

Agilent X-Series Signal Analyzer

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

**PXA Signal Analyzer N9030A
MXA Signal Analyzer N9020A
EXA Signal Analyzer N9010A
CXA Signal Analyzer N9000A
MXE EMI Receiver N9038A**

**N9063A & W9063A
Analog Demod
Measurement Application
User's and Programmer's
Guide**



Agilent Technologies

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:TRIGger[:SEquence]:LINE:DELay:STATe OFF ON 0 1	473
:TRIGger[:SEquence]:LINE:DELay:STATe?	473
:TRIGger[:SEquence]:LINE:SLOPe POSitive NEGative	472
:TRIGger[:SEquence]:LINE:SLOPe?	472
:TRIGger[:SEquence]:OFFSet <time>	471
:TRIGger[:SEquence]:OFFSet?	471
:TRIGger[:SEquence]:OFFSet:STATe OFF ON 0 1	471
:TRIGger[:SEquence]:OFFSet:STATe?	471
:TRIGger[:SEquence]:QDEMod:DELay <time>	501
:TRIGger[:SEquence]:QDEMod:DELay?	501
:TRIGger[:SEquence]:QDEMod:DELay:STATe OFF ON 0 1	501
:TRIGger[:SEquence]:QDEMod:DELay:STATe?	501
:TRIGger[:SEquence]:QDEMod:LEVel <voltage>	500
:TRIGger[:SEquence]:QDEMod:LEVel?	500
:TRIGger[:SEquence]:QDEMod:SLOPe POSitive NEGative	501
:TRIGger[:SEquence]:QDEMod:SLOPe?	501
:TRIGger[:SEquence]:QINPut:DELay <time>	504
:TRIGger[:SEquence]:QINPut:DELay?	504
:TRIGger[:SEquence]:QINPut:DELay:STATe OFF ON 0 1	504
:TRIGger[:SEquence]:QINPut:DELay:STATe?	504
:TRIGger[:SEquence]:QINPut:LEVel <voltage>	503
:TRIGger[:SEquence]:QINPut:LEVel?	503
:TRIGger[:SEquence]:QINPut:SLOPe POSitive NEGative	504
:TRIGger[:SEquence]:QINPut:SLOPe?	504
:TRIGger[:SEquence]:RFBurst:DELay <time>	482
:TRIGger[:SEquence]:RFBurst:DELay?	482
:TRIGger[:SEquence]:RFBurst:DELay:STATe OFF ON 0 1	482
:TRIGger[:SEquence]:RFBurst:DELay:STATe?	482
:TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl>	479
:TRIGger[:SEquence]:RFBurst:LEVel:ABSolute?	479

List of Commands

:TRIGger[:SEQuence]:RFBurst:LEVel:RELative <rel_amp>	481
:TRIGger[:SEQuence]:RFBurst:LEVel:RELative?	481
:TRIGger[:SEQuence]:RFBurst:LEVel:TYPE ABSolute RELative	480
:TRIGger[:SEQuence]:RFBurst:LEVel:TYPE?	480
:TRIGger[:SEQuence]:RFBurst:SLOPe POSitive NEGative	482
:TRIGger[:SEQuence]:RFBurst:SLOPe?	482
:TRIGger[:SEQuence]:SLOPe POSitive NEGative.	470
:TRIGger[:SEQuence]:SLOPe?	470
:TRIGger[:SEQuence]:TV:FMODE ENTire ODD EVEN	493
:TRIGger[:SEQuence]:TV:FMODE?	493
:TRIGger[:SEQuence]:TV:LINE <integer>	492
:TRIGger[:SEQuence]:TV:LINE?	492
:TRIGger[:SEQuence]:TV:STANdard MNTSc JNTSc NTSC443 MPAL BPAL NPAL CPAL PAL60 LSEC	495
:TRIGger[:SEQuence]:TV:STANdard?	495
:TRIGger[:SEQuence]:VIDeo:DELay <time>	470
:TRIGger[:SEQuence]:VIDeo:DELay?	470
:TRIGger[:SEQuence]:VIDeo:DELay:STATe OFF ON 0 1	470
:TRIGger[:SEQuence]:VIDeo:DELay:STATe?	470
:TRIGger[:SEQuence]:VIDeo:LEVel <amp>.	469
:TRIGger[:SEQuence]:VIDeo:LEVel?	469
:TRIGger[:SEQuence]:VIDeo:SLOPe POSitive NEGative.	470
:TRIGger[:SEQuence]:VIDeo:SLOPe?	470

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

TIP To view help for any front-panel key or menu key, press that key while this Help Window is open.

To scroll any page vertically, press the **Down Arrow** or **Up Arrow** front-panel keys. To locate these keys, see [“Front Panel Keys used by the Help System” on page 37](#).

Structure of Help

See [“How Help is Organized” on page 34](#).

Navigating Help

- If the instrument has an attached mouse, see [“Navigating Help with a Mouse” on page 40](#).
- If the instrument does not have an attached mouse, see [“Navigating Help Without a Mouse” on page 41](#).

For specific details of how to navigate to topics, see [“Finding a Topic” on page 45](#).

- You can also copy the Help files to a separate computer and view them there. For details, see [“Viewing Help Files on a separate Computer” on page 48](#).

Locating Other Documentation

See [“Other Help Resources” on page 50](#).

Key Path	Front-panel key
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How Help is Organized

This topic includes:

- “Help Contents Listing” on page 34
- “Key Descriptions for Each Measurement” on page 35
- “Key Information for Softkeys” on page 36
- “Common Measurement Functions” on page 36

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. Additional Documentation

Describes available documents for X Series Analyzers, with links to allow you to download or open the files.

3. About the Analyzer

Provides general information about the instrument.

4. About this Mode or Measurement Application

Provides an overview of the currently-selected Measurement Application

5. Programming the Analyzer

Provides an overview of available programming information. Includes a list of all SCPI commands for the currently-selected Measurement Application.

6. System Functions

This section contains information for the following front-panel 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 instrument measurement you have selected.

The sections for **Recall** and **Save** contain only cross-references to the respective sections in [“Common Measurement Functions” on page 36](#), and are included here for convenience.

7. Measurement Functions

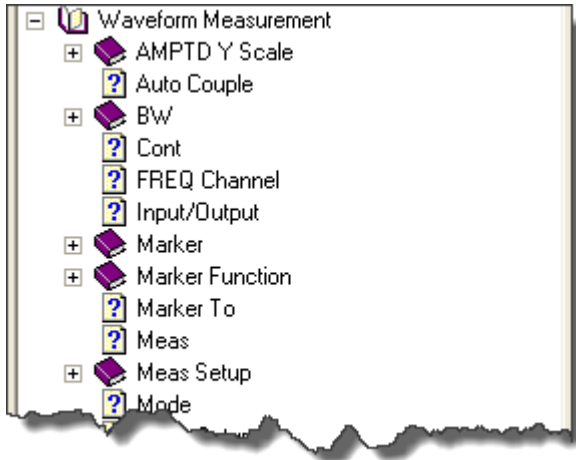
See [“Key Descriptions for Each Measurement” on page 35](#) below.

8. Common Measurement Functions

See [“Common Measurement Functions” on page 36](#) below.

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.



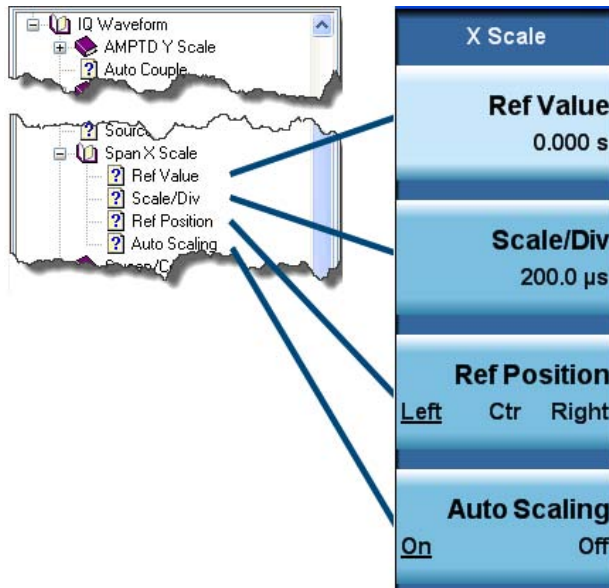
When you expand any front-panel key section, you will see a listing of softkeys in the menu for that front-panel key (if there is a menu), plus any SCPI Remote Commands associated with the functionality, as described in [“Key Information for Softkeys” on page 36](#) below.

If you don't see a topic for a front-panel key in the Measurement-specific section, then it is located in the System Functions section.

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 each key.

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 [Key Descriptions for Each Measurement](#), so you will generally not need to refer to this section.

The key subsections are listed alphabetically.

NOTE The presence of a key or command description in this section indicates that it is available in more than one measurement. Its presence does **not** indicate that the functionality is necessarily available in all measurements.

Front Panel Keys used by the Help System

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



Item	Name	Description
1	Help	Opens Help (displaying the topic for the last key pressed).
2	Cancel (Esc)	Exits Help.
3	Next Window	Changes the current window pane selection.
4	Arrows / Enter	A central Enter key, surrounded by four directional arrow keys. Navigates within the Help system.
5	Backward Tab	Moves between controls in the Help display.
6	Forward Tab	Moves between controls in the Help display.
7	Select / Space	Navigates within the Help system, in conjunction with other keys.
8	Ctrl	Navigates within the Help system, in conjunction with other keys. See “Navigating the Help Files” on page 38.
9	Alt	Navigates within the Help system, in conjunction with other keys. See “Navigating the Help Files” on page 38.
10	Bk Sp (Backspace)	Acts as a "Back" key when navigating the pages of the Help system.

Navigating the Help Files

This topic includes:

- “Help Window Components” on page 38
- “Basic Help Window Operations” on page 39
- “Navigating Help with a Mouse” on page 40

Help Window Components

The Help Window appears on top of, and to the left of, the measurement display. When Help is open, the instrument’s display appears as below.



1. Application Title Bar

The instrument retains its current Mode and Measurement when Help is open, as shown in the Title Bar.

2. Help Button Bar

These buttons provide shortcuts to frequently-used help functions, including printing.

3. Help Navigation Pane Tabs

Click one of these tabs to display either the Table of Contents, Index, Search or Favorites controls.

4. Help Navigation Pane

5. Help Topic Pane

6. Previous Page and Next Page Buttons

Use these buttons to move to the previous or next page in the Help file.

7. Application Softkey Menu

You can still see and use the current softkey menu when Help is open.

When Help is open, pressing a softkey displays Help for that softkey, but does **not** execute the softkey’s function.

Basic Help Window Operations

This topic includes:

- [“Opening Help” on page 39](#)
- [“Getting Help for a Specific Key” on page 39](#)
- [“Closing Help” on page 39](#)
- [“Viewing Help on Using Help” on page 40](#)

For more Help window operations, see [“Navigating Help Without a Mouse” on page 41](#).

To locate the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 37](#).

Opening Help

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



Note that the softkey menu remains visible when Help is open.

Getting Help for a Specific Key

- If Help is already open, press the desired key. The relevant Help topic appears.

The function normally invoked by the key is **not** executed when the key is pressed with Help open.

If you want to execute the key's function, first close Help by pressing the **Cancel (Esc)** key (as described in [“Closing Help” on page 39](#)), then press the key, before opening Help again (if required).

- If Help 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 the Help Files” on page 38](#).

Closing Help

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



Viewing Help on Using Help

With the Help window open, press the green **Help** key a second time.

The "Using Help" page appears.

To exit Help on Using Help, press the **Bk Sp** key, or see [“Topic Pane Operations” on page 43](#) for equivalent methods.



Navigating Help with a Mouse

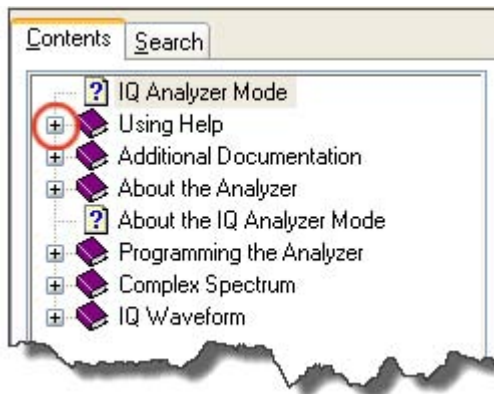
When Help is open, you can point-and-click to navigate, as you would when using Help for any Microsoft Windows computer application.

If you also have a keyboard attached to the instrument, 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. See [“Searching for a Help Topic” on page 41](#).

Selecting a Topic from the Contents Listing

To select and display a topic, do the following:

- If necessary, press the green **Help** key on the Front Panel, as described in [“Opening Help” on page 39](#), to open Help.
- Choose the desired topic from the list under the Contents Tab of the Navigation Pane, then click on the topic title to display the first page of the topic.
- To expand the tree and display a listing of subtopics (if any), click on the + icon to the left of the topic's book icon, as shown below.

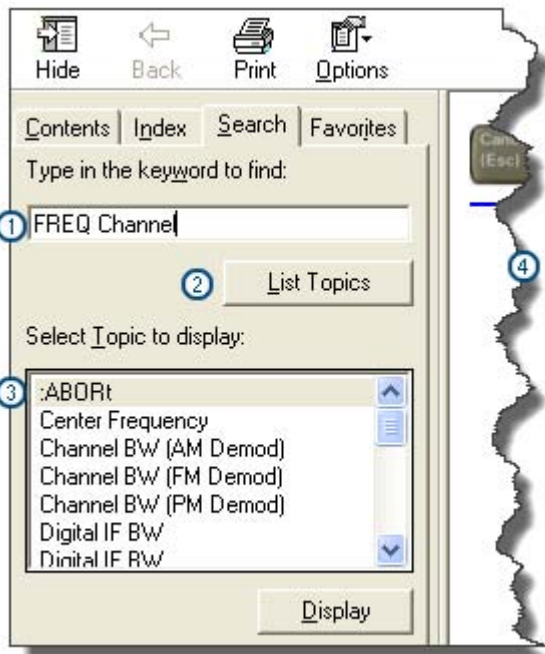


- To move to the next or previous page within a topic, click the **Next Page** or **Previous Page** keys (at the top right of the **Topic Pane**), as shown below.



Searching for a Help Topic

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



1. Type the desired topic text into the Search edit box. 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 displayed in the Topic Pane.

Navigating Help Without a Mouse

Most features of the Help system can be accessed and navigated without attaching a mouse or keyboard to the instrument.

There are a few exceptions, as noted in [“Functions that cannot be used without a Mouse and Keyboard”](#) on page 45.

This topic includes:

- [“Next Window Key”](#) on page 42
- [“Contents Tab \(Navigation Pane\) Operations”](#) on page 42
- [“Topic Pane Operations”](#) on page 43
- [“Selecting a Hyperlink”](#) on page 44

Using Help
Navigating the Help Files

- “Finding a Topic” on page 45

To locate all the keys mentioned in this section, see “Front Panel Keys used by the Help System” on page 37.

Next Window Key

- To toggle the focus between the Navigation Pane and the Topic Pane, press the **Next Window** key.

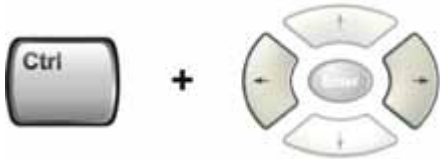


Contents Tab (Navigation Pane) Operations

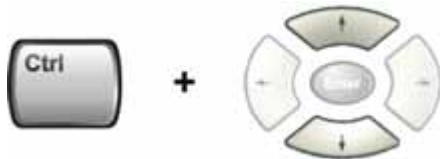
- To switch the active tab, hold down the **Ctrl** key, then press either the **Forward Tab** or **Backward Tab** key.



- To scroll **horizontally**, hold down the **Ctrl** key, then press either the **Left Arrow** or **Right Arrow** keys.



- To scroll **vertically**, hold down the **Ctrl** key, then press either the **Up Arrow** or **Down Arrow** keys.



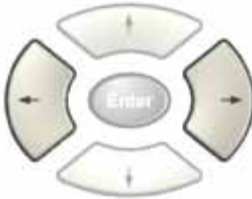
- To scroll up or down the list of topics, press the **Up Arrow** or **Down Arrow** keys.



- To display a selected topic in the Topic Pane, select it in the Contents listing, then press the **Enter** key.



- To expand or collapse a selected topic, press the **Right Arrow** or **Left Arrow** key.

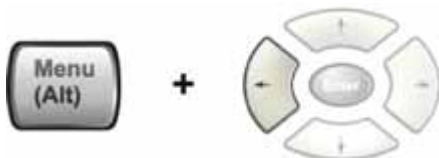


Topic Pane Operations

- To scroll up or down within a topic, press either the **Up Arrow** key or **Down Arrow** key.



- To go **back**
(that is, to display the previously-viewed topic), **either**:
Hold down the **Alt** key, then press the **Left Arrow** key.



Or:

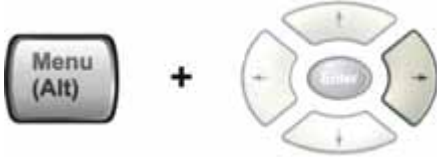
Press the **Bk Sp** key.



Using Help

Navigating the Help Files

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



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

- To go to the next or previous page, use the **Forward Tab** or **Backward Tab** keys



to select the **Next Page** or **Previous Page** key



then press **Enter**.



- To print the currently displayed, topic, press the Front-panel **Print** key



Selecting a Hyperlink

To select and follow a hyperlink on a Help page:.

1. Ensure that the focus is in the **Topic Pane**.

(If necessary, toggle the focus between the Navigation Pane and the Topic Pane by pressing the [Next Window Key](#).)

2. Move from link to link in the Topic Pane by pressing the **Forward Tab** and **Backward Tab** keys.



Links become highlighted upon selection.

3. When you have selected the desired link, activate it by pressing the **Enter** key.



Finding a Topic

To display a different Help topic by selecting it from the Contents tab of the Navigation Pane:

1. Ensure that the focus is in the Contents tab of the Navigation Pane.
(If necessary, toggle the focus between the Navigation Pane and the Topic Pane, by pressing the [Next Window Key](#). Then press **Ctrl + Forward Tab** or **Backward Tab** to select the Contents tab.)
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.



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 instrument.

- The buttons in the Help Button Bar, 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.

Definition of Terms

Many special terms are used throughout this documentation. The table below provides brief definitions of commonly-used terms. Please refer to the "Getting Started Guide" for detailed explanations.

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

Term	Meaning
State Saved	Indicates what happens to a particular function when the instrument 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 instrument is powered on or preset using Power On Last State or User Preset .

Viewing Help Files on a separate Computer

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

Two separate Help files are available for each instrument Mode (or Measurement Application). The two files contain all the same help pages in different formats:

1. HTML Help (CHM) format.

These files are installed on the instrument's hard disk. To copy these files to another computer, see ["Copying the HTML Help \(CHM\) Files" on page 49](#) below.

2. Adobe Acrobat (PDF) format.

These files are called "Users & Programmers References". They are included on the Documentation CD supplied with the instrument, or may be downloaded from the Agilent web site.

For details of how to navigate PDF files, see ["Navigating Acrobat \(PDF\) Files" on page 50](#).

You can copy any of the CHM or PDF 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. See "Printing Acrobat Files" on page 51 .
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 find the HTML Help (.chm) files:

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

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

Other Help Resources

- All available documentation is present either on the Documentation CD that was supplied with the instrument, or may be downloaded from the Agilent web site.
- Many of the supporting documents use the Adobe Acrobat (PDF) file format. You can view PDF files using the pre-installed Adobe Reader software.

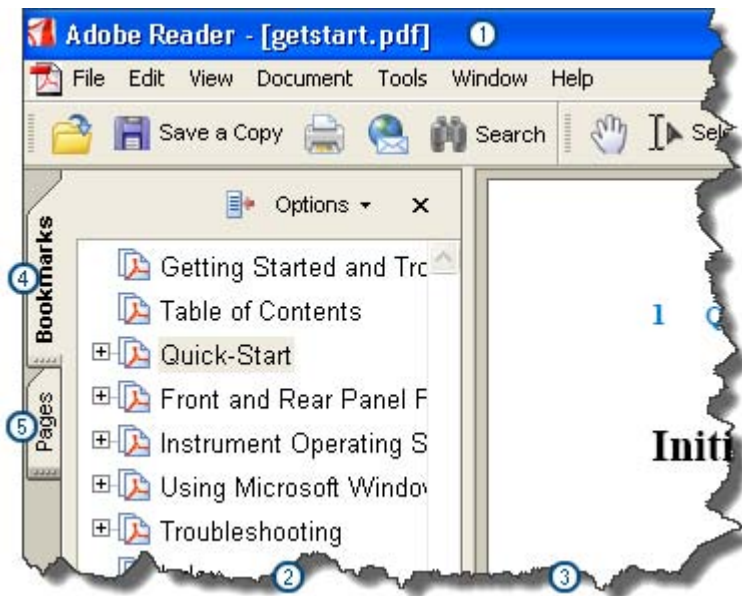
The Adobe Reader user interface differs from the Windows Help interface. For full details, see [“Navigating Acrobat \(PDF\) Files” on page 50](#) and [“Printing Acrobat Files” on page 51](#).

Navigating Acrobat (PDF) Files

IMPORTANT To navigate PDF files effectively, you must attach a mouse and keyboard to the instrument. If it is not possible to attach a mouse and keyboard to the instrument, you should transfer the PDF file to a separate computer, then open it on that computer.

Acrobat Reader Window

When a PDF file is open and being viewed, the instrument’s display shows the Adobe Acrobat Reader Window, which has the following features.



1. Adobe Acrobat Reader Window title bar
2. Navigation Pane
3. Document Pane
4. Navigation Pane: Bookmarks tab

5. Navigation Pane: Pages tab

The Navigation Pane also has tabs labeled Attachments and Comments, but, typically, PDF files for Agilent X-Series Analyzers contain useful content only under the Bookmarks and Pages Tabs.

Unlike the HTML Help Window, the Acrobat Reader Window is **not** embedded in the instrument's Application window, but can be resized, moved and closed independently of the Application window.

Printing Acrobat Files

NOTE The driver for the appropriate printer must be installed on the instrument's hard disk before any file can be printed. For driver installation instructions, see the printer manufacturer's documentation.

To print all or part of an open Acrobat file from the instrument, 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.

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

X-Series Signal Analyzers

The X-Series signal analyzers measure and monitor 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 FES[®] 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.

EMI Receiver

The N9038A EMI Receiver is a fully compliant EMC single box solution that extends the capability of the N6141A measurement application and offers the following:

- measurements conforming to CISPR 16-1-1 specifications
- smooth and stepped scans for outstanding throughput in compliance testing
- tools to speed time to insight in EMI troubleshooting

In addition, the analyzer integrates EMC measurements with traditional spectrum analysis and advanced measurement applications such as Phase Noise.

With a broad set of applications and demodulation capabilities, an intuitive user interface, outstanding connectivity and powerful one-button measurements, the EMI Receiver is ideal for both R&D and manufacturing engineers working on EMC, 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.
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Obtaining and Installing a License Key

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

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

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

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/pxa_software
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 PXA,

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

Select the **PXA N9030A, Options and Measurement Applications** link on the top of the page.

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.

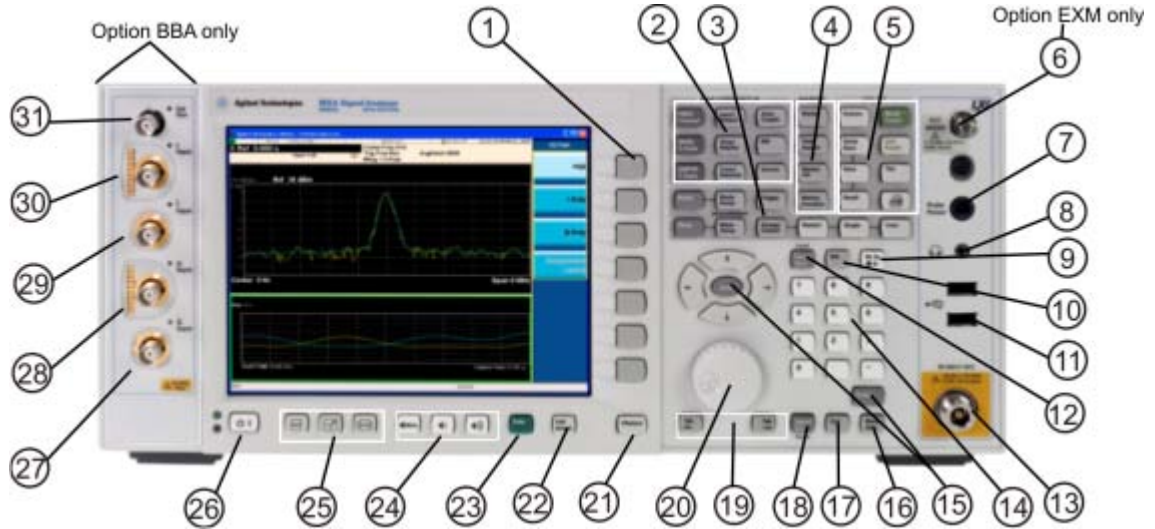
For CXA,

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

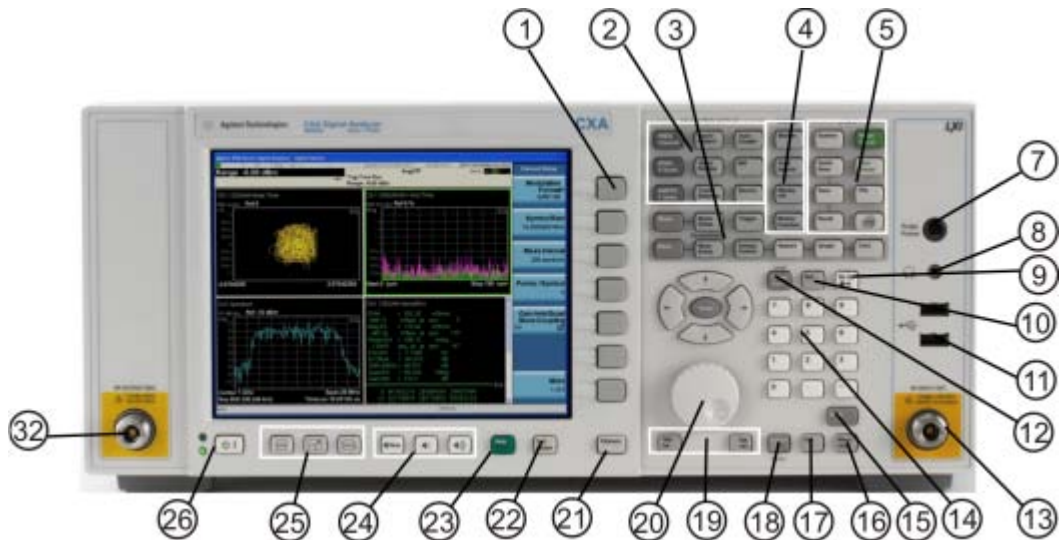
Select the **CXA N9000A, Options and Measurement Applications** link on the top of the page.

Front-Panel Features

PXA, MXA, and EXA



CXA



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.

About the Instrument
Front-Panel Features

Item		Description
#	Name	
2	Analyzer Setup Keys	These keys set the parameters used for making measurements in the current Mode and Measurement.
3	Measurement Keys	These keys select the Mode and the Measurement within the mode. They also control the initiation and rate of recurrence of measurements.
4	Marker Keys	Markers are often available for a measurement to measure a very specific point/segment of data within the range of the current measurement data.
5	Utility Keys	These keys control system-wide functionality such as: <ul style="list-style-type: none"> • instrument configuration information and I/O setup, • printer setup and printing, • file management, save and recall, • instrument presets.
6	Ext Mixer	Provides LO output signal to and receives IF input signals from an external mixer. See the Specifications Guide for details on signal levels. PXA only.
7	Probe Power	Supplies power for external high frequency probes and accessories.
8	Headphones Output	Headphones can be used to hear any available audio output.
9	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.
10	Delete Key	Press this key to delete files or to perform other deletion tasks.
11	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a mouse, keyboard, DVD drive, or hard drive.
12	Local/Cancel/(Esc) Key	<p>If you are in remote operation, Local:</p> <ul style="list-style-type: none"> • 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.) <p>If you have not already pressed the units or Enter key, Cancel exits the currently selected function without changing its value.</p> <p>Esc works the same as it does on a PC keyboard. It:</p> <ul style="list-style-type: none"> • exits Windows dialogs • clears errors • aborts printing • cancels operations.
13	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).
14	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.

Item		Description
#	Name	
15	Enter and Arrow Keys	<p>The Enter key terminates data entry when either no unit of measure is needed, or you want to use the default unit.</p> <p>The arrow keys:</p> <ul style="list-style-type: none"> • 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. <p>NOTE The arrow keys cannot be used to move a mouse pointer around on the display.</p>
16	Menu/ (Alt) Key	Alt works the same as a PC keyboard. Use it to change control focus in Windows pull-down menus.
17	Ctrl Key	Ctrl works the same as a PC keyboard. Use it to navigate in Windows applications or to select multiple items in lists.
18	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.
19	Tab Keys	Use these keys to move between fields in Windows dialogs.
20	Knob	Increments and decrements the value of the current active function.
21	Return Key	Exits the current menu and returns to the previous menu. Has typical PC functionality.
22	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.
23	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.
24	Speaker Control Keys	Enables you to increase or decrease the speaker volume, or mute it.
25	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.
26	Power Standby/ On	<p>Turns the analyzer on. A green light indicates power on. A yellow light indicates standby mode.</p> <p>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.</p> <p>The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.</p>

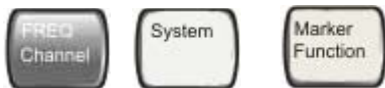
About the Instrument
Front-Panel Features

Item		Description
#	Name	
27	\bar{Q} Input	Input port for the \bar{Q} channel when in differential mode.*
28	Q Input	Input port for the Q channel for either single or differential mode.*
29	\bar{I} Input	Input port for the \bar{I} channel when in differential mode.*
30	I Input	Input port for the I channel for either single or differential mode.*
31	Cal Out	Output port for calibrating the I, \bar{I} , Q and \bar{Q} inputs and probes used with these inputs.*
32	RF Out	Output port for Options T03/07 (CXA only)

*. 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

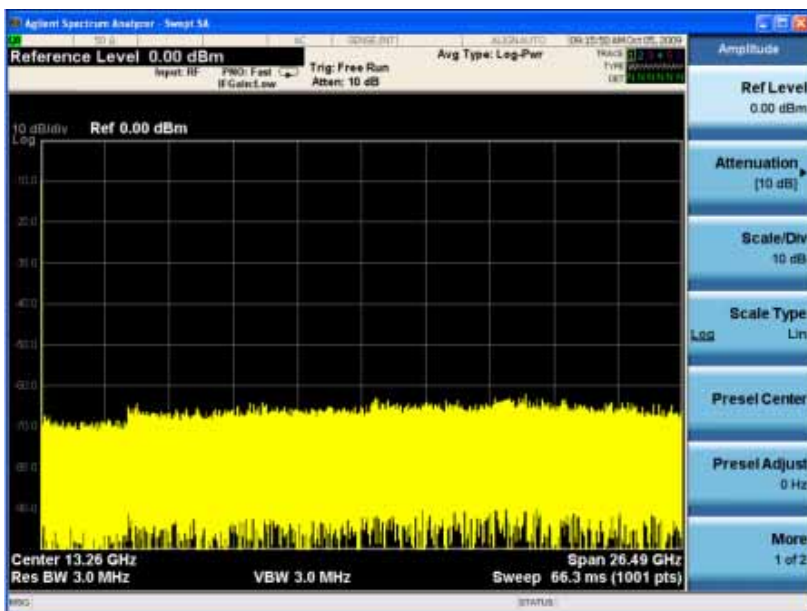
The keys labeled **FREQ Channel**, **System**, and **Marker Function** are all examples of front-panel keys.



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.

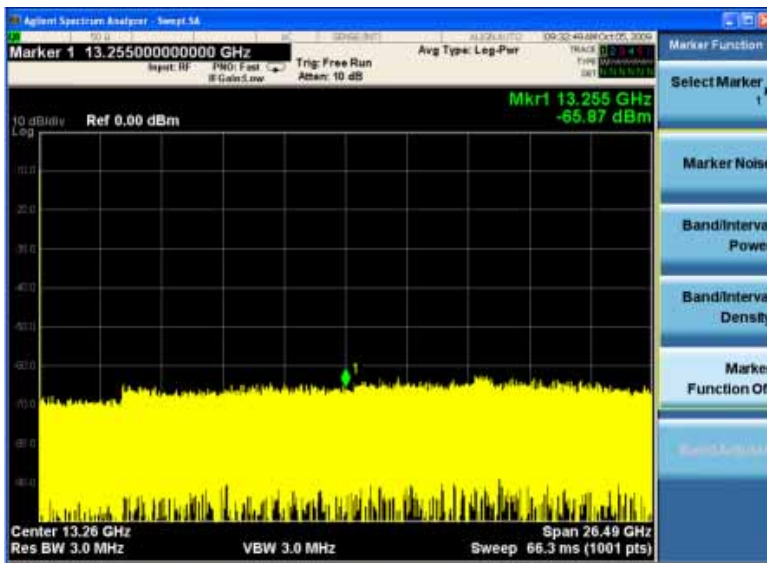


Some menu keys have multiple choices on their label, such as **On/Off**, **Auto/Man**, or **Log/Lin** (as shown above). The different choices are selected by pressing the key multiple times. For example, the Auto/Man type of key. To select the function, press the menu key and notice that Auto is underlined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

About the Instrument

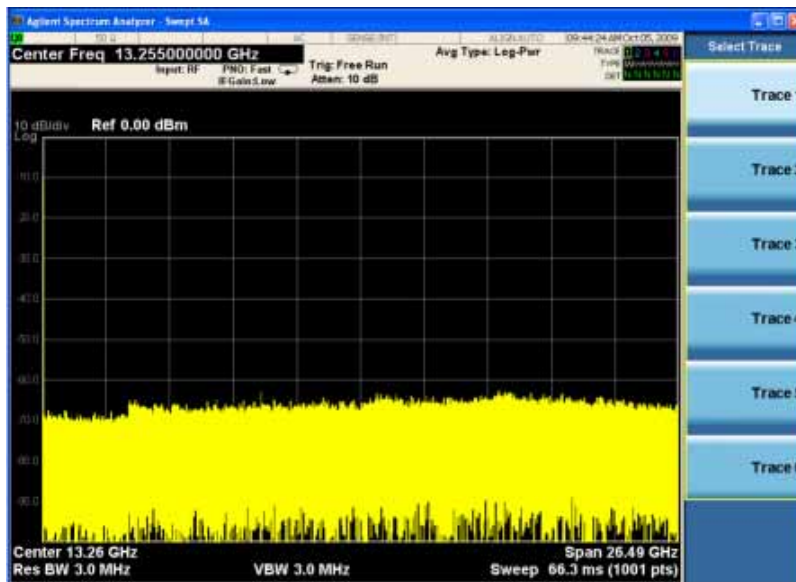
Front-Panel Features

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.

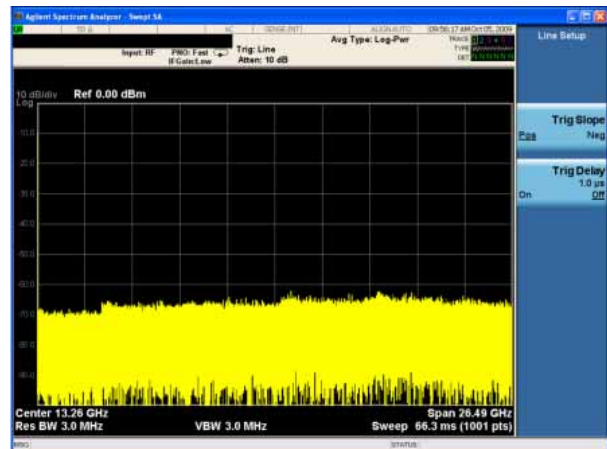
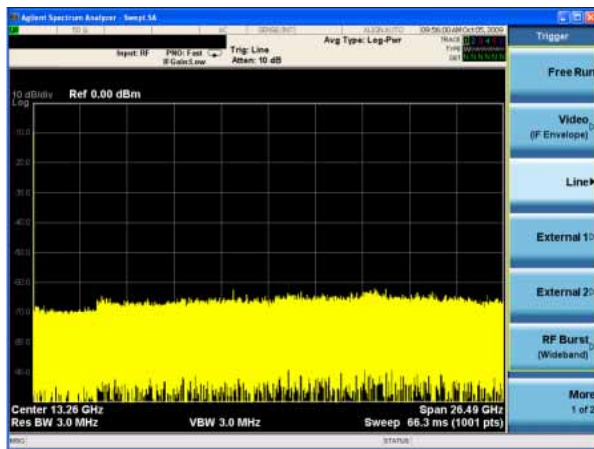
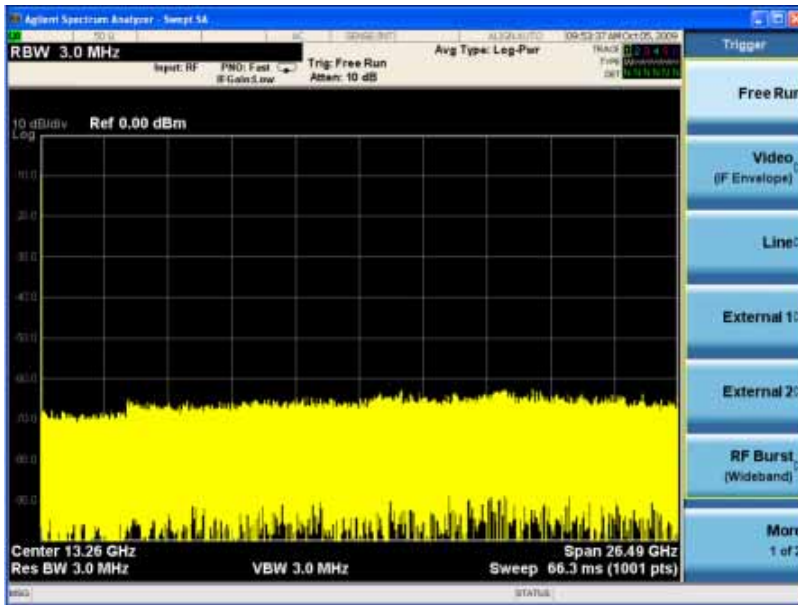


Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are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

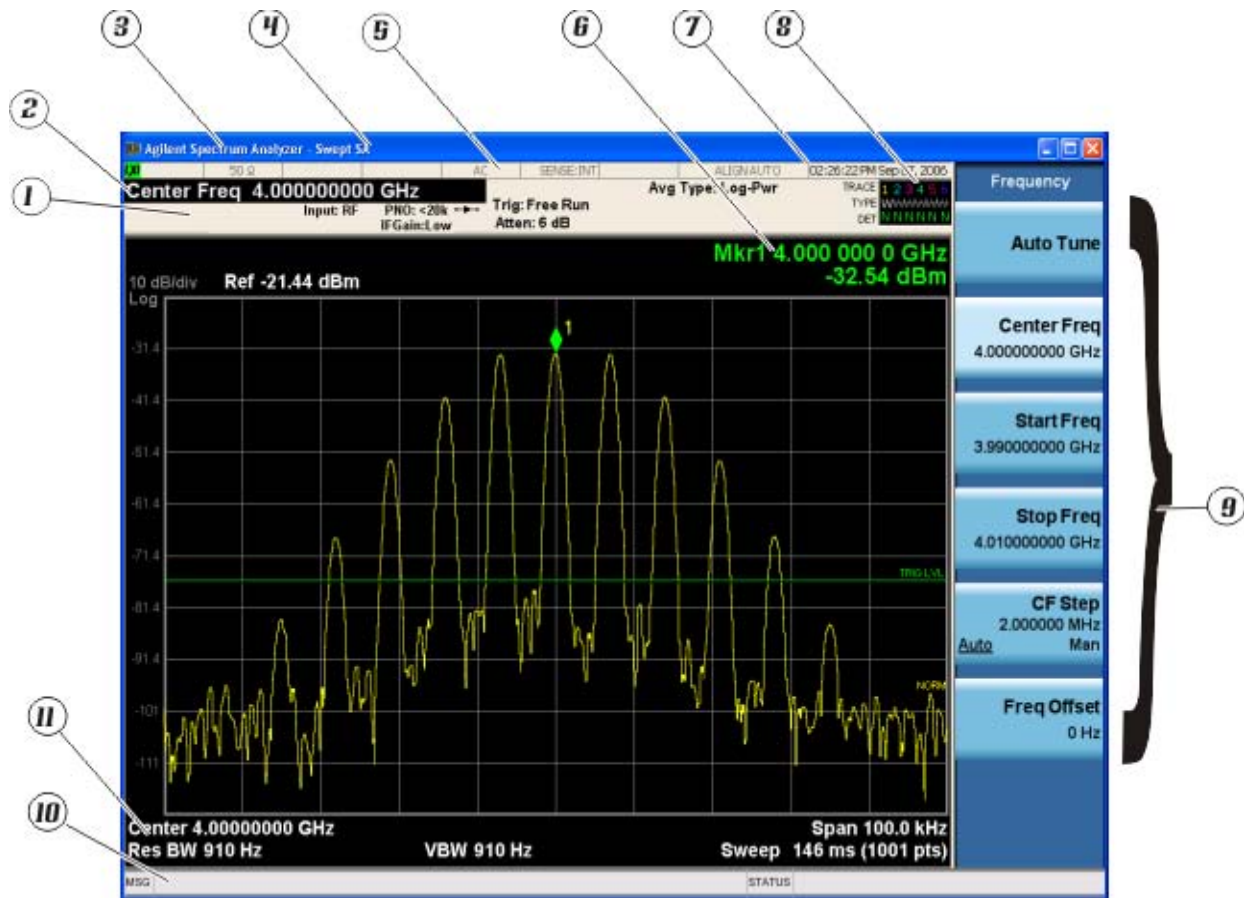



If a displayed key label shows a small solid-black arrow tip pointing to the right, it indicates that additional key menus are available. If the arrow tip is not filled in solid then pressing the key the first time selects that function. Now the arrow is solid and pressing it again brings up an additional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

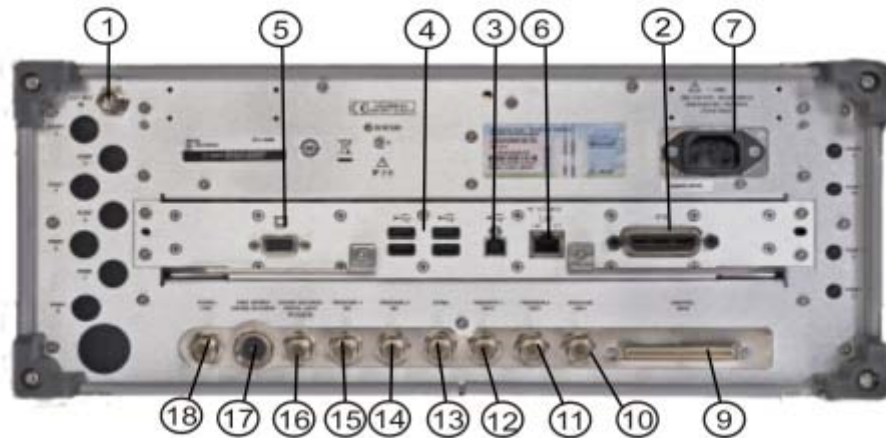
Item	Description	Function Keys
5	Settings panel - displays system information that is not specific to any one application. <ul style="list-style-type: none"> • Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ • Input impedance and coupling • Selection 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

Current PXA, MXA and EXA



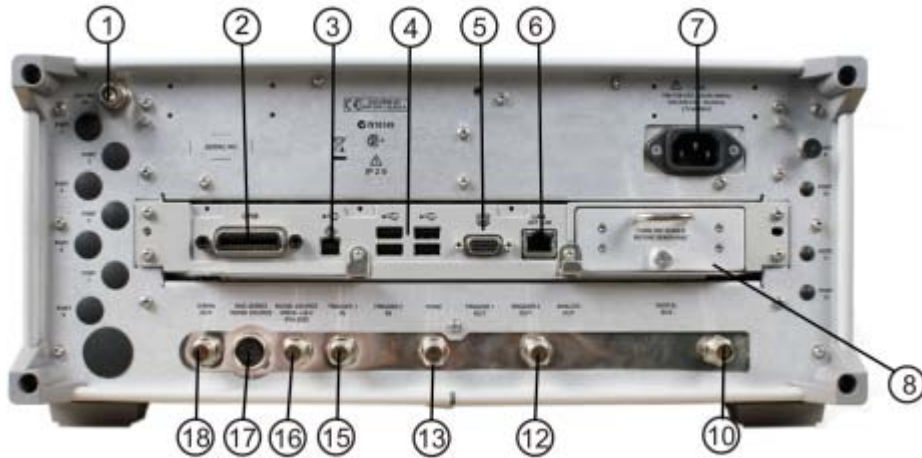
Older MXA and EXA



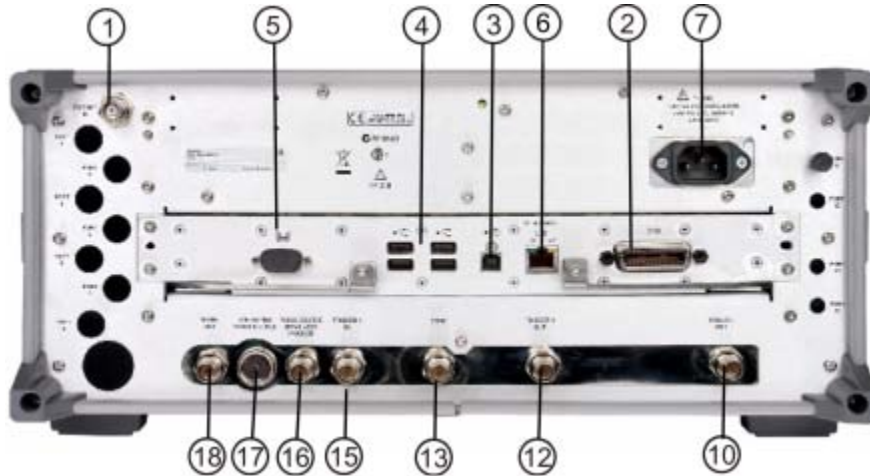
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For PXA – 1 to 50 MHz For MXA – 1 to 50 MHz For EXA – 10 MHz.
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.

Item		Description
#	Name	
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 current analyzers. Optional on older MXAs and EXAs.
9	Digital Bus	Reserved for future use.
10	Analog Out	For PXA Option YAV: Screen Video Log Video Linear Video For 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.
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	CR3 Second IF Out (PXA, MXA, and EXA) CRP Arbitrary IF Out (PXA, MXA, and EXA) ALV Log Video (PXA)

CXA with Option PC3 (S/N MY/US/SG49370546 or higher)



CXA (for S/N less than MY/US/SG49370546)

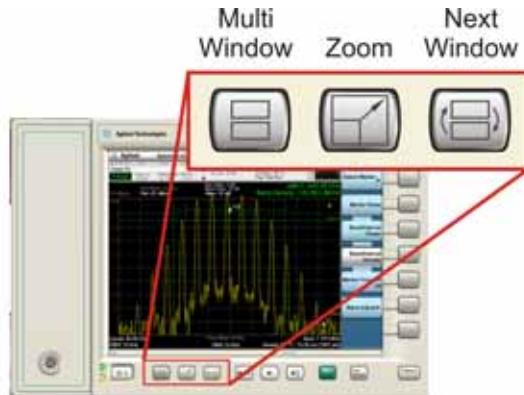


Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For CXA – 10 MHz.
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.

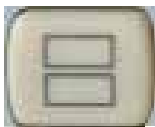
Item		Description
#	Name	
3	USB Connector	USB 2.0 port, Type B. USB TMC (test and measurement class) connects to an external pc controller to control the instrument and for data transfers over a 480 Mbps link.
4	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a 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	Option PC3. Only available on instruments with S/N MY/US/SG49370546 or higher.
10	Analog Out	For Option EMC: Demod Audio
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.
15	TRIGGER 1 IN	Allows external triggering of measurements.
16	Noise Source Drive +28 V (Pulsed)	For use with Agilent 346A, 346B, and 346C Noise Sources.
17	SNS Series Noise Source	For use with Agilent N4000A, N4001A, N4002A Smart Noise Sources (SNS).
18	10 MHz OUT	An output of the analyzer internal 10 MHz frequency reference signal. It is used to lock the frequency reference of other test equipment to the analyzer.

Window Control Keys

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



Multi-Window



The **Multi Window** front-panel key 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.

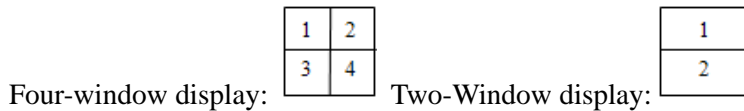
Remote Command	:DISPlay:WINDow:FORMat:ZOOM
-----------------------	-----------------------------

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

The window numbers are as follows. Note that these numbers also determine the order of precedence (that is, Next Window goes from 1 to 2, then 2 to 3, etc.):



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

One and only one window is always selected. The selected window has the focus; this means that all window-specific key presses apply only to that window. You can tell which window is selected by the thick green border around it. 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.

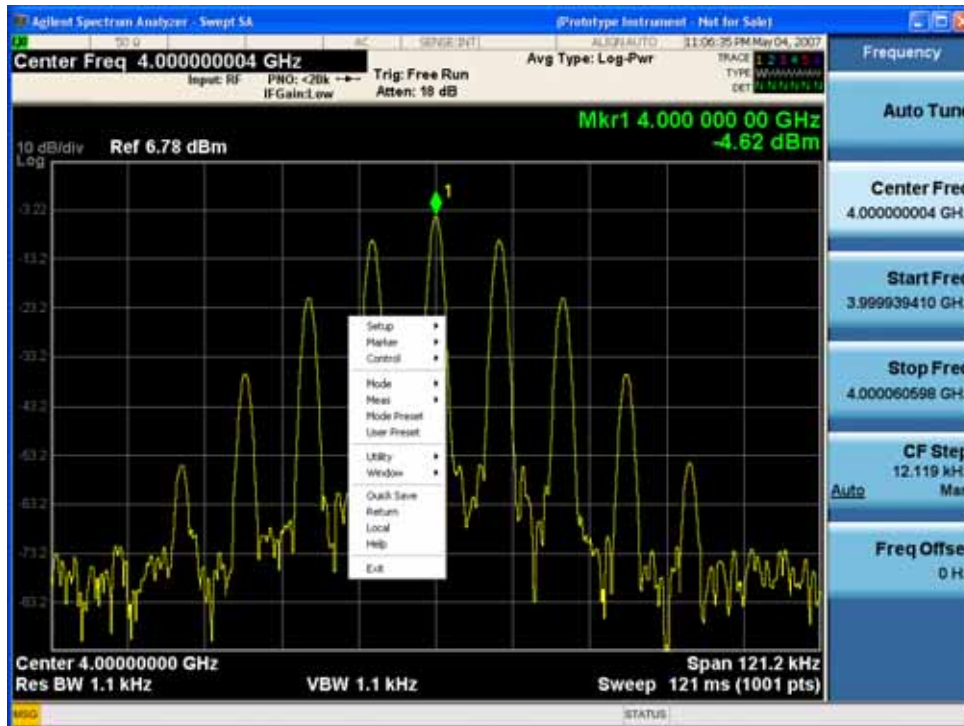
NOTE When this key is pressed in Help Mode, it toggles focus between the table of contents window and the topic pane window.

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:

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:

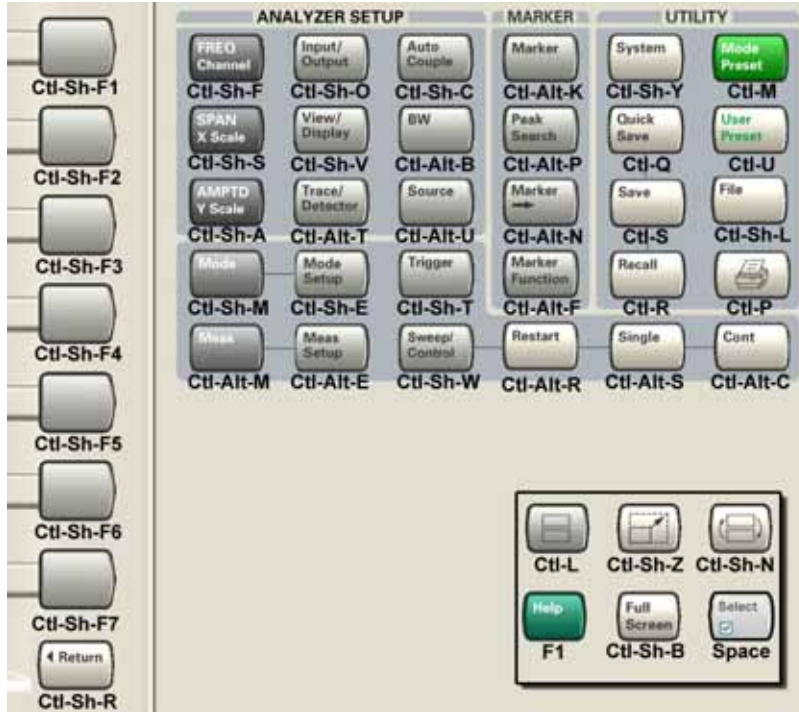
Front-panel key	Key code
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+SHIFT+U
Marker	CTRL+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker 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

Front-panel key	Key code
Restart	CTRL+ALT+R
Single	CTRL+ALT+S
Cont	CTRL+ALT+C
Zoom	CTRL+SHIFT+Z
Next Window	CTRL+SHIFT+N
Split Screen	CTRL+L
Full Screen	CTRL+SHIFT+B
Return	CTRL+SHIFT+R
Mute	Mute
Inc Audio	Volume Up
Dec Audio	Volume Down
Help	F1
Control	CTRL
Alt	ALT
Enter	Return
Cancel	Esc
Del	Delete
Backspace	Backspace
Select	Space
Up Arrow	Up
Down Arrow	Down
Left Arrow	Left
Right Arrow	Right
Menu key 1	CTRL+SHIFT+F1
Menu key 2	CTRL+SHIFT+F2
Menu key 3	CTRL+SHIFT+F3
Menu key 4	CTRL+SHIFT+F4
Menu key 5	CTRL+SHIFT+F5
Menu key 6	CTRL+SHIFT+F6
Menu key 7	CTRL+SHIFT+F7

About the Instrument
Mouse and Keyboard Control

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

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.

About the Instrument

Instrument Security & Memory Volatility

The analog demodulation measurements provide the capability of demodulating Amplitude, Frequency, or Phase modulated signals (AM, FM, PM). These measurements provide functionality that can be generally categorized as follows:

- Demodulating a modulated carrier and playing the modulating signal over a speaker (sometimes referred to as tune and listen)
- Displaying demodulated signals in both time and frequency domain
- Displaying modulation metrics

Each measurement has four basic windows in which to display demodulated data. The primary view displays all four of these windows. In all views, the display is split into signal display windows and a numeric results (metrics) window. The metrics window displays carrier and modulation metrics.

These views are designed such that you can identify analog modulated carriers, determine whether the carrier is a commercial or other broadcast station, and analyze the modulating signal.

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	<p>Provides general SCPI programming information on the following topics:</p> <ul style="list-style-type: none"> • Programming the X-Series Applications • Programming fundamentals • Programming examples <p>Note that SCPI command descriptions for measurement applications are NOT in this book, but are in the User's and Programmer's Reference.</p>
User's and Programmer's Reference manuals	<p>Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that:</p> <ul style="list-style-type: none"> • 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	<p>Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application.</p> <p>Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference.</p>
X-Series Getting Started Guide	<p>Provides valuable sections related to programming including:</p> <ul style="list-style-type: none"> • 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 <p>This printed document is shipped with the instrument.</p>
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 151 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.
Backwards Compatibility Notes	In general the status bits used in the X-Series status system will be backwards compatible with ESA and PSA. However, note that all conditions will generate events that go into the event log, and some will also generate status bits.
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.

Backwards Compatibility Notes	<p>The ESA/PSA/VSA products do not meet all the requirements for the *OPC command specified by IEEE 488.2. This is corrected for X-Series. This will sometimes cause behavior that is not backward compatible, but it will work as customers expect.</p> <p>Commands such as, *OPC/*OPC?/*WAI/*RST used to be global. They considered front panel operation in conjunction with the GPIB functionality. Now they are evaluated on a per channel basis. That is, the various rear panel remote ports and the front panel i/o are all considered separately. Only the functionality initiated on the port where the *OPC was sent, is considered for its operation.</p> <p>*OPC used to hold off until the operation bits were cleared. Now it holds off until all overlapping commands are completed. Also, earlier instruments did not wait for completion of all processes, only the ones identified here (in the STATus:OPERation register):</p> <p>Calibrating: monitored by PSA, ESA, VSA (E4406A)</p> <p>Sweeping: monitored by PSA, ESA, VSA (E4406A)</p> <p>Waiting for Trigger: monitored by PSA, ESA, VSA (E4406A)</p> <p>Measuring: monitored by PSA and ESA (but not in all Modes).</p> <p>Paused: monitored by VSA (E4406A).</p> <p>Printing: monitored by VSA (E4406A).</p> <p>Mass memory busy: monitored by VSA (E4406A).</p>
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

File

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

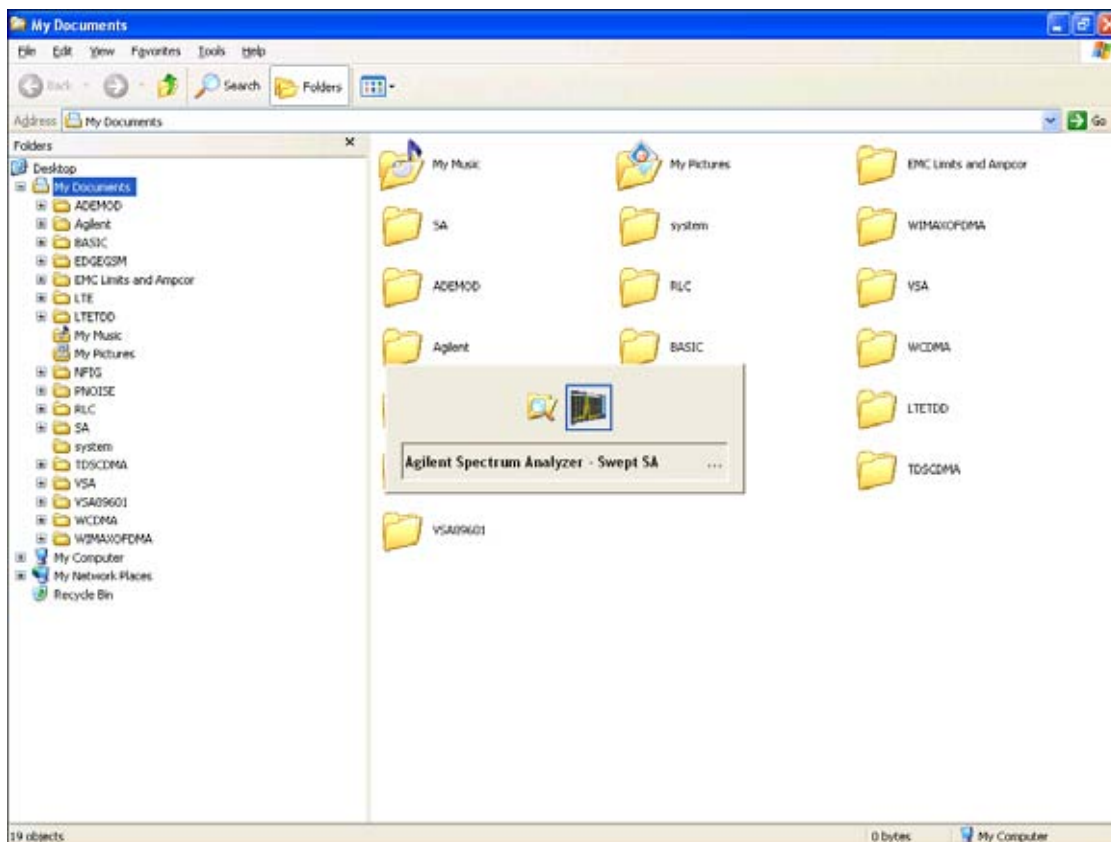
Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00

File Explorer

Opens the standard Windows File Explorer. The File Explorer opens in 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.

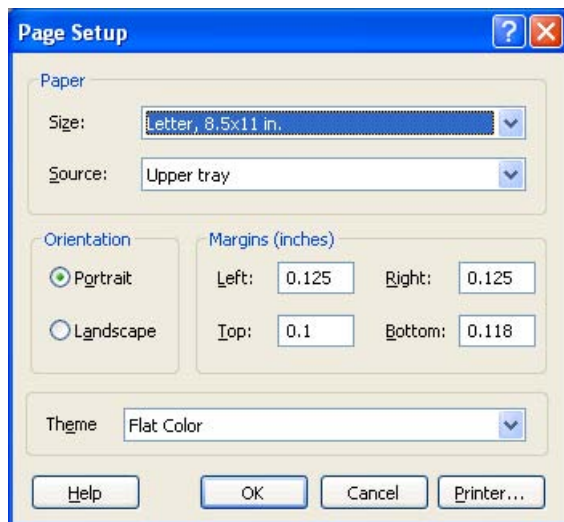
Key Path	File
Initial S/W Revision	Prior to A.02.00

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

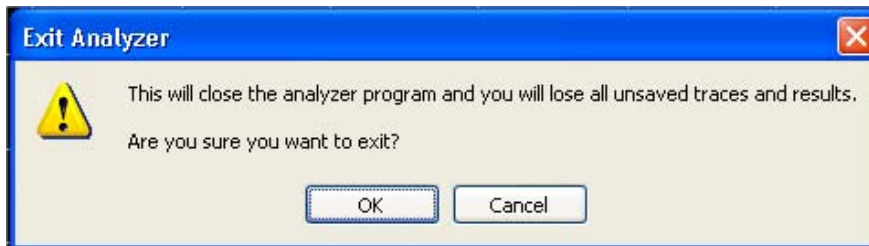
The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see

the Windows Desktop. You can use Alt-Tab (press and hold the Alt  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

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 [“How-To Preset” on page 97](#) 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 it 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.

Backwards Compatibility Notes	<p>In the X-Series, the legacy “Factory Preset” has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way in to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA.</p> <p>There is also no “Preset Type” as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues.</p> <p>The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using User Preset.</p>
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

System Functions
Mode Preset

Type Of Preset	SCPI Command	Front Panel Access
*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

Meas Preset

Resets the measurement local variables for the currently active measurement to their factory default values. The measurement settings that get reset are the same ones that are reset during a Mode Preset. This function keeps the instrument in the current measurement and the current mode and does not affect the settings for other measurements, but does abort the currently running measurement.

Key Path	Meas Setup
Remote Command	:CONFigure:<Measurement>
Example	:CONF:ACP immediately does a Meas Preset to the ACP measurement.
Notes	<p>Clears the Measuring bit</p> <p>:CONF:<Measurement> resets the specified measurement settings to default in ESA, VSA and PSA; in GPSA it allows the addition of the NDEFault node to the command to prevent a measurement preset from occurring after a measurement switch.</p> <p>:MEASure:<Measurement> also restores the default values of the selected measurement, but it also initiates the specified measurement.</p>
Initial S/W Revision	Prior to A.02.00

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

Mode	All
Remote Command	:SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE?
Example	:SYST:PRESet:TYPE FACT
Notes	This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation.
Preset	This is unaffected by Preset but is set to Mode on a “Restore System Defaults->All”
State Saved	No
Initial S/W Revision	Prior to A.02.00

*RST (Remote Command Only)

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

System Functions
Mode Preset

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.
Backwards Compatibility Notes	In legacy analyzers *RST did not set the analyzer to Single, but in the X-Series it does, for compliance with the IEEE 488.2 specification. In the X-Series, *RST does not do a *CLS (clear the status bits and the error queue). In legacy analyzers, *RST used to do the equivalent of SYSTEM:PRESet, *CLS and INITiate:CONTinuous OFF. But to be 488.2 compliant, *RST in the X-Series does not do a *CLS.
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.

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

Key Path	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	<p>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>.</p> <p>If the user tries to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p>
Backwards Compatibility Notes	<p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p>
Backwards Compatibility Notes	<p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn’t support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can’t be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>Note that there is no compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p>
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 105](#).

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 107 .
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 will have their data immediately overwritten.

Register 1 thru Register 6

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified.

Registers are shared by all modes, so recalling from any one of the 6 registers may cause a mode switch to the mode that was active when the save to the Register occurred.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. 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 113.](#)

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...
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System Functions
Recall

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.
Backwards Compatibility SCPI	:MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored.
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
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
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System Functions

Recall

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

These menu 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 determined you 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 113](#).

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 107](#) for details.

Key Path	Recall, Trace, Open...
Remote Command	<pre>:MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , <filename> :MMEMory:LOAD:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 , <integer></pre>
Example	<pre>:MMEM:LOAD:TRAC TRACE2, "myState.trace" recalls the file myState.trace on the default path; if it is a "single trace" save file, that trace is loaded to trace 2, and is set to be not updating. :MMEM:LOAD:TRAC:REG TRACE1,2 restores the trace data in register 2 to Trace 1</pre>

Notes	<p>Auto return to the Trace menu and the Open dialog goes away.</p> <p>Advisory Event "Recalled File <file name>" after recall is complete.</p> <p>Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: MMEMoRY:LOAD:TRACe TRACE1 TRACE2 TRACE3,<filename></p> <p>The load trace command actually performs a load state, which in the Swept SA measurement includes the trace data. However it looks in the recalled state file to see how it was flagged at save time. The possibilities are:</p> <p>If the trace file was saved using one of the TRACE# enums, it is flagged as a single trace save file. The trace that was flagged as the one that was saved, is loaded to the trace specified. The trace is loaded with update off and display on, and none of the other traces are loaded.</p> <p>If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update".</p>
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	<p>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.</p> <p>No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands.</p>
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

Open...

Accesses the standard Windows File Open dialog and the File Open key menu. When you navigate to this selection, you have already determined you 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
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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 here you can 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
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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. If you navigated here from recalling State, "State File (*.state)" is in the dialog selection and is the only type available in the pull down menu. If you navigated here from recalling Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu.

If you navigated here from importing a data file, the data types available will be dependent on the current measurement and the selection you made under **Import Data**. For example:

Amplitude Corrections: pull down menu shows

- Amplitude Corrections (*.csv)
- Legacy Cable Corrections (*.cbl)
- Legacy User Corrections (*.amp)
- Legacy Other Corrections (*.oth)

System Functions

Recall

- 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 the 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 123 .
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.

System Functions
Save

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.

System Functions
Save

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. Both single and double quotes are supported for any filename parameter over remote. Using the C: drive is not encouraged, it is best to use My Documents on the D: drive. Auto return to the State menu and the Save As dialog goes away.
Backwards Compatibility SCPI	:MMEMory:STORe:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply 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 125.
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

System Functions
Save

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 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 key. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files including .trace files is:

My Documents\<<mode name>\state

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

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

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	<p>Some modes and measurements do not have available all 6 traces. The Phase Noise mode command, for example, is: MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 ALL,<filename></p> <p>This command actually performs a save state, which in the Swept SA measurement includes the trace data. However it flags it (in the file) as a “save trace” file of the specified trace (or all traces).</p> <p>The range for the register parameter is 1–5</p> <p>If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.</p> <p>Auto return to the State menu and the Save As dialog goes away.</p>
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	<p>The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary.</p> <p>No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands.</p>
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

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.

System Functions

Save

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 an 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

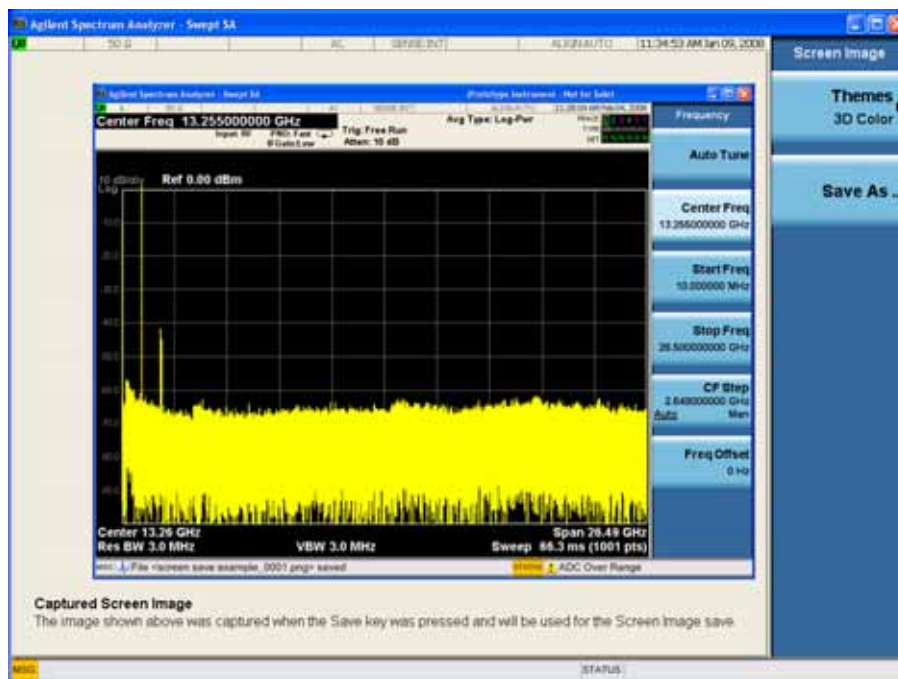
Screen Image

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 you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



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 "Save" on page 120
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
Backwards Compatibility Notes	In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if the user selected Reverse Bitmap AND a black&white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical.

System Functions

Save

Initial S/W Revision	Prior to A.02.00
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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 an 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
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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 allow you to replace the existing file with an **OK** or to **Cancel** the request.

While the save is being performed, the floppy icon shows up in the settings bar near the Continuous/Single icon. After the save completes, the corresponding register menu key annotation is updated with the date the time and the message "File <file name> saved" appears in the message bar.

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...
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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	<p>The string must be a valid logical path.</p> <p>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:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>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:</p> <p><file_name>,<file_type>,<file_size></p> <p>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.</p>
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	<p>The string must be a valid logical path.</p> <p>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.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p>
Initial S/W Revision	Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Remote Command	:MMEMory:COpy <string>, <string>[, <string>, <string>]
Notes	<p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>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.</p> <p>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.</p>

Mass Storage Delete (Remote Command Only)

Remote Command	:MMEMory:DELeTe <file_name>[, <directory_name>]
Notes	<p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed.</p>
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	<p>The string must be a valid logical path.</p> <p>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.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p>
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.

System Functions

System

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 those shown on the Show Errors screen

Backwards Compatibility Notes	<p>In some legacy analyzers, the Repeat field shows the number of times the message has repeated since the last time the error queue was cleared. In the X-Series, the Repeat field shows the number of times the error has repeated since the last intervening error. So the count may very well be different than in the past even for identical signal conditions</p> <p>Unlike previous analyzers, in the X-Series all errors are reported through the Message or Status lines and are logged to the event queue. They never appear as text in the graticule area (as they sometimes do in previous analyzers) and they are never displayed in the settings panel at the top of the screen (as they sometimes do, by changing color, in previous analyzers).</p> <p>As a consequence of the above, the user can only see one status condition (the most recently generated) without looking at the queue. In the past, at least in the Spectrum Analyzer, multiple status conditions might display on the right side of the graticule.</p> <p>In general there is no backwards compatibility specified or guaranteed between the error numbers in the X-Series and those of earlier products. Error, event, and status processing code in customers' software will probably need to be rewritten to work with X-Series.</p> <p>In the legacy analyzers, some conditions report as errors and others simply turn on status bits. Conditions that report as errors often report over and over as long as the condition exists. In the X-series, all conditions report as start and stop events. Consequently, software that repeatedly queries for a condition error until it stops reporting will have to be rewritten for the X-series.</p>
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 [“Next Page” on page 137.](#)

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 138.

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	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

Input Overload Enable (Remote Command Only)

Input Overload errors are reported using the Input Overload status bit (bit 12 in the Measurement Integrity status register). Input Overloads (for example, ADC Overload errors) can come and go with great frequency, generating many error events (for example, for signals just on the verge of overload), and so are not put into the SCPI error queue by default. Normally the status bit is the only way for detecting these errors remotely.

It is possible to enable Input Overload reporting to the SCPI queue, by issuing the :SYSTem:ERRor:OVERload ON command. To return to the default state, issue the :SYSTem:ERRor:OVERload OFF command. In either case, Input Overloads always set the status bit.

NOTE	For versions of firmware before A.10.01, the Input Overload was only a Warning and so was never available in the SCPI queue, although it did set the status bit. For A.10.01 and later, the Input Overload is an error and can be enabled to the SCPI queue using this command.
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Key Path	SCPI only
Remote Command	:SYSTem:ERRor:OVERload[:STATe] 0 1 OFF ON
Example	:SYST:ERR:OVER 1 Enable overload errors
Preset	Set to OFF by Restore Misc Defaults (no Overload errors go to SCPI)
State Saved	Saved in State
Initial S/W Revision	A.10.01

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:

System Functions

System

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

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

Key Path	System, Show
Mode	All
Example	SYST:SHOW SYST
Backwards Compatibility Notes	The hardware statistics that are displayed in the PSA Show System screen have been moved to a dedicated Show Hardware Statistics screen in the Service Menu.
Initial S/W Revision	Prior to A.02.00

Show System contents (Remote Command Only)

A remote command is available to obtain the contents of the Show System screen (the entire contents, not just the currently displayed page).

Remote Command	:SYSTem:CONFigure[:SYSTem]?
Example	:SYST:CONF?
Notes	The output is an IEEE Block format of the Show System contents. Each line is separated with a new-line character.
Initial S/W Revision	Prior to A.02.00

Initial S/W Revision	Prior to A.02.00
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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 :SYSTem: PON: TYPE?
Example	:SYST:PON:TYPE MODE
Preset	This is unaffected by a Preset but is set to Mode on a “Restore System Defaults->All”
State Saved	No
Backwards Compatibility SCPI	:SYSTem:PON:TYPE PRESet the “PRESet” parameter is supported for backward compatibility only and behaves the same as MODE.
Backwards Compatibility Notes	The Preset Type key in legacy analyzers has been removed, and the Power On toggle key has been replaced by this 1-of-N key in the System menu.
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
Backwards Compatibility Notes	Power On User Preset will cause the instrument to power up in the power-on mode, not the last mode the instrument was in prior to shut down. Also, Power On User Preset will User Preset all modes. This does not match legacy behavior exactly.
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 can 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 may not work properly. For proper operation, Power On Last State depends on you shutting down the instrument using the Standby key or the SYSTem:PDOWn SCPI command. This will ensure the last state of each mode is saved and can be recalled during a power up.

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

Readback Text	Last State
Backwards Compatibility Notes	It is no longer possible to power-up the analyzer in the last mode the analyzer was running with that mode in the preset state. (ESA/PSA SYST:PRESET:TYPE MODE with SYST:PON:PRESET) You can power-on the analyzer in the last mode the instrument was running in its last state (SYST:PON:TYPE LAST), or you can specify the mode to power-up in its preset state (SYST:PON:MODE <mode>).
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	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 gauge, 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 that 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:

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

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 operating 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

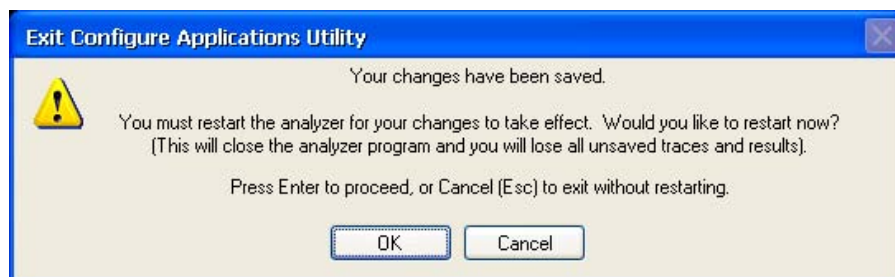
Toggles the currently highlighted application in the list.

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
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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 program a 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 when 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 148](#)
- [“Configuration Memory Available \(Remote Command Only\)” on page 149](#)
- [“Configuration Memory Total \(Remote Command Only\)” on page 149](#)
- [“Configuration Memory Used \(Remote Command Only\)” on page 149](#)
- [“Configuration Application Memory \(Remote Command Only\)” on page 150](#)

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?
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Example	:SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"
Notes	<p><string of INSTRument:SElect names> are from the enums of the :INSTRument:SElect command.</p> <p>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.</p> <p>Error message –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.</p>
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

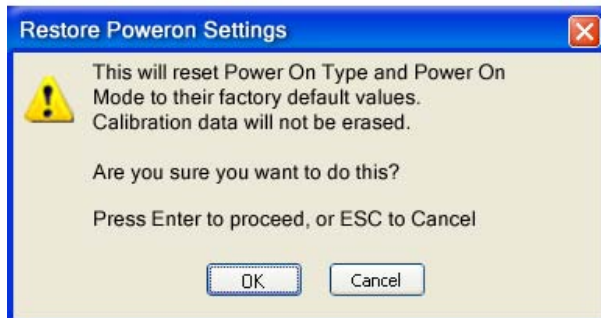
Configuration Application Memory (Remote Command Only)

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.



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	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.
Backwards Compatibility SCPI	:CALibration:AUTO ALERt Parameter ALERt is for backward compatibility only and is mapped to PARTial

Backwards Compatibility Notes	<p>ESA SCPI for Auto Align is :CALibration:AUTO <Boolean>. The command for X-Series is an enumeration. Thus the parameters of “0” and “1” are not possible in X-Series.</p> <p>Similarly, the ESA SCPI for :CALibration:AUTO? returned the Boolean value 1 or 0, in X-Series it is an Enumeration (string). Thus, queries by customer applications into numeric variables will result in an error</p> <p>In PSA Auto Align OFF was not completely off, it is equivalent to PARTial in X-Series. In X-Series, OFF will be fully OFF. This means users of PSA SCPI who choose OFF may see degraded performance and should migrate their software to use PARTial.</p>
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	<p>Alignment processing as a result of the transition to Normal will be executed sequentially. Thus, *OPC? or *WAI following CAL:AUTO ON will return when the alignment processing is complete.</p> <p>The presence of an external signal may interfere with the RF portion of the alignment. If so, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, and bit 11 is set in the Status Questionable Calibration register. After the interfering signal is removed, subsequent alignment of the RF will clear the condition, and clear bit 11 in the Status Questionable Calibration register.</p>
Readback Text	Normal
Status Bits/OPC dependencies	<p>An interfering user signal may prevent automatic alignment of the RF subsystem. If this occurs, the Error Condition message “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.</p>
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 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
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System Functions
System

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	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	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 message "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 message "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

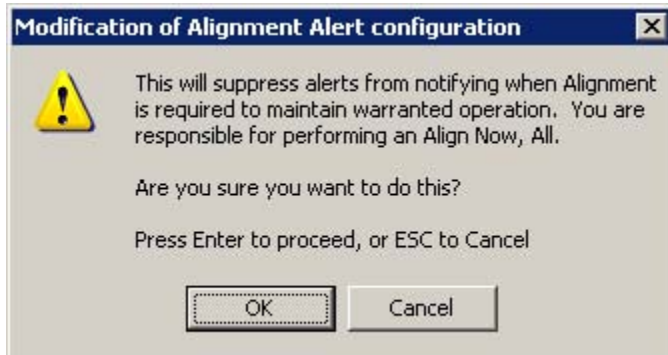
24 hours

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 message "Align Now, All required".

System Functions

System

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 message “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:



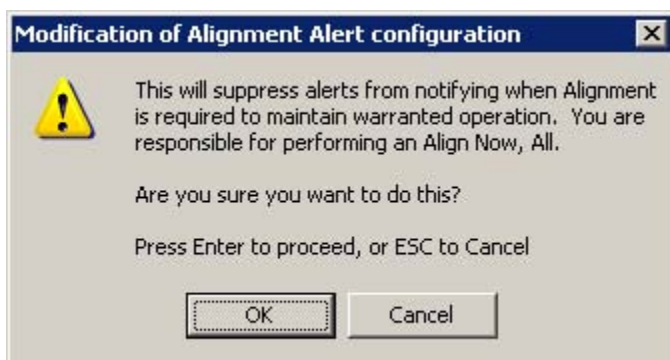
No confirmation is required when Alert is configured through a remote command.

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 recommend 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 message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is generated. In addition the Error Condition message “Align Now, RF required” is generated, 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 message “Align Now, All required” is generated, 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.

In models with the RF Preselector, such as the N9038A, the Align Now All alignment will immediately execute an alignment of all subsystems in the Spectrum Analyzer and partial subsystems of the RF Preselector. The additional alignments are the System Gain, Mechanical attenuator and Electronic attenuator alignments on the RF Preselector path. The purpose of these alignments is to improve the RF Preselector path amplitude variation compared to the bypass path.

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

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

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System

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 message “Align Now, RF required” is generated 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 message “Align Now, All required” is generated, 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.

In models with the RF Preselector, such as the N9038A, the “All but RF” alignment will execute an alignment of all subsystems except the RF subsystem of the Spectrum Analyzer, as well as the system gain of the RF Preselector.

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 generate the Error Condition message “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.

Successful completion of Align Now, RF will 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 message “Align Now, RF required” is generated, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

In models with the RF Preselector, such as the N9038A, the RF alignment will execute an alignment of the RF subsystem of the Spectrum Analyzer, as well as the RF subsystem on RF Preselector path.

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	:CALibration:RF :CALibration:RF?
Example	:CAL:RF

Notes	<p>:CALibration:RF? returns 0 if successful</p> <p>:CALibration:RF? returns 1 if failed (including interfering user signal)</p> <p>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.</p> <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.</p> <p>Successful completion 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.</p> <p>A failure encountered during alignment will generate the Error Condition message “Align RF failed” and set bit 3 in the Status Questionable Calibration register.</p> <p>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.</p> <p>An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.</p>
Couplings	<p>Initializes the time for the Last Align Now, RF Time.</p> <p>Records the temperature for the Last Align Now, RF Temperature.</p>
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

External Mixer

Immediately executes an alignment of the External Mixer which is plugged into the USB port. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key). As this alignment calibrates the LO power to the mixer, this is considered an LO alignment; and failure is classified as an LO alignment failure.

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

Key Path	System, Alignments, Align Now
Mode	All
Remote Command	<p>:CALibration:EMIXer</p> <p>:CALibration:EMIXer?</p>
Example	:CAL:EMIX

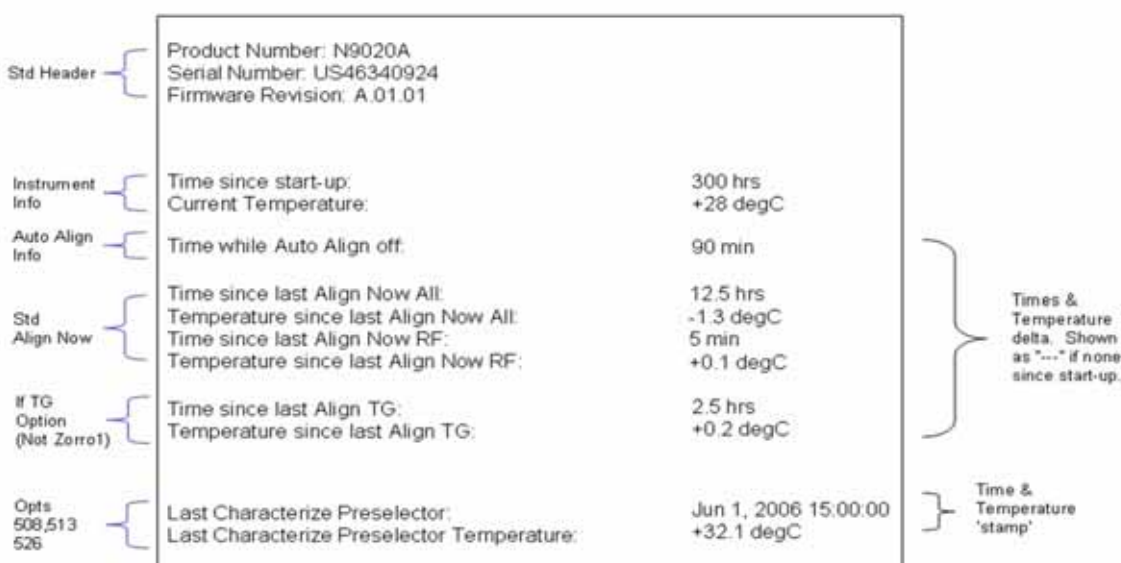
Notes	<p>:CAL:EMIX? returns 0 if successful</p> <p>:CAL:EMIX? returns 1 if failed</p> <p>While Align Now, Ext Mix is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.</p> <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORT command.</p> <p>A failure encountered during alignment will generate the Error Condition message "Align LO failed" and set bit 5 in the Status Questionable Calibration register. Successful completion will clear the "Align LO failed" message and bit 5 in the Status Questionable Calibration register.</p>
Dependencies	This key does not appear unless option EXM is present and is grayed out unless a USB mixer is plugged in to the USB.
Status Bits/OPC dependencies	Bit3 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

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:



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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:SOURce:LALL?
Example	:CAL:TIME:SOUR:LALL?
Notes	Value is the date and time of the last successful Align Now, Source was performed on the instrument. Returns NaN if no Align Now, Source has ever been performed on the instrument.
State Saved	No

System Functions
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Initial S/W Revision	A.05.00
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Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:SOURce: LALL?
Example	:CAL:TEMP:SOUR:LALL?
Notes	Value is in degrees Centigrade at which the last successful was performed on the instrument.
State Saved	No
Initial S/W Revision	A.05.00

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:LPreselector?
Example	:CAL:TIME:LPR?
Notes	Value is the 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

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:RFPSector:LCONducted?
Example	:CAL:TIME:RFPS:LCON?
State Saved	No
Restriction and Notes	Values are the date and time the last successful Align Now, 20 Hz – 30 MHz was executed. The date is separated from the time by a semi-colon character.

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:RFPSector:LCONducted?
Example	:CAL:TEMP:RFPS:LCON?
State Saved	No
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, 20 Hz – 30 MHz was executed.

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TIME:RFPSector:LRADiated?
Example	:CAL:TIME:RFPS:LRAD?
State Saved	No
Restriction and Notes	Value is the date and time the last successful Align Now, 30 MHz – 3.6 GHz was executed. The date is separated from the time by a semi-colon character.

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:TEMPerature:RFPSector:LRADiated?
Example	:CAL:TEMP:RFPS:LRAD?

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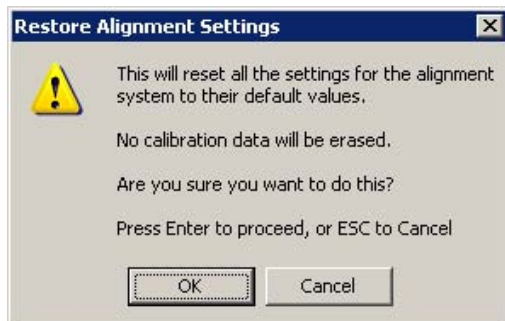
State Saved	No
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, 30 MHz – 3.6 GHz was executed.

Key Path	Visual annotation in the Show Alignment Statistics screen
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:TIME:NEXT? This query returns data using the following format “YYYY/MM/DD; HH:MM:SS”
Example	:CAL:RFPS:SCH:TIME:NEXT?
State Saved	No
Restriction and Notes	The next run time will be updated based on the start date/time and recurrence set by the users. “date” is representation of the date the task will run in the form of “YYYY/MM/DD” where: YYYY is the four digit representation of year. (for example, 2009) MM is the two digit representation of month. (for example, 01 to 12) DD is the two digit representation of the 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 task will run in the form of “HH:MM:SS” where: HH is the two digit representation of the hour in 24 hour format MM is the two digit representation of minute SS is the two digit representation of seconds For model N9038A only.

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 or Restore Align Data...

Opens the utility for backing-up or restoring the 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 back up the alignment data to storage outside of the instrument.

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

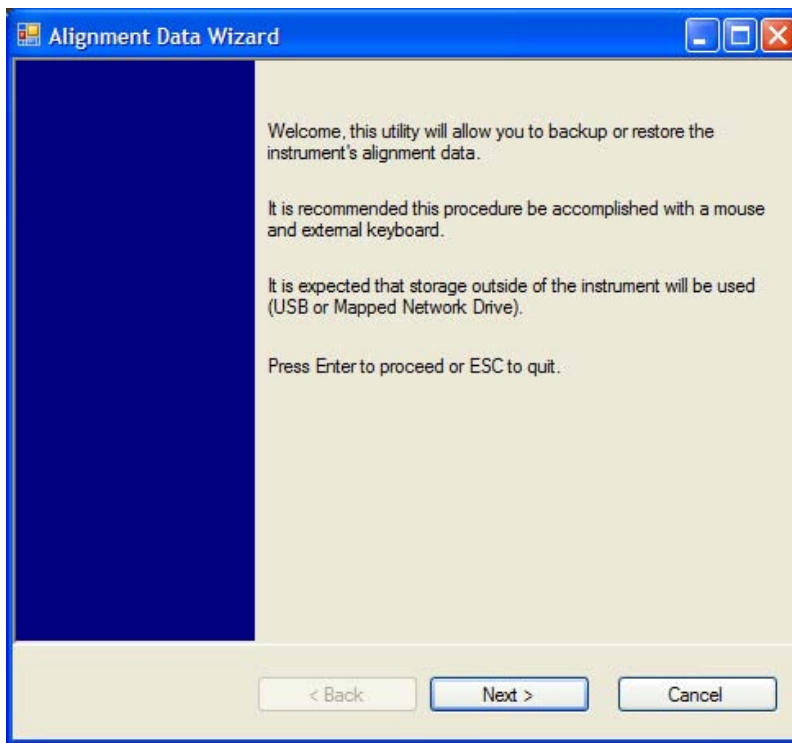
Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:DATA:DEfAult

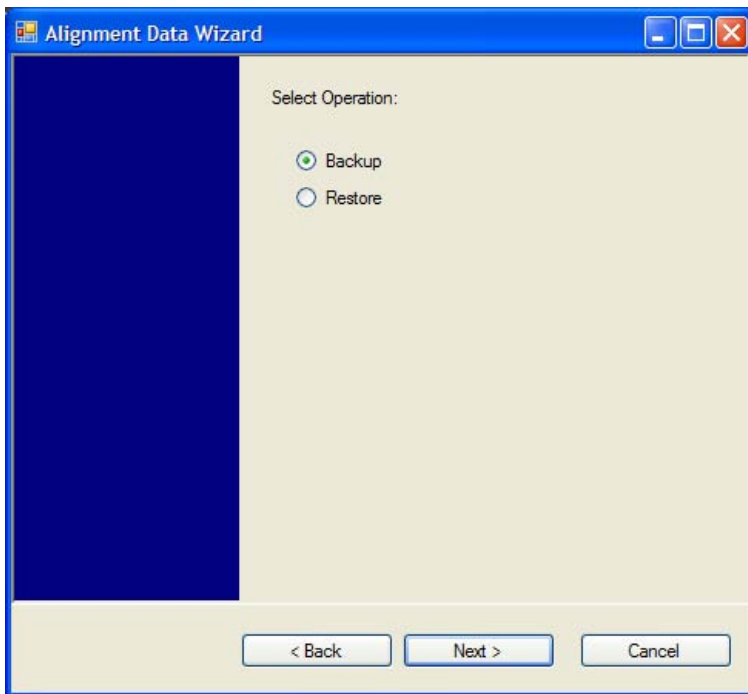
Example	:CAL:DATA:DEF
Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition message “Align Now, All required” is generated.
Initial S/W Revision	Prior to A.02.00

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.

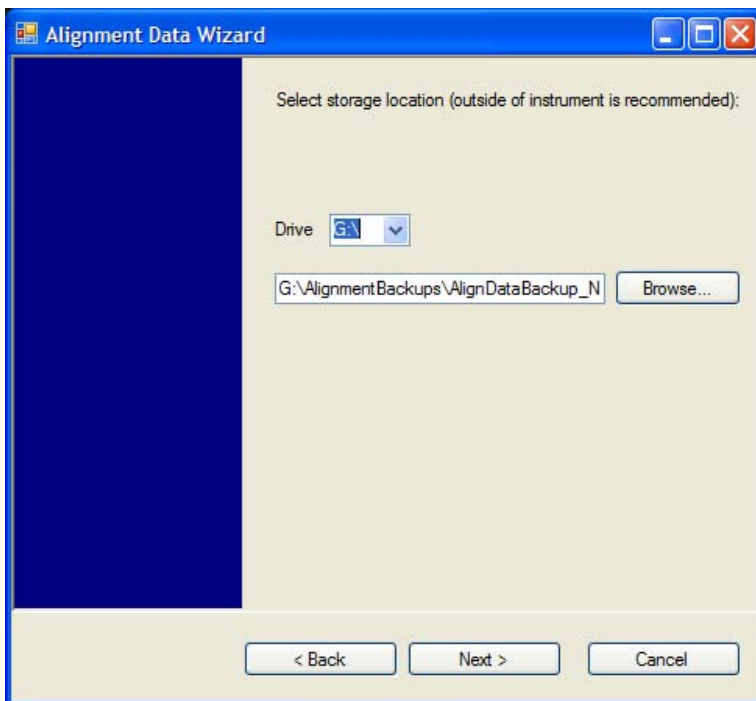




The backup screen will indicate the approximate amount of space required to contain the backup file.

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

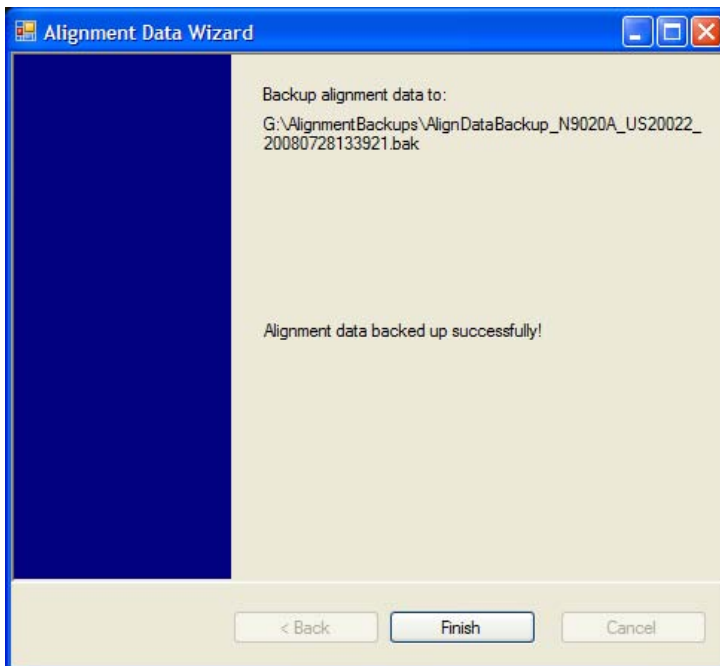
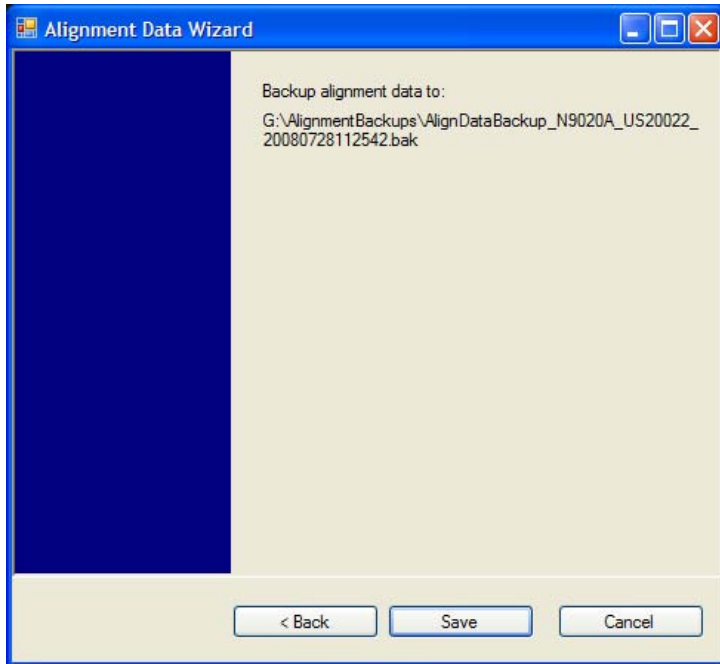
For the N9030A the default backup location will be the internal F: drive which is a solid-state memory device located internally on the instrument.



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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.

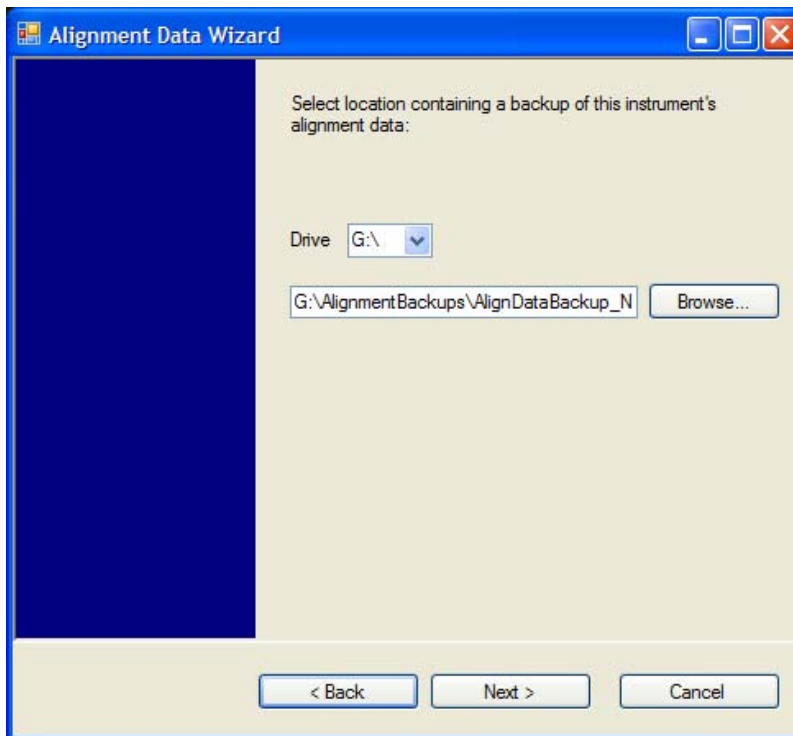


The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.

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):

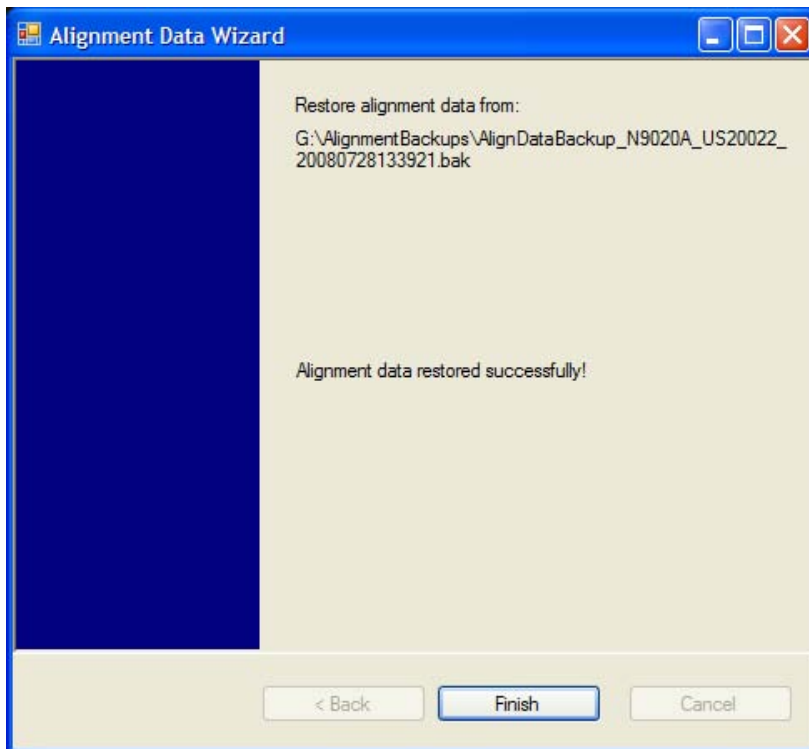
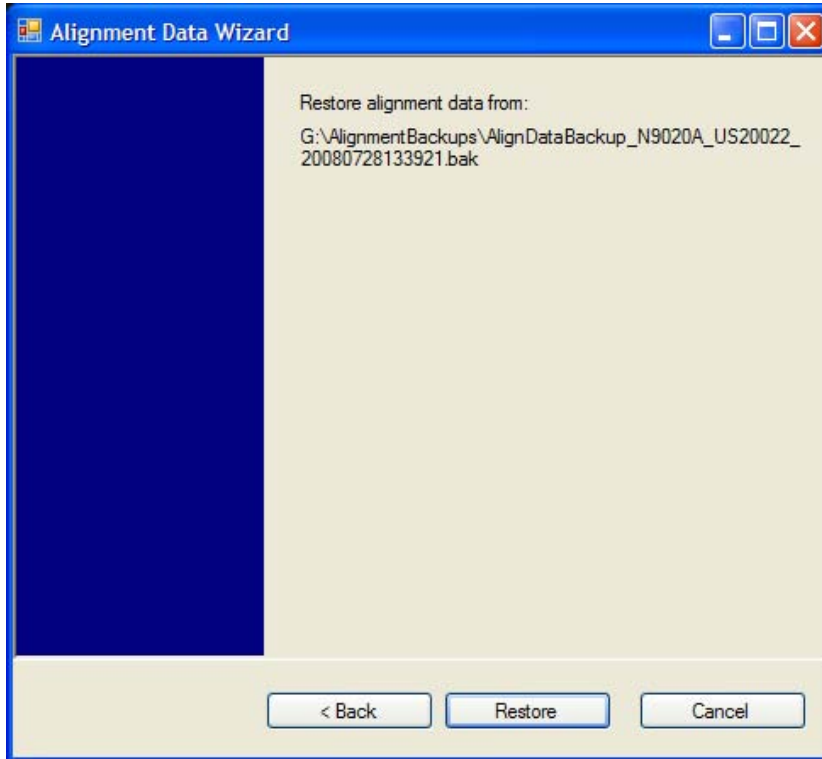


For the N9030A, the default restore location will be the internal F: drive which is a solid-state memory device located internally on the instrument. The default restore file will be the most recent file that matches the default backup file name format: AlignDataBackup_N9030A_<serial number>_<date>.bak



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.

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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

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.

System Functions

System

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 The Characterize Preselector function 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 preselector. 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	<p>:CALibration:YTF? returns 0 if successful</p> <p>:CALibration:YTF? returns 1 if failed (including interfering user signal)</p> <p>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.</p> <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORT command.</p> <p>Successful completion will clear bit 9 in the Status Questionable Calibration register.</p> <p>A failure encountered during alignment will generate the Error Condition message “Characterize Preselector failed” and set bit 9 in the Status Questionable Calibration register.</p> <p>For Options that support frequencies > 3.6 GHz only.</p>
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	<p>Initializes the time for the Last Characterize Preselector Time.</p> <p>Records the temperature for the Last Characterize Preselector Temperature.</p>
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	<p>If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.</p> <p>If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.</p>
Preset	This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”.

System Functions
System

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

Backwards Compatibility SCPI	:CALibration:FREQuency:REFerence:COARse ESA hardware contained two DAC controls for the Timebase. In X-Series the command :CALibration:FREQuency:REFerence:FINE is the method for adjusting the timebase. The :COARse command is provided as an alias to :FINE.
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

RF Preselector

This menu and all of its submenus are only available in models with the RF Preselector, such as the N9038A.

Align Now, 20 Hz to 30 MHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPSelector:CONDUCTed?) will invoke the alignment of the RF Preselector on Conducted Band and return a success or failure value. Successful completion will clear the “Align 20 Hz to 30 MHz required” Error Condition, and clear the bit 1 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Conducted Time, and the temperature is captured for the Last Align Now, Conducted Temperature. The alignment 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 20 Hz to 30 MHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 20 Hz to 30 MHz required” Error Condition will appear when this alignment has expired. User is now responsible to perform the Align Now, 20 Hz to 30 MHz in order to keep the receiver in warranted operation. This alignment can only be performed by user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All

Remote Command	:CALibration:RFPSelector:CONDUCTed :CALibration:RFPSelector:CONDUCTed?
Example	:CAL:RFPS:COND
Notes	:CALibration:RFPSelector:CONDUCTed? Return 0 if successful :CALibration:RFPSelector:CONDUCTed? Return 1 if failed When Align 20 Hz to 30 MHz 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 1 in the Status Questionable Calibration Extended Needed register and bit 0 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “20 Hz to 30 MHz Alignment Failure” and set both bit 1 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register. For model N9038A only.
Dependencies	This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.
Couplings	Initializes the time for the Last Align Conducted Now, Conducted Time. Records the temperature for the Last Align Conducted Now, Conducted Temperature.
Status Bits/OPC Dependencies	Bit 8 or 9 may be set in the Status Questionable Calibration register. Bit 1 may be set in the Status Questionable Calibration Extended Needed register. Bit 0 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

Align Now, 30 MHz to 3.6 GHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPSelector:RADiated?) will invoke the alignment of the RF Preselector on Radiated Band and return a success or failure value. Successful completion will clear the “Align 30 MHz to 3.6 GHz required” Error Condition, and clear the bit 2 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Radiated Time, and the temperature is captured for the Last Align Now, Radiated Temperature. The alignment 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 30 MHz to 3.6 GHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 30 MHz to 3.6 GHz required” Error Condition will appear when this alignment has expired. User is now responsible to perform the Align Now, 30 MHz to 3.6 GHz in order to keep the receiver in warranted operation. This alignment can only be performed by user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All
Remote Command	:CALibration:RFPSelector:RADiated :CALibration:RFPSelector:RADiated?
Example	:CAL:RFPS:RAD
Notes	:CALibration:RFPSelector:RADiated? Return 0 if successful :CALibration:RFPSelector:RADiated? Return 1 if failed When Align 30 MHz to 3.6 GHz 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 2 in the Status Questionable Calibration Extended Needed register and bit 1 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “30 MHz to 3.6 GHz Alignment Failure” and set both bit 2 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register. For model N9038A only.
Dependencies	This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.
Couplings	Initializes the time for the Last Align Radiated Now, Radiated Time. Records the temperature for the Last Align Radiated Now, Radiated Temperature.
Status Bits/OPC Dependencies	Bit 8 or 9 may be set in the Status Questionable Calibration register. Bit 2 may be set in the Status Questionable Calibration Extended Needed register. Bit 1 may be set in the Status Questionable Calibration Extended Failure register.
Initial S/W Revision	A.08.00

Align Now, 20 Hz to 3.6 GHz

Immediately executes an alignment of the receiver subsystem. The receiver will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:RFPreselector:FULL?) will invoke the alignment of the RF Preselector on both Conducted and Radiated Band and return a success or failure value. Successful completion will clear the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear the bit 1 and bit 2 in the Status Questionable Calibration Extended Needed register. The elapsed time counter will begin for Last Align Now, Conducted Time and Last Align Now Radiated Time and the temperature is captured for Last Align Now, Conducted Temperature and Last Align Now, Radiated Temperature. The alignment 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 20 Hz to 3.6 GHz required” is set because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

The “Align 20 Hz to 3.6 GHz required” Error Condition will appear when this alignment has expired. User is now responsible to perform the Align Now, 20 Hz to 3.6 GHz in order to keep the receiver in warranted operation. This alignment can only be performed by user as it is not part of the Auto Align process.

Key Path	System, Alignments, RF Preselector, Align Now
Mode	All
Remote Command	:CALibration:RFPreselector:FULL :CALibration:RFPreselector:FULL?
Example	:CAL:RFPS:FULL
Notes	:CALibration:RFPreselector:FULL? Return 0 if successful :CALibration:RFPreselector:FULL? Return 1 if failed When Align 20 Hz to 3.6 GHz 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 1, bit 2 in the Status Questionable Calibration Extended Needed register and bit 0, bit 1 in Status Questionable Calibration Extended Failure register. A failure encountered during alignment will set the Error Condition “20 Hz to 3.6 GHz Alignment Failure” and set bit 1, bit 2 in the Status Questionable Calibration Extended Needed register and bit 9 in Status Questionable Calibration register. For model N9038A only.
Dependencies	This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.

Couplings	<p>Initializes the time for the Last Align Conducted Now, Conducted Time.</p> <p>Initializes the time for the Last Align Radiated Now, Radiated Time.</p> <p>Records the temperature for the Last Align Conducted Now, Conducted Temperature.</p> <p>Records the temperature for the Last Align Radiated Now, Radiated Temperature.</p>
Status Bits/OPC Dependencies	<p>Bit 8 or 9 may be set in the Status Questionable Calibration register.</p> <p>Bit 1 and 2 may be set in the Status Questionable Calibration Extended Needed register.</p> <p>Bit 0 and 1 may be set in the Status Questionable Calibration Extended Failure register.</p>
Initial S/W Revision	A.08.00

Alert

Setting Alert to ON/OFF will enable/disable the display of RF Preselector alignment required message on the status line. The instrument will power up with Alert On mode.

Key Path	System, Alignments, RF Preselector
Mode	All
Remote Command	:CALibration:RFPreselector:ALERT ON OFF 0 1 :CALibration:RFPreselector:ALERT?
Example	:CAL:RFPS:ALER OFF
Notes	<p>For model N9038A only.</p> <p>Error Condition will be generated when the alert is On and any of the RF Preselector alignments has expired.</p>
Preset	This is unaffected by Preset, but is set to ON on a “Restore System Defaults->Align”.
State Saved	No
Initial S/W Revision	A.08.00

Schedule Setup

To schedule a task to run automatically at the background based on the recurrence and time set in the scheduler. Make sure that the Instrument’s local time is accurate as the Scheduler relies on this information to execute the task.

Key Path	System, Alignments, RF Preselector
Initial S/W Revision	A.08.00

System Functions

System

Task

There is Task 1 to 3 to be selected for the scheduler to run. Task 1 is the 20 Hz to 30 MHz alignment, Task 2 is the 30 MHz to 3.6 GHz alignment and Task 3 is the 20 Hz to 3.6 GHz alignment.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPreselector:Scheduler:TASK T1 T2 T3 :CALibration:RFPreselector:Scheduler:TASK?
Example	:CAL:RFPS:SCH:TASK T1
Notes	Changing the task will not reset the Scheduler time and the alignment is based on the current scheduled configuration to occur. For model N9038A only.
Preset	This is unaffected by Preset but is set to T3 on a “Restore System Defaults->Align”.
State Saved	No
Range	Task 1 Task 2 Task 3
Initial S/W Revision	A.08.00

Date/Time

Configure the scheduler to run a task starting from this date and time. The date and time rely on the instrument’s local time to execute a scheduled task. The date is based on the format “YYYY/MM/DD” and the time is based on a 24 hour clock.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPreselector:Scheduler:TIME:START "date", "time" :CALibration:RFPreselector:Scheduler:TIME:START? This query returns data using the following format "YYYY/MM/DD; HH:MM:SS"
Example	:CAL:RFPS:SCH:TIME:STAR "2009/8/20","12:00:00"

Notes	<p>“date” is representation of the date the task will run in the form of “YYYY/MM/DD” where:</p> <p>YYYY is the four digit representation of year. (for example, 2009)</p> <p>MM is the two digit representation of month. (for example, 01 to 12)</p> <p>DD is the two digit representation of the day. (for example, 01 to 28, 29, 30 or 31 depending on the month and year)</p> <p>“time” is a representation of the time of day the task will run in the form of “HH:MM:SS” where:</p> <p>HH is the two digit representation of the hour in 24 hour format</p> <p>MM is the two digit representation of minute</p> <p>SS is the two digit representation of seconds</p> <p>For model N9038A only.</p>
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a “Restore System Defaults->Align”.
State Saved	No
Initial S/W Revision	A.08.00

Date

Configure the date of the scheduled task. The SCPI command to configure the date and time parameters of the scheduler is the same; however, they each have their own front panel control.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Date/Time
Notes	<p>See “Date/Time ” on page 184.</p> <p>For model N9038A only.</p>
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a “Restore System Defaults->Align”.
State Saved	No
Initial S/W Revision	A.08.00

Time

Configure the time of the scheduled task. The SCPI command to configure the date and time parameters of the scheduler is the same; however, they each have their own front panel control.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Date/Time
Notes	<p>See “Date/Time ” on page 184 .</p> <p>For model N9038A only.</p>
Preset	This is unaffected by Preset but is set to Current date and 00:00:00 on a “Restore System Defaults->Align”.

System Functions System

State Saved	No
Initial S/W Revision	A.08.00

Recurrence

Configure the scheduler to run the task recurrently on a scheduled date and time. You can schedule it to run daily, weekly or alternate weeks.

Key Path	System, Alignments, RF Preselector, Schedule Setup
Mode	All
Remote Command	:CALibration:RFPSelector:Scheduler:REcurrence DAY WEEK OFF :CALibration:RFPSelector:Scheduler:REcurrence?
Example	:CAL:RFPS:SCH:REC DAY
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Align”.
State Saved	No
Range	DAY WEEK OFF
Initial S/W Revision	A.08.00

Every N Weeks

Configure the scheduler to run the task on a day in every number of week’s duration.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence
Initial S/W Revision	A.08.00

N of Weeks

Set the number of week’s duration the scheduler will trigger a task.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence, Every N Weeks
Mode	All
Remote Command	:CALibration:RFPSelector:Scheduler:REcurrence:WEEK <integer> :CALibration:RFPSelector:Scheduler:REcurrence:WEEK?
Example	:CAL:RFPS:SCH:REC:WEEK 2
Notes	New scheduled date to run the alignment task will get updated when this parameter is changed. For model N9038A only.

Preset	This is unaffected by Preset but is set to 1 on a “Restore System Defaults->Align”.
State Saved	No
Range	1–52
Initial S/W Revision	A.08.00

Day

Set the Day of the Week the scheduler will run a scheduled task.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Recurrence, Every N Weeks
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:REcurrence:DAY SUN MON TUE WED THU FRI SAT :CALibration:RFPSelector:SCHeduler:REcurrence:DAY?
Example	:CAL:RFPS:SCH:REC:DAY SUN
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to SUN on a “Restore System Defaults->Align”.
State Saved	No
Range	Sunday Monday Tuesday Wednesday Thursday Friday Saturday
Initial S/W Revision	A.08.00

Scheduler

Setting the Scheduler to ON will trigger the execution of the scheduled task based on the recurrence and time set in the scheduler since the last successful of the specific alignment. A warning condition of “RF Preselector alignment scheduler is ON” will be appeared when the scheduler is set to ON. OFF will turn off the Scheduler from running any scheduled task.

Key Path	System, Alignments, RF Preselector
Mode	All
Remote Command	:CALibration:RFPSelector:SCHeduler:STATe ON OFF 0 1 :CALibration:RFPSelector:SCHeduler:STATe?
Example	:CAL:RFPS:SCH:STAT OFF
Notes	For model N9038A only.
Preset	This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Align”.

State Saved	No
Initial S/W Revision	A.08.00

Restore Defaults

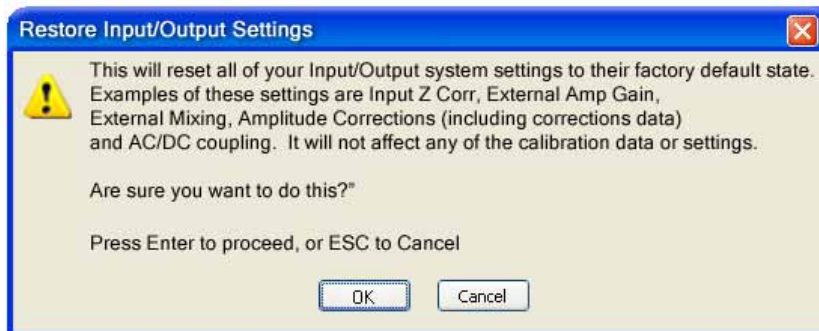
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back 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:

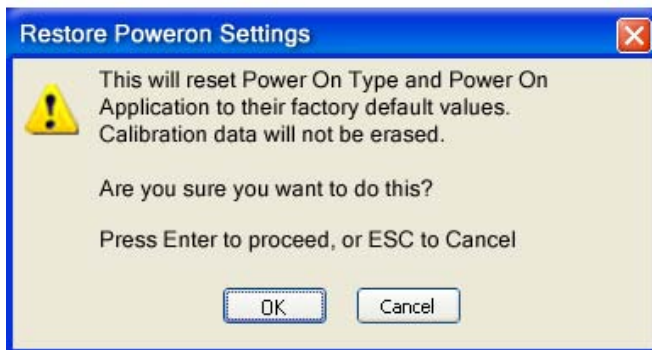


Key Path	System, Restore System Defaults
Example	:SYST:DEF INP
Initial S/W Revision	Prior to A.02.00

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:



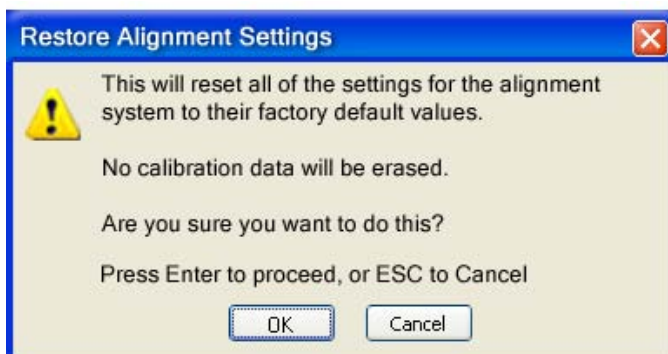
Key Path	System, Restore System Defaults
Example	:SYST:DEF PON
Initial S/W Revision	Prior to A.02.00

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
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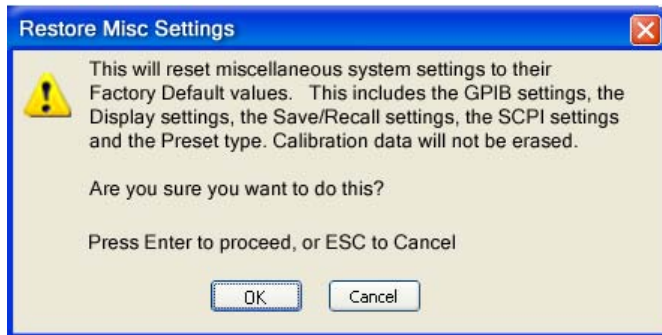
Example	:SYST:DEF ALIG
Initial S/W Revision	Prior to A.02.00

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:

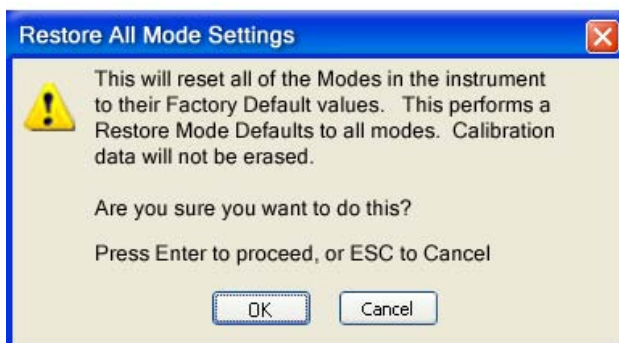


Key Path	System, Restore System Defaults
Example	:SYST:DEF MISC
Initial S/W Revision	Prior to A.02.00

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.

System Functions

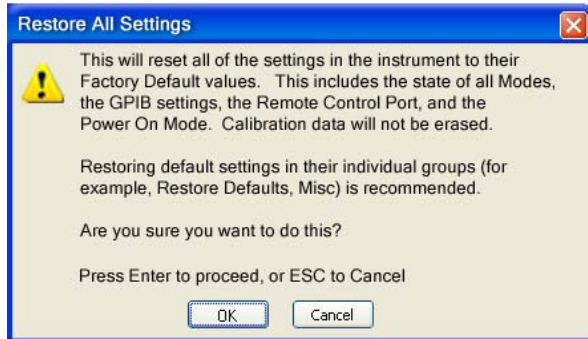
System

Initial S/W Revision	Prior to A.02.00
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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:



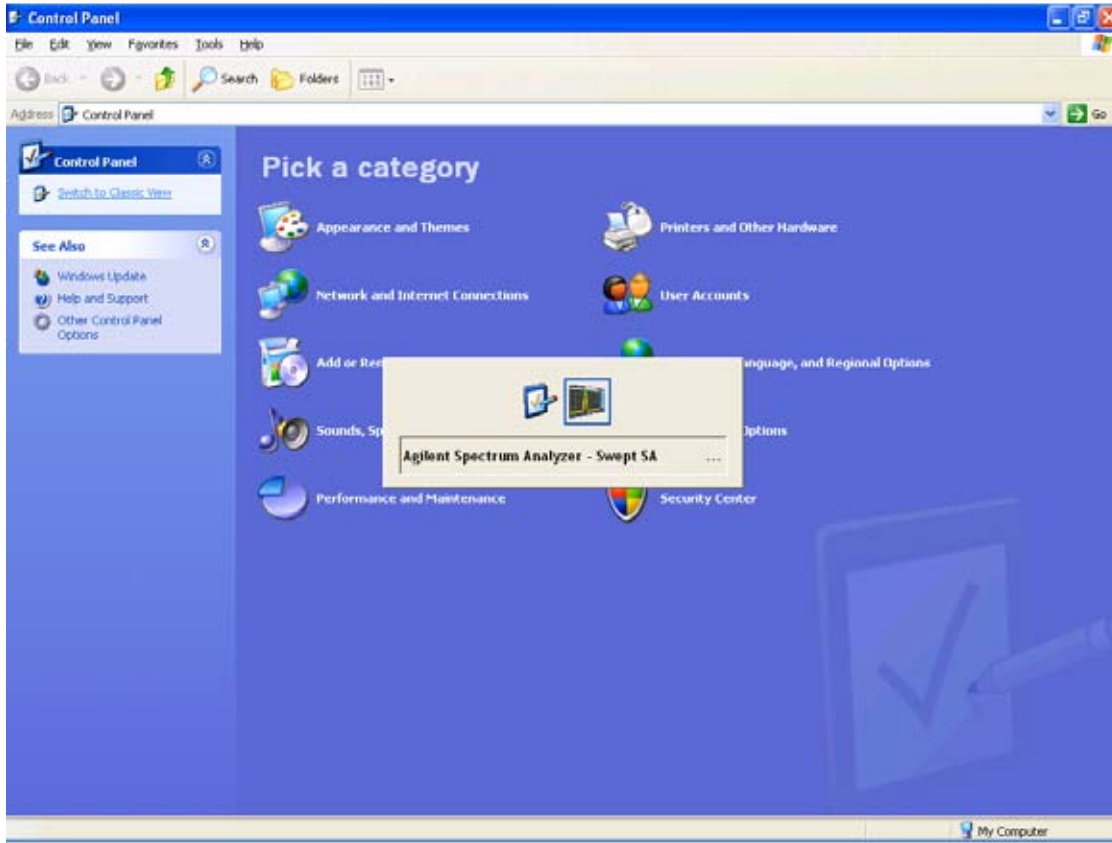
Key Path	System, Restore System Defaults
Example	:SYST:DEF ALL
Couplings	An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings.
Initial S/W Revision	Prior to A.02.00

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 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.

System Functions
System

Backwards Compatibility Notes	In ESA the SCPI command for displaying the Show Licenses screen is: :SYSTem:CONFIgure:LKEY:STATe OFF ON 0 1 :SYSTem:CONFIgure:LKEY:STATe? There are no equivalent SCPI commands in the X-Series for displaying the License Explorer.
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 reverse 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 reverse compatibility.
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY:LIST?
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Notes	<p>Return Value:</p> <p>An <arbitrary block data> of all the installed instrument licenses.</p> <p>The format of each license is as follows.</p> <p><Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport></p> <p>Return Value Example:</p> <p>#3136</p> <p>N9073A-1FP,1.000,B043920A51CA</p> <p>N9060A-2FP,1.000,4D1D1164BE64</p> <p>N9020A-508,1.000,389BC042F920</p> <p>N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005</p> <p><arbitrary block data> is:</p> <p>#NMMM<data></p> <p>Where:</p> <p>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.</p> <p>MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55.</p> <p><data> ASCII contents of the data</p>
Initial S/W Revision	Prior to A.02.00

Remote Command	:SYSTem:LKEY? <"OptionInfo">
Example	SYST:LKEY? "N9073A-1FP"
Notes	<p>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.</p> <p>Return Value:</p> <p><"LicenseInfo"> if the license is valid, null otherwise.</p> <p><"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable.</p> <p>Return Value Example:</p> <p>"B043920A51CA"</p>
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
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Example	:SYST:SEC:USB:WPR ON Will set USB ports to Read only
Initial S/W Revision	A.04.00

Diagnostics

RF Preselector

This menu provides the ability to switch to the particular filter in the Conducted or Radiated Band in order to see the frequency response of the specific RF Preselector filter. The Conducted band has 13 fixed filters and Radiated band has 6 tunable filters and 1 fixed filter. The tunable filters will be characterized during the Factory Calibration test by executing the Characterize RF Preselector, All Bands button. Once after the filter is characterized, the amplitude correction for the RF Preselector path will be invalid and the receiver needs to go through the Factory Flatness calibration tests for the RF Preselector Path. The internal Calibrators for RF Preselector consists of DDS (Direct Digital Synthesizer) and Noise Source. The DDS operating range is from DC to 60 MHz whereas Noise Source is from 10 MHz to 4 GHz. Both the calibrators are used by the firmware to execute the RF Preselector System alignment to improve the amplitude variation of the RF Preselector path.

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

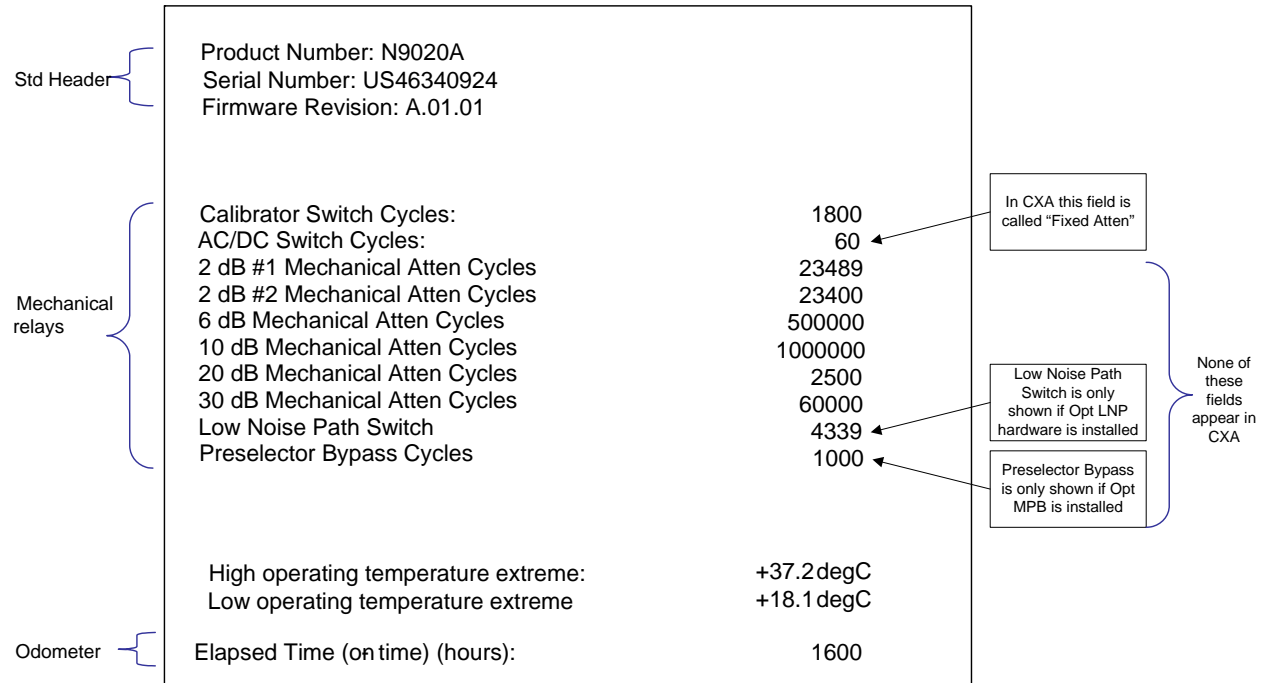
Show Hardware Statistics

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.

System Functions
System



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 queried via SCPI.

- “Query the Mechanical Relay Cycle Count” on page 198
- “Query the Operating Temperature Extremes” on page 199
- “Query the Elapsed Time since 1st power on” on page 199

Query the Mechanical Relay Cycle Count

Returns the count of mechanical relay cycles.

Remote Command	:SYSTem:MRELay:COUNT?
Example	:SYST:MREL:COUN?

Notes	<p>Query Only</p> <p>The return value is a comma separated list of the individual counts for each mechanical relay.</p> <p>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>”</p> <p>Items in the list not pertaining to your particular hardware configuration will return as -999 for those items.</p>
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

System Functions
System

Initial S/W Revision	Prior to A.02.00
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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

	Agilent Converged	PSA
IP Address	SYSTem:COMMunicate:LAN:ADDRess <string> SYSTem:COMMunicate:LAN:ADDRess?	:SYSTem:COMMunicate:LAN[:SELF]:IP <string> :SYSTem:COMMunicate:LAN[:SELF]:IP?
Gateway	SYSTem:COMMunicate:LAN:DGATeway <string> SYSTem:COMMunicate:LAN:DGATeway?	:SYSTem:COMMunicate:LAN[:SELF]:GATEway <string> :SYSTem:COMMunicate:LAN[:SELF]:GATEway?
Subnet Mask	SYSTem:COMMunicate:LAN:SMASk <string> SYSTem:COMMunicate:LAN:SMASk?	:SYSTem:COMMunicate:LAN[:SELF]:SUBNetmask <string> :SYSTem:COMMunicate:LAN[:SELF]:SUBNetmask?

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
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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

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	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	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.

System Functions
System

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	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	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	This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc”

System Functions
System

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
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Initial S/W Revision	Prior to A.02.00
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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	<ul style="list-style-type: none"> • 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.

System Functions

System

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	<p>SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when:</p> <p>The bus is not connected to any controller</p> <p>The controller is currently powered off</p> <p>The controller has explicitly placed the USB device into the suspended state.</p> <p>When in the suspended state, no USB activity, including start of frame packets are received.</p> <p>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.</p>
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	<p>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.</p> <p>The packet count is initialized to 0,0 when the instrument application is started.</p>
State Saved	No
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
Backwards Compatibility Notes	<p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p>
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/Output 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.

System Functions
User Preset

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

For the AM Demod measurement, the analyzer will return the metrics results, such as AM depth, modulation rate, SINAD, total harmonic distortion and carrier power. The analyzer can display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when the Average/Hold feature is turned off, the resulting data will be default values.

This topic contains the following sections:

[“Measurement Commands for AM Demod” on page 215](#)

[“Remote Command Results for AM Demod” on page 215](#)

Measurement Commands for AM Demod

Parameter Name	AM Meas/Read/Fetch Query Results
SCPI Command	:MEASure READ FETCh:AM[1] 0 2 3 4 5 6?
SCPI Example	MEAS:AM? FETCh:AM0? READ:AM5?
Setup	[COMPARE OFF]
Post Setup	[COMPARE ON]

Remote Command Results for AM Demod

<i>Command</i>	<i>n</i>	<i>Return Value</i>
:INITiate:AM	n/a	n/a
:CONFigure?	n/a	name of current measurement: "AM"
:CONFigure:AM	n/a	n/a (selects AM measurement in Meas Preset state)
:CONFigure:AM:NDEFault	n/a	n/a (selects AM measurement without affecting settings)
:FETCh:AM[n]? :MEASure:AM[n]? :READ:AM[n]?	0	This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view.

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1	Returns the following comma-separated results. All modulation depth numbers are in units of percent. <ol style="list-style-type: none"> 1. The RF Spectrum window's center frequency 2. Carrier Power 3. 0 4. Modulation Rate 5. SINAD value 6. Distortion/Total Vrms (% - not ratio - or dB) 7. Total Harmonic Distortion (% - not ratio - or dB) 8. Modulation Depth (Peak+) 9. Modulation Depth (Peak-) 10. Modulation Depth (Pk-Pk)/2 11. Modulation Depth (RMS) 12. Modulation Depth (Peak+) Max Hold 13. Modulation Depth (Peak-) Max Hold 14. Modulation Depth (Pk-Pk)/2 Max Hold 15. Modulation Depth (RMS) Max Hold
	2	This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all values are 10,000..
	3	This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -100.
	4	This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	5	This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -100.
	6	This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	7	Returns the following comma-separated results: Mod Depth (RMS) Mod Depth (RMS) Ratio Ratio Reference

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

For the FM Demod measurement, the analyzer will display the metrics results, such as FM deviation, modulation rate, carrier frequency error, SINAD, total harmonic distortion and carrier power. The analyzer can also display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when Average/Hold feature is turned off, the resulting data will be default values.

If any of the metrics are off, a SCPI query will return not a number and show “---“ in the metrics window. The metrics that can be turned off are: Modulation Rate, SINAD, Distortion, THD and all but one of the Deviations.

This topic contains the following sections:

[“Measurement Commands for FM Demod ” on page 219](#)

[“Remote Command Results for FM Demod” on page 219](#)

Measurement Commands for FM Demod

Parameter Name	FM Meas/Read/Fetch Query Results
SCPI Command	:MEASure READ FETCh:FM[1] 0 2 3 4 5?
SCPI Example	MEAS:FM? FETCH:FM0? READ:FM5?
Setup	[COMPARE OFF]
Post Setup	[COMPARE ON]

Remote Command Results for FM Demod

<i>Command</i>	<i>n</i>	<i>Return Value</i>
:INITiate:FM	n/a	n/a
:CONFigure?	n/a	name of current measurement: "FM"
:CONFigure:FM	n/a	n/a (selects FM measurement in Meas Preset state)
:CONFigure:FM:NDEFault	n/a	n/a (selects FM measurement without affecting settings)
:FETCh:FM[n]? :MEASure:FM[n]? :READ:FM[n]?	0	This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1	Returns the following comma-separated results: 1. The RF Spectrum window's center frequency 2. Carrier Power 3. Carrier Frequency Error 4. Modulation Rate 5. SINAD value 6. Distortion/Total Vrms (% - not ratio - or dB) 7. Total Harmonic Distortion(% - not ratio - or dB) 8. Deviation (Peak+) 9. Deviation (Peak-) 10. Deviation (Pk-Pk)/2 11. Deviation (RMS) 12. Deviation (Peak+) Max Hold 13. Deviation (Peak-) Max Hold 14. Deviation (Pk-Pk)/2 Max Hold 15. Deviation (RMS) Max Hold
	2	This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.
	3	This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	4	This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	5	This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	6	This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	7	Returns the following comma-separated results: <ol style="list-style-type: none">1. Deviation (RMS)2. Deviation (RMS) Ratio3. Ratio Reference

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

For the PM Demod measurement, the analyzer will display the metrics results, such as deviation, modulation rate, carrier frequency error, SINAD, total harmonic distortion and carrier power. The analyzer can also display trace data of the RF spectrum, the AF spectrum, or the demod waveform.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when the Average/Hold feature is turned off, the resulting data will be default values.

If any of the metrics are off, a SCPI query will return not a number and show “---“ in the metrics window. The metrics that can be turned off are: Modulation Rate, SINAD, Distortion, THD and all but one of the Deviations.

This topic contains the following sections:

[“Measurement Commands for PM Demod” on page 223](#)

[“Remote Command Results for PM Demod” on page 223](#)

Measurement Commands for PM Demod

Parameter Name	PM Meas/Read/Fetch Query Results
SCPI Command	:MEASure READ FETCh:PM[1] 0 2 3 4 5?
SCPI Example	MEAS:PM? FETCH:PM0? READ:PM5?
Setup	[COMPARE OFF]
Post Setup	[COMPARE ON]

Remote Command Results for PM Demod

<i>Command</i>	<i>n</i>	<i>Return Value</i>
:INITiate:PM	n/a	n/a
:CONFigure?	n/a	name of current measurement: "PM"
:CONFigure:PM	n/a	n/a (selects PM measurement in Meas Preset state)
:CONFigure:PM:NDEFault	n/a	n/a (selects PM measurement without affecting settings)
:FETCh:PM[n]? :MEASure:PM[n]? :READ:PM[n]?	0	This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1	Returns the following comma-separated results: <ol style="list-style-type: none"> 1. The RF Spectrum window's center frequency 2. Carrier Power 3. Carrier Frequency Error 4. Modulation Rate 5. SINAD value 6. Distortion/Total Vrms (% - not ratio - or dB) 7. Total Harmonic Distortion(% - not ratio - or dB) 8. Deviation (Peak+) 9. Deviation (Peak-) 10. Deviation (Pk-Pk)/2 11. Deviation (RMS) 12. Deviation (Peak+) Max Hold 13. Deviation (Peak-) Max Hold 14. Deviation (Pk-Pk)/2 Max Hold 15. Deviation (RMS) Max Hold
	2	This query returns the Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 10 k.
	3	This query returns the Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -10 k.
	4	This query returns the Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	5	This query returns the Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -10 k.
	6	This query returns the AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	7	Returns the following comma-separated results: <ol style="list-style-type: none">1. Deviation (RMS)2. Deviation (RMS) Ratio3. Ratio Reference

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

For the FM Stereo Demod measurement, the analyzer will display the metrics results, such as FM deviation, modulation rate, carrier frequency error, SINAD, total harmonic distortion and carrier power. The analyzer can also display trace data of the RF spectrum, the AF spectrum, the demod waveform, or the L/R channel waveform/spectrum.

If Demod Min trace, Demod Max trace or Demod Average trace is queried using a Meas, Read or Fetch command when Average/Hold feature is turned off, the resulting data will be default values.

If any of the metrics are off, a SCPI query will return not a number and show “---“ in the metrics window. The metrics that can be turned off are: Modulation Rate, SINAD, Distortion, THD and all but one of the Deviations.

This topic contains the following sections:

[“Measurement Commands for FM Stereo Demod” on page 227](#)

[“Remote Command Results for FM Stereo Demod” on page 227](#)

Measurement Commands for FM Stereo Demod

Parameter Name	FM Stereo Meas/Read/Fetch Query Results
SCPI Command	:MEASure READ FETCh:FMSTereo[1] 0 2 3 4 5?
SCPI Example	MEAS:FMST? FETCH:FMST0? READ:FMST5?
Setup	[COMPARE OFF]
Post Setup	[COMPARE ON]

Remote Command Results for FM Stereo Demod

<i>Command</i>	<i>n</i>	<i>Return Value</i>
INITiate:FMSTereo	n/a	n/a
CONFigure?	n/a	name of current measurement: "FMST"
CONFigure:FMSTereo	n/a	n/a (selects FM Stereo measurement in Meas Preset state)
CONFigure:FMSTereo:NDEFault	n/a	n/a (selects FM Stereo measurement without affecting settings)
FETCh:FMSTereo[n]? MEASure:FMSTereo[n]? READ:FMSTereo[n]?	0	This query returns the RF Spectrum trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1	<p>Returns the following comma-separated results:</p> <ol style="list-style-type: none"> 1. The RF Spectrum window's center frequency 2. RF Carrier Power 3. RF Carrier Frequency Error 4. 38 kHz Carrier Frequency Error 5. 38 kHz Carrier Phase Error 6. Left To Right 7. Mono To Stereo 8. MPX SINAD value 9. MPX Distortion/Total Vrms (% - not ratio - or dB) 10. MPX Deviation (Peak+) 11. MPX Deviation (Peak-) 12. MPX Deviation (Pk-Pk)/2 13. MPX Deviation (RMS) 14. MPX Deviation (Peak+) Max Hold 15. MPX Deviation (Peak-) Max Hold 16. MPX Deviation (Pk-Pk)/2 Max Hold 17. MPX Deviation (RMS) Max Hold 18. Mono Modulation Frequency 19. Mono SINAD value 20. Mono Distortion/Total Vrms (% - not ratio - or dB) 21. Mono Deviation (Peak+) 22. Mono Deviation (Peak-) 23. Mono Deviation (Pk-Pk)/2 24. Mono Deviation (RMS) 25. Mono Deviation (Peak+) Max Hold 26. Mono Deviation (Peak-) Max Hold 27. Mono Deviation (Pk-Pk)/2 Max Hold 28. Mono Deviation (RMS) Max Hold 29. Stereo Modulation Frequency 30. Stereo Deviation (Peak+) 31. Stereo Deviation (Peak-) 32. Stereo Deviation (Pk-Pk)/2 33. Stereo Deviation (RMS)

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1 (Cont.)	34. Stereo Deviation (Peak+) Max Hold 35. Stereo Deviation (Peak-) Max Hold 36. Stereo Deviation (Pk-Pk)/2 Max Hold 37. Stereo Deviation (RMS) Max Hold 38. Left Modulation Frequency 39. Left SINAD value 40. Left Distortion/Total Vrms (% - not ratio - or dB) 41. Left Total Harmonic Distortion(% - not ratio - or dB) 42. Left Deviation (Peak+) 43. Left Deviation (Peak-) 44. Left Deviation (Pk-Pk)/2 45. Left Deviation (RMS) 46. Left Deviation (Peak+) Max Hold 47. Left Deviation (Peak-) Max Hold 48. Left Deviation (Pk-Pk)/2 Max Hold 49. Left Deviation (RMS) Max Hold 50. Right Modulation Frequency 51. Right SINAD value 52. Right Distortion/Total Vrms (% - not ratio - or dB) 53. Right Total Harmonic Distortion(% - not ratio - or dB) 54. Right Deviation (Peak+) 55. Right Deviation (Peak-) 56. Right Deviation (Pk-Pk)/2 57. Right Deviation (RMS) 58. Right Deviation (Peak+) Max Hold 59. Right Deviation (Peak-) Max Hold 60. Right Deviation (Pk-Pk)/2 Max Hold 61. Right Deviation (RMS) Max Hold 62. Pilot Modulation Frequency 63. Pilot Deviation (Peak+) 64. Pilot Deviation (Peak-) 65. Pilot Deviation (Pk-Pk)/2 66. Pilot Deviation (RMS)

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	not specified or n=1 (Cont.)	67. Pilot Deviation (Peak+) Max Hold 68. Pilot Deviation (Peak-) Max Hold 69. Pilot Deviation (Pk-Pk)/2 Max Hold 70. Pilot Deviation (RMS) Max Hold 71. RDS Deviation (Peak+) 72. RDS Deviation (Peak-) 73. RDS Deviation (Pk-Pk)/2 74. RDS Deviation (RMS) 75. RDS Deviation (Peak+) Max Hold 76. RDS Deviation (Peak-) Max Hold 77. RDS Deviation (Pk-Pk)/2 Max Hold 78. RDS Deviation (RMS) Max Hold 79. RDS Error Block Count 80. RDS Total Block Count 81. RDS BLER (Block Error Rate)
	2	This query returns the MPX Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.
	3	This query returns the MPX Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	4	This query returns the MPX Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	5	This query returns the MPX Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	6	This query returns the MPX AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view
	7	This query returns the Mono Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	8	This query returns the Mono Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	9	This query returns the Mono Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	10	This query returns the Mono Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	11	This query returns the Mono AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view
	12	This query returns the Stereo Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.
	13	This query returns the Stereo Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	14	This query returns the Stereo Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	15	This query returns the Stereo Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.
	16	This query returns the Stereo AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view
	17	This query returns the Left Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.
	18	This query returns the Left Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are -1 GHz.

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	19	This query returns the Left Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	20	This query returns the Left Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are –1 GHz.
	21	This query returns the Left AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view
	22	This query returns the Right Demod Min Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are 1 GHz.
	23	This query returns the Right Demod Max Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are –1 GHz.
	24	This query returns the Right Demod Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view
	25	This query returns the Right Demod Average Trace data as a list of x,y pairs. The x-axis values are in units of seconds. The y-value units depend on the current view If Aver/Hold is off, all y-values are –1 GHz.
	26	This query returns the Right AF Spectrum Trace data as a list of x,y pairs. The x-axis values are in units of Hz. The y-value units depend on the current view

<i>Command</i>	<i>n</i>	<i>Return Value</i>
	27	Returns the following comma-separated results: <ol style="list-style-type: none"> 1. MPX Deviation (RMS) 2. MPX Deviation (RMS) Ratio 3. MPX Ratio Referenced 4. Mono Deviation (RMS) 5. Mono Deviation (RMS) Ratio 6. Mono Ratio Referenced 7. Stereo Deviation (RMS) 8. Stereo Deviation (RMS) Ratio 9. Stereo Ratio Referenced 10. Left Deviation (RMS) 11. Left Deviation (RMS) Ratio 12. Left Ratio Referenced 13. Right Deviation (RMS) 14. Right Deviation (RMS) Ratio 15. Right Ratio Referenced 16. Pilot Deviation (RMS) 17. Pilot Deviation (RMS) Ratio 18. Pilot Ratio Referenced 19. RDS Deviation (RMS) 20. RDS Deviation (RMS) Ratio 21. RDS Ratio Referenced

Key Path	Meas
Initial S/W Revision	A.10.00

In all views, the display is split into signal display windows and a numeric results (metrics) window. The metrics window displays carrier and modulation metrics and is similar to the numeric windows common in the SA communications measurements such as Channel Power and Occupied Bandwidth. The metrics associated with the 3 Demod measurements and their metrics including units are shown below.

For the Modulation Depth/FM Deviation/PM Deviation metrics, two columns are displayed.

Column 1: Averaging off - shows the metrics in real time, that is, the value from the last measurement.

Averaging on - shows the average value of the metric since the last restart. This uses the arithmetic average:

$$\text{New avg} = ((K-1) \text{ Old avg} + \text{New data})/K$$

where K is the average counter

Column 2: Only displayed if Aver/Hold Num is on - shows the maximum value that the non-averaged metric has taken on since the last time the measurement was restarted, known as the “Max Hold” value (note: for the Peak(-) metric, Max Hold reads the negative of the absolute value of the maximum value. For example, if the absolute value of Peak- got up to 80 kHz, the Max Hold column would read -80 kHz)

Metric	Units			
	AM	FM	PM	FM Stereo
Carrier Power - the average power detected at the carrier frequency, averaged over integer periods of the modulation frequency	(dBm)	(dBm)	(dBm)	(dBm)
Carrier Frequency Error - represents the difference between the instrument’s tuned center frequency and the detected carrier’s frequency. This does not apply to AM signals.	N/A	(Hz)	(Hz)	(Hz)
Modulation Rate - represents the frequency of the detected modulation. This is also sometimes known as Modulation Frequency.	(Hz)	(Hz)	(Hz)	(Hz) for Left, Right, and Pilot
SINAD - represents the ratio of total received power (the received signal-plus-noise-plus-distortion power) to the received noise-plus-distortion power. It is always expressed in decibel units. The rejection of the carrier from the noise-plus-distortion power measurement is usually not much more than 50 dB, thus limiting the maximum SINAD.	(dB)	(dB)	(dB)	(dB) for MPX, Mono, Left, and Right

Metric	Units			
	AM	FM	PM	FM Stereo
Distortion/Total Vrms - represents the ratio of unwanted received rms voltage (noise combined with distortion) to the total received rms voltage, expressed in % or dB on the display and over SCPI. Therefore, this metric is the negative of SINAD when expressed in decibels. When expressed in %, the SCPI value is a true percentage, thus 100 times as large as the ratio – for example, 99% would return as 99, not as 0.99.	(dB or %)	(dB or %)	(dB or %)	(dB or %) for MPX, Mono, Left, and Right
THD - represents the ratio of the root mean square voltage of the harmonics referenced to the fundamental voltage, expressed in % or dB on the display and over SCPI. Note the difference with respect to Distortion. The denominator of the ratio is different and the items in the numerator do not include the noise between harmonics, just the harmonics themselves. When expressed in %, the SCPI value is a true percentage, thus 100 times as large as the ratio – for example, 99% would return as 99, not as 0.99.	(dB or %)	(dB or %)	(dB or %)	(dB or %) for Left, and Right
AM Mod Depth Peak (+) - the maximum AM modulation depth in units of % during the acquisition period. When averaging is on, column 1 includes averaging of peaks through the acquisition period – this significantly improves the SNR when measuring cyclic signals. If averaging is off, column 1 shows simply the highest peak. Column 2 always shows the maximum of the highest peak. Note that in amplitude modulation, the modulation depth (also known as % modulation or modulation index) is the amount of voltage deviation the modulated signal has relative to its original un-modulated level. Modulation depth of 100% means the peak voltage doubles, which in turn implies the peak power quadruples.	(%)	N/A	N/A	N/A
AM Mod Depth Peak (-) – represents the minimum value of AM modulation depth in units of % during the acquisition period. Not the absolute value, but the negative value.	(%)	N/A	N/A	N/A
AM Mod Depth (Pk – Pk)/2 – half the difference between the AM modulation depth Peak+ and Peak-.	(%)	N/A	N/A	N/A

Metric	Units			
	AM	FM	PM	FM Stereo
AM Mod Depth RMS - represents the Root Mean Square AM modulation depth in units of % during the acquisition period.	(%)	N/A	N/A	N/A
Deviation Peak (+) - represents the maximum frequency (FM) or phase (PM) deviation during the acquisition period. When averaging is on, column 1 includes averaging of peaks through the acquisition period – this significantly improves the SNR when measuring cyclic signals. If averaging is off, column 1 shows simply the highest peak. Column 2 always shows the maximum of the highest peak.	N/A	(Hz)	(rad)	(Hz) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS
Deviation Peak (-) - the minimum frequency (FM) or phase (PM) deviation during the acquisition period.	N/A	(Hz)	(rad)	(Hz) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS
Deviation (Pk-Pk)/2 - half the difference between the modulation depth Peak+ and Peak-.	N/A	(Hz)	(rad)	(Hz) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS
Deviation RMS - the Root Mean Square frequency (FM) or phase (PM) deviation during the acquisition period.	N/A	(Hz)	(rad)	(Hz) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS
RMS Ratio - the ratio between the displayed value of RMS modulation and the Ratio Reference (see below). Only appears when RMS Ratio is selected under View/Display, Metrics Settings .	(dB)	(dB)	(dB)	(dB) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS

Metrics

Metric	Units			
	AM	FM	PM	FM Stereo
Ratio Ref - the reference value being used for the Ratio display. The reference is set whenever the ratio metric is selected (see View/Display, Metrics Settings, RMS Ratio). Only appears when RMS Ratio is selected (see above)	(%)	(Hz)	(rad)	(Hz) for MPX, Mono, Stereo, Left, Right, Pilot, and RDS
Left to Right - represents the ratio of the left-channel signal power to the right-channel signal power. This only applies to FM Stereo signals.	N/A	N/A	N/A	(dB)
Mono to Stereo - represents the ratio of the mono signal power to the stereo signal power. This only applies to FM Stereo signals.	N/A	N/A	N/A	(dB)
38 kHz Carrier Freq Error This only applies to FM Stereo signals.	N/A	N/A	N/A	(Hz)
38 kHz Carrier Phase Error This only applies to FM Stereo signals.	N/A	N/A	N/A	(deg)

The key and command descriptions in this section describe functions of the Analog Demod Mode. In some instances, such as the Save front-panel key and the Display softkey, a more general description is documented. To access information on a specific key, press that key and then press the green Help key. This activates the applications context sensitive Help system, which displays the desired topic.

AMPTD Y Scale

Accesses a menu that enables you to set the reference level, attenuation, scale per division, reference position, and internal pre-amplifier parameters for your measurement.

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

Ref Value

The reference value specifies the amplitude of a signal displayed on the reference graticule line. The reference line is at the top, center, or bottom of the graticule, depending on the value of the Ref Position function.

Changing the reference value does not restart a measurement, but changes all displayed traces and markers to the new value. If a change to the reference value changes an auto-coupled attenuation value, the measurement restarts .

The Ref Value key applies only to the window with the focus. If the focus is on the Metrics window, the Ref Value key is unavailable.

Key Path	AMPTD Y Scale
Remote Command	:DISPlay:AM FM PM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:AM FM PM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]:RLEVel?
Example	DISP:AM:WIND:TRAC:Y:RLEV 20 dBm Sets the reference value in window 1 to 20 dBm.
Remote Command Notes	Regardless of the View, the windows are numbered as follows: 1. RF Spectrum 2. Demod Waveform 3. AF Spectrum 4. Metrics
Couplings	The value is constrained within the MAX and MIN values, but is otherwise generally not adjusted.

AMPTD Y Scale

Preset	<p>RF Spectrum 0 dBm</p> <p>Demod Waveform AM: 0%</p> <p>FM: 0 Hz</p> <p>PM: 0 rad</p> <p style="padding-left: 100px;">FM Stereo: 0 Hz</p> <p>AF Spectrum AM: 100%</p> <p>FM: 100 kHz</p> <p>PM: 6.28 rad</p> <p style="padding-left: 100px;">FM Stereo: 100 kHz</p>
State Saved	Saved in instrument state
Min	<p>AM:</p> <p>RF Spectrum -170 dBm – Ext Gain</p> <p>Demod Waveform -100%</p> <p>AF Spectrum 1 m%</p> <p>FM:</p> <p>RF Spectrum -170 dBm – Ext Gain</p> <p>Demod Waveform -10 GHz</p> <p>AF Spectrum 1 Hz</p> <p>PM:</p> <p>RF Spectrum -170 dBm – Ext Gain</p> <p>Demod Waveform -10 krad</p> <p>AF Spectrum 100 urad</p> <p>FM Stereo:</p> <p>RF Spectrum -170 dBm – Ext Gain</p> <p>Demod Waveform -10 GHz</p> <p>AF Spectrum 1 Hz</p>

Max	<p>AM:</p> <p>RF SpectrumN9030A: 30 dBm</p> <p>N9020A: 30 dBm</p> <p>N9010A: 23 dBm</p> <p>N9000A: 23 dBm</p> <p>Demod Waveform 100%</p> <p>AF Spectrum 10 k%</p> <p>FM:</p> <p>RF SpectrumN9030A: 30 dBm</p> <p>N9020A: 30 dBm</p> <p>N9010A: 23 dBm</p> <p>N9000A: 23 dBm</p> <p>Demod Waveform 10 GHz</p> <p>AF Spectrum 10 GHz</p> <p>PM:</p> <p>RF SpectrumN9030A: 30 dBm</p> <p>N9020A: 30 dBm</p> <p>N9010A: 23 dBm</p> <p>N9000A: 23 dBm</p> <p>Demod Waveform 10 krad</p> <p>AF Spectrum 10 krad</p> <p>FM Stereo:</p> <p>RF Spectrum 30 dBm</p> <p>Demod Waveform 10 GHz</p> <p>AF Spectrum 1 GHz</p>
Default Unit	depends on the current view
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Attenuation

This single control replaces the Attenuation menu that is used in other applications. For a single attenuator configuration in the Analog Demod mode, control of the two stages of the single attenuator is integrated into this single control. In the dual attenuator configuration, the electronic attenuator is not used.

Key Path	AMPTD Y Scale
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AMPTD Y Scale

Remote Command	[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWer[:RF]:ATTenuation?
Example	POW:ATT 20
Preset	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 you from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if this attenuation IS below 6 dB it can be increased with the knob and step keys, but not decreased.
Max	N9020A: 70 dBm N9010A: 60 dBm N9000A: 50 dBm
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.03.00

Scale / Div

Sets the units per vertical graticule division on the display.

The Scale/Div key applies only to the window with the focus. If the focus is on the Metrics window, the Scale/Div key is unavailable.

Key Path	AMPTD Y Scale
Remote Command	:DISPlay:AM FM PM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]:PDIVision <real> :DISPlay:AM FM PM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]:PDIVision?
Example	DISP:AM:WIND:TRAC:Y:PDIV 5 DB
Remote Command Notes	Regardless of the View, the windows are numbered as follows: 1. RF Spectrum 2. Demod Waveform 3. AF Spectrum 4. Metrics

<p>Preset</p>	<p>AM: RF Spectrum 10 dB Demod Waveform 20 % AF Spectrum 10 dB FM: RF Spectrum 10 dB Demod Waveform 15 kHz AF Spectrum 10 dB PM: RF Spectrum 10 dB Demod Waveform 1 rad AF Spectrum 10 dB FM Stereo: RF Spectrum 10 dB Demod Waveform 15 kHz AF Spectrum 10 dB</p>
<p>State Saved</p>	<p>Saved in instrument state</p>
<p>Min</p>	<p>AM: RF Spectrum 0.1 dB Demod Waveform 1% AF Spectrum 0.1 dB FM: RF Spectrum 0.1 dB Demod Waveform 1 Hz AF Spectrum 0.1 dB PM: RF Spectrum 0.1 dB Demod Waveform 10 mrad AF Spectrum 0.1 dB FM Stereo: RF Spectrum 0.1 dB Demod Waveform 1 Hz AF Spectrum 0.1 dB</p>

AMPTD Y Scale

Max	AM: RF Spectrum 20 dB Demod Waveform 1 kHz AF Spectrum 20 dB FM: RF Spectrum 20 dB Demod Waveform 1 GHz AF Spectrum 20 dB PM: RF Spectrum 20 dB Demod Waveform 1 krad AF Spectrum 20 dB FM Stereo: RF Spectrum 20 dB Demod Waveform 1 GHz AF Spectrum 20 dB
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Ref Position

Positions the reference value at the top, center, or bottom of the Y Scale display. Changing the reference position does not change the reference value.

The Ref Position key applies only to the window with the focus. If the focus is on the Metrics window, the Ref Position key is unavailable.

Key Path	AMPTD Y Scale
Remote Command	:DISPlay:AM PM FM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]]:RPOSition TOP CENTER BOTTom :DISPlay:AM PM FM FMSTereo:WINDow[1] 2 3:TRACe:Y[:SCALE]]:RPOSition?
Example	DISP:AM:WIND:TRAC:Y:RPOS BOTT
Remote Command Notes	Regardless of the View, the windows are numbered as follows: <ol style="list-style-type: none"> 1. RF Spectrum 2. Demod Waveform 3. AF Spectrum 4. Metrics

Preset	RF Spectrum window: Top Demod Waveform window: Center AF Spectrum window: Top
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

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

AMPTD Y Scale

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.

For Analog Demod, these parameters are:

- RF Res BW
- AF Res BW
- CF Step

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

Auto Couple

BW

Opens a menu of keys that enable you to control the bandwidth functions of the application.

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

RF Res BW

Activates the RF Res BW function, which enables you to manually set the resolution bandwidth used in the RF Spectrum window.

Normally, the RF Res BW (Auto) key selects automatic coupling of the resolution bandwidth. To decouple the resolution bandwidth, press the RF Res BW key until Man is underlined, or enter a different value for the resolution bandwidth.

When the resolution bandwidth is manually selected, it may be returned to the coupled state by pressing the RF Res BW key until **Auto** is underlined. This may also be done by pressing the Auto Couple key or by performing a **preset**.

Only the Gaussian filter type is used.

Key Path	BW
Remote Command	<pre>[:SENSe]:AM FM PM FMSTereo:BANDwidth[:RESolution] <freq> [:SENSe]:AM FM PM FMSTereo:BANDwidth[:RESolution]? [:SENSe]:AM FM PM:BANDwidth[:RESolution]:AUTO OFF ON 0 1 [:SENSe]:AM FM PM:BANDwidth[:RESolution]:AUTO?</pre>
Example	<pre>AM:BAND 1 KHZ AM:BAND? AM:BAND:AUTO ON AM:BAND:AUTO?</pre>
Notes	Only certain discrete resolution bandwidths are available. For numeric entries, all RBW Types choose the nearest (arithmetically, on a linear scale, rounding up) available RBW to the value entered.

BW

Couplings	<p>AM/FM/PM: In Auto, the 3 dB RBW of the desired filter is the closest possible choice to that given by Span divided by 106 (the Span: 3 dB RBW parameter), except that the range for auto-coupling is restricted to not exceed 3 MHz.</p> <p>FMST: In Auto, RBW is coupled to Span in the following ways: $RBW = \text{Span} / 500$ (Span > 500 kHz)</p> <p>$RBW = 1 \text{ kHz}$ (100kHz <= Span <= 500 kHz)</p> <p>$RBW = \text{Span} / 100$ (Span < 100 kHz)</p>
Preset	<p>AM/FM/PM: Preset is Auto, which results in a 680 Hz value since the preset span is 75 kHz and the Span/RBW ratio is 106</p> <p>FMST: Preset is Auto, which results in a 1 kHz value since the preset span is 500 kHz</p>
State Saved	Saved in instrument state
Min	1 Hz
Max	8 MHz
Default Unit	Hz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Channel BW

The Channel BW variable is used to determine the bandwidth used for the demodulation. The flat top filter type must be used for demodulation.

This parameter also controls the RBW hardware setting for the demodulation fed to the speaker.

Key Path	BW
Remote Command	<pre>[:SENSE] : AM FM PM FMSTereo : BANDwidth : CHANnel <freq> [:SENSE] : AM FM PM FMSTereo : BANDwidth : CHANnel ?</pre>
Example	AM:BAND:CHAN 200 kHz
Preset	<p>= AM/FM/PM = 25 kHz</p> <p>= FMST = 400 kHz</p>
State Saved	Saved in instrument state
Min	390 Hz
Max	8 MHz
Default Unit	Hz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

AF Res BW

In the AF Spectrum window, the AF Res BW key is used to set the Resolution bandwidth of the FFT of the demodulated waveform.

The data acquisition uses the Channel BW value for hardware control during data acquisition, just as it does in the Demod Waveform window.

AF Res BW (Auto) selects automatic coupling of the AF Res BW to the AF Span (defined as AF Stop Freq – AF Start Freq) using the same factor of 106 used by the RF Res BW. To decouple the resolution bandwidth, press the AF Res BW key until **Man** is underlined, or enter a different value for the AF resolution bandwidth.

When the AF resolution bandwidth is manually selected, it may be returned to the coupled state by pressing the **AF Res BW** key until **Auto** is underlined. This may also be done by pressing Auto Couple or by performing a **Preset**.

Only the Gaussian filter type is used.

Key Path	BW
Remote Command	[:SENSe] :AM FM PM FMSTereo :AFSPepectrum :BANDwidth <freq> [:SENSe] :AM FM PM FMSTereo :AFSPepectrum :BANDwidth? [:SENSe] :AM FM PM FMSTereo :AFSPepectrum :BANDwidth :AUTO OFF ON 0 1 [:SENSe] :AM FM PM FMSTereo :AFSPepectrum :BANDwidth :AUTO?
Example	AM:AFSP:BAND 1 KHZ AM:AFSP:BAND?
Notes	Only certain discrete resolution bandwidths are available. For numeric entries, all RBW Types choose the nearest (arithmetically, on a linear scale, rounding up) available RBW to the value entered.
Notes	For numeric entries, all RBW Types choose the nearest (arithmetically, on a linear scale, rounding up) available RBW to the value entered.
Remote Command Notes	The setting and querying of values depends on the current bandwidth type.
Couplings	In Auto, the 3 dB RBW of the desired filter is the closest possible choice to that given by Span divided by 106 (the Span: 3 dB RBW parameter), except that the range for auto-coupling is restricted to not exceed 3 MHz.
Preset	Preset is Auto, which results in a 180 Hz value since the preset span is 20 kHz and the Span/RBW ratio is 106
State Saved	Saved in instrument state
Min	1 Hz
Max	8 MHz
Default Unit	Hz
Initial S/W Revision	Prior to A.02.00

BW

Modified at S/W Revision	A.10.00
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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
Backwards Compatibility Notes:	For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont softkey. In these analyzers, switching the Sweep Single/Cont softkey from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold . The X-Series has Single and Cont hardkeys in place of the Sweep Single Cont softkey. In the X-Series, if in single measurement, the Cont hardkey (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep.
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/Hold 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.

Cont (Continuous Measurement/Sweep)

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.

FREQ Channel

Accesses a menu of keys that enable you to control the Frequency parameters of the instrument.

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

Center Frequency

Sets the frequency that corresponds to the horizontal center of the RF Spectrum window. While adjusting the Center Frequency the Span is held constant, this means that both the start frequency and the stop frequency will change.

The Center Frequency is retained as you go from measurement to measurement.

Key Path	FREQ Channel
Remote Command	[:SENSE] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer?
Example	FREQ:CENT 50MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100MHz sets the center frequency step size to 100 MHz FREQ:CENT?
Dependencies	The Center Frequency can be limited by Start or Stop Freq limits, In addition, the Center Frequency can be limited if the Span is so large that Start or Stop hit their limit.
Couplings	When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer frequency range
Preset	1.000 GHz
State Saved	Saved in instrument state
Min	Depends on instrument minimum frequency and 10 Hz minimum span. If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Max	Depends on instrument maximum frequency and 10 Hz minimum span If the knob or step keys are being used, depends on the value of the other three interdependent parameters.
Default Unit	Hz
Status Bits/OPC dependencies	non-overlapped

FREQ Channel

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

Changes the step size for the center frequency function. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Key Path	FREQ Channel
Remote Command	[:SENSE] :FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSE] :FREQuency:CENTer:STEP[:INCRement]? [:SENSE] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSE] :FREQuency:CENTer:STEP:AUTO?
Example	FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO?
Remote Command Notes	Preset and Max values are depending on Hardware Options (503, 508, 513, 526)
Dependencies	Span, RBW, Center frequency
Couplings	When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value.
Preset	Auto
State Saved	Saved in instrument state
Min	- (the maximum frequency of the instrument). For example, 27 GHz max freq instrument has a CF step range of +/- 27 GHz.
Max	The maximum frequency of the instrument. For example, 27 GHz max freq instrument has a CF step range of +/- 27 GHz.
Default Unit	Hz
Status Bits/OPC dependencies	non-overlapped
Initial S/W Revision	Prior to A.02.00

AF Start Freq

Sets the frequency at the left side of the graticule in the AF Spectrum window. While adjusting the AF start frequency the AF stop frequency is held constant.

The AF Start Frequency is retained as you go from measurement to measurement.

Key Path	FREQ Channel
Remote Command	[:SENSE] :AM FM PM FMSTereo :AFSPectrum :FREQuency :STARt <freq> [:SENSE] :AM FM PM FMSTereo :AFSPectrum :FREQuency :STARt?
Example	AM:AFSP:FREQ:STAR 0 Hz
Dependencies	You cannot set the Start frequency > the Stop frequency. You cannot set the Start frequency = Stop frequency. You cannot set the Start Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, Stop Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop.
Preset	0 Hz
State Saved	Saved in instrument state
Min	0 Hz
Max	99.999990 MHz
Default Unit	Hz
Status Bits/OPC dependencies	non-overlapped
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

AF Stop Freq

Sets the frequency at the right side of the graticule in the AF Spectrum window. While adjusting the AF Stop Frequency the AF Start Frequency is held constant.

Key Path	FREQ Channel
Remote Command	[:SENSE] :AM FM PM FMSTereo :AFSPectrum :FREQuency :STOP <freq> [:SENSE] :AM FM PM FMSTereo :AFSPectrum :FREQuency :STOP?
Example	AM:AFSP:FREQ:STOP 20 kHz
Dependencies	You cannot set the Stop frequency < the Start frequency. You cannot set the Start frequency = Stop frequency. You cannot set the Stop Frequency to a value that would create a span of less than 10 Hz. If you try to do any of these, the Start Frequency will change to maintain a minimum value of 10 Hz for the difference between Start and Stop.

FREQ Channel

Preset	20 kHz
State Saved	Saved in instrument state
Min	10 Hz
Max	100 MHz
Default Unit	Hz
Status Bits/OPC dependencies	non-overlapped
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

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.

[“Input/Output variables - Preset behavior” on page 263](#)

The Input Port selection is the first menu under the **Input/Output** key:

Remote Command:	[:SENSe] :FEED RF AIQ EMIXer [:SENSe] :FEED?
Example:	:FEED RF :FEED?
Couplings:	The [:SENSe]:FEED RF command turns the calibrator OFF
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

Input/Output

<p>Backwards Compatibility SCPI:</p>	<p><code>[:SENSe]:FEED AREFERENCE</code></p> <p>In the PSA the calibrator was one of the inputs and selected using the AREF parameter to the same :FEED command that switched the inputs. In the X-Series it is controlled in a separate menu and overrides the input selection. For code compatibility the <code>[:SENSe]:FEED AREFERENCE</code> command is provided, and is aliased to <code>[SENSe]:FEED:AREF REF50</code>, which causes the input to be switched to the 50 MHz calibrator. The <code>[:SENSe]:FEED RF</code> command switches the input back to the RF port and turns the calibrator OFF, thus providing full compatibility with the PSA calibrator function.</p> <p>Note that after sending this, the query <code>[:SENSe]:FEED?</code> will NOT return "AREF" but instead the currently selected input.</p>
<p>Backwards Compatibility SCPI:</p>	<p><code>[:SENSe]:FEED IQ IONLy QONLy</code></p> <p><code>[:SENSe]:FEED?</code></p> <p>The parameters <code>IQ IONLy QONLy</code> are supported for backwards compatibility with the E44406A.</p> <p><code>[:SENSe]:FEED IQ</code> aliases to <code>[:SENSe]:FEED:IQ:TYPE IQ</code></p> <p><code>[:SENSe]:FEED IONLy</code> aliases to <code>[:SENSe]:FEED:IQ:TYPE IONLy</code></p> <p><code>[:SENSe]:FEED QONLy</code> aliases to <code>[:SENSe]:FEED:IQ:TYPE QONLy</code></p> <p>The query <code>[:SENSe]:FEED?</code> will always returns AIQ whatever the type of legacy parameters <code>IQ IONLy QONLy</code> has been used.</p>
<p>Backwards Compatibility Notes:</p>	<p>Most of the settings in the X-Series Input/Output system, including External Gain, Amplitude Corrections settings and data, etc., are shared by all modes and are not changed by a mode switch. Furthermore, most variables in the Input/Output system key are not affected by Mode Preset. Both of these behaviors represent a departure from legacy behavior.</p> <p>In the X-Series. Input/Output settings are reset by using the "Restore Input/Output Defaults" function. They can also be reset to their default values through the System->Restore System Defaults-> In/Out Config key or through the System ->Restore System Defaults -> All key (and corresponding SCPI).</p> <p>While this matches most use cases better, it does create some code compatibility issues. For example, Amplitude Corrections are no longer turned off by a Mode Preset, but instead by using the "Restore Input/Output Defaults" key/SCPI.</p> <p>Although Input/Output settings are not part of each Mode's State, they are saved in the Save State files, so that all of the instrument settings can be recalled with Recall State, as in legacy instruments.</p>
<p>Initial S/W Revision:</p>	<p>Prior to A.02.00</p>
<p>Remote Command:</p>	<p><code>:INPut :MIXer EXTernal INTernal</code></p> <p><code>:INPut :MIXer?</code></p>

Example:	INP:MIX INT INP:MIX?
Notes:	In legacy analyzers you choose between the Internal mixer or an External Mixer. In the X-Series, the External Mixer is one of the choices for the Input and hence is selected using the FEED command (:SENSe:FEED EXTMixer). For compatibility, the INPut:MIXer EXTernal INTernal legacy command is mapped as follows: 1. When INPut:MIXer EXTernal is received, SENSe:FEED EMIXer is executed. 2. When INPut:MIXer INTernal is received, SENSe:FEED RF is executed. 3. When INPut:MIXer? is received, the response will be INT if any input other than the external mixer is selected and EXT if the external mixer is selected
Preset:	INT
Backwards Compatibility Notes:	PSA supports the following SCPI Command : :INPut:MIXer:TYPE PRESelected UNPReselect :INPut:MIXer:TYPE? PXA does not support the :INPut:MIXer:TYPE command.
Initial S/W Revision:	A.08.01

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

Input/Output

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, dB μ V, dB μ A, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 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. This key does not appear in models that are always DC coupled. When the SCPI command to set AC coupling is sent to these models, it results in the error “Illegal parameter value;This instrument is always DC coupled” In these models, the SCPI query INP:COUP? always returns DC.
Preset:	AC on models that support AC coupling On models that are always DC coupled, such as millimeter wave models (frequency ranges 30 GHz and above), the preset is DC.
State Saved:	Saved in instrument state.
Initial S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.03.00

Input/Output

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" When any input is selected in a measurement that does not support it, the "No result; Meas invalid with this input" error condition occurs, and the measurement returns invalid data when queried.
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
Backwards Compatibility SCPI:	INPut<1 2>:TYPE INPUT1 INPUT2 INPut<1 2>:TYPE? included for R&S ESU compatibility. In the MXE, the INPUT1 parameter is aliased to RFIN and the INPUT2 parameter is aliased to RFIN2
Initial S/W Revision:	A.05.01
Read Back:	The current RF Input Port selected is read back to this key

RF Input

Specifies using the main RF port for the current measurement

Key Path:	Input/Output, RF Input, RF Input Port
Example:	:FEED:RF:PORT RFIN
ReadBack:	RF Input
Initial S/W Revision:	A.05.01

RF Input 2

Specifies using the second RF port, if supported, for the current measurement. Note that in some cases (for example, the N9038A) the second input has a lower maximum frequency than the main RF port (input 1).

N9038A: the second input has a maximum frequency of 1 GHz. For your convenience, the actual “Max Freq” value is allowed to go slightly higher than 1 GHz, to 1.000025 GHz. So in the coupling equations shown in the table below, use 1.000025 GHz for Max Freq and 10 Hz for Min Span. Thus, in the N9038A, when switching from Input 1 to Input 2:

- If the Stop Freq is above 1.000025 GHz, it is set to 1.000025 GHz, otherwise it does not change.
- If the Start Freq is above 1.000024990 Hz, Start Freq is set to 1.000024990 Hz and Span to 10 Hz, otherwise nothing changes.

Key Path:	Input/Output, RF Input, RF Input Port
Example:	:FEED:RF:PORT RFIN2
Couplings:	<p>When switching from Input 1 to Input 2:</p> <ul style="list-style-type: none"> • If the Stop Freq is above the Max Freq, it is set to the Max Freq, otherwise it does not change. • If the Start Freq is above (Max Freq – Min Span), it is set to (Max Freq – Min Span), otherwise it does not change. <p>When switching from Input 2 to Input 1, neither the Start Freq nor the Stop Freq change.</p> <p>For the Swept SA measurement, Min Span is 10 Hz. This may vary from measurement to measurement.</p>
ReadBack:	RF Input 2
Initial S/W Revision:	A.05.01

RFIO1

Specifies using the RFIO 1 port, if supported, for the current measurement

Key Path:	Input/Output, RF Input, RF Input Port
Example:	:FEED:RF:PORT RFIO1
Dependencies:	Only available in EXT
ReadBack:	RFIO 1
Initial S/W Revision:	A.05.01

RFIO2

Specifies using the RFIO 2 port, if supported, for the current measurement

Key Path:	Input/Output, RF Input, RF Input Port
Example:	:FEED:RF:PORT RFIO2
Dependencies:	Only available in EXT

Input/Output

ReadBack:	RFIO 2
Initial S/W Revision:	A.05.01

RF Preselector

In models that support the RF Preselector, such as MXE (N9038A), this key allows you to turn the preselector on and off.

Key Path:	Input-Output, RF Setup
Mode:	All
Remote Command:	[:SENSe]:POWer[:RF]: RFPreselector [:STATe] 1 0 ON OFF [:SENSe]:POWer[:RF]: RFPreselector [:STATe]?
Example:	:POW:RFPS 1
Example:	:INP:PRES:STAT ON
Notes:	[:SENSe]:POWer[:RF]: RFPreselector [:STATe] 1 ON. Sets to full compliance measurement. [:SENSe]:POWer[:RF]: RFPreselector [:STATe] 0 OFF. Sets to pre-compliance measurement.
Dependencies:	<p>The RF Preselector is not available in all measurements. The key is grayed out in measurements that do not support it, unless you are in a Mode in which no measurements support it, in which case the key does not appear at all. If the preselector is unavailable it is forced to Off. Attempting to turn it on or off in measurements that do not support it generates an error message:</p> <p>–221.3200, Settings conflict; Feature not supported for this measurement.</p> <p>The RF Preselector is not available when FFT Sweep Type is manually selected. Attempting to turn it on or off when this is the case generates an error message:</p> <p>“–221, Settings conflict; RF Presel unavailable when Sweep Type=Manual FFT”.</p> <p>When using the preselector, if your measurement starts below 3.6 GHz and finishes above 3.6 GHz, the preselector bypass switch will have to switch in and out for every measurement. When this is the case, a warning message is displayed: “Settings Alert:Mechanical switch cycling”. You are advised to avoid such setups as much as possible, to minimize switch wear.</p> <p>This key only appears in Modes that support the RF Preselector, in other Modes, setting or querying the SCPI will generate an error.</p> <p>This key only appears in models that support the RF Preselector, in other models, setting or querying the SCPI will generate an error.</p>
Preset:	It is set to Off when mode selected is SA. If mode is EMI Receiver, then it will be set to On.

Backwards Compatibility SCPI:	INPut<1 2>:PRESelection[:STATe] ON OFF INPut<1 2>:PRESelection[:STATe]? included for R&S ESU compatibility
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External Mixer

The **External Mixer** key allows you to choose an External Mixer through which to apply signal input to the analyzer. When **External Mixer** is chosen, the LO/IF port becomes the input to the analyzer.

External Mixing requires option EXM. The External Mixer key will not appear unless option EXM is installed. The presence of the LO/IF connector alone does not indicate that you have Option EXM licensed; you can verify that option EXM is installed by pressing **System, Show, System**.

When **External Mixer** is selected, the **Center Freq** key controls the setting of Center Freq in external mixing, which is separate from the settings of **Center Freq** for the RF Input or BBIQ. Each input retains its unique settings for **Center Freq**. A unique SCPI command is provided solely for the external mixing Center Freq (see the **Center Freq** key description) which only affects the External Mixer CF; although sending the generic Center Freq command while External Mixer is selected also controls the External Mixer CF.

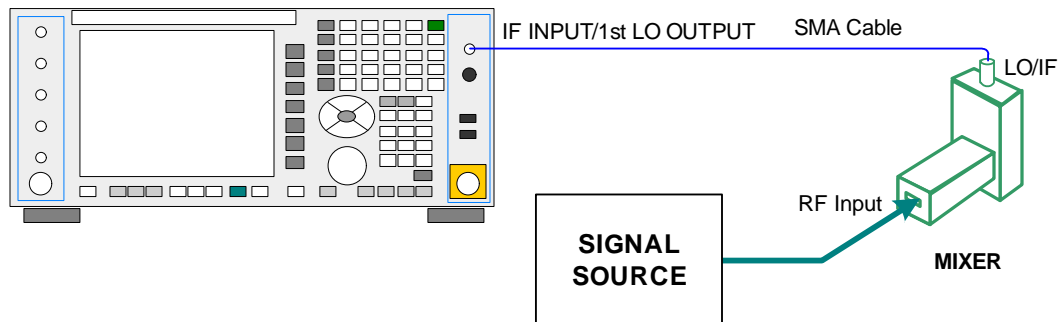
See [“More Information” on page 270](#)

Key Path:	Input/Output
Example:	:FEED EMIX
Notes:	Not all measurements support the use of the External Mixer input. When External Mixer is selected in a measurement that does not support it, the "No result; Meas invalid with Ext Mixing" error condition occurs.
Dependencies:	Unless option EXM is present, the External Mixer key is blanked, and all SCPI commands associated with menus accessed by this key return an error Manual FFT mode is available with external mixing, but not with Signal ID.
Preset:	All settings under this key are returned to their default state when Restore Input/Output Defaults is pressed.
State Saved:	All settings under this key, and all Frequency settings, are remembered when you go out of External Mixer, so that when External Mixer is chosen again, all the external mixer functions will retain their previous settings, with the exception of Signal ID which is set to OFF (Signal ID is also set to Off unless External Mixer is the selected Input).
Readback Text:	The readback text on this key shows the currently selected mixer, in square brackets.
Backwards Compatibility Notes:	Unlike PSA, all external mixer settings including Center Frequency are retained when you go in and out of External Mixing. Also, Preset does not take you out of External Mixing (Restore Input/Output Defaults does).
Initial S/W Revision:	A.08.01

Input/Output

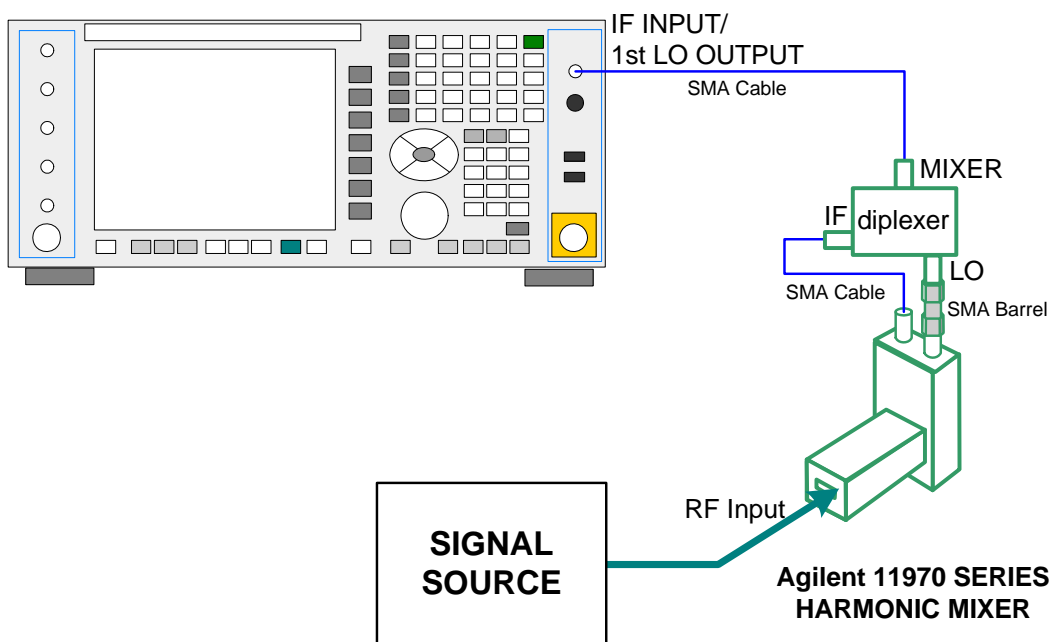
More Information

X-series analyzers have a combined LO Out/IF In connection, whereas earlier analyzers used separate ports for the LO Out and the IF in. Internal diplexers in the analyzer and the mixer simplify the connection for the user – only a single SMA cable is required.



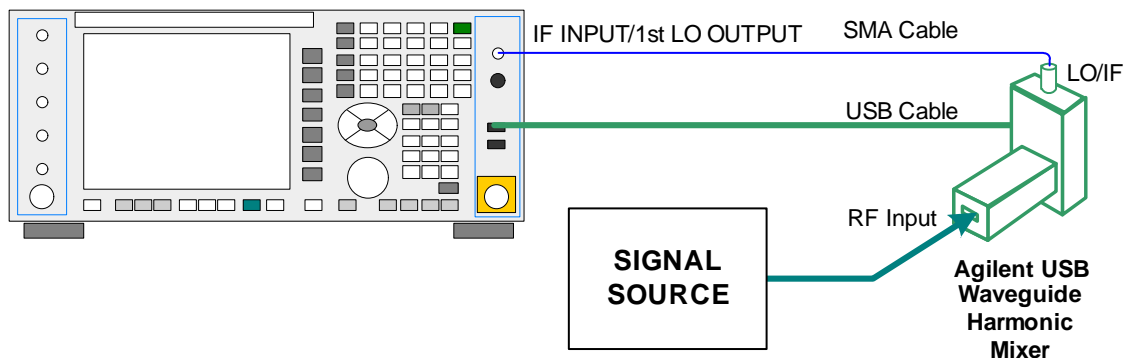
Legacy HP/Agilent and some third party mixers have separate LO In and IF out connections. This requires you to use an external diplexer to connect these mixers. A diplexer can easily be purchased for this purpose (for example, Diplexer Model # DPL.26 or # DPL.313B from OML Inc., Morgan Hill CA)

The connection diagram for such a legacy mixer is:



In addition, External Mixing in the X-Series supports the new Agilent M1970 series of Waveguide Harmonic Mixers, which provide a USB connection for download of calibration data and additional control.

The connection diagram for one of the Agilent USB mixers is:



External Mixing is only supported in certain Modes and Measurements in the X-Series, as shown in the table below:

Mode	Measurements	Sig ID (Image Suppress only)
Spectrum Analyzer	Swept SA	Y*
	TOI	Y
	Harmonics	N
	Spurious Emissions	Y
	Channel Power	Y
	Occupied BW	Y
	ACP	Y
	Spectrum Emissions Mask	Y
	CCDF	N
	Burst Power	N
Phase Noise	List Sweep	N
	Monitor Spectrum	Y
	Log Plot	Y
	Spot Frequency	N
I/Q Analyzer	Waveform	N
	Complex Spectrum	N
	Waveform	N

- * the Swept SA measurement also supports Image Shift

Input/Output

Ext Mix Setup

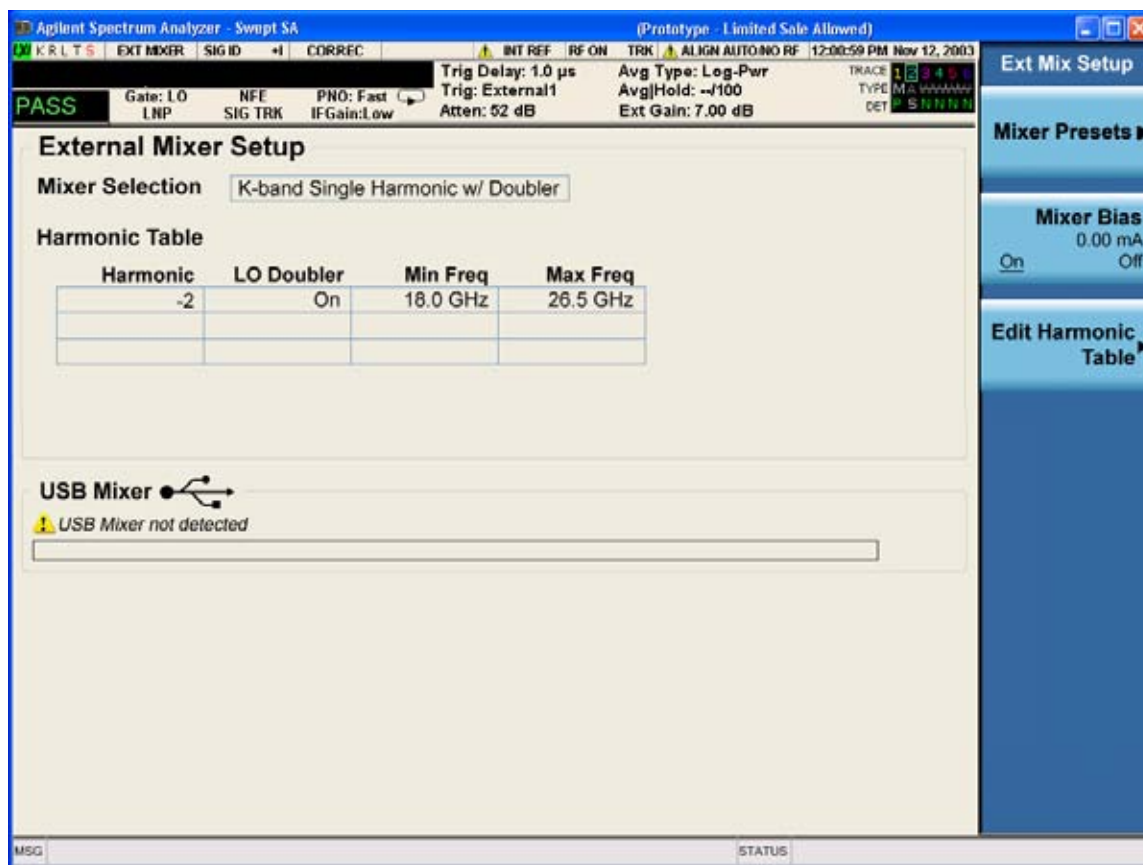
This menu lets you select the mixer type, and lets you configure your mixer (if necessary). While in this menu, and any of its submenus, the External Mixer Setup screen appears, showing you the current settings for the selected mixer. These settings may be dependent on which IF path is currently in use, whether a + or – harmonic is currently selected, etc.

To apply any amplitude correction factors needed to correct mixer flatness, you enter values into one of the Correction tables (under Input/Output, Corrections). The correction conversion loss values can be extracted from data supplied with the mixer or from manual measurements you make to determine the conversion loss. Note that the correction applied by the Correction tables is global to the analyzer; therefore you should make sure to turn off the External Mixer corrections when you are not using the External Mixer input.

NOTE The Agilent USB Mixers automatically give their flatness data to the analyzer, and the correction is applied internally. No correction needs to be entered by the user, and the correction does not appear in the user-accessible Corrections tables. The user is free to enter additional corrections into the Correction tables under Input/Output, Corrections.

Key Path:	Input/Output, External Mixer
State Saved:	All settings in the Mixer Setup are part of the Input/Output system, and hence are saved whenever State is saved.
Readback Text:	The readback line on this key shows the currently selected mixer, in square brackets.
Initial S/W Revision:	A.08.01
Modified at S/W Revision:	A.08.50

The External Mixer Setup screen looks like this



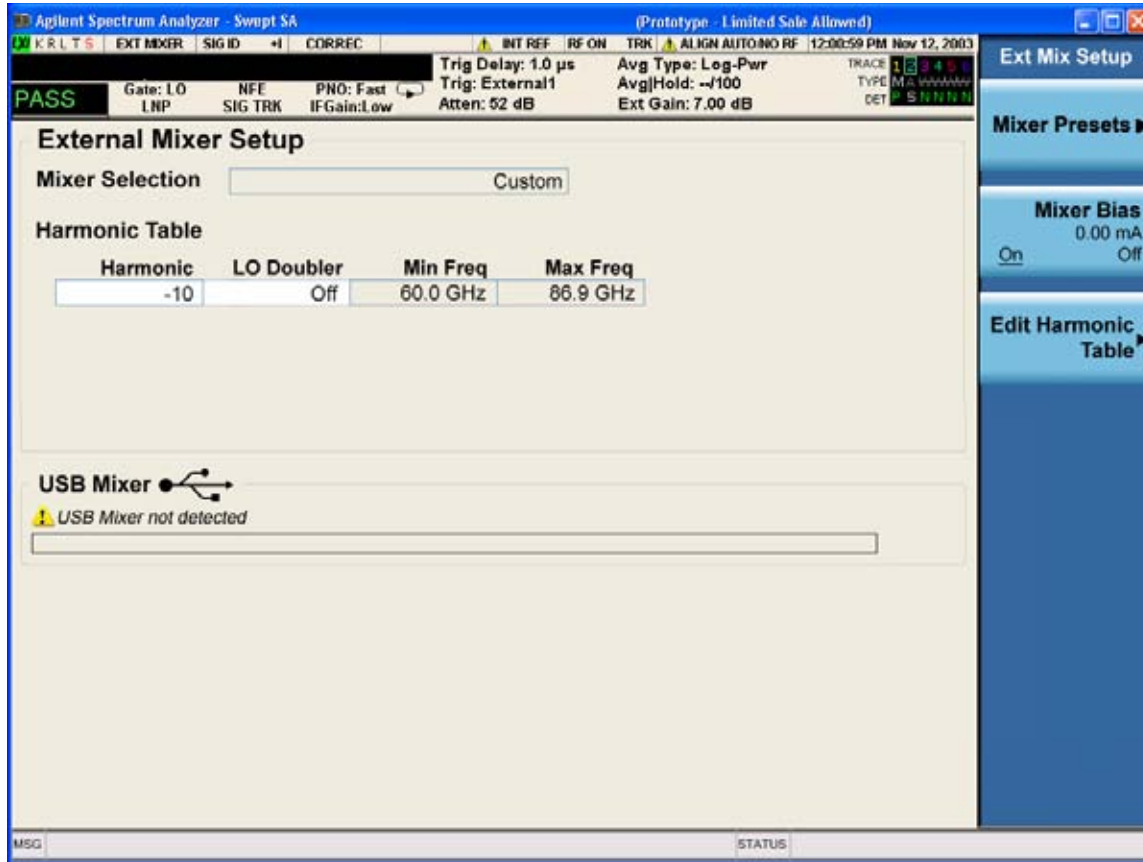
The current Mixer selection (the current or most recently connected USB Mixer, or the most recent Mixer Preset, or “Custom” if the user has modified the setup) reads out at the top of this screen.

The Harmonic Table currently being used reads out below the Mixer Selection. It shows each range being used for the current mixer. Note that a band may be made up of up to 3 ranges. Each range represents a choice of mixer harmonic and doubler state. When you select a Mixer Preset, it sets the analyzer Start and Stop frequency to the values shown in the Harmonic Table; Start Freq is set to the Min Freq for the bottom range, and Stop Freq is set to the Max Freq for the top range. In many cases you can exceed these nominal values; the absolute maximum and minimum frequency for each preset are shown in the tables that accompany the key descriptions for the Mixer Presets.

NOTE

If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.

Input/Output



You may customize the Harmonic Table, but when you do this the analyzer goes into “single harmonic” mode. You may enter the harmonic number and whether to use the doubler or not, but now range switching is not supported, so you can only have one harmonic.

When you edit the Harmonic Table, the Mixer Selection changes to “Custom.” To change it back you must go back into the Mixer Presets menu and select a Preset.

When you edit the Harmonic Table, the nominal Min Freq and Max Freq that are available will usually be different than the Preset you were using; and the absolute frequency limits will change as well. This may result in a change to your Start and/or Stop Freq, if the current values fall outside the new range, requiring you to retune your Center Freq to get your signal back in the center.

The analyzer supports the new Agilent M1970 Series Waveguide Harmonic Mixers with USB connection. While in External Mixing, if one of these mixers is plugged in to a USB port, it is automatically detected and displayed in the “USB Mixer” area of the setup screen, including its model number and serial number. As long as it is connected to the USB, the analyzer assumes that this is the mixer you want to use.

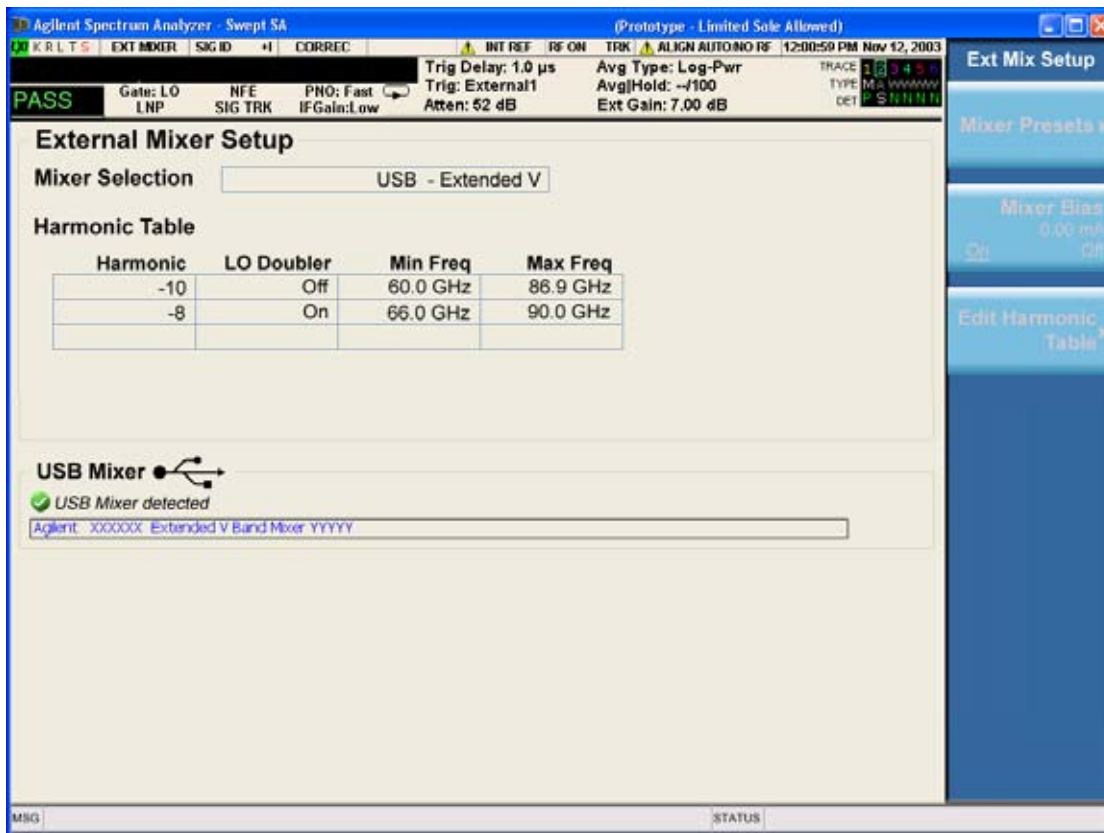
The analyzer assumes that if you plug a mixer into the USB, that is the mixer you want to use. Therefore:

If a USB mixer is connected to the USB port, the Mixer Presets menu is grayed out, as none of the presets make sense with a USB Mixer connected. Note that once the analyzer has acquired the USB Mixer, the mixer selection will remain if it is subsequently unplugged from the USB, allowing you to plug it back in with no change to your settings. However, once you unplug it, the Mixer Presets key will stop being grayed out, allowing you to preset to a different mixer.

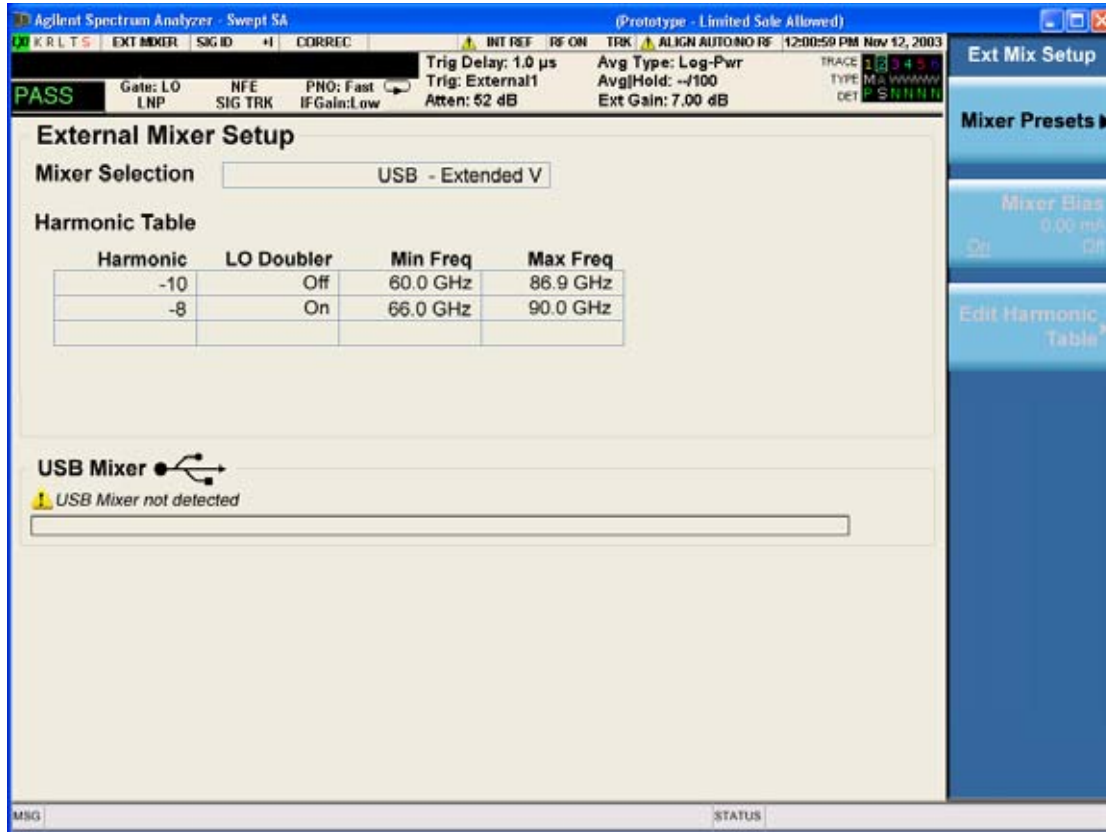
When **Restore Input/Output Defaults** is performed, if an Agilent USB Mixer is plugged into the analyzer's USB port, the Mixer Selection remains unchanged.

When recalling an instrument state, if an Agilent USB Mixer is plugged into the analyzer's USB port, and the Mixer Selection in the recalled state is for a USB Mixer which does not match the mixer that is currently plugged in, you will have to unplug your mixer and then plug it back in to get the analyzer to recognize your mixer.

As long as the selection in Ext Mixer Setup shows one of the USB mixers, both the **Mixer Bias** and **Edit Harmonic Table** keys will be grayed out.



Input/Output



Only one USB Mixer is supported at a time. To switch to a different USB Mixer, disconnect the one that is no longer being used prior to connecting a new one.

The Mixer Selection displayed and softkey readback for the Agilent M1970 series mixers is:

Mixer Model	Mixer Selection display on Setup Screen	Readback on softkeys
Agilent M1970V Option 001: 50 to 75 GHz Waveguide Harmonic Mixer	USB - M1970V-001 V-Band	USB Mixer V-Band
Agilent M1970V Option 002: 50 to 80 GHz Waveguide Harmonic Mixer	USB - M1970V-002 Extended V-Band	USB Mixer Extended V
Agilent M1970W: 75 to 110 GHz Waveguide Harmonic Mixer	USB - M1970W W-Band	USB Mixer W-Band

Connecting the mixer to the USB port on the analyzer switches you to External Mixing, aborts the current measurement, and initiates an alignment of the mixer. A popup message, “USB Mixer connected” appears on the display. This message is removed once the alignment begins. When the alignment begins, an “Aligning” popup goes onto the display. When a USB mixer and the LO/IF cable are connected the alignment is performed. When the alignment completes, the current measurement restarts.

The Agilent USB mixer essentially acts as a “remote front end” and is fully calibrated over the specified frequency range, without user interaction required. This is particularly useful at high mm-wave frequencies, where cable loss is typically quite large, and it is desirable to bring the front end right up to the device under test, rather than bringing the mm-wave signal to the more bulky analyzer via a lossy and uncalibrated cable or waveguide connection.

Mixer Presets

This menu lets you preset the mixer setup for the particular type of mixer that you are using.

These presets are divided into four groups, one for Agilent legacy mixers, and three for general purpose mixers. Note that the IF/LO port provides 3.8–14 GHz LO in two bands: 3.8–8.7 (LO fundamental), and 8.6–14 GHz (doubled LO). The presets that use a single harmonic and no doubling are provided as one group of presets; presets that use a single harmonic but double the LO are another group; and presets that use multiple harmonics are a fourth group.

In most cases, once you have executed the preset, you will not need to adjust any further settings.

Key Path:	Input/Output, External Mixer, Ext Mix Setup
Remote Command:	[:SENSe] :MIXer : BAND A Q U V W NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT DD D F DG DJ DK DQ DV DW DY DEXT MA ME MU MCOAX [:SENSe] :MIXer : BAND?
Example:	:MIX:BAND A :MIX:BAND?

Input/Output

<p>Notes:</p>	<p>A Q U V W select Agilent 11970 mixer presets</p> <p>NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT select single harmonic, non-doubled LO presets</p> <p>DD DF DG DJ DK DQ DV DW DY DEXT select single harmonic, doubled LO presets</p> <p>MA ME MU MCOAX select multiple harmonic presets</p> <p>All of these presets are detailed in their respective key descriptions</p> <p>The query form of this command returns the most recent preset, UNLESS the harmonic table has been edited after the preset was executed. If the harmonic table has been edited it returns CUSTOM</p> <p>The query form of this command returns the following if an Agilent USB Mixer is plugged into the analyzer's USB port:</p> <p>USBV Agilent V-Band USB Mixer</p> <p>USBVEXT Agilent Extended V-Band USB Mixer</p> <p>USBWAgilent W-Band USB Mixer</p> <p>Note that the parameters CUSTOM, USBV, USBVEXT, and USBW are query responses only, and cannot be sent TO the analyzer.</p> <p>The following cross-reference matches the mixer band designators used by Agilent to the EIA waveguide designations:</p> <p>EIAAgilentFreq Range</p> <p>WR-28 A26.5 – 40 GHz</p> <p>WR-22 Q33 – 50 GHz</p> <p>WR-19 U40 – 60 GHz</p> <p>WR-15 V50 – 75 GHz</p> <p>WR-12 E60 – 90 GHz</p> <p>WR-10 W75 – 110 GHz</p> <p>WR-8 F90 – 140 GHz</p> <p>WR-6 D110 – 170 GHz</p> <p>WR-5 G140 – 220 GHz</p> <p>WR-3 J220 – 325 GHz</p>
<p>Preset:</p>	<p>When Restore Input/Output Defaults is performed, an “A” mixer preset is also issued (11970A band), unless an Agilent USB Mixer is plugged into the analyzer's USB port, in which case the Mixer Selection remains unchanged.</p>
<p>Backwards Compatibility Notes:</p>	<p>The [:SENSE]:MIXer:BAND command was used in PSA and ESA to select the mixer band. In the X-Series, only the legacy parameters A, Q, U, V, and W are honored, and they preset the analyzer to match the corresponding Agilent 11970 legacy mixer. Parameters D, E, F, G, J, K, Y, which were accepted in ESA and PSA, return an error if sent. If you are using a mixer in one of these bands, you should study the tables of presets and choose the appropriate preset to match your application. Also the USER parameter is no longer accepted, as the control model for mixer customization is very different in the X-Series.</p>
<p>Initial S/W Revision:</p>	<p>A.08.01</p>

Agilent 11970

This menu allows you to preset for one of the models in the HP/Agilent 11970 series.

Because the X-Series has an LO range of 3.8 – 14 GHz, and older analyzers had an LO range of 3.0 – 6.8 GHz, the harmonic numbers used in the X-Series may differ from those used on older analyzers for the same mixers. Additionally, some of the 11970 mixers cannot be operated over their full range with the X-Series without switching harmonics. Consequently, you will find that some of the bands (A-Band, for example) are broken into two ranges for use with the X-Series.

See [“More Information” on page 279](#)

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example:	MIX:BAND A
Initial S/W Revision:	A.08.01

More Information

Below are the 11970A presets. The 11970U and the 11970W use a single harmonic. The other three switch harmonics mid-band. Both harmonic ranges are shown in the table. None of these mixers use LO doubling.

The 11970 K-band mixer and the 11974 preselected mixer series are not supported.

Preset	Readout in setup screen	Readback on softkeys	Range	Harm #	RF start	RF stop	RF center
A-band	Agilent 11970A	Agilent 11970A	1	-6	26.5	30.45	28.475
			2	-8	30.35	40	35.175
Q-band	Agilent 11970Q	Agilent 11970Q	1	-8	33	40.8	36.9
			2	-10	39.8	50	44.9
U-band	Agilent 11970U	Agilent 11970U	...	-10	40	60	50
V-band	Agilent 11970V	Agilent 11970V	1	-12	50	66	58
			2	-14	53	75	64
W-band	Agilent 11970W	Agilent 11970W	..	-18	75	110	92.5

Single Harmonic

These presets choose a setup that uses a single harmonic and no doubling for the LO.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example:	MIX:BAND NA
Initial S/W Revision:	A.08.01

Input/Output

These are the presets for single harmonic operation with no doubler:

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
K-band	K-band Single Harmonic, no doubler	Sngl harm LOx1 K-band	-4	18	26.5	22.25
A-band	A-band Single Harmonic, no doubler	Sngl harm LOx1 A-band	-6	26.5	40	33.25
D-band	D-band Single Harmonic, no doubler	Sngl harm LOx1 D-band	-20	110	170	140
E-band	E-band Single Harmonic, no doubler	Sngl harm LOx1 E-band	-12	60	90	75
F-band	F-band Single Harmonic, no doubler	Sngl harm LOx1 F-band	-18	90	140	115
Q-band	Q-band Single Harmonic, no doubler	Sngl harm LOx1 Q-band	-6	33	50	41.5
U-band	U-band Single Harmonic, no doubler	Sngl harm LOx1 U-band	-8	40	60	50
V-band	V-band Single Harmonic, no doubler	Sngl harm LOx1 V-band	-10	50	75	62.5
W-band	W-band Single Harmonic, no doubler	Sngl harm LOx1 W-band	-14	75	110	92.5
G-band	G-band Single Harmonic, no doubler	Sngl harm LOx1 G-band	-26	140	220	180
Y-band	Y-band Single Harmonic, no doubler	Sngl harm LOx1 Y-band	-30	170	260	215
J -band	J-band Single Harmonic, no doubler	Sngl harm LOx1 J-band	-38	220	325	272.5
Extended	Extended Single Harmonic, no doubler	Sngl harm LOx1 Extended	-40	155	345	250

Single Harmonic w/doubler

These presets choose a setup that uses a single harmonic and no doubling for the LO.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example:	MIX:BAND DW
Initial S/W Revision:	A.08.01

These are the presets for single harmonic operation with no doubler:

Mixer	Readout in setup screen	Readback on softkeys	Harm #	RF start	RF stop	RF center
D-band	D-band Single Harmonic w/doubler	Sngl harm LOx2 K-band	-14	110	170	140
F-band	F-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-10	90	140	115
G-band	G-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-16	140	220	180
J-band	J-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-24	220	325	272.5
K-band	K-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-2	18	26.5	22.25
Q-band	Q-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-4	33	50	41.5
V-band	V-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-6	50	75	62.5
W-band	W-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-8	75	110	92.5
Y-band	Y-band Single Harmonic w/doubler	Sngl harm LOx2 A-band	-20	170	260	215
Extended	Extended Single Harmonic w/doubler	Sngl harm LOx2 A-band	-28	245	390	317.5

Input/Output

Multiple Harmonics

These presets choose a setup that uses multiple harmonics and may or may not use doubling for the LO.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Mixer Presets
Example:	MIX:BAND MA
Initial S/W Revision:	A.08.01

These are the presets for multiple harmonic operation:

Mixer	Readout in setup screen	Readback on softkeys	Range	Harm #	Dbl r?	RF start	RF stop	RF Center
A-band	A-band Multiple Harmonic	Multi harm A-band	1	-4	N	26.5	34.1	30.3
			2	-4	Y	33.1	40	36.55
E-band	E-band Multiple Harmonic	Multi harm E-band	1	-6	Y	60	83	71.5
			2	-8	Y	65	90	77.5
U-band	U-band Multiple Harmonic	Multi harm U-band	1	-6	N	40	51.5	45.75
			2	-6	Y	49.5	60	54.75
Coaxial	Coaxial Multiple Harmonic	Multi harm Coaxial	1	-4	N	26.5	34	30.25
			2	-4	Y	32.5	55	43.75
			3	-6	Y	50	70	60

Mixer Bias

Adjusts an internal bias source for use with external mixers. The bias signal is present on the center conductor of the IF input connector on the front panel. The shunt current range is from -10 mA to 10 mA and it can be set whether Mixer Bias state is On or Off, but it will only be applied if it is On.

The bias remains as set if the user switches to another input (e.g., the RF Input).

Key Path:	Input/Output, External Mixer, Ext Mix Setup
Remote Command:	[:SENSe]:MIXer:BIAS <real> [:SENSe]:MIXer:BIAS? [:SENSe]:MIXer:BIAS:STATe OFF ON 0 1 [:SENSe]:MIXer:BIAS:STATe?
Example:	:MIX:BIAS 0 :MIX:BIAS? MIX:BIAS:STAT 0 MIX:BIAS:STAT?

Preset:	This is unaffected by Preset but is set to OFF and 0 on a "Restore Input/Output Defaults"
State Saved:	Saved in state
Min:	-10 mA
Max:	10 mA
Initial S/W Revision:	A.08.01

Edit Harmonic Table

This menu lets you directly configure the Harmonic number and LO Doubler state of your mixer by editing the Harmonic Table. The Harmonic Table can be configured as either a single row (meaning only one harmonic number is used and the LO Doubler is either on or off), two rows where the harmonic number switches between the first row and the second, or two rows where the LO Doubler state switches between the first row and the second.

When you press the Edit Harmonic Table softkey, a dialog pops up on the display informing you that when you edit the Harmonic Table you will go into Custom mixer mode, and that to undo your changes you must go to the Mixer Presets menu and choose the preset appropriate for your mixer. You may cancel out of this dialog and not enter the Edit Harmonic Table menu. If you choose to enter the menu, the Mixer Selection changes to "Custom".

In Custom mode, your maximum start and stop frequencies are strictly set by the LO range and the harmonic number you have chosen. The undoubled LO range is approximately 3.8 – 8.7 GHz, and (for LO's that support doubling) the doubled range is approximately 8.0 – 14.0 GHz. That range times the harmonic you have selected will determine your tuning range. If your frequency is currently outside that range when you edit the Harmonic Table, your frequency will be changed to fall at the edge of the range. To change it back you must go into the Mixer Presets menu and select a Preset.

Whenever you are in the **Edit Harmonic Table** menu, the editable fields in the table have a white background, indicating that they can be edited. These fields vary depending on the Table Type. For the Single Row Table Type, both the Harmonic and LO Doubler cells are white. For Harmonic Switching both the Harmonic and LO Doubler cells are white, but only in the first row, as only the first row can be edited. For Doubler Switching, only the Harmonics cell in the first row is white, as this is the only cell you can edit.

Note that you cannot add or delete rows from the table; you can only modify the rows that are already there.

Key Path:	Input/Output, External Mixer, Ext Mix Setup
Initial S/W Revision:	A.08.01
Modified at S/W Revision:	A.10.01

Table Type

This parameter determines which type of configuration you want the Custom Mixer to be. You can choose Single Row, Harmonic Switching, or Doubler Switching. See detail under each of these keys.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
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Input/Output

Remote Command:	[:SENSe]:MIXer:TTYPe SINGle HARMonic DOUBLer [:SENSe]:MIXer:TTYPE?
Example:	:MIX:TTYP SING
Couplings:	When you change the Table Type, the Mixer Selection changes to “Custom”
Preset:	Depends on the current Mixer Preset. This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" the Mixer is preset to 11970A, for which the Table Type is Harmonic Switching
State Saved:	Saved in State
Initial S/W Revision:	A.10.01

Single Row

In the Single Row type, the External Mixer always stays in the same Harmonic Number and the LO Doubler is either on or off and does not change state during a sweep. You may change the Harmonic Number and you may change the state of the Doubler.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example:	:MIX:TTYP SING
State Saved:	Saved in State
Initial S/W Revision:	A.10.01

Harmonic Switching

In the Harmonic Switching type, the External Mixer switches Harmonic Number in the middle of the sweep. The Lo Doubler may be on or off but it is the same for both Harmonic Numbers. You can set the initial Harmonic Number, and when it switches it decrements by two when the harmonic is negative and increments by two when the harmonic is positive. For example, if you set the initial number to -6, when it switches it will go to -8. If you set the harmonic number to 8 when it switches it will go to 10.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example:	:MIX:TTYP HARM
State Saved:	Saved in State
Initial S/W Revision:	A.10.01

Doubler Switching

In the Doubler Switching type, the External Mixer switches the doubler from Off to On in the middle of the sweep. You can set the Harmonic Number but it stays the same for the Doubler Off state as for the Doubler On state. The LO Doubler key is grayed out in this table type.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table, Table Type
Example:	:MIX:TTYP DOUB
State Saved:	Saved in State
Initial S/W Revision:	A.10.01

Harmonic

This lets you enter the Harmonic value with its associated sign (mixing mode).

The harmonic number is a signed integer, where the sign has the meaning of choosing between positive and negative mixing products. Desired mixing products occur at an IF frequency which equals the difference between the RF frequency (f_{RF}) and the LO frequency (Nf_{LO}). When this difference is positive, we can say $f_{IF} = f_{RF} - Nf_{LO}$. When this difference is negative, we can say $f_{IF} = Nf_{LO} - f_{RF}$. Thus, a negative harmonic means the analyzer will be tuned such that the harmonic of the LO is higher than the indicated frequency by the frequency of the first IF. A positive harmonic means the analyzer will be tuned such that the harmonic of the LO is lower than the indicated frequency by the frequency of the first IF.

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
Remote Command:	[:SENSe]:MIXer:HARMonic <integer> [:SENSe]:MIXer:HARMonic?
Example:	:MIX:HARM -28 :MIX:HARM?
Notes:	The query returns the harmonic value of the first row of the harmonic table.
Couplings:	When you set a value for the Harmonic via SCPI, the Mixer Selection changes to "Custom"
Preset:	This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" editing is turned off, the Harmonic Table returns to normal, and the Mixer is preset to 11970A, which has -6 in the first row of its Harmonic Table
State Saved:	Saved in State
Min:	-400
Max:	400
Initial S/W Revision:	A.08.01
Modified at S/W Revision:	A.10.01

LO Doubler

This lets you enter the LO Doubler setting. The LO Doubler setting controls the choice of the LO doubler state for LO's which support doubled operation.

In LO's which support doubling, the fundamental band is approximately 3.8 – 8.7 GHz, and the doubled band is approximately 8.0 – 14 GHz. The higher LO frequency can result in a lower mixer harmonic and reduced mixer conversion loss.

Input/Output

Key Path:	Input/Output, External Mixer, Ext Mix Setup, Edit Harmonic Table
Remote Command:	[:SENSE]:MIXer:LODoubler ON OFF 0 1 [:SENSE]:MIXer:LODoubler?
Example:	:MIX:LOD 0 :MIX:LOD?
Notes:	The query returns the doubler value of the first row of the harmonic table.
Dependencies:	This key is grayed out and set to Off when Table Type is set to Doubler Switching.
Couplings:	When you set a value for the doubler setting via SCPI, the Mixer Selection changes to "Custom"
Preset:	This is unaffected by Mode Preset, but on a "Restore Input/Output Defaults" editing is turned off, the Harmonic Table returns to normal, and the Mixer is preset to 11970A, which has the doubler Off in the first row of its Harmonic Table
State Saved:	Saved in state
Initial S/W Revision:	A.08.01
Modified at S/W Revision:	A.10.01

Signal ID On/Off

Activates or deactivates an algorithm which aids with the identification of multiple responses

Toggles the Signal ID (signal identification) function On or Off. This function lets you identify multiple responses of a single input signal that are generated when using un-preselected external mixers. The use of mixers without pre-selecting filters offers the advantage of improved receiver sensitivity because of the absence of the filter insertion loss, but results in multiple responses due to images and undesired harmonic mixing products.

While in Signal ID, basic spectrum analyzer functions work normally (for example, you can change Span normally) but some functions are disabled (for example, some traces are unavailable).

There are two forms of Signal ID, Image Suppress and Image Shift. Choose the one most appropriate for your application. For Image Shift, an LO-shifted and an unshifted trace are taken in Trace 1 and Trace 2 and displayed together. Any peaks that are not the same in both traces are images. For Image Suppress, image cancellation is performed in the background using two hidden traces, and the result displayed in Trace 1, which shows only the valid signals.

Key Path:	Input/Output, External Mixer
Remote Command:	[:SENSE]:SIDentify[:STATE] OFF ON 0 1 [:SENSE]:SIDentify[:STATE]?
Example:	:SID 0 :SID?

Notes:	Signal ID uses data from two successive sweeps. Therefore, if the analyzer is in single sweep mode, two sweep triggers are used to generate the data needed for signal identification.
Dependencies:	<p>Signal ID is not available in some measurements. If the Signal ID key does not appear or is grayed out while in your measurement, then it is not available.</p> <p>Because Signal ID uses data from two successive sweeps, several trace and sweep functions are grayed out in Signal ID. See the documentation for your measurement for details on which trace keys are grayed out.</p> <p>Signal ID is not available with Signal Track so Signal ID will be grayed out if in Signal Track. Message:</p> <p>Signal ID will be turned off when External Mixer is turned off. Signal ID cannot be turned on when using internal mixing.</p> <p>Rules for auto coupling of the Sweep and FFT keys are changed with Signal ID on. For both the dynamic range case and the speed case, swept is chosen whenever any form of Signal ID is on. If Manual FFT is selected, the Signal ID key is grayed out.</p> <p>Whenever Signal ID is on, a warning message will be generated</p> <p>If Signal ID is selected in a measurement that does not support it, a warning message is generated</p>
Couplings:	The Auto Rules for detector selection select Normal for all active traces when Signal ID is turned on.
Preset:	This is unaffected by Preset but is set to OFF on a "Restore Input/Output Defaults"
Initial S/W Revision:	A.08.01

Signal ID Mode

Lets you set which Signal ID mode you will use, either Image Suppress or Image Shift.

Key Path:	Input/Output, External Mixer
Remote Command:	[:SENSE]:SIDentify:MODE ISUPpress IShift [:SENSE]:SIDentify:MODE?
Example:	:SID:MODE ISUP :SID:MODE?
Preset:	This is unaffected by Preset but is set to ISUPpress on a "Restore Input/Output Defaults"
State Saved:	Saved in state
Initial S/W Revision:	A.08.01

Input/Output

Image Suppress

The Image Suppress mode of Signal ID mathematically removes all image and multiple responses of signals present at the mixer input. Two hidden sweeps are taken in succession. The second sweep is offset in LO frequency by $2*IF/N$. For each point in each trace, the smaller amplitude from the two traces is taken and placed in that point in Trace 1. Responses of each trace that lie on top of one another will remain and are valid signals, others are images and are suppressed. The action of taking the smaller of the two traces will make the average noise level lower in all points that do not have an image, thus reducing the accuracy of the measurement of noise and noise-like signals.

NOTE This function takes control of and uses Trace 1 and Trace 2. Any data in these traces prior to activating Image Suppress will be lost.

Key Path:	Input/Output, External Mixer, Signal ID Mode
Example:	:SID:MODE ISUP
Notes:	In Image Suppress Mode, synchronization is ensured by first turning off Signal ID, initiating a single sweep, then turning on Signal ID followed by two single sweeps.
Couplings:	In Image Suppress the Peak detector is auto-selected to improve the image suppression effectiveness.
Initial S/W Revision:	A.08.01
Modified at S/W Revision:	A.10.01

Image Shift

Like the Image Suppress mode, Image Shift is a two sweep sequence. The data from the first sweep is placed in Trace 1 and the data from the second (LO frequency shifted by $2*IF/N$) sweep is placed in Trace 2. On alternate sweeps, the alternate trace (trace 2) is placed in front of trace 1. This way, you can see a signal at the same place on alternate sweeps, showing in yellow (trace1) and blue (trace2). Signal responses of Trace 1 and Trace 2 that have the same horizontal position are considered to be in the current band and therefore can be analyzed with the amplitude and frequency measurement systems of the SA. All other responses are invalid and should be ignored.

NOTE This function takes control of and uses Trace 1 and Trace 2. Any data in these traces prior to activating Image Shift will be lost.

Key Path:	Input/Output, External Mixer, Signal ID Mode
Example:	:SID:MODE ISH

Notes:	To synchronize in Image Shift Mode, turn off Signal ID and then initiate a single sweep. Then turn on Signal ID and initiate two single sweeps. The results of the first sweep after Signal ID is turned on are available in Trace 1. The next sweep is shifted and the data from that sweep is available in Trace 2. The unshifted and shifted data can then be compared.
Couplings:	Trace 2 is turned off when Image Shift is turned Off.
Initial S/W Revision:	A.08.01

Cable IF Loss

The loss at the IF in the IF/LO cable can be compensated for with this function, by entering the loss in dB for your cable.

The cable loss will depend on the IF frequency. The IF frequency varies depending on which IF path your measurement is using. For best accuracy, characterize your cable's loss for the IF frequency or frequencies you will be using.

IF Frequencies:

10 MHz path: 322.5 MHz

25 MHz path: 322.5 MHz

40 MHz path: 250 MHz

140 MHz path: 300 MHz

Key Path:	Input/Output, External Mixer
Key Path:	Input/Output, External Mixer, Calibrate Mixer
Remote Command:	[:SENSE] :MIXer :CIFLoss <rel_amp> [:SENSE] :MIXer :CIFLoss?
Example:	:MIX:CIFL 0.23 DB :MIX:CIFL?
Preset:	0.26 dB
State Saved:	Saved in state
Min:	-100
Max:	100
Initial S/W Revision:	A.08.01

I/Q

This feature is not available unless the “[Baseband I/Q \(Option BBA\)](#)” on page 290 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.

Input/Output

Key Path:	Input/Output
Mode:	BASIC, CDMA2K, EDGE GSM, TDSCMDA, VSA89601, WIMAX OFDMA
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
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 M Ω input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 M Ω probes, the probe will introduce a capacitive load on the circuit, unless higher attenuation is used at the probe interface. Higher attenuation reduces the signal level and degrades the signal-to-noise-ratio of the measurement. Passive probes are available with a variety of attenuation values for a moderate cost. Most Agilent passive probes can be automatically identified by the system, setting the input impedance setting required as well as the nominal attenuation. For single ended measurements a single probe is used for each channel. Other passive probes can be used, with the attenuation and impedance settings configured manually.

For full differential measurements, the system supports probes on each of the four inputs. The attenuation of the probes should be the same for good common mode rejection and channel match.

Both active and passive probes in single ended and differential configurations can be calibrated. This calibration uses the Cal Out BNC connection and a probe connection accessory. The calibration achieves excellent absolute gain flatness in a probed measurement. It matches both the gain and frequency response of the I and Q channels as well as any delay skew, resulting in high accuracy in derived measurements such as Error Vector Magnitude (EVM).

When a probe is connected a status message will be displayed. The message will indicate if calibration data is available or not. Calibration data is saved for each type of probe (including "none") for each port and will be reapplied whenever that type of probe is re-connected to the same port. For probes with EEPROM identification, the calibration data will be stored based on the unique probe identifier and will reapply data for that particular probe if it is available. The data will not follow a probe from one port to another. For probes without EEPROM identification, the instrument cannot distinguish between different probes of the same type and it will use the data from the last calibration for that probe type on that port.

When in differential mode, both the main and complementary probes are expected to be of the same type.

In some situations, the I and Q channels should be configured identically. In other situations it is convenient to control them independently. Some menus have a "Q Same as I" setting that will cause the Q channel configuration to mirror the I channel configuration, avoiding the overhead of double data entry when the channels should be the same.

The output port is for calibrating the I/Q input ports, although it can also be manually controlled.

There are two types of calibrations available: cable calibration and probe calibration. The cable calibration will guide 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.

Baseband I/Q Remote Language Compatibility

For the Agilent E4406A VSA Series Transmitter Tester, Option B7C provided baseband I/Q inputs. Code compatibility has been provided to allow many of the commands for option B7C to function

Input/Output

properly with the X-Series. The X-Series has hardware differences and additional capabilities (e.g., E4406A does not have independent settings of I & Q nor does it provide for probe calibrations) which make 100% compatibility impossible.

The following commands are supported:

:CALibration:IQ:FLATness

:INPut:IMPedance:IQ U50|B50|U1M|B1M

:INPut:IMPedance:REFeRence <integer>

The [:SENSe]:FEED RF|IQ|IONLy|QONLy|AREFeRence|IFALIgn command supports all parameters except IFALIgn. The FEED? query will return only RF|AIQ|AREF.

The following commands are not supported:

:CALibration:GIQ

:CALibration:IQ:CMR

:INPut:IQ:ALIGn OFF|ON|0|1

The Rohde & Schwarz FSQ-B71 also provides baseband I/Q inputs. A certain amount of code compatibility is provided in the X-Series, however hardware differences make this a somewhat limited set.

Supported:

The "<1|2>" is supported as "[1]".

INPut<1|2>:IQ:BALEnced[:STATe] ON | OFF

INPut<1|2>:IQ:TYPE I | Q | IQ

INPut<1|2>:IQ:IMPedance LOW | HIGH

Not Supported:

INPut<1|2>:SELEct AIQ | RF

TRACe<1|2>:IQ:DATA:FORMat COMPAtible | IQBLock | IQPair>

TRACe<1|2>:IQ:DATA:MEMory? <offset samples>,<# of samples>

TRACe<1|2>:IQ:DATA?

TRACe<1|2>:IQ:SET <filter type>,<rbw>,<sample rate>,<trigger source>,<trigger slope>,<pretrigger samples>,<# of samples>

TRACe<1|2>:IQ:SRATE 10.0kHz to 81.6MHz

TRACe<1|2>:IQ[:STATe] ON|OFF

The Rohde & Schwarz FMU has the following SCPI which is not supported (these commands start/abort the probe calibration procedure, which is manually interactive from the front panel):

CALibration:ABORt

CALibration:PROBE[:STARt]

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?
Notes:	For R&S FSQ-B71 compatibility
Preset:	IQ

Input/Output

Initial S/W Revision:	Prior to A.02.00
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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

Input/Output

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:	For R&S FSQ-B71 compatibility, with no 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 M Ω INP:IQ:IMP HIGH
Notes:	LOW = 50 Ω HIGH = 1 M Ω 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 M Ω
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 301](#).

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?
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Input/Output

Example:	<pre>:INPut:IMPedance:IQ U50</pre> <p>This is equivalent to the following two SCPI commands:</p> <pre>:INP:IQ:DIFF OFF</pre> <pre>:INP:IQ:IMP 50</pre>
Notes:	<p>Provided for E4406A code compatibility.</p> <p>The enum values translate as follows:</p> <p>U50: Differential Input = Off, Input Z = 50Ω</p> <p>B50: Differential Input = On, Input Z = 50Ω</p> <p>U1M: Differential Input = Off, Input Z = 1 MΩ</p> <p>B1M: Differential Input = On, Input Z = 1 MΩ</p> <p>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.</p> <p>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.</p> <p>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.</p>
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 you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is turned off the I and Q channel setups will be identical. This does not apply to Probe settings or to parameters that determined by the probe.

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.

Input/Output

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 M Ω INP:IQ:Q:IMP HIGH
Notes:	LOW = 50 Ω , HIGH = 1 M Ω 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 M Ω
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 "[I/Q Probe Setup](#)" on page 301.

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

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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 [“I/Q Guided Calibration” on page 347](#)).

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.

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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 347](#).

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
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Readback Text:	The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM
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 "I Input Z" on page 296).

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"

Input/Output

Range:	1 Ω to 1 M Ω
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 [“I/Q Cable Calibrate...”](#) on [page 349](#) 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".

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.
Couplings:	When one of the calibrator signals is selected, the analyzer routes that signal (an internal amplitude reference) to the analyzer, and changes the main input selection to RF so the calibrator signal can be seen. When you turn the calibrator off it does not switch back to the previously selected input.
Preset:	OFF
State Saved:	Saved in instrument state
Readback:	Off, 50 MHz, 4.8 GHz
Initial S/W Revision:	Prior to A.02.00

Remote Command:	:CALibration:SOURce:STATe OFF ON 0 1 :CALibration:SOURce:STATe?
Notes:	For ESA backwards compatibility. In the ESA the calibrator was a separate output which you connected to the input and switched on with this command. In the X-Series, the ON parameter is aliased to the [SENSe]:FEED:AREF REF50 command and the OFF parameter is aliased to [SENSe]:FEED:AREF OFF. When CALibration:SOURce:STATe? is received, 1 will be returned if any of the references is selected and 0 if the Calibrator is "Off"
Preset:	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
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Input/Output

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. The data will not change until the trace data updates because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.
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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:	-120 dB
Max:	120 dB
Readback:	Preamp Gain, <Ext Gain value> dB
Backwards Compatibility SCPI:	[:SENSe]:CORRection:OFFSet[:MAGNitude] The legacy "Ext Preamp Gain" key is now called "Ext Gain" and the sub-menu has choices of Ext Preamp MS BTS for backwards compatibility.
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.)

Input/Output

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
Initial S/W Revision:	Prior to A.02.00

Remote Command:	[:SENSE]:CORRection:MS[:RF]:LOSS <rel_ampl> [:SENSE]:CORRection:MS[:RF]:LOSS?
Example:	CORR:MS:LOSS 10 sets the Ext Gain value to -10 dB, and subsequently querying :LOSS will give 10 dB CORR:MS:LOSS -10 sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give -10 dB
Notes:	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset:	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min:	100 dB
Max:	-100 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
Initial S/W Revision:	Prior to A.02.00

Remote Command:	[:SENSE]:CORRection:BTS[:RF]:LOSS <rel_ampl> [:SENSE]:CORRection:BTS[:RF]:LOSS?
Example:	CORR:BTS:LOSS 10 sets the Ext Gain value to -10 dB, and subsequently querying :LOSS will give 10 dB CORR:BTS:LOSS -10 sets the Ext Gain value to 10 dB, and subsequently querying :LOSS will give -10 dB
Notes:	A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime :LOSS is set it sets :GAIN to the negative value of the parameter sent. Anytime :LOSS is queried it gives the negative of :GAIN
Preset:	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Min:	100 dB
Max:	-100 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.

Input/Output

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 [“Record Data Now” on page 315](#)) 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?

Input/Output

Notes:	INPut = Inputs STORed = Capture Buffer RECOred = 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
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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

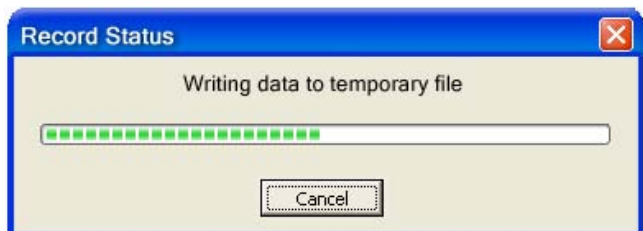
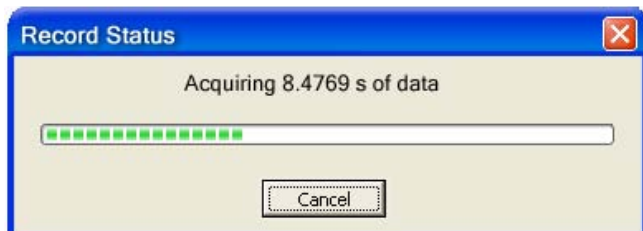
Record Data Now

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.

Input/Output

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" is 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?

Input/Output

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.

Input/Output

Backwards Compatibility Notes:	Unlike legacy analyzers, Preset does not turn Corrections off (Restore Input/Output Defaults does).
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 dB μ V, the display is calibrated in the appropriate units. The "Antenna Unit" used for the conversion is contained within the corrections array database. It may be specified by 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

dB μ V/m

Sets the antenna unit to dB μ V/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dB μ V/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:	"dB μ V/m"
Initial S/W Revision:	A.02.00

dB μ A/m

Sets the antenna unit to dB μ A/m. If this correction is turned on, and Apply Corrections is on, the Y Axis Unit will then be forced to dB μ A/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:	" dB μ A/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

Input/Output

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.

See [“Interpolation” on page 322](#)

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

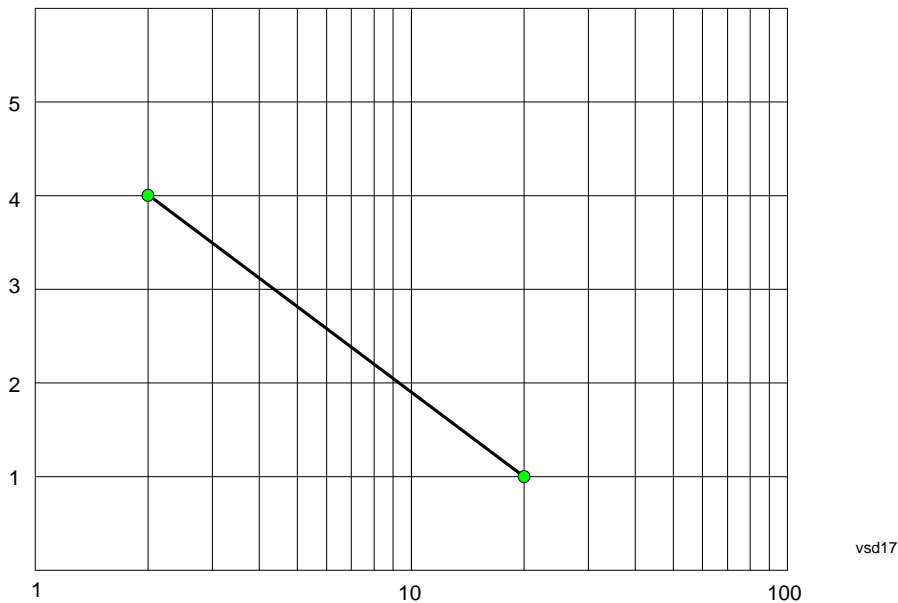
Interpolation

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.

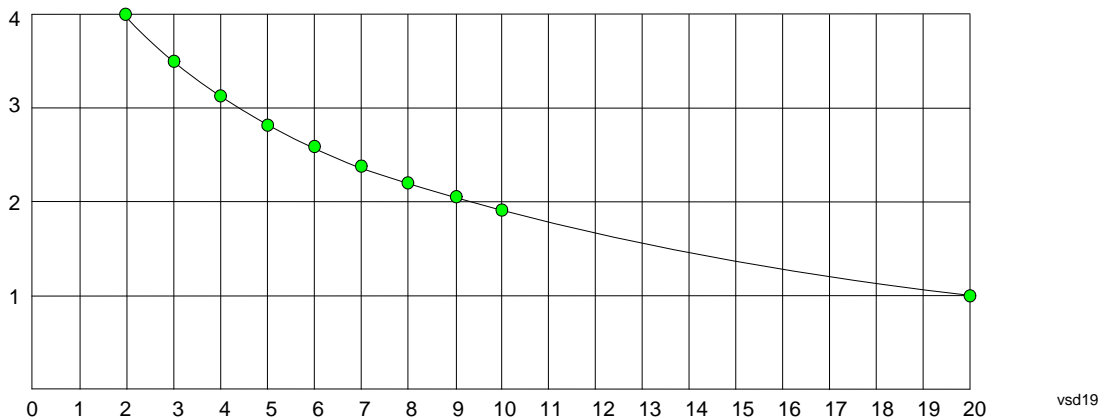
To effect this correction, the goal, for any particular start and stop frequency, is to build a correction trace, whose number of points matches the current Sweep Points setting of the instrument, which will be used to apply corrections on a bucket by bucket basis to the data traces.

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:

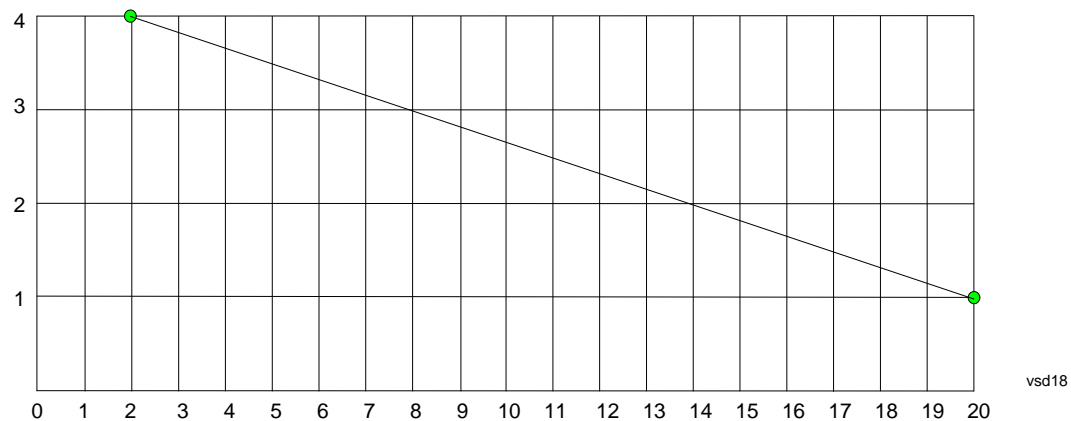


On a linear scale (like that of the spectrum analyzer), this translates to:



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:

Input/Output



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
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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
-----------	--

Input/Output

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
Dependencies:	If either the first or last point in the array is outside the frequency range of the current input, an error message is generated: “-221. Settings conflict; Start or Stop Freq out of range for current input settings”
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 319](#)) 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

Input/Output

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.

Input/Output

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.
Backwards Compatibility Notes:	Freq Ref In was not saved in state in the legacy instruments. It is a part of state in the X-Series.
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: <ol style="list-style-type: none"> 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 Notes:	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:	For PSA compatibility the command form is provided and is directly mapped to [:SENSe]:ROSCillator:SOURce:TYPE
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
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Input/Output

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
Default Unit:	Hz
Initial S/W Revision:	Prior to A.02.00

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.

Input/Output

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
-----------	---------------------

Backwards Compatibility Notes:	In ESA there was not a user interface to enable the Video Output (Analog Output), Trigger Output, or Gate Output. In the X-Series each of these physical connectors requires configuration, thus the user interface has been added for X-Series, along with the potential for an output you think is always on to be switched off.
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

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

Input/Output

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

Analog Out

This menu lets you control which signal is fed to the “Analog Out” connector on the analyzer rear panel.

See [“More Information” on page 338](#)

Input/Output

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 with earlier X-Series firmware versions, 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.

Key Path:	Input/Output, Output Config, Analog Out
Example:	OUTP:ANAL SVID

Input/Output

Dependencies:	<p>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.</p> <p>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.</p> <p>The output holds at its last value during an alignment and during a marker count. After a sweep:</p> <ul style="list-style-type: none">• 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. <p>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.</p>
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
Backwards Compatibility Notes:	See “ Backwards Compatibility: ” on page 340, below.
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.

Furthermore, 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:	<p>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.</p> <p>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.</p> <p>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).</p> <p>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.</p>
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

Input/Output

Dependencies:	<p>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.</p> <p>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.</p> <p>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).</p> <p>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.</p>
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:	<p>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.</p> <p>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.</p> <p>When Demod Audio is the selected Analog Output:</p> <ul style="list-style-type: none"> • 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

Digital Bus

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

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
-----------	---

Input/Output

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

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

The Aux IF Out functionality is only valid for RF and External Mixer inputs. When using the External Mixing path, the Aux IF Out levels (for all three Options CR3, CRP, and ALV) will be uncalibrated because the factory default Aux IF level was set to accommodate the expected IF levels for the RF path.

Key Path:	Input/Output, Output Config
Remote Command:	:OUTPut:AUX SIF AIF LOGVideo OFF :OUTPut:AUX?
Dependencies:	The softkey does not appear in models that do not support the Aux IF Out.
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 functionality, 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 Output in 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
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Input/Output

Example:	OUTP:AUX SIF causes the aux output type to be Second IF
Dependencies:	Does not appear unless Option CR3 is installed.
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 frequencies 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
Dependencies:	Does not appear unless Option CRP is installed.
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

Default Unit:	Hz
Initial S/W Revision:	A.04.00

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:	Does not appear unless Option ALV is installed. 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.

Input/Output

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 359).
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

Input/Output

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 359).
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 359).
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

Input/Output

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 359).
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 359).
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

Input/Output

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 ["Show Adapter Screen" on page 359](#).

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 359).
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 359](#).

Key Path:	Input/Output, I/Q, I Setup, I Probe, Calibrate
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Input/Output

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:	<code>:CALibration:IQ:PROBe:IBar</code>
Example:	<code>CAL:IQ:PROB:IB</code>
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 359).
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 359](#).

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
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Input/Output

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 359).
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 [“Show Adapter Screen” on page 359](#).

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:	<code>:CALibration:IQ:PROBe:QBar</code>
Example:	<code>CAL:IQ:PROB:QB</code>
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 359).
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.

Marker

Accesses the Marker menu. A marker can be placed on a trace to allow the value of the trace at the marker point to be determined precisely. The functions in this menu include a 1-of-N selection of the control mode Normal, Delta, Fixed, or Off for the selected marker.

If the selected marker is Off, pressing Marker sets it to the selected window. If the metrics window is selected, the marker will appear in the first visible window (RF Spectrum if Quad View is selected).

The units of Delta Marker are window dependent. In the Spectrum windows they are dB, in the Demod Waveform window they are the same as the Y-Axis Unit. In this window delta marker is a linear difference rather than a ratio. For example, in FM, in the Demod Waveform window, the units of delta marker are Hz.

Control Mode

Key Path	Front-panel key
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:MODE POSITION DELTA FIXed OFF :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:MODE?
Example	CALC:AM:MARK:MODE POS turns on marker 1 in Normal mode
Remote Command Notes	This command (not the query) causes the specified marker to become selected.
Preset	OFF (all markers)
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Select Marker

Displays a menu with 12 markers available for selection for the current measurement.

Key Path	Marker
Notes	The selected marker is remembered even when not in the Marker menu and is used if a Search is initiated.
Preset	Marker 1
State Saved	The number of the selected marker is saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Marker

Normal

Sets the control mode for the selected marker to Normal and turns on the active function for setting its value. If the selected marker was off, it is placed at the center of the screen on the trace specified by the marker's Trace attribute.

A Normal mode (POSition type) marker can be moved to any point on the X Axis by specifying its X Axis value. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

Key Path	Marker
Example	: CALC: MARK: MODE POS sets Marker 1 to Normal.
Remote Command Notes	See the description under the “Marker” on page 361 key.
Couplings	The marker addressed by this command becomes the selected marker on the front panel.
State Saved	The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Delta

Sets the control mode for the selected marker to Delta and turns on the active function for setting its delta value. If the selected marker is off, the marker is placed at the center of the screen on the trace specified by the marker's Trace attribute.

In Delta mode the marker result shows the relative result between the selected (Delta) marker and its reference marker. A delta marker can be moved to any point on the X Axis by specifying its X Axis offset from a reference marker. Its absolute Y Axis value is then the value of the trace point at that X Axis value.

Key Path	Marker
Example	:CALC:MARK:MODE DELT sets marker 1 to Delta.
Remote Command Notes	See the description under the Marker key.
Couplings	Coupled to fix absolute X when turned On.
State Saved	The marker control mode (Normal, Delta, Fixed, Off) and X Axis value are saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Fixed

Sets the control mode for the selected marker to Fixed. A fixed marker is fixed in the sense that it stays where you place it. It can be directly moved in both X and Y. It can be moved with a Peak Search. It can also be indirectly moved by re-zeroing the delta if it is a relative marker. If it is moved, it again becomes fixed at the X Axis point it moved to and it has a Y-axis result that it took on when it moved there. If a Normal or Delta marker is changed to Fixed it becomes fixed at the X Axis point it was at, and with the Y-axis result it had when it was set to Fixed.

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

Marker X

Sets and queries a marker's X value.

Key Path	Marker, Fixed
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:X <time> <freq> :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:X?
Remote Command Notes	The query is returned in the fundamental units for the current marker X Axis scale. This command (not the query) causes the specified marker to become selected.
Preset	After a preset, all Markers are turned off, so a Marker X Axis Value query will return not a number (9.91 e37). When a Marker is on, the default value of the Marker X value is the center of the appropriate window.
Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Marker Y

Sets and queries a marker's Y axis value.

Key Path	Marker, Fixed
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:Y <real> :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:Y?
Remote Command Notes	The query is returned in the fundamental units for the current marker Y Axis scale. This command (not the query) causes the specified marker to become selected.
Preset	Defaults to the measurement result at the default X value, or not a number (9.91 e37) if off or if off screen is Fixed.

Marker

Min	-9.9E+37
Max	9.9E+37
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Off

Turns off the selected marker. Turning the marker off does not affect which marker is selected.

Key Path	Marker
Example	: CALC: MARK: MODE OFF sets Marker 1 to Off.
Remote Command Notes	See the description under the “ Marker ” on page 361 key.
State Saved	The marker control mode (Normal, Delta, Fixed, Off) is saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Properties

Accesses a menu used to assign properties to the selected marker.

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

Select Marker

Displays a menu with 12 markers available for selection for the current measurement.

Key Path	Marker, Properties
Notes	The selected marker is remembered even when not in the Marker menu and is used if a Search is initiated.
Preset	Marker 1
State Saved	The number of the selected marker is saved in instrument state.
Initial S/W Revision	Prior to A.02.00

Relative To

Selects the reference marker for a marker in Delta mode.

If a delta marker has a reference marker in a different window, the delta marker’s mode changes to POS (for example, it becomes a normal marker).

Key Path	Marker, Properties
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Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:REferenc e <int> :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:REferenc e?
Example	CALC:AM:MARK1:REF 2 sets marker 1's reference marker to 2 and turns marker 1 on as a delta marker.
Remote Command Notes	This command (not the query) causes the specified marker to become selected.
Preset	By default, marker X is relative to marker X + 1 except for marker 12, which is relative to marker 1.
Min	1
Max	12
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

AM/FM/PM Marker Trace

Selects the trace on which to place the marker. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even **Fixed** markers. It is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

In the Analog Demod mode FM/AM/PM measurements, there are five named traces. The RF Spectrum trace is the trace in the RF Spectrum window, and the AF Spectrum trace is the trace in the AF Spectrum window. There are four traces in the Demod Waveform window: Demod, Demod Avg, Demod Max, and Demod Min.

When Auto Init is on, the marker's trace attribute is re-determined automatically by the analyzer whenever the marker turns on (Normal, Delta, or Fixed) from an off state. The marker goes to the trace in the window that has the focus, or onto the RF spectrum window if the Metrics window has the focus. If in the Demod Waveform window, it goes to the Demod trace.

This command associates the marker with the specified trace. Setting the Marker Trace directly (whether the marker is on or off) will turn off Auto Init.

If the marker is not **off**, it moves the marker from the trace it was on to the new trace. If the new trace is in the same window, the marker goes to the same data point on the new trace. If the marker changes windows, it retains its relative horizontal positions in the new window. If it is a fixed marker, it will retain both relative horizontal and vertical position.

If the marker is **off** it stays off, but is now associated with the specified trace.

The query returns the name of the trace on which the marker is currently placed.

Key Path	Marker, Properties
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Marker

Remote Command	:CALCulate:AM FM PM:MARKer[1] 2 . . . 12:TRACe RFSpectrum AFSpectrum DEMod DAverage DMaximum DMINimum :CALCulate:AM FM PM:MARKer[1] 2 . . . 12:TRACe?
Example	:CALC:AM:MARK1:TRAC DEM places marker 1 on the Demod trace
Couplings	This is not affected by Auto Coupling. Sending the remote command causes the addressed marker to become selected. If ever a delta marker has a reference marker in a different window, the delta marker's mode changes to POS (for example, it becomes a normal marker). When Marker Trace Auto Init State is on, the marker trace will automatically be set whenever the marker is turned on.
Preset	RF Spectrum on a Preset or All Markers Off
State Saved	The Marker Trace for each marker is saved in instrument state.
Readback line	[Trace name, Auto Init] or [Trace Name, Manual]
Initial S/W Revision	Prior to A.02.00

RF Spectrum

Selects the input RF signal in the RF Spectrum window as the trace on which you want to place your marker. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace
Example	:CALC:AM:MARK1:TRAC RFSP
Initial S/W Revision	Prior to A.02.00

Demod

Selects the current demodulated signal in the Demod Waveform window, shown in yellow, as the trace on which you want to place your marker. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace
Example	:CALC:AM:MARK1:TRAC DEM
Initial S/W Revision	Prior to A.02.00

Demod Average

Selects the averaged demodulation signal in the Demod Waveform window, shown in green, as the trace on which you want to place your marker. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace
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Example	:CALC:AM:MARK1:TRAC DAV
Initial S/W Revision	Prior to A.02.00

Demod Max

Selects the Demod Max trace in the Demod Waveform window, shown in cyan, as the trace on which you want to place your marker. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace
Example	:CALC:AM:MARK1:TRAC DMAX
Initial S/W Revision	Prior to A.02.00

Demod Min

Selects the Demod Min trace in the Demod Waveform window, shown in magenta, as the trace on which you want to place your marker. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace
Example	:CALC:AM:MARK1:TRAC DMIN
Initial S/W Revision	Prior to A.02.00

AF Spectrum

Selects the demodulated signal in the AF Spectrum window as the trace on which you want to place your marker.

Key Path	Marker, Properties, Marker Trace
Example	:CALC:AM:MARK1:TRAC AFSP
Initial S/W Revision	Prior to A.02.00

FM Stereo Marker Trace

Selects the trace on which to place the marker. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even **Fixed** markers. It is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

In the Analog Demod mode FM Stereo Measurement, there are 26 named traces. The RF Spectrum trace is the trace in the RF Spectrum window of MPX view. The Spectrum trace is the trace in the Spectrum window of the five views (MPX/Mono/Stereo/Left/Right). There are four kinds of traces in the Demod Waveform window of the five views (MPX/Mono/Stereo/Left/Right): Demod, Demod Avg, Demod Max, and Demod Min.

When Auto Init is on, the marker's trace attribute is re-determined automatically by the analyzer whenever the marker turns on (Normal, Delta, or Fixed) from an off state. The marker goes to the trace in

Marker

the window that has the focus, or onto the RF spectrum window if the Metrics window has the focus. If in the Demod Waveform window, it goes to the Demod trace.

This command associates the marker with the specified trace. Setting the Marker Trace directly (whether the marker is on or off) will turn off Auto Init.

If the marker is not **off**, it moves the marker from the trace it was on to the new trace. If the new trace is in the same window, the marker goes to the same data point on the new trace. If the marker changes windows, it retains its relative horizontal positions in the new window. If it is a fixed marker, it will retain both relative horizontal and vertical position.

If the marker is **off** it stays off, but is now associated with the specified trace.

The query returns the name of the trace on which the marker is currently placed.

Key Path	Marker, Properties
Remote Command	:CALCulate:FMSTereo:MARKer[1] 2 ...12:TRACe RFSpectrum AFSpectrum DEMod DAverage DMAximum DMINimum MDEMod MDAaverage MMAXimum MMINimum MSpectrum SDEMod SDA verage SMAximum SMINimum SSpectrum LDEMod LDAverage LMA Ximum LMINimum LSpectrum RDEMod RDAverage RMAximum RMIN imum RSpectrum :CALCulate:FMSTereo:MARKer[1] 2 ...12:TRACe?
Example	:CALC:FMST:MARK1:TRAC DEM places marker 1 on the Demod trace
Couplings	This is not affected by Auto Coupling. Sending the remote command causes the addressed marker to become selected. If ever a delta marker has a reference marker in a different window, the delta marker's mode changes to POS (for example, it becomes a normal marker). When Marker Trace Auto Init State is on, the marker trace will automatically be set whenever the marker is turned on.
Preset	RF Spectrum on a Preset or All Markers Off
State Saved	The Marker Trace for each marker is saved in instrument state.
Readback line	[Trace name, Auto Init] or [Trace Name, Manual]
Initial S/W Revision	A.10.00

MPX

Selects the trace in MPX view to place the marker on.

Key Path	Marker, Properties, Marker Trace
Initial S/W Revision	A.10.00

RF Spectrum

Selects the input RF signal in the RF Spectrum window as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC RFSP
Initial S/W Revision	A.10.00

Demod

Selects the current demodulated signal in the MPX Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC DEM
Initial S/W Revision	A.10.00

Demod Average

Selects the averaged demodulation signal in the MPX Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC DAV
Initial S/W Revision	A.10.00

Demod Max

Selects the Demod Max trace in the MPX Waveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC DMAX
Initial S/W Revision	A.10.00

Demod Min

Selects the Demod Min trace in the MPX Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC DMIN
Initial S/W Revision	A.10.00

Marker

Spectrum

Selects the spectrum signal in the MPX Spectrum window as the trace that you want your marker to be placed on.

Key Path	Marker, Properties, Marker Trace, MPX
Example	:CALC:FMST:MARK1:TRAC AFSP
Initial S/W Revision	A.10.00

Mono

Selects the trace in Mono view to place the marker on.

Key Path	Marker, Properties, Marker Trace
Initial S/W Revision	A.10.00

Demod

Selects the current demodulated signal in the Mono Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Mono
Example	:CALC:FMST:MARK1:TRAC MDEM
Initial S/W Revision	A.10.00

Demod Average

Selects the averaged demodulation signal in the Mono Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Mono
Example	:CALC:FMST:MARK1:TRAC MDAV
Initial S/W Revision	A.10.00

Demod Max

Selects the Demod Max trace in the MonoWaveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Mono
Example	:CALC:FMST:MARK1:TRAC MMAX
Initial S/W Revision	A.10.00

Demod Min

Selects the Demod Min trace in the Mono Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Mono
Example	:CALC:FMST:MARK1:TRAC MMIN
Initial S/W Revision	A.10.00

Spectrum

Selects the spectrum signal in the Mono Spectrum window as the trace that you want your marker to be placed on.

Key Path	Marker, Properties, Marker Trace, Mono
Example	:CALC:FMST:MARK1:TRAC MSP
Initial S/W Revision	A.10.00

Stereo

Selects the trace in Stereo view to place the marker on.

Key Path	Marker, Properties, Marker Trace
Initial S/W Revision	A.10.00

Demod

Selects the current demodulated signal in the Stereo Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Stereo
Example	:CALC:FMST:MARK1:TRAC SDEM
Initial S/W Revision	A.10.00

Demod Average

Selects the averaged demodulation signal in the Stereo Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Stereo
Example	:CALC:FMST:MARK1:TRAC SDAV
Initial S/W Revision	A.10.00

Marker

Demod Max

Selects the Demod Max trace in the Stereo Waveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Stereo
Example	:CALC:FMST:MARK1:TRAC SMAX
Initial S/W Revision	A.10.00

Demod Min

Selects the Demod Min trace in the Stereo Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Stereo
Example	:CALC:FMST:MARK1:TRAC SMIN
Initial S/W Revision	A.10.00

Spectrum

Selects the spectrum signal in the Stereo Spectrum window as the trace that you want your marker to be placed on.

Key Path	Marker, Properties, Marker Trace, Stereo
Example	:CALC:FMST:MARK1:TRAC SSP
Initial S/W Revision	A.10.00

Left

Selects the trace in Left view to place the marker on.

Key Path	Marker, Properties, Marker Trace
Initial S/W Revision	A.10.00

Demod

Selects the current demodulated signal in the Left Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Left
Example	:CALC:FMST:MARK1:TRAC LDEM
Initial S/W Revision	A.10.00

Demod Average

Selects the averaged demodulation signal in the Left Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Left
Example	:CALC:FMST:MARK1:TRAC LDAV
Initial S/W Revision	A.10.00

Demod Max

Selects the Demod Max trace in the Left Waveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Left
Example	:CALC:FMST:MARK1:TRAC LMAX
Initial S/W Revision	A.10.00

Demod Min

Selects the Demod Min trace in the Left Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Left
Example	:CALC:FMST:MARK1:TRAC LMIN
Initial S/W Revision	A.10.00

Spectrum

Selects the Left spectrum trace in the Left Spectrum window as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Left
Example	:CALC:FMST:MARK1:TRAC LSP
Initial S/W Revision	A.10.00

Right

Selects the trace in Right view to place the marker on.

Key Path	Marker, Properties, Marker Trace
Initial S/W Revision	A.10.00

Marker

Demod

Selects the current demodulated signal in the Right Waveform window, shown in yellow, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Right
Example	:CALC:FMST:MARK1:TRAC RDEM
Initial S/W Revision	A.10.00

Demod Average

Selects the averaged demodulation signal in the Right Waveform window, shown in green, as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Right
Example	:CALC:FMST:MARK1:TRAC RDAV
Initial S/W Revision	A.10.00

Demod Max

Selects the Demod Max trace in the Right Waveform window, shown in cyan, as the trace that you want your marker to be placed on. This trace shows the maximum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Right
Example	:CALC:FMST:MARK1:TRAC RMAX
Initial S/W Revision	A.10.00

Demod Min

Selects the Demod Min trace in the Right Waveform window, shown in magenta, as the trace that you want your marker to be placed on. This trace shows the minimum hold value for each data point since the last restart.

Key Path	Marker, Properties, Marker Trace, Right
Example	:CALC:FMST:MARK1:TRAC RMIN
Initial S/W Revision	A.10.00

Spectrum

Selects the Right spectrum trace in the Right Spectrum window as the trace that you want your marker to be placed on. This trace is used to determine the placement, result, and X Axis Scale of the marker.

Key Path	Marker, Properties, Marker Trace, Right
Example	:CALC:FMST:MARK1:TRAC RSP
Initial S/W Revision	A.10.00

Trace Auto Init

Selects whether the marker trace is automatically reset to the selected window when the marker is turned on or not.

Key Path	Marker, Properties, Trace
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:TRACe:AUTO OFF ON 0 1 :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:TRACe:AUTO?
Example	:CALC:AM:MARK1:TRAC:AUTO 0 turns off auto-initialization of marker trace.
Preset	On
State Saved	Saved in instrument state.
Readback line	Trace name
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Lines

When on, displays a vertical line of graticule height and a horizontal line of graticule width, intersecting at the indicator point of the marker (that is, the center of the X or the bottom tip of the diamond). The lines are blue in color.

If the marker is off screen, the lines should be extended from the marker so that they go through the screen area if possible. This is really useful for off screen Fixed markers as it lets you see their amplitude even though they are off the X Axis.

Key Path	Marker, Properties
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:LINes[:STATE] OFF ON 0 1 :CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:LINes[:STATE]?
Example	CALC:AM:MARK2:LIN ON turns Lines on for marker 2.
Couplings	Sending the remote command causes the addressed marker to become selected.
Preset	OFF
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Marker

All Markers Off

Turns off all markers.

Key Path	Marker
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer:AOFF
Example	CALC:AM:MARK:AOFF turns off all markers for the AM measurement
Couplings	Sets the selected marker to 1.
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Marker Function

There are no menus or marker functions under this key in the Analog Demod mode.

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

Marker Function

Marker To

Accesses a menu that contains only the marker center frequency key.

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

Mkr->CF

Sets the center frequency of the RF Spectrum window to the frequency of the selected marker. The marker stays at this frequency, so it moves to the center of the display.

In delta marker mode, this function sets the center frequency to the x-axis value of the delta marker.

Key Path	Marker ->
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12[:SET]:CENTer
Example	CALC:AM:MARK2:CENT sets the CF of the analyzer to the value of marker 2.
Remote Command Notes	Sending this command selects the sub-op coded marker. If the currently selected marker is not on when this key is pressed, it will be turned on at the center of the RF Spectrum trace as a normal type marker.
Dependencies	This function is unavailable (key is grayed out) unless the selected marker's trace is off, or on the RF Spectrum trace.
Couplings	All the usual couplings associated with setting Center Frequency apply (see "Center Frequency" on page 257).
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Marker To

Meas

Accesses a menu that contains: AM, FM, PM (Phase Modulation), and FM Stereo/RDS.

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

Meas

Meas Setup

Overview

This section describes the measurement setup features of the Analog Demod measurements.

Set Parameters

The following parameters are set as indicated, are not settable by the user and therefore do not appear in any menus:

FFT IF Gain	Low (0 dB)
ADC Dither	On
Avg Mode	Exponential
Phase Noise Optimization	Auto

Auto Rules for Phase Noise Optimization:

Use “Optimize for $f < 20$ kHz” when the Channel BW < 120 kHz, otherwise use “Optimize for $f > 30$ kHz”.

[“Optimizing Measurement Speed” on page 383](#)

[“Channel Bandwidth” on page 383](#)

[“RF Spectrum Span ” on page 384](#)

[“RF Spectrum RBW / AF Spectrum RBW” on page 384](#)

[“AF Waveform Sweep Time” on page 384](#)

[“Filters and Annotation” on page 384](#)

Optimizing Measurement Speed

The speed of the analog demodulation measurements is driven largely by how much data must be acquired to satisfy the selected configuration.

Each measurement cycle generates all of the metrics and traces from a single acquisition, so there are several different settings which can affect the overall speed. Note that even though you may not be viewing a particular result on the display, the result is available and its configuration and constraints are used to determine the acquisition settings.

Channel Bandwidth

This setting determines the sampling rate used by the measurement, higher bandwidths will result in larger data sets being acquired and processed. This should be set to the lowest value possible which allows your signal to be fully captured.

Meas Setup

RF Spectrum Span

This setting is used in a similar way as the Channel Bandwidth in that it determines the sampling rate. As with channel bandwidth, it should be set as narrow as possible to capture the signal of interest.

RF Spectrum RBW / AF Spectrum RBW

These settings dictate a minimum acquisition time for the measurement. The Auto setting is recommended for optimal performance while maintaining measurement integrity. Narrower resolution bandwidths (RBWs) require longer acquisitions to achieve the resolution improvements.

AF Waveform Sweep Time

This setting sets another minimum acquisition time for the measurement. In many uses, the AF Spectrum RBW will dominate the determination of the data acquisition duration, but if the AF waveform view is not needed keeping its sweep time low will ensure that it does not negatively impact the throughput.

Filters and Annotation

You may choose to filter by frequency – choosing an optional low-pass filter and an optional high-pass filter – or may filter using a standard published band-pass filter (CCITT). Turning on a band-pass filter will automatically turn off the high-pass and low-pass filters; similarly, the band-pass filter will automatically turn off if you request either a high-pass or a low-pass filter.

Accesses a menu of keys that enable you to control specific parameters for the current measurement.

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

Average/Hold Num

When turned on, the RF Spectrum and AF spectrum traces are averaged, and the Demod window shows an Average trace, a Max Hold trace, and a Min Hold trace in addition to the current trace. All metrics are averaged, and the metrics show an “Average” column and a “Max Hold” column.

The average feature for the Analog Demod measurement differs from other measurements in that the average type is fixed depending on the window as shown in the following table:

Window	Average Type
RF Spectrum	Pwr Average
Demod Waveform	Arithmetic Average
AF Spectrum	Log Average

For more details, see [“Average/Hold On/Off Functionality” on page 385](#).

Key Path	Meas Setup
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Remote Command	<pre>[:SENSE] :AM FM PM FMSTereo :AVERage :COUNT <integer> [:SENSE] :AM FM PM FMSTereo :AVERage :COUNT? [:SENSE] :AM FM PM FMSTereo :AVERage [:STATE] ON OFF 1 0 [:SENSE] :AM FM PM FMSTereo :AVERage [:STATE] ?</pre>
Example	AM:AVER:COUN 10
Preset	10 ON
State Saved	Saved in instrument state
Min	1
Max	9999
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Average/Hold On/Off Functionality

Average, Minhold, and Maxhold are coupled.

When Average/Hold is on:

- The RF Spectrum and AF Spectrum traces are averaged.
- The Demod Waveform window will display a current trace, an Average trace, a Max Hold trace, and a Min Hold trace.
- The Metrics window will display an “Average” column and a “Max Hold” column.
- Metrics will display to four significant digits.
- The Meas Bar will display the Average/Hold number (along with how many of those sweeps have been captured).
- Demod Min trace, Demod Max trace, and Demod Avg trace are maintained.
- The Max Hold column shows the maximum value the un-averaged metric has attained since the last Restart.

When Average/Max Hold is off:

- The RF Spectrum and AF Spectrum traces are not averaged.
- The Demod Waveform window will display only the demod trace.
- The Metrics window will display only a “Current” column.
- Metrics will display to two significant digits.
- The Meas Bar will not display the Average/Hold number.
- Max Hold metrics over SCPI will return SCPI not a number.

Meas Setup

- Demod Min trace, Demod Max trace and Demod Avg trace will return default values in a Meas?, Read?, and Fetch? and when exported to a .csv file
- Max Hold column is blank.

Filters

Pressing this key displays the Filters menu, allowing the user to control the post demodulation and de-emphasis filters.

If any filters are turned on and the filters cannot be applied, the error “161 Setting Modified; Filters not applied” will appear.

Key Path	Meas Setup
Initial S/W Revision	Prior to A.02.00

High Pass Filter (Post Demod)

This parameter allows you to adjust the post demodulation high pass filters. This filter allows you to remove unwanted low-frequency components from the modulated signal..

Key Path	Meas Setup
Remote Command	[:SENSe] :AM FM PM FMSTereo :HPFilter OFF HPF20 HPF50 HPF300 [:SENSe] :AM FM PM FMSTereo :HPFilter?
Example	FM:HPF HPF20
Remote Command Notes	Off = No filtering HPF20 = Use 20 Hz high pass filter HPF50 = Use 50 Hz high pass filter HPF300 = Use 300 Hz high pass filter
Couplings	AM/FM/PM: Turning on any high-pass filter will turn off bandpass filters. If a band-pass filter is turned off, the following advisory message is displayed: “Band-pass filter set to OFF”. If the band-pass filter was already off, no advisory message is displayed. FM Stereo: None
Preset	Off (AM/FM/FM Stereo), HPF20 (PM)
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.10.00
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Off

This selection turns the post demodulation high pass filter off.

Key Path	Meas Setup, HPF
Example	AM:HPF OFF
Notes	Annotation line (DC Coupled) appears in the Meas Bar, except if in the AM measurement.
Readback	Off
Initial S/W Revision	Prior to A.02.00

20 Hz

Sets the post demodulation high pass filter to 20 Hz.

Key Path	Meas Setup, HPF
Example	AM:HPF HPF20
Readback	20 Hz
Initial S/W Revision	Prior to A.02.00

50 Hz

Sets the post demodulation high pass filter to 50 Hz.

Key Path	Meas Setup, HPF
Example	AM:HPF HPF50
Readback	50 Hz
Initial S/W Revision	Prior to A.02.00

300 Hz

Sets the post demodulation high pass filter to 300 Hz.

Key Path	Meas Setup, HPF
Example	AM:HPF HPF300
Readback	300 Hz
Initial S/W Revision	Prior to A.02.00

Meas Setup

Lowpass Filter (Post Demod)

This parameter allows you to adjust the post demodulation low pass filter. The filter is useful in removing unwanted high frequency components of the modulating signal.

Key Path	Meas Setup
Remote Command	[:SENSE]:AM FM PM FMSTereo:LPFilter OFF LPF300 LPF3K LPF15K LPF30K LPF80K LPF300K [:SENSE]:AM FM PM FMSTereo:LPFilter?
Example	FM:LPF LPF3K
Remote Command Notes	Off = No filtering LPF300 = Use 300 Hz low pass filter LPF3K = Use 3 kHz low pass filter LPF15K = Use 15 kHz low pass filter LPF30K = Use 30 kHz low pass filter LPF80K = Use 80 kHz low pass filter LPF300K = Use 300 kHz low pass filter
Dependencies	LPF key is unavailable (grayed out) when the CCITT filter is selected.
Couplings	AM/FM/PM: Turning on any low-pass filter will turn off band-pass filters. If a band-pass filter is turned off, the following advisory message is displayed: "Band-pass filter set to OFF". If the band-pass filter was already off, no advisory message is displayed. FM Stereo: None
Preset	Off
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.10.00

Off

Turns the post demodulation low pass filter off.

Key Path	Meas Setup, Post Demod LPF
Example	AM:LPF OFF
Readback	Off

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

Sets the post demodulation low pass filter to 300 Hz.

Key Path	Meas Setup, HPF/LPF
Example	AM:HPBP LPF300
Readback	300 Hz
Initial S/W Revision	Prior to A.02.00

3 kHz

Selects the 3 kHz post demodulation low pass filter.

Key Path	Meas Setup, Post Demod LPF
Example	AM:LPF LPF3K
Readback	3 kHz
Initial S/W Revision	Prior to A.02.00

15 kHz

Selects the 15 kHz post demodulation low pass filter.

Key Path	Meas Setup, Post Demod LPF
Example	AM:LPF LPF15K
Readback	15 kHz
Initial S/W Revision	Prior to A.02.00

30 kHz

Selects the 30 kHz post demodulation low pass filter.

Key Path	Meas Setup, Post Demod LPF
Example	AM:LPF LPF30K
Readback	30 kHz
Initial S/W Revision	Prior to A.02.00

80 kHz

Selects the 80 kHz post demodulation low pass filter.

Key Path	Meas Setup, Post Demod LPF
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Meas Setup

Example	AM:LPF LPF80K
Readback	80 kHz
Initial S/W Revision	Prior to A.02.00

300 kHz

Selects the 300 kHz post demodulation low pass filter.

Key Path	Meas Setup, Post Demod LPF
Example	AM:LPF LPF300K
Readback	300 kHz
Initial S/W Revision	Prior to A.02.00

Band Pass Filter (Post Demod)

This parameter enables you to choose the post demodulation band pass filters, allowing you to apply industry-defined filters.

Key Path	Meas Setup
Remote Command	[:SENSE] :AM FM PM FMSTereo :BPFilter OFF CCITT AWAudio [:SENSE] :AM FM PM FMSTereo :BPFilter ?
Example	FM:BPFilter CCITT
Remote Command Notes	Off = No filtering CCITT = Use CCITT filter AWAudio = Use A-Weighted Audio filter
Couplings	AM/FM/PM: Turning on any bandpass filter will turn off high-pass and low-pass filters. If a high-pass filter is turned off, the following advisory message is displayed: “High-pass filter set to OFF”. If a low-pass filter is turned off, the following advisory message is displayed: “Low-pass filter set to OFF”. If both are turned off, the following advisory message is displayed: “High-pass and Low-pass filters set to OFF”. If both high-pass and low-pass filters were already off, no advisory message is displayed. FM Stereo: None
Preset	Off
State Saved	Saved in instrument state

Readback	1-of-N
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

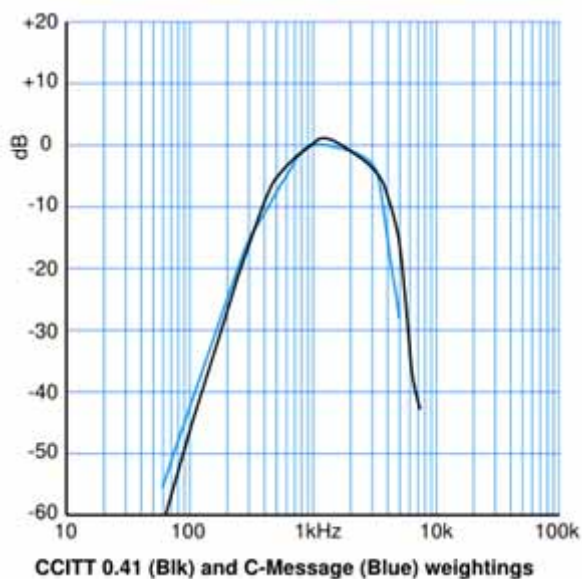
Off

Turns the post demodulation band-pass filter off.

Key Path	Meas Setup, BPF
Example	AM:BPF OFF
Readback	Off
Initial S/W Revision	Prior to A.02.00

CCITT

Sets the post demodulation band-pass filter to CCITT.



Key Path	Meas Setup, BPF
Example	AM:BPF CCITT
Readback	CCITT
Initial S/W Revision	Prior to A.02.00

Meas Setup

A-Weighted

Sets the post demodulation band-pass filter to A-Weighted Audio filter, this key is only valid in FM Stereo measurement.

Key Path	Meas Setup, Filters, Bandpass Filter
Example	FMST:BPF AWA
Readback	A-Weighted
Initial S/W Revision	A.10.00

De-emphasis (FM and FM Stereo Demod measurement only)

Controls a single-pole filter, usually 6 dB/octave roll off, to counter intentional pre-emphasis in the transmitter. When the De-emphasis state is OFF the hardware digital filter is bypassed, otherwise the setting is applied

US75 is recommended for US commercial FM 75 μ s pre-emphasis.

The De-emphasis key only appears in the Meas Setup menu for the FM and FM Stereo Demod measurement. It is unavailable for the AM and PM measurements.

Key Path	Meas Setup, Filters
Remote Command	[:SENSe] :FM FMSTereo:DEEMphasis OFF US25 US50 US75 US750 [:SENSe] :FM FMSTereo:DEEMphasis?
Example	FM:DEEM US75 FM:DEEM?
Dependencies	Only available in FM and FM Stereo measurement. Unavailable for AM and PM
Preset	OFF
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.10.00

Off

Bypasses the De-emphasis filter.

Key Path	Meas Setup, Filters, De-emphasis
Example	FM:DEEM OFF
Readback	Off

Initial S/W Revision	Prior to A.02.00
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25 μ s

Sets the De-emphasis time constant to 25 μ s.

Key Path	Meas Setup, Filters, De-emphasis
Example	FM:DEEM US25
Readback	25 μ s
Initial S/W Revision	Prior to A.02.00

50 μ s

Sets the De-emphasis time constant to 50 μ s.

Key Path	Meas Setup, Filters, De-emphasis
Example	FM:DEEM US50
Readback	50 μ s
Initial S/W Revision	Prior to A.02.00

75 μ s

Sets the De-emphasis time constant to 75 μ s.

Key Path	Meas Setup, Filters, De-emphasis
Example	FM:DEEM US75
Readback	75 μ s
Initial S/W Revision	Prior to A.02.00

750 μ s

Sets the De-emphasis time constant to 750 μ sec.

Key Path	Meas Setup, Filters, De-emphasis
Example	FM:DEEM US750
Readback	750 μ s
Initial S/W Revision	Prior to A.02.00

Demod to Speaker

Controls whether a demodulated audio signal is connected to the speaker or not. This allows the demodulated audio to be turned off without completely disabling (muting) the instrument speaker. When

Meas Setup

the Analog Demod application is running, the demodulated signal can be heard from the speaker as long as the “Demod to Speaker” function is set to On.

This function is shared among all measurements in the mode, but not across other modes.

Key Path	Meas Setup
Remote Command	[:SENSE] :SPEaker [:STATE] ON OFF 1 0 [:SENSE] :SPEaker [:STATE] ?
Example	SPE OFF Disconnects demodulated audio from speaker circuit.
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

Auto Scale

Automatically sets many measurement parameters by pressing one button , based upon the current signal under test. The feature requires that the center frequency be set to the signal of interest, and works best on stable periodic signals. The measurement is preset at the beginning of the Auto Scale operation, with the exception that the user’s Center Frequency is maintained.

The signal is analyzed using an Occupied Bandwidth measurement to automatically set the RF Spectrum Span and Channel Bandwidth to good values. Once this is done, the software examines the demodulated signal and appropriately sets the Sweep Time and Demod Waveform Scale/Div.

There are no configurable parameters for Auto Scale. The function is pre-configured to work with most real-world use cases.

This key is not valid in the FM Stereo measurement.

Key Path	Meas Setup
Remote Command	[:SENSE] :AUToscale
Example	AUT
Initial S/W Revision	Prior to A.02.00

Advanced

This key and sub menu is only valid in the FM Stereo measurement. Accesses a menu to specify advanced settings for the FM Stereo measurement.

Key Path	Meas Setup
Initial S/W Revision	A.10.00

BLER Block Count

Sets BLER Block Count. It is used to control the stop time of BLER Calculation. When the total block count exceeds the value of BLER Block Count for the first time, the calculation of BLER will stop.

Key Path	Meas Setup, Advanced
Remote Command	[:SENSe]: FMSTereo:BLER:COUNT <real> [:SENSe]: FMSTereo:BLER:COUNT?
Example	FMST:BLER:COUN 1.0e8 FMST:BLER:COUN?
Preset	1.0e8
State Saved	Saved in instrument state.
Min	1
Max	1.0e+307
Initial S/W Revision	A.10.00

Ref Deviation

Sets the FM reference deviation.

Key Path	Meas Setup, Advanced
Remote Command	[:SENSe]:FMSTereo:RDEviation <freq> [:SENSe]:FMSTereo:RDEviation?
Example	FMST:RDEV 75e3 FMST:RDEV?
Preset	75 kHz
State Saved	Saved in instrument state.
Min	15 kHz
Max	150 kHz
Initial S/W Revision	A.10.00

SINAD MPX BW

Sets the bandwidth of MPX signal to calculate SINAD.

Key Path	Meas Setup, Advanced
Remote Command	CALCulate:FMSTereo:MPX[:BANDwidth] <freq> CALCulate:FMSTereo:MPX[:BANDwidth]?

Meas Setup

Example	CALC:FMST:MPX 53e3 CALC:FMST:MPX?
Preset	53 kHz
State Saved	Saved in instrument state.
Min	0 kHz
Max	58 kHz
Initial S/W Revision	A.10.00

SINAD Mono BW

Sets the bandwidth of Mono signal to calculate SINAD.

Key Path	Meas Setup, Advanced
Remote Command	CALCulate:FMSTereo:MONO[:BANDwidth] <freq> CALCulate:FMSTereo:MONO[:BANDwidth]?
Example	CALC:FMST:MONO 16e3 CALC:FMST:MONO?
Preset	16 kHz
State Saved	Saved in instrument state.
Min	0 kHz
Max	16 kHz
Initial S/W Revision	A.10.00

Meas Preset

Returns the variables in the current measurement to their preset values.

Key Path	Meas Setup
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 [“More Information” on page 398](#)

Key Path:	Front panel key
Remote Command:	:INSTrument [:SElect] SA SEQAN EMI BASIC WCDMA EDGEgSM WIMAXOFDMA VSA PNOISE NFIGURE ADEMOD BT TDSCDMA CDMA2K CDMA1XEV LTE LTETDD DV B DTMB DCATV ISDBT CMMB CWLAN CWIMAXOFDM WIMAXFIXED IDE N RLC SCPI LC VSA89601 :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
Backwards Compatibility SCPI:	:INSTrument[:SElect] GSM provided for backwards compatibility. Mapped to EDGEgSM.
Backwards Compatibility SCPI:	:INSTrument[:SElect] SANalyzer provided for ESU compatibility. When this command is received, the analyzer aliases it to the following: INST:SEL SCPI LC This results in the analyzer being placed in SCPI Language Compatibility Mode, in order to emulate the ESU Spectrum Analyzer Mode.

Mode

Backwards Compatibility SCPI:	:INSTrument[:SElect] RECEiver provided for ESU compatibility. 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 Receiver Mode.
Initial S/W Revision:	Prior to A.02.00
Modified at S/W Revision:	A.10.01

Example:	:INST 'SA'
Notes:	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.
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 applications – 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 in the same order they appear in the Mode menu (if the order is not changed by the Configure Applications utility found in the **System, Power On** menu). See [“Detailed List of Modes” on page 404](#) for Mode details.

The Mode Number is the parameter for use with the :INSTRument:NSElect command. The Mode Parameter is the parameter for use with the :INSTRument[:SElect] command.

Mode	Mode Number	Mode Parameter
Spectrum Analyzer	1	SA
Sequence Analyzer	400	SEQAN
EMI Receiver	141	EMI
I/Q Analyzer (Basic)	8	BASIC
WCDMA with HSPA+	9	WCDMA
GSM/EDGE/EDGE Evo	13	EDGE GSM

Mode

Mode	Mode Number	Mode Parameter
802.16 OFDMA (WiMAX/WiBro)	75	WIMAXOFDMA
Vector Signal Analyzer (VXA)	100	VSA
Phase Noise	14	PNOISE
Noise Figure	219	NFIGURE
Analog Demod	234	ADEMODO
Bluetooth	228	BT
TD-SCDMA with HSPA/8PSK	211	TDSCDMA
cdma2000	10	CDMA2K
1xEV-DO	15	CDMA1XEV
LTE	102	LTE
LTE TDD	105	LTETDD
MSR	106	MSR
DVB-T/H with T2	235	DVB
DTMB (CTTB)	236	DTMB
Digital Cable TV	238	DCATV
ISDB-T	239	ISDBT
CMMB	240	CMMB
WLAN	217	WLAN
Combined WLAN	19	CWLAN
Combined Fixed WiMAX	81	CWIMAXOFDM
802.16 OFDM (Fixed WiMAX)	104	WIMAXFIXED
iDEN/WiDEN/MotoTalk	103	IDEN
Remote Language Compatibility	266	RLC
SCPI Language Compatibility	270	SCPILC
89601 VSA	101	VSA89601

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"
Backwards Compatibility Notes:	VSA (E4406A) :INSTrument:CATalog? returned a list of installed INSTrument:SELECT items as a comma separated list of string values: "BASIC","GSM","EDGE GSM","CDMA","NADC","PDC","WCDMA","CDMA2K","CDMA1XEV","IDEN","WIDEN","WLAN","SERVICE" X-Series uses the ESA/PSA compatible query of a string contain comma separated values: "SA,PNOISE,NFIGURE,BASIC,CDMA,CDMA2K,WCDMA,CDMA1XEV,EDGE GSM,GSM,NADC,PDC,TDSCDMA,DMODULATION,WLAN"
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]?
------------------------	---------------------------------------

Mode

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:COUNT?
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'

Mode

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 by a Preset
State Saved:	Not saved in instrument state.
Initial S/W Revision:	Prior to A.02.00

Detailed List of Modes

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

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

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

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

Mode

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

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM PM (phase), and FM Stereo/RDS 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 ADEMOM 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

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
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Example:	INST:SEL CDMA2K INST:NSEL 10
Initial S/W Revision:	Prior to A.02.00

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

Mode

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

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

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

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

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

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

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.

Mode

Key Path:	Mode
Example:	INST:SEL BASIC INST:NSEL 8
Initial S/W Revision:	Prior to A.02.00

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

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

MSR

Selects the MSR mode. The MSR mode makes several measurements for Cellular Communication devices that can be configured with multiple radio formats simultaneously following the 3GPP standard of Multi-Standard Radio, including GSM/EDGE, WCDMA/HSPA+ and LTE.

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 MSR INST:NSEL 106
Initial S/W Revision:	A.10.01

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 INST:NSEL 219
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

Mode

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 SCPI LC Or INST:NSEL 270
Initial S/W Revision:	A.06.00

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

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

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

Mode

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ 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

WLAN

Selects the WLAN 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 WLAN INST:NSEL 217
Initial S/W Revision:	A.10.01

Global Settings

Opens up a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all Modes 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

The Mode Setup menu contains setup functions that are global across the entire Mode. These functions are independent of which measurement is currently running - they are global to all measurements in the mode, or "Meas Global." The Mode Setup functions are not the only Meas Global functions in the analyzer; for example, the Trigger Setup functions are Meas Global, and there are even Mode Global functions (that is, the same for all Modes) in the Input/Output menu, but the fact that they are all Meas Global is a distinguishing characteristic of the Mode Setup functions.

The Mode Setup menu also contains the **Restore Mode Defaults** key. Most Meas Global functions are restored to their preset values by **Mode Preset**, however some variables are more persistent and are not preset until the **Restore Mode Defaults** key is pressed.

There are also a few Meas Global variables (for example, Global Center Frequency) that can be switched to be Mode Global, that is, the same for all modes. The keys under the Global Settings key control whether these variables are Mode Global or not.

In the Spectrum Analyzer mode, the Mode Setup functions include which radio standard and/or EMC standard is in use and how it is configured. A set of CISPR EMC presets is available as well.

The EMC keys require either the N6141A or W6141A application or Option EMC to be installed and licensed.

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

Radio Standard

Allows you to specify the radio standard to be used. Spectrum Analyzer mode supports many radio standards. You can select the desired radio standard using the **Radio Std** key.

Key Path	Mode Setup
Scope	Meas Global
Remote Command	[:SENSE] :RADio:STANdard[:SElect] NONE JSTD IS95a IS97D IS98D GSM W3GPP CDMA2000MC1 C2000 1X NADC PDC BLUETOOTH TETRA WL802DOT11A WL802DOT11B WL8 02DOT11G HIPERLAN2 DVBTLSN DVBTGPN DVBTIPN FCC15 SDMBSE UWBINDOOR [:SENSE] :RADio:STANdard[:SElect]?
Example	RAD:STAN NONE RAD:STAN?
Couplings	By changing the radio standard, the measurement parameters will be automatically set to an appropriate default value.
State Saved	Saved in instrument state

Mode Setup

Range	None IS-95A J-STD-008 IS-97D/98D GSM/EDGE 3GPP W-CDMA cdma2000 1x NADC PDC Bluetooth TETRA W-LAN DVB-T FCC Part 15 Subpart F S-DMB System E UWB Indoor
Initial S/W Revision	Prior to A.02.00

Note that not every measurement in the Spectrum Analyzer mode is available with every standard. The chart below describes which measurements are available with each radio standard.

	None	IS-95A	J-STD-008	IS-97D/98D	GSM/EDGE	3GPP W-CDMA	cdma2000 1x	NADC	PDC	Bluetooth	TETRA	FCC Part 15 Subpart F	W-LAN 802.11a	W-LAN 802.11b	W-LAN 802.11g	W-LAN HiperLAN/2	DVB-T L/SECAM/NICAM	DVB-T G/PAL/NICAM	DVB-T I/PAL/NICAM	S-DMB System E	UWB Indoor	
Swept SA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Channel Power	X	X	X	X		X	X	X	X		X						X	X	X	X		
Occupied BW	X	X	X	X		X	X	X	X												X	
ACP	X	X	X	X		X	X	X	X		X										X	
Power Stat CCDF	X	X	X	X	X	X	X	X	X	X							X	X	X			
Burst Power	X	X	X		X	X	X	X	X	X												
Spurious Emission	X											X										X
Spectrum Emission Mask	X					X							X	X	X	X						

The tables below give the setting used for each standard:

None	
IBW	2MHz
Span	3MHz
RBW	Auto rules
VBW	Auto rules
IS-95A, J-STD-008, IS-97D/98D, cdma2000	
IBW	1.23MHz
Span	1.845MHz
RBW	24kHz
VBW	Auto rules

3GPP W-CDMA	
IBW	5MHz
Span	7.5MHz
RBW	240kHz
VBW	Auto rules
RRC Filter	Off
RRC Filter Alpha	0.22
NADC	
IBW	32.8kHz
Span	49.2kHz
RBW	1.2kHz
VBW	Auto rules
PDC	
IBW	21kHz
Span	31.5kHz
RBW	6.2kHz
VBW	Auto rules
TETRA	
IBW	18kHz
Span	27kHz
RBW	1.2kHz
VBW	Auto rules
RRC Filter	On
RRC Filter Alpha	0.35
DVB-T L/SECAM/NICAM, G/PAL/NICAM, I/PAL/NICAM	
IBW	7.61MHz
Span	24MHz
RBW	3.9kHz

Mode Setup

VBW	Auto rules
Sweep Points	8001
S-DMB System E	
IBW	25MHz
Span	37.5MHz
RBW	360kHz
VBW	Auto rules
RRC Filter	Off
RRC Filter Alpha	0.22

Some standards are used by only one or two measurements, and their settings are documented in those measurements. These are:

GSM/EDGE – used only in CCDF and Burst Power

Bluetooth - used only in CCDF and Burst Power

WLAN - used only in SEM

FCC Part15 - used only in Spurious Emissions

UWB Inband - used only in Spurious Emissions

Device

Allows you to specify the device to be used. This key appears in the Setup menu of most of the Radio Stds. It is a global setting that affects the Device selection, between Mobile (MS) and Base Station (BTS) settings, for all relevant Power Suite measurements.

Key Path	Mode Setup, Radio Std
Scope	Meas Global
Remote Command	[:SENSE]:RADio:STANdard:DEVIce BTS MS [:SENSE]:RADio:STANdard:DEVIce?
Example	RAD:STAN:DEV MS RAD:STAN:DEV?
Preset	BTS
State Saved	Saved in instrument state
Range	BTS MS
Initial S/W Revision	Prior to A.02.00

IS-95A

Sets the specific parameters for the selected measurement appropriate for industry standard IS-95A. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN IS95
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

J-STD-008

Sets the specific parameters for the selected measurement appropriate for industry standard J-STD-008. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN JSTD
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

IS-97D/98D

Sets the specific parameters for the selected measurement appropriate for industry standard IS-97D/98D. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN IS97D :RAD:STAN IS98D :RAD:STAN IS95C
Notes	Regardless of whether IS97D, IS98D or IS95C is used to select this standard, the query always returns IS97D
Initial S/W Revision	Prior to A.02.00

Mode Setup

Band Class

This function is only available when you have selected the standard: IS-97D/98D. It enables you to select the band class.

Key Path	Mode Setup, Radio Std, IS-97D/98D, IS-97D/98D
Scope	Meas Global
Remote Command	[:SENSe]:RADio:STANdard:BAND:CLASs BC0 BC1 [:SENSe]:RADio:STANdard:BAND:CLASs?
Example	RAD:STAN:BAND:CLAS BC0 RAD:STAN:BAND:CLAS?
Preset	BC0
State Saved	Saved in instrument state
Range	0 (800 MHz Band) 1 (1900 MHz Band)
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

GSM/EDGE

Sets the specific parameters for the selected measurement appropriate for industry standard GSM/EDGE. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN GSM
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

3GPP W-CDMA

Sets the specific parameters for the selected measurement appropriate for industry standard 3GPP W-CDMA. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN W3GPP

Initial S/W Revision	Prior to A.02.00
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Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

Cdma2000 1x

Sets the specific parameters for the selected measurement appropriate for industry standard cdma2000–1x. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN CDMA20001X :RAD:STAN CDMA2000MC1
Notes	Regardless of whether CDMA20001X or CDMA2000MC1 is used to select this standard, the query always returns CDMA2001X
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

NADC

Sets the specific parameters for the selected measurement appropriate for industry standard NADC. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN NADC
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

PDC

Sets the specific parameters for the selected measurement appropriate for industry standard PDC. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
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Mode Setup

Example	:RAD:STAN PDC
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

Bluetooth

Sets the specific parameters for the selected measurement appropriate for industry standard Bluetooth™. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN BLUE
Initial S/W Revision	Prior to A.02.00

Std Setup

Sets the packet type for the Bluetooth measurement

Key Path	Mode Setup, Radio Std, Bluetooth
Scope	Meas Global
Remote Command	[:SENSE]:RADio:STANdard:PACKet DH1 DH3 DH5 [:SENSE]:RADio:STANdard:PACKet?
Example	RAD:STAN:PACK DH1 RAD:STAN:PACK?
Notes	The packet length is DH1 -> 366 μ s DH3 -> 1622 μ s DH5 -> 2870 μ s
Preset	DH1
State Saved	Saved in instrument state
Range	DH1 DH3 DH5
Initial S/W Revision	Prior to A.02.00

TETRA

Sets the specific parameters for the selected measurement appropriate for industry standard TETRA. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN TETR
Initial S/W Revision	Prior to A.02.00

Device

Operation of this key is identical for many locations in this measurement. For details about this key, see [“Device” on page 420](#).

W-LAN

Accesses the W-LAN radio standards key menu to enable you to select a W-LAN standard. Selecting a W-LAN standard modifies spectrum analyzer settings for the measurement activated under the Meas menu. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN WL802DOT11A 802.11a :RAD:STAN WL802DOT11B 802.11b :RAD:STAN WL802DOT11G 802.11g :RAD:STAN HIPERLAN2 HiperLAN/2
Range	802.11a 802.11b 802.11g HiperLAN/2
Initial S/W Revision	Prior to A.02.00

DVB-T

Accesses the DVB-T key menu to enable you to select a DVB-T mask filtering standard. Selecting a DVB-T filtering standard modifies spectrum analyzer settings for the measurement activated under the Meas menu. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN DVBTLN L/SECAM/NICAM :RAD:STAN DVBTGPN G/PAL/NICAM :RAD:STAN DVBTIPN I/PAL/NICAM
Range	L/SECAM/NICAM G/PAL/NICAM I/PAL/NICAM
Initial S/W Revision	Prior to A.02.00

FCC Part 15 Subpart F

Sets the specific parameters for the selected measurement appropriate for unlicensed devices. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Mode Setup

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN FCC15
Initial S/W Revision	Prior to A.02.00

S-DMB System E

Sets the specific parameters for the selected measurement appropriate for industry standard System E. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN SDMBSE
Initial S/W Revision	Prior to A.02.00

UWB Indoor

Sets the specific parameters for the selected measurement appropriate for UWB Indoor standard. For the available measurements with this radio standard, see the chart in the [“Radio Standard” on page 417](#) section.

Key Path	Mode Setup, Radio Std
Example	:RAD:STAN UWBINDOOR
Initial S/W Revision	Prior to A.02.00

Enable Non-Std Measurements

Allows you to specify whether all measurements and radio standards are enabled or not. In default, Enable All Measurements is set to No, so you can select only the valid combination of preset available standard and measurement. Any measurement or standard that make the combination that have no valid preset value are grayed out. When Enable Non-Std Measurements is set to Yes, all measurements and standard selections are enabled so that you can choose any.

If you select an unavailable measurement or unavailable radio standard using the Enable Non-Std Measurement key, the measurement results may not conform to the selected standard.

Key Path	Mode Setup
Scope	Meas Global
Remote Command	[:SENSE] :RADio :STANdard :EAMeas YES NO [:SENSE] :RADio :STANdard :EAMeas ?
Example	RAD:STAN:EAM YES RAD:STAN:EAM ?
Preset	NO

State Saved	Saved in instrument state
Range	Yes No
Initial S/W Revision	Prior to A.02.00

EMC Standard

Only appears with the N6141A or W6141A application or Option EMC installed and licensed.

This menu allows you to select None (no EMI standard), CISPR (CISPR 16–1–1), and MIL (MIL–461A). Each standard has a unique way of determining the couplings between detectors and RBWs, as well as its own set of available RBW's.

Note that Auto Couple will have no effect on the EMC Standard setting.

Key Path	Mode Setup
Scope	Meas Global
Remote Command	[:SENSE] :EMC :STANDARD [:SELEct] NONE CISPr MIL [:SENSe] :EMC :STANDARD [:SELEct] ?
Example	:EMC:STAN CISP
Dependencies	When the EMC Standard changes to CISPR or MIL , the RBW Control key is grayed out. The Filter Type is then always Gaussian; the Filter BW is chosen as appropriate for the filter and the standard. When the EMC Standard changes to None, the Filter Type is set to Gaussian and the Filter BW is set to –3 dB. Only appears with the N6141A or W6141A application or Option EMC installed and licensed. If not, the SCPI command generates a message.
Couplings	The auto rules for detector select Peak for any trace in Auto when the EMI Standard is CISPR or MIL. Choosing a CISPR detector or CISPR presets automatically picks the CISPR Standard, however switching from a CISPR detector has no impact on EMC Standard.
State Saved	Saved in instrument state
Initial S/W Revision	A.02.00

Remote Command	[:SENSE] :BANDwidth BWIDth : [:RESolution] :MODE EMI SAN OFF [:SENSE] :BANDwidth BWIDth : [:RESolution] :MODE?
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Mode Setup

Notes	This command is mapped to the EMC:STANdard command with the following mappings: EMI=>CISPr, SAN =>None, and if the legacy command comes in with the OFF parameter, it sets EMC Standard to None and Res BW to Manual . The query returns “OFF” if Res BW in Manual, otherwise “EMI” if EMC Standard is CISPR or MIL, and “SAN” if EMC Standard is None
Dependencies	Only appears with the N6141A or W6141A applications or Option EMC installed and licensed. If not, the SCPI command generates a message.
Preset	SAN
Initial S/W Revision	A.02.00

CISPR presets

Only appears with the N6141A or W6141A application or Option EMC installed and licensed.

This key lets you easily set up the analyzer for CISPR measurements.

This topic contains the following sections:

[“Band Setup” on page 428](#)

[“Sweep Points in Band E” on page 429](#)

[“Number of points in band E” on page 429](#)

Key Path	Mode Setup, CISPR Presets
Remote Command	[:SENSE] :FREQuency:CISPr: BAND A B C CD D E
Example	FREQ:CISPR:BAND A activates the CISPR preset for Band A
Couplings	Selecting a CISPR preset sets the EMI Standard to CISPR, performs an autocouple all, and sets the Y Axis Unit to dB μ V (unless dBuV is grayed out, in which case it will leave the Y Axis Unit unaffected).
Initial S/W Revision	A.02.00

Band Setup

The number of sweep points for each band is roughly calculated by the formula $2 * (\text{Stop Frequency} - \text{Start Frequency}) / \text{RBW}$, so that you get two points for every RBW width. This number is increased as necessary to make it an odd integer, so that you always end up with an odd number of sweep points. This is desirable so that you always have a sweep point at the Center Freq.

Band Setup	Band A	Band B	Band C	Band D	Band C&D	Band E
Start Frequency	9kHz	150kHz	30MHz	300MHz	30MHz	1GHz

Band Setup	Band A	Band B	Band C	Band D	Band C&D	Band E
Stop Frequency	150kHz	30MHz	300MHz	1GHz	1GHz	Max freq of analyzer or 18 GHz, whichever is lower
Sweep Point	1411	6635	4501	11667	16167	See below

The table above is based on the fact that the Res BW autocouples to the center frequency when in the CISPR EMC standard as follows:

Center Frequency	RBW
<150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
>30 MHz to 1 GHz	120 kHz
>1 GHz	1 MHz

Sweep Points in Band E

Note that the Res BW will be 1 MHz in band E. The number of sweep points for band E is dependent on the maximum frequency of the analyzer. The formula above gives the following values for Band E:

Number of points in band E

Option	Max Analyzer Freq(nominal)	Width of Band E	Number of Points
503 (3.0 GHz models)	3.0 GHz	2.0 GHz	4001
503 (3.6 GHz models)	3.6 GHz	2.6 GHz	5201
507 (7 GHz models)	7.0 GHz	6.0 GHz	12001
507 (7.5 GHz models)	7.5 GHz	6.5 GHz	13001
508	8.4 GHz	7.4 GHz	14801
513	13.2 GHz	12.2 GHz	24401
526 (and above)	26.5 GHz	17 GHz	34001

Mode Setup

Noise Reduction

Noise Reduction accesses a menu for configuring the noise compensation of the instrument. This menu only appears in models that support Noise Reduction.

Key Path	Mode Setup
Initial S/W Revision	A.04.00

Noise Floor Extension

Turns on the **Noise Floor Extension** function. When this function is On, the expected noise power of the analyzer (derived from a factory calibration) is subtracted from the trace data. When **Noise Floor Extension** is On, it will usually reduce the apparent noise level by about 10 dB in low band, and 8 dB in high band (>~3.6 GHz).

Noise Floor Extension works with any RBW, VBW, detector, any setting of Average Type, any amount of trace averaging, and any signal type. It is ineffective when the trace is not smoothed (smoothing processes include narrow VBWs, trace averaging, and long sweep times with the detector set to Average or Peak). It works best with extreme amounts of smoothing. It works best with the average detector, with the Average Type set to Power.

NOTE Noise Floor Extensions has no effect unless the RF Input is selected, therefore it does nothing when External Mixing is selected.

In those cases where the cancellation is ineffective, it nonetheless has no undesirable side-effects. There is no significant speed impact to having **Noise Floor Extension** on.

The best accuracy is achieved when substantial smoothing occurs in each point before trace averaging. Thus, when using the average detector, results are better with long sweep times and fewer trace averages. When using the sample detector, the VBW filter should be set narrow with less trace averaging, instead of a wide VBW filter with more trace averaging.

See [“More Information” on page 431](#)

Key Path	Mode Setup, Noise Reduction
Scope	Meas Global
Remote Command	[:SENSe]:CORRection:NOISe:FLOOr ON OFF 1 0 [:SENSe]:CORRection:NOISe:FLOOr?
Example	CORR:NOIS:FLO ON
Dependencies	In models that do not support Noise Floor Extension, the SCPI command will be accepted without error but will have no effect.
Preset	Unaffected by Mode Preset. Turned off by Restore Mode Defaults.
State Saved	No
Initial S/W Revision	A.04.00

More Information

The analyzer is characterized in the factory (or during a field calibration) with a model of the noise, referred to the input mixer, versus frequency in each band and path combination. Bands are 0 (low band) and 1 through 4 (high band) in a 26.5 GHz instrument, for example. Paths include normal paths, preamp paths, the electronic attenuator, etc.

In most band/path combinations, the noise can be well characterized based on just two parameters and the analyzer frequency response before compensation for frequency-dependent losses.

After the noise density at the input mixer is estimated, the effects of the input attenuator, RBW, detector, etc. are computed to get the estimated input-port-referred noise level.

In the simplest case, the measured power (signal plus analyzer noise) in each display point (bucket) is compensated by subtracting the estimated noise power, leaving just the signal power. This is the operation when the detector is Average and the Average Type is set to Power.

In other cases, operation is often not quite as good but still highly effective. With peak detection, the noise floor is estimated based on the RBW and the duration of the bucket using the same equations used in the noise marker function. The voltage of the noise is subtracted from the voltage of the observed signal-plus-noise measurement to compute the estimated signal voltage. The peak detector is one example of processing that varies with detector to give good estimates of the signal level without the analyzer noise.

For best operation, the average detector and the power scale are recommended, as already stated. Peak detection for pulsed-RF can still give excellent effectiveness. FFT analysis does not work well, and does not do NFE well, with pulsed-RF signals, so this combination is not recommended. Negative peak detection is not very useful, either. Sample detection works well, but is never better than the average detector because it doesn't smooth as well. The Normal detector is a combination of peak and negative peak behaviors, and works about as well as these.

For best operation, extreme smoothing is desirable, as already stated. Using narrow VBWs works well, but using very long bucket durations and the average detector works best. Reducing the number of trace points will make the buckets longer.

For best operation, the power scale (Average Type = Power) is optimum. When making CW measurements in the presence of noise without NFE, averaging on the decibel scale has the advantage of reducing the effect of noise. When using NFE, the NFE does an even better job than using the log scale ever could. Using NFE with the log scale is not synergistic, though; NFE with the power scale works a little better than NFE with log averaging type.

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

See [“Restore Mode Defaults” on page 98](#) under “Preset” in the System Functions section, for more information.

Mode Setup

Global Settings

Opens a menu that allows you to switch certain Meas Global parameters to a Mode Global state.

See [“Global Settings” on page 414](#) under Mode Setup in the Common Measurement Functions section for more information.

Peak Search

Displays the Peak Search menu and places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

Key Path	Front-panel key
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:MAXimum
Example	CALC:AM:MARK2:MAX
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the current marker value. If there is no valid peak lower than the current marker position, an error is generated and the marker is not moved.

If the selected marker was off, then it is turned on as a normal marker and a peak search is performed. In Analog Demod, the Peak Threshold and Peak Excursion functions are both OFF. If there is no valid peak, an error is generated and the marker is not moved. If the selected marker was off, then it is turned on as a normal marker and a peak search is performed.

Key Path	Peak Search
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:MAXimum: NEXT
Example	CALC:AM:MARK2:MAX:NEXT selects marker 2 and moves it to the peak that is closest in amplitude to the current peak, but the next lower value.
Remote Command Notes	Sending this command selects the specified marker
State Saved	Not part of instrument saved state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if on a time domain trace) differences between the highest and lowest y-axis value. It places the selected marker on the minimum value on its selected trace and it places that marker's reference marker on the peak of its selected trace. This function turns on the reference marker and sets its mode to **Fixed** if it is not already on. (These markers may be on two different traces.)

Peak Search

When peak-to-peak search is successful, a message is displayed on the message line.

If the selected marker is off, a delta type marker is turned on and the peak-to-peak search is done. If the selected marker is on, but it is not a delta marker, then it is changed to delta, which turns on the reference marker if needed. It then performs the peak-to-peak function.

Key Path	Peak Search
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:PTPeak
Example	CALC:AM:MARK:PTP CALC:AM:MARK:Y? queries the delta amplitude value for marker 1.
Notes	Turns on the Marker Δ active function.
Remote Command Notes	Sending this command selects the specified marker.
Couplings	Selected marker becomes a delta marker if not already in delta mode..
State Saved	Not part of instrument saved state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Min Search

Moves the selected marker to the minimum y-axis value on the current trace. If the selected marker is off, it is turned on before the minimum search is performed.

Key Path	Peak Search
Remote Command	:CALCulate:AM FM PM FMSTereo:MARKer[1] 2 ...12:MINimum
Example	CALC:AM:MARK:MIN selects marker 1 and moves it to the minimum amplitude value.
Remote Command Notes	Sending this command selects the specified marker.
State Saved	Not part of instrument saved state
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

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 104.

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 EDGE GSM PN
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.

Recall

Dependencies:	<p>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.</p> <p>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.</p> <p>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.</p> <p>This key does not appear unless you have the proper option installed in your instrument.</p> <p>This command will generate an “Option not available” error unless you have the proper option installed in your instrument.</p>
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:	<p>:MMEMory:LOAD:CORRection ANTenna CABLE OTHer USER, <filename></p> <p>For backwards compatibility, ANTenna maps to 1, CABLE maps to 2, OTHER maps to 3 and USER maps to 4</p>
Initial S/W Revision:	A.02.00

Amplitude Correction

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
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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] :INITiate:RESTART
Example:	:INIT:IMM :INIT:REST
Notes:	:INITiate:RESTART and :INITiate:IMMEDIATE 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.
Backwards Compatibility Notes:	For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write , but did not restart Max Hold and Min Hold . In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average , but Max Hold and Min Hold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation.
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

Restart

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

Accesses a menu that provides the save type options. The Analog Demod measurements will support the following:

Save and Recall of state only.

Save of measurement results

The Analog Demod measurements will NOT support save or recall of trace + state.

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

Export/Import Data

The Analog Demod Mode Export Data options include Traces and Measurement Results.

Key Path	Save, Data
Remote Command Notes	No SCPI command directly controls the Data Type that this key controls. The Data Type is included as part of the MMEM:STORe commands.
Preset	Trace; is not affected by a Preset, but is reset during Restore Mode Defaults and survives Power cycles.
State Saved	Saved in instrument state.
Readback line	1-of-N selection
Initial S/W Revision	Prior to A.02.00

AM/FM/PM Trace

Selects Trace as the data type to be exported with this save request. This key brings up the Trace menu that enables you to select one of the following traces:

- RF Spectrum (RFSPectrum)
- Demod (DEMod)
- Demod Avg (DAverage)
- Demod Max (DMAXimum)
- Demod Min (DMINimum)
- AF Spectrum (AFSPectrum)

Once you select a trace, the menu returns back to the Data menu and the name of the selected trace is annotated on the Trace key. Now that 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 Data menu.

If the Demod Min trace, Demod Max trace, or Demod Avg trace is exported when the Average/Hold

Save

Num feature is turned off, the resulting data will be default values.

The trace data file is a .csv file containing the data for one trace, suitable for import into spreadsheet software. There is a header block , followed by metadata that includes the parameters necessary to recreate the measurement, followed by a DATA block that contains the x,y data for the specified trace. Each line in the metadata includes the parameter, followed by a comma, followed by the parameter value. The metadata includes the following information:

Parameter	
Measurement †	AM FM PM
Trace	AF Spectrum RF Spectrum Demod Demod Ave Demod Min Demod Max
X Axis Unit	Hz S
Y Axis Unit	dBm % Hz Rad
Center Frequency †	[units of Hz]
Channel BW †	[units of Hz]
Average State †	Off On
Average Count	#
HPF/BPF †	Off HPF20 HPF50 HPF300 CCITT
LPF †	Off LPF300 LPF3K LPF15K LPF30K LPF80K LPF300K
Attenuation †	[units of dB]
RF Coupling †	AC DC
Ref Level	[units of Y Axis Unit]
RF Span †	[units of Hz]
RF Res Bandwidth †	[units of Hz]
Sweep Time †	[units of S]
AF Start Freq	[units of Hz]
AF Stop Freq †	[units of Hz]
AF Res Bandwidth †	[units of Hz]
Trigger Source †	Off Ext1 Ext2
Trigger Level †	[units of V]
Trigger Slope †	Positive Negative
Trigger Delay †	[units of S]
PreAmp State †	Off On
PreAmp Band †	Low High

Parameter	
Input Z Correction †	50 75
RF Calibrator	Off 50 MHz 4.8 GHz Comb
External Gain	[units of dB]

† Changing this parameter requires a measurement restart.

Note that all metadata is stored for each trace. After the metadata, the keyword DATA occurs on its own line, followed by the data (one X, Y pair per line).

Key Path	Save, Data
Notes	The first key press selects traces out of the 1-of-N file type options. The second key press brings up the Traces menu so you can select which trace you want to export.
Preset	RF Spectrum; is not affected by a Preset, but is reset during Restore Mode Defaults and survives Power cycles.
State Saved	Saved in instrument state.
Readback	Selected Trace table
Readback line	RF Spectrum, Demod, Demod Avg, Demod Max, Demod Min, AF Spectrum
Initial S/W Revision	Prior to A.02.00

FM Stereo Trace

Selects Trace as the data type to be exported with this save request. This key brings up the Trace menu that enables you to select one of the following traces:

- RF Spectrum(RFSpectrum)
- MPX Demod(DEMod)
- MPX Demod Avg(DAVerage)
- MPX Demod Max(DMAXimum)
- MPX Demod Min(DMINimum)
- MPX Spectrum(AFSpectrum)
- Mono Demod(MDEMod)
- Mono Demod Avg(MDAVerage)
- Mono Demod Max(MMAXimum)
- Mono Demod Min(MMINimum)
- Mono Spectrum(MSPpectrum)
- Stereo Demod(SDEMod)

Save

- Stereo Demod Avg(SDAverage)
- Stereo Demod Max(SMAXimum)
- Stereo Demod Min(SMINimum)
- Stereo Spectrum(SSpectrum)
- Left Demod(LDEMod)
- Left Demod Avg(LDAverage)
- Left Demod Max(LMAXimum)
- Left Demod Min(LMINimum)
- Left Spectrum(LSpectrum)
- Right Demod(RDEMod)
- Right Demod Avg(RDAverage)
- Right Demod Max(RMAXimum)
- Right Demod Min(RMINimum)
- Right Spectrum(RSPpectrum)

Once you select a trace, the menu returns back to the Data menu and the name of the selected trace is annotated on the Trace key. Now that 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 Data menu.

If the Demod Min trace, Demod Max trace, or Demod Avg trace is exported when the Average/Hold Num feature is turned off, the resulting data will be default values.

The trace data file is a .csv file containing the data for one trace, suitable for import into spreadsheet software. There is a header block, followed by metadata that includes the parameters necessary to recreate the measurement, followed by a DATA block that contains the x,y data for the specified trace. Each line in the metadata includes the parameter, followed by a comma, followed by the parameter value. The metadata includes the following information:

Parameter	
Measurement †	FM Stereo
Trace	RF Spectrum MPX Demod MPX Demod Ave MPX Demod Min MPX Demod Max MPX Spectrum Mono Demod Mono Demod Ave Mono Demod Min Mono Demod Max Mono Spectrum Stereo Demod Stereo Demod Ave Stereo Demod Min Stereo Demod Max Stereo Spectrum Left Demod Left Demod Ave Left Demod Min Left Demod Max Left Spectrum Right Demod Right Demod Ave Right Demod Min Right Demod Max Right Spectrum
X Axis Unit	Hz S

Parameter	
Y Axis Unit	dBm % Hz Rad
Center Frequency †	[units of Hz]
Channel BW †	[units of Hz]
Average State †	Off On
Average Count	#
HPF/BPF †	Off HPF20 HPF50 HPF300 CCITT A-Weighted
LPF †	Off LPF300 LPF3K LPF15K LPF30K LPF80K LPF300K
Attenuation †	[units of dB]
RF Coupling †	AC DC
Ref Level	[units of Y Axis Unit]
RF Span †	[units of Hz]
RF Res Bandwidth †	[units of Hz]
Sweep Time †	[units of S]
AF Start Freq	[units of Hz]
AF Stop Freq †	[units of Hz]
AF Res Bandwidth †	[units of Hz]
Trigger Source †	Off Ext1 Ext2
Trigger Level †	[units of V]
Trigger Slope †	Positive Negative
Trigger Delay †	[units of S]
PreAmp State †	Off On
PreAmp Band †	Low High
Input Z Correction †	50 75
RF Calibrator	Off 50 MHz 4.8 GHz Comb
External Gain	[units of dB]

† Changing this parameter requires a measurement restart.

Note that all metadata is stored for each trace. After the metadata, the keyword DATA occurs on its own line, followed by the data (one X, Y pair per line).

Key Path	Save, Data
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Save

Preset	RF Spectrum; is not affected by a Preset, but is reset during Restore Mode Defaults and survives Power cycles.
State Saved	Saved in instrument state.
Readback	Selected Trace table
Readback line	RF Spectrum, MPX Demod, MPX Demod Avg, MPX Demod Max, MPX Demod Min, MPX Spectrum, Mono Demod, Mono Demod Avg, Mono Demod Max, Mono Demod Min, Mono Spectrum, Stereo Demod, Stereo Demod Avg, Stereo Demod Max, Stereo Demod Min, Stereo Spectrum, Left Demod, Left Demod Avg, Left Demod Max, Left Demod Min, Left Spectrum, Right Demod, Right Demod Avg, Right Demod Max, Right Demod Min, Right Spectrum
Initial S/W Revision	A.10.00

Measurement Results

The file format of the .csv Measurement Results file is shown in the table below. If any metrics are off, or there is no valid value, they will appear as not a number (9.91 e37)

<i>AM</i>	<i>FM and PM</i>
Carrier Power	Carrier Power
Carrier Frequency Error (0)	Carrier Frequency Error
Modulation Rate	Modulation Rate
SINAD value	SINAD value
Distortion/Total Voltage (rms)	Distortion/Total Voltage (rms)
Total Harmonic Distortion	Total Harmonic Distortion
Mod Depth (Peak+)	Deviation (Peak+)
Mod Depth (Peak-)	Deviation (Peak-)
Mod Depth (Pk-Pk)/2	Deviation (Pk-Pk)/2
Mod Depth (RMS)	Deviation (RMS)
Mod Depth (Peak+) Max Hold	Deviation (Peak+) Max Hold
Mod Depth (Peak-) Max Hold	Deviation (Peak-) Max Hold
Mod Depth (Pk-Pk)/2 Max Hold	Deviation (Pk-Pk)/2 Max Hold
Mod Depth (RMS) Max Hold	Deviation (RMS) Max Hold
RMS Ratio (only valid for Metrics Setting of RMS Ratio)	RMS Ratio (only valid for Metrics Setting of RMS Ratio)
Ratio Reference (only valid for Metrics Setting of RMS Ratio)	Ratio Reference (only valid for Metrics Setting of RMS Ratio)

For FM Stereo, the results are

RF Carrier Power, RF Carrier Frequency Error, 38 kHz Carrier Frequency Error, 38 kHz Carrier Phase Error, Left To Right, Mono To Stereo,

MPX SINAD value, MPX Distortion/Total Voltage (rms), MPX Deviation (Peak+), MPX Deviation (Peak-), MPX Deviation (Pk-Pk)/2, MPX Deviation (RMS), MPX Deviation (Peak+) Max Hold, MPX Deviation (Peak-) Max Hold, MPX Deviation (Pk-Pk)/2 Max Hold, MPX Deviation (RMS) Max Hold, MPX RMS Ratio (only valid for Metrics Setting of RMS Ratio), MPX Ratio Reference (only valid for Metrics Setting of RMS Ratio),

Mono Modulation Frequency, Mono SINAD value, Mono Distortion/Total Voltage (rms), Mono Deviation (Peak+), Mono Deviation (Peak-), Mono Deviation (Pk-Pk)/2, Mono Deviation (RMS), Mono Deviation (Peak+) Max Hold, Mono Deviation (Peak-) Max Hold, Mono Deviation (Pk-Pk)/2 Max Hold, Mono Deviation (RMS) Max Hold, Mono RMS Ratio (only valid for Metrics Setting of RMS Ratio), Mono Ratio Reference (only valid for Metrics Setting of RMS Ratio),

Stereo Modulation Frequency, Stereo Deviation (Peak+), Stereo Deviation (Peak-), Stereo Deviation (Pk-Pk)/2, Stereo Deviation (RMS), Stereo Deviation (Peak+) Max Hold, Stereo Deviation (Peak-) Max Hold, Stereo Deviation (Pk-Pk)/2 Max Hold, Stereo Deviation (RMS) Max Hold, Stereo RMS Ratio (only valid for Metrics Setting of RMS Ratio), Stereo Ratio Reference (only valid for Metrics Setting of RMS Ratio),

Left Modulation Frequency, Left SINAD value, Left Distortion/Total Voltage (rms), Left Total Harmonic Distortion, Left Deviation (Peak+), Left Deviation (Peak-), Left Deviation (Pk-Pk)/2, Left Deviation (RMS), Left Deviation (Peak+) Max Hold, Left Deviation (Peak-) Max Hold, Left Deviation (Pk-Pk)/2 Max Hold, Left Deviation (RMS) Max Hold, Left RMS Ratio (only valid for Metrics Setting of RMS Ratio), Left Ratio Reference (only valid for Metrics Setting of RMS Ratio),

Right Modulation Frequency, Right SINAD value, Right Distortion/Total Voltage (rms), Right Total Harmonic Distortion, Right Deviation (Peak+), Right Deviation (Peak-), Right Deviation (Pk-Pk)/2, Right Deviation (RMS), Right Deviation (Peak+) Max Hold, Right Deviation (Peak-) Max Hold, Right Deviation (Pk-Pk)/2 Max Hold, Right Deviation (RMS) Max Hold, Right RMS Ratio (only valid for Metrics Setting of RMS Ratio), Right Ratio Reference (only valid for Metrics Setting of RMS Ratio),

Pilot Modulation Frequency, Pilot Deviation (Peak+), Pilot Deviation (Peak-), Pilot Deviation (Pk-Pk)/2, Pilot Deviation (RMS), Pilot Deviation (Peak+) Max Hold, Pilot Deviation (Peak-) Max Hold, Pilot Deviation (Pk-Pk)/2 Max Hold, Pilot Deviation (RMS) Max Hold, Pilot RMS Ratio (only valid for Metrics Setting of RMS Ratio), Pilot Ratio Reference (only valid for Metrics Setting of RMS Ratio),

RDS Deviation (Peak+), RDS Deviation (Peak-), RDS Deviation (Pk-Pk)/2, RDS Deviation (RMS), RDS Deviation (Peak+) Max Hold, RDS Deviation (Peak-) Max Hold, RDS Deviation (Pk-Pk)/2 Max Hold, RDS Deviation (RMS) Max Hold, RDS RMS Ratio (only valid for Metrics Setting of RMS Ratio), RDS Ratio Reference (only valid for Metrics Setting of RMS Ratio), RDS Error Block Count, RDS Total Block Count, RDS BLER (Block Error Rate).

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

Save

Save As...

Accesses a menu that enables you to select the location where you can save the Data Type. 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 Data Type. The filename is filled in using the auto file naming algorithm for the specific Data Type and is highlighted. The “auto file name” feature automatically generates a file name for use when saving a file.

When you navigate to this selection, you have already determined that you are saving Data and now you want to specify to which file to direct the save.

When you first enter this dialog, the path in the Save In: field in this Save As dialog depends on the export data type from which you navigated. 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 Analog Demod Mode, 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:

My Documents\Analog Demod\data\traces

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

Save When a Save of a specific Data File is requested, the 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 an OK or you can cancel the request.

While the save is being performed, the floppy icon will show up in the settings bar near the Continuous/Single icon. After a register save completes, the corresponding register key annotation is updated with the date, time, and an advisory message that the file was saved appears in the message bar.

Remote Command	AM/FM/PM: :MMEMory:STORe:TRACe:DATA RFSpectrum DEMod DAverage DMAximum DMINimum AFSpectrum, <filename> FM Stereo: :MMEMory:STORe:TRACe:DATA RFSpectrum DEMod DAverage DMAximum DMINimum AFSpectrum MDEMod MDAaverage MMAXimum MMINimum MSpectrum SDEMod SDA Vaverage SMAximum SMINimum SSpectrum LDEMod LDAverage LMA Ximum LMINimum LSpectrum RDEMod RDAverage RMAximum RMIN imum RSpectrum,<filename>
Example	:MMEM:STOR:TRAC:DATA RRSP, “myRFSpectrum.csv” exports the RF Spectrum trace to the file myRFSpectrum.csv in the default path.

Remote Command Notes	<p>If the save is initiated through SCPI, and the file already exists, the file will be overwritten.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.</p>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Remote Command	<code>:MMEMory:STORe:RESults <filename></code>
Example	<p><code>:MMEM:STOR:RES "myResults.csv"</code></p> <p>saves the results from the current measurement to the file myResults.csv in the default path.</p>
Remote Command Notes	<p>If the save is initiated through SCPI, and the file already exists, the file will be overwritten.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.</p>

Save

Source

There are no menus under this key in the Analog Demod mode.

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

Source

SPAN X Scale

Activates and displays the Span function menu.

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

Span

Adjusts the Span of the RF Spectrum window.

Key Path	SPAN X Scale
Remote Command	[:SENSE] :AM FM PM FMSTereo :FREQuency :SPAN <freq> [:SENSE] :AM FM PM FMSTereo :FREQuency :SPAN?
Example	AM:FREQ:SPAN 2.122kHz AM:FREQ:SPAN?
Notes	Adjusts the Span of the RF Spectrum window.
Preset	= AM/FM/PM = 75 kHz = FMST = 500 kHz
State Saved	Saved in instrument state
Min	10 Hz
Max	Max Span is the same as max information bandwidth. This is normally 10 MHz, or 25 MHz if the analyzer has the wide bandwidth option licensed
Default Unit	Hz
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

SPAN X Scale

Sweep/Control

Activates a menu and selects **Sweep Time** as the active function. Sweep time is used by the Demod Waveform window, but this key is available in any view.

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

Demod Wfm Sweep Time

Selects the display length for the Demod Waveform window. This is commonly set to two sample lengths.

Key Path	Sweep/Control
Remote Command	[:SENSe] :AM FM PM FMSTereo:DWSweep:TIME <time> [:SENSe] :AM FM PM FMSTereo:DWSweep:TIME?
Example	AM:DWSW:TIME 50 ms AM:DWSW:TIME?
Preset	2 ms
State Saved	Saved in Instrument State
Min	1 μ s
Max	2 s
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Demod Time

Selects the minimum length of data acquisition used in demodulation. Increasing the demodulation time will result in more accurate metrics; reducing the demodulation time will result in a faster measurement.

The measurement might require more data than specified by the demodulation time. If the resolution bandwidth is low in the spectrum windows, or the demod waveform sweep time is high, then the data required for the measurement might be higher than the demodulation time.

If measurement speed is critical, make sure to increase the resolution bandwidth and reduce the demodulation waveform sweep time.

The Auto rules for the demodulation time will give the nominal specification performance if the sweep time is set to display two cycles of data.

Key Path	Sweep/Control
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Sweep/Control

Remote Command	<pre>[:SENSe]:AM FM PM FMSTereo:DEMod:TIME <time> [:SENSe]:AM FM PM FMSTereo:DEMod:TIME? [:SENSe]:AM FM PM:DEMod:TIME:AUTO OFF ON 0 1 [:SENSe]:AM FM PM:DEMod:TIME:AUTO?</pre>
Example	<pre>AM:DEM:TIME 50 ms AM:DEM:TIME?</pre>
Couplings	<p>When in Auto mode, the demodulation time depends on the demodulation waveform sweep time.</p> <p>Lower</p>
Preset	<pre>= AM/FM/PM = 72 ms = FMST = 280 ms ON</pre>
State Saved	Saved in instrument state
Min	1 μ s
Max	<pre>= AM/FM/PM =44 s = FMST = 1 s</pre>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.10.00

Trace/Detector

There are no menus under this key in the Analog Demod mode.

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). When in External Mixing, the analyzer uses the RF trigger source.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

See [“Trigger Source Presets” on page 461](#)

See [“RF Trigger Source” on page 464](#)

See [“I/Q Trigger Source” on page 465](#)

See [“More Information” on page 466](#)

Key Path	Front-panel key
Remote Command	<pre>:TRIGger:<measurement>[:SEQuence]:SOURce EXTErnal1 EXTErnal2 IMMediate LINE FRAMe RFBurst VIDeo IF ALARm LAN IQMag IDEMod QDEMod IINPut QINPut AIQMag T V :TRIGger:<measurement>[:SEQuence]:SOURce? where <measurement> is the measurement for which you wish to set the Source (blank for the Swept SA measurement)</pre>
Example	<pre>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 Swept SA (SANalyzer) measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword. Only send this form in the Spectrum Analyzer mode or you will get an Undefined Header error</pre>

Trigger

Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. See the “RF Trigger Source” on page 464 and “I/Q Trigger Source” on page 465 commands for detailed information on which trigger sources are available for each input.</p> <p>Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.</p> <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges and presets can vary from mode to mode.</p>
Dependencies	<p>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.</p>
Preset	See table below
Status Bits/OPC dependencies	<p>The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.</p>
Backwards Compatibility SCPI	<p>:TRIGger[:SEQuence]:SOURCe EXTernal</p> <p>For backward compatibility, the parameter EXTernal is mapped to EXTernal1</p>
Backwards Compatibility SCPI	<p>[:SENSe] : <measurement> : TRIGger : SOURce</p> <p>This backwards compatibility alias command is provided for ESA/PSA compatibility</p> <p>This backwards compatibility command does not apply to the Swept SA measurement, for that just use :TRIGger:SOURCe</p> <p>This backwards compatibility command does not apply to the monitor spectrum, log plot and spot frequency measurements</p>
Backwards Compatibility SCPI	<p>[:SENSe] : <measurement> : TRIGger : SOURce IF</p> <p>In earlier instruments, the parameter IF was used by apps for the video trigger, so using the IF parameter selects VIDEo triggering. Sending IF in the command causes VID to be returned to a query.</p>
Backwards Compatibility SCPI	<p>[:SENSe] : ACPR : TRIGger : SOURce</p> <p>This backwards Compatibility SCPI command 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.</p>
Initial S/W Revision	Prior to A.02.00

Modified at S/W Revision	A.03.00
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Trigger Source Presets

Here are the Trigger Source Presets for the various measurements:

Meas	Mode	Preset for RF	Preset for IQ	Notes
Swept SA	SA	IMM	IQ not supported	
CHP	SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR	IMM	IQ not supported	
OBW	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, LTE, LTETDD, CMMB, ISDB-T, MSR	1xEVDO: EXT1 others: IMM	IQ not supported	For 1xEVDO mode, the trigger source is coupled with the gate state, as well as the gate source. When the trigger source changes to RFBurst, External1 or External2, the gate state is set to on, and the gate source is set identically with the trigger source. When the trigger source changes to IMMEDIATE, VIDEO, LINE, FRAME or IF, the gate state is set to off.
CCDF	SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR	WIMAX OFDMA : 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, MSR: 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.

Trigger

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, MSR	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, 1xEVDO, DVB-T/H, LTE, LTETDD, MSR	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, MSR	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	

Meas	Mode	Preset for RF	Preset for IQ	Notes
MON	All except SA and BASIC	IMM	IQ not supported	
WAV		LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: RFBurst All others: IMMmediate	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	

Trigger

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	
Conformance EVM	LTE, LTETDD, MSR	IMM	IMM	

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 TV :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	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the RF Trigger Source, the following trigger sources are available:</p> <ul style="list-style-type: none"> — IMMEDIATE - free run triggering — VIDEO - triggers on the video signal level — LINE - triggers on the power line signal — EXTERNAL1 (or EXTERNAL) - 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 <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and presets can vary from mode to mode.</p>
Status Bits/OPC dependencies	<p>The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.</p>
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	<pre>:TRIGger:<measurement>[:SEQUENCE]:IQ:SOURce EXternal1 EXternal2 IMMEDIATE IQMag IDEMod QDEMod IINPut QINPut AIQMag :TRIGger:<measurement>[:SEQUENCE]:IQ:SOURce?</pre>
Example	<pre>TRIG:WAVEform:SOUR IQM</pre> <p>Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input</p>

Trigger

Notes	<p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the I/Q Trigger Source, the following trigger sources are available:</p> <ul style="list-style-type: none"> — IMMEDIATE - free run triggering — EXTERNAL1 (or EXTERNAL) - 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 <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and from mode to mode presets can vary</p>
Status Bits/OPC dependencies	<p>The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.</p>
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.

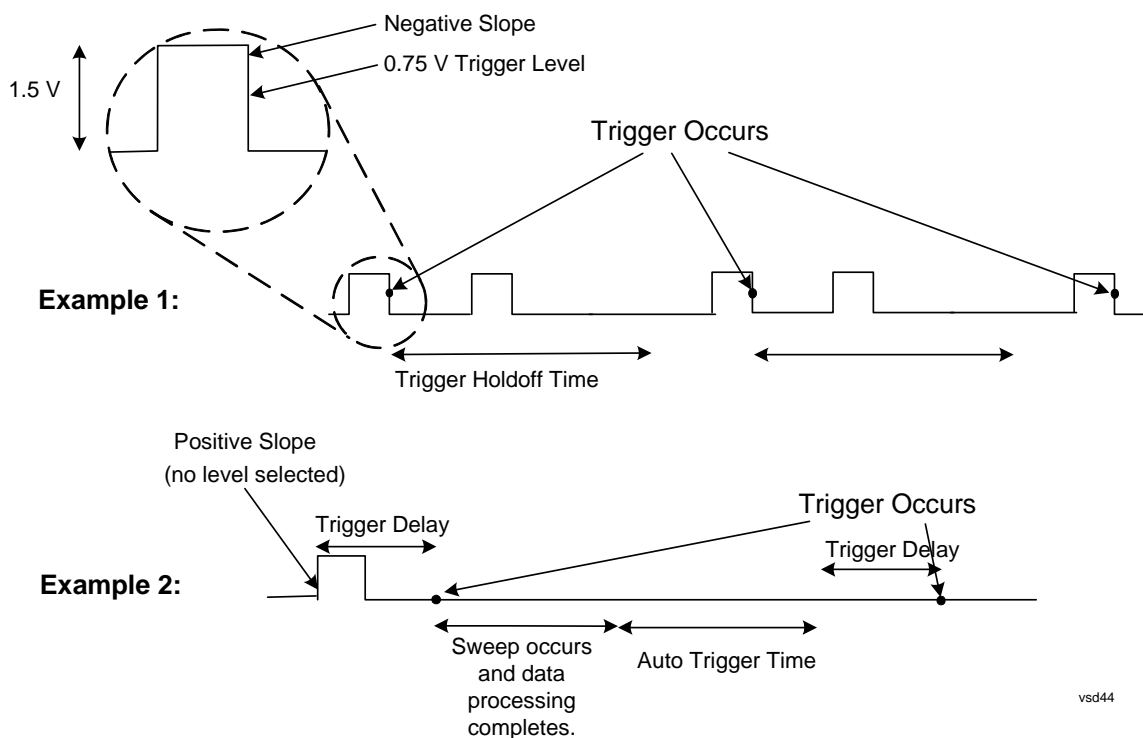
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into 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

Trigger

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.
Backwards Compatibility Notes	In the past, the Average detector was not available when Video triggering was on, and consequently, functions that set the detector to average (such as Marker Noise or Band/Intvl Power) were not available when the video trigger was on. Similarly, Video triggering was not available when the detector was Average. In the X-Series, these restrictions are removed.
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	<p>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.</p> <p>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.</p> <p>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.</p>
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
Default Unit	depends on the current selected Y axis unit
Backwards Compatibility SCPI	:TRIGger[:SEquence]:IF:LEVel :TRIGger[:SEquence]:IF:LEVel?
Backwards Compatibility Notes	This alias is provided for backward compatibility with VSA/PSA comms apps.
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.

Trigger

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]:IF:SLOPe NEGative POSitive :TRIGger[:SEQuence]:IF:SLOPe? For backward compatibility with VSA/PSA comms apps
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
Initial S/W Revision	Prior to A.02.00

Remote Command	:TRIGger[:SEQuence]:SLOPe POSitive NEGative :TRIGger[:SEQuence]:SLOPe?
Example	TRIG:SLOP NEG
Preset	POSitive
State Saved	Saved in instrument state
Backwards Compatibility Notes	In ESA/PSA, the Trigger Slope was global to all triggers. In the X-Series, the slope can be set individually for each Trigger Source. For backward compatibility, the global SLOPe command updates all instances of trigger slope (VID, LINE, EXT1, EXT2, TV, RFB). The query returns the trigger slope setting of the currently selected trigger source.
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
Default Unit	s
Backwards Compatibility SCPI	:TRIGger[:SEquence]:IF:DELay :TRIGger[:SEquence]:DELay For backward compatibility with VSA/PSA comms apps
Initial S/W Revision	Prior to A.02.00

Remote Command	:TRIGger[:SEquence]:DELay <time> :TRIGger[:SEquence]:DELay? :TRIGger[:SEquence]:DELay:STATE OFF ON 0 1 :TRIGger[:SEquence]:DELay:STATE?
Example	TRIG:DEL 1 ms
Preset	1 us
State Saved	Saved in instrument state
Backwards Compatibility Notes	In ESA/PSA, the Trigger Delay was global to all triggers. In the X-Series, the delay can be set individually for each Trigger Source. For backward compatibility, the global DELay command updates all instances of trigger slope (VID, LINE, EXT1, EXT2) except TV and RFBurst. The query returns the trigger delay setting of the currently selected trigger source.
Initial S/W Revision	Prior to A.02.00

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

Trigger

Notes	These are ESA commands for trigger offset that allowed you to use a positive or negative delay when in zero span and in a Res BW \geq 1 kHz. For ESA compatibility, X-series analyzers keep track of this offset and adds it to the Trigger Delay for VIDEo, LINE, EXTERNAL1 or EXTERNAL2 whenever the value is sent to the hardware, if in Zero Span and RBW \geq 1 kHz.
Preset	Off, 0 s
State Saved	Saved in instrument state
Min	-11 s
Max	+11 s
Initial S/W Revision	Prior to A.02.00

Line

Pressing this key, when it is not selected, selects the line signal as the trigger. A new sweep/measurement will start synchronized with the next cycle of the line voltage. Pressing this key, when it is already selected, access the line trigger setup menu.

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 Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
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
Default Unit	S
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELAy command affects the delay for the VID, LINE, EXT1, and EXT2 triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDEo, LINE, EXT1, and EXT2 triggers.
Initial S/W Revision	Prior to A.02.00

Trigger

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
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1

Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:EXTernal1:LEVel
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, 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	:TRIGger[:SEQuence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:FRAMe:EXTernal1:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
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

Trigger

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
Default Unit	s
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:EXTernal:DELay For backward compatibility, the parameter EXTernal is mapped to EXTernal1
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELay command affects the delay for the VID, LINE, EXT1, and EXT2 triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDEO, LINE, EXT1, and EXT2 triggers.
Initial S/W Revision	Prior to A.02.00

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

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
Default Unit	V
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAME:EXTernal2:LEVel
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, External 2
Remote Command	:TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe?
Example	TRIG:EXT2:SLOP NEG

Trigger

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	:TRIGger[:SEQuence]:FRAMe:EXTernal2:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
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
Default Unit	s
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:DELay command affects the delay for the VID, LINE, EXT1, and EXT2 triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDEO, LINE, EXT1, and EXT2 triggers.

Initial S/W Revision	Prior to A.02.00
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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.
Backwards Compatibility Notes	<ol style="list-style-type: none"> 1. The legacy command: 2. :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 3. is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series.
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.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

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

Trigger

Notes	<p>Sending this command does not switch the setting from relative to absolute; to switch it you need to send the <code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE</code> command, below.</p> <p>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.</p> <p>If mode is Bluetooth, the default value is -50 dBm.</p>
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
Default Unit	depends on the current selected Y-Axis unit
Backwards Compatibility SCPI	<code>:TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute</code>
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.04.00

Key Path	Trigger, RF Burst
Remote Command	<code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE</code> <code>ABSolute RELative</code> <code>:TRIGger[:SEquence]:RFBurst:LEVel:TYPE?</code>
Example	<code>TRIG:RFB:LEV:TYPE REL</code> 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 cannot 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

Trigger

Max	0 dB
Default Unit	dB or dBc
Backwards Compatibility SCPI	:TRIGger[:SEQuence]:RFBurst:LEVel This legacy command 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

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	:TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe
Backwards Compatibility Notes	The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers.
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
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

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**.

Trigger

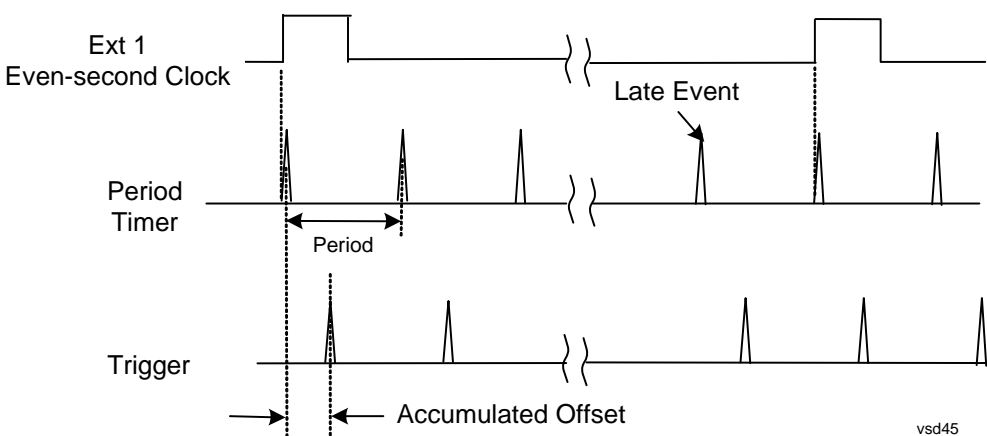
The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

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

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, 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

Trigger

Notes	<p>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).</p> <p>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 “Trig Delay” on page 490.</p> <p>An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.</p>
Notes	<p>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.</p> <p>The SCPI query simply returns the value currently showing on the key.</p>
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
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

Remote Command	:TRIGger[:SEquence]:FRAMe:ADJust <time>
Example	TRIG:FRAM:ADJ 1.2 ms
Notes	<p>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 490</p> <p>An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.</p>

Notes	<p>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.</p> <p>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.</p> <p>This is a "command only" SCPI command, with no query.</p>
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
Default Unit	S
Initial S/W Revision	Prior to A.02.00

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the **Offset** key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The **Offset** key can then be used to add offset relative to this new timing.

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
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Trigger

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.
Backwards Compatibility SCPI	:TRIGger[:SEquence]:FRAMe:SYNC EXTernal For backward compatibility, the parameter EXTernal is mapped to EXTernal1
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 474](#) 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 475](#) 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 477](#) 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 477](#) 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

Trigger

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 479](#) 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 482](#) 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
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

Key Path	Trigger, Periodic Timer
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Remote Command	<pre>: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?</pre>
Preset	On, 1.000 ms
State Saved	Saved in instrument state
Min	0 ms
Max	+500 ms
Default Unit	s
Initial S/W Revision	Prior to A.02.00

TV

Pressing this key, when it is not selected, selects the TV input signal as the trigger. A new sweep/measurement will start synchronized with the next occurrence of the synchronizing pulse of a selected TV line

Pressing this key, when it is already selected, sets the desired line number accesses the other TV trigger setup functions.

The Frame and Field options enable you to determine how the fields of the TV picture signal will be affected by the trigger system. One complete TV image consists of one frame of 525 or 625 horizontal lines depending on the TV standard being used. Each frame is composed of two fields of interlacing lines, each consisting of 262 1/2 lines (or 312 1/2 lines). The fields are called Field One and Field Two. Field One is viewed as having 263 lines (or 313 lines) and Field Two is viewed as having 262 lines (or 312 lines).

For the 525 line NTSC video standard, we refer to TV lines as follows (these are the Field Modes):

Entire Frame, lines 1 to 525

Field One, lines 1 to 263

Field Two, lines 1 to 262 (note that this really refers to "actual" lines 264 to 525)

For the 625 line PAL and SECAM video standards, we refer to TV lines as follows:

Entire Frame, lines 1 to 625

Field One, lines 1 to 313

Field Two, lines 314 to 625

Trigger

As the Field is changed, the appropriate value for Line is chosen to keep triggering on the same line as before, or if this is not possible, the corresponding line in the new Field. For example, suppose line 264 is selected while in the NTSC-M standard and the Entire Frame mode. This is the first line in Field Two. If Field Two is then selected, the Line number changes to Line 1, the same actual line in the TV signal. If Field One is then selected, the line number stays at 1, but now we are triggering in the first line in Field One. The only exception to this is if we are on the last line of Field One and change to Field Two. In this case, we go to the last line in Field Two.

Key Path	Trigger
Example	TRIG:SOUR TV Swept SA measurement TRIG:<meas>:SOUR TV Measurements other than Swept SA
Readback	This key displays the value read back from TV Line
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

TV Line

Selects the TV line number to trigger on. Line number range is dependent on the settings of the **Standard** and **Field** menus within the TV trigger setup functions. When the line number is incremented beyond the upper limit, the value will change to the lower limit and continue incrementing from there. When the line number is decremented below the lower limit, the value will change to the upper limit and continue decrementing from there.

Key Path	Trigger, TV
Remote Command	:TRIGger[:SEquence]:TV:LINE <integer> :TRIGger[:SEquence]:TV:LINE?
Example	TRIG:TV:LINE 20 TRIG:TV:LINE?
Notes	The range of the TV line number is dependent on the settings of the Standard and Field menus within the TV trigger setup functions.
Preset	17
State Saved	Saved in instrument state
Min	The minimum value is the minimum line, and rolls over to the maximum value. The minimum line number depends on which Field and standard are selected.

Max	The maximum value is the maximum line, and rolls over to the minimum value. The maximum line number depends on which Field and standard are selected.
Initial S/W Revision	Prior to A.02.00

Field

Accesses the menu to select the field.

Key Path	Trigger, TV
Remote Command	:TRIGger[:SEquence]:TV:FMODE ENTire ODD EVEN :TRIGger[:SEquence]:TV:FMODE?
Example	TRIG:TV:FMODE EVEN
Notes	ODD is Field 1 EVEN is Field 2
Dependencies	This command is available only when Option B7B (TV trigger) is installed.
Preset	ENTire
Readback	Displays the Readback value
Initial S/W Revision	Prior to A.02.00

Entire Frame

When you select Entire Frame it causes the selected line number to be viewed as an offset into the entire frame starting with line 1, the first line in Field One.

Key Path	Trigger, TV, Field
Example	TRIG:TV:FMODE ENT
Min	1, for all formats.
Max	525, for formats NTSC-M, NTSC-Japan, NTSC-4.43, PAL-M and PAL-60 625, for formats PAL-B, D, G, H, I, PAL-N, PAL-N Combin, and SECAM-L.
Readback	Entire Frame
Initial S/W Revision	Prior to A.02.00

Field One

When you select Field One it causes the selected line number to be viewed as an offset into the first field starting with Line 1, the first line in Field One.

Key Path	Trigger, TV, Field
Example	TRIG:TV:FMODE ODD

Trigger

Min	Field 1 (ODD) The minimum line is 1
Max	Field 1 (ODD) Maximum line is 263 for formats NTSC-M, NTSC-Japan, NTSC-4.43, PAL-M and PAL-60 Maximum line is 313 for formats PAL-B, D, G, H, I, PAL-N, PAL-N Combin, and SECAM-L.
Readback	Field 1
Initial S/W Revision	Prior to A.02.00

Field Two

When you select Field Two it causes the selected line number to be viewed as an offset into the second field. If Line 1 is selected, it is the 264th line of the frame (NTSC-M, NTSC-Japan, NTSC-4.43, PAL-M, PAL-60) or the 314th line of the frame (PAL-B,D,G,H,I, PAL-N, PAL-N-Combin, SECAM-L).

Key Path	Trigger, TV, Field
Example	TRIG:TV:FMODEVEN
Min	Field 2 (EVEN) The minimum line is 1
Max	Field 2 (EVEN) The maximum line 262 for formats NTSC-M, NTSC-Japan, NTSC-4.43, PAL-M and PAL-60 The maximum line is 312 for formats PAL-B, D, G, H, I, PAL-N, PAL-N Combin, and SECAM-L
Readback	Field 2
Initial S/W Revision	Prior to A.02.00

Standard

Accesses the Standard menu keys which select from the following TV standards: **NTSC-M, NTSC-Japan, NTSC-4.43, PAL-M, PAL-B,D,G,H,I, PAL-N, PAL-N-Combin, PAL-60, SECAM-L.**

As the TV standard is changed, the current line value is clipped as necessary to keep it valid for the chosen standard and field mode. For example, line 600 is selected in Entire Frame mode in PAL-N; if NTSC-M is selected, the line number is clipped to 525. Or, if line 313 is selected in Field 1 mode in PAL-N and NTSC-M is selected, the line number is clipped to 263. Changing back to the PAL-N standard will leave the line number at 263.

Key Path	Trigger, TV
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Remote Command	:TRIGger[:SEquence]:TV:STANdard MNTSc JNTSc NTSC443 MPAL BPAL NPAL CPAL PAL60 LSEC :TRIGger[:SEquence]:TV:STANdard?
Example	TRIG:TV:STANdard MPAL TRIG:TV:STA?
Preset	MNTSC
State Saved	Saved in instrument state
Readback	Displays Readback value
Initial S/W Revision	Prior to A.02.00

NTSC-M

Sets the TV standard to **NTSC-M**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN MNTS
Readback	NTSC-M
Initial S/W Revision	Prior to A.02.00

NTSC-Japan

Sets the TV standard to **NTSC-Japan**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN JNTS
Readback	NTSC-Japan
Initial S/W Revision	Prior to A.02.00

NTSC-4.43

Sets the TV standard to **NTSC-4.43**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN NTSC443
Readback	NTSC-Japan
Initial S/W Revision	Prior to A.02.00

Trigger

PAL-M

Sets the TV standard to **PAL-M**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN MPAL
Readback	PAL-M
Initial S/W Revision	Prior to A.02.00

PAL-N

Sets the TV standard to **PAL-N**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN NPAL
Readback	PAL-N
Initial S/W Revision	Prior to A.02.00

PAL-N-Combin

Sets the TV standard to **PAL-N-Combin**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN CPAL
Readback	PAL-N-C
Initial S/W Revision	Prior to A.02.00

PAL-B,D,G,H,I

Sets the TV standard to **PAL-B,D,G,H,I**

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN BPAL
Readback	PAL-B
Initial S/W Revision	Prior to A.02.00

PAL-60

Sets the TV standard to **PAL-60**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN PAL60

Readback	PAL-N
Initial S/W Revision	Prior to A.02.00

SECAM-L

Sets the TV standard to **SECAM-L**.

Key Path	Trigger, TV, Standard
Example	TRIG:TV:STAN LSEC
Readback	SECAM-L
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
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Trigger

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

Trigger

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

Trigger

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

Trigger

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

Trigger

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
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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 summary of the Auto Trig and Holdoff settings, in square brackets First line: Auto Off or Auto On Second Line: "Hldf" followed by: <ul style="list-style-type: none"> • 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

Trigger

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
Default Unit	s
Initial S/W Revision	Prior to A.02.00

Trig Holdoff

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions will be ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

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
Default Unit	s
Initial S/W Revision	Prior to A.02.00

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

AM/FM/PM View/Display

Each of the Analog Demod measurements (AM, FM, PM) have four views. The primary view is called “Quad View” and displays all four of the view windows with the focus in the RF Spectrum window. This is the view seen after a Mode Preset. There are also three other views that combine one of the graphics windows with the metrics windows. The views can be selected from the **View/Display** menu.

These views are designed such that you can identify analog modulated carriers, determine whether the carrier is a commercial or other broadcast station, and analyze the modulating signal.

Key Path	Front-panel key
Remote Command	:DISPlay:AM FM PM:VIEW[:SElect] QUAD RFSPectrum DEMod AFSPectrum :DISPlay:AM FM PM:VIEW[:SElect]?
Example	:DISP:FM:VIEW DEM selects Demod Waveform & Metrics View for FM Demod measurement
Preset	QUAD (Focus in RF Spectrum Window)
State Saved	Saved in instrument state
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
Initial S/W Revision	Prior to A.02.00

Annotation

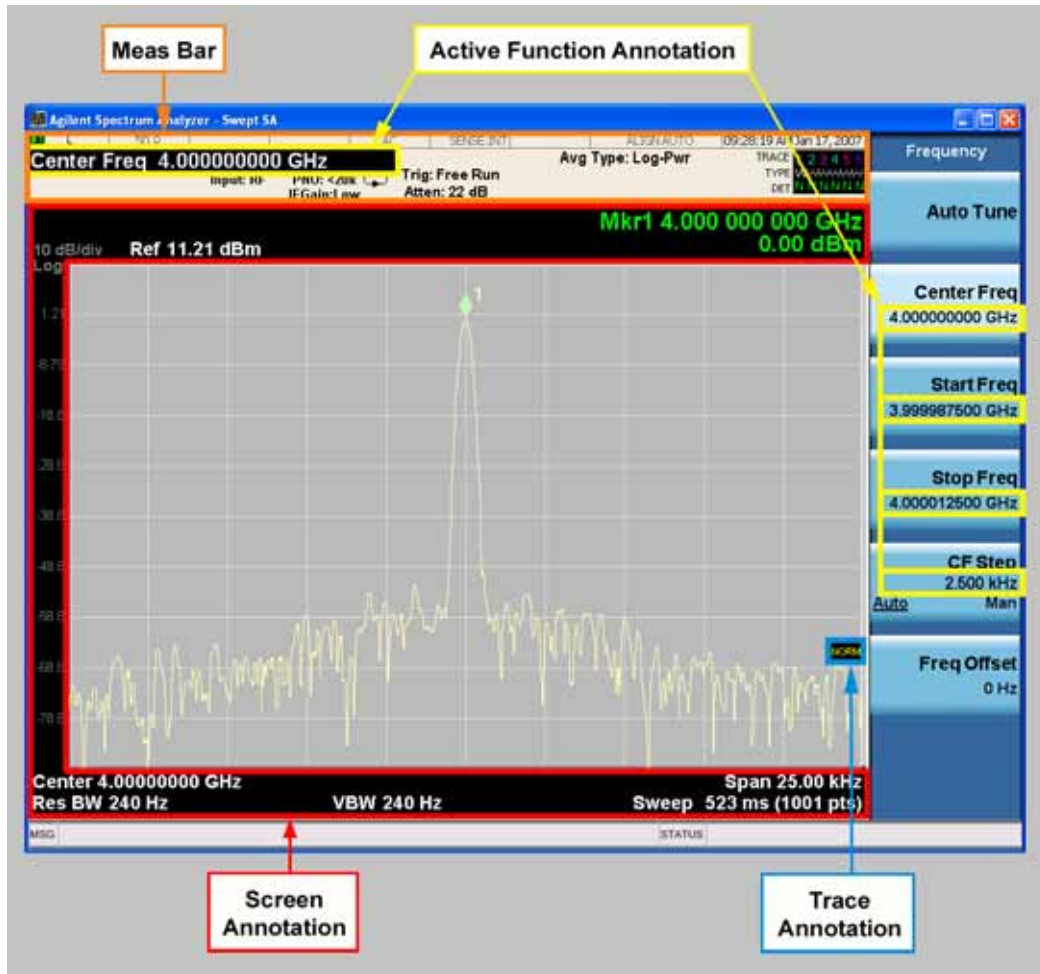
Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

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.

AM/FM/PM View/Display

- Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
- 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

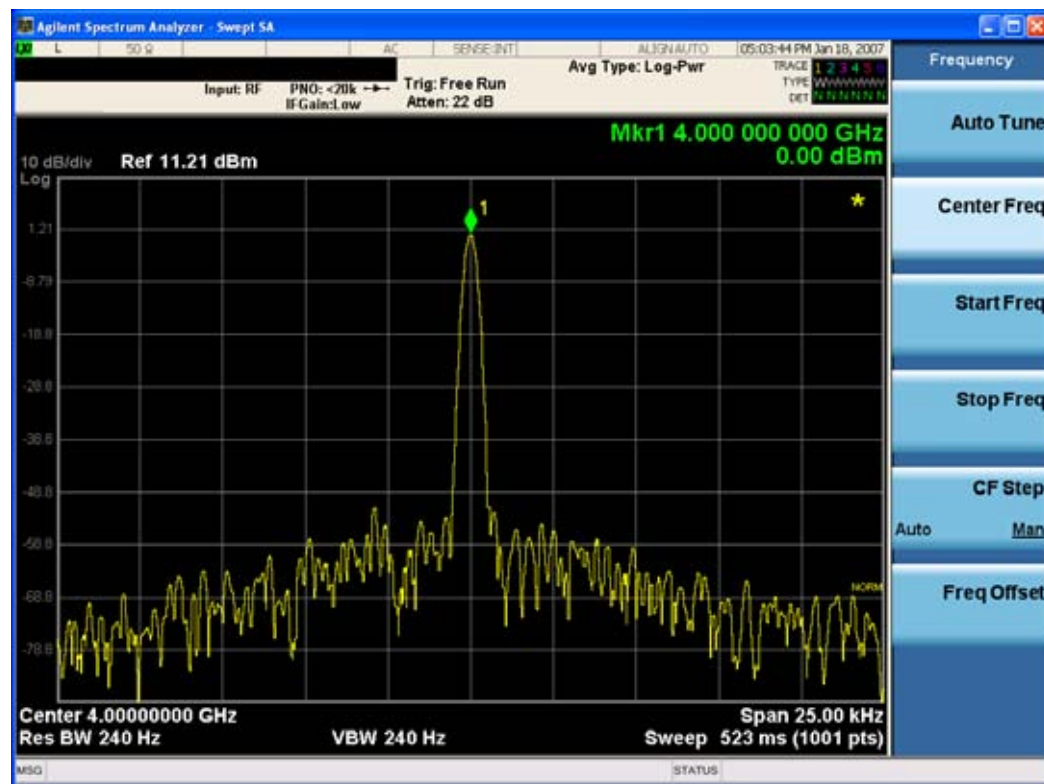
AM/FM/PM View/Display

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
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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:TITL:DATA <string> :DISPlay:<measurement>:ANNotation:TITL: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.

AM/FM/PM View/Display

Initial S/W Revision	Prior to A.02.00
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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	-∞ (minus infinity) in current units
Max	+∞ (plus infinity) in current units
Default Unit	Depends on the current selected Y axis unit
Initial S/W Revision	Prior to A.02.00

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by **Restore Misc Defaults** or **Restore System Defaults** under System.

Key Path	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

AM/FM/PM View/Display

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
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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

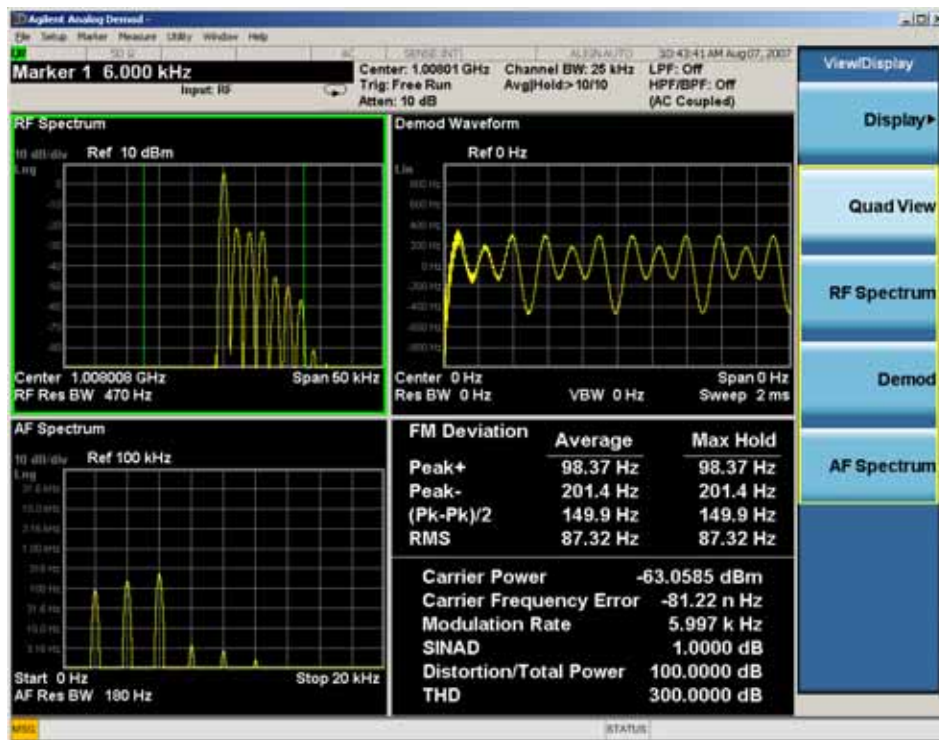
Quad View

The Quad View displays each of the four fundamental windows of the Analog Demod mode. The basic window format is essentially the same for the 3 measurements. The main difference is the demodulation technique performed in the hardware and the specific metrics and units of the displayed results.

In general, there is little window-context sensitivity in the Analog Demod mode, that is, most of the variables have been designed so that they are unique to their window. The three variables that are window dependent are, Ref Value, Scale/Div, and Ref Position. These variables change to reflect the settings of the current window (the current window is always outlined in green).

The Quad View is shown below. For more information on the views, see [“RF Spectrum Window” on page 520](#), [“Demod Waveform Window” on page 520](#), [“AF Spectrum Window” on page 521](#), or [“Metrics Window” on page 521](#).

AM/FM/PM View/Display



RF Spectrum Window

The **RF Spectrum** window shows a spectral display of the input RF signal with amplitude in the vertical Y axis and frequency in the horizontal X axis. The vertical axis is always scaled in dB, with units of dBm, with the Ref Value initially at the top of the vertical scale. This spectral display is basically identical to the frequency display of the Swept SA measurement; however it is always taken using an FFT. The span is restricted to 8 MHz and zero span is not allowed.

The **RF Spectrum** window provides a convenient way to identify broadcast stations by placing the signal of interest at the center frequency using this window and listening to the instrument's speaker. Demodulation is always performed at the center frequency of the RF Spectrum window; this is regarded as the application's center frequency and is annotated in the Measurement Bar.

In the RF Spectrum window, two green vertical lines are shown centered around the center frequency, with spacing equal to the Channel BW. If the Channel BW is wider than the span, they are not seen.

The Center Frequency, Span, and RF Res BW are annotated at the bottom of the RF Spectrum Window. The Ref Value and Scale/Div are annotated above the graticule.

Demod Waveform Window

In the **Demod Waveform** window, the demodulated signal is displayed in the time domain (zero span) with time on the horizontal X axis, and modulation depth (AM) or deviation (FM, PM) on the vertical Y axis.

In the **Demod Waveform** window the Y axis is linearly scaled in units of percent modulation for AM, frequency (Hz) for FM, or phase (radians) for PM. On a preset, the Ref Value is positioned in the center of the vertical scale.

Four traces are available in the Demod Waveform window. The Demod trace, in yellow, shows the current demodulation signal. The Demod Max trace, in cyan, shows the Max Hold value for each display point since the last restart and the Demod Min trace, in magenta, shows the Min Hold value for each display point since the last restart. The Demod Average trace, in green, shows the averaged demodulation signal. If Averaging is turned off, only the Demod trace is displayed.

The Sweep Time is annotated at the bottom of the Demod Waveform Window. The Ref Value and Scale/Div are annotated above the graticule.

AF Spectrum Window

In the **AF Spectrum** window, the demodulated signal is displayed in the frequency domain with frequency on the X axis and amplitude on the Y axis.

The vertical axis is always scaled in dB with the Ref Value initially at the top of the vertical scale. The Y-Axis Unit is % for AM, Hz for FM, and radians for PM.

In this view you can observe the spectral components of the modulating signal. The preset Start Frequency of this window is 0 Hz. The AF Start Freq and AF Stop Freq are annotated at the bottom of the AF Spectrum Window, as is the AF Res BW.

The Ref Value and Scale/Div are annotated above the graticule.

It is only possible to show a spectrum to a maximum frequency of Channel BW / 2. For trace display points beyond that frequency, the value 1.0E-50 is plotted and returned in queries.

Metrics Window

The metrics window displays measurement results.

If averaging is turned on, the column marked “Current” is relabeled “Average” and the results in that column are averaged over successive measurements until the Average/Hold number is reached. Then, if not in Single measurement mode, the measurement continues, exponentially averaging in successive results. The Max Hold column shows the Maximum value the un-averaged metric has attained since the last Restart. The Max Hold column is removed when averaging is turned off.

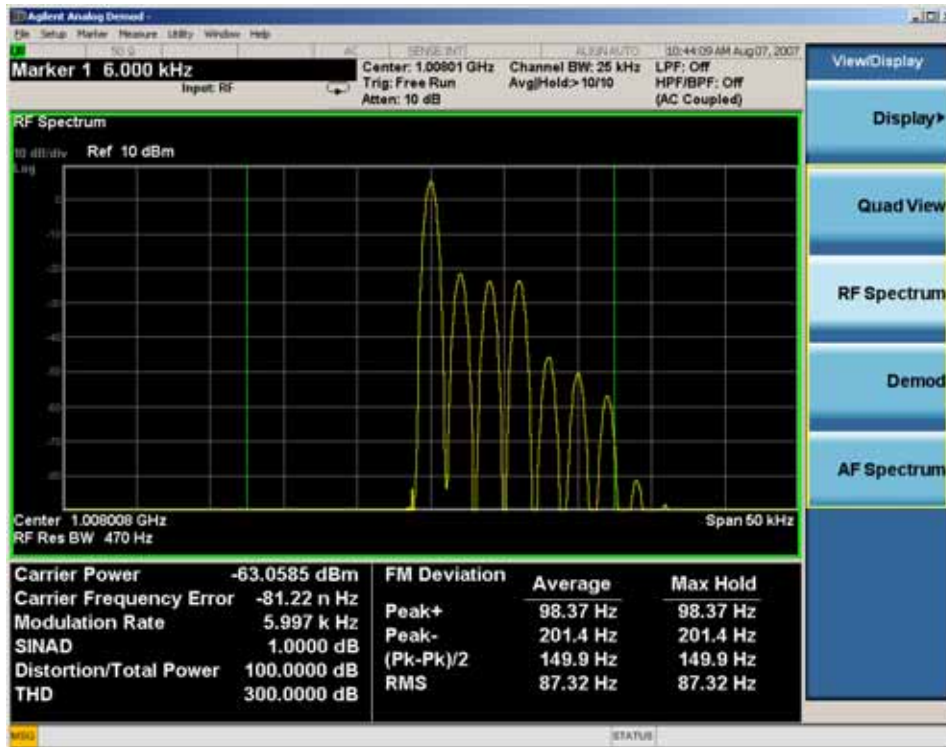
The window title is “FM Deviation” in FM, “AM Mod Depth” in AM, and “PM Radians” in PM.

Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

AM/FM/PM View/Display

RF Spectrum & Metrics View

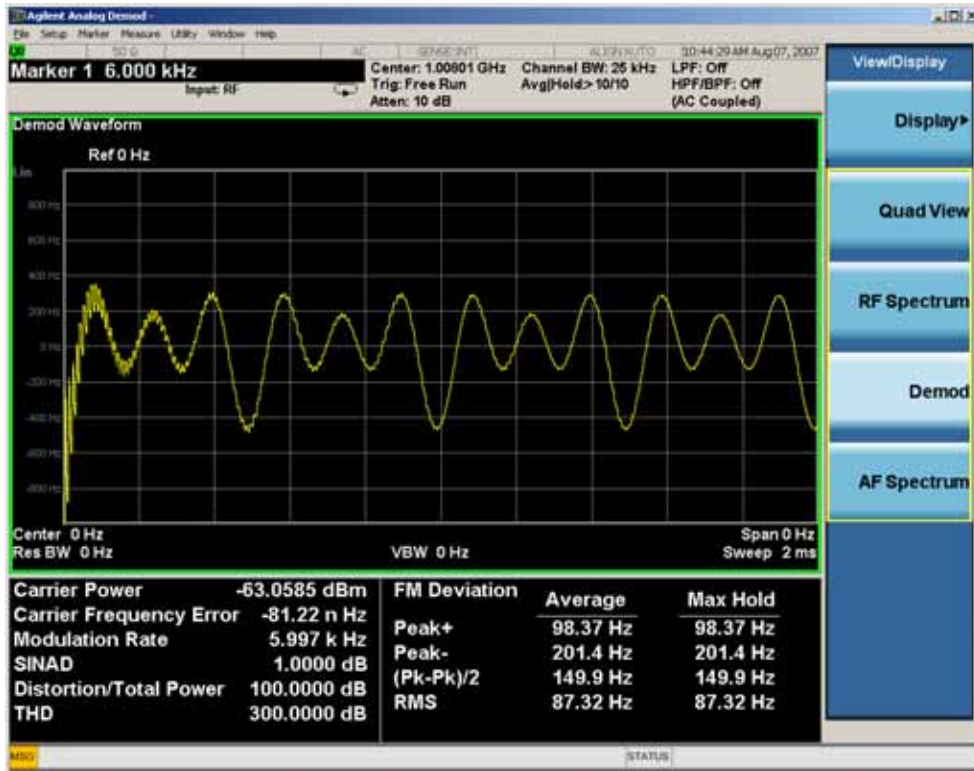
This view shows the RF Spectrum window and the Metrics window displayed in a split screen mode with the RF Spectrum window taking up approximately $\frac{3}{4}$ of the display.



Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Demod Waveform & Metrics View

This view shows the Demod Waveform window and the Metrics windows displayed in a split screen mode with the Demod Waveform window taking up approximately ¾ of the display.

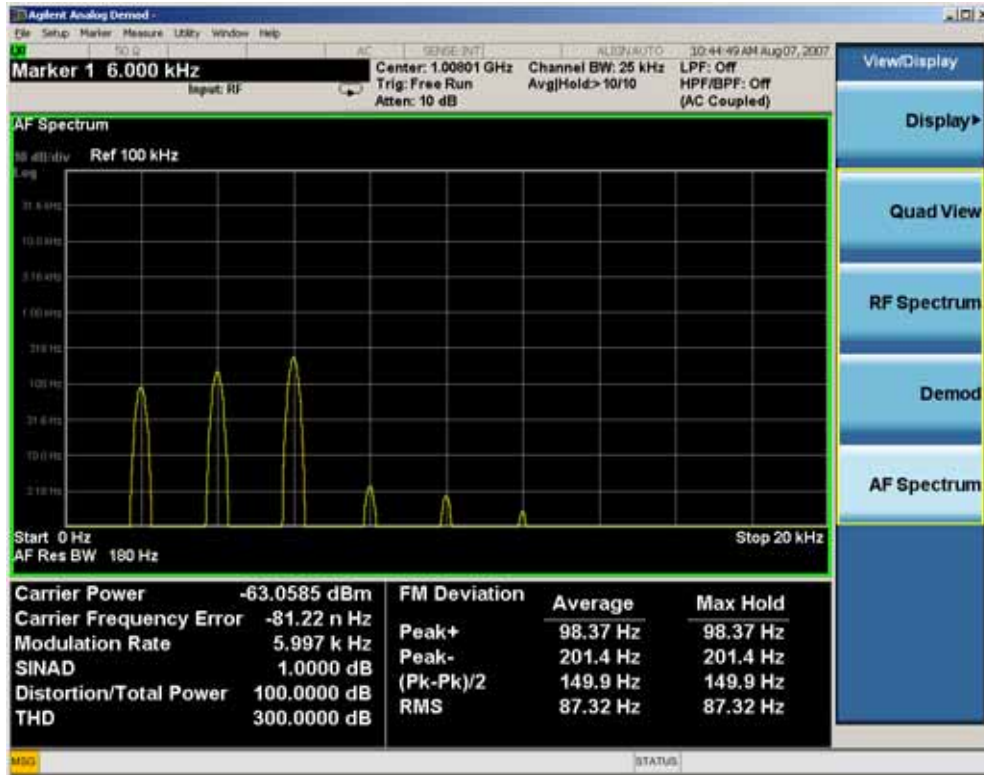


Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

AM/FM/PM View/Display

AF Spectrum & Metrics View

This view shows the AF Spectrum window and the Metrics windows displayed in a split screen mode with the AF Spectrum window taking up approximately $\frac{3}{4}$ of the display.



Key Path	View/Display
Initial S/W Revision	Prior to A.02.00

Distortion & THD Unit

Changes the units of distortion and THD in the Metrics screen between % and dB units.

Key Path	View/Display
Remote Command	DISPlay:AM FM PM:VIEW:DISToRtion:UNIT DB PCT DISPlay:AM FM PM:VIEW:DISToRtion:UNIT?
Example	DISP:AM:VIEW:DIS:UNIT PCT Sets AM distortion and THD display to percent.
Preset	PCT
State Saved	Saved in State
Initial S/W Revision	Prior to A.02.00

Metrics Settings

Accesses a menu used to control which metrics will be provided. This includes a 1-of-N menu which allows you to control which modulation magnitude metrics are displayed, as well as On/Off controls for Modulation Rate and SINAD/Distortion/THD. If speed is an issue, select only the metric(s) that is(are) required. If modulation magnitude is set to Peak+ Only, Pk-Pk/2 Only, or RMS Only, the other modulation magnitude metrics are loaded with not a number and show “---“ in the metrics window.

Key Path	View/Display, Metrics Settings
Remote Command	:DISPlay:AM FM PM:VIEW:METRics:MMAGnitude ALL PPK PNPK RMS RMSRatio :DISPlay:AM FM PM:VIEW:METRics:MMAGnitude?
Example	DISP:AM:VIEW:METR:MMAG PPK Sets AM modulation magnitude to peak +. DISP:FM:VIEW:METR:MMAG RMSR Sets ratio reference and sets FM modulation magnitude to ratio display
Preset	ALL
State Saved	Saved in State
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.05.00

Normal

Turns on all absolute modulation magnitude metrics. In the metrics window, Peak +, Peak -, Pk-Pk/2 and RMS results are provided.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:AM:VIEW:METR:MMAG ALL
Notes	This key was labeled “All” in earlier releases
Initial S/W Revision	Prior to A.02.00
Modified at S/W Revision	A.05.00

Peak+ Only

Turns on just the Peak+ metric in the portion of the metrics window that shows the modulation magnitude results.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:AM:VIEW:METR:MMAG PPK
Initial S/W Revision	Prior to A.02.00

AM/FM/PM View/Display

Pk-Pk/2 Only

Turns on just the Pk-Pk/2 metric in the portion of the metrics window that shows the modulation magnitude results. .

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:AM:VIEW:METR:MMAG PNPk
Initial S/W Revision	Prior to A.02.00

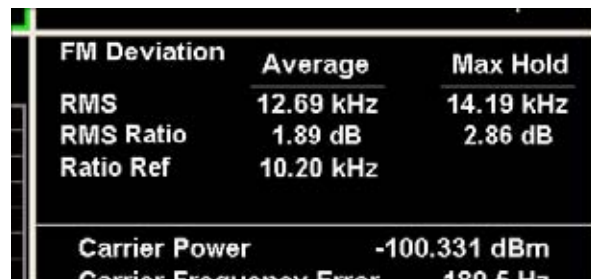
RMS Only

Turns on just the RMS metric in the portion of the metrics window that shows the modulation magnitude results.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:AM:VIEW:METR:MMAG RMS
Initial S/W Revision	Prior to A.02.00

RMS Ratio

Turns on the display of RMS Ratio. In this mode, the only magnitude metrics that are displayed are the RMS metrics, but besides the display of RMS, the ratio (in dB) of the RMS modulation to its reference is displayed, as well as the value of the reference, as shown in the display below:



FM Deviation	Average	Max Hold
RMS	12.69 kHz	14.19 kHz
RMS Ratio	1.89 dB	2.86 dB
Ratio Ref	10.20 kHz	

Carrier Power	-100.331 dBm
Carrier Frequency Error	180.5 Hz

Pressing the RMS Ratio key (or sending :DISP:AM:VIEW:METR:MMAG RMSR) establishes the reference. Pressing it again (or sending the SCPI command again) establishes a new reference. Whenever this happens, the current value of RMS modulation from the left hand column (Current or Average) is taken as the new reference.

If, when the ratio is to be established, there is not a valid value being displayed to use as a reference, an error is generated, the RMS Ratio and Ratio Ref values display --- and queries of either return not a number (9.91 e37).

To turn off the ratio display, select one of the other Mod magnitude views.

Note that each measurement (AM, FM and PM) has its own reference; and the reference is remembered when you leave the measurement and return.

The ratio references are saved in State, and when the recalled state of **Metrics Settings** is **RMS Ratio**, the saved reference for the current measurement should be recalled and used, rather than establishing a new one.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:AM:VIEW:METR:MMAG RMSR
Initial S/W Revision	A.05.00

Modulation Rate

Toggles the Modulation Rate metric on and off. When turned on, the Modulation Rate metric is provided. When turned off, the Modulation Rate metric is set to not a number and shows “---“ in the metric window.

Key Path	View/Display, Metrics Settings
Remote Command	:DISPlay:AM FM PM:VIEW:METRics:MRATe[:STATE] ON OFF 1 0 :DISPlay:AM FM PM:VIEW:METRics:MRATe[:STATE]?
Example	DISP:AM:VIEW:METR:MRAT OFF Sets AM modulation rate to off
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

SINAD, THD, Distortion

Toggles the distortion metrics (SINAD, Distortion, & THD) on and off. When turned on, the SINAD, Distortion, and THD metrics are provided. When turned off, the SINAD, Distortion, and THD metrics are set to not a number and show “---“ in the metric window.

SINAD is the ratio of total received power (the received signal-plus-noise-plus-distortion power) to the received noise-plus-distortion power. It is always expressed in decibel units. The rejection of the carrier from the noise-plus-distortion power measurement is usually not much more than 50 dB, thus limiting the maximum SINAD.

THD is the ratio of the root mean square voltage of the harmonics referenced to the fundamental voltage, expressed in % or dB. Note the differences with respect to Distortion. The denominator of the ratio is different and the items in the numerator do not include the noise between harmonics, just the harmonics themselves.

Distortion/Total Voltage (rms) is the ratio of unwanted received power (noise plus distortion) to the total received power, expressed in % or dB. Therefore, this metric is the negative of SINAD when expressed in decibels.

Key Path	View/Display, Metrics Settings
Remote Command	:DISPlay:AM FM PM:VIEW:METRics:DISTortion[:STATE] ON OFF 1 0 :DISPlay:AM FM PM:VIEW:METRics:DISTortion[:STATE]?
Example	DISP:AM:VIEW:METR:DIST OFF Sets AM SINAD, Distortion, THD Metrics to off

AM/FM/PM View/Display

Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	Prior to A.02.00

FM Stereo View/Display

The primary view is called “MPX View” and displays RF Spectrum, MPX Demod Waveform, MPX Spectrum, and Metrics. This is the view seen after a Mode Preset. There are also six other views. Mono view displays Waveform, Spectrum, and Metrics of mono signal. Stereo view displays Waveform, Spectrum, and Metrics of stereo signal. Left view displays Waveform, Spectrum, and Metrics of the left-channel signal. Right view displays Waveform, Spectrum, and Metrics of right-channel signal. RDS/RBDS view displays the decoded RDS bits. Result Metrics Summary view displays all the results together in one view. The views can be selected from the **View/Display** menu.

These views are designed such that you can identify analog modulated carriers, determine whether the carrier is a commercial or other broadcast station, and analyze the modulating signal.

Key Path	Front-panel key
Remote Command	:DISPlay:FMSTereo:VIEW[:SElect] MPX MONO STEReo LEFT RIGHT RDS NRESults :DISPlay:FMSTereo:VIEW[:SElect]?
Example	:DISP:FMST:VIEW MPX selects MPX View for FM Stereo Demod measurement
Preset	MPX (Focus in RF Spectrum Window)
State Saved	Saved in instrument state
Initial S/W Revision	A.10.00

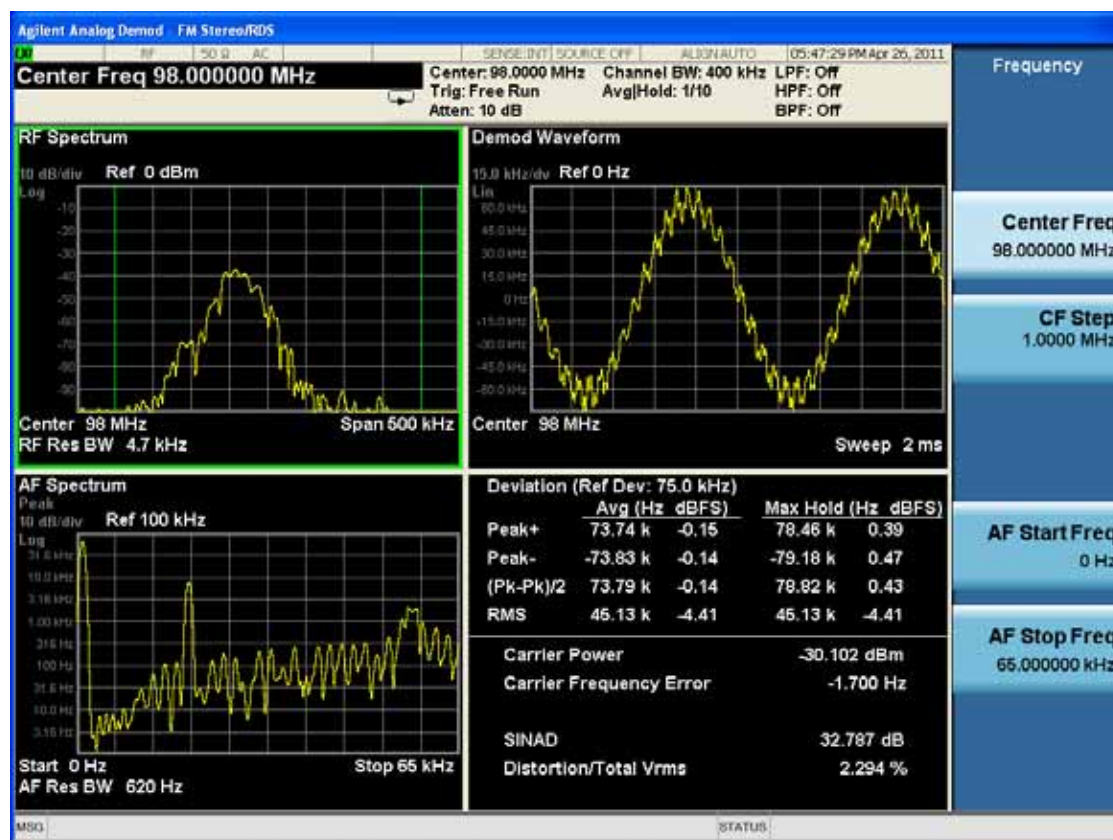
MPX View

The MPX View displays RF Spectrum, Demod Waveform, AF Spectrum, and Metrics of the multiplex signal.

In general, there is little window-context sensitivity in the Analog Demod mode, that is, most of the variables have been designed so that they are unique to their window. The three variables that are window dependent are, Ref Value, Scale/Div, and Ref Position. These variables change to reflect the settings of the current window (the current window is always outlined in green).

The MPX View is shown below. For more information on the views, see “RF Spectrum Window” on page 520, “Demod Waveform Window” on page 520. “AF Spectrum Window” on page 521, or “Metrics Window” on page 521.

FM Stereo View/Display



RF Spectrum Window

The **RF Spectrum** window shows a spectral display of the input RF signal with amplitude in the vertical Y axis and frequency in the horizontal X axis. The vertical axis is always scaled in dB, with units of dBm, with the Ref Value initially at the top of the vertical scale. This spectral display is basically identical to the Swept SA measurement's frequency display; however it is always taken using an FFT. Its span is restricted to 8 MHz. Zero span is not allowed.

The **RF Spectrum** window provides a convenient way to identify broadcast stations by placing the signal of interest at the center frequency using this window and listening to the instrument's speaker. Demodulation is always performed at the center frequency of the RF Spectrum window; this is regarded as the application's center frequency and is annotated in the Measurement Bar.

In the RF Spectrum window, two green vertical lines are shown centered around the center frequency, with spacing equal to the Channel BW. If the Channel BW is wider than the span, they are not seen.

The Center Frequency, Span, and RF Res BW are annotated at the bottom of the RF Spectrum Window. The Ref Value and Scale/Div are annotated above the graticule.

Demod Waveform Window

In the **Demod Waveform** window, the demodulated signal is displayed in the time domain (zero span) with time on the horizontal X axis, and deviation on the vertical Y axis.

In the **Demod Waveform** window the Y axis is linearly scaled in units of frequency (Hz). On a preset, the Ref Value is positioned in the center of the vertical scale.

Four traces are available in the Demod Waveform window. The Demod trace, in yellow, shows the current demodulation signal. The Demod Max trace, in cyan, shows the Max Hold value for each display point since the last restart and the Demod Min trace, in magenta, shows the Min Hold value for each display point since the last restart. The Demod Average trace, in green, shows the averaged demodulation signal. If Averaging is turned off, only the Demod trace is displayed.

The Sweep Time is annotated at the bottom of the Demod Waveform Window. The Ref Value and Scale/Div are annotated above the graticule.

Spectrum Window

In the **Spectrum** window, the demodulated signal is displayed in the frequency domain with frequency on the X axis and amplitude on the Y axis.

The vertical axis is always scaled in dB with the Ref Value initially at the top of the vertical scale. The Y-Axis Unit is Hz.

In this view you can observe the spectral components of the modulating signal. The preset Start Frequency of this window is 0 Hz. The AF Start Freq and AF Stop Freq are annotated at the bottom of the AF Spectrum Window, as is the AF Res BW.

The Ref Value and Scale/Div are annotated above the graticule.

It is only possible to show a spectrum to a maximum frequency of Channel BW / 2. For trace display points beyond that frequency, the value 1.0E-50 is plotted and returned in queries.

FM Stereo View/Display

Metrics Window

The metrics window displays measurement results..

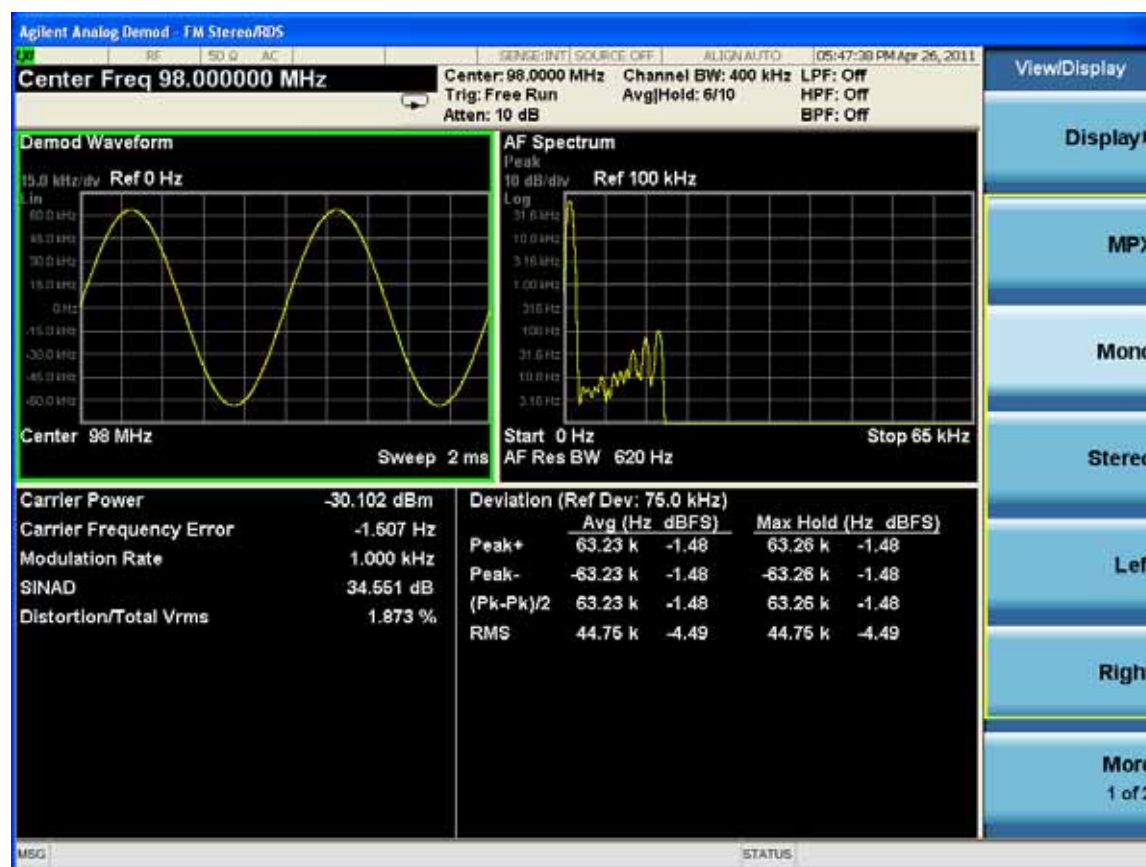
If averaging is turned on, the column marked “Current” is relabeled “Average” and the results in that column are averaged over successive measurements until the Average/Hold number is reached. Then, if not in Single measurement mode, the measurement continues, exponentially averaging in successive results. The Max Hold column shows the Maximum value the un-averaged metric has attained since the last Restart. The Max Hold column is removed when averaging is turned off.

The window title is “FM Deviation”.

Key Path	View/Display
Initial S/W Revision	A.10.00

Mono View

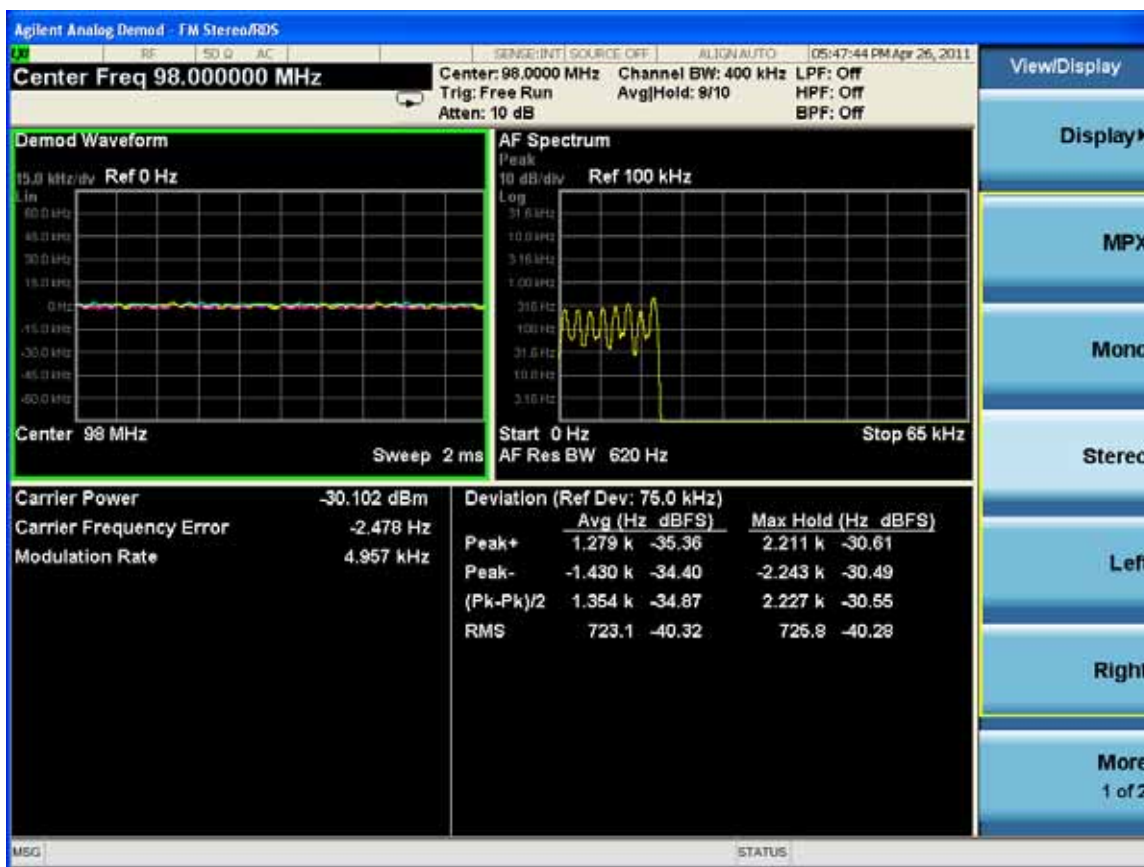
This view shows the Waveform, Spectrum, and the Metrics of the mono signal.



Key Path	View/Display
Initial S/W Revision	A.10.00

Stereo View

This view shows the Waveform, Spectrum, and the Metrics of the stereo signal.

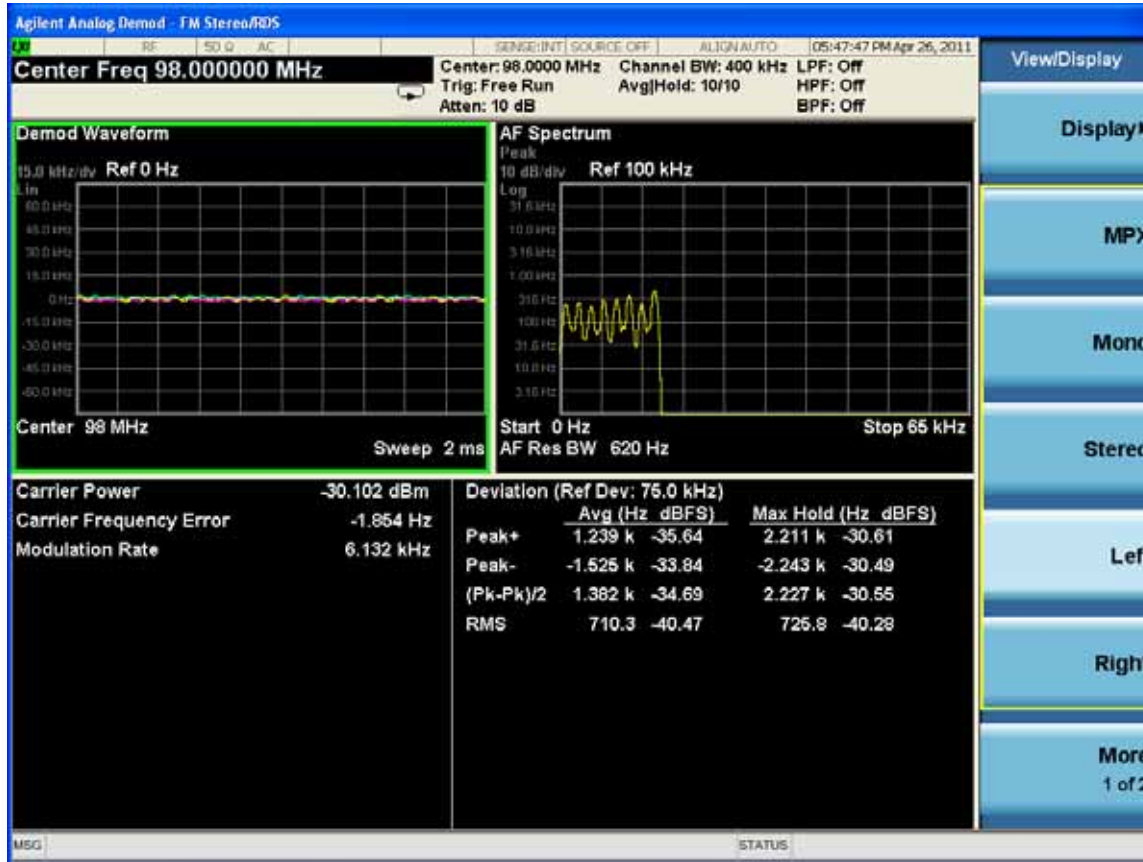


Key Path	View/Display
Initial S/W Revision	A.10.00

Left View

This view shows the Waveform, Spectrum, and the Metrics of the left audio signal.

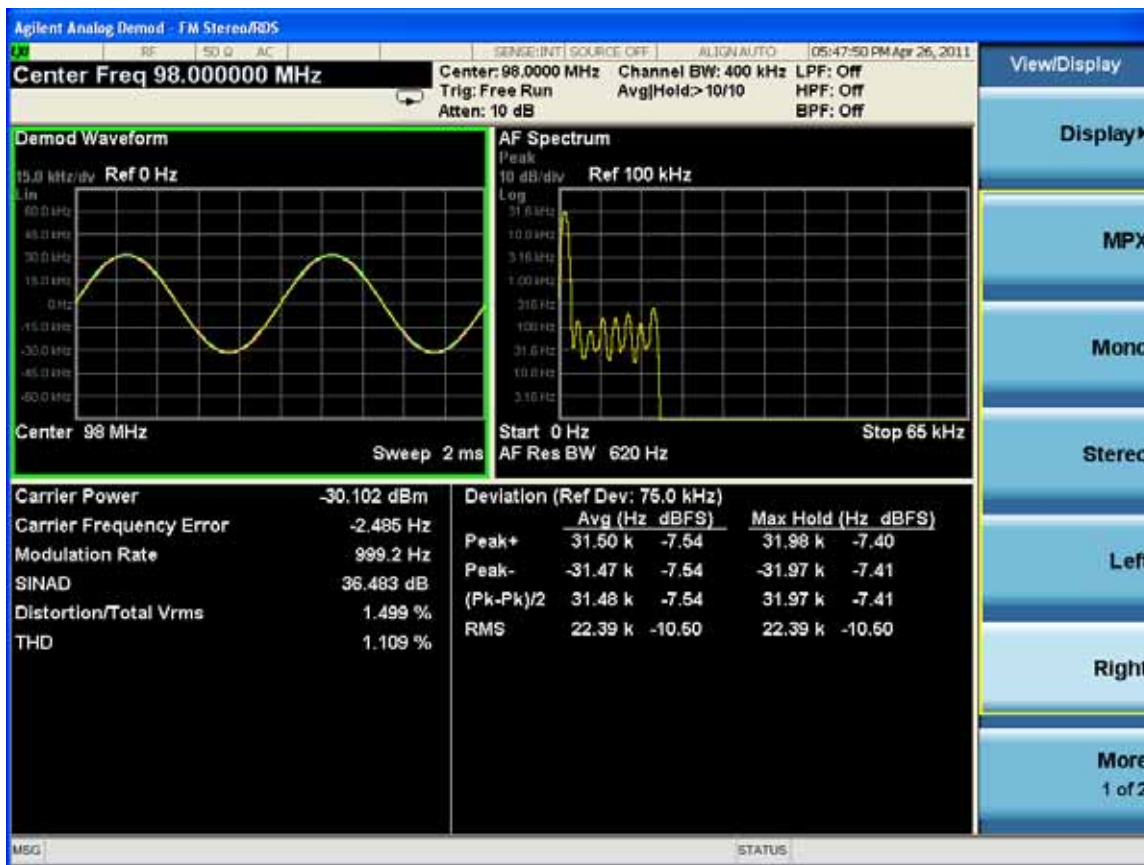
FM Stereo View/Display



Key Path	View/Display
Initial S/W Revision	A.10.00

Right View

This view shows the Waveform, Spectrum, and the Metrics of the right audio signal.

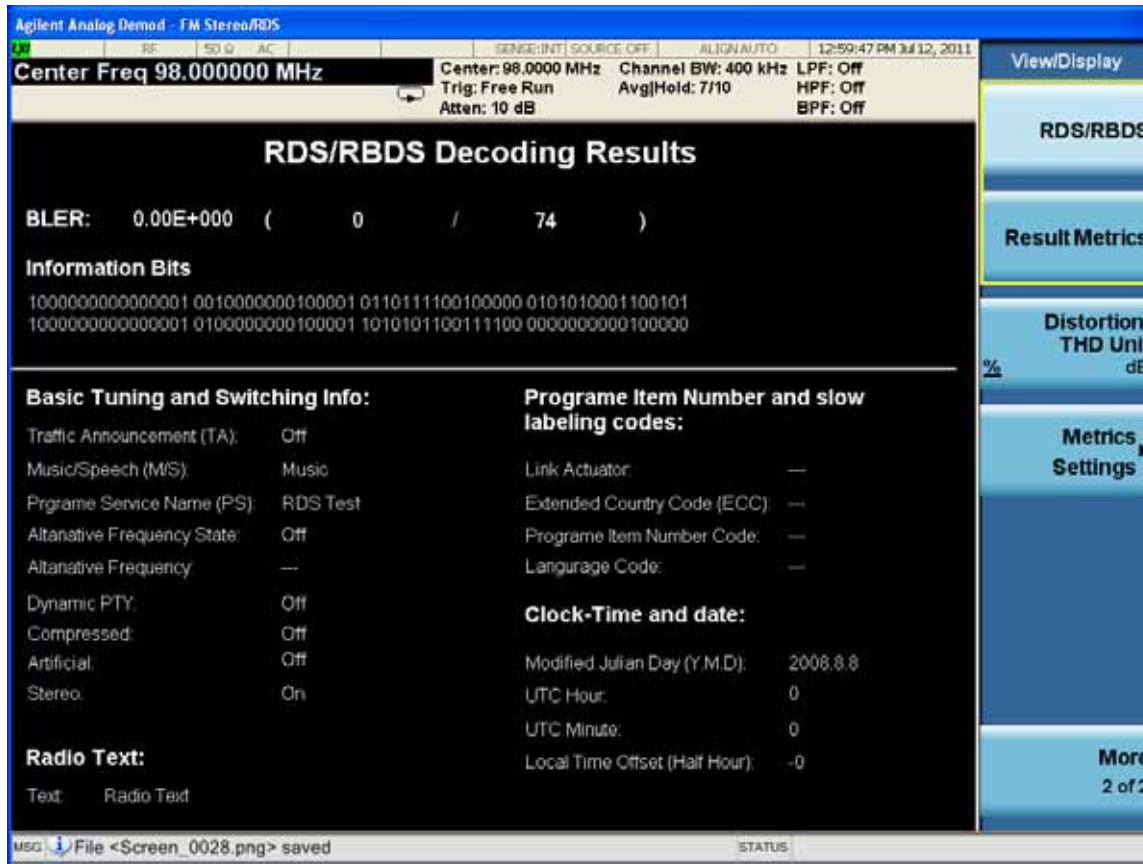


Key Path	View/Display
Initial S/W Revision	A.10.00

RDS/RBDS View

This view shows the RDS bits.

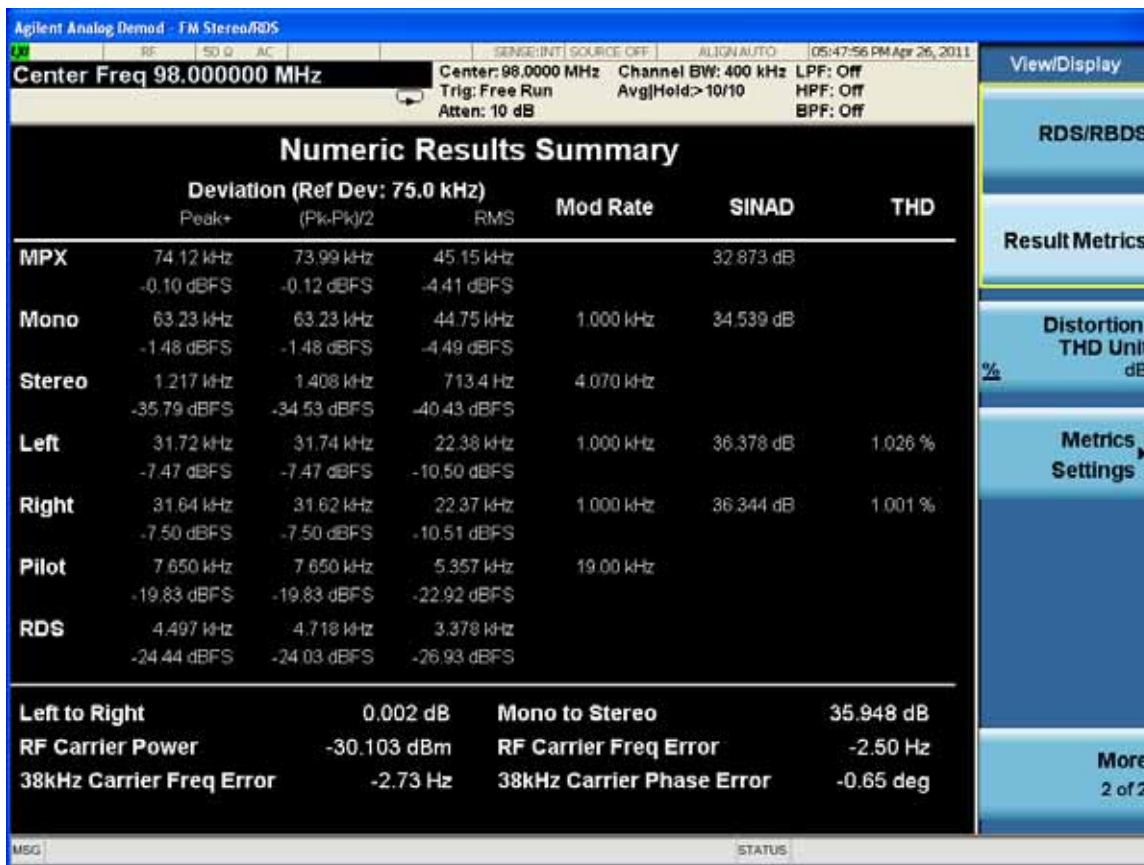
FM Stereo View/Display



Key Path	View/Display
Initial S/W Revision	A.10.00

Result Metrics Summary View

This view shows all the results together in one view.



Key Path	View/Display
Initial S/W Revision	A.10.00

Distortion & THD Unit

Changes the units of distortion and THD in the Metrics screen between % and dB units.

Key Path	View/Display
Remote Command	DISPlay:FMSTereo:VIEW:DISToRtion:UNIT DB PCT DISPlay:FMSTereo:VIEW:DISToRtion:UNIT?
Example	DISP:FMST:VIEW:DIST:UNIT PCT Sets FM Stereo distortion and THD display to percent.
Preset	PCT
State Saved	Saved in State
Initial S/W Revision	A.10.00

Metrics Settings

Accesses a menu used to control which metrics will be provided. This includes a 1-of-N menu which allows you to control which modulation magnitude metrics are displayed, as well as On/Off controls for Modulation Rate and SINAD/Distortion/THD. If speed is an issue, select only the metric(s) that is(are) required. If modulation magnitude is set to Peak+ Only, Pk-Pk/2 Only, or RMS Only, the other modulation magnitude metrics are loaded with not a number and show “--” in the metrics window.

Key Path	View/Display, Metrics Settings
Remote Command	:DISPlay:FMSTereo:VIEW:METRics:MMAGnitude ALL PPK PNPk RMS RMSRatio :DISPlay:FMSTereo:VIEW:METRics:MMAGnitude?
Example	DISP:FMST:VIEW:METR:MMAG PPK Sets FM Stereo modulation magnitude to peak +. DISP:FMST:VIEW:METR:MMAG RMSR Sets ratio reference and sets FM Stereo modulation magnitude to ratio display
Preset	ALL
State Saved	Saved in State
Initial S/W Revision	A.10.00

Normal

Turns on all absolute modulation magnitude metrics. In the metrics window, Peak +, Peak -, Pk-Pk/2 and RMS results are provided.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:FMST:VIEW:METR:MMAG ALL
Notes	This key was labeled “All” in earlier releases
Initial S/W Revision	A.10.00

Peak+ Only

Turns on just the Peak+ metric in the portion of the metrics window that shows the modulation magnitude results.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:FMST:VIEW:METR:MMAG PPK
Initial S/W Revision	A.10.00

Pk-Pk/2 Only

Turns on just the Pk-Pk/2 metric in the portion of the metrics window that shows the modulation

magnitude results. .

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:FMST:VIEW:METR:MMAG PNPk
Initial S/W Revision	A.10.00

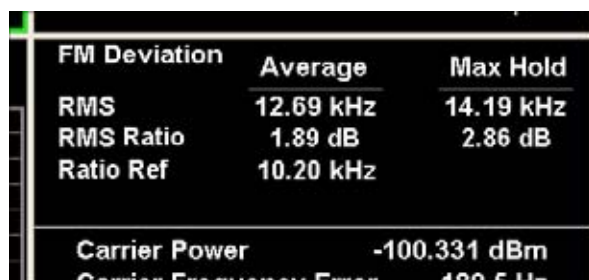
RMS Only

Turns on just the RMS metric in the portion of the metrics window that shows the modulation magnitude results.

Key Path	View/Display, Metrics Settings, Mod Magnitude
Example	:DISP:FMST:VIEW:METR:MMAG RMS
Initial S/W Revision	A.10.00

RMS Ratio

Turns on the display of RMS Ratio. In this mode, the only magnitude metrics that are displayed are the RMS metrics, but besides the display of RMS, the ratio (in dB) of the RMS modulation to its reference is displayed, as well as the value of the reference, as shown in the display below:



Pressing the RMS Ratio key (or sending :DISP:FMST:VIEW:METR:MMAG RMSR) establishes the reference. Pressing it again (or sending the SCPI command again) establishes a new reference. Whenever this happens, the current value of RMS modulation from the left hand column (Current or Average) is taken as the new reference.

If, when the ratio is to be established, there is not a valid value being displayed to use as a reference, an error is generated, the RMS Ratio and Ratio Ref values display --- and queries of either return not a number (9.91 e37).

To turn off the ratio display, select one of the other Mod magnitude views.

Note that each measurement (AM, FM, PM, PM and FM Stereo) has its own reference; and the reference is remembered when you leave the measurement and return.

The ratio references are saved in State, and when the recalled state of **Metrics Settings** is **RMS Ratio**, the saved reference for the current measurement should be recalled and used, rather than establishing a new one.

Key Path	View/Display, Metrics Settings, Mod Magnitude
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FM Stereo View/Display

Example	:DISP:FMST:VIEW:METR:MMAG RMSR
Initial S/W Revision	A.10.00

Modulation Rate

Toggles the Modulation Rate metric on and off. When turned on, the Modulation Rate metric is provided. When turned off, the Modulation Rate metric is set to not a number and shows “---“ in the metric window.

Key Path	View/Display, Metrics Settings
Remote Command	DISPlay:FMSTereo:VIEW:METRics:MRATE[:STATe] ON OFF 1 0 DISPlay:FMSTereo:VIEW:METRics:MRATE[:STATe]?
Example	DISP:FMST:VIEW:METR:MRAT OFF Sets FM Stereo modulation rate to off
Preset	On
State Saved	Saved in instrument state
Initial S/W Revision	A.10.00

SINAD, THD, Distortion

Toggles the distortion metrics – SINAD, Distortion and THD. When turned off, SINAD, Distortion and THD metrics are set to not a number and show “---“ in the metric window.

SINAD is the ratio of total received power (the received signal-plus-noise-plus-distortion power) to the received noise-plus-distortion power. It is always expressed in decibel units. The rejection of the carrier from the noise-plus-distortion power measurement is usually not much more than 50 dB, thus limiting the maximum SINAD.

THD is the ratio of the root mean square voltage of the harmonics referenced to the fundamental voltage, expressed in % or dB. Note the differences with respect to Distortion. The denominator of the ratio is different and the items in the numerator do not include the noise between harmonics, just the harmonics themselves.

Distortion/Total Voltage (rms) is the ratio of unwanted received power (noise plus distortion) to the total received power, expressed in % or dB. Therefore, this metric is the negative of SINAD when expressed in decibels.

Key Path	View/Display, Metrics Settings
Remote Command	DISPlay:FMSTereo:VIEW:METRics:DISToRtion[:STATe] ON OFF 1 0 DISPlay:FMSTereo:VIEW:METRics:DISToRtion [:STATe]?
Example	DISP:FMST:VIEW:METRics:DIST OFF Sets FM Stereo modulation rate to off
Preset	On

State Saved	Saved in instrument state
Initial S/W Revision	A.10.00

FM Stereo View/Display