies,N9020A,MY00012345,A.05.01"

where the fields are manufacturer, model number, serial number, firmware revision.

Key Path	**System, I/O Config, IDN Response**
Example	:SYST:IDN "" null string, restores the factory setting
Initial S/W Revision	A.06.0

User

This key allows you to specify your own response to the *IDN? query. You may enter your desired response with the Alpha Editor or a plugin PC keyboard.

When you press this key, the active function becomes the current User string with the cursor at the end. This makes it easy to edit the existing string.

If you enter a null string (for example, by clearing the User String while editing and then pressing **Done**) the analyzer automatically reverts to the Factory setting.

Key Path	**System, I/O Config, IDN Response**
Example	:SYST:IDN "XYZ Corp,Model 12,012345,A.01.01" user specified response
Initial S/W Revision	A.06.00

Query USB Connection (Remote Command Only)

Enables you to determine the speed of the USB connection.

Mode	All
Remote Command	:SYSTem:COMMunicate:USB:CONNection?
Example	:SYST:COMM:USB:CONN?
Notes	NONE – Indicates no USB connection has been made.
	LSPeed – Indicates a USB low speed connection (1.5 Mbps). 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
Initial 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?
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
Initial 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?
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
Initial 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 the user to query the epoch time.

Remote Command	`:LXI:CLOCk[:TIME][:VALue] <seconds>,<fractionalSeconds>`
Example	:LXI:CLOC 10020304.0 s,0.123456 s
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
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
Initial S/W Revision	Prior to A.02.00

Remote Command	`:LXI:CLOCk[:TIME][:VALue]?`
Example	:LXI:CLOC?
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
Initial 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 portion of the clock. Otherwise, this allows the user to query the seconds portion of the epoch time. Valid values are in discrete increments of whole seconds.

Remote Command	:LXI:CLOCk[:TIME]:SEConds <seconds>
	:LXI:CLOCk[:TIME]:SEConds?
Example	:LXI:CLOC:SEC 10020304.0
Notes	Ignored when the device is not selected as the IEEE 1588 master clock.
	Error generated if the argument contains a fractional portion. For example 1243.0 s is acceptable, but 1243.01 results in an error.
Preset	System time
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)
Initial 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 the user to query the sub-second value of the epoch time.

Remote Command	:LXI:CLOCk[:TIME]:FRACtion <fraction>
	:LXI:CLOCk[:TIME]:FRACtion?
Example	:LXI:CLOC:FRAC 10 ms
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)
Initial 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
Initial 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)
Initial 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
Initial 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
Initial 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

Preset	The Windows system Daylight Savings setting.
Initial 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
Initial 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
Initial 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
Initial 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 $0.0 – 1.7976931348623157 \times 10^{308}$ s (Max Double)
Range	$0.0 – 1.7976931348623157 \times 10308$ s (Max Double)
Initial 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 $0.0 - 1.7976931348623157 \times 10^{308}$ s (Max Double)
Initial 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
Initial 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 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|US1000|US2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown :LXI:CLOCk:PTP:ACCuracy?
Example	:LXI:CLOC:PTP:ACC US25
Preset	GT10S
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|US2500|MS10|MS25|MS100|MS1000|S10|GT10S|UNKNown

Initial 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:CLOC:PTP:ANN:INT 1
Preset	2
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
Initial 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	3
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
Initial S/W Revision	Prior to A.02.00

Clock Class (Remote Command Only)

Returns a ranking of the master clock suitability relative to other clocks on the network. A lower value represents a more suitable clock.

Suitability is defined by the IEEE 1588 standard section 7.6.2.4

Remote Command	:LXI:CLOCk:PTP:CCLass?

Example	:LXI:CLOC:PTP:CCL?
Preset	248
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
Initial 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?
Initial 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	0
Preset	Not affected by a Preset. The default value of "0" can be restored by using the command: SYSTem:DEFault INPut
Min	0
Max	127
Initial 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)
Initial 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	128
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
Initial 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	128
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
Initial 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
Initial 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
Initial 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)
Initial 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	1
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
Initial S/W Revision	Prior to A.02.00

Remote Command	:LXI:CLOCk:PTP:SINTerval?
Example	:LXI:CLOC:PTP:SINT?
Preset	1
Range	0.0625s|0.125s|0.25s|0.5s|1s|2s
Initial 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	8 s
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
Initial 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
Initial S/W Revision	Prior to A.02.00

Grand Master

In the IEEE 1588 the best clock in the system, as determined by the Best Master Clock algorithm, is chosen as the Grand Master clock. The Grand Master clock is the ultimate source of time which all other clocks attempt to synchronize to. If the network is limited to a single subnet, the Master clock and the Grand Master clock are synonymous.

If a network spans multiple subnets, boundary clocks must be utilized to segment the network. Each subnet then selects a Master Clock using the Best Master Clock algorithm. From this population of Master Clocks, the best clock is selected to be the Grand Master clock.

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
Initial 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:MADDress?
Example	:LXI:CLOC:PTP:GMAS:MADD? For example, this might return "00–00–50–1e-ca-ad".
Range	Uppercase, Lowercase, Numeric, Symbol
Initial 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
Initial S/W Revision	Prior to A.02.00

Master

Instruments on the same subnet use the Best Master Clock algorithm to select a Master clock. The Master clock is used as the basis for synchronization.

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
Initial 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

Remote Command	:LXI:CLOCk:SALGorithm:LOG[:NEXT]?
Example	:LXI:CLOC:SALG:LOG?
Range	Uppercase, Lowercase, Numeric, Symbol
Initial 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	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
Initial 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:ENTtry? 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
Initial 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
Initial 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
Initial 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	0
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
Initial 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	256

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
Initial 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?
Example	:LXI:CLOC:SALG:LOG?
Range	Uppercase, Lowercase, Numeric, Symbol
Initial 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
Initial 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"

Initial 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"
Initial 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
Initial 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

Initial 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
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
Initial 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
Initial 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	0.35
Min	0
Max	1
Initial S/W Revision	Prior to A.02.00
Preset/	Not affected by a Preset. The default value of "0.35 " can be restored by using the command:
	SYSTem:DEFault INPut

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
Initial 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
Initial 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
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
Initial 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
Initial S/W Revision	Prior to A.02.00

Set/Steer Threshold (Remote Command Only)

If the instrument's clock deviates from the master by an amount equal to or greater than this threshold, it is reset to

match the master rather than being gradually steered toward it.

Remote Command	:LXI:CLOCk:SALGorithm[:SET]:STHReshold <seconds>
	:LXI:CLOCk:SALGorithm[:SET]:STHReshold?
Example	:LXI:CLOC:SALG:STHR 15 ms
Preset	0.1 s
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
Initial 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
Initial S/W Revision	Prior to A.02.00

Synchronization (Remote Command Only)

Synchronization parameters are used to control the behavior of the LAN communication used to achieve converging times across the system.

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
Initial 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	OFF
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
Initial 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	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
Initial S/W Revision	Prior to A.02.00

Instrument Status Events

Instrument status events represent internal state changes that are important for synchronization. The recognized Status Events are:

WaitingForTrigger:	Transitions high when the measurement is awaiting a trigger event. Transitions low when the trigger event occurs or the measurement is aborted.
Sweeping:	Transitions high when the instrument begins sweeping. Transitions low when the sweep is completed.
Measuring:	Transitions high when measurement data is being recorded. Transitions low when measurement data is no longer being recorded.
OperationComplete:	Transitions low when a measurement operation is in progress. In some cases (for example, ListSweep), multiple sweeps are taken during a single measurement operation. Transitions high when the measurement operation is finished or aborted.
Recalling:	Transitions high while the instrument is recalling a previous state. Transitions low when a recall is not in progress.

Enable (Remote 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	ON
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
Initial 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
Initial S/W Revision	Prior to A.02.00

LXI State Recall

The LXI Event system can be used to recall states upon receipt of LXI Input LAN Events.

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 next 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"
Notes	The maximum length of the string is 512 characters.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial 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
Notes	The maximum length of the string is 512 characters.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial 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
Initial 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"
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
Initial 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"

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
Initial 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
Notes	Only LAN Events added with the Add command are removed. Default events cannot be removed.
Initial 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"

- The LXI:EVENt:INPut:LAN:FILTer command applies only to state events and will have no effect on trigger events, even when both are tied to the same event name (like "LAN0").   Similarly, the

TRIGger:LXI:LAN:FILTer command applies only to trigger events and will have no effect on state events.

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?
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
Initial 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"
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
Initial S/W Revision	Prior to A.02.00

Detection (Remote Command Only)

Selects the triggering option..

- Selecting "Rise" causes the instrument to trigger on the receipt of a signal low LAN Event followed by a signal high LAN Event.

- Selecting "Fall" causes the instrument to trigger on the receipt of a signal high LAN Event followed by a signal low LAN Event.

- Selecting "High" causes the instrument to trigger on every signal high LAN Event.

- Selecting "Low" causes the instrument to trigger on every signal low LAN Event.

Remote Command	`:LXI:EVENt:INPut:LAN[:SET]:DETection "LANEVENT",` `HIGH|LOW|RISE|FALL`

Example	:LXI:EVENt:INP:LAN:DET "LANEVENT",HIGH
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
Readback Text	Currently selected detection type
Initial S/W Revision	Prior to A.02.00

Remote Command	:LXI:EVENt:INPut:LAN[:SET]:DETection? "LANEVENT"
Example	:LXI:EVEN:INP:LAN:DET? "LANEVENT"
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
Readback Text	Currently selected detection type
Initial 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
Initial 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
Initial 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?
Initial 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.
Initial 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"
Initial 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

default values.

Key Path	System
Mode	All
Remote Command	`:SYSTem:DEFault [ALL]|ALIGn|INPut|MISC|MODes|PON`
Example	SYST:DEF
State Saved	No
Initial 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:
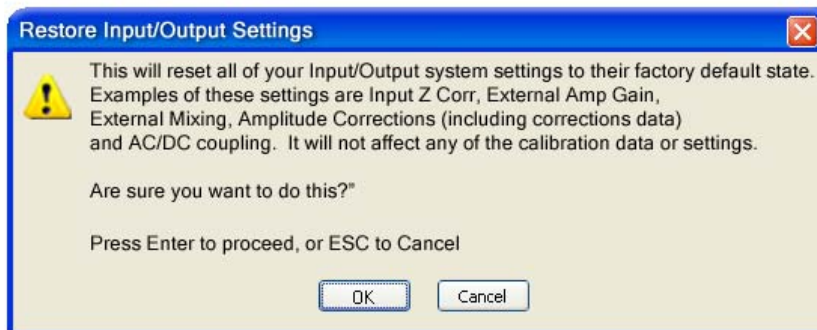
Key Path	**System, Restore System Defaults**
Example	:SYST:DEF INP
Initial S/W Revision	Prior to A.02.00

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:
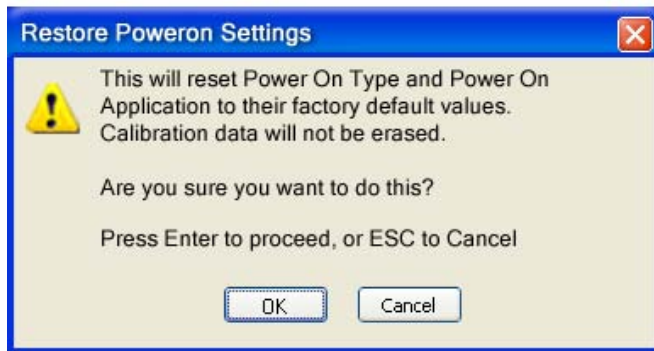
Key Path	**System, Restore System Defaults**
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

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:
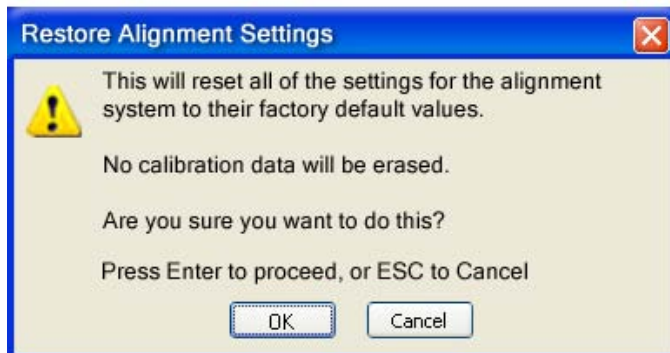
Key Path	**System, Restore System Defaults**
Example	:SYST:DEF ALIG
Initial S/W Revision	Prior to A.02.00

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

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:
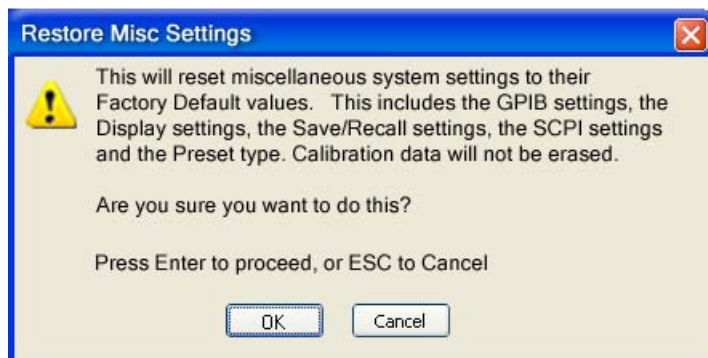
Key Path	**System, Restore System Defaults**
Example	:SYST:DEF MISC
Initial S/W Revision	Prior to A.02.00

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	**System, Restore System Defaults**
Example	:SYST:DEF MOD
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.
Initial 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	**System, Restore System Defaults**
Example	:SYST:DEF ALL
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.
Initial S/W Revision	Prior to A.02.00

Control Panel…

Opens the Windows Control Panel. The Control Panel is used to configure certain elements of Windows that are not configured through the hardkey/softkey System menus.

The Control Panel is a separate Windows application, so to return to the analyzer once you are in the Control Panel, you may either:

Exit the Control Panel by clicking on the red X in the upper right hand corner, with a mouse
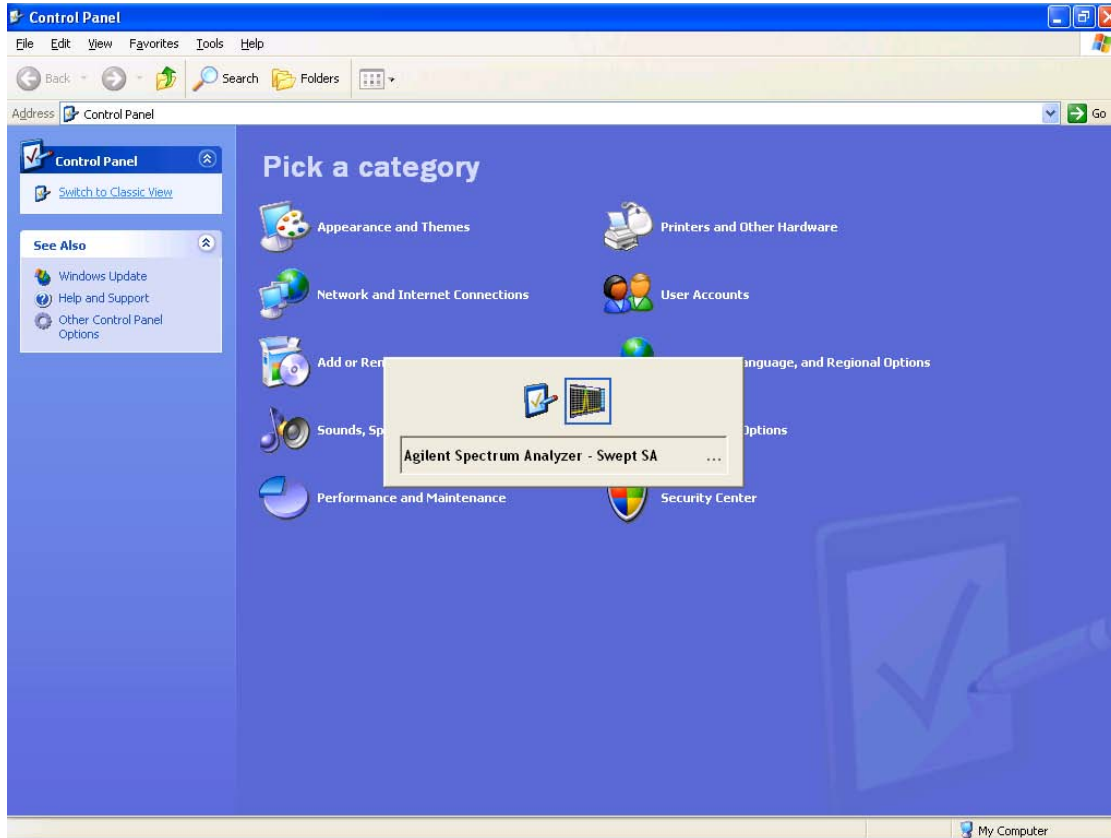
Or use Alt-Tab: press and hold the Alt [Menu (Alt)] key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as above, then release the Alt key.

Key Path	**System**
Notes	No remote command for this key.
Initial 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	**System**
Notes	No equivalent remote command for this key.
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">

Example	SYST:LKEY "N9073A–1FP",”027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91”
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.
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY:DELete <”OptionInfo”>,<”LicenseInfo”>
Example	SYST:LKEY:DEL ‘N9073A–1FP”,”027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91”
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.
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY:LIST?

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
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY? <"OptionInfo">
Example	SYST:LKEY? "N9073A–1FP"
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"
Initial S/W Revision	Prior to A.02.00

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

Security

Accesses capabilities for operating the instrument in a security controlled environment.

Key Path	**System**
Initial S/W Revision	A.04.00

USB

The Windows operating system can be configured to disable write access to the USB ports for users who are in a secure environment where transferring data from the instrument is prohibited. This user interface is a convenient way for the customer to disable write access to USB.

Key Path	**System, Security**
Mode	All
Scope	Mode Global
Remote Command	:SYSTem:SECurity:USB:WPRotect[:ENABle] ON|OFF|0|1 :SYSTem:SECurity:USB:WPRotect[:ENABle]?
Example	:SYST:SEC:USB:WPR ON Will set USB ports to Read-only
Notes	When the USB ports are in Read-only mode then no data can be stored to USB, including the internal USB memory used for a back-up location for the calibration data.
Dependencies	This key is grayed-out unless the current user has administrator privileges.
Preset	This is unaffected by Preset or any Restore System Defaults. An Agilent Recovery will set the USB to write protect OFF
State Saved	No
Range	Read-Write|Read only
Initial S/W Revision	A.04.00

Read-Write

Selection for allowing full read-write access to the USB ports.

Key Path	**System, Security, USB**
Example	:SYST:SEC:USB:WPR OFF Will set USB ports to Read-Write
Initial S/W Revision	A.04.00

Read only

Selection for disabling write access to the USB ports.

Key Path	**System, Security, USB**

Example	:SYST:SEC:USB:WPR ON	Will set USB ports to Read only
Initial S/W Revision	A.04.00	

Diagnostics

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

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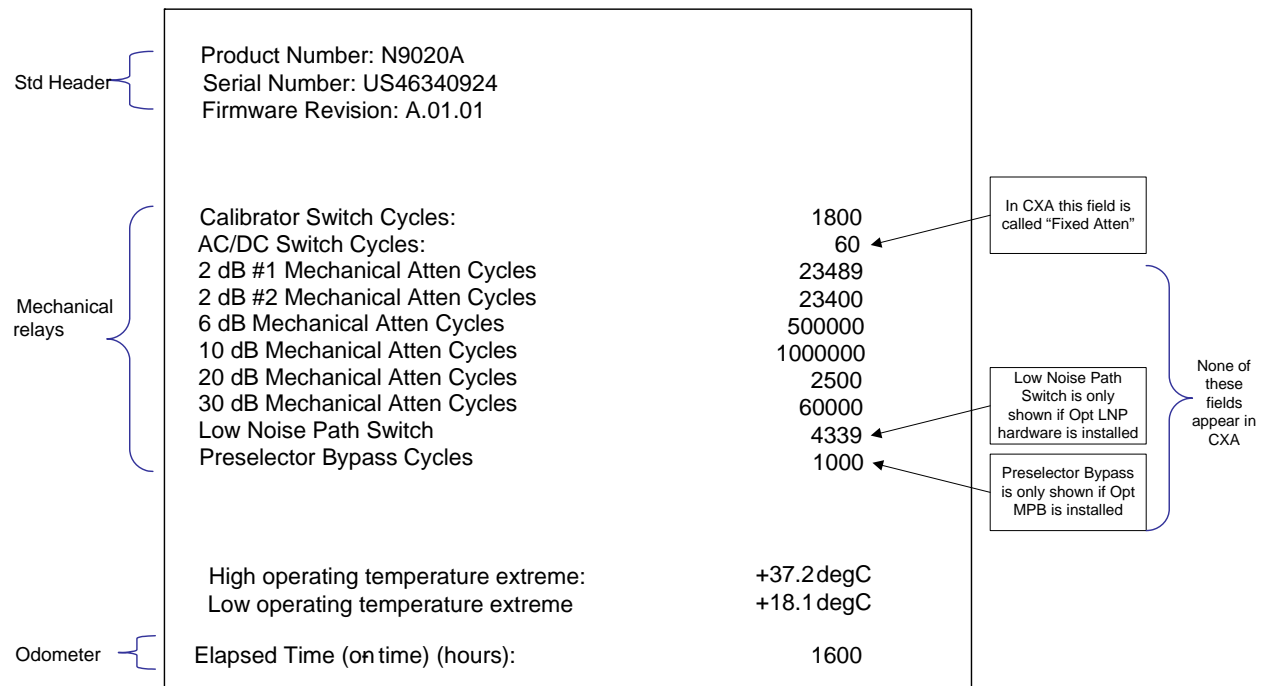
The data will be updated only when the Show Hardware Statistics menu key is pressed, it will not be updated while the screen is displayed.

The tabular data should be directly printable.

Key Path	**System, Diagnostics**

Mode	All
Notes	The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed.
Initial S/W Revision	Prior to A.02.00

SCPI for Show Hardware Statistics (Remote Commands Only)

Each of the hardware statistic items can be queriedvia SCPI.

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-
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Query the Mechanical Relay Cycle Count

Returns the count of mechanical relay cycles.

Remote Command	:SYSTem:MRELay:COUNt?
Example	:SYST:MREL:COUN?
Notes	Query Only
	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>,<Fixed Atten>,<Low Noise Path Switch>,<Presel Bypass>"
	Items in the list not pertaining to your particular hardware configuration will return as –999 for those items.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00, A.04.00

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?
Notes	Value is in degrees Celsius at which the lowest operating temperature has been recorded since 1st power-up.
State Saved	No

Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	`:SYSTem:TEMPerature:HEXTreme?`
Example	:SYST:TEMP:HEXT?
Notes	Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up.
State Saved	No
Initial 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?
Notes	Query Only
Initial 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	**System, Diagnostics**
Notes	Password is required to access this menu.
Initial S/W Revision	Prior to 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	**System**
Initial S/W Revision	Prior to A.02.00

Internet Explorer…

This key launches Microsoft Internet Explorer. A mouse and external keyboard are highly desired for using Internet Explorer. When Internet Explorer is running, close Internet Explorer to return focus to the Instrument Application (or use Alt-Tab).

Key Path	**System**
Mode	**All**
Notes	No equivalent remote command for this key.
Initial S/W Revision	A.05.01

System Remote Commands (Remote Commands Only)

The commands in this section have no front panel key equivalent

Initial S/W Revision	Prior to A.02.00

System Powerdown (Remote Command Only)

Remote Command	SYSTem:PDOWn [NORMal|FORCe]
Notes	Shuts down the instrument in the normal way (NORMal) or forced way (FORCe). In case there is another application with modified data pending for saving, the application prompt the user. The system waits until the user responds in the normal mode. It will go off after 20 seconds of wait in the force mode and all data will be lost.

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?
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
Initial 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
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
Initial 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?
Notes	The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A)
Initial 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?
Initial 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"
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
Initial 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"
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
Initial S/W Revision	Prior to A.02.00

User Preset

Accesses a menu that gives you the following three choices:

User Preset – recalls a state previously saved using the **Save User Preset** function.

User Preset All Modes – presets all of the modes in the analyzer

Save User Preset – saves the current state for the current mode

Key Path	**Front-panel key**
Initial S/W Revision	Prior to A.02.00

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the **Save User Preset** menu key or the SCPI command, `SYST:PRES:USER:SAV. It not only recalls the`Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Outpit system setting 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. 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.

The User Preset function 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	**User Preset**
Remote Command	`:SYSTem:PRESet:USER`
Example	:SYST:PRES:USER:SAVE
	:SYST:PRES:USER

Notes	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.
	Clears all pending OPC bits. The Status Byte is set to 0.
	Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed
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.
Initial S/W Revision	Prior to A.02.00

User Preset All Modes

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.

The User Preset function 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	**User Preset**
Remote Command	:SYSTem:PRESet:USER:ALL
Example	:SYST:PRES:USER:SAVE
	:SYST:PRES:USER:ALL
Notes	Clears all pending OPC bits. The Status Byte is set to 0.
	:SYST:PRES:USER:SAVE is used to save the current state as the user preset state.

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.
Initial S/W Revision	Prior to A.02.00

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file 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	**User Preset**
Remote Command	`:SYSTem:PRESet:USER:SAVE`
Example	:SYST:PRES:USER:SAVE
Notes	:SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM: STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file.
Initial S/W Revision	Prior to A.02.00

6   Combined WLAN Measurement

Combined WLAN is to perform as many measurements as possible on one capture.

The following features are provided for the Combined WLAN measurement application:

- Transmit Power

- Transmit Output Spectrum

- Modulation Accuracy

This topic contains the following sections:

Measurement Commands for Combined WLAN

```
:CONFigure:CWLan
```

```
:CONFigure:CWLan:NDEFault
```

```
:FETCh:CWLan[n]?
```

```
:INITiate:CWLan
```

```
:MEASure:CWLan[n]?
```

```
:READ:CWLan[n]?
```

For more measurement related commands, see the SENSe subsystem, and the section "Remote Measurement Functions" on page 431.

Remote Command Results for Combined WLAN Measurement

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.

1   Measurement Result Values

Total result length is 796.

If there are multiple bursts, then the result below starts at the lowest burst list.

Transmit Power Results:

Length is 76.

(0) Total Power of the first Transmit Power Burst(dBm),

(1) Peak PSD of 1 MHz of the first Transmit Power Burst(dBm/MHz),

(2) Total Power of the integrated bandwidth of the second Transmit Power 3 Burst(dBm),

(3) Peak PSD of 1 MHz of the second Transmit Power Burst(dBm/MHz)

…

(72) Average Total Power of all the Transmit Power Burst(dBm),

(73) Average peak PSD of all the Transmit Power Burst(dBm/MHz),

(74) Peak Total Power of all the Transmit Power Burst(dBm),

(75) Peak PSD of all the Transmit Power Burst(dBm/MHz),

Transmit Output Spectrum Results:

Length is 432,

Ltosp = 76,

The first Transmit Output Spectrum group:

(Ltosp +0) Total Power of the reference channel of the first group(dBm),

(Ltosp +1) Peak PSD (RBW) of the reference channel of the first group(dBm/RBW),

(Ltosp +2) Reserved for the future use, returns –999.0

(Ltosp +3) Reserved for the future use, returns –999.0

(Ltosp +4) Minimum margin level on the negative offset A (dBm)

(Ltosp +5) Minimum margin from limit line on the negative offset A (dB)

(Ltosp +6) Minimum margin offset frequency from the center frequency in the negative offset A (Hz)

(Ltosp +7) Pass/Fail flag on the negative offset A (1/fail, 0/pass),

(Ltosp +8) Minimum margin level on the positive offset A (dBm)

(Ltosp +9) Minimum margin from limit line on the positive offset A (dB)

(Ltosp +10) Minimum margin offset frequency from the center frequency in the positive offset A (Hz),

(Ltosp +11) Pass/Fail flag on the positive offset A (1/fail, 0/pass),

(Ltosp +12) Minimum margin level on the negative offset B (dBm)

(Ltosp +13) Minimum margin from limit line on the negative offset B (dB)

1   (Ltosp +14) Minimum margin offset frequency from the center frequency in the negative offset B (Hz)

(Ltosp +15) Pass/Fail flag on the negative offset B (1/fail, 0/pass),

(Ltosp +16) Minimum margin level on the positive offset B(dBm)

(Ltosp +17) Minimum margin from limit line on the positive offset B (dB)

(Ltosp +18) Minimum margin offset frequency from the center frequency in the positive offset B (Hz),

(Ltosp +19) Pass/Fail flag on the positive offset B (1/fail, 0/pass),

If Farther Offset is enabled or the radio stand is WLAN11a or WLAN11g-OFDM, Offset C's result is output.

(Ltosp +20) Minimum margin level on the negative offset C (dBm)

(Ltosp +21) Minimum margin from limit line on the negative offset C (dB)

(Ltosp +22) Minimum margin offset frequency from the center frequency in the negative offset C (Hz)

(Ltosp +23) Pass/Fail flag on the negative offset C (1/fail, 0/pass),

(Ltosp +24) Minimum margin level on the positive offset C (dBm)

(Ltosp +25) Minimum margin from limit line on the positive offset C (dB)

(Ltosp +26) Minimum margin offset frequency from the center frequency in the positive offset A (Hz),

(Ltosp +27) Pass/Fail flag on the positive offset C (1/fail, 0/pass),

If Farther Offset is enabled, Offset D's result is output.

(Ltosp +28) Minimum margin level on the negative offset D (dBm)

(Ltosp +29) Minimum margin from limit line on the negative offset D (dB)

(Ltosp +30) Minimum margin offset frequency from the center frequency in the negative offset D (Hz)

(Ltosp +31) Pass/Fail flag on the negative offset D (1/fail, 0/pass),

(Ltosp +32) Minimum margin level on the positive offset D (dBm)

(Ltosp +33) Minimum margin from limit line on the positive offset D (dB)

(Ltosp +34) Minimum margin offset frequency from the center frequency in the positive offset D (Hz),

(Ltosp +35) Pass/Fail flag on the positive offset D (1/fail, 0/pass),

The second Transmit the second Output Spectrum group:

…

The third Output Spectrum group:

…

1   …

Modulation Accuracy Results:

Length is 288.

Lm =76+432 = 508;

The first Modulation Accuracy burst:

(Lm+0) Frequency Error,

(Lm+1) Symbol Clock Error,

(Lm+2) Chip Cloak Error,

(Lm+3) Center Frequency Leakage,

(Lm+4) Spectral Flatness,

(Lm+5) Carrier Suppression,

(Lm+6) RMS EVM

(Lm+7) 802.11b Peak EVM

The second Modulation Accuracy burst:

(Lm+8) Frequency Error,

(Lm+9) Symbol Clock Error,

(Lm+10) Chip Cloak Error,

(Lm+11) Center Frequency Leakage,

(Lm+12) Spectral Flatness,

(Lm+13) Carrier Suppression,

(Lm+14) RMS EVM,

(Lm+15) 802.11b Peak EVM,

…

2   Return the RF envelope trace data, as a series of comma-separated trace points, in dBm.

4   Transmit Power Results:

Length is 76.

(0) Total Power of the first Transmit Power Burst(dBm),

(1) Peak PSD of 1 MHz of the first Transmit Power Burst(dBm/MHz),

(2) Total Power of the integrated bandwidth of the second Transmit Power 3 Burst(dBm),

(3) Peak PSD of 1 MHz of the second Transmit Power Burst(dBm/MHz)

…

(72) Average Total Power of all the Transmit Power Burst(dBm),

(73) Average peak PSD of all the Transmit Power Burst(dBm/MHz),

(74) Peak Total Power of all the Transmit Power Burst(dBm),

(75) Peak PSD of all the Transmit Power Burst (dBm/MHz).

5   Transmit Output Spectrum Results:

Length is 432.

The first Transmit Output Spectrum group:

(0) Total Power of the reference channel of the first group(dBm),

(1) Peak PSD (RBW) of the reference channel of the first group(dBm/RBW),

(2) Reserved for the future use, returns –999.0

(3) Reserved for the future use, returns –999.0

(4) Minimum margin level on the negative offset A (dBm)

(5) Minimum margin from limit line on the negative offset A (dB)

(6) Minimum margin offset frequency from the center frequency in the negative offset A (Hz)

(7) Pass/Fail flag on the negative offset A (1/fail, 0/pass),

(8) Minimum margin level on the positive offset A (dBm)

(9) Minimum margin from limit line on the positive offset A (dB)

(10) Minimum margin offset frequency from the center frequency in the positive offset A (Hz),

(11) Pass/Fail flag on the positive offset A (1/fail, 0/pass),

(12) Minimum margin level on the negative offset B (dBm)

(13) Minimum margin from limit line on the negative offset B (dB)

(14) Minimum margin offset frequency from the center frequency in the negative offset B (Hz)

(15) Pass/Fail flag on the negative offset B (1/fail, 0/pass),

(16) Minimum margin level on the positive offset B(dBm)

(17) Minimum margin from limit line on the positive offset B (dB)

(18) Minimum margin offset frequency from the center frequency in the positive offset B (Hz),

(19) Pass/Fail flag on the positive offset B (1/fail, 0/pass),

If Farther Offset is enabled or the radio stand is WLAN11a or WLAN11g-OFDM, Offset C's result is output.

(20) Minimum margin level on the negative offset C (dBm)

(21) Minimum margin from limit line on the negative offset C (dB)

(22) Minimum margin offset frequency from the center frequency in the negative offset C (Hz)

(23) Pass/Fail flag on the negative offset C (1/fail, 0/pass),

(24) Minimum margin level on the positive offset C (dBm)

(25) Minimum margin from limit line on the positive offset C (dB)

(26) Minimum margin offset frequency from the center frequency in the positive offset A (Hz),

5

(27) Pass/Fail flag on the positive offset C (1/fail, 0/pass),

If Farther Offset is enabled, Offset D's result is output.

(28) Minimum margin level on the negative offset D (dBm)

(29) Minimum margin from limit line on the negative offset D (dB)

(30) Minimum margin offset frequency from the center frequency in the negative offset D (Hz)

(31) Pass/Fail flag on the negative offset D (1/fail, 0/pass),

(32) Minimum margin level on the positive offset D (dBm)

(33) Minimum margin from limit line on the positive offset D (dB)

(34) Minimum margin offset frequency from the center frequency in the positive offset D (Hz),

(35) Pass/Fail flag on the positive offset D (1/fail, 0/pass),The second Transmit the second Output Spectrum group:

…

The third Output Spectrum group:

…

6

Modulation Accuracy Results:

Length is 288.The first Modulation Accuracy burst:

(0) Frequency Error,

(1) Symbol Clock Error,

(2) Chip Cloak Error,

(3) Center Frequency Leakage,

(4) Spectral Flatness,

(5) Carrier Suppression,

(6) RMS EVM,

(7) Peak EVM,

The second Modulation Accuracy burst:

(8) Frequency Error,

(9) Symbol Clock Error,

(10) Chip Cloak Error,

(11) Center Frequency Leakage,

(12) Spectral Flatness,

(13) Carrier Suppression,

(14) RMS EVM,

(15) Peak EVM,

…

7   Modulation Accuracy Spectral Flatness Results:

Length is 52*36=1872.The first Spectral Flatness Results:

(0) Diff between No. –26 sub carrier and average power (dB),

(1) Diff between No. –25 sub carrier and average power (dB),

…

(25) Diff between No. –1 sub carrier and average power (dB),

(26) Diff between No. 1 sub carrier and average power (dB),

(27) Diff between No. 2 sub carrier and average power (dB),

…

(51) Diff between No. 26 sub carrier and average power (dB),

The second Modulation Accuracy burst:

(52) Diff between No. –26 sub carrier and average power (dB),

(53) Diff between No. –25 sub carrier and average power (dB),

…

(77) Diff between No. –1 sub carrier and average power (dB),

(78) Diff between No. 1 sub carrier and average power (dB),

(79) Diff between No. 2 sub carrier and average power (dB),

…

(103) Diff between No. 26 sub carrier and average power (dB),

…

Key Path	**Meas**
Instrument S/W Revision	A.02.00

Amplitude (AMPTD) Y Scale

Accesses the AMPTD Y Scale menu that allows you to set desired vertical scale settings in RF Envelope View.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Ref Value

Sets the absolute power reference.

Remote Command	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl>
	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel ?
Dependencies/Couplings	When Y Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Y Auto Scaling is automatically set to Off.
Example	DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:RLEV 5dbm
	DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:RLEV?
Key Path	**AMPTD Y Scale**
Mode	Combined WLAN
Preset	10.00
State Saved	Saved in instrument state.
Min	–250.0
Max	250.0
Instrument S/W Revision	A.02.00

Attenuation

This menu controls both the electrical and mechanical attenuators and their interactions. The value read back on the softkey 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 AMPTD Y Scale, "Attenuation" on page 322 in the "Common Measurement Functions" section for more information.

Key Path	**AMPTD Y Scale**
Instrument S/W Revision	A.02.00

Scale/Div

Allows you to enter a numeric value to change vertical display sensitivity.

Remote Command	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>`
	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?`
Dependencies/Couplings	When the Y Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set a value manually, Y Auto Scaling is automatically set to Off.
Example	DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:PDIV 10dB
	DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:PDIV?
Key Path	**AMPTD Y Scale**
Mode	Combined WLAN
Preset	10.00 dB
State Saved	Saved in instrument state.
Min	0.1 dB
Max	20.00 dB
Instrument S/W Revision	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 337 in the "Common Measurement Functions" section for more information.

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 339 in the "Common Measurement Functions" section for more information.

Internal Preamp

This menu controls the internal preamplifier. 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 AMPTD Y Scale, "Internal Preamp" on page 351 in the "Common Measurement Functions" section for more information.

Ref Position

Allows you to set the display reference position to the top, center, or bottom of the display.

Remote Command	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSit ion TOP|CENTer|BOTTom`
	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSit ion?`
Example	:DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:RPOS CENT
	:DISP:CWL:VIEW:WIND:TRAC:Y:SCAL:RPOS?
Key Path	**AMPTD Y Scale, More**
Mode	Combined WLAN
Preset	TOP
State Saved	Saved in instrument state.
Range	Top|Ctr|Bot
Instrument S/W Revision	A.02.00

Auto Scaling

Allows you to toggle the Y axis Auto Scaling function between On and Off.

Remote Command	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0|1|OFF|ON`
	`:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle ?`
Dependencies/Couplings	When Auto Scaling is On, and you press the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you manually set a value for the Y Rel Value or Y Scale/Div, this parameter is automatically set to Off.
Example	:DISP:CWL:VIEW:WIND:TRAC:Y:COUP 0
	:DISP:CWL:VIEW:WIND:TRAC:Y:COUP?
Key Path	**AMPTD Y Scale, More**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Auto Couple

See "Auto Couple" on page 355 in the section "Common Measurement Functions" for more information.

BW

The mode does not have BW functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Cont

See "Cont (Continuous Measurement/Sweep)" on page 357 in the section "Common Measurement Functions" for more information.

FREQ Channel

The mode does not have FREQ Channel functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Input/Output

See in the "Common Measurement Functions" section for more information.

Marker

This mode does not have Marker functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Marker Function

This mode does not have Marker Function functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Marker To

This mode does not have Marker To functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Meas

See "Meas" on page 431 in the section "Common Measurement Functions" for more information.

Meas Setup

Allows you to change the capture setting and the measurement setting of TX Power, TX Output Spectrum and Mod Accuracy.

The TX power is always "On" and can not be turned "Off". The TX Output Spectrum and Mod Accuracy are "Off" by default.

NOTE	There is no menu displayed under Meas Setup, all the settings under Meas Setup are SCPI only.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

General Setting Commands

IF Gain

To take advantage of the instrument's dynamic range, a switchable IF amplifier with approximately 10 dB of gain is employed. When it can be turned on without overloading the instrument the dynamic range is improved. The IF Gain key can be used to set the IF Gain function to Auto, or to On (the extra 10 dB) or Off.

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.

Remote Command	[:SENSe]:CWLan:IF:GAIN:AUTO[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:IF:GAIN:AUTO[:STATe]?
Example	CWL:IF:GAIN:AUTO ON
	CWL:IF:GAIN:AUTO?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off

Instrument S/W Revision	A.02.00

IF Gain State Selects the range of IF gain.

Remote Command	[:SENSe]:CWLan:IF:GAIN[:STATe] ON|OFF|1|0
	[:SENSe]:CWLan:IF:GAIN[:STATe]?
Example	CWL:IF:GAIN OFF
	CWL:IF:GAIN?
Key Path	**SCPI only**
Mode	Combined WLAN
Notes	ON = high gain
	OFF = low gain
Preset	OFF
State Saved	Saved in instrument state.
Instrument S/W Revision	A.02.00

Capture Setup

Allows you to set the capture parameters for testing, including Burst Number, Burst Type, Capture Offset and Burst Setup.

In any case, maximum of 36 sets of burst data are provided (either by default or by the previous user's settings),

You can specify the settings for each burst using Burst Setup.

Burst Number

Bursts Number specifies how many bursts are to be measured in one capture.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:NUMBer <integer>
	[:SENSe]:CWLan:CAPTure:BURSt:NUMBer?
Example	CWL:CAPT:BURS:NUMB 2
	CWL:CAPT:BURS:NUMB?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	36

Instrument S/W Revision	A.02.00

Burst Type

There are two kinds of burst type: Static and Dynamic.

No matter which burst type you select, each Burst can have different settings for **Prefix** and **Burst**. Total capture length is equal to **Capture Offset** plus the sum of **Prefix** and **Burst** of all the bursts.

In Static burst, the capture cannot do frequency and Attenuation hopping, so Suffix of burst has no effect to the capture. The capture will only use the **Center Freq** of the first burst as the center frequency of the whole capture, the **Center Freq** parameter of the other bursts will be ignored. The atten is equal to Elec-Atten plus Mech-Atten.

In Dynamic Burst, each burst may have different settings for Center Freq and Burst Atten, the Suffix is used to set the switching time for the Center frequency or E-Atten hopping. Each burst may have different E-Atten based on different settings.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:TYPE STATic|DYNamic
	[:SENSe]:CWLan:CAPTure:BURSt:TYPE?
Example	CWL:CAPT:BURS:TYPE DYN
	CWL:CAPT:BURS:TYPE?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	STATic
State Saved	Saved in instrument state.
Range	Static |Dynamic
Instrument S/W Revision	A.02.00

Capture Offset

Capture Offset specifies where the first burst starts after the trigger delay.

Remote Command	[:SENSe]:CWLan:CAPTure:OFFSet <time>
	[:SENSe]:CWLan:CAPTure:OFFSet?
Example	CWL:CAPT:OFFS 200us
	CWL:CAPT:OFFS?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	0 s
State Saved	Saved in instrument state.

Min	0
Max	1 s
Instrument S/W Revision	A.02.00

Burst Setup

Accesses a menu that enables you to set up the parameters for both Static and Dynamic Burst, these settings includes Center Freq, Atten ,Prefix, Burst, Suffix of the whole interval.

The whole burst interval is the sum of Prefix, Burst and Suffix.

Prefix If burst type is Static, prefix is used to define the time spacing between this burst and the previous burst. But if burst type is Dynamic, **Prefix** is used to represent the measurement start time of each burst.

Burst allows you to specify the data time over which the measurement is made.

Suffix is used to define the hardware switching time between this burst and the next burst.

Center Freq

Specifies the Center Frequency of the bursts. If Burst Type is set to Static, the capture will only use the center frequency of the first burst for the whole capture, the center frequency of all the other bursts will be ignored.

Remote Command	`[:SENSe]:CWLan:CAPTure:BURSt:FREQuency`
	`<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>`
	`,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq`
	`>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<fre`
	`q>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<freq>,<fr`
	`eq>,<freq>,<freq>,<freq>,<freq>`
	
	`[:SENSe]:CWLan:CAPTure:BURSt:FREQuency?`

Example	CWL:CAPT:BURS:FREQ 30MHz, 30MHz CWL:CAPT:BURS:FREQ?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	2.412 GHz
State Saved	Saved in instrument state.
Min	–79.999995 MHz

Max	Hardware Dependent:
	Opt503 = 3.699999995 GHz
	Opt508 = 8.499999995 GHz
	Opt513 = 13.799999995 GHz
	Opt526 = 26.999999995 GHz
Instrument S/W Revision	A.02.00

Burst Attenuation

Allows user to set the Electronic Attenuation for all bursts. The value must be 0 or 20.

In Static burst, this parameter will be ignored.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:ATTenuation <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>
	[:SENSe]:CWLan:CAPTure:BURSt:ATTenuation?
Example	CWL:CAPT:BURS:ATT 20,20,20,20,20,20,20,20,0,0,0,0,20,20,20,20,20,20,20,20,0,0,0,0,20,20,20,20, 20,20,20,20,0,0,0,0
	CWL:CAPT:BURS:ATT?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	Support 2 values or single value, 20 or 0dB.
	If used value 20 in the list, the electric attenuation must be set to 20 (POW:EATT 20).
	The first value of the list can't be 0.
Preset	0 dB
State Saved	Saved in instrument state.
Min	0
Max	20
Instrument S/W Revision	A.02.00

Arrival Time Uncertainty

Arrival Time Uncertainty is the parameter to help SA determine the ramp-up side of burst.

Here is an illustration of the ATU time window:
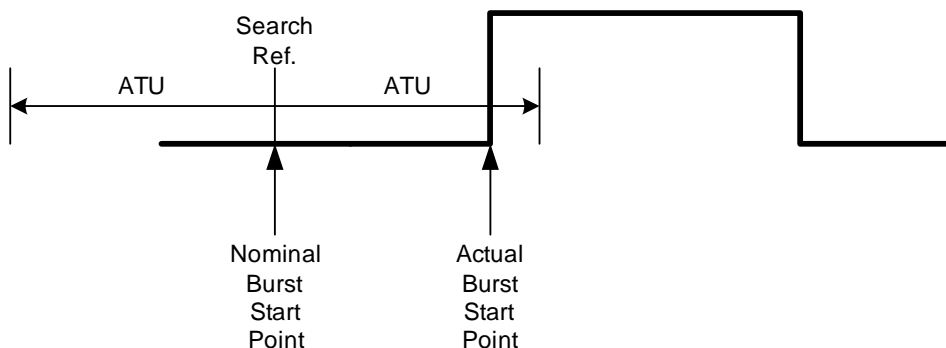
If we capture bursts without Gate, the XA settings of the input signal cannot very exactly match the actual input signal. When the burst start point does not begin at the nominal point due to unpredictable reasons, use the ATU to allow the XA to search for the ramp up side of the burst signal.

Remote Command	`[:SENSe]:CWLan:CAPTure:ATUNcertain <time>`
	`[:SENSe]:CWLan:CAPTure:ATUNcertain?`
Example	CWL:CAPT:ATUN 0.000002
	CWL:CAPT:ATUN?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	0s
State Saved	Saved in instrument state.
Min	0s
Max	3.6ms
Instrument S/W Revision	A.02.00

Prefix

Prefix is used to define the time spacing between the current burst and the previous burst under the static mode. It is good practice to set a 2us Prefix under the dynamic burst setting. This allows the RF front input circuitry time to ramp up.

Data capture is actually on during Prefix time, yet the system excludes this data from being processed.

Remote Command	`[:SENSe]:CWLan:CAPTure:BURSt:PREFix <time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>`
	`[:SENSe]:CWLan:CAPTure:BURSt:PREFix?`

Example	CWL:CAPT:BURS:PREF 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us, 200us,200us
	CWL:CAPT:BURS:PREF?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	In any cases, the burst 1 doe not have a meaningful Prefix value, the values defined here is use only for definition of the Prefix values for other bursts under Static Burst types.
Preset	0 us, 0 us
State Saved	Saved in instrument state.
Min	0 s
Max	88.5 ms
Instrument S/W Revision	A.02.00

Burst

Burst is the duration in which the RF front end captures the target burst. The output results are calculated based on the data captured during this period.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:LOAD <time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>
	[:SENSe]:CWLan:CAPTure:BURSt:LOAD?
Example	CWL:CAPT:BURS:LOAD 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms, 5ms,5ms
	CWL:CAPT:BURS:LOAD?
Key Path	**SCPI Only**
Mode	Combined WLAN

Notes	If burst length < 3.769508/RBW, settings conflict (ID –221) message will be posted, this RF burst will not be measured for power test.
	If burst length < EVM required length, settings conflict (ID –221) message will be posted, this RF burst will not be measured for modulation test.
	If burst type is Dynamic and E-Atten changes, the burst length is better > 100 us.
Preset	1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms,1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms,1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms, 1 ms,1 ms, 1 ms, 1 ms, 1 ms
State Saved	Saved in instrument state.
Min	100 ns
Max	88.5 ms
Instrument S/W Revision	A.02.00

Suffix

Suffix is time from the end of the current burst to the start of Prefix of the next burst.

It is important to note that the suffix time actually represents the duration in which the RF front end changes the capturing parameters such as center frequency, electronic attenuations. So the suffix times are supposed to be 0s regardless what is entered under the Static Burst type. It is had better larger than 500 us under the dynamic burst type scenario.

Data capture is suspended during this time, and the final captured raw data does not contain the data corresponding to all the suffix time.

One very important exception is that there is no suffix time for the ending burst.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:SUFFix <time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>,<time>
	[:SENSe]:CWLan:CAPTure:BURSt:SUFFix?
Dependencies/Couplings	Set to 0 when the burst type is static
Example	CWL:CAPT:BURS:SUFF 0s,0s, 0s,0s, 0s,0s, 0s,0s, 0s,5ms, 0s,0s, 0s,0s, 0s,0s, 0s,0s, 0s,0s, 0s,5ms, 0s,0s, 0s,0s, 0s,0s, 0s,0s, 0s,0s, 0s,5ms, 0s,0s
	CWL:CAPT:BURS:SUFF?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	0 us, 0 us

State Saved	Saved in instrument state.
Min	0 s
Max	1 s
Instrument S/W Revision	A.02.00

Gate Source

This command defines a list of gate source settings at which the burst type is Dynamic. Trigger Source is the start of a sweep list, and Gate Source is the start of each sweep list point. After using Gate Source, the SA will begin to capture the data of each burst when it detects the rising side of it. For the non-deterministic signal, it is difficult to determine the exactly timing of each burst without Gate Source.

Remote Command	[:SENSe]:CWLan:CAPTure:BURSt:GATE:SOURce <IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM<IMM>,<IMM>,<IMM>,<IMM>,<IMM>,<IMM>
	[:SENSe]:CWLan:CAPTure:BURSt:GATE:SOURce?
Example	CWL:CAPT:BURS:GATE:SOUR IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM,IMM, IMM,IMM,IMM,IMM,IMM,IMM
	CWL:CAPT:BURS:GATE:SOUR?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	One or any two types of Gate Sources can be set. When two sources are set, in accordance with the Ns cycle, each combination must include one source and the other repeated Ns–1 times.
	[Example]
	No cycle
	RFB, RFB, RFB,RFB,,,
	Ns=2 cycle
	EXT, IMM, EXT, IMM, EXT, IMM, EXT, IMM
	EXT1, EXT2, EXT1, EXT2, EXT1, EXT2, EXT1, EXT2
	Ns=5 cycle
	RFB, IMM, IMM, IMM, IMM, RFB, IMM, IMM, IMM, IMM
Preset	IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM, IMM
State Saved	Saved in instrument state.

Range	IMMediate|EXTernal1|EXTernal2|RFBurst|FRAMe
Instrument S/W Revision	A.02.00

TX Power Setup

Average

Switch Average on or off for the TX power measurement result.

When the average is on, the system performs a repeat average against the measured power of burst within the test range.

Remote Command	`[:SENSe]:CWLan:TXPower:AVERage[:STATe] OFF|ON|0|1`
	`[:SENSe]:CWLan:TXPower:AVERage[:STATe]?`
Example	:CWL:TXP:AVER ON
	:CWL:TXP:AVER?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Test Range

Specifies the burst range where the TX power measurement is made.

Start Burst

Allows you to specify the Burst Number where the TX power measurement starts.

Start Burst must be equal to or less than the Burst Number.

Remote Command	`[:SENSe]:CWLan:TXPower:BURSt:STARt <integer>`
	`[:SENSe]:CWLan:TXPower:BURSt:STARt?`
Dependencies/Couplings	Max value of Start Burst is equal to the value of Burst Number.
Example	CWL:TXP:BURS:STAR 2
	CWL:TXP:BURS:STAR?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1

State Saved	Saved in instrument state.
Min	1
Max	Burst Number
Instrument S/W Revision	A.02.00

Stop Burst

Allows you to specify the burst number where the TX power measurement stops.

Stop Burst must be equal to or less than Burst Number.

Remote Command	[:SENSe]:CWLan:TXPower:BURSt:STOP <integer>
	[:SENSe]:CWLan:TXPower:BURSt:STOP?
Dependencies/Couplings	Min value of Stop Burst is equal to the value of Start Burst.
	Max value of Stop Burst is equal to the value of Burst Number.
Example	CWL:TXP:BURSt:STOP 2
	CWL:TXP:BURSt:STOP?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.
Min	Start Burst
Max	Burst Number
Instrument S/W Revision	A.02.00

TX Output Spectrum Setup

TX Output Spectrum

Allows you to enable or disable the TX Output Spectrum measurement.

Remote Command	[:SENSe]:CWLan:TOSPectrum[:ENABle] OFF|ON|0|1
	[:SENSe]:CWLan:TOSPectrum[:ENABle]?
Example	CWL:TOSP ON
	CWL:TOSP?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	OFF

State Saved	Saved in instrument state.
Range	Off|On
Instrument S/W Revision	A.02.00

Farther Offset

Allows you to define whether he/she desire to measure the offset spectrum around 50 MHz away from the Center Frequency.

Remote Command	[:SENSe]:CWLan:TOSPectrum:FOFFset[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:TOSPectrum:FOFFset[:STATe]?
Example	:CWL:TOSP:FOFF ON
	:CWL:TOSP:FOFF?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Test Range

Specify the burst range where the TX Output Spectrum measurement is made.

The menu map is the same with **Test Range** of TX Power Setup

Start Burst

Allows you to specify the Burst Number where the TX Output Spectrum measurement starts.

Start Burst must be equal to or less than the Burst Number.

Remote Command	[:SENSe]:CWLan:TOSPectrum:BURSt:STARt <integer>
	[:SENSe]:CWLan:TOSPectrum:BURSt:STARt?
Dependencies/Couplings	Max value of Start Burst is equal to the value of the Burst Number.
Example	CWL:TOSPectrum:BURSt:STARt 2
	CWL:TOSPectrum:BURSt:STARt?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.

Min	1
Max	the Burst Number
Instrument S/W Revision	A.02.00

Stop Burst

Allows you to specify the Burst Number where the TX Output Spectrum measurement stops.

And for TX Output Spectrum, value of Stop Burst should be equal to or larger than 3.

Stop Burst must be equal to or less than the Burst Number.

Remote Command	[:SENSe]:CWLan:TOSPectrum:BURSt:STOP <integer>
	[:SENSe]:CWLan:TOSPectrum:BURSt:STOP?
Dependencies/Couplings	Min value of Stop Burst is equal to the value of Start Burst.
	Max value of Stop Burst is equal to the Burst Number.
Example	CWL:TOSP:BURS:STOP 6
	CWL:TOSP:BURS:STOP?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	3
State Saved	Saved in instrument state.
Min	Start Burst
Max	Burst Number
Instrument S/W Revision	A.02.00

Offset/Limits

Limits Level

Allows you to set Transmit Output Spectrum Limit Line of Offset A, B, C, D. If the radio stand is 802.11a or 802.11g-OFDM, Offset A, B, C, D is 9–11MHz, 11–20 MHz, 20–30 MHz, 30–55 MHz. If radio stand is 802.11b or 802.11g-DSSS, Offset A, B, C, D is 11–22 MHz, 22–33 MHz, 33–44 MHz, 44–55 MHz.

Remote Command	:CALCulate:CWLan:TOSPectrum:LIMit:DATA <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>
	:CALCulate:CWLan:TOSPectrum:LIMit:DATA?
Example	CALC:CWL:TOSP:LIM:DATA –10,–10,–20,–20,–20
	CALC:CWL:TOSP:LIM:DATA?
Key Path	**SCPI Only**

Mode	Combined WLAN
Preset	0 dB, –20dB, -–28dB, –40dB,–50dB (802.11a, 802.11g-OFDM)
	–30 dB, –50dB, –50dB, –50dB,–50dB (802.11b, 802.11g-DSSS)
State Saved	Saved in instrument state.
Min	–200 dB
Max	50 dB
Instrument S/W Revision	A.02.00

Mod Accuracy Setup

Modulation Accuracy

Allows you to set the On/Off status of the Modulation Accuracy measurement.

Remote Command	[:SENSe]:CWLan:EVM[:ENABle] OFF|ON|0|1
	[:SENSe]:CWLan:EVM[:ENABle]?
Example	**CWL:EVM ON**
	CWLS:EVM?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	Off|On
Instrument S/W Revision	A.02.00

Test Range

Allows you to specify the burst number where the Mod Accuracy measurement is made.

Start Burst

Specifies the Burst Number where the Mod Accuracy measurement starts.

Start Burst must be equal to or less than the Burst Number.

Remote Command	[:SENSe]:CWLan:EVM:BURSt:STARt <integer>
	[:SENSe]:CWLan:EVM:BURSt:STARt?
Dependencies/Couplings	Max value of Start Burst is equal to the Burst Number
Example	CWL:EVM:BURSt:STARt 2
	CWL:EVM:BURSt:STARt?

Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.
Range	1 to Burst Number
Instrument S/W Revision	A.02.00

Stop Burst

Allows you to specify the burst number where the Mod Accuracy measurement stops.

Stop Burst must be equal to or less than the Burst Number.

Remote Command	[:SENSe]:CWLan:EVM:BURSt:STOP <integer>
	[:SENSe]:CWLan:EVM:BURSt:STOP?
Dependencies/Couplings	Min value of Stop Burst is equal to the value of Start Burst.
	Max value of Stop Burst is equal to the Burst Number.
Example	CWL:EVM:BURSt:STOP 2
	CWL:EVM:BURSt:STOP?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.
Min	Frtart Burst
Max	Burst Number
Instrument S/W Revision	A.02.00

Meas Time

The following illustration shows the interrelationship between the Search Length, Result Length, Measurement Interval, and Measurement Offset. The Search Length is the total capture length.

11a, or 11f-OFDM:
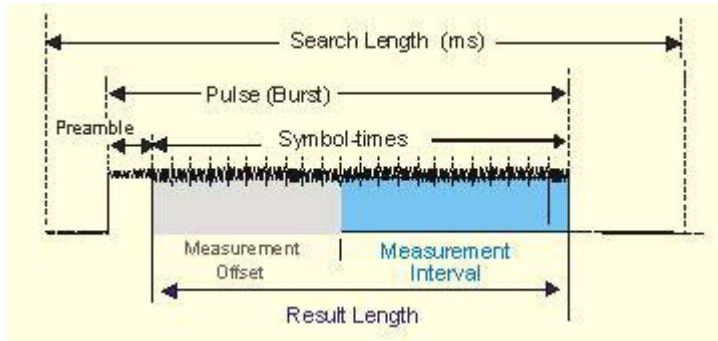
Figure 2-1 Parameter Interrelationship for 802.11a

11b, or 11g-DSSS:
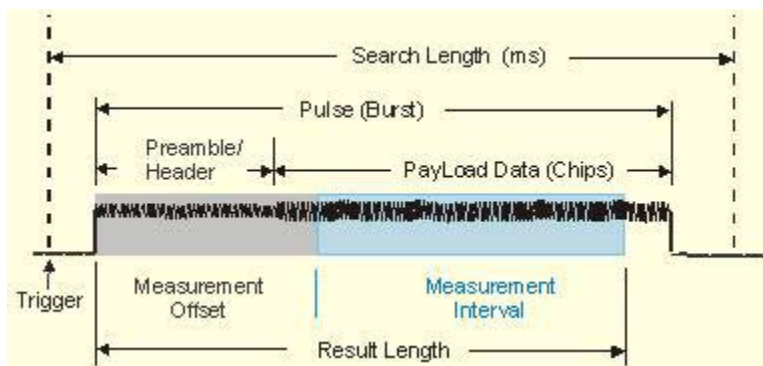
Figure 2-2 Parameter Interrelationship for 802.11b

Meas Interval

802.11a, or 802.11g-OFDM:

This parameterspecifies the measurement interval (length), in symbol times, of the portion of the OFDM burst that will be analyzed. This analyzed portion of the OFDM burst starts at a measurement offset specified by Meas Offset.

802.11b, or 802.11g-DSSS:

Used to set the measurement interval (length), in chips, of the portion of the WLAN burst that will be analyzed. This analyzed portion of the WLAN burst starts at a measurement offset specified by Meas Offset.

Remote Command	[:SENSe]:CWLan:EVM:TIME:INTerval <integer>
	[:SENSe]:CWLan:EVM:TIME:INTerval?
Example	CWL:EVM:TIM:INT 100symbols
	CWL:EVM:TIM:INT?
Key Path	**SCPI Only**
Mode	Combined WLAN

Notes	If results length state is Auto,
	Measure Interval Max value = Max Result Length
	If results length state is Man,
	Measure Interval Max value = Result Length
Preset	802.11a, 802.11g-OFDM: 60 symbols
	802.11b, 802.11g-DSSS: 2794 chips
State Saved	Saved in instrument state.
Min	1
Max	802.11a, 802.11g-OFDM: 1397 symbols
	802.11b, 802.11g-DSSS: 96360 chips
Instrument S/W Revision	A.02.00

Meas Offset

802.11a, or 802.11g-OFDM:

This parameterspecifies the measurement offset, in symbol times, of the portion of the OFDM burst that will be analyzed. The length of this analyzed portion of the OFDM burst is specified by Meas Interval. If the specified measurement offset is less than zero, a value of zero is used instead.

802.11b, or 802.11g-DSSS:

Used to set the measurement offset, in chips, of the portion of the WLAN burst that will be analyzed. The length of this analyzed portion of the WLAN burst is specified by Meas Interval. If the specified measurement offset is less than zero, a value of zero is used instead.

The measurement interval and offset are relative to the ideal starting point of the PLCP preamble portion of the burst. For a signal that uses the long PLCP format, the ideal starting point of the PLCP preamble is exactly 128 symbol times (128*11 chip times) before the start of the SFD sync pattern. For a signal that uses the short PLCP format, the ideal starting point of the PLCP preamble is exactly 56 symbol times (56*11 chip times) before the start of the SFD sync pattern.

Remote Command	[:SENSe]:CWLan:EVM:TIME:OFFSet <integer>
	[:SENSe]:CWLan:EVM:TIME:OFFSet?
Example	CWL:EVM:TIM:OFFS 100symbols
	CWL:EVM:TIM:OFFS?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	802.11a, 802.11g-OFDM: 0 symbols
	802.11b, 802.11g-DSSS: 22 chips
State Saved	Saved in instrument state.

Min	0
Max	If Result Length is Auto, then the specified measurement offset will be clipped to be less than or equal to the value of Max Result Length - Meas Interval,
	If Result Length is Man, then the specified measurement offset will be clipped to be less than or equal to the value of Result Length - Meas Interval.
Instrument S/W Revision	A.02.00

Result Length

When Result Length is Auto, the length of the burst is auto-detected. The result length is determined from the decoded SIGNAL symbol. The value of Max Result Length specifies the maximum result length for the burst; any burst longer than that will be treated as though that were the length of the burst.

When Result Length is Man, you can specify the result length of the burst regardless of the actual length of the burst.

For 802.11n, when Auto is selected, the analyzer automatically determines the measurement result length. It compares the information detected within the High Throughput Signal Field of the High Throughput Preamble to the Max Result Length parameter and uses the smaller value as the measurement result length

Remote Command	[:SENSe]:CWLan:EVM:TIME:RESult:LENGth <integer>
	[:SENSe]:CWLan:EVM:TIME:RESult:LENGth?
	[:SENSe]:CWLan:EVM:TIME:RESult[:STATe]:AUTO OFF|ON|0|1
	[:SENSe]:CWLan:EVM:TIME:RESult[:STATe]:AUTO?
Example	CWL:EVM:TIME:RES:LENG 60
	CWL:EVM:TIME:RES:LENG?
	CWL:EVM:TIME:RES:AUTO ON
	CWL:EVM:TIME:RES:AUTO?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	802.11a, 802.11g-OFDM, 802.11n: 60 symbols
	802.11b, 802.11g-DSSS: 2816 chips
	On
State Saved	Saved in instrument state.
Min	1
Max	802.11a, 802.11g-OFDM, 802.11n: 1397 symbols
	802.11b, 802.11g-DSSS: 96360 chips
Instrument S/W Revision	A.02.00

Max Result Length

Max Result Length specifies a maximum result length.

If the auto-detected length is greater than the specified maximum result length, the maximum result length is used instead.

The actual results returned will be for a subset of this maximum, as specified by the Meas Interval and Meas Offset, and will be further limited to the auto-detected result length if that is shorter than the maximum result length.

Remote Command	[:SENSe]:CWLan:EVM:TIME:RESult:MAX <integer>
	[:SENSe]:CWLan:EVM:TIME:RESult:MAX?
Example	CWL:EVM:TIM:RES:MAX 100symbols
	CWL:EVM:TIM:RES:MAX?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	802.11a, 802.11g-OFDM, 802.11n: 60 symbols
	802.11b, 802.11g-DSSS: 2816 chips
State Saved	Saved in instrument state.
Min	1
Max	802.11a, 802.11g-OFDM, 802.11n: 1397 symbols
	802.11b, 802.11g-DSSS: 96360 chips
Instrument S/W Revision	A.02.00

Subcarrier

This parameter specifies whether the demodulation results are for all subcarriers in the signal, for a single subcarrier, or for the pilot subcarriers when Radio Std is set to 802.11a, 802.11g-OFDM, or 802.11n.

Remote Command	[:SENSe]:CWLan:EVM:SUBCarrier:SELect ALL|PILot|SINGle
	[:SENSe]:CWLan:EVM:SUBCarrier:SELect?
Example	CWL:EVM:SUBC:SEL SING
	CWL:EVM:SUBC:SEL?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	This key is only available for 802.11a, 802.11g-OFDM, 802.11n Radio Std.
Preset	ALL
State Saved	Saved in instrument state.

Range	All|Pilot|Single
Instrument S/W Revision	A.02.00

Subcarrier Number

This parameter specifies the subcarrier to which the demodulation results apply.

Remote Command	`[:SENSe]:CWLan:EVM:SUBCarrier:NUMBer <integer>`
	`[:SENSe]:CWLan:EVM:SUBCarrier:NUMBer?`
Example	CWL:EVM:SUBC:NUMB 2
	CWL:EVM:SUBC:NUMB?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	52
Instrument S/W Revision	A.02.00

Chip Rate

Thisspecifies the fundamental chip rate of the signal to be analyzed. The value should be positive; non-positive values are converted to 1 Hz. The default is 11 MHz, which matches the chip rate of 802.11b/g.

The only special case is the optional 802.11g 33Mbit PBCC mode. In this mode, the chip rate of the transmitted signal starts at 11 MHz, but changes to 16.5 MHz in the middle of the burst. For signals of this type, the CHIP_RATE should still be specified as 11 MHz, and the measurement will automatically switch to 16.5 MHz at the appropriate place in the burst.

Remote Command	`[:SENSe]:EVM:CHPRate <frequency>`
	`[:SENSe]:EVM:CHPRate?`
Example	:EVM:CHPR 11.0MHz
	:EVM:CHPR?
Key Path	**No equivalent front-panel key**
Mode	Combined WLAN
Preset	11.0 MHz
State Saved	Saved in instrument state.
Min	1MHz

Max	HW DEPENDENT opt. 122:25.0 MHz, opt. 140: 12.5 MHz
Instrument S/W Revision	A.02.00

Clock Adjust

In normal measurements, the signal is synchronized to the chip timing. In unusual cases, it is possible for the synchronization to be off slightly. This parameter allows you to specify a timing offset which is added to the chip timing detected. This parameter should only be used when trying to debug unusual signals.

The maximum valid value for this parameter is 0.5 chips, and the minimum valid value is –0.5 chips.

Remote Command	`[:SENSe]:EVM:CLKadj <real>`
	`[:SENSe]:EVM:CLKadj?`
Example	:EVM:CLK –0.1
	:EVM:CLK?
Key Path	**No equivalent front-panel key**
Mode	Combined WLAN
Preset	0.0 chips
State Saved	Saved in instrument state.
Min	–0.5
Max	0.5
Instrument S/W Revision	A.02.00

Equalizer Len

This parameter specifies the total length of the equalizer filter's impulse response, in chips.

The minimum valid value for Equalizer Len is 3. The maximum valid value is 99, and also must be less than either Max Result Length or Result Length. The value must be an odd number. The impulse response is centered, so that it extends (EQ_FILT_LEN–1)/2 chips on either side of t=0.

Remote Command	`[:SENSe]:EVM:EQUalizer:LENGth <integer>`
	`[:SENSe]:EVM:EQUalizer:LENGth?`
	`[:SENSe]:EVM:EQUalizer[:STATe] OFF|ON| 0|1`
	`[:SENSe]:EVM:EQUalizer[:STATe]?`
Example	:EVM:EQU:LENG 21
	:EVM:EQU:LENG?
	:EVM:EQU ON
	:EVM:EQU ON?

Key Path	**No equivalent front-panel key**
Mode	Combined WLAN
Preset	21 chips
	OFF
State Saved	Saved in instrument state.
Min	3
Max	Min(99, Result length/Max result length)
Instrument S/W Revision	A.02.00

Descramble

This parameter specifies what type of descrambling to do when producing bitvector results. The valid values are: On, Off, Preamble Only, Preamble & Header Only. OFF means no descrambling is done at all. Preamble Only means only the PLCP preamble is descrambled. Preamble & Header Only means that the PLCP preamble and PLCP header are descrambled. ON means that all parts of the burst are descrambled.

Normally, an 802.11b/g signal has all bits scrambled before transmission, so normally you would want to descramble all of the bitvector results. However, when debugging an 802.11b/g transmitter, it is sometimes helpful to disable scrambling in the transmitter, in which case you would disable descrambling.

Remote Command	`[:SENSe]:EVM:PREamble ALL|NONE|PONLy|PHONly`
	`[:SENSe]:EVM:PREamble?`
Example	:EVM:PRE NONE
	:EVM:PRE?
Key Path	**No equivalent front-panel key**
Mode	Combined WLAN
Preset	ALL
State Saved	Saved in instrument state.
Range	All	None	Preamble Only |Preamble & Header Only
Instrument S/W Revision	A.02.00

Meas Filter

This parameter controls the measurement filter type used for computing EVM.

Remote Command	`[:SENSe]:CWLan:EVM:FILTer:MEASurement NONE|RRCosine`
	`[:SENSe]:CWLan:EVM:FILTer:MEASurement?`

Example	CWL:EVM:FILT:MEAS RRC
	CWL:EVM:FILT:MEAS?
Key Path	**SCPI Only**
Mode	Combined WLAN
State Saved	Saved in instrument state.
Range	None|RRC
Instrument S/W Revision	A.02.00

Ref Filter

This parameter controls the measurement filter type used for computing EVM.

Remote Command	[:SENSe]:CWLan:EVM:FILTer:REFerence GAUSsian|RECTangle|RCOSine
	[:SENSe]:CWLan:EVM:FILTer:REFerence?
Example	CWL:EVM:FILT:REF RCOS
	CWL:EVM:FILT:REF?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	This key is only available for 802.11b, 802.11g-DSSS Radio Std.
Preset	RECT
State Saved	Saved in instrument state.
Range	Rect|Gaussion|Raised Consine
Instrument S/W Revision	A.02.00

Alpha/BT

This parameter is used only when the Ref Filter is set to "GAUSSIAN" or "Raised Cosine", or the measurement filter is set to "RRC". In these cases, this parameter controls the BT value for the Gaussian filter and alpha values for Raised Cosine and RRC filters.

Remote Command	[:SENSe]:CWLan:EVM:FILTer:ALPHa <real>
	[:SENSe]:CWLan:EVM:FILTer:ALPHa?
Example	CWL:EVM:FILT:ALPH 1
	CWL:EVM:FILT:ALPH?
Key Path	**SCPI Only**
Mode	Combined WLAN
Notes	This key is only available for 802.11b, 802.11g-DSSS Radio Std.

Preset	0.5
State Saved	Saved in instrument state.
Min	0.05
Max	When Reference Filter is set to Gaussian:100.0
	When Reference Filter is set to Raised Cosine: 1.0
Instrument S/W Revision	A.02.00

Modulation Format

Allows you to specify the demodulation format to use. Modulation format is automatically set when a radio standard is selected. You can also specify a modulation format for your testing.

Remote Command	`[:SENSe]:CWLan:EVM:DEMod AUTO` `|BPSK|QPSK|QAM16|QAM64|QAM256`
	`[:SENSe]:CWLan:EVM:DEMod?`
Example	:CWL:EVM:DEM AUTO
	:CWL:EVM:DEM?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	AUTO
State Saved	Saved in instrument state.
Range	802.11a, 802.11g-OFDM: AUTO Detect |BPSK|QPSK|QAM16|QAM64
	802.11b, 802.11g-DSSS: AUTO Detect | DSSS 1Mbps | DSSS 2Mbps | CCK 5.5Mbps | CCK 11Mbps | PBCC 5.5Mbps | PBCC 11Mbps | PBCC 22Mbps | PBCC 33Mbps
	802.11n: AUTO Detect |BPSK|QPSK|QAM16|QAM64|QAM256|HTS
Instrument S/W Revision	A.02.00

Symbol Timing Adjust

Normally, when demodulating of an OFDM symbol, the guard interval is skipped over, and an FFT is performed on the last portion of the symbol time. However, this means that the FFT would include the transition region between this symbol and the following symbol. To avoid this, it is generally beneficial to back up away from the end of the symbol time, and use a part of the guard interval.

Symbol Timing Adjust controls how far the FFT part of the symbol is adjusted away from the end of the symbol time. The value is in terms of percent of the used (FFT) part of the symbol time. The value must be between zero (meaning no adjustment) and (–100 * Guard Interval). Values outside of that range are clipped to the limit. Note that this parameter value is negative, because the FFT start time is moved back

by this parameter.

Remote Command	`[:SENSe]:CWLan:EVM:TADJust <percent>`
	`[:SENSe]:CWLan:EVM:TADJust?`
Dependencies/Couplings	if guard interval equal to 1/32, the symbol time adjust value be set to –1.5625%.
Example	CWL:EVM:TADJ –3.125
	CWL:EVM:TADJ?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	–3.125
State Saved	Saved in instrument state.
Min	–100 * guard interval
Max	0.0
Instrument S/W Revision	A.02.00

Pilot Track

These parameters specifies how to track the pilot.

Track Amplitude

This parameter specifies whether the demodulation will track the pilot amplitude over the course of the OFDM burst.

Remote Command	`[:SENSe]:CWLan:EVM:TRACk:AMP OFF|ON|0|1`
	`[:SENSe]:CWLan:EVM:TRACk:AMP?`
Example	:CWL:EVM:TRAC:AMP OFF
	:CWL:EVM:TRAC:AMP?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Track Phase

This parameter specifies whether the demodulation will track the pilot phase over the course of the

OFDM burst.

Remote Command	`[:SENSe]:CWLan:EVM:TRACk:PHASe OFF|ON|0|1`
	`[:SENSe]:CWLan:EVM:TRACk:PHASe?`
Example	:CWL:EVM:TRAC:PHAS ON
	:CWL:EVM:TRAC:PHAS?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	802.11a, 802.11g-OFDM: ON
	802.11b, 802.11g-DSSS: OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Track Timing

This parameter specifies whether the demodulation will track the pilot timing over the course of the OFDM burst.

Remote Command	`[:SENSe]:CWLan:EVM:TRACk:TIMing OFF|ON|0|1`
	`[:SENSe]:CWLan:EVM:TRACk:TIMing?`
Example	:CWL:EVM:TRAC:TIM OFF
	:CWL:EVM:TRAC:TIM?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	OFF
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Equalizer Training

This specifies how the equalizer is initialized, or "trained". The valid values are Channel Estimation Seq Only and Channel Estimation Seq & Data. The value Channel Estimation Seq Only, which is the default, specifies that the equalizer is trained using only the channel estimation sequence (also called the "long sync") portion of the burst preamble. The 802.11a/g standards imply that the equalizer should be implemented this way when measuring EVM, and this matches how a real receiver would probably implement an equalizer.

The value Channel Estimation Seq & Data specifies that the equalizer should be trained using both the

channel estimation sequence and the entire data portion of the burst. This usually gives a more accurate estimate of the equalizer response. It also typically lowers the EVM by one or two dB.

Remote Command	[:SENSe]:CWLan:EVM:EQUalizer:TRAining SEQ|SDATa
	[:SENSe]:CWLan:EVM:EQUalizer:TRAining?
Example	:CWL:EVM:EQU:TRA SEQ
	:CWL:EVM:EQU:TRA?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	SEQ
State Saved	Saved in instrument state.
Range	Channel Estimation Seq Only|Channel Estimation Seq & Data
Instrument S/W Revision	A.02.00

EVM Threshold

EVM Threshold Upper

If a user want to do EVM in some range of Tx Power, and this parameter is the upper limit of TxPower. If measured TxPower of the corresponding burst great than this value, the EVM of the burst will not be computed.

Remote Command	:CALCulate:CWLan:EVM:BURSt:THReshold:UPPer <ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl> ,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl >,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl >,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<am pl>,<ampl>,<ampl>,<ampl>,<ampl>
	:CALCulate:CWLan:EVM:BURSt:THReshold:UPPer?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	30 dBm, 30 dBm
State Saved	Saved in instrument state.
Min	–998 dBm
Max	999 dBm
Instrument S/W Revision	A.02.00

EVM Threshold Lower

If a user want to do EVM in some range of Tx Power, and this parameter is the lower limit of TxPower. If measured TxPower of the corresponding burst less than this value, the EVM of the burst will not be computed.

If the TX Power of one burst is not measured, but user still want to get EVM result for this burst, the EVM Threshold Lower value of this burst must be set to –999 dBm.

Remote Command	`:CALCulate:CWLan:EVM:BURSt:THReshold:LOWer <ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>,<ampl>`
	`:CALCulate:CWLan:EVM:BURSt:THReshold:LOWer?`
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	–999 dBm, –999 dBm
State Saved	Saved in instrument state.
Min	–999 dBm
Max	998 dBm
Instrument S/W Revision	A.02.00

Mirror Spectrum

If this parameter is set to Invert, the input time data will be conjugated. Sets Mirror Spectrum to conjugate the input time data before any processing of the signal. This will mirror the frequency spectrum of the input data around the center frequency. Most results are computed in the same way after this frequency mirroring, but the exception is the Freq Error. This result is computed relative to the original unmodified input signal.

Remote Command	`[:SENSe]:CWLan:EVM:SPECtrum NORMal|INVert`
	`[:SENSe]:CWLan:EVM:SPECtrum?`
Example	`:CWL:EVM:SPEC INV`
	`:CWL:EVM:SPEC?`
Key Path	**SCPI Only**
Mode	Combined WLAN

Preset	NORM
State Saved	Saved in instrument state.
Range	Normal|Invert
Instrument S/W Revision	A.02.00

Guard Interval

IEEE 802.11n supports multiple Guard Interval implementations

Remote Command	`[:SENSe]:CWLan:EVM:GINTerval:RATio R1BY8|R1BY4|HTS`
	`[:SENSe]:CWLan:EVM:GINTerval:RATio?`
Example	:CWL:EVM:GINT:RAT R1BY8
	:CWL:EVM:GINT:RAT?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	R1BY4
State Saved	Saved in instrument state.
Range	1/8 | 1/4 | HTS
Instrument S/W Revision	A.07.00

FFT Size

The FFT Size parameter specifies the fast Fourier transform size. The Preset to Standard value for 802.11n HT 20 MHz is 64. The Preset to Standard value for 802.11n HT 40 MHz is 128.

NOTE	Option B40 (40 MHz analysis bandwidth) is required when you set FFT Size =128 to perform 40 MHz EVM.

Remote Command	`[:SENSe]:CWLan:EVM:NFFT <integer>`
	`[:SENSe]:CWLan:EVM:NFFT?`
Example	:CWL:EVM:EVM:NFFT 128
	:CWL:EVM:NFFT?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	NORM
State Saved	Saved in instrument state.
Range	64 | 128

Instrument S/W Revision   A.07.00

Meas Method

Allows you to select different measurement methods based on your specific needs.

The main difference is the equivalent RBW that a user can choose in order to decide the minimum capture time

The following formula is used to calculate the minimum capture time:

Minimum capture time = k/RBW

In the equation k is the window factor and its value is 3.765908. A larger RBW value corresponds to fast speed with less accuracy, while smaller RBW results in better accuracy with slower speed. You can select one of the following 3 RBWs options for your measurement needs.

Best Speed, RBW = 400 kHz, for priority on measurement speed.

Balanced, RBW = 200 kHz, for priority on balanced performance.

Best Accuracy, RBW = 100 kHz, for priority on accuracy.

Remote Command	`[:SENSe]:CWLan:METHod FAST|BALanced|ACCuracy`
	`[:SENSe]:CWLan:METHod?`
Example	:CWL:METH ACC
	:CWL:METH?
Key Path	**SCPI Only**
Mode	Combined WLAN
Preset	ACCuracy
Preset	ACCuracy
State Saved	Saved in instrument state.
Range	Fast	Balanced	Best Accuracy
Instrument S/W Revision	A.02.00

RF Trace Display

If RF Trace Display is switched to on, the RF Trace is displayed to allow for the alignment of the signal by RF envelop view.

If RF Trace Display is switched to off, the measurement speed will be faster as the RF trace is not reconstructed and RF Envelop view will not update the trace during the measurement.

This is a SCPI only command.

Remote Command	`[:SENSe]:CWLan:TRACe:RF[:ENABle] OFF|ON|0|1`
	`[:SENSe]:CWLan:TRACe:RF[:ENABle]?`
Example	:CWL:TRAC:RF ON
	:CWL:TRAC:RF?
Key Path	**SCPI only**
Mode	Combined WLAN
Preset	ON
State Saved	Saved in instrument state.
Range	Off|On
Instrument S/W Revision	A.02.00

Meas Preset

Restores all the measurement parameters to their default values.

For more information, see the section under the Preset key in the Utility section.

Remote Command	`:CONFigure:CWLan`
Example	:CONF:CWLan
Key Path	**SCPI Only**
Mode	Combined WLAN
Instrument S/W Revision	A.02.00

Mode

See "Mode" on page 447 in the section "Common Measurement Functions" for more information.

Mode Setup

See in the section "Common Measurement Functions" for more information.

Peak Search

This mode does not have Peak Search functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Recall

See in the section "Common Measurement Functions" for more information.

Restart

See in the section "Common Measurement Functions" for more information.

Save

See "Save" on page 123 in the section "Common Measurement Functions" for more information.

Single

See "Single (Single Measurement/Sweep)" on page 479 in the section "Common Measurement Functions" for more information.

Source

See "Source" on page 481 in the section "Common Measurement Functions" for more information.

SPAN X Scale

Accesses the SPAN/X Scale menu that allows you to set the desired horizontal scale settings.

Key Path	**Front-panel Key**
Instrument S/W Revision	A.02.00

Ref Value

Allows you to set the display X Reference value.

Remote Command	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
Dependencies/Couplings	See Restriction and Notes
Example	DISP:CWL:VIEW:WIND:TRAC:X:RLEV 1s
	DISP:CWL:VIEW:WIND:TRAC:X:RLEV?
Key Path	**SPAN /X Scale**
Mode	Combined WLAN
Notes	If X Auto Scaling is On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scaling is automatically set to Off.
Preset	0 s
State Saved	Saved in instrument state.
Min	−10.0 s
Max	10.00 s
Instrument S/W Revision	A.02.00

Scale/Div

Allows you to set the display X Scale/Division value.

Remote Command	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
Dependencies/Couplings	See Restriction and Notes

Example	:DISP:CWL:VIEW:WIND:TRAC:X:PDIV 1ms
	:DISP:CWL:VIEW:WIND:TRAC:X:PDIV?
Key Path	**SPAN/ X Scale**
Mode	Combined WLAN
Notes	If X Auto Scaling is set to On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scaling is automatically set to Off.
Preset	1.0 ms
State Saved	Saved in instrument state.
Min	1.00 ns
Max	1.00 s
Instrument S/W Revision	A.02.00

Ref Position

Allows you to set the X Reference position to the left, center, or right of the display.

Remote Command	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT|CENTer|RIGHt
	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
Example	:DISP:CWL:VIEW:WIND:TRAC:X:RPOS LEFT
	:DISP:CWL:VIEW:WIND:TRAC:X:RPOS?
Key Path	**SPAN/ X Scale**
Mode	Combined WLAN
Preset	LEFT
State Saved	Saved in instrument state.
Range	Left|Ctr|Right
Instrument S/W Revision	A.02.00

Auto Scaling

Allows you to toggle the X Auto Scaling function between On and Off.

Remote Command	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0|1|OFF|ON
	:DISPlay:CWLan:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?

Dependencies/Couplings	See Restriction and Notes
Example	:DISP:CWL:VIEW:WIND:TRAC:X:COUP OFF
	:DISP:CWL:VIEW:WIND:TRAC:X:COUP?
Key Path	**SPAN / X Scale**
Mode	Combined WLAN
Notes	Upon pressing the Restart front-panel key, or Restart softkey under the Meas Control menu, 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 manually set a value to either X Rel Value or X Scale/Div, X Auto Scaling is automatically set to Off.
Preset	ON
State Saved	Saved in instrument state.
Range	On|Off
Instrument S/W Revision	A.02.00

Sweep/Control

This mode does not have Sweep/Control functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Trace/Detector

This mode does not have Trace/Detector functionality.

Key Path	**Front-panel key**
Instrument S/W Revision	A.02.00

Trigger

See "Trigger" on page 483 in the "Common Measurement Functions" section for more information.

View/Display

Allows you to select the desired measurement view from the following selections:

- RF Envelope View – RF Envelope view

- Results List – Results List View

- Param List – Parameters List View

Remote Command	`:DISPlay:CWLan:VIEW[:SELect]`
	`RFENvelope|RESult|PARameter`
	
	`:DISPlay:CWLan:VIEW[:SELect]?`

Example	DISP:CWL:VIEW RFEN DISP:CWL:VIEW?
Key Path	**Front-panel Key**
Mode	Combined WLAN
Preset	RESult
State Saved	Saved in instrument state.
Range	RF Envelope|Result List|Param List
Instrument S/W Revision	A.02.00

Display

Accesses a menu of functions that enable you to set the display parameters.

See "Display" on page 545 in the "Common Measurement Functions" section for more information.

RF Envelope View

The RF Envelope View is useful for setting the time alignment between target signal and the instrument; however, it is recommended to always use SCPI command ([:SENSe]:CWLan:TRACe:RF[:ENABle] OFF) to turn the trace off once the time alignment is finishedIt is not recommended to use the RF Envelope View trace for post-processing. Captured raw data is available by READ SCPI for post processing.
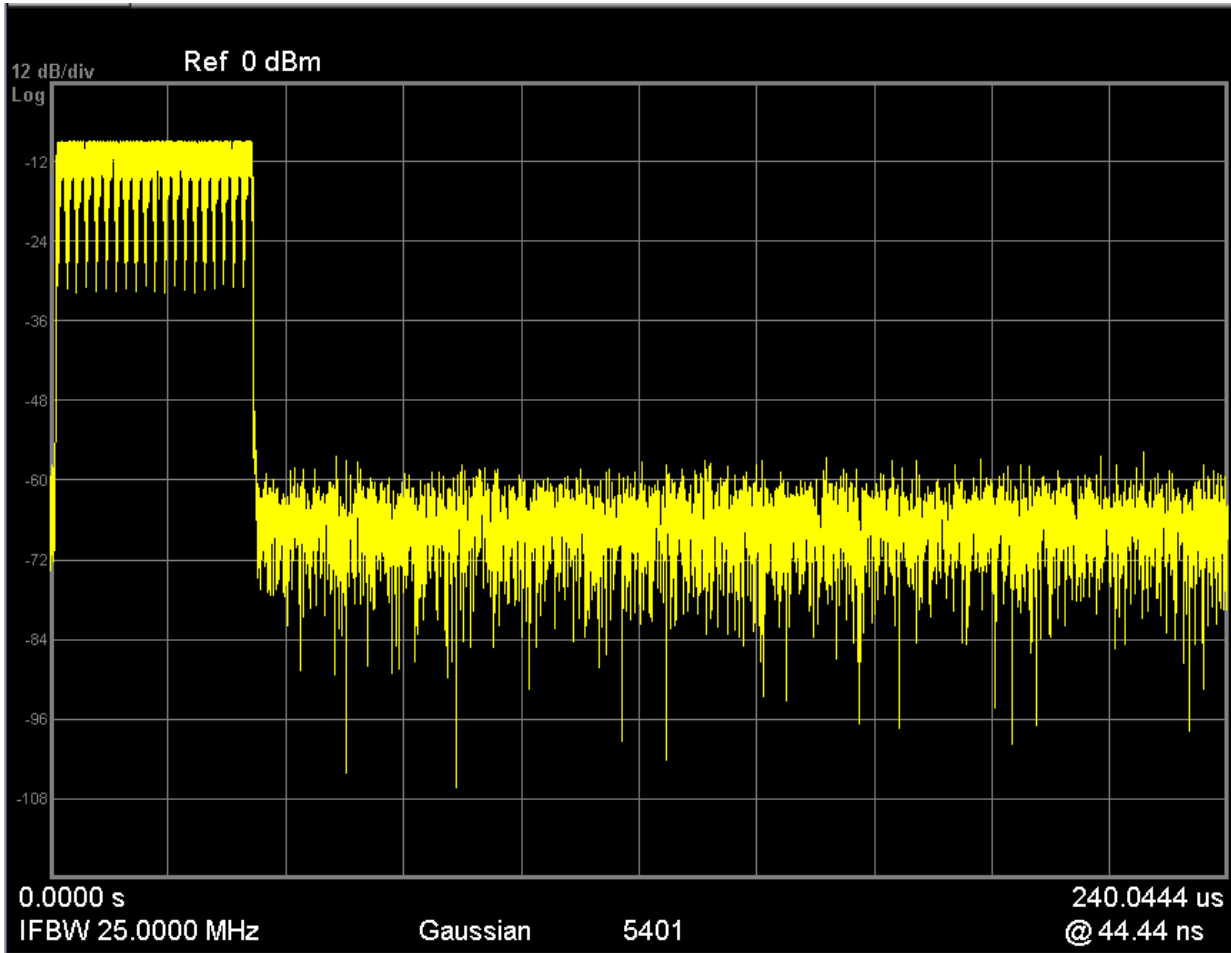
Key Path	**View/Display**
Instrument S/W Revision	A.02.00

Results List View

This view provides a list of all the numeric results defined in the last chapter. You can use the DOWN|UP key to scroll the list by using either the front panel or the key board.

When the modulation accuracy measurement is performed, the following results are provided:

- Frequency Error

- Symbol Clock Error (802.11a or 802.11g-OFDM)

- Chip Clock Error (802.11b or 802.11g-DSSS)

- Center Frequency Leakage (802.11a or 11g-OFDM)

- Spectral Flatness (802.11a or 802.11g-OFDM)

- Carrier Suppression (802.b or 802.11g-DSSS)

- RMS EVM

- Peak EVM

Measurement	Measurement Item	Result
------------TX Power------------		
Burst1	Total Power	-66.775 dBm/18.000 MHz
	Peak PSD	-76.075 dBm/MHz
------------Mod Accuracy------------		
Burst1	Frequency Error	598610.688 Hz
	Symbol Clock Error	76.775 ppm
	Chip Cloak Error	---
	Center Frequency Leakage	-30.156 dB
	Spectral Flatness	FAIL
	Carrier Suppression	---
	RMS EVM	7.059 dB
	Peak EVM	25.792 dB

Key Path	**View/Display**
Instrument S/W Revision	A.02.00

Parameters List View

This view shows name, remote command and value of available commands for this measurement. you can verify and change values with the up/down key from either the front panel or key board.

Name	SCPI	Value
EVM Meas Lower Threshold	:CALCulate:CWLan:EVM:BURSt:THReshold:LOWer	List:Amplitude[36]
EVM Meas Upper Threshold	:CALCulate:CWLan:EVM:BURSt:THReshold:UPPer	List:Amplitude[36]
TOSP Limit Level	:CALCulate:CWLan:TOSPectrum:LIMit:DATA	List:Amplitude[5]
Current View	:DISPlay:CWLan:VIEW:SELect	PARameter
Auto Scaling	:DISPlay:CWLan:VIEW1:WINDow:TRACe:X:SCALe:COUPle	On
X Scale/Div	:DISPlay:CWLan:VIEW1:WINDow:TRACe:X:SCALe:PDIVision	100.00 µs
X Ref	:DISPlay:CWLan:VIEW1:WINDow:TRACe:X:SCALe:RLEVel	0.0000 s
XRefPosition_RfEnv	:DISPlay:CWLan:VIEW1:WINDow:TRACe:X:SCALe:RPOSition	Left
YAutoScale_RfEnv	:DISPlay:CWLan:VIEW1:WINDow:TRACe:Y:SCALe:COUPle	Off
Scale/Div	:DISPlay:CWLan:VIEW1:WINDow:TRACe:Y:SCALe:PDIVision	10.00 dB
YRefLevel_RfEnv	:DISPlay:CWLan:VIEW1:WINDow:TRACe:Y:SCALe:RLEVel	10.00 dBm
YRefPosition_RfEnv	:DISPlay:CWLan:VIEW1:WINDow:TRACe:Y:SCALe:RPOSition	TOP
Arrival Time Uncertainty	:SENSe:CWLan:CAPTure:ATUNcertain	0.00 s
Burst Attenuation	:SENSe:CWLan:CAPTure:BURSt:ATTenuation	List:Amplitude[36]
Burst Frequency	:SENSe:CWLan:CAPTure:BURSt:FREQuency	List:Frequency[36]
Burst Length	:SENSe:CWLan:CAPTure:BURSt:LOAD	List:Time[36]
Burst Count	:SENSe:CWLan:CAPTure:BURSt:NUMBer	1
Burst Prefix	:SENSe:CWLan:CAPTure:BURSt:PREFix	List:Time[36]
Burst suffix	:SENSe:CWLan:CAPTure:BURSt:SUFFix	List:Time[36]
BurstType	:SENSe:CWLan:CAPTure:BURSt:TYPe	STATic
Capture Offset	:SENSe:CWLan:CAPTure:OFFSet	0.00 s
Mod Accuracy Start Burst	:SENSe:CWLan:EVM:BURSt:STARt	1
Mod Accuracy Stop Burst	:SENSe:CWLan:EVM:BURSt:STOP	1
Mod Accuracy Chip Rate	:SENSe:CWLan:EVM:CHPRate	11.000 MHz
Mod Accuracy Clock Adjust	:SENSe:CWLan:EVM:CLKadj	0.000
Mod Accuracy Mod Format	:SENSe:CWLan:EVM:DEMod	AUTO
ModAccuracyOn	:SENSe:CWLan:EVM:ENABle	On
Mod Accuracy EqFilter Length	:SENSe:CWLan:EVM:EQUalizer:LENGth	21
Mod Accuracy EqFilter On/Off	:SENSe:CWLan:EVM:EQUalizer:STATe	Off
Mod Accuracy Equalizer Training	:SENSe:CWLan:EVM:EQUalizer:TRAining	SEQ

Key Path   **View/Display**

Instrument S/W Revision   A.02.00

7   Common Measurement Functions

The key and command descriptions in this section describe functions that operate the same in multiple measurements and/or modes. This section is a library of functions that is referenced by many measurements and modes

To find the exact description and parameters for functions in a specific measurement, always look in the measurement section of this documentation. Pressing the front-panel key or softkey and then pressing the green Help key also provides the correct information.

NOTE	If you want to print the documentation, be sure to select this section and the measurement of interest to ensure having all the information you need. See "Printing Acrobat Files" on page 55 for further instructions about printing.

AMPTD Y Scale

The Amplitude front-panel key activates the Amplitude menu and selects Reference Level or Reference Value (depending on the measurement) as the active function.

Some features in the Amplitude menu apply to multiple measurements; others apply only to specific measurements. Keys that only apply to some measurements are blanked or grayed out in measurements in which they are not supported.

Key Path	**Front-panel key**
Initial S/W Revision	Prior to A.02.00

Reference Level

The Reference Level specifies the amplitude represented by the topmost graticule line.

Changing the reference level does not restart a measurement, because it is a display function only; instead it vertically 'pans' all displayed traces and markers to the new value. If a change to the reference level changes the attenuation value (eg through an auto coupling), then the measurement will be restarted.

Key Path	**AMPTD Y Scale**
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 dBμV, then 126.99 dBμV will be displayed.
Couplings	If you reduce the attenuation, the analyzer may have to lower the reference level to keep it below its allowed maximum. This allowed maximum level is specified in the "Max" row, below, along with other variables which affect it. When you increase attenuation, the reference level does not change.
Preset	0 dBm
State Saved	Saved in instrument state
Min	RefLevelMin = –170 dBm + RefLevelOffset - ExtGain.

Max	The maximum Ref Level is typically:
	+30 dBm + RL Offset – External Gain (for MXA and PXA)
	+23 dBm + RL Offset – External Gain (for EXA and CXA)
	This maximum value is determined by the maximum power that can be safely applied to the input circuitry. The actual maximum value at any given time may be even 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.
Initial S/W Revision	Prior to A.02.00
Default Unit	Depends on the current selected Y axis unit

Amplitude Representations

The following is an illustration of the reference level and Y Axis scales under various conditions:
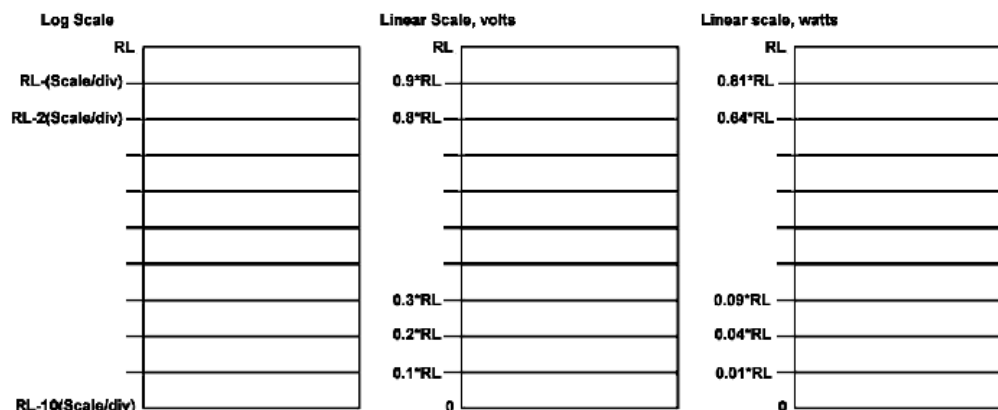
Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections thatcontrols all the attenuation functions. Different models in the X-Series come with different configurations.

See "Dual Attenuator Configuration:" on page 323.

See "Single Attenuator Configuration:" on page 323

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called "Meas Global" and are unaffected by Meas Preset.

Key Path	**AMPTD Y Scale**
Scope	Meas Global

Dependencies	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.
Readback Line	Contains a summary in [ ] brackets of the current total attenuation. See the descriptions of the "(Mech) Atten " on page 324, "Enable Elec Atten" on page 326, and "Elec Atten" on page 328 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Dual Attenuator Configuration:
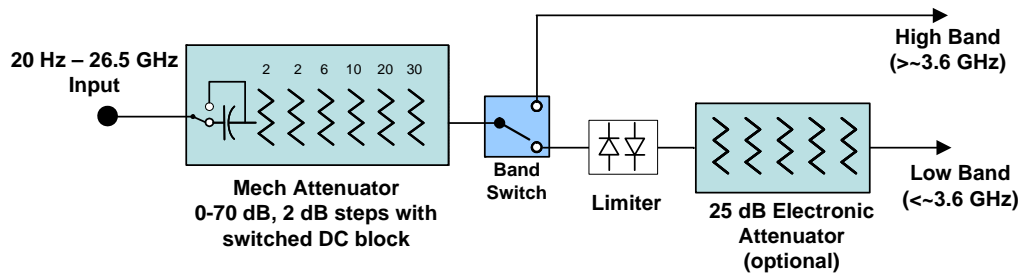
Single Attenuator Configuration:
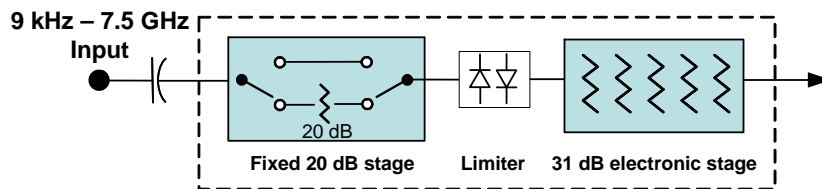
You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens up the Attenuation menu. If the first key in the Attenuation menu says **Mech Atten** you have the dual attenuator configuration. If the first key says **Atten** you have the single attenuator configuration.
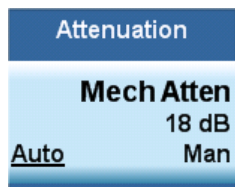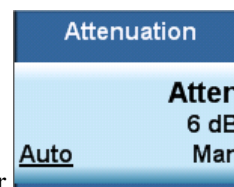
 Dual Attenuator   Single Attenuator

In the single attenuator configuration, youcontrol the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless you purchase the Electronic Attenuator option you will only have the mechanical attenuator.

(Mech) Atten

This key is labeled **Mech Atten** in dual attenuator models and **Atten** in single attenuator models.   In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the 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.

See "Attenuator Configurations and Auto/Man" on page 325

Key Path	AMPTD Y Scale, Attenuation

Remote Command	`[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>`
	
	`[:SENSe]:POWer[:RF]:ATTenuation?`
	
	`[:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF|ON|0|1`
	
	`[:SENSe]:POWer[:RF]:ATTenuation:AUTO?`

Example	POW:ATT 20 Dual attenuator configuration: sets the mechanical attenuator to 20 dB Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation). If the attenuator was in Auto, it sets it to Manual.
Dependencies	Some measurements do not support the Auto setting of **(Mech) Atten**. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears. In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the `"Enable Elec Atten" on page 326` key description. See "Attenuator Configurations and Auto/Man" on page 325 for more information on the Auto/Man functionality of Attenuation.
Couplings	When **(Mech) Atten** is in Auto, it uses the following algorithm to determine a value: Atten = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is 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). The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

Preset	The preset for Mech Attenuation is "Auto."
	The Auto value of attenuation is:
	CXA, EXA, MXA and PXA: 10 dB
State Saved	Saved in instrument state
Min	0 dB
	The attenuation set by this key 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	CXA: 50 dB
	EXA: 60 dB
	MXA and PXA: 70 dB
	In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the **(Mech) Atten** key (or POW:ATT SCPI) as the "main" attenuation; and the attenuation that is set by the SCPI command POW:EATT as the "soft" attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the **Elec Atten** key description for more on "soft" attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:

Enable Elec Atten

Enables the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as in the single attenuator configuration there is no "electronic attenuator" there is only a single integrated attenuator (which has both a mechanical and electronic stage).

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See "Using the Electronic Attenuator: Pros and Cons" on page 327 for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the "soft" attenuation feature replaces the dual attenuator configuration's electronic attenuator. All the same couplings and limitations apply. See **"Attenuator Configurations and Auto/Man" on page 325**

See "More Information" on page 327

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	[:SENSe]:POWer[:RF]:EATTenuation:STATe OFF|ON|0|1 [:SENSe]:POWer[:RF]:EATTenuation:STATe?
Example	POW:EATT:STAT ON
Dependencies	This key only appears in the dual attenuator configuration. However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in "Attenuator Configurations and Auto/Man" on page 325 The electronic attenuator (and the "soft" attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the **Enable Elec Atten** key will be OFF and grayed out. If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the "soft" attenuation function provided in single attenuator configurations) 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, an error indicating that the electronic attenuator is unavailable will be sent. If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.
Couplings	Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table.
Preset	OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

More Information

When the Electronic 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 Electronic Attenuation is enabled:

- In the dual attenuator configuration, 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

- In the dual attenuator configuration, the Electronic 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 in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.

- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.

- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled:

- In the dual attenuator configuration, the Elec Atten key is grayed out (it never displays in the single attenuator configuration)

- The Auto/Man state of (Mech) Atten is restored

- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The "finer steps" advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its "Auto" setting,

making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single **Atten** key.

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	[:SENSe]:POWer[:RF]:EATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:EATTenuation?
Notes	Electronic Attenuation's spec is defined only when Mechanical Attenuation is 6 dB.
Dependencies	This key only appears in the dual attenuator configuration. However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in **"Attenuator Configurations and Auto/Man" on page 325**. The "soft" attenuation is treated as an addition to the "main" attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When **Enable Elec Atten** is off, the **Elec Atten** key is grayed out.
Preset	0 dB
State Saved	Saved in instrument state
Min	0 dB
Max	Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" 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.

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	[:SENSe]:POWer[:RF]:RANGe:OPTimize IMMediate
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "Adjust Atten for Min Clip" on page 328 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set **Elec+Mech Atten**, in which case both attenuators participate in the autoranging, or **Elec Atten Only**, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	[:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation OFF|ELECtrical|COMBined [:SENSe]:POWer[:RF]:RANGe:OPTimize:ATTenuation?
Notes	The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query.
Preset	OFF for Swept SA measurement; ON for all other measurements that support **Pre-Adjust for Min Clip**
State Saved	Saved in instrument state
Range	Dual attenuator models: Off | Elec Atten Only | Mech + Elec Atten Single attenuator models: Off | On
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Remote Command	[:SENSe]:POWer[:RF]:RANGe:AUTO ON|OFF|1|0 [:SENSe]:POWer[:RF]:RANGe:AUTO?

Notes	ON aliases to "Elec Atten Only"
	OFF aliases to "Off"
	The query returns true if not "Off"
Initial S/W Revision	Prior to A.02.00

(Mech) Atten Step

This controls thestep size used when making adjustments to the input attenuation.

This key is labeled **Mech Atten Step** in dual attenuator models and **Atten Step** in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	`[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement] 10 dB | 2 dB`
	`[:SENSe]:POWer[:RF]:ATTenuation:STEP[:INCRement]?`
Example	POW:ATT:STEP 2
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.
Dependencies	Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error.
Couplings	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
Preset	PXA and MXA: 2 dB
	EXA and CXA: 10 dB (2 dB with option FSA)
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

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.

Key Path	**AMPTD Y Scale, Attenuation**
Remote Command	`[:SENSe]:POWer[:RF]:MIXer:RANGe[:UPPer] <real>`
	`[:SENSe]:POWer[:RF]:MIXer:RANGe[:UPPer]?`
Example	POW:MIX:RANG –15 dBm

Preset	–10 dBm
State Saved	Saved in instrument state
Min	–50 dBm
Max	–10 dBm
Initial S/W Revision	Prior to A.02.00
Default Unit	Depends on the current selected Y axis unit, see Swept SA discussion of Y Axis Unit

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 of millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

Gain Setting	Volts RMS	Volts Peak	Volts Peak - Peak	dBm (50W)	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

Key Path	**AMPTD Y Scale**
Notes	Visible only when the selected input is I/Q.
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.
Initial S/W Revision	Prior to A.02.00

Range Auto/Man

The Auto setting for Range causes 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 the top of the 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 Auto/Man setting for Range.When you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto mode.

Key Path	**AMPTD Y Scale, Range**
Scope	Meas Global
Remote Command	`[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF|ON|0|1`
	`[:SENSe]:VOLTage:IQ:RANGe:AUTO?`
Example	Put the I Range and Q Range in manual.
	VOLT:IQ:RANG:AUTO OFF
Dependencies	If Auto is not supported, sending the SCPI command will generate an error.
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.
Preset	ON
State Saved	Saved in instrument state
Range	Auto	Man
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:POWer:IQ:RANGe:AUTO OFF|ON|0|1`
	`[:SENSe]:POWer:IQ:RANGe:AUTO?`
Example	Put the I Range and Q Range in manual.
	POW:IQ:RANG:AUTO OFF
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.
Preset	ON
Range	Auto	Man
Initial 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 the Input Path is I+jQ. See .

Key Path	**AMPTD Y Scale, Range**
Remote Command	[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer] <voltage> [:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer]?
Example	Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V
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.
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.
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
Initial S/W Revision	Prior to A.02.00

Remote Command	[:SENSe]:POWer:IQ[:I]:RANGe[:UPPer] <ampl> [:SENSe]:POWer:IQ[:I]:RANGe[:UPPer]?
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
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
Preset	10.0 dBm
Range	–20 dBm to 10 dBm
Min	–20 dBm
Max	10 dBm
Initial S/W Revision	Prior to A.02.00

Q Range

Accesses the Q Range menu.

Key Path	**AMPTD Y Scale, Range**
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.
Initial S/W Revision	Prior to A.02.00

Q Same as I

Many, but not all, usages require the I and Q channels to 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.

Key Path	**AMPTD Y Scale, Range, Q Range**
Remote Command	`[:SENSe]:VOLTage|POWer:IQ:MIRRored OFF|ON|0|1`
	`[:SENSe]:VOLTage|POWer:IQ:MIRRored?`
Example	Turn off the mirroring of I Range to Q Range.
	VOLT:IQ:MIRR OFF
	POW:IQ:MIRR OFF
Couplings	When On, the I Range value is mirrored (copied) to the Q Range.
Preset	On
State Saved	Saved in instrument state.
Range	On | Off
Readback Text	"Q Same as I" when On, otherwise none.
Initial 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. The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

Key Path	**AMPTD Y Scale, Range**
Remote Command	`[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer] <voltage>`
	`[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer]?`
Example	Set the Q Range to 0.5 V Peak
	VOLT:IQ:Q:RANG 0.5 V

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.
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.
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
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:POWer:IQ:Q:RANGe[:UPPer] <ampl>`
	`[:SENSe]:POWer:IQ:Q:RANGe[:UPPer]?`
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
Notes	The POWer form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command.
	The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples:
	50Ω: 10, 4, –2, –8
	75Ω: 8.2, 2.2, –3.8, –9.8
	600Ω: –0.8, –6.8, –12.8, –18.9
Preset	10.0 dBm
Range	–20 dBm to 10 dBm
Min	–20 dBm
Max	10 dBm
Initial 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	**AMPTD Y Scale, I Range	Q Range**
Initial S/W Revision	Prior to A.02.00

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

Key Path	**AMPTD Y Scale, I Range	Q Range**
Initial S/W Revision	Prior to A.02.00

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

Key Path	**AMPTD Y Scale, I Range	Q Range**
Initial S/W Revision	Prior to A.02.00

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

Key Path	**AMPTD Y Scale, I Range	Q Range**
Initial S/W Revision	Prior to A.02.00

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.

Key Path	**AMPTD Y Scale**
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	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 instrument state

Min	0.10 dB
Max	20 dB
Initial 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.

Key Path	**AMPTD Y Scale**
Remote Command	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing LINear|LOGarithmic`
	`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:SPACing?`
Example	DISP:WIND:TRAC:Y:SPAC LOG
	DISP:WIND:TRAC:Y:SPAC?
Dependencies	If Normalize is on, Scale Type forced to Log and is grayed out.
Couplings	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 instrument state
Initial 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, and 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)**.

A number of considerations should be observed to ensure proper operation. See "Proper Preselector Operation" on page 338.

Key Path	**AMPTD Y Scale**
Remote Command	[:SENSe]:POWer[:RF]:PCENter
Example	POW:PCEN
Notes	Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command.
Dependencies	• Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 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 these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Couplings	The active marker position determines where the centering will be attempted. If the analyzer s in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.
Status Bits/OPC dependencies	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. The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Proper Preselector Operation

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

In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

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" on page 337 is available.

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.

Key Path	**AMPTD Y Scale**
Scope	Meas Global
Remote Command	[:SENSe]:POWer[:RF]:PADJust <freq> [:SENSe]:POWer[:RF]:PADJust?
Example	POW:PADJ 100KHz POW:PADJ?
Notes	The value on the key reads out to 0.1 MHz resolution.
Dependencies	• Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View.
Preset	0 MHz
State Saved	The **Presel Adjust** value set by **Presel Center**, or by manually adjusting **Presel Adjust**, is not saved in Instrument State, and does not survive a Preset or power cycle.
Min	–500 MHz
Max	500 MHz
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust (These were undocumented commands for PSA which X-Series will accept)

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00
Default Unit	Hz

Remote Command	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVe|MMWave|EXTernal
	[:SENSe]:POWer[:RF]:PADJust:PRESelector?
Notes	[:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVe|MMWave|EXTernal
	where: MWAV = 3–26 GHz
	MMWave = 26–50 GHz
	EXTernal = External
	Preselector Selection - PSA had multiple preselectors, and you could select which preselector to center. Since the X-Series will have only one preselector, the preselector selection softkey will no longer be available. However, in order to provide backward compatibility, we will support the remote command.
	The command form is a NOP
	The query will return MWAVe
Initial 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.
	All four of the EMI units (dBμA/m, dBμV/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.
	If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

Key Path	**AMPTD Y Scale**

Mode	SA
Scope	Meas Global

Remote Command	`:UNIT:POWer`
	`DBM｜DBMV｜DBMA｜V｜W｜A｜DBUV｜DBUA｜DBUVM｜DBUAM｜DBPT｜DBG`
	
	`:UNIT:POWer?`

Example	UNIT:POW dBmV UNIT:POW?
Notes	The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dBµV, dBµA, dBµV/m, dBµA/m, dBpT, and dBG. The set if units that is linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out.

Notes	The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results:
	
	Example 1, set the following:
	
	Scale Type (Log)
	
	  Y Axis Unit, dBm
	
	  Scale/Div, 1 dB
	
	  Ref Level, 10 dBm
	
	This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5.
	
	Example 2, set the following:
	
	  Scale Type (Lin)
	
	  Y Axis Unit, Volts
	
	  Ref Level, 100 mV (10 mV/div)
	
	This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50.

Dependencies	If an amplitude correction with an Antenna Unit other than **None** 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. If an amplitude correction with an Antenna Unit other than **None** is applied and enabled, and you then turn off that correction or set **Apply Corrections** to **No**, the Y Axis Unit that existed before the Antenna Unit was applied is restored.
Couplings	The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types

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 instrument state
Readback line	1-of-N selection
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.02.00, A.04.00

dBm

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

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBM
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	dBm
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBMV
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	dBmV
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBMA
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	dBmA
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW W
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	W
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW V
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	V
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW A
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	A
Initial 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 dBμV.

Key Path	**AMPTD Y Scale, Y Axis Unit**

Example	UNIT:POW DBUV
Dependencies	Grayed out if an Amplitude Correction with an Antenna Unit is ON.
Readback	dBμV
Initial 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 dBμA.

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

dBmV/m

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

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBUVM
Dependencies	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Readback	dBμV/m
Initial S/W Revision	A.02.00

dBmA/m

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

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBUAM
Dependencies	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Readback	dBμA/m

Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBPT
Dependencies	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Readback	dBpT
Initial 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.

Key Path	**AMPTD Y Scale, Y Axis Unit**
Example	UNIT:POW DBG
Dependencies	Grayed out if no Amplitude Correction with an Antenna Unit is on.
Readback	dBG
Initial 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

Key Path	**AMPTD Y Scale**
Mode	SA
Scope	Meas Global
Remote Command	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_ampl> :DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?

Example	DISP:WIND:TRAC:Y:RLEV:OFFS 12.7
	Sets the Ref Level Offset to 12.7 dB. The only valid suffix is dB. If no suffix is sent, dB will be assumed.
Preset	0 dBm
State Saved	Saved in instrument 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.
Max	327.6 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

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 so forth, 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.

µW Path Control

The **µW Path Control** functions include the **µW Preselector Bypass** (Option MPB) and **Low Noise Path** (Option LNP) controls in the High Band path circuits.

When the µW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate

based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wearout in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around 30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

Key Path	**AMPTD Y Scale**
Mode	SA, BASIC, PNOISE, VSA
Scope	Meas Global

Remote Command	`[:SENSe]:POWer[:RF]:MW:PATH STD|LNPath|MPBypass|FULL`
	
	`[:SENSe]:POWer[:RF]:MW:PATH?`

Example	:POW:MW:PATH LNP Enables the Low Noise path
Notes	If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of **μW Path Control** The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean "when the low noise path is enabled" but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is **Low Noise Path Enable** . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished.
Dependencies	Blanked in BBIQ
Preset	All modes other than IQ Analyzer mode: STD IQ Analyzer mode: MPB option present and licensed: MPB MPB option not present and licensed: STD

State Saved	Save in instrument state
Readback	Value selected in the submenu
Initial S/W Revision	A.04.00

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

Key Path	**AMPTD Y Scale, µW Path Control**
Example	:POW:MW:PATH STD
Readback Text	Standard Path
Initial S/W Revision	A.04.00

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:

- the start frequency is above 3.5 GHz and

- the stop frequency is above 3.6 GHz.

- the internal preamp is not installed or (if installed) is set to **Off** or **Low Band**

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the **Low Noise Path Enable** is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the **Low Noise Path Enable** is selected in the user interface. The only time the Low Noise Path is used is when **Low Noise Path Enable** is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See

Key Path	**AMPTD Y Scale, µW Path Control**
Measurement	Swept SA
Example	:POW:MW:PATH LNP

Notes	For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.
	In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.
	This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.
Dependencies	Key is blanked if current mode does not support it.
	Key is grayed out if mode supports it but current measurement does not support it.
	Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error –241, "Hardware missing; Option not installed" is generated.
Readback Text	Low Noise Path Enable
Initial S/W Revision	A.04.00

More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life; so if the **Low Noise Path** is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the **Standard Path**, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression.   The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around 30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size

is 2 dB.
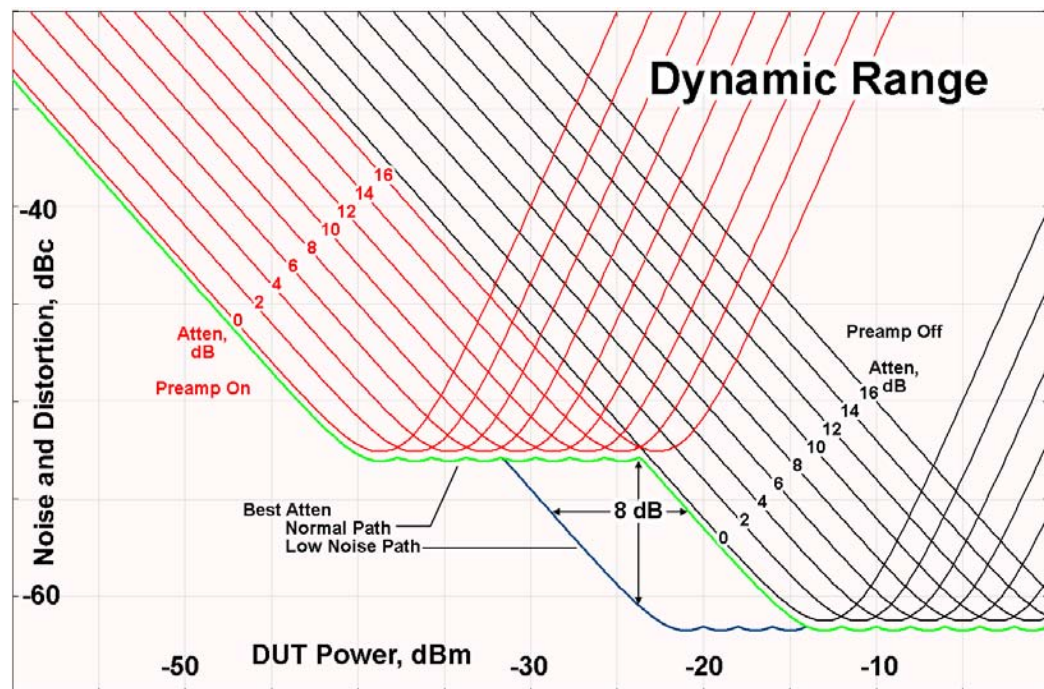
There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

µW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave presel is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Key Path	**AMPTD Y Scale, µW Path Control**
Example	:POW:MW:PATH MPB

Dependencies	Key is blanked if current mode does not support it.
	Key is grayed out if mode supports it but current measurement does not support it.
	Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error –241, "Hardware missing; Option not installed" is generated.
Readback Text	µW Preselector Bypass
Initial S/W Revision	A.04.00

Example	:POW:MW:PRES OFF
	Bypasses the microwave preselector
Preset	ON
Backwards Compatibility SCPI	[:SENSe]:POWer[:RF]:MW:PRESelector[:STATe] ON|OFF|0|1
	[:SENSe]:POWer[:RF]:MW:PRESelector[:STATe]?
Backwards Compatibility Notes	The ON parameter sets the STD path. The OFF parameter sets Path MPB.

Internal Preamp

Accesses a menu of 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.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

Key Path	**AMPTD Y Scale**
Scope	Meas Global
Remote Command	[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1
	[:SENSe]:POWer[:RF]:GAIN[:STATe]?
Dependencies	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/soft attenuator is enabled.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Key Path	**AMPTD Y Scale, Internal Preamp**

Scope	Meas Global
Remote Command	[:SENSe]:POWer[:RF]:GAIN:BAND LOW|FULL
	[:SENSe]:POWer[:RF]:GAIN:BAND?
Dependencies	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 instrument state
Initial S/W Revision	Prior to A.02.00

Off

Turns the internal preamp off

Key Path	**AMPTD Y Scale, Internal Preamp**
Example	:POW:GAIN OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the **Low Band** key label.

Key Path	**AMPTD Y Scale, Internal Preamp**
Example	:POW:GAIN ON
	:POW:GAIN:BAND LOW
Readback	Low Band
Initial 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 or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the **Full Range**

key label. If the high band option is not installed the Full Range key does not appear.

Key Path	**AMPTD Y Scale, Internal Preamp**
Example	:POW:GAIN ON
	:POW:GAIN:BAND FULL
Readback	Full Range
Initial S/W Revision	Prior to A.02.00

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 keyactions 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.

See

Key Path	**Front-panel key**
Remote Command	`:COUPle ALL|NONE`
Example	`:COUP ALL`
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.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between "Auto" (where the parameter is automatically coupled to the other parameters it is dependent upon) and "Man" (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either "Auto" or "Man" underlined as illustrated below.

Sweep Time
66.24 ms
Auto   Man

vsd07

Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in "Auto" in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

X Axis Scale
Frequency▶
Auto   Man

X Axis Scale

Auto

Frequency

Period

Time

Inverse Time
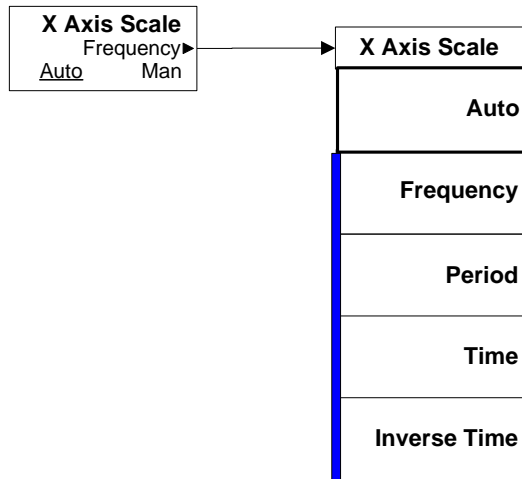
vsd08

Cont (Continuous Measurement/Sweep)

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.

Key Path	**Front-panel key**
Remote Command	:INITiate:CONTinuous OFF|ON|0|1
	:INITiate:CONTinuous?
Example	:INIT:CONT 0 puts analyzer in Single measurement operation.
	:INIT:CONT 1 puts analyzer in Continuous measurement operation
Preset	ON
	(Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF)
State Saved	Saved in instrument state
Initial 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/Hiold Num** (in the **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/Hold Num** 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/Hold Num 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 **Cont** 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 is 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 the idle state.

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 softkeys 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 the **Trigger** and **AMPTD Y Scale** keys. In addition, some of the digital I/O bus configurations can be found under the **System** key.

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.

The Input Port selection is the first menu under the **Input/Output** key:

Remote Command	`[:SENSe]:FEED`
	`RF|AIQ|IQ|IONLy|QONLy|INDependent|AREFerence`
	
	`[:SENSe]:FEED?`

Preset	This setting is unaffected by a Preset or power cycle. It survives a 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 instrument state
Backwards Compatibility SCPI	The calibrator was one of the inputs in legacy analyzers but is outside the input selection in the X-Series. The legacy parameter [:SENSe]:FEED AREFerence is aliased to the new command [:SENSe]:FEED:AREF REF50 for backwards compatibility. This causes the input to be switched to the 50 MHz calibrator, but after sending this, the query [:SENSe]:FEED? will NOT return "AREF" but instead the currently selected input.
Initial 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 a Preset and a Power cycle.

A very few of the Input/Output settings do respond to a Mode Preset; for example, if the Calibrator is on it turns off on a Preset, and if DC coupling is in effect it switches to AC on a Preset. These exceptions are made in the interest of reliability and usability, which overrides the need for absolute consistency. Exceptions are noted in the SCPI table for the excepted functions.

RF Input

Selects the front-panel RF input port to be the analyzer signal input. If RF is already selected, pressing this key accesses the RF input setup functions.

Key Path	**Input/Output**
Example	[:SENSe]:FEED RF
Readback	The RF input port, RF coupling, and current input impedance settings appear on this key as:
	"XX, YY, ZZ" where
	XX is RF, RF2, RFIO1, RFIO2, depending on what input is selected (only appears on analyzers with multiple RF inputs)
	YY is AC or DC
	ZZ is 50 or 75
Initial 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, dBµV, dBµA, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohms. Setting the computational input impedance to 75 ohms is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with a 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.

Key Path	**Input/Output, RF Input**
Remote Command	[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50|75
	[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?
Example	CORR:IMP 75 sets the input impedance correction to 75 ohms.
	CORR:IMP?

Preset	This is unaffected by a 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 instrument state
Readback	50 Ω or 75 Ω. Current setting reads back to the RF key.
Initial 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 below the corner frequency of the DC block, but below a certain frequency the amplitude accuracy is not specified. The frequency below which specifications do not apply is:

X-Series Model	Lowest Freq for meeting specs when AC coupled	Lowest Freq for meeting specs when DC coupled
N9000A	100 kHz	n/a
N9010A	10 MHz	9 kHz
N9020A	10 MHz	3 Hz
N9030A	10 MHz	3 Hz

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).

Key Path	**Input/Output, RF Input**

Remote Command	`:INPut:COUPling AC|DC`
	
	`:INPut:COUPling?`

Example	INP:COUP DC
Dependencies	This key does not appear in models that are always AC coupled. When the SCPI command to set DC coupling is sent to these models, it results in the error "Illegal parameter value;This model is always AC coupled" In these models, the SCPI query INP:COUP? always returns AC.
Preset	AC
State Saved	Saved in instrument state.

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

RF Input Port

Specifies the RF input port used. The RF Input Port key only appears on units with multiple inputs, and lets you switch between the two inputs.

Switching from the RF input port to one of the RFIO ports, on units which have them, changes the receiver performance of the instrument.

Key Path	**Input/Output, RF Input**
Remote Command	[:SENSe]:FEED:RF:PORT[:INPut] RFIN|RFIN2|RFIO1|RFIO2 [:SENSe]:FEED:RF:PORT[:INPut]?
Example	:FEED:RF:PORT RFIN
Dependencies	This key only appears in models that support multiple inputs. If the SCPI command is sent with unsupported parameters in any other model, an error is generated, –221.1900, "Settings conflict;option not installed"
Preset	This is unaffected by Mode Preset but is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in State
Initial S/W Revision	A.05.01
Read Back	The current RF Input Port selected is read back to this key

I/Q

This feature is not available unless the "Baseband I/Q (Option BBA)" on page 363 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.

Key Path	**Input/Output**
Mode	BASIC, CDMA2K, EDGEGSM, TDSCMDA, VSA89601, WIMAXOFDMA
Example	FEED AIQ
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 "No Result; Meas invalid with I/Q inputs " error condition message appears. This is error 135

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 X-Series.
	[: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 that [:SENSe]:FEED? will not be backward compatible. The query [:SENSe]:FEED? will always returns AIQ whatever the type of legacy parameters IQ|IONLy|QONLy has been used.
Initial S/W Revision	Prior to A.02.00

Baseband I/Q (Option BBA)

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 MΩ input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 MΩ 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 by 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 the user 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, the user is 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 the user (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 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.

I/Q voltage to power conversion processing is dependent on the I/Q Path selected.

- With I+jQ input we know that the input signal may not be symmetrical about 0 Hz, because it has a complex component. Therefore, above 0 Hz only the positive frequency information is displayed, and below 0 Hz only the negative frequency information is displayed.

- With all other Input Path selections, the input signal has no complex component and therefore is always symmetrical about 0 Hz. In this case, by convention, the power conversion shows the combined voltage for both the positive and negative frequencies. The information displayed below 0 Hz is the mirror of the information displayed above 0 Hz.   This results in a power reading 6.02 dB higher (for both) than would be seen with only the positive frequency voltage. Note also that, in this case the real signal may have complex modulation embedded in it, but that must be recovered by further signal processing.

Key Path	**Input/Output, I/Q**
Remote Command	[:SENSe]:FEED:IQ:TYPE IQ|IONLy|QONLy|INDependent [:SENSe]:FEED:IQ:TYPE?
Example	Set the input to be both the I and Q channels, combined as I + j * Q. FEED:IQ:TYPE IQ
Notes	The Independent I and Q selection is only available in GPVSA
Preset	IQ
State Saved	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	I+jQ | I Only | Q Only | Independent I and Q
Readback Text	I+jQ | I Only | Q Only | Ind I/Q
Initial S/W Revision	Prior to A.02.00

Remote Command	:INPut[1]:IQ:TYPE IQ|I|Q :INPut[1]:IQ:TYPE?
Preset	IQ

Initial 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.

Key Path	**Input/Output, I/Q, I/Q Path**
Example	Set the input to be both the I and Q channels, combined as I + j * Q.
	FEED:IQ:TYPE IQ
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Path**
Example	Set the input to be only the I channel.
	FEED:IQ:TYPE IONL
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Path**
Example	Set the input to be only the Q channel.
	FEED:IQ:TYPE QONL
Initial S/W Revision	Prior to A.02.00

Independent I and Q

Sets the signal input to be both the I and Q channels, but as independent inputs. It is equivalent to treating I as channel 1 and Q as channel 2 in an oscilloscope. Each channel's data is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

This selection is only available in VXA.

Key Path	**Input/Output, I/Q, I/Q Path**
Example	Turn on both I and Q channels and treat I as channel 1 and Q as channel 2.
	FEED:IQ:TYPE IND
Notes	The Independent I and Q selection is only available in GPVSA
Readback Text	Ind I/Q
Initial S/W Revision	Prior to A.02.00

I Setup

Access the channel setup parameters for the I channel.

Key Path	**Input/Output, I/Q**
Initial 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 called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

Key Path	**Input/Output, I/Q, I Setup**
Remote Command	:INPut:IQ[:I]:DIFFerential OFF|ON|0|1
	:INPut:IQ[:I]:DIFFerential?
Example	Put the I channel in Differential Input mode
	INP:IQ:DIFF ON
Notes	When I 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 a Settings Alert error condition, error 159 will be set.
	When I Differential Input = On, and IQ Path is I+jQ, the Q Differential input must also be On. Similarly, when I Differential Input = Off, and IQ Path is I+jQ, the Q Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential.
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.
Preset	Off

State Saved	Yes
	This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	Off | On
Initial S/W Revision	Prior to A.02.00

Remote Command	`:INPut[1]:IQ:BALanced[:STATe] OFF|ON|0|1`
	`:INPut[1]:IQ:BALanced[:STATe]?`
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.
Preset	OFF
Initial 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.

Key Path	**Input/Output, I/Q, I Setup**
Remote Command	`:INPut[1]:IQ[:I]:IMPedance LOW|HIGH`
	`:INPut[1]:IQ[:I]:IMPedance?`
Example	Set the I channel input impedance to 1 MΩ
	INP:IQ:IMP HIGH
Notes	LOW = 50 Ω, HIGH = 1 MΩ
	When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z.
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.
Preset	LOW
State Saved	Yes
	This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

Range	50 Ω	1 MΩ
Initial S/W Revision	Prior to A.02.00

I Skew

Sets the skew factor for the I channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling.

Key Path	**Input/Output, I/Q, I Setup**
Remote Command	`[:SENSe]:CORRection:IQ[:I]:SKEW <seconds>`
	`[:SENSe]:CORRection:IQ[:I]:SKEW?`
Example	Delay the data for the I channel by 10 ns.
	CORR:IQ:SKEW 10 ns
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
Initial S/W Revision	Prior to A.02.00

I Probe

Access the probe setup parameters for the I channel. See "I/Q Probe Setup" on page 373.

Key Path	**Input/Output, I/Q, I Setup**
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.
Initial S/W Revision	Prior to A.02.00

Combined Differential/Input Z (Remote Command Only)

This is Remote Command 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?`

Example	:INPut:IMPedance:IQ U50
	This is equivalent to the following two SCPI commands:
	:INP:IQ:DIFF OFF
	:INP:IQ:IMP 50
Notes	The enum values translate as follows:
	U50: Differential Input = Off, Input Z = 50Ω
	B50: Differential Input = On, Input Z = 50Ω
	U1M: Differential Input = Off, Input Z = 1 MΩ
	B1M: Differential Input = On, Input Z = 1 MΩ
	This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) parameter with the Differential Input (Off = "Unbalanced", On = "Balanced") parameter into a single enumeration.
	This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On.
	Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has "IQ" before "IMP" while this command has that order reversed.
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.
Preset	U50
Initial S/W Revision	Prior to A.02.00

Q Setup

Access the channel setup parameters for the Q channel.

Key Path	**Input/Output, I/Q**
Readback Text	When Q Same as I is On the readback is "Q Same as I".
Initial 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 your 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.

Key Path	**Input/Output, I/Q, Q Setup**
Remote Command	:INPut:IQ:MIRRored OFF|ON|0|1 :INPut:IQ:MIRRored?
Example	Turn off the mirroring of parameters from I to Q. INP:IQ:MIRR OFF
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)
Preset	This is unaffected by a 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.
Initial 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.

Key Path	**Input/Output, I/Q, Q Setup**
Remote Command	:INPut:IQ:Q:DIFFerential OFF|ON|0|1 :INPut:IQ:Q:DIFFerential?
Example	Put the Q channel in Differential Input mode INP:IQ:Q:DIFF ON
Notes	When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When Q Differential Input = On, and IQ Path is I+jQ, the I Differential input must also be On. Similarly, when Q Differential Input = Off, and IQ Path is I+jQ, the I Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential.

Couplings	Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use).
	When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On.
Preset	Off
State Saved	On
	This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	Off | On
Initial 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.

Key Path	**Input/Output, I/Q, Q Setup**
Remote Command	:INPut[1]:IQ:Q:IMPedance LOW|HIGH
	:INPut[1]:IQ:Q:IMPedance?
Example	Set the Q channel input impedance to 1 MΩ
	INP:IQ:Q:IMP HIGH
Notes	LOW = 50 Ω, HIGH = 1 MΩ
	When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z.
Couplings	Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe.
	When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On.
Preset	LOW
State Saved	On
	This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range	50 Ω | 1 MΩ
Initial S/W Revision	Prior to A.02.00

Q Skew

Sets the skew factor for the Q channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling and probes.

Key Path	**Input/Output, I/Q, Q Setup**
Remote Command	[: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
Preset	0
State Saved	Yes
	This is unaffected by a 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
Initial S/W Revision	Prior to A.02.00

Q Probe

Accesses the probe setup parameters for the Q channel. See .

Key Path	**Input/Output, I/Q, Q Setup**
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.
Initial S/W Revision	Prior to A.02.00

I/Q Probe Setup

The set of I/Q probe setup parameters will change based on the type of probe that is sensed. All probe types have the Attenuation parameter, and all probe types can be calibrated. The remaining parameters are only available for some probe types and will not be shown when not available. The probe type is determined by and reported for only for the I and Q ports, never the I-bar or Q-bar ports. The menu title will be "<ch>: <probe id>", where "<ch>" is either "I" or "Q" and "<probe id>" is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be "I: 1130A".

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe 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 a power cycle) and is not affected by a 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 Section).

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 can modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe**
Remote Command	[:SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio <real> [:SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio?
Example	Set the attenuation for the current I probe to 100.00:1. CORR:IQ:I:ATT:RAT 100
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. When the IQ Path is I+jQ, the Q probe attenuation setting must match the I Probe attenuation setting within 1 dB. If this is not the case, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Attenuation.
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 a power cycle and is not affected by a Preset or Restore.
Range	0.001 to 10000
Initial S/W Revision	Prior to A.02.00

Remote Command	[:SENSe]:CORRection:IQ:I|Q:ATTenuation <rel_ampl> [:SENSe]:CORRection:IQ:I|Q:ATTenuation?
Example	Set the attenuation for the current I probe type to 100.00:1. CORR:IQ:I:ATT 20 dB
Range	–60 dB to +80 dB
Initial 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 adjusted for the DC offset before entering the analyzer's port. This allows for removal of a DC offset before hitting the analyzer's input port voltage limits. For example, a signal that varies 1 V peak-to-peak with a DC offset equal to the analyzer's max input voltage would exceed the input limits of the analyzer for half its cycle. Removing the DC offset allows the analyzer to correctly process the entire signal.

Key Path	**Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe**
Remote Command	:INPut:OFFSet:I|Q <voltage>
	:INPut:OFFSet:I|Q?
Example	Remove a DC offset of –0.5 V from the I channel input.
	INP:OFFS:I –0.5
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.
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
Initial 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.

Key Path	**Input/Output, I/Q, I Setup | Q Setup, I Probe | Q Probe**
Remote Command	:INPut:COUPling:I|Q DC|LFR1|LFR2
	:INPut:COUPling:I|Q?
Example	Set the probe to low frequency rejection below 1.7 Hz.
	INP:COUP:I LFR1
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.
Preset	DC
State Saved	Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore.

Range	DC	AC 1.7 Hz LFR1	AC 0.14 Hz LFR2
Readback Text	DC	LFR1	LFR2
Initial S/W Revision	Prior to A.02.00

DC

Turns off low frequency rejection, allowing signals down to DC.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe, Coupling**
Example	Turn off low frequency rejection on the I channel INP:COUP:I DC
Initial S/W Revision	Prior to A.02.00

LFR1

Turns on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe, Coupling**
Example	Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1
Initial S/W Revision	Prior to A.02.00

LFR2

Turns on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe, Coupling**
Example	Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2
Initial S/W Revision	Prior to A.02.00

Calibrate

Invokes 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 418.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe, Coupling**

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
Initial 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.

Key Path	**Input/Output, I/Q, I Setup	Q Setup, I Probe	Q Probe**
Remote Command	`: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
Initial 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).

Key Path	**Input/Output, I/Q**
Remote Command	`:INPut:IMPedance:REFerence <integer>`
	`:INPut:IMPedance:REFerence?`
Example	Set the I/Q reference impedance to 50 Ω
	INP:IMP:REF 50
Preset	50 Ω
State Saved	Yes
	This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

Range	1 Ω to 1 MΩ
Initial S/W Revision	Prior to A.02.00

I/Q Cable Calibrate…

Invokes the guided cable calibration. The guided cable calibration steps the user through a calibration of all ports (I, I-bar, Q, and Q-bar) using just a cable (no probe attached). See for more information.

Key Path	**Input/Output, I/Q**
Initial S/W Revision	Prior to A.02.00

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator "off" (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 (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 or I/Q).

Key Path	**Input/Output**

Remote Command	`[:SENSe]:FEED:AREFerence REF50|REF4800|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 OFF turns the calibrator "off" (switches back to the selected input – RF or I/Q)
Dependencies	Selecting an input (RF 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 frequency range options. If the 4.8 GHz reference is not present, the **4.8 GHz** softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error.
Preset	OFF
State Saved	Saved in instruemnt state
Readback	Off, 50 MHz, 4.8 GHz

Backwards Compatibility SCPI	For ESA backwards compatibility, the legacy SCPI command CALibration:SOURce:STATe <boolean> (ESA's Amptd Ref Out SCPI) will still be supported and mapped as follows:
	When CALibration:SOURce:STATe ON is received [SENSe]:FEED:AREF REF50 will execute
	When CALibration:SOURce:STATe OFF is received [SENSe]:FEED:AREF OFF will execute
	When CALibration:SOURce:STATe? is received, 1 will be returned if any of the references is selected and 0 if the Calibrator is "Off"
Initial 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**
Example	:FEED:AREF REF50
Readback	50 MHz
Initial S/W Revision	Prior to A.02.00

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

Key Path	**Input/Output, RF Calibrator**
Example	:FEED:AREF REF4800
Dependencies	The 4.8 GHz internal reference is only available in some models and frequency range options. If the 4.8 GHz reference is not present, the **4.8 GHz** softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error.
Readback	4.8 GHz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Off

Switches the input back to the selected input (RF or I/Q)

Key Path	**Input/Output, RF Calibrator**
Example	:FEED:AREF OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

External Gain

Compensates for gain or 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 or 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.

NOTE	Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep, but the data will not change until the trace data updates, because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.

In the Spectrum Analyzer mode, a Preamp is the common external device providing gain or loss. In a measurement application mode like GSM or W-CDMA, the gain or 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.

Key Path	**Input/Output**
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.
Readback	1-of-N selection | [variable]
Initial 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.)

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 or loss.

Key Path	**Input/Output, External Gain**
Remote Command	[:SENSe]:CORRection:SA[:RF]:GAIN <rel_ampl>
	[: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)
Notes	Does not auto return.
Dependencies	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 Modes that do not support External Gain
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 instrument state
Min	–81.90 dB
Max	81.90 dB
Readback	Preamp Gain, <Ext Gain value> dB
Backwards Compatibility SCPI	[:SENSe]:CORRection:OFFSet[:MAGNitude]
Initial S/W Revision	Prior to A.02.00

MS

Sets an external gain/attenuation value for MS (Mobile Station) tests.

Key Path	**Input/Output, External Gain**
Remote Command	[: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.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten
	This key is grayed out in modes that do not support MS.
Preset	This is unaffected by a 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	MS, <Ext Gain value> dB
Backwards Compatibility SCPI	[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl>
	[:SENSe]:CORRection:MS[:RF]:LOSS?
	Important notes regarding the alias commands:
	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. So, for example, sending the command
	a) CORR:MS:LOSS 10 dB will set the value on the softkey and the active function to –10 dB since the softkey and the active function always show the Gain.
	The query CORR:MS:LOSS? returns 10 dB
	The query CORR:MS:GAIN? returns –10 dB
	b) CORR:MS:LOSS –10 dB will set the value on the softkey and the active function to 10 dB since the softkey and the active function always show the Gain
	The query CORR:MS:LOSS? returns –10 dB
	The query CORR:MS:GAIN? returns 10 dB
Initial S/W Revision	Prior to A.02.00

BTS

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

Key Path	**Input/Output, External Gain**
Remote Command	[: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.)
Notes	Does not auto return.
Dependencies	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten
	This key is grayed out in modes that do not support BTS.
Preset	This is unaffected by a 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	BTS, <Ext Gain value> dB
Backwards Compatibility SCPI	[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>
	[:SENSe]:CORRection:BTS[:RF]:LOSS?
	Important notes regarding the alias commands:
	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. So, for example, sending the command
	a) CORR:BTS:LOSS 10 dB will set the value on the softkey and the active function to –10 dB since the softkey and the active function always show the Gain.
	The query CORR:BTS:LOSS? returns 10 dB
	The query CORR:BTS:GAIN? returns –10 dB
	b) CORR:BTS:LOSS –10 dB will set the value on the softkey and the active function to 10 dB since the softkey and the active function always show the Gain
	The query CORR:BTS:LOSS? returns –10 dB
	The query CORR:BTS:GAIN? returns 10 dB
Initial 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.

Key Path	**Input/Output, External Gain**
Remote Command	[:SENSe]:CORRection:IQ:I:GAIN <rel_ampl>
	[:SENSe]:CORRection:IQ:I:GAIN?
Example	Set the I Ext Gain to 10 dB
	CORR:IQ:I:GAIN 10
	Set the I Ext Gain to –10 dB (that is, a loss of 10 dB.)
	CORR:IQ:I:GAIN –10
Notes	Not available unless option BBA is installed
Preset	0 dB
	This is unaffected by a 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
Initial 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.

Key Path	**Input/Output, External Gain**
Remote Command	[:SENSe]:CORRection:IQ:Q:GAIN <rel_ampl>
	[:SENSe]:CORRection:IQ:Q:GAIN?
Example	Set the Q Ext Gain to 10 dB
	CORR:IQ:Q:GAIN 10
	Set the Q Ext Gain to –10 dB (that is, a loss of 10 dB.)
	CORR:IQ:Q:GAIN –10
Notes	Not available unless option BBA is installed.
Preset	0 dB
	This is unaffected by a 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
Initial S/W Revision	Prior to A.02.00

Restore Input/Output Defaults

This selection causes the group of settings and data associated with the **Input/Output** key to be a reset to their default values.   In addition, when a Source is installed, licensed and selected, Restore Input/Output defaults will initiate a Source Preset.

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).

Key Path	**Input/Output**
Example	:SYST:DEF INP presets all the Input/Output variables to their factory default values.

Notes	Refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEFault INPut: command.
Initial 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 port, for example RF, AREF, I/Q, 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) 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.

Key Path	Input/Output
Remote Command	[:SENSe]:FEED:DATA INPut|STORed|RECorded [:SENSe]:FEED:DATA?
Example	FEED:DATA REC FEED:DATA?
Notes	INPuts = Inputs STORed = Capture Buffer RECorded = Record Data Buffer
Dependencies	Not all inputs are available in all modes. Unavailable keys are grayed out.
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 instrument state
Readback	Variable
Backwards Compatibility SCPI	[:SENSe]:FEED:SOURce INPut|STORed [:SENSe]:FEED:SOURce?
Initial S/W Revision	Prior to A.02.00

Inputs

Sets the measurement to use the input selections (RF, AREF, I/Q)

Key Path	**Input/Output, Data Source**
Example	FEED:DATA INP causes the measurement to look at the input selection
Notes	Does not auto return.
Readback	Inputs
Initial 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.

Key Path	**Input/Output, Data Source**
Example	FEED:DATA STOR causes stored measurement data to be used with a different measurement that supports this.
Notes	Does not auto return. This key is grayed out when you switch to a measurement that does not support this feature.
Dependencies	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.
Readback	Stored Data
Initial 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.

Key Path	**Input/Output, Data Source**
Example	FEED:DATA REC causes the measurement to extract data from the record data buffer.
Notes	Does not auto return.
Dependencies	Grayed out in the SA measurement.
Readback	Recorded Data
Initial 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 the 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.

Key Path	**Input/Output, Data Source**
Remote Command	`[:SENSe]:FEED:DATA:STORe`
Example	FEED:DATA:STOR stores recorded data
Notes	This is command only, there is no query
Dependencies	Grayed out in the SA measurement.
Backwards Compatibility SCPI	[:SENSe]:FEED:SOURce:STORe
Initial S/W Revision	Prior to A.02.00

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:
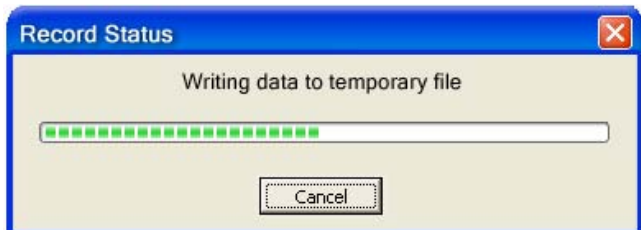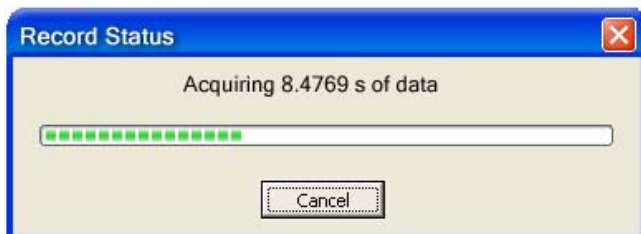
This key is also available in the Sweep/Control menu.

Key Path	**Input/Output, Data Source**

Mode	VSA
Remote Command	[:SENSe]:RECording:INITiate[:IMMediate]
Example	REC:INIT
Notes	This is command only, there is no query. See the Recall functionality to access previously saved data.
Dependencies	Grayed out in the SA measurement.
Couplings	Changes Data source to Recorded Data.
Initial S/W Revision	Prior to A.02.00

Key Path	**Input/Output, Data Source**
Remote Command	[:SENSe]:RECording:ABORt
Example	REC:ABOR
Notes	This is command only, there is no query. The command does nothing if it is sent when there is no recording in progress.
Initial 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.

Key Path	**Input/Output, Data Source**
Mode	VSA
Remote Command	[:SENSe]:RECording:LENGth <real>,SEConds|RECords|POINts [:SENSe]:RECording:LENGth:STATe MAX|MANual [:SENSe]:RECording:LENGth:STATe?
Example	REC:LENG 20,REC REC:LENG 4.1E–4,SEC REC:LENG:STAT MAX REC:LENG:STAT?
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" us used.
Preset	50 Records, Manual
State Saved	No

Min	0
Max	Depends on memory available.
Readback	<value><Seconds|Points|Records>
Initial S/W Revision	Prior to A.02.00

Mode	VSA
Remote Command	[:SENSe]:RECording:LENGth:VALue?
Example	REC:LENG:VAL?
Notes	Query Only
	Returns the first (numeric) parameter of the most recent [:SENSe]:RECording:LENGth command.
Preset	50 Records
Initial S/W Revision	Prior to A.02.00

Mode	VSA
Remote Command	[:SENSe]:RECording:LENGth:UNIT?
Example	REC:LENG:UNIT?
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.
Preset	RECords
Initial S/W Revision	Prior to A.02.00

Corrections

This key accesses the Amplitude Corrections menu.

Amplitude Corrections arrays can be entered, sent over SCPI, or loaded from a file. They allow you 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.

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	**Input/Output, Corrections**
Mode	SA, DVB-T/H, DTMB, SEQAN, TDSCDMA
Dependencies	This key will only appear if you have the proper option installed in your instrument. 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
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.
Initial 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	**Input/Output, Corrections**
Mode	SA
Notes	The selected correction is remembered even when not in the correction menu.
Preset	Set to Correction 1 by Restore Input/Output Defaults
Readback	Correction 1|Correction 2|Correction 3|Correction 4|Correction 5|Correction 6
Initial 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.

Key Path	**Input/Output, Corrections**

Remote Command	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6[:STATe]` `ON|OFF|1|0`
	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6[:STATe]?`
Example	SENS:CORR:CSET1 ON
Dependencies	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.
	This command will generate an "Option not available" error unless you have the proper option installed in your instrument.
Preset	Not affected by a Preset. Set to OFF by **Restore Input/Output Defaults**
State Saved	Saved in instrument state.
Initial S/W Revision	A.02.00

Properties

Accesses a menu that lets you set the properties of the selected correction.

Key Path	**Input/Output, Corrections**
Initial 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	**Input/Output, Corrections, Properties**
Notes	The selected correction is remembered even when not in the correction menu.
Preset	Set to Correction 1 by Restore Input/Output Defaults.
Readback	Correction 1|Correction 2|Correction 3|Correction 4|Correction 5|Correction 6
Initial 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 dBμV, 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 the user 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.

Key Path	**Input/Output, Corrections, Properties**
Mode	SA
Remote Command	[:SENSe]:CORRection:CSET[1]|2|3|4:ANTenna[:UNIT] GAUSs|PTESla|UVM|UAM|NOConversion
	[:SENSe]:CORRection:CSET[1]|2|3|4:ANTenna[:UNIT]?
Example	CORR:CSET:ANT GAUS
Dependencies	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.
Preset	Unaffected by Preset. Set to NOC by Restore Input/Output Defaults
State Saved	Saved in State
Initial S/W Revision	A.02.00

dBμV/m

Sets the antenna unit to dBμV/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBμV/m and all other Y Axis Unit selections will be grayed out.

Key Path	**Input/Output, Corrections, Properties, Antenna Unit**
Example	:CORR:CSET2:ANT UVM
Readback	"dBμV/m"
Initial S/W Revision	A.02.00

dBμA/m

Sets the antenna unit to dBμA/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dBμA/m and all other Y Axis Unit selections will be grayed out.

Key Path	**Input/Output, Corrections, Properties, Antenna Unit**
Example	:CORR:CSET2:ANT UVA

Readback	" dBμA/m"
Initial 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.

Key Path	**Input/Output, Corrections, Properties, Antenna Unit**
Example	:CORR:CSET3:ANT PTES
Readback	"dBpT"
Initial 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.

Key Path	**Input/Output, Corrections, Properties, Antenna Unit**
Example	:CORR:CSET:ANT GAUS
Readback	" dBG"
Initial S/W Revision	A.02.00

None

Selects no antenna unit for this Correction set. Thus no Y Axis unit will be forced.

Key Path	**Input/Output, Corrections, Properties, Antenna Unit**
Example	:CORR:CSET4:ANT NOC
Readback	"None"
Initial 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.

This setting is handled and stored individually per correction set.

Key Path	**Input/Output, Corrections, Properties**

Remote Command	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:X:SPACing`
	`LINear|LOGarithmic`
	
	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:X:SPACing?`

Example	CORR:CSET:X:SPAC LIN
Preset	Unaffected by a Preset. Set to Linear by Restore Input/Output Defaults.
State Saved	Saved in instrument state.
Initial S/W Revision	A.02.00

Interpolation

For each bucket processed by the application, all of the correction factors at the frequency of interest (center frequency of each bucket) are summed and added to the amplitude. All trace operations and post processing treat this post-summation value as the true signal to use.

To effect this correction, the goal, for any particular start and stop frequency, is to build a correction trace, whose number of points matches the current Sweep Points setting of the instrument, which will be used to apply corrections on a bucket by bucket basis to the data traces.

For amplitudes that lie between two user specified frequency points, we interpolate to determine the amplitude value. You may select either linear or logarithmic interpolation between the frequencies.

If we interpolate on a log scale, we assume that the line between the two points is a straight line on the log scale. For example, let's say the two points are (2,4) and (20,1). A straight line between them on a log scale looks like:
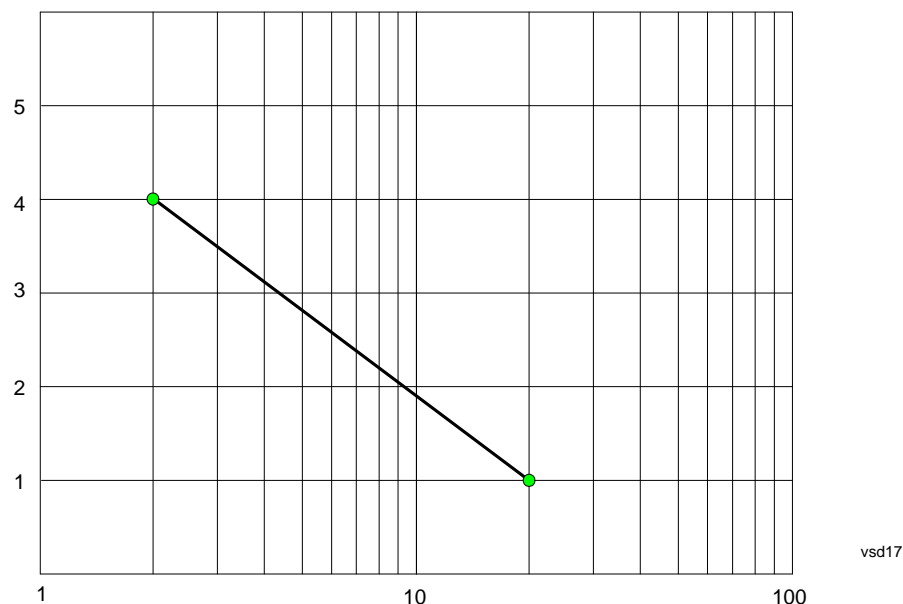
On a linear scale (like that of the spectrum analyzer), this translates to:
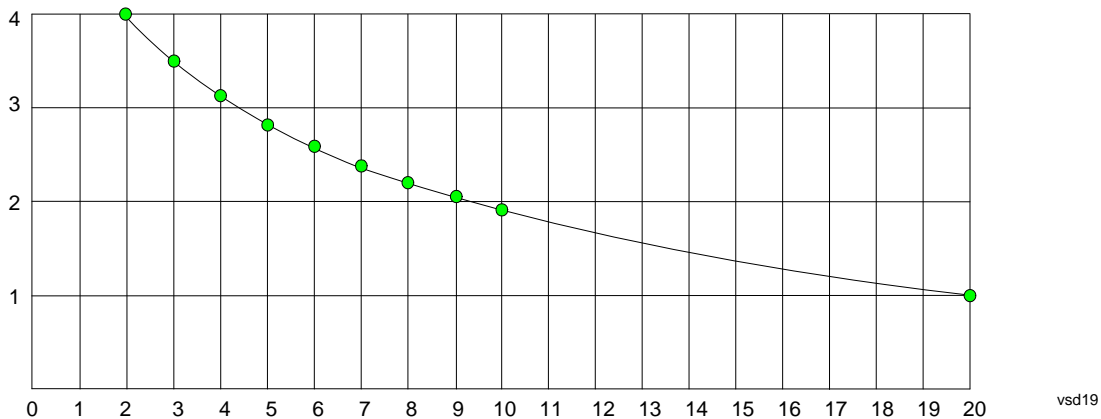
On the other hand, if we interpolate on a linear scale, we assume that the two points are connected by a straight line on the linear scale, as below:
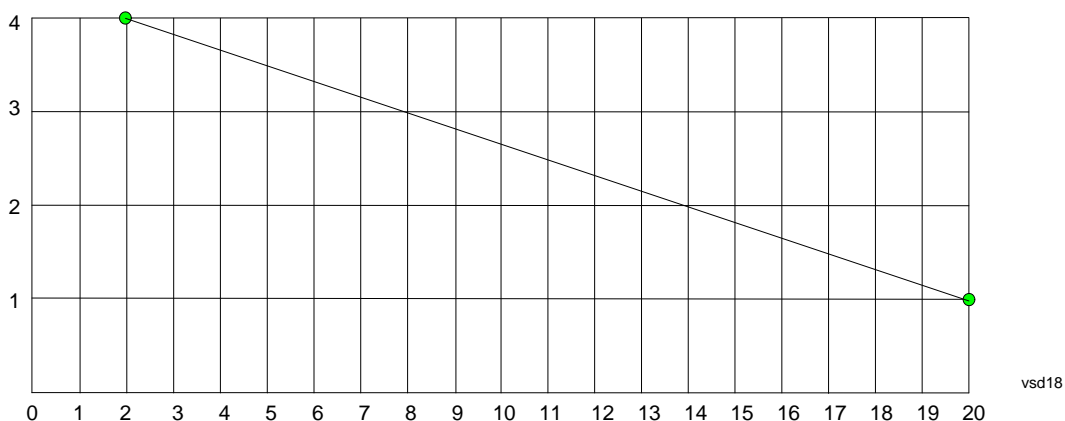
The correction to be used for each bucket is taken from the interpolated correction curve at the center of the bucket.

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.

Key Path	Input/Output, Corrections, Properties
Remote Command	[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:DESCription "text"
	[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:DESCription?
Example	:CORR:CSET1:DESC "11941A Antenna correction"
Notes	45 chars max; may not fit on display if max chars used
Preset	Unaffected by a Preset. Set to empty by **Restore Input/Output Defaults**
State Saved	Saved in instrument state.
Initial 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.

Key Path	**Input/Output, Corrections, Properties**
Remote Command	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:COMMent "text"` `[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:COMMent?`
Example	:CORR:CSET1:COMM "this is a comment"
Notes	45 chars max; may not fit on display if max chars used
Preset	Unaffected by Preset. Set to empty by **Restore Input/Output Defaults**
State Saved	Saved in instrument state
Initial 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.

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 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 a 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	**Input/Output, Corrections**
Initial S/W Revision	A.02.00

Navigate

Lets you move through the table to edit the desired point.

Key Path	**Input/Output, Corrections, Edit**
Notes	There is no value readback on the key
Min	1
Max	2000
Initial S/W Revision	A.02.00

Frequency

Lets you edit the frequency of the current row.

Key Path	**Input/Output, Corrections, Edit**
Notes	There is no value readback on the key.
Min	0
Max	1 THz
Initial S/W Revision	A.02.00

Amplitude

Lets you edit the Amplitude of the current row.

Key Path	**Input/Output, Corrections, Edit**
Notes	There is no value readback on the key.
Min	–1000 dB
Max	1000 dB
Initial S/W Revision	A.02.00

Insert Point Below

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	Input/Output, Corrections, Edit
Initial S/W Revision	A.02.00

Delete Point

Deletes the currently-selected point, whether or not that point is being edited, and selects the Navigate functionality. The point following the currently-selected point (or the point preceding if there is none) will be selected.

Key Path	Input/Output, Corrections, Edit
Initial 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	Input/Output, Corrections, Edit
Initial 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.

Key Path	Input/Output, Corrections
Remote Command	[:SENSe]:CORRection:CSET[1]|2|3|4|5|6:DELete
Example	CORR:CSET:DEL
	CORR:CSET1:DEL
	CORR:CSET4:DEL
Notes	Pressing this key when no corrections are present is accepted without error.
Initial 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 OFF, then no amplitude correction sets will be used, regardless of their individual on/off settings. If set to ON, the

corrections that are marked as ON (see "Correction On/Off" on page 390) are used.

Key Path	**Input/Output, Corrections**

Remote Command	`[: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 instrument state.
Initial 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.

Key Path	**Input/Output, Corrections**
Remote Command	`[:SENSe]:CORRection:CSET:ALL:DELete`
Example	CORR:CSET:ALL:DEL
Initial 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|5|6:DATA <freq>, <ampl>, . . .`
	
	`[:SENSe]:CORRection:CSET[1]|2|3|4|5|6: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 a shutdown or restart of analyzer application (including a power cycle).

State Saved	Saved in instrument state.
Min	Freq: 0 Hz Amptd: –1000 dBm
Max	Freq: 1 THz Amptd: +1000 dBm
Initial 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|5|6: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
Initial 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, a condition error 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 a condition error message is generated. When lock is regained, Status bit 2 in the Questionable Frequency register will be cleared and the condition error will be cleared.

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.

Key Path	**Input/Output**

Remote Command	`[:SENSe]:ROSCillator:SOURce:TYPE INTernal|EXTernal|SENSe`
	
	`[:SENSe]:ROSCillator:SOURce:TYPE?`

Preset	This is unaffected by a Preset but is set to SENSe on a "Restore Input/Output Defaults" or "Restore System Defaults->All".
State Saved	Saved in instrument state.
Status Bits/OPC dependencies	STATus:QUEStionable:FREQuency bit 2 set if unlocked.
Initial S/W Revision	Prior to A.02.00

Remote Command	`[:SENSe]:ROSCillator:SOURce?`
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
Backwards Compatibility SCPI	The query [:SENSe]:ROSCillator:SOURce? was a query-only command in ESA which always returned whichever reference the instrument was using. The instrument automatically switched to the ext ref if it was present. In PSA (which had no sensing) the command [:SENSe]:ROSCillator:SOURce set the reference (INT or EXT), so again its query returned the actual routing. Thus the query form of this command is 100% backwards compatible with both instruments.
Initial S/W Revision	Prior to A.02.00

Remote Command	[:SENSe]:ROSCillator:SOURce INTernal|EXTernal
Notes	([:SENSe]:ROSCillator:SOURce:TYPE INTernal|EXTernal and directly sets the routing to either internal or external.)
Initial 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.

Key Path	**Input/Output, Freq Ref In**
Example	:ROSC:SOUR:TYPE SENS
Readback	Sense
Initial S/W Revision	Prior to A.02.00

Internal

The internal reference is used.

Key Path	**Input/Output, Freq Ref In**
Example	:ROSC:SOUR:TYPE INT
Readback	Internal
Initial S/W Revision	Prior to A.02.00

External

The external reference is used.

Key Path	**Input/Output, Freq Ref In**
Example	:ROSC:SOUR:TYPE EXT
Readback	External
Initial 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.

Key Path	**Input/Output, Freq Ref In**
Remote Command	`[:SENSe]:ROSCillator:EXTernal:FREQuency <freq>` `[:SENSe]:ROSCillator:EXTernal:FREQuency?`
Example	ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference. ROSC:SOUR:TYPE EXT selects the external reference.
Notes	Still available with Internal selected, to allow setup for when External is in use.
Preset	This is unaffected by a Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min	CXA: 10 MHz EXA: 10 MHz or 13 MHz, depending on whether N9010A-R13 is licensed MXA: 1 MHz PXA: 1 MHz
Max	CXA: 10 MHz EXA: 10 MHz MXA: 50 MHz PXA: 50 MHz
Initial S/W Revision	Prior to A.02.00
Default Unit	Hz

External Reference Lock BW

This control lets you adjust the External Reference phase lock bandwidth. This control is available in some models of the X-Series.

The PXA variable reference loop bandwidth allows an external reference to be used and have the analyzer close-in phase noise improved to match that of the reference. This could result in an improvement of tens of decibels. The choice of "Wide" or "Narrow" affects the phase noise at low offset frequencies, especially 4 to 400 Hz offset. When using an external reference with superior phase noise, we recommend setting the external reference phase-locked-loop bandwidth to wide (60 Hz), to take advantage of that superior performance. When using an external reference with inferior phase noise performance, we recommend setting that bandwidth to narrow (15 Hz). In these relationships, inferior and superior phase noise are with respect to 134 dBc/Hz at 30 Hz offset from a 10 MHz reference. Because most reference sources have phase noise behavior that falls off at a rate of 30 dB/decade, this is usually equivalent to 120 dBc/Hz at 10 Hz offset.

Key Path	**Input/Output, Freq Ref In**

Scope	Mode Global
Remote Command	[:SENSe]:ROSCillator:BANDwidth WIDE|NARRow [:SENSe]:ROSCillator:BANDwidth?
Example	ROSC:BAND WIDE
Dependencies	This key only appears in analyzers equipped with the required hardware.
Preset	This is unaffected by a Preset but is set to Narrow on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in Input/Output state.
Initial S/W Revision	A.04.00

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 message 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, 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.

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, a popup 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 a 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.

Key Path	**Input/Output, Freq Ref In**
Mode	All
Remote Command	`[:SENSe]:ROSCillator:COUPling NORMal|NACQuisition` `[:SENSe]:ROSCillator:COUPling?`
Preset	This setting is persistent: it survives power-cycling or a Preset and is reset with Restore Input/Output defaults.
State Saved	Not saved in instrument state
Readback	Normal|Stop Acq
Initial 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	**Input/Output**
Initial 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.

Key Path	**Input/Output, Output Config**

Remote Command	`:TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut HSWP|MEASuring|MAIN|GATE|GTRigger|OEVen|SPOint|SSWeep|S SETtled|S1Marker|S2Marker|S3Marker|S4Marker|OFF`
	
	`:TRIGger|TRIGger1|TRIGger2[:SEQuence]:OUTPut?`

Example	TRIG:OUTP HSWP TRIG2:OUTP GATE
Dependencies	The second Trigger output (Trig 2 Out) does not appear in all models; in models that do not support it, the Trig 2 Out key is blanked, and sending the SCPI command for this output generates an error, "Hardware missing; Not available for this model number" In models that do not support the Trigger 2 output, this error is returned if trying to set Trig 2 Out and a query of Trig 2 Out returns OFF.
Preset	Trigger 1: Sweeping (HSWP) Trigger 2: Gate This is unaffected by a 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
Initial S/W Revision	Prior to A.02.00

Polarity

Sets the output to the Trig 1 Out or Trig 2 Out connector to trigger on either the positive or negative polarity.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**

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 a Preset but is set to POSitive on a "Restore Input/Output Defaults" or "Restore System Defaults->All"

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

Sweeping (HSWP)

Selects the Sweeping Trigger signal to be output to the Trig 1 Out or Trig 2 Out connector when a measurement is made. This signal has historically been known as "HSWP" (High = Sweeping), and is 5 V TTL level with 50 ohm output impedance."

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP HSWP
Readback	Sweeping
Initial S/W Revision	Prior to A.02.00

Measuring

Selects the Measuring trigger signal to be output to the Trig 1 Out or Trig 2 Out connector. This signal is true while the Measuring status bit is true.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP MEAS
Readback	Measuring
Initial S/W Revision	Prior to A.02.00

Main Trigger

Selects the current instrument trigger signal to be output to the Trig 1 Out or Trig 2 Out connector.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP MAIN
Readback	Main Trigger
Initial S/W Revision	Prior to A.02.00

Gate Trigger

Selects the gate trigger signal to be output to the Trig 1 Out or Trig 2 Out connector. This is the source of the gate timing, not the actual gate signal.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP GTR
Readback	Gate Trigger
Initial S/W Revision	Prior to A.02.00

Gate

Selects the gate signal to be output to the Trig 1 Out or Trig 2 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 or Trig 2 Out represents the time the gate is configured to pass the signal.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP GATE
Readback	Gate
Initial 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 or Trig 2 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.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP OEV
Readback	Odd/Even
Initial S/W Revision	Prior to A.02.00

Off

Selects no signal to be output to the Trig 1 Out or Trig 2 Out connector.

Key Path	**Input/Output, Output Config, Trig 1/2 Output**
Example	TRIG1:OUTP OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

Analog Out

This menu lets you control which signal is fed to the "Analog Out" connector on the analyzer rear panel.

See

Key Path	**Input/Output, Output Config**
Remote Command	:OUTPut:ANALog OFF|SVIDeo|LOGVideo|LINVideo|DAUDio :OUTPut:ANALog?
Example	OUTP:ANAL SVIDeo ! causes the analog output type to be Screen Video
Preset	OFF

Preset	This is unaffected by Preset but is set to DAUDio on a "Restore Input/Output Defaults" or "Restore System Defaults->All
State Saved	Saved in Input/Output State
Readback line	1-of-N selection [variable]
Backwards Compatibility Notes	Prior to A.04.00, OFF was the default functionality except when in the Analog Demod application or with Tune and Listen, in which case it was DAUDio, and there was no selection menu. So for backwards compatibility, Auto (:OUTP:ANAL:AUTO ON) will duplicate the prior behavior.
	The DNWB and SANalyzer parameters, which were legal in PSA but perform no function in the X-Series, are accepted without error.
Initial S/W Revision	A.04.00

More Information

The table below gives the range for each output.

Analog Out	Nominal Range exc. (10% overrange)	Scale Factor	Notes
Off	0 V		
Screen Video	0 – 1 V open circuit	10%/division	8566 compatible
Log Video	0 – 1 V terminated	1/(192.66 dB/V)	dB referenced to mixer level, 1V out for –10 dBm at the mixer.
Linear Video	0 – 1 V terminated	100%/V	Linear referenced to Ref Level, 1 V out for RF envelope at the Ref Level.
Demod Audio	(varies with analyzer setting)		

Auto

Selects the Auto state for the Analog Output menu. In this state, the Analog Output will automatically be set to the most sensible setting for the current mode or measurement.

If you make a selection manually from the Analog Out menu, this selection will remain in force until you change it (or re-select Auto), even if you go to a mode or measurement for which the selected output does not apply.

Key Path	**Input/Output, Output Config, Analog Out**
Remote Command	`OUTPut:ANALog:AUTO OFF|ON|0|1`
	`OUTPut:ANALog:AUTO?`
Example	OUTP:ANAL:AUTO ON
Preset	ON

State Saved	Saved in Input/Output State
Initial S/W Revision	A.04.00

Off

Turns off the analog output.

Key Path	**Input/Output, Output Config, Analog Out**
Example	OUTP:ANAL OFF ! causes the analog output to be off
Readback Text	Off
Initial S/W Revision	A.04.00

Screen Video

Selects the analog output to be the screen video signal.   In this mode, the pre-detector data is output to the Analog Out connector. The output looks very much like the trace displayed on the analyzer's screen, and depends on the Log/Lin display Scale, Reference Level, and dB per division, but is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

Note that this mode is similar to the Analog Output of the HP 8566 family and the Video Out (opt 124) capability of the Agilent PSA analyzer (E444x), although there are differences in the behavior.

See "Backwards Compatibility:" on page 411.

Key Path	**Input/Output, Output Config, Analog Out**
Example	OUTP:ANAL SVID

Dependencies	Because the Screen Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Screen Video is activated.
	Screen Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Screen Video output.
	The output holds at its last value during an alignment and during a marker count. After a sweep:
	• If a new sweep is to follow (as in Continuous sweep mode), the output holds at its last value during the retrace before the next sweep starts. If the analyzer is in zero-span, there is no retrace, as the analyzer remains tuned to the Center Frequency and does not sweep. Therefore, in zero-span, the output simply remains live between display updates.
	• If no new sweep is to follow (as in Single sweep mode), the output remains live, and continues to show the pre-detector data
	This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV or YAS licensed in your instrument.
Couplings	Screen Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Screen Video output will look different than it does in swept mode.
Readback Text	Screen Video
Initial S/W Revision	A.04.00

Backwards Compatibility:

The Screen Video function is intended to be very similar to the 8566 Video Output and the PSA Option 124. However, unlike the PSA, it is not always on; it must be switched on by the Screen Video key. Also, unlike the PSA, there are certain dependencies (detailed above) – for example, the Quasi Peak Detector is unavailable when Screen Video is on.

Futhermore, the PSA Option 124 hardware was unipolar and its large range was padded to be exactly right for use as a Screen Video output. In the X-Series, the hardware is bipolar and has a wider range to accommodate the other output choices. Therefore, the outputs won't match up exactly and users may have to modify their setup when applying the X-Series in a PSA application.

Log Video (RF Envelope, Ref=Mixer Level)

Selects the analog output to be the log of the video signal. In this mode, the pre-detector data is output to the Analog Out connector with a Log scaling. The output is referenced to the current level at the mixer, does not depend on display settings like Reference Level or dB per division, and it is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging), but does change with input attenuation.

The output is designed so that full scale (1 V) corresponds to –10 dBm at the mixer. The full range (0–1

V) covers 192.66 dB ; thus, 0 V corresponds to –202.66 dBm at the mixer.

Key Path	**Input/Output, Output Config, Analog Out**
Example	OUTP:ANAL LOGV
Dependencies	Because the Log Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated. Log Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Log Video output. The output holds at its last value during an alignment, during a marker count, and during retrace (after a sweep and before the next sweep starts). This function depends on optional capability. The key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.
Couplings	Log Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Log Video output will look different than it does in swept mode.
Readback Text	Log Video
Initial S/W Revision	A.04.00

Linear Video (RF Envelope, Ref=Ref Level)

Selects the analog output to be the envelope signal on a linear (voltage) scale. In this mode, the pre-detector data is output to the Analog Out connector with a Linear scaling. The output is based on the current Reference Level, and is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

The scaling is set so that 1 V output occurs with an instantaneous video level equal to the reference level, and 0 V occurs at the bottom of the graticule. This scaling gives you the ability to control the gain without having another setup control for the key. But it requires you to control the look of the display (the reference level) in order to control the analog output.

This mode is ideal for looking at Amplitude Modulated signals, as the linear envelope effectively demodulates the signal.

Key Path	**Input/Output, Output Config, Analog Out**
Example	OUTP:ANAL LINV

Dependencies	Because the Linear Video output uses one of the two IF processing channels, only one detector is available while Linear Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated.
	Linear Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Linear Video output.
	The output holds at its last value during an alignment and during a marker count and during retrace (after a sweep and before the next sweep starts).
	This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.
Couplings	Linear Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Linear Video output will look different than it does in swept mode.
Readback Text	Linear Video
Initial S/W Revision	A.04.00

Demod Audio

Selects the analog output to be the demodulation of the video signal.

When Demod Audio is selected, the demodulated audio signal appears at this output whenever the Analog Demod application is demodulating a signal or when **Analog Demod Tune and Listen** is operating in the Swept SA measurement.

When Analog Out is in the Auto state, this output is auto-selected when in the Analog Demod mode or when **Analog Demod Tune and Listen** is operating in the Swept SA measurement.

If any other Analog Output is manually selected when in the Analog Demod mode or when **Analog Demod Tune and Listen** is operating in the Swept SA measurement, a condition warning message appears.

Key Path	**Input/Output, Output Config, Analog Out**
Example	OUTP:ANAL DAUD
Dependencies	This key only appears if the Analog Demod application (N9063A), the N6141A or W6141A application, or Option EMC is installed and licensed, otherwise the key will be blanked and the command will generate an "Option not available" error.
	The output holds at its last value during an alignment and during a marker count. It is not held between sweeps, in order for Tune and Listen to work properly.
	When Demod Audio is the selected Analog Output:
	• all active traces are forced to use the same detector.
	• CISPR detectors (QPD, EMI Avg, RMS Avg) are unavailable

Readback Text	Demod Audio
Initial S/W Revision	Prior to A.02.00 (this was the default functionality, and there was no selection)
Modified at S/W Revision	A.04.00

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.

Key Path	**Input/Output, Output Config**

Remote Command	`:OUTPut:IQ:OUTPut IQ1|IQ250|OFF`
	
	`:OUTPut:IQ:OUTPut?`

Example	OUTP:IQ:OUTP IQ1
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.
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
Initial S/W Revision	Prior to A.02.00
Saved State	Saved in instrument state

1 kHz Square Wave

Turns on the 1 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

Key Path	**Input/Output, Output Config, I/Q Cal Out**
Readback	I/Q 1kHz
Initial S/W Revision	Prior to A.02.00

250 kHz Square Wave

Turns 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
Initial S/W Revision	Prior to A.02.00

Off

Turns 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
Initial S/W Revision	Prior to A.02.00

Digital Out

Opens a menu that allows you to select options for configuring the digital output(s) of the analyzer.

Key Path	**Input/Output, Output Config**
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Digital Bus (Narrowband)

This menu allows you to configure the LVDS connector located on the rear panel of the instrument. It is a unidirectional link of real time data at a 90 MSa/s rate. The ADC is sampling a 22.5 MHz IF.

The data that appears on this port is raw, uncorrected ADC samples, unless you have option RTL. With option RTL, you get fully corrected I/Q data.

This connector will only be active when the Narrowband IF Path is currently in use.

Key Path	**Input/Output, Output Config, Digital Out**
Initial S/W Revision	A.04.00

Bus Out On/Off

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.

When Bus Out is off, no signal appears on the LVDS port.

Key Path	**Input/Output, Output Config, Digital Out, Digital Bus**
Scope	Mode Global
Remote Command	:OUTPut:DBUS[1][:STATe] ON|OFF|1|0 :OUTPut:DBUS[1][:STATe]?
Example	OUTP:DBUS ON
Preset	This is unaffected by a Preset but is set to Off on a "Restore Input/Output Defaults" or "Restore System Defaults -> All"
State Saved	Saved in Input/Output State

Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Aux IF Out

This menu controls the signals that appear on the SMA output on the rear panel labeled "AUX IF OUT":

Key Path	**Input/Output, Output Config**
Remote Command	:OUTPut:AUX SIF|AIF|LOGVideo|OFF :OUTPut:AUX?
Preset	This is unaffected by a Preset but is set to OFF on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in Input/Output state
Readback line	1-of-N selection [variable]
Backwards Compatibility Notes	In the PSA, the IF output has functionality equivalent to the "Second IF" function in the X-Series' Aux IF Out menu. In the X-Series, it is necessary to switch the Aux IF Out to "Second IF" to get this functionaluity, whereas in PSA it is always on, since there are no other choices. Hence a command to switch this function to "Second IF" will have to be added by customers migrating from PSA who use the IF Outputin PSA.
Initial S/W Revision	A.04.00

Second IF

In this mode the 2nd IF output is routed to the rear panel connector. The annotation on the key shows the current 2nd IF frequency in use in the analyzer.

The frequency of the 2nd IF depends on the current IF signal path as shown in the table below:

IF Path Selected	**Frequency of "Second IF" Output**
10 MHz	322.5 MHz
25 MHz	322.5 MHz
40 MHz	250 MHz
140 MHz	300 MHz

The signal quality, such as signal to noise ratio and phase noise, are excellent in this mode.

Key Path	**Input/Output, Output Config, Aux IF Out**
Example	OUTP:AUX SIF causes the aux output type to be Second IF

Readback Text	Second IF
Initial S/W Revision	A.04.00

Arbitrary IF

In this mode the 2nd IF output is mixed with a local oscillator and mixer to produce an arbitrary IF output between 10 MHz and 75 MHz with 500 kHz resolution. The phase noise in this mode will not be as good as in **Second IF** mode.

The IF output frequency is adjustable, through an active function which appears on the Arbitrary IF selection key, from 10 MHz to 75 MHz with 500 kHz resolution.

The bandwidth of this IF output varies with band and center frequency, but is about 40 MHz at the –3 dB width. When the output is centered at lower freqeuncies in its range, signal frequencies at the bottom of the bandwidth will "fold". For example, with a 40 MHz bandwidth (20 MHz half-bandwidth), and a 15 MHz IF center, a signal –20 MHz relative to the spectrum analyzer center frequency will have a relative response of about –3 dB with a frequency 20 MHz below the 15 MHz IF center. This –5 MHz frequency will fold to become a +5 MHz signal at the IF output. Therefore, lower IF output frequencies are only useful with known band-limited signals.

Key Path	**Input/Output, Output Config, Aux IF Out**
Example	OUTP:AUX AIF
	causes the aux output type to be the Arbitrary IF
Readback Text	Arbitrary IF
Initial S/W Revision	A.04.00

Key Path	**Input/Output, Output Config, Aux IF Out**
Scope	Mode Global
Remote Command	:OUTPut:AUX:AIF <value>
	:OUTPut:AUX:AIF?
Example	:OUTP:AUX:AIF 50 MHZ
Preset	This is unaffected by a Preset but is set to 70 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved	Saved in Input/Output State
Min	10 MHz
Max	75 MHz
Initial S/W Revision	A.04.00
Default Unit	Hz

Fast Log Video

In this mode the 2nd IF output is passed through a log amp and the log envelope of the IF signal is sent to the rear panel. The open circuit output level varies by about 25 mV per dB, with a top-of-screen signal producing about 1.6 Volts. The output impedance is nominally 50 ohms.

This mode is intended to meet the same needs as Option E4440A-H7L Fast Rise Time Video Output on the Agilent E4440A PSA Series, allowing you to characterize pulses with fast rise times using standard measurement suites on modern digital scopes.

Key Path	**Input/Output, Output Config, Aux IF Out**
Example	OUTP:AUX LOGVideo causes the aux output type to be Fast Log Video
Dependencies	The output is off during an alignment but not during a marker count, and is not blanked during retrace (after a sweep and before the next sweep starts).
Readback Text	Fast Log Video
Initial S/W Revision	A.04.00

Off

In this mode nothing comes out of the "AUX IF OUT" connector on the rear panel. The connector appears as an open-circuit (that is, it is not terminated in any way).

Key Path	**Input/Output, Output Config, Aux IF Out**
Example	OUTP:AUX OFF causes the aux output type to be off
Readback Text	Off
Initial S/W Revision	A.04.00

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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibration**
Remote Command	`:CALibration:IQ:ISOLation`
Example	CAL:IQ:ISOL
Notes	All front panel I/Q ports must not be connected to anything.
Notes	All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command.
State Saved	No.
Initial S/W Revision	Prior to A.02.00

Exit

Exits the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path	**Input/Output, I/Q, I/Q Cable Calibration**
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 430).
Initial S/W Revision	Prior to A.02.00

I/Q Isolation Calibration Time (Remote Command Only)

Returns 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?
Notes	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial S/W Revision	A.02.00

I/Q Cable Calibrate…

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 the user 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 softkeys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. The user 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	**Input/Output, I/Q**
Initial 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	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
Initial S/W Revision	Prior to A.02.00

Next

Perform the I port calibration.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
Remote Command	:CALibration:IQ:FLATness:I

Example	CAL:IQ:FLAT:I
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.
Notes	The I port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No.
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 430).
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibration**
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 the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the I-bar port calibration.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
Remote Command	:CALibration:IQ:FLATness:IBAR

Example	CAL:IQ:FLAT:IBAR
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.
Notes	The I-bar port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 430).
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
Remote Command	:CALibration:IQ:FLATness:Q

Example	CAL:IQ:FLAT:Q
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.
Notes	The Q port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 430).
Initial 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.

Back

Return to the prior step in the calibration procedure.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q-bar port calibration.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
Remote Command	:CALibration:IQ:FLATness:QBAR

Example	CAL:IQ:FLAT: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.
Notes	The Q-bar port must be connected to the Cal Out port before issuing the SCPI command.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, I/Q Cable Calibrate…**
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 430).
Initial S/W Revision	Prior to A.02.00

I/Q Cable Calibration Time (Remote Command Only)

Returns 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?
Notes	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial 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 the user 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 softkeys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. The user 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 .

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
Initial S/W Revision	Prior to A.02.00

Next

Perform the I port calibration.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
Remote Command	`:CALibration:IQ:PROBe:I`
Example	CAL:IQ:PROB:I
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.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
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 430).
Initial 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 430.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
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 the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the I-bar port calibration.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
Remote Command	:CALibration:IQ:PROBe:IBar
Example	CAL:IQ:PROB:IB
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.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, I Setup, I Probe, Calibrate**
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 430).
Initial 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 the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See "Show Adapter Screen" on page 430.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Remote Command	:CALibration:IQ:PROBe:Q
Example	CAL:IQ:PROB:Q
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.
State Saved	No
Initial 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.

Key Path	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
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 430).
Initial 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 .

Key Path	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
Notes	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
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 the user to go back to a prior step to redo that calibration step.
Initial S/W Revision	Prior to A.02.00

Next

Perform the Q-bar port calibration.

Key Path	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
Remote Command	:CALibration:IQ:PROBe:QBar
Example	CAL:IQ:PROB:QB
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.
State Saved	No
Initial 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.

Key Path	**Input/Output, I/Q, Q Setup, Q Probe, Calibrate**
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 430).
Initial S/W Revision	Prior to A.02.00

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?`
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.
Initial S/W Revision	A.02.00

Exit Confirmation

When Exit is pressed 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 the user really wants 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.

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that 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	**Front-panel key**
Initial S/W Revision	Prior to A.02.00

Remote Measurement Functions

This section contains the following topics:

Initial S/W Revision	Prior to A.02.00

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:

Measure 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 message 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 then 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:

Measure 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 then the ASCII format. (FORMat:DATA)

Initial S/W Revision	Prior to A.02.00

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command	:CONFigure?

Example	CONF?
Initial S/W Revision	Prior to A.02.00

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.
Initial S/W Revision	Prior to A.02.00

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.
Initial S/W Revision	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst

in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command	`:CALCulate:DATA<n>:COMPress?`
	`BLOCk|CFIT|MAXimum|MINimum|MEAN|DMEan|RMS|RMSCubed|SAMP`
	`le|SDEViation|PPHase`
	`[,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]`

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.)
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.
Initial S/W Revision	Prior to A.02.00

- 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.

NOTE	MEAN - returns a single value that is the arithmetic mean of the data point values

(in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1
Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{Xi \in region(s)} Xi$$

vsd27-1

where Xi 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)

$$MEAN = \frac{1}{n} \sum_{Xi \in region(s)} |Xi|$$

vsd27-2

where |Xi| 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)

$$DME = 10 \times \log_{10} \left(\frac{1}{n} \sum_{Xi \in region(s)} 10^{\frac{Xi}{10}} \right)$$

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.

NOTE   For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation.

This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4
RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{Xi \,\in\, \text{region(s)}} Xi^2}$$

vsd27-4

where Xi 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)

$$RMS = \sqrt{\frac{1}{n} \sum_{Xi \,\in\, \text{region(s)}} Xi\, Xi^*}$$

vsd27-5

where Xi is the complex value representation of an I/Q pair, Xi* 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)

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \,\in\, \text{region(s)}} (Xi - \overline{X})^2}$$

vsd27-7

where Xi is a data point value, 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).

$$SDEV = \sqrt{\frac{1}{n} \sum_{Xi \,\in\, \text{region(s)}} (|Xi| - \overline{X})^2}$$

vsd27-8

where |Xi| 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:

Power = 10 x log [10 x (RMS I/Q value)] + 10.

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{Xi\,\in\,\text{region}} Xi\,Xi*}$$

vsd27-9

where Xi is the complex value representation of an I/Q pair, Xi* 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:

$$\frac{1}{n} \sum_{Yi\,\in\,\text{region}} Yi$$

vsd27-10

where Yi 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.)

length

soffset

roffset

t_0

vsd29

If rlimit is set to 3, this last chunk of data will be ignored.
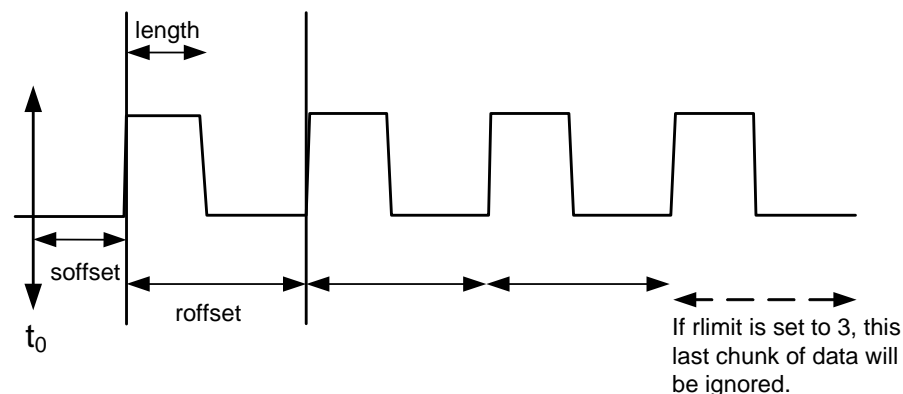
Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)
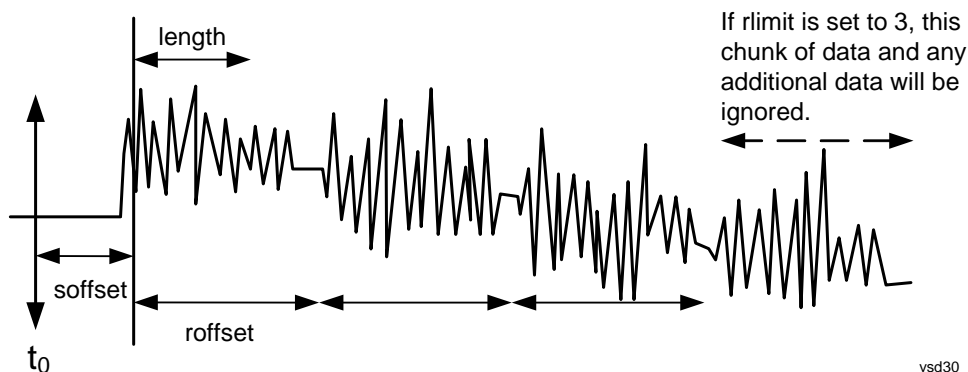
<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints – 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDer and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)

- 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).

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.
	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 reportedSorting 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.
Initial 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]?

Notes	The query response is:
	ASCii: ASC,8
	REAL,32: REAL,32
	REAL,64: REAL,64
	INTeger,32: INT,32
	When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).
	Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.
	The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.
Dependencies	Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).
	Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message –161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message –121 "Invalid Character in Number".
Preset	ASCii
Initial 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.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command	:FORMat:BORDer NORMal|SWAPped
	:FORMat:BORDer?
Preset	NORMal
Initial S/W Revision	Prior to A.02.00

Mode

The Mode key allows you to select the available measurement applications or "Modes". Modes 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 and must be licensed to be available. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

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.

For more information on Modes, preloading Modes, and memory requirements for Modes, see

Key Path	Front panel key

Remote Command	`:INSTrument[:SELect]`
	`SA|BASIC|WCDMA|CDMA2K|EDGEGSM|PNOISE|CDMA1XEV|CWLAN|WIM`
	`AXOFDMA|CWIMAXOFDM|VSA|VSA89601|LTE|IDEN|WIMAXFIXED|LTE`
	`TDD|TDSCDMA|NFIGURE|ADEMOD|DVB|DTMB|ISDBT|CMMB|RLC|SCPI`
	`LC|SANalyzer|RECeiver|SEQAN|BT`
	
	`:INSTrument[:SELect]?`

Example	:INST SA
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. A list of the valid mode choices is returned with the INST:CAT? Query.
Preset	Not affected by Preset. Set to SA following Restore System Defaults, if SA is the default mode.
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Example	:INST 'SA'
Notes	NOTE: The query is not a quoted string. It is an enumeration as indicated in the Instrument Select table above. 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.

Mode

Backwards Compatibility SCPI	:INSTrument[:SELect] 'SA'|'PNOISE'|'EDGE'|'GSM'|'BASIC'
Initial S/W Revision	Prior to A.02.00

More Information

The Mode name appears on the banner after the word "Agilent" followed by the Measurement Title. For example, for the Spectrum Analyzer mode with the Swept Sa measurement running:

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 into memory at startup time, which can significantly decrease the startup time of the analyzer. During runtime, if an application that is not loaded into memory is selected (by either pressing that applications Mode key or sending that applications :INST:SEL command over SCPI), there will be a pause while the Application is loaded. During this pause a message box that says "Loading application, please wait…" is displayed.

Each application (Mode) that runs in the X-Series signal analyzers consumes virtual memory. The various applications consume varying amounts of virtual memory, and as more applications run, the memory consumption increases. Once an application is run, some of its memory remains allocated even when it is not running, and is not released until the analyzer program (xSA.exe) is shut down.

Agilent characterizes each Mode and assigns a memory usage quantity based on a conservative estimate. There is a limited amount of virtual memory available to applications (note that this is virtual memory and is independent of how much physical RAM is in the instrument). The instrument keeps track of how much memory is being used by all loaded applicationss – which includes those that preloaded at startup, and all of those that have been run since startup.

When you request a Mode that is not currently loaded, the instrument looks up the memory estimate for that Mode, and adds it to the residual total for all currently loaded Modes. If there is not enough virtual memory to load the Mode, a dialog box and menu will appear that gives you four options:

Close and restart the analyzer program without changing your configured preloads. This may free up enough memory to load the requested Mode, depending on your configured preloads

Clear out all preloads and close and restart the analyzer program with only the requested application preloaded, and with that application running. This choice is guaranteed to allow you to run the requested application; but you will lose your previously configured preloads. In addition, there may be little or no room for other applications, depending on the size of the requested application.

Bring up the Configure Applications utility in order to reconfigure the preloaded apps to make room for the applications you want to run (this will then require restarting the analyzer program with your new configuration). This is the recommended choice because it gives you full flexibility to select exactly what you want.

Exit the dialog box without doing anything, which means you will be unable to load the application you requested.

In each case except 4, this will cause the analyzer software to close, and you will lose all unsaved traces and results.

If you attempt to load a mode via SCPI that will exceed memory capacity, the Mode does not load and an error message is returned:

`-225,"Out of memory;Insufficient resources to load Mode (mode name)"`

where "mode name" is the SCPI parameter for the Mode in question, for example, SA for Spectrum Analyzer 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 453 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	EDGEGSM
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
LTE TDD	105	LTETDD
EMI Receiver	141	EMI
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
Noise Figure	219	NFIGURE
Bluetooth	228	BT
Analog Demod	234	ADEMOD

Mode	:INSTrument:NSELect <integer>	:INSTrument[:SELect] <parameter>
DVB-T/H with T2	235	DVB
DTMB (CTTB)	236	DTMB
Digital Cable TV	238	DCATV
ISDB-T	239	ISDBT
CMMB	240	CMMB
Remote Language Compatibility	266	RLC
SCPI Language Compatibility	270	SCPILC
Sequence Analyzer	400	SEQAN

Remote Command	:INSTrument:NSELect <integer>
	:INSTrument:NSELect?
Example	:INST:NSEL 1
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 instrument state
Initial 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.

Remote Command	:INSTrument:CATalog?
Example	:INST:CAT?
Notes	Query returns a quoted string of the installed and licensed modes separated with a comma. Example:
	"SA,PNOISE,WCDMA"
Initial 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 that is the Model Number of the currently selected application (mode).

Remote Command	`:SYSTem:APPLication[:CURRent][:NAME]?`
Example	`:SYST:APPL?`
Notes	Query returns a quoted string that is the Model Number of the currently selected application (Mode). Example: "N9060A" String length is 6 characters.
Preset	Not affected by Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Revision

Returns a string that is the Revision of the currently selected application (mode).

Remote Command	`:SYSTem:APPLication[:CURRent]:REVision?`
Example	`:SYST:APPL:REV?`
Notes	Query returns a quoted string that 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 a Preset
State Saved	Not saved in state, the value will be the selected application when a Save is done.
Initial S/W Revision	Prior to A.02.00

Current Application Options

Returns a string that is the Options list of the currently selected application (Mode).

Remote Command	`:SYSTem:APPLication[:CURRent]:OPTion?`
Example	`:SYST:APPL:OPT?`

Notes	Query returns a quoted string that 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 a Preset
State Saved	Not saved in state per se, the value will be the selected application when a Save is invoked.
Initial 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 instrument state.
Initial 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?
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 a Preset
State Saved	Not saved in instrument state.
Initial 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'
Notes	Returned value is a quoted string of revision for the provided Model Number. The revision will be a null-string ("") if the provided Model Number is not installed and licensed. Example, if SAMS is installed and licensed: "1.0.0.0"
Preset	Not affected by a Preset.
State Saved	Not saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Application Catalog Options

Returns a list of Options for the provided Model Number

Remote Command	:SYSTem:APPLication:CATalog:OPTion? <model>
Example	:SYST:APPL:CAT:OPT? 'N9060A'
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 bya Preset
State Saved	Not saved in instrument state.
Initial 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.

Key Path	**Mode**
Example	INST:SEL SA
	INST:NSEL 1
Initial S/W Revision	Prior to A.02.00

EMI Receiver

The EMI Receiver Mode makes EMC measurements. Several measurements are provided to aid the user in characterizing EMC performance of their systems, including looking at signals with CISPR–16 compliant detectors, performing scans for interfering signals, and determining and charting interfering signals over time.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL EMI
	INST:NSEL 141
Initial S/W Revision	A.07.01

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL BASIC
	INST:NSEL 8
Initial 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.

Key Path	**Mode**

Example	INST:SEL WCDMA
	INST:NSEL 9
Initial 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.

Key Path	**Mode**
Example	INST:SEL EDGEGSM
	INST:NSEL 13
Initial 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 it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL WIMAXOFDMA
	INST:NSEL 75
Initial S/W Revision	Prior to A.02.00

Vector Signal Analyzer (VXA)

The N9064A (formerly 89601X) VXA Vector signal and WLAN modulation analysis application provides solutions for basic vector signal analysis, analog demodulation, digital demodulation and WLAN analysis. The digital demodulation portion of N9064A allows you to perform measurements on standard-based formats such as cellular, wireless networking and digital video as well as general purpose flexible modulation analysis for wide range of digital formats, FSK to 1024QAM, with easy-to-use measurements and display tools such as constellation and eye diagram, EVM traces and up to four simultaneous displays. The WLAN portion of N9064A allows you to make RF transmitter measurements on 802.11a/b/g/p/j WLAN devices. Analog baseband analysis is available using the MXA with option BBA.

N9064A honors existing 89601X licenses with all features and functionalities found on X-Series software versions prior to A.06.00.

If you are using the Help feature, this mode must be currently active to access its detailed information. If

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL VSA INST:NSEL 100
Initial 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.

Key Path	**Mode**
Example	INST:SEL PNOISE or INST:NSEL 14
Initial 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.

Key Path	**Mode**
Example	INST:SEL NFIGURE Or INST:NSEL 219
Initial 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.

Key Path	**Mode**

Example	INST:SEL ADEMOD
	INST:NSEL 234
Initial S/W Revision	Prior to A.02.00

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL BT
	INST:NSEL 228
Initial S/W Revision	A.06.01

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL TDSCDMA
	INST:NSEL 211
Initial 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 it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL CDMA2K
	INST:NSEL 10
Initial 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.

Key Path	**Mode**
Example	INST:SEL CDMA1XEV
	INST:NSEL 15
Initial S/W Revision	Prior to A.02.00

LTE

Selects the LTE mode for general purpose measurements of signals following the LTE FDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL LTE
	INST:NSEL 102
Initial S/W Revision	Prior to A.02.00

LTE TDD

Selects the LTE TDD mode for general purpose measurements of signals following the LTE TDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path	**Mode**
Example	INST:SEL LTETDD
	INST:NSEL 105
Initial S/W Revision	A.03.00

DVB-T/H with T2

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.

Key Path	**Mode**
Example	INST:SEL DVB INST:NSEL 235
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.07.00

DTMB (CTTB)

Selects the DTMB (CTTB) 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.

Key Path	**Mode**
Example	INST:SEL DTMB INST:NSEL 236
Initial S/W Revision	A.02.00

ACATV

Selects the ACATV mode for measurements of analog cable television systems. 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.

Key Path	**Mode**
Example	INST:SEL ACATV INST:NSEL 237
Initial S/W Revision	A.08.00

Digital Cable TV

Selects the Digital Cable TV mode for measurements of digital cable television systems. 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.

Key Path	**Mode**

Example	INST:SEL DCATV
	INST:NSEL 238
Initial S/W Revision	A.07.00

ISDB-T

Selects the ISDB-T 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.

Key Path	**Mode**
Example	INST:SEL ISDBT
	INST:NSEL 239
Initial S/W Revision	A.03.00

CMMB

Selects the CMMB 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.

Key Path	**Mode**
Example	INST:SEL CMMB
	INST:NSEL 240
Initial S/W Revision	A.03.00

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.

Key Path	**Mode**
Example	INST:SEL CWLAN
	INST:NSEL 19
Initial 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.

Key Path	Mode
Example	INST:SEL CWIMAXOFDM INST:NSEL 81
Initial 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, 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	Mode
Example	INST:SEL WIMAXFIXED INST:NSEL 104
Initial 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.

Key Path	Mode
Example	INST:SEL IDEN INST:NSEL 103
Initial 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 this 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.

Key Path	**Mode**
Example	INST:SEL RLC Or INST:NSEL 266
Initial S/W Revision	Prior to A.02.00

SCPI Language Compatibility

The SCPI Language Compatibility mode provides remote language compatibility for SCPI-based instruments, such as the Rohde and Schwartz FSP and related series of spectrum analyzers.

NOTE	After changing into or out of this 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.

Key Path	**Mode**
Example	INST:SEL SCPILC Or INST:NSEL 270
Initial S/W Revision	A.06.00

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

To learn more about how to use the 89600 VSA running in the X-Series, after the 89600 VSA application is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzers (MXA/EXA) with 89600-Series Software" help topic.

Key Path	**Mode**
Example	INST:SEL VSA89601 INST:NSEL 101
Initial S/W Revision	Prior to A.02.00

EMI Receiver Aliases (Remote Command Only)

The following commands are translated to the specified X-Series instrument commands, in order to emulate EMI Receiver products from other manufacturers

Example	INST:SEL SANalyzer
Notes	When this command is received, the analyzer aliases it to the following: INST:SEL SCPILC This results in the analyzer being placed in SCPI Language Compatibility Mode, in order to emulate the ESU Spectrum Analyzer Mode.
Initial S/W Revision	A.07.00

Example	INST:SEL RECeiver
Notes	When this command is received, the analyzer aliases it to the following: :INST:SEL EMI :CONF FSC This results in the analyzer being placed in the EMI Receiver Mode, running the Frequency Scan measurement, in order to emulate the ESU Receiever Mode.
Initial S/W Revision	A.07.00

Global Settings

Opens a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These

switches apply to all Modes that support global settings. No matter what Mode you are in when you set the "Global Center Frequency" switch to on, it applies to all Modes that support Global Settings.

Key Path	**Front Panel Key**
Initial 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	**Mode Setup, Global Settings**
Scope	Mode Global
Remote Command	:INSTrument:COUPle:FREQuency:CENTer ALL|NONE :INSTrument:COUPle:FREQuency:CENTer?
Example	INST:COUP:FREQ:CENT ALL INST:COUP:FREQ:CENT?
Preset	Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes
Range	On|Off
Initial S/W Revision	Prior to A.02.00

Remote Command	:GLOBal:FREQuency:CENTer[:STATe] 1|0|ON|OFF :GLOBal:FREQuency:CENTer[:STATe]?
Preset	Off
Initial 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	**Mode Setup, Global Settings**
Remote Command	`:INSTrument:COUPle:DEFault`
Example	INST:COUP:DEF
Backwards Compatibility SCPI	:GLOBal:DEFault
Initial S/W Revision	Prior to A.02.00

Mode

Mode Setup

This key accesses a menu to allow you to select mode parameters. These settings will be in effect for all measurements in the current mode. See the information of Radio and Restore Mode Default under this key.

Key Path: **Front-panel Key**

Radio Standards

Allows you to specify the Radio Standard to be measured, the supported WLAN standards in the apps are: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, and IEEE 802.11n

Remote Command	`[:SENSe]:RADio:STANdard W11A|W11B|W11GOFDM|W11GDSSS|W11N`
	`[:SENSe]:RADio:STANdard?`
Example	:RADio:STAN W11A
	:RADio:STAN?
Key Path	**Mode Setup**
Mode	WLAN
Preset	W11A
State Saved	Saved in instrument state.
Range	802.11a|802.11b| 802.11g-OFDM|802.11g-DSSS|802.11n

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 "Restore Mode Defaults" on page 102.

Recall

Most of the functions under this key work the same way in many measurements, so they are documented in the Utility Functions section. For details about this key, see "Recall" on page 106.

The Amplitude Correction Import Data function under Recall is documented here.

Amplitude Correction

This key selects the Amplitude Corrections as the data type to be imported. When pressed a second time, it brings up the Select Menu, which lets you select the Correction into which the data will be imported.

Amplitude Corrections are fully discussed in the documentation of the Input/Output key, under the Corrections softkey.

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.

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 the Antenna Unit in the file.

Key Path	**Front Panel Key**
Mode	SA|EDGEGSM
Remote Command	`:MMEMory:LOAD:CORRection 1|2|3|4|5|6, <filename>`
Example	:MMEM:LOAD:CORR 2 "myAmpcor.csv" recalls the Amplitude Correction data from the file myAmpcor.csv in the current directory to the 2nd Amplitude Correction table, and turns on Correction 2. The default path is My Documents\amplitudeCorrections.

Dependencies	Only the first correction array (Correction 1) supports antenna units. 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.
	Corrections are not supported by all Measurements. If in a Mode in which some Measurements support it, this key will be grayed out in measurements that do not. The key will not show at all if no measurements in the Mode support it.
	Errors are reported if the file is empty or missing, or if the file type does not match, or if there is a mismatch between the file type and the destination data type. If any of these occur during manual operation, the analyzer returns to the Import Data menu and the File Open dialog goes away.
	This key does not appear unless you have the proper option installed in your instrument. This command will generate an "Option not available" error unless you have the proper option installed in your instrument.
Couplings	When a correction file is loaded from mass storage, it is automatically turned on (**Correction** ON) and **Apply Corrections is** set to On. This allows the user to see its effect, thus confirming the load.
Readback	selected Correction
Backwards Compatibility SCPI	For backwards compatibility, the following parameters syntax is supported: :MMEMory:LOAD:CORRection ANTenna|CABLe|OTHer|USER, <filename> ANTenna maps to 1, CABLe maps to 2, OTHer maps to 3 and USER maps to 4
Initial S/W Revision	A.02.00

Amplitude Correction 1, 2, 3, 4

These keys let you select which Correction to import the data into. Once selected, the key returns back to the Import Data menu and the selected Correction number is annotated on the key. The next step is to select the Open key in the Import Data menu.

Antenna corrections are a particular kind of Amplitude Corrections – they are distinguished in the corrections file by having the Antenna Unit set to a value other than None. Only Correction 1 supports Antenna Units.

Key Path	**Recall, Data, Amplitude Correction**
Notes	auto return
Dependencies	Only Correction 1 may be used to load a Correction that contains an Antenna Unit other than None
Preset	not part of Preset, but is reset to Correction 1 by Restore Input/Output Defaults; survives shutdown

State Saved	The current Correction number is saved in instrument state
Initial S/W Revision	A.02.00

Recall

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held 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

Key Path	**Front panel key**
Remote Command	`:INITiate[:IMMediate]`
Example	:INIT:IMM
Notes	:INITiate:RESTart :INITiate:IMMediate Either of the above commands perform exactly the same function.
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.
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.
Initial S/W Revision	Prior to A.02.00

Remote Command	`:INITiate:RESTart`
Example	:INIT:REST
Notes	:INITiate:RESTart :INITiate:IMMediate Either of the above commands perform exactly the same function.
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.

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.
Initial 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.

Save

Most of the functions under this key work the same way in many measurements, so they are documented in the Utility Functions section. For details about this key, see "Save" on page 123.

The Amplitude Correction Export Data function under Save is documented here.

Amplitude Correction

Pressing this key selects **Amplitude Corrections** as the data type to be exported. Pressing this key again brings up the Select Menu, which allows the user to select which **Amplitude Correction** to save.

Amplitude Corrections are fully discussed in the documentation of the Input/Output key, under the Corrections softkey.

Key Path	Front Panel Key
Remote Command	:MMEMory:STORe:CORRection 1|2|3|4|5|6, <filename>
Example	:MMEM:STOR:CORR 2 "myAmpcor.csv" saves Correction 2 to the file myAmpcor.csv on the current path.
	The default path is My Documents\amplitudeCorrections.
Notes	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 SCPI.
Dependencies	Corrections are not supported by all Measurements. If in a Mode in which some Measurements support it, this key will be grayed out in measurements that do not. The key will not show at all if no measurements in the Mode support it.
	This key will not appear unless you have the proper option installed in your instrument.
Readback	Selected Correction
Backwards Compatibility SCPI	For backwards compatibility only, the following parameters syntax is supported:
	:MMEMory:STORe:CORRection ANTenna|CABLe|OTHer|USER, <filename>
	ANTenna maps to 1, CABle maps to 2, OTHer maps to 3 and USER maps to 4
Initial S/W Revision	A.02.00

Correction Data File

A Corrections Data File contains a copy of one of the analyzer correction tables. Corrections provide a

Save

way to adjust the trace display for predetermined gain curves (such as for cable loss).

The first five lines are system-required header lines, and must be in the correct order.

Amplitude CorrectionData file type name
"Correction Factors for 11966E"File Description
"Class B Radiated"Comment
A.01.00.R0001,N9020AInstrument Version, Model Number
P13 EA3 UK6,01   Option List, File Format Version

Corrections files may include Antenna amplitude units. This amplitude unit in the Antenna Unit field is a conversion factor that is used to adjust the Y Axis Units of the current mode, if the mode supports Antenna Units. For more details on antenna correction data, refer to the Input/Output chapter, Corrections section.

The metadata required to properly import the correction data is:

- Frequency Unit for the x axis data

- Antenna Unit for the y axis data (not required)

- Frequency Interpolation algorithm – either Logarithmic or Linear

The data follows as comma separated X, Y pairs; one pair per line. The keyword "DATA" precedes the data.

For example, suppose you have an Antenna to correct for on an E4445A version A.01.00 R0011 and the correction data is:

- 0 dB at 200 MHz

- 17 dB at 210 MHz

- 14.8 dB at 225 MHz

Then the file will look like:

- Amplitude Correction

- "Correction Factors for 11966E"

- "Class B Radiated"

- A.01.00 R0011,N9020A

- P13 EA3 UK6,01

- Frequency Unit,MHz

- Antenna Unit,dBuV/m

- Frequency Interpolation,Linear

- DATA

- 200.000000,0.00

- 210.000000,17.00

- 225.000000,14.80

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The choices for the 1 of N fields in the metadata are as follows:

- Frequency Unit: Hz, kHz, MHz, GHz

- Antenna Unit: dBuv/m, dBuA/m, dBG, dBpT, None

- Frequency Interpolation: Logarithmic, Linear

Amplitude Correction 1, 2, 3, 4

These keys let you pick which Correction to save. Once selected, the key returns back to the Export Data menu and the selected Correction number is annotated on the key.

The next step in the Save process is to select the Save As key in the Export Data menu.

Key Path	Save, Data, Amplitude Correction
Preset	Not part of a Preset, but is reset to Correction 1 by Restore Input/Output Defaults. Survives a shutdown.
Readback	1
Initial S/W Revision	A.02.00

Save

Single (Single Measurement/Sweep)

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.

Key Path	**Front-panel key**
Example	:INIT:CONT OFF
Notes	See **Cont** key description.
Initial S/W Revision	Prior to A.02.00

Single (Single Measurement/Sweep)

Source

This mode does not have any Source control functionality.

Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

Trigger

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, and so forth.

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.

Key Path	**Front-panel key**

Remote Command	`:TRIGger:<measurement>[:SEQuence]:SOURce`
	`EXTernal1|EXTernal2|IMMediate|LINE|FRAMe|RFBurst|VIDeo|`
	`IF|ALARm|LAN|IQMag|IDEMod|QDEMod|IINPut|QINPut|AIQMag`
	
	`:TRIGger:<measurement>[:SEQuence]:SOURce?`

Example	TRIG:ACP:SOUR EXT1 Selects the external 1 trigger input for the ACP measurement and the selected input TRIG:SOUR VID Selects video triggering for the SANalyzer measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword.

Notes	Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.
	Not all trigger sources are available for each input. See the "RF Trigger Source" on page 488 and "I/Q Trigger Source" on page 489 commands for detailed information on which trigger sources are available for each input.
	Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.
	*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.
	Available ranges and presets can vary from mode to mode.
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message.
Preset	See table below
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.
Backwards Compatibility SCPI	[:SENSe]:<measurement>:TRIGger:SOURce
	This backwards compatibility command does not apply to the Swept SA measurement, for that just use :TRIGger:SOURce
	This backwards compatibility command does not apply to the monitor spectrum, log plot and spot frequency measurements at all.
	The backwards Compatibility SCPI command, [:SENSe]:ACPR:TRIGger:SOURce, is provided to support the same functionality as [:SENSe]:ACPr:TRIGger:SOURce (PSA W-CDMA, PSA cdma2000 and PSA 1xEVDO) due to the fact that the ACPr node conflicts with the ACPower node.
	In earlier instruments, the parameter IF was used by apps for the video trigger, so using the IF enum selects video triggering.
	Sending IF in the command causes VID to be returned to a query.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

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, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	IMM	IQ not supported	
OBW	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, LTE, LTETDD, CMMB, ISDB-T	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, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	WIMAXOFDMA: RFBurst LTETDD: BTS: External 1 MS: Periodic Timer TD-SCDMA and 1xEV-DO: BTS: External 1 MS: RFBurst SA, WCDMA, C2K, LTE, CMMB, ISDB-T, DVB-T/H, DTMB, Digital Cable TV: IMMediate	TD-SCDMA and 1xEV-DO: BTS: External 1 MS: IQMag LTETDD: BTS: External 1 MS: Periodic Timer 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.

Meas	Mode	Preset for RF	Preset for IQ	Notes
ACP	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	IMM	IQ not supported	
Tx Power	SA, GSM, TD-SCDMA	SA, GSM: RFBurst TD-SCDMA: EXTernal	IMM	TD-SCDMA doesn't support the Line and Periodic Timer parameters. When the mode is TD-SCDMA, if the Radio Device is switched to BTS, the value will be changed to External 1 and if the Radio device is switched to MS, the value will be changed to RFBurst
SPUR	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA,1xEV-DO, DVB-T/H, LTE, LTETDD	IMM	IQ not supported	
SEM	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	1xEVDO(BTS): EXTernal1 All others: IMMediate	IQ not supported	
CDP	WCDMA	IMM	IMM	
RHO	WCDMA	IMM	IMM	
PCON	WCDMA	IMM	IMM	
QPSK	WCDMA, C2K, 1xEVDO	All except CDMA1xEVDO: IMMediate CDMA1xEVDO: EXT1	IMM	
MON	All except SA and BASIC	IMM	IQ not supported	

Meas	Mode	Preset for RF	Preset for IQ	Notes
WAV		LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: RFBurst All others: IMMediate	LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: IQMag All others: IMMMediate	
PVT	WIMAXOFDMA	RFB	IMM	
EVM	WIMAXOFDMA, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV	All but CMMB: IMM CMMB: Periodic Timer	All but CMMB: IMM CMMB: External 1	LTE, LTETDD supports Free Run, Video and External 1 only.
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	RF Burst	IQ not supported	
EDGE PVT	EDGE/GSM	RFB	IMM	
EDGE EVM	EDGE/GSM	RFB	IQMag	
EDGE ORFS	EDGE/GSM	Periodic Timer	IQ not supported	
Combined WCDMA	WCDMA	IMM	IQ not supported	
Combined GSM	EDGE/GSM	RFB	IQ not supported	

Meas	Mode	Preset for RF	Preset for IQ	Notes
List Power Step	WCDMA, EDGE/GSM	IMM	IQ not supported	
Transmit On/Off Power	LTETDD	LTETDD: BTS: External 1 MS: Periodic Timer	LTETDD: BTS: External 1 MS: Periodic Timer	
Transmit Analysis	BLUETOOTH	RFB	IQ not supported	
Adjacent Channel Power	BLUETOOTH	IMM	IQ not supported	
LE In-band Emissions	BLUETOOTH	IMM	IQ not supported	
EDR In-band Spurious Emissions	BLUETOOTH	Periodic Timer	IQ not supported	

RF Trigger Source

The **RF Trigger Source** command selects the trigger to be used for the specified measurement when RF is the selected input. The RF trigger source can be queried and changed even while another input is selected, but it is inactive until RF becomes the selected input.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

Remote Command	`:TRIGger:<measurement>[:SEQuence]:RF:SOURce EXTernal1│EXTernal2│IMMediate│LINE│FRAMe│RFBurst│VIDeo│ IF│ALARm│LAN`
	
	`:TRIGger:<measurement>[:SEQuence]:RF:SOURce?`

Example	TRIG:ACP:RF:SOUR EXT1 Selects the external 1 trigger input for the ACP measurement and the RF input TRIG:RF:SOUR VID Selects video triggering for the SANalyzer measurement and the RF input. For SAN, do not use the <measurement> keyword.

Notes	Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.
	Not all trigger sources are available for each input. For the **RF Trigger Source,** the following trigger sources are available:
	— IMMediate - free run triggering
	— VIDeo - triggers on the video signal level
	— LINE - triggers on the power line signal
	— EXTernal1 - triggers on an externally connected trigger source marked "Trigger 1 In" on the rear panel
	— EXTernal2 - triggers on an externally connected trigger source marked "Trigger 2 In" on the front panel. In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message
	— RFBurst - triggers on the bursted frame
	— FRAMe - triggers on the periodic timer
	— IF (video) - same as video, for backwards compatibility only
	— ALARm – LXI Alarm
	— LAN – LXI LAN event
	*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.
	Available ranges, and presets can vary from mode to mode.
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.
Backwards Compatibility SCPI	In earlier instruments, the parameter IF was used by apps for the video trigger, so using the IF enum selects video triggering.
	Sending IF in the query returns the VID enum.
Initial S/W Revision	Prior to A.02.00

I/Q Trigger Source

This command 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|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
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, an from mode to mode.d presets can vary
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.
Initial 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

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.
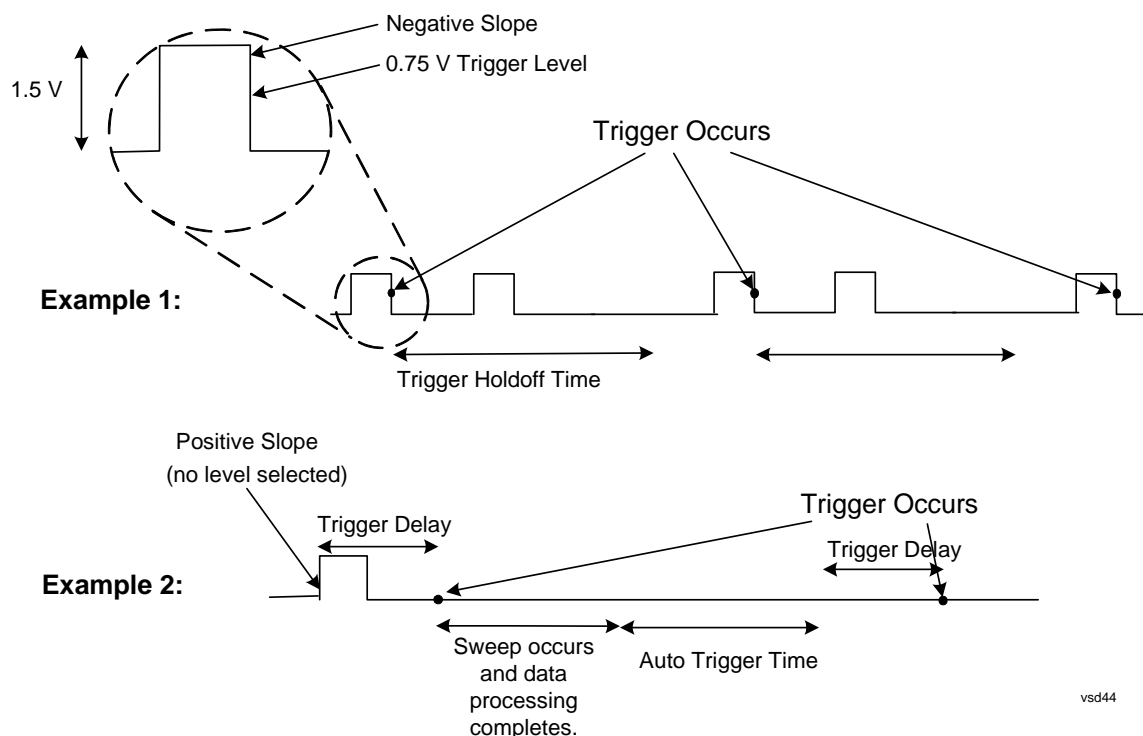
Free Run

Pressing this key, when it is not selected, selects free-run triggering. Free run triggering occurs immediately after the sweep/measurement is initiated.

Key Path	**Trigger**
Example	TRIG:SOUR IMM Swept SA measurement TRIG:<meas>:SOUR IMM Measurements other than Swept SA
State Saved	Saved in instrument state
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.
Initial 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.

NOTE	When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

The video trigger level is shown as a labeled line on the display. The line is displayed as long as video is the selected trigger source.

Pressing this key, when it is already selected, accesses the video trigger setup functions.

Key Path	**Trigger**
Example	TRIG:SOUR VID Swept SA measurement TRIG:<meas>:SOUR VID Measurements other than Swept SA
Notes	Log Plot and Spot Frequency measurements do not support Video Trigger
Dependencies	Video trigger is allowed in average detector mode.
State Saved	Saved in instrument state
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.

Initial 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.

Key Path	**Trigger, Video**
Remote Command	:TRIGger[:SEQuence]:VIDeo:LEVel <ampl>
	:TRIGger[:SEQuence]:VIDeo:LEVel?
Example	TRIG:VID:LEV –40 dBm
Notes	When sweep type = FFT, the video trigger uses the amplitude envelope in a bandwidth wider than the FFT width as a trigger source. This might often be useful, but does not have the same relationship between the displayed trace and the trigger level as in swept triggering.
	Amplitude Corrections are not taken into account by the Video Trig Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Video Trigger will not fire until you have dropped the trigger line that far below the displayed signal level, rather than simply dropping it down to the displayed signal level.
	Note that other corrections, specifically External Gain and Ref Level Offset, modify the actual trace data as it is taken and therefore ARE taken into account by Trig Level.
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.
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	–170 dBm
Max	+30 dBm
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:IF:LEVel
	:TRIGger[:SEQuence]:IF:LEVel?
Backwards Compatibility SCPI	For backward compatibility with VSA/PSA comms apps, we need this alias.
Initial S/W Revision	Prior to A.02.00
Default Unit	depends on the current selected Y axis unit

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a

falling edge.

Key Path	**Trigger, Video**
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
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:SLOPe
	:TRIGger[:SEQuence]:IF:SLOPe
Backwards Compatibility SCPI	For backward compatibility, the following commands should update all instances of trigger slope (video/external/line). The query returns the trigger slope setting of the selected trigger source.
	:TRIGger[:SEQuence]:SLOPe POSitive|NEGative
	:TRIGger[:SEQuence]:SLOPe?
	For backward compatibility with VSA/PSA comms apps, we need to alias :TRIGger[:SEQuence]:IF:SLOPe NEGative|POSitive
	:TRIGger[:SEQuence]:IF:SLOPe?
Initial S/W Revision	Prior to A.02.00

Trig Delay

Controls a time delay during that the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in the time domain or FFT, but not in swept spans.

Key Path	**Trigger, Video**
Remote Command	:TRIGger[:SEQuence]:VIDeo:DELay <time>
	:TRIGger[:SEQuence]:VIDeo:DELay?
	:TRIGger[:SEQuence]:VIDeo:DELay:STATe OFF|ON|0|1
	:TRIGger[:SEQuence]:VIDeo:DELay:STATe?
Example	TRIG:VID:DEL:STAT ON
	TRIG:VID:DEL 100 ms
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.

Preset	Off, 1 us
State Saved	Saved in instrument state
Min	–150 ms
Max	+500 ms
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:IF:DELay
	:TRIGger[:SEQuence]:DELay
Backwards Compatibility SCPI	For backward compatibility with VSA/PSA comms apps, we need to alias Video trigger to
	:TRIGger[:SEQuence]:IF:DELay <time>
	:TRIGger[:SEQuence]:IF:DELay?
	For backward compatibility, the following commands should update all instances of trigger delay (not including RF Burst). The query returns the video trigger delay settings of the selected trigger source.
	:TRIGger[:SEQuence]:DELay <time>
	:TRIGger[:SEQuence]:DELay?
	:TRIGger[:SEQuence]:DELay:STATe OFF|ON|0|1
	:TRIGger[:SEQuence]:DELay:STATe?
	Also, the legacy ESA command for trigger offset, TRIGger[:SEQuence]:OFFSet, is supported (see section "Trigger Offset (Remote Command Only)" on page 543). The offset specified by this commands is remembered by the analyzer and added to the video trigger delay whenever the value is sent to the hardware, when in zero span and in a Res BW >= 1 kHz.
Initial S/W Revision	Prior to A.02.00
Default Unit	s

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.

Key Path	**Trigger**	
Example	TRIG:SOUR LINE	Swept SA measurement
	TRIG:<meas>:SOUR LINE	Measurements other than Swept SA
Dependencies	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	

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.
Initial 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.

Key Path	**Trigger, Line**
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
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:SLOPe (There are SLOPe backward compatibility commands.)
Initial 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.

Key Path	**Trigger, Line**
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

Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	–150 ms
Max	500 ms
Backwards Compatibility SCPI	There are DELay backward compatibility commands described in video, Section "Trig Delay " on page 494)
	:TRIGger[:SEQuence]:DELay
	(Also, the legacy ESA command for trigger offset, TRIGger[:SEQuence]:OFFSet, is supported. See section "Trigger Offset (Remote Command Only)" on page 543. The offset specified by this commands is remembered by the analyzer and added to the line trigger delay whenever the value is sent to the hardware, when in zero span and in a Res BW >= 1 kHz.)
Initial S/W Revision	Prior to A.02.00
Default Unit	S

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.

Key Path	**Trigger**
Example	TRIG:SOUR EXT1 Swept SA measurement
	TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA
Dependencies	Grayed out if in use by Point Trigger in the Source Setup menu.
	Forced to Free Run if already selected and Point Trigger is set to External 1.
State Saved	Saved in instrument state

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.
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

Key Path	**Trigger, External 1**
Remote Command	:TRIGger[:SEQuence]:EXTernal1:LEVel <level>
	:TRIGger[:SEQuence]:EXTernal1:LEVel?
Example	TRIG:EXT1:LEV 0.4 V
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
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:EXTernal:LEVel
	(For backward compatibility, EXTernal should also work.)
Initial S/W Revision	Prior to A.02.00
Default Unit	V

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	**Trigger, External 1**
Remote Command	:TRIGger[:SEQuence]:EXTernal1:SLOPe POSitive|NEGative
	:TRIGger[:SEQuence]:EXTernal1:SLOPe?
Example	TRIG:EXT1:SLOP NEG
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
Backwards Compatibility SCPI	For backward compatibility, EXTernal should also work.
	Also, there are SLOPe backward compatibility cmds described in Video section "Trig Slope " on page 493 :TRIGger[:SEQuence]:SLOPe
Initial 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.

Key Path	**Trigger, External 1**
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
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	–150 ms
Max	+500 ms

Backwards Compatibility SCPI	For backward compatibility, EXTernal should also work.
	Also, there are DELay backward compatibility commands described in video section "Trig Delay " on page 494
	:TRIGger[:SEQuence]:DELay
	Also, the legacy ESA command for trigger offset, TRIGger[:SEQuence]:OFFSet, is supported (see section "Trigger Offset (Remote Command Only)" on page 543). The offset specified by this commands is remembered by the analyzer and added to the external1 trigger delay whenever the value is sent to the hardware, when in zero span and in a Res BW >= 1 kHz.
Initial S/W Revision	Prior to A.02.00
Default Unit	s

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.

Key Path	**Trigger**
Example	TRIG:SOUR EXT2 Swept SA measurement
	TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message.
	Grayed out if in use by Point Trigger in the Source Setup menu.
	Forced to Free Run if already selected and Point Trigger is set to External 2.
State Saved	Saved in instrument state
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.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

Key Path	**Trigger, External 2**
Remote Command	:TRIGger[:SEQuence]:EXTernal2:LEVel
	:TRIGger[:SEQuence]:EXTernal2:LEVel?
Example	TRIG:EXT2:LEV 1.1 V
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
Initial S/W Revision	Prior to A.02.00
Default Unit	V

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	**Trigger, External 2**
Remote Command	:TRIGger[:SEQuence]:EXTernal2:SLOPe POSitive|NEGative
	:TRIGger[:SEQuence]:EXTernal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG
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
Backwards Compatibility SCPI	Also, there are SLOPe backward compatibility commands described in Video, section :TRIGger[:SEQuence]:SLOPe
Initial 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.

Key Path	Trigger, External 2
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
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	–150 ms
Max	500 ms
Backwards Compatibility SCPI	Also, there are DELay backward compatibility commands described in video section "Trig Delay " on page 494.
	:TRIGger[:SEQuence]:DELay
	Also, the legacy ESA command for trigger offset, TRIGger[:SEQuence]:OFFSet, is supported (see section "Trigger Offset (Remote Command Only)" on page 543). The offset specified by this commands is remembered by the analyzer and added to the external2 trigger delay whenever the value is sent to the hardware, when in zero span and in a Res BW >= 1 kHz.
Initial S/W Revision	Prior to A.02.00
Default Unit	s

RF Burst

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.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the

hardware configuration and other settings of the analyzer.

Key Path	**Trigger**
Example	TRIG:SOUR RFB Swept SA measurement
	TRIG:<meas>:SOUR RFB Measurements other than Swept SA
State Saved	Saved in instrument state
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.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

Key Path	**Trigger, RF Burst**
Scope	Meas Global
Remote Command	:TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl>
	:TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute?
Example	TRIG:RFB:LEV:ABS 10 dBm
	sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm
Notes	Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below.
	Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions.
	If mode is Bluetooth, the default value os –50 dBm.
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	–20 dBm

State Saved	Saved in state
Min	–200 dBm
Max	100 dBm
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00
Default Unit	depends on the current selected Y-Axis unit

Key Path	**Trigger, RF Burst**
Remote Command	`:TRIGger[:SEQuence]:RFBurst:LEVel:TYPE ABSolute|RELative`
	`:TRIGger[:SEQuence]:RFBurst:LEVel:TYPE?`
Example	TRIG:RFB:LEV:TYPE REL
	sets the trigger level type of the RF burst trigger to Relative.
Preset	ABSolute
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function 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 the user. 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)

Steps 2 and 3 repeat for subsequent measurements.

Key Path	**Trigger, RF Burst**

Scope	Meas Global
Remote Command	:TRIGger[:SEQuence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:RELative?
Example	TRIG:RFB:LEV:REL –10 dB sets the trigger level of the RF burst envelope signal to the relative level of –10 dB
Notes	Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent.
Dependencies	This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering.
Preset	–6 dB GSM: –25 dB
State Saved	Saved in instrument state
Min	–45 dB
Max	0 dB
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:RFBurst:LEVel Is aliased to: :TRIGger[:SEQuence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00
Default Unit	dB or dBc

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

Key Path	**Trigger, RF Burst**
Remote Command	:TRIGger[:SEQuence]:RFBurst:SLOPe POSitive|NEGative :TRIGger[:SEQuence]:RFBurst:SLOPe?
Example	TRIG:RFB:SLOP NEG

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
Backwards Compatibility SCPI	Also, there are SLOPe backward compatibility commands described in Video section "Trig Slope " on page 493 :TRIGger[:SEQuence]:SLOPe
Initial 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.

Key Path	**Trigger, RF Burst**
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
Notes	Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	–150 ms
Max	500 ms
Backwards Compatibility SCPI	Also, there are DELay backward compatibility commands described in video section "Trig Delay " on page 494. :TRIGger[:SEQuence]:DELay
Initial S/W Revision	Prior to A.02.00
Default Unit	s

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.

Key Path	**Trigger**
Example	TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA
State Saved	Saved in instrument state
Readback	[Sync: <value of Sync Source>], for example, [Sync: External 1]
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.
Initial 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.)
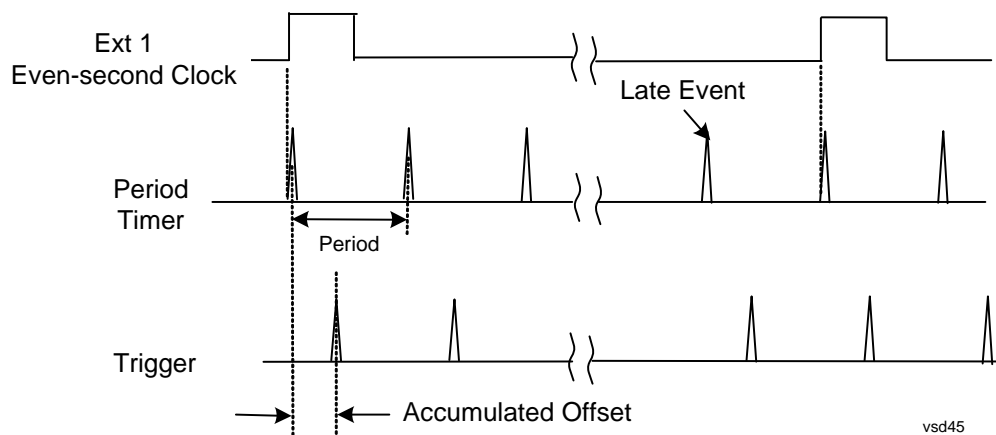
Period

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.

Key Path	**Trigger, Periodic Timer**
Remote Command	:TRIGger[:SEQuence]:FRAMe:PERiod <time>
	:TRIGger[:SEQuence]:FRAMe:PERiod?
Example	TRIG:FRAM:PER 100 ms
Dependencies	The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes.
Couplings	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

Initial S/W Revision	Prior to A.02.00
Default Unit	S

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, 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.

Key Path	**Trigger, Periodic Timer**
Remote Command	:TRIGger[:SEQuence]:FRAMe:OFFSet <time> :TRIGger[:SEQuence]:FRAMe:OFFSet?
Example	TRIG:FRAM:OFFS 1.2 ms
Notes	The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key).
	Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section .
	An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.
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.
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.

Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s
State Saved	Saved in instrument state
Min	–10.000 s
Max	10.000 s
Initial S/W Revision	Prior to A.02.00
Default Unit	S

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command	:TRIGger[:SEQuence]:FRAMe:ADJust <time>
Example	TRIG:FRAM:ADJ 1.2 ms
Notes	Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section "Trig Delay" on page 513
	An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.
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.
Dependencies	The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes.
Couplings	The same offset is used in the Gate Source selection of the period timer.
Preset	0 s
State Saved	Saved in instrument state
Min	–10.000 s
Max	10.000 s
Initial S/W Revision	Prior to A.02.00

Default Unit	S

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.

Key Path	**Trigger, Periodic Timer**
Remote Command	:TRIGger[:SEQuence]:FRAMe:OFFSet:DISPlay:RESet
Example	TRIG:FRAM:OFFS:DISP:RES
Initial 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 which menu it is accessed from.

Key Path	**Trigger, Periodic Timer**
Remote Command	:TRIGger[:SEQuence]:FRAMe:SYNC EXTernal1|EXTernal2|RFBurst|OFF :TRIGger[:SEQuence]:FRAMe:SYNC?
Example	TRIG:FRAM:SYNC EXT2
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message.
Preset	Off GSM/EDGE: RFBurst
State Saved	Saved in instrument state
Readback	The current setting is read back to this key and it is also Readback to the previous **Periodic Timer** trigger key.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

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.

Key Path	**Trigger, Periodic Timer, Sync Source**
Example	TRIG:FRAM:SYNC OFF
Readback	Off
Initial 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.

Key Path	**Trigger, Periodic Timer, Sync Source**
Example	TRIG:FRAM:SYNC EXT
Couplings	Same as External 1 trigger source.
Readback	External 1
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the value where the signal at the external 1 trigger input will synchronize with the periodic timer trigger. This same level is used in the Ext1 trigger source in the Trigger menu. See section "Trigger Level " on page 498 for information on this key and the SCPI command.

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge. This same value is used in the Ext1 trigger source in the Trigger menu. See section "Trig Slope " on page 498 for information on this key and the SCPI command

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.

Key Path	**Trigger, Periodic Timer, Sync Source**
Example	TRIG:FRAM:SYNC EXT2
Dependencies	In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message.
Couplings	Same as External 2 trigger source.

Readback	External 2
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Trigger Level

Sets the value where the signal at the external 2 trigger input will synchronize with the periodic timer trigger. This same level is used in the Ext2 trigger source in the Trigger menu. See section "Trigger Level " on page 501 for information on this key and the SCPI command.

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge. This same value is used in the Ext2 trigger source in the Trigger menu. See section "Trig Slope " on page 501 for information on this key and the SCPI command

RF Burst

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.

Key Path	**Trigger, Periodic Timer, Sync Source**
Example	TRIG:FRAM:SYNC RFB
Couplings	Same as RF Burst trigger source.
Readback	RF Burst
Initial S/W Revision	Prior to A.02.00

Trigger Level

Sets the trigger level to be used for the RF Burst trigger. This same level is used in the RF Burst trigger source in the Trigger menu. See section "Absolute Trigger Level" on page 503 for information on this key and the SCPI command.

Trig Slope

Controls the RF Burst trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge. This same value is used in the RF Burst trigger source in the Trigger menu. See section "Trigger Slope " on page 505 for information on this key and the SCPI command

Trig Delay

This setting delays the measurement timing relative to the Periodic Timer.

Key Path	**Trigger, 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?`
Notes	Note that delay is used when the sync source is not set to OFF. If the sync source is set to OFF, offset is used.
Preset	Off, 1.000 us
State Saved	Saved in instrument state
Min	–150 ms
Max	+500 ms
Initial S/W Revision	Prior to A.02.00
Default Unit	s

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

Key Path	**Trigger, Periodic Timer**
Remote Command	`:TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff <time>`
	`:TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff?`
	`:TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe OFF│ON│0│1`
	`:TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe?`
Preset	On, 1.000 ms
State Saved	Saved in instrument state
Min	0 ms
Max	+500 ms
Initial S/W Revision	Prior to A.02.00
Default Unit	s

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.

NOTE	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	**Trigger**
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"
Initial 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 514). Pressing this key when it is already selected accesses the LAN trigger setup menu.

NOTE	Pressing this key causes Enabled LXI Alarm Triggers to be ignored, since the Trigger source is changed to LXI LAN Event.

Key Path	**Trigger, LXI Trigger**
Example	TRIG:SOUR LAN Swept SA measurement TRIG:<meas>:SOUR LAN Measurements other than Swept SA
Preset	ON
State Saved	Saved in instrument state
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.
Initial 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.

Key Path	**Trigger, LXI Trigger, LAN Event**
Remote Command	`:TRIGger[:SEQuence]:LXI:LAN:DISable:ALL`
Example	:TRIG:LXI:LAN:DIS:ALL
Initial S/W Revision	Prior to A.02.00

LAN Event List

After selecting LAN as the trigger source, the user is 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.

Key Path	**Trigger, LXI Trigger, LAN Event**
Remote Command	`:TRIGger[:SEQuence]:LXI:LAN:LIST?`
Example	:TRIG:LXI:LAN:LIST? Returns the complete list of Trigger LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7"
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).
Initial S/W Revision	Prior to A.02.00

Detection

Pressing this key accesses 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.

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	`:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection "LANEVENT",` `HIGH|LOW|RISE|FALL`
Example	:TRIG:LXI:LAN:DET "LAN0",HIGH

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
Readback	Currently selected detection type
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:LAN[:SET]:DETection? "LANEVENT"
Example	:TRIG:LXI:LAN:DET? "LAN0"?
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
Readback	Currently selected detection type
Initial 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.

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:LAN[:SET]:DELay "LANEVENT",<time>
Example	:TRIG:LXI:LAN:DEL "LAN0",5S
Preset	0.0 s
State Saved	Saved in instrument state
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:LAN[:SET]:DELay? "lanEvent"
Example	:TRIG:LXI:LAN:DEL? "LAN0"

Preset	0.0 s
State Saved	Saved in instrument state
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial 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.

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	`:TRIGger[:SEQuence]:LXI:LAN[:SET]:ENABled "LANEVENT",ON|OFF|1|0`
Example	:TRIG:LXI:LAN:ENAB "LAN0",ON
Preset	OFF
State Saved	Saved in instrument state
Range	OFF|ON|0|1
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, LAN Event, <lanEvent>**
Remote Command	`:TRIGger[:SEQuence]:LXI:LAN[:SET]:ENABled? "LANEVENT"`
Example	:TRIG:LXI:LAN:ENAB? "LAN0"
Preset	OFF
State Saved	Saved in instrument state
Range	OFF|ON|0|1
Initial S/W Revision	Prior to A.02.00

Add (Remote Command 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"

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.
State Saved	Saved in instrument state
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Initial S/W Revision	Prior to A.02.00

Remove (Remote Command 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.

Remote Command	:TRIGger[:SEQuence]:LXI:LAN:REMove[:EVENt] "LANEVENT"
Example	:TRIG:LXI:LAN:REM "LANEVENT"
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.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Initial S/W Revision	Prior to A.02.00

Remove All (Remote Command 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.

Remote Command	:TRIGger[:SEQuence]:LXI:LAN:REMove:ALL
Example	:TRIG:LXI:LAN:REM:ALL
Notes	This command modifies the LXI Trigger LAN Event List Parameter.
Initial S/W Revision	Prior to A.02.00

Event Filter (Remote Command Only)

Only LXI Trigger LAN Events coming from hosts matching the filter string are processed. There is no front panel access to this command

The syntax for specifying a filter is as follows:

Filter == ([host[:port]] | [ALL[:port]]) [,Filter]

Specifying an empty string means that LXI trigger packets are accepted as a Trigger from any port on any host on the network via either TCP or UDP.

Specifying only the port means that any host communicating over that port can send events.

Specifying ALL indicates that UDP multicast packets are accepted if they are directed to the Internet Assigned Numbers Authority (IANA) assigned multicast address on the IANA assigned default port, or the designated port if specified.

Examples:

"192.168.0.1:23"

"agilent.com, soco.agilent.com"

"agilent.com:80, 192.168.0.1"

The TRIGger:LXI:LAN:FILTer command applies only to trigger events and will have no effect on state events, even when both are tied to the same event name (like "LAN0"). Similarly, the LXI:EVENt:INPut:LAN:FILTer command applies only to state events and will have no effect on trigger events.

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?
Notes	The maximum length of the string is 45 characters. Nothing happens if the LAN event does not exist.
Preset	"" (empty string)
State Saved	Saved in instrument state
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

Count (Remote Command 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?
Initial 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 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"
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
Initial 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	:TRIGger[:SEQuence]:LXI:LAN[:SET]:CONFigure "lanEvent", <enable>, <detection>, <delay>,<filter>,<identifier>
Example	:TRIG:LXI:LAN:CONF "LAN0",1,FALL,0.0,"ALL","debugIdentifier"
Initial 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 514). Pressing this key when it is already selected accesses the alarm source selection menu.

Key Path	**Trigger, LXI Trigger**
Example	TRIG:ACP:SOUR ALAR
Preset	ON
State Saved	Saved in instrument state

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.
Initial 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)

Key Path	**Trigger, LXI Trigger, Alarm**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm:DISable:ALL
Example	:TRIG:LXI:ALAR:DIS:ALL
Initial S/W Revision	Prior to A.02.00

Alarm List

After selecting Alarm as the trigger source, the user is presented with a list of possible alarms. Pressing an alarm (for example,. "ALARM0") branches to the alarm setup menu.

Key Path	**Trigger, LXI Trigger, Alarm**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm:LIST?
Example	:TRIG:LXI:ALAR:LIST? Returns the complete list of Alarm events which is: "ALARM0"
Preset	"ALARM0"
State Saved	Saved in instrument state
Readback	Displays the value of the LXI Trigger Alarm Enabled parameter (Enabled|Disabled).
Initial 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 (for example, 12/14/2007 at 11:45:15.3456). The Date and Time are represented in the instrument's local time. This is the only way to set an alarm from the front panel.

Epoch time is another type of absolute alarm time. A specific time is identified by the number of seconds it occurs after January 1, 1970 00:00:00 in International Atomic Time (TAI). Epoch Time is time zone invariant. Epoch time is only set via remote; see "Epoch Time Value (Remote Command Only)" on page 525.

The date and time the alarm is scheduled to go off is noted on the branch softkey.

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	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Readback	Annotated with the date and time the alarm is scheduled to go off.
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>,Time**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolute "alarmEvent","date","time"
Example	:TRIG:LXI:ALAR:TIME:ABS "ALARM0","2007/4/6", "15:45:02.123456"
Notes	"date" is a representation of the date the alarm should occur in the form of "YYYY/MM/DD" where: • YYYY is the four digit representation of year. (for example, 2007) • MM is the two digit representation of month. (for example. 01 to 12) • DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year) "time" is a representation of the time of day the alarm should occur in the form of "HH:MM:SS.SSSSSS" where: • HH is the two digit representation of the hour in 24 hour format • MM is the two digit representation of minute • SS.SSSSSS is a real representing seconds (for example 02.123456)
Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>,Time**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:ABSolute? "alarmEvent"

Example	:TRIG:LXI:ALAR:TIME:ABS? "ALARM0"
	This query returns data using the following format "YYYY/MM/DD HH:MM:SS.SSSSSS" If the Absolute time has been changed from the front panel, but has not been applied, the return value is of the form "YYYY/MM/DD HH:MM:SS.SSSSSS (epoch time not set)".
Notes	<date> is a representation of the date the alarm should occur in the form of
	YYYY/MM/DD where:
	• YYYY is the four digit representation of year. (for example, 2007)
	• MM is the two digit representation of month. (for example. 01 to 12)
	• DD is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31 depending on the month and year)
	<time> is a representation of the time of day the alarm should occur in the form of HH:MM:SS.SSSSSS where:
	• HH is the two digit representation of the hour in 24 hour format
	• MM is the two digit representation of minute
	• SS.SSSSSS is a real representing seconds (for example 02.123456)
Preset	Current date at initialization at 00:00:00.000000
State Saved	Saved in instrument state
Initial 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	**Trigger, LXI Trigger, Alarm, <alarmEvent>,Time**
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.
Initial 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.

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>,Time**
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.
Preset	00:00:00.000000
State Saved	Saved in instrument state
Range	00:00:00.000000 – 23:59:59.999999
Initial S/W Revision	Prior to A.02.00

Apply

Causes the Absolute Alarm Time values to be converted into an Epoch time (see "Epoch Time Value (Remote Command Only)" on page 525), 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.

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>,Time**
Notes	Alarm times are settable to microsecond resolution.
Initial S/W Revision	Prior to A.02.00

Epoch Time Value (Remote Command 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.

Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue] "alarmEvent",<seconds>, <fractionalSeconds>
Example	:TRIG:LXI:ALAR:TIME "ALARM0",123456.0 S, 0.123456
Notes	Values representing a time in the past result in an error.
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
Initial S/W Revision	Prior to A.02.00

Remote Command	`:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]?`
Example	:TRIG:LXI:ALAR:TIME?
Notes	Values representing a time in the past result in an error.
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
Initial S/W Revision	Prior to A.02.00

Epoch Time Seconds (Remote Command Only)

Sets the seconds portion of the LXI Alarm time. This represents the number of seconds after January 1, 1970 00:00:00 (in TAI time) that the alarm should go off.

Values must be in the form of whole seconds; decimal values result in an error.

Remote Command	`:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME:SEConds "alarmEvent",<seconds>`
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0",123456.0 S
Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
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
Initial S/W Revision	Prior to A.02.00

Remote Command	`:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME:SEConds? "alarmEvent"`
Example	:TRIG:LXI:ALAR:TIME:SEC "ALARM0"?
Notes	Values representing a time in the past result in an error. Values containing a decimal portion result in an error.
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
Initial S/W Revision	Prior to A.02.00

Epoch Time Fraction (Remote Command Only)

Sets the sub-second value of the Epoch time.

Remote Command	`:TRIGger[:SEQuence]:LXI:ALARm[:SET]:TIME[:VALue]:FRACtion "alarmEvent",<fractionalSeconds>`
Example	:TRIG:LXI:ALAR:TIME:FRAC "ALARM0",0.123456 S
Notes	Values representing a time in the past result in an error.
Preset	0
State Saved	Saved in instrument state
Range	0.0 – 0.999999
Initial 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"?
Notes	Values representing a time in the past result in an error.
Preset	0
State Saved	Saved in instrument state
Min	0.0
Max	0.999999
Initial S/W Revision	Prior to A.02.00

Relative Time (Remote Command 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
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial 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"?
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial S/W Revision	Prior to A.02.00

Period

Sets the amount of time that should elapse between alarms in a repeating alarm trigger.

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:PERiod "alarmEvent",<seconds>
Example	:TRIG:LXI:ALAR:PER "ALARM0",1.2345 s
Notes	A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously
Preset	0.0 s
State Saved	Saved in instrument state
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:PERiod? "alarmEvent"
Example	:TRIG:LXI:ALAR:PER "ALARM0"?
Notes	A period of 0.0s effectively causes the trigger to occur only once, since all repetitions are fired simultaneously
Preset	0.0 s
State Saved	Saved in instrument state
Range	0.0 – 1.7976931348623157 x 10308 (Max Double)
Initial 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.

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:REPeat "alarmEvent",<repetitions>

Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Notes	A repetition value of 0 means infinite repetitions (zero is a special case, triggers at the given period indefinitely)
	A repetition value of 1 means 1 trigger only, not the intial trigger + 1 repeat
Preset	1
State Saved	Saved in instrument state
Range	1 – 2,147,483,647
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:REPeat? "alarmEvent"
Example	:TRIG:LXI:ALAR:REP "ALARM0",10
Preset	1
State Saved	Saved in instrument state
Min	1
Max	2,147,483,647
Initial 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

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:ENABled "alarmEvent",ON|OFF|1|0
Example	:TRIG:LXI:ALAR:ENAB "ALARM0",ON
Preset	OFF
State Saved	Saved in instrument state
Range	1|0
Initial S/W Revision	Prior to A.02.00

Key Path	**Trigger, LXI Trigger, Alarm, <alarmEvent>**
Remote Command	:TRIGger[:SEQuence]:LXI:ALARm[:SET]:ENABled? "alarmEvent"

Example	:TRIG:LXI:ALAR:ENAB "ALARM0"?
Preset	OFF
State Saved	Saved in instrument state
Range	1|0
Initial 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	: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
Initial S/W Revision	Prior to A.02.00

Count (Remote Command Only)

Returns the number of alarms in the LXI Trigger Alarm List.

Remote Command	:TRIGger1|TRIGger[:SEQuence]:LXI:ALARm:COUNt?
Example	:TRIG:LXI:ALAR:COUN?
Initial 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	**Trigger**
State Saved	Saved in instrument state
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".
Initial 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.

Key Path	**Trigger, Baseband I/Q**
Example	TRIG:<meas>:SOUR IQM
Readback Text	I/Q Mag
Initial 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.

Key Path	**Trigger, Baseband I/Q, I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:IQMag:LEVel <ampl > :TRIGger[:SEQuence]:IQMag:LEVel?
Example	TRIG:IQM:LEV –30 dBm
Notes	The I/Q reference impedance is used for converting between power and voltage.
Preset	–25 dBm
State Saved	Saved in instrument state
Range	–200 dBm to 100 dBm
Readback Text	<level> dBm
Initial 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.

Key Path	**Trigger, Baseband I/Q, I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:IQMag:SLOPe POSitive | NEGative :TRIGger[:SEQuence]:IQMag:SLOPe?
Example	TRIG:IQM:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	**Trigger, Baseband I/Q, I/Q Mag**

Remote Command	`:TRIGger[:SEQuence]:IQMag:DELay <time>`
	`:TRIGger[:SEQuence]:IQMag:DELay?`
	`:TRIGger[:SEQuence]:IQMag:DELay:STATe OFF|ON|0|1`
	`:TRIGger[:SEQuence]:IQMag:DELay:STATe?`

Example	TRIG:IQM:DEL 10 ms TRIG:IQM:DEL:STAT ON
Preset	1 us OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial 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.

Key Path	**Trigger, Baseband I/Q**
Example	TRIG:<meas>:SOUR IDEM
Readback Text	I
Initial 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.

Key Path	**Trigger, Baseband I/Q, I (Demodulated)**
Remote Command	`:TRIGger[:SEQuence]:IDEMod:LEVel <voltage>` `:TRIGger[:SEQuence]:IDEMod:LEVel?`
Example	TRIG:IDEM:LEV 0.5 V
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.)
Initial 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.

Key Path	**Trigger, Baseband I/Q, I (Demodulated)**
Remote Command	:TRIGger[:SEQuence]:IDEMod:SLOPe POSitive | NEGative
	:TRIGger[:SEQuence]:IDEMod:SLOPe?
Example	TRIG:IDEM:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	**Trigger, Baseband I/Q, I (Demodulated)**
Remote Command	:TRIGger[:SEQuence]:IDEMod:DELay <time>
	:TRIGger[:SEQuence]:IDEMod:DELay?
	:TRIGger[:SEQuence]:IDEMod:DELay:STATe OFF|ON|0|1
	:TRIGger[:SEQuence]:IDEMod:DELay:STATe?
Example	TRIG:IDEM:DEL 10 ms
	TRIG:IDEM:DEL:STAT ON
Preset	1 us
	OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial 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.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR QDEM
Readback Text	Q
Initial 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.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEQuence]:QDEMod:LEVel <voltage>
	:TRIGger[:SEQuence]:QDEMod:LEVel?
Example	TRIG:QDEM:LEV 0.5 V
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.)
Initial 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.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEQuence]:QDEMod:SLOPe POSitive | NEGative
	:TRIGger[:SEQuence]:QDEMod:SLOPe?
Example	TRIG:QDEM:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	Trigger, Baseband I/Q, Q (Demodulated)
Remote Command	:TRIGger[:SEQuence]:QDEMod:DELay <time> :TRIGger[:SEQuence]:QDEMod:DELay? :TRIGger[:SEQuence]:QDEMod:DELay:STATe OFF|ON|0|1 :TRIGger[:SEQuence]:QDEMod:DELay:STATe?
Example	TRIG:QDEM:DEL 10 ms TRIG:QDEM:DEL:STAT ON
Preset	1 us OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial 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.

Key Path	Trigger, Baseband I/Q
Example	TRIG:<meas>:SOUR IINP
Readback Text	Input I
Initial 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.

Key Path	Trigger, Baseband I/Q, Input I
Remote Command	:TRIGger[:SEQuence]:IINPut:LEVel <voltage> :TRIGger[:SEQuence]:IINPut:LEVel?
Example	TRIG:IINP:LEV 0.5 V
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.)

Initial 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.

Key Path	**Trigger, Baseband I/Q, Input I**
Remote Command	:TRIGger[:SEQuence]:IINPut:SLOPe POSitive | NEGative
	:TRIGger[:SEQuence]:IINPut:SLOPe?
Example	TRIG:IINP:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	**Trigger, Baseband I/Q, Input I**
Remote Command	:TRIGger[:SEQuence]:IINPut:DELay <time>
	:TRIGger[:SEQuence]:IINPut:DELay?
	:TRIGger[:SEQuence]:IINPut:DELay:STATe OFF|ON|0|1
	:TRIGger[:SEQuence]:IINPut:DELay:STATe?
Example	TRIG:IINP:DEL 10 ms
	TRIG:IINP:DEL:STAT ON
Preset	1 us
	OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial 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.

Key Path	**Trigger, Baseband I/Q**
Example	TRIG:<meas>:SOUR QINP

Readback Text	Input Q
Initial 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.

Key Path	**Trigger, Baseband I/Q, Input Q**
Remote Command	`:TRIGger[:SEQuence]:QINPut:LEVel <voltage>`
	`:TRIGger[:SEQuence]:QINPut:LEVel?`
Example	TRIG:QINP:LEV 0.5 V
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.)
Initial 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.

Key Path	**Trigger, Baseband I/Q, Input Q**
Remote Command	`:TRIGger[:SEQuence]:QINPut:SLOPe POSitive	NEGative`
	`:TRIGger[:SEQuence]:QINPut:SLOPe?`
Example	TRIG:QINP:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	**Trigger, Baseband I/Q, Input Q**

Remote Command	`:TRIGger[:SEQuence]:QINPut:DELay <time>`
	`:TRIGger[:SEQuence]:QINPut:DELay?`
	`:TRIGger[:SEQuence]:QINPut:DELay:STATe OFF|ON|0|1`
	`:TRIGger[:SEQuence]:QINPut:DELay:STATe?`
Example	TRIG:QINP:DEL 10 ms
	TRIG:QINP:DEL:STAT ON
Preset	1 us
	OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial 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.

Key Path	**Trigger, Baseband I/Q**
Example	TRIG:<meas>:SOUR AIQM
Readback Text	Aux I/Q Mag
Initial 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.

Key Path	**Trigger, Baseband I/Q, Aux Channel I/Q Mag**
Remote Command	`:TRIGger[:SEQuence]:AIQMag:LEVel <ampl >`
	`:TRIGger[:SEQuence]:AIQMag:LEVel?`
Example	TRIG:AIQM:LEV –30 dBm
Notes	The I/Q reference impedance is used for converting between power and voltage.
Preset	–25 dBm
State Saved	Saved in instrument state
Range	–200 dBm to 100 dBm
Readback Text	<level> dBm

Initial 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.

Key Path	**Trigger, Baseband I/Q, Aux Channel I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:AIQMag:SLOPe POSitive | NEGative :TRIGger[:SEQuence]:AIQMag:SLOPe?
Example	TRIG:AIQM:SLOP POS
Preset	POSitive
State Saved	Saved in instrument state
Initial 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.

Key Path	**Trigger, Baseband I/Q, Aux Channel I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:AIQMag:DELay <time> :TRIGger[:SEQuence]:AIQMag:DELay? :TRIGger[:SEQuence]:AIQMag:DELay:STATe OFF|ON|0|1 :TRIGger[:SEQuence]:AIQMag:DELay:STATe?
Example	TRIG:AIQM:DEL 10 ms TRIG:AIQM:DEL:STAT ON
Preset	1 us OFF
State Saved	Saved in instrument state
Range	–2.5 s to +10 s
Initial S/W Revision	Prior to A.02.00

Trigger Center Frequency

This key sets the center frequency to be used by the auxiliary receiver.

Key Path	**Trigger, Baseband I/Q, Aux Channel I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:AIQMag:CENTer <freq> :TRIGger[:SEQuence]:AIQMag:CENTer?

Example	:TRIG:AIQM:CENT 10 MHz
Notes	Trigger CF + 1/2 Trigger BW < Max
	Trigger CF – 1/2 Trigger BW > Min
Preset	0 Hz
State Saved	Saved in instrument state
Range	–40 MHz to 40 MHz
Initial 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.

Key Path	**Trigger, Baseband I/Q, Aux Channel I/Q Mag**
Remote Command	:TRIGger[:SEQuence]:AIQMag:BANDwidth <freq>
	:TRIGger[:SEQuence]:AIQMag:BANDwidth?
Example	:TRIG:AIQM:BAND 8 MHz
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
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
Initial S/W Revision	Prior to A.02.00

Auto/Holdoff

Opens up a menu that lets you adjust Auto Trigger and Trigger Holdoff parameters

Key Path	**Trigger**

Readback line	Displays a summaryof the Auto Trig and Holdoff settings, in square brackets
	First line: Auto Off or Auto On
	Second Line: "Hldf" followed by:
	• If Holdoff is Off, readback Off
	• If Holdoff On and Type = Normal, readback value
	• If Holdoff On and Type = Above, readback value followed by AL
	• If Holdoff On and Type = Below, readback value followed by BL
	• If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal
Initial 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.

Key Path	**Trigger, Auto/Holdoff**
Remote Command	:TRIGger[:SEQuence]:ATRigger <time>
	:TRIGger[:SEQuence]:ATRigger?
	:TRIGger[:SEQuence]:ATRigger:STATe OFF|ON|0|1
	:TRIGger[:SEQuence]:ATRigger:STATe?
Example	TRIG:ATR:STAT ON
	TRIG:ATR 100 ms
Notes	The "time that the analyzer will wait" starts when the analyzer is ready for a trigger, which may be hundreds of ms after the data acquisition for a sweep is done. The "time" ends when the trigger condition is satisfied, not when the delay ends.
Preset	Off, 100 ms
State Saved	Saved in instrument state
Min	1 ms
Max	100 s
Initial S/W Revision	Prior to A.02.00
Default Unit	s

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.

Key Path	Trigger, Auto/Holdoff
Remote Command	:TRIGger[:SEQuence]:HOLDoff <time> :TRIGger[:SEQuence]:HOLDoff? :TRIGger[:SEQuence]:HOLDoff:STATe OFF|ON|0|1 :TRIGger[:SEQuence]:HOLDoff:STATe?
Example	TRIG:HOLD:STAT ON TRIG:HOLD 100 ms
Preset	Off, 100 ms
State Saved	Saved in instrument state
Min	0 s
Max	0.5 s
Initial S/W Revision	Prior to A.02.00
Default Unit	s

Holdoff Type

Lets you set the Trigger Holdoff Type.

NOTE	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.

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 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.

Key Path	**Trigger, Auto/Holdoff**
Remote Command	:TRIGger[:SEQuence]:HOLDoff:TYPE NORMal|ABOVe|BELow
	:TRIGger[:SEQuence]:HOLDoff:TYPE?
Example	TRIG:HOLD:TYPE NORM
Preset	All modes but GSM/EDGE: Normal
	GSM/EDGE: Below
State Saved	Saved in instrument state
Initial S/W Revision	A.02.00

Trigger Offset (Remote Command Only)

ESA Backwards Compatibility command

Remote Command	: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
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 >= 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 >= 1 kHz.
Preset	Off, 0 s
State Saved	Saved in instrument state
Min	–11 s
Max	+11 s
Initial S/W Revision	Prior to A.02.00

Trigger

View/Display

The View/Display key opens up the Display Menu (common to most measurments) 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	**Front-panel key**
Initial 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.

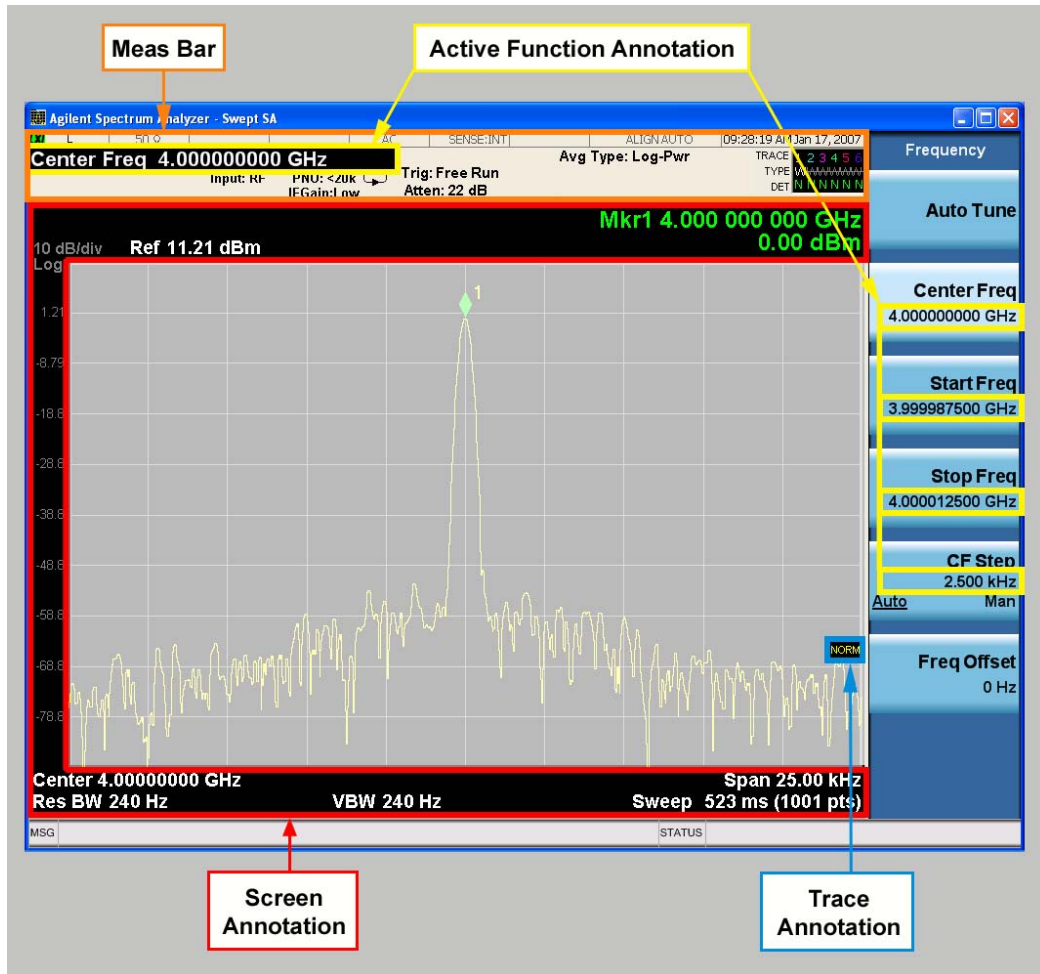| Key Path	**Display**
Key Path	**Front Panel Key**
Initial S/W Revision	Prior to A.02.00

Annotation

Turns on and 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 softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

Key Path	**View/Display, Display**
Initial 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.

Key Path	**View/Display, Display, Annotation**

Remote Command	`:DISPlay:ANNotation:MBAR[:STATe] OFF|ON|0|1`
	
	`:DISPlay:ANNotation:MBAR[:STATe]?`

Example	DISP:ANN:MBAR OFF
Dependencies	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.
Initial 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.

Key Path	**View/Display, Display, Annotation**
Remote Command	`:DISPlay:ANNotation:SCReen[:STATe] OFF|ON|0|1`
	`:DISPlay:ANNotation:SCReen[:STATe]?`
Example	DISP:ANN:SCR OFF
Dependencies	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.
Initial 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.

Key Path	**View/Display, Display, Annotation**
Remote Command	`: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.
Initial S/W Revision	Prior to A.02.00

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..
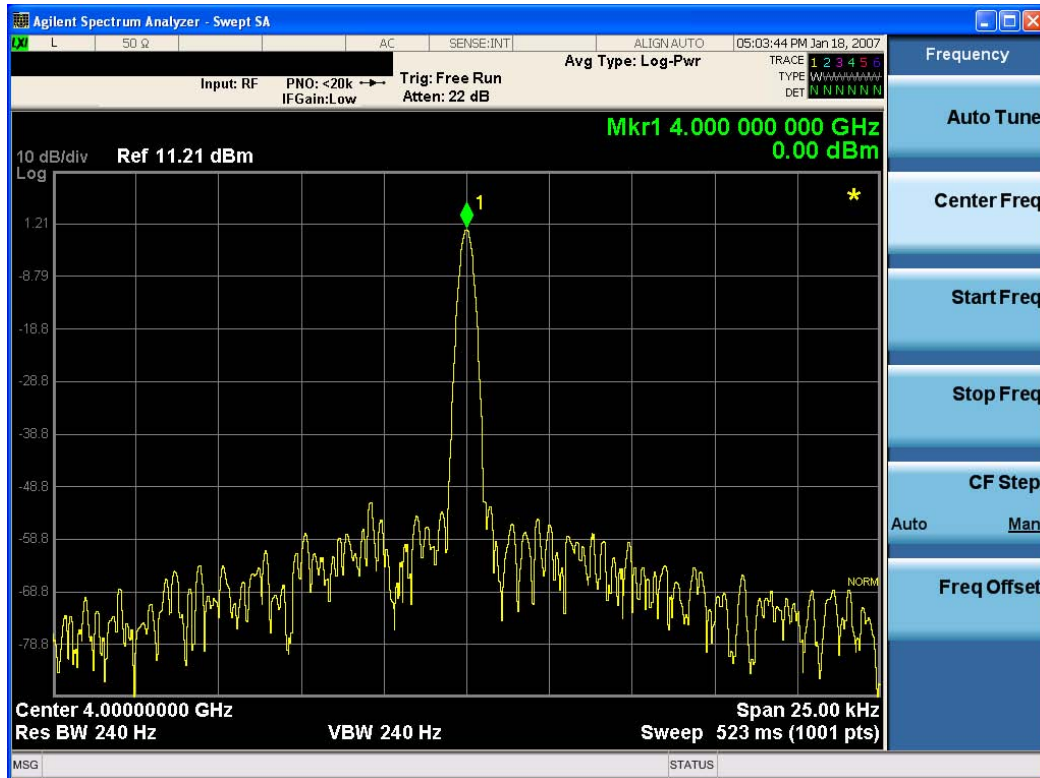
Key Path	**View/Display, Display, Annotation**
Remote Command	:DISPlay:ACTivefunc[:STATe] ON|OFF|1|0 :DISPlay:ACTivefunc[:STATe]?
Example	DISP:ACT OFF
Dependencies	Grayed out and forced to OFF when **System Display Settings**, **Annotation** is set to Off.
Preset	On This should remain Off through a Preset when **System Display Settings**, **Annotation** is set to Off
State Saved	Saved in instrument state.
Initial 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	**View/Display, Display**
Initial 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**.

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.

Key Path	**View/Display, Display, Title**
Mode	All
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
Notes	Pressing this key cancels any active function.
	When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters.
Preset	No title (measurement name instead)
State Saved	Saved in instrument state.
Initial 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.

Key Path	**View/Display, Display, Title**
Example	DISP:ANN:TITL:DATA "" clears any existing title characters.
Notes	Use the :DISPlay:ANNotation:TITLe:DATA <string> command with an empty string.
Preset	Performed on Preset.
Initial 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.

Key Path	**View/Display, Display**
Remote Command	:DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF|ON|0|1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]?
Example	DISP:WIND:TRAC:GRAT:GRID OFF
Notes	The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis.
Preset	On
State Saved	saved in instrument state
Initial 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.

Key Path	**View/Display, Display**

Remote Command	`:DISPlay:WINDow[1]:TRACe:Y:DLINe <ampl>`
	`:DISPlay:WINDow[1]:TRACe:Y:DLINe?`
	`:DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe OFF|ON|0|1`
	`:DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe?`
Example	DISP:WIND:TRAC:Y:DLIN:STAT ON
	DISP:WIND:TRAC:Y:DLIN:STAT –32 dBm
Preset	Set the Display Line to Off and –25 dBm on Preset. When the Display Line goes from Off to On, if it is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was.
	The Display Line's value does not change when it is turned off.
State Saved	Saved in instrument state.
Min	$-\infty$ (minus infinity) in current units
Max	$+\infty$ (plus infinity) in current units
Initial S/W Revision	Prior to A.02.00
Default Unit	Depends on the current selected Y axis unit

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by **Restore Misc Defaults** or **Restore System Defaults** under System.

Key Path	**View/Display, Display**
Initial S/W Revision	Prior to A.02.00

Annotation Local Settings

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,** the **Screen, Meas Bar, Trace,** and **Active Function Values** keys under the **Display, Annotation** menu are grayed out and forced to **Off**. When **Local Settings** is selected, you are able to set the local annotation settings on a measurement by measurement basis.

Key Path	**View/Display, Display, System Display Settings**
Remote Command	`:DISPlay:WINDow[1]:ANNotation[:ALL] OFF|ON|0|1`
	`:DISPlay:WINDow[1]:ANNotation[:ALL]?`
Example	:DISP:WIND:ANN OFF
Preset	On (Set by Restore Misc Defaults)

State Saved	Not saved in instrument state.
Initial 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 Page Setup and Save Screen Image. The four themes are detailed below.

Key Path	**View/Display, Display, System Display Settings**
Remote Command	:DISPlay:THEMe TDColor│TDMonochrome│FCOLor│FMONochrome :DISPlay:THEMe?
Example	DISP:THEM TDM sets the display theme to 3D Monochrome.
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
Preset	TDColor (Set by Restore Misc Defaults)
State Saved	Not saved in instrument state.
Initial 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.

Key Path	**View/Display, Display, System Display Settings**
Remote Command	:DISPlay:BACKlight ON│OFF :DISPlay:BACKlight?
Preset	ON (Set by Restore Misc Defaults)
Initial S/W Revision	Prior to A.02.00

On

Turns the display backlight on.

Key Path	**View/Display, Display, System Display Settings, Backlight**
Example	DISP:BACK ON

Readback	On
Initial S/W Revision	Prior to A.02.00

Off

Turns the display backlight off.

Key Path	**View/Display, Display, System Display Settings, Backlight**
Example	DISP:BACK OFF
Readback	Off
Initial 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.

Key Path	**View/Display, Display, System Display Settings**
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
Initial 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 softkey 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.

Key Path	**Display**
Remote Command	:DISPlay:FSCReen[:STATe] OFF|ON|0|1
	:DISPlay:FSCReen[:STATe]?

Preset	Off
State Saved	Not saved in instrument state.
Backwards Compatibility SCPI	:DISPlay:MENU[:STATe] OFF|ON|0|1
Backwards Compatibility SCPI	DISPlay:MENU[:STATe] emulates ESA full screen functionality, which is the same as the FSCReen command in PSA except that the sense of on/off is reversed (that is, OFF means the menus are OFF) and the default is ON.
Initial 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
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.
Initial S/W Revision	Prior to A.02.00