



Agilent X-Series Signal Analyzer

This manual provides documentation for the following analyzers:

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

N9069A & W9069A Noise Figure Measurement Application User's and Programmer's Reference



Agilent Technologies

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[:SENSe]:NFIGure:CORRection:LOSS:AFTer:MODE OFF FIXed TABLe	
[:SENSe]:NFIGure:CORRection:LOSS:AFTer:MODE?	410
[:SENSe]:NFIGure:CORRection:LOSS:AFTer:TABLe:DATA:DELeTe	414
[:SENSe]:NFIGure:CORRection:LOSS:AFTer:VALue <value>	411
[:SENSe]:NFIGure:CORRection:LOSS:AFTer:VALue?	411
[:SENSe]:NFIGure:CORRection:LOSS:BEFore:MODE OFF FIXed TABLe	
[:SENSe]:NFIGure:CORRection:LOSS:BEFore:MODE?	409
[:SENSe]:NFIGure:CORRection:LOSS:BEFore:TABLe:DATA:DELeTe	413
[:SENSe]:NFIGure:CORRection:LOSS:BEFore:VALue <value>	409
[:SENSe]:NFIGure:CORRection:LOSS:BEFore:VALue?	409
[:SENSe]:NFIGure:CORRection:LOSS:BEFore AFTer:TABLe:COUNT?	415
[:SENSe]:NFIGure:CORRection:LOSS:BEFore AFTer:TABLe:DATA <frequency>, <amplitude> ([, <frequency>, <amplitude>)] *	414
[:SENSe]:NFIGure:CORRection:LOSS:BEFore AFTer:TABLe:DATA?	414
[:SENSe]:NFIGure:CORRection:SPOT:MODE ENR THOT	397
[:SENSe]:NFIGure:CORRection:SPOT:MODE?	397
[:SENSe]:NFIGure:CORRection:TCOLd USER DEFault	399
[:SENSe]:NFIGure:CORRection:TCOLd:SNS[:STATe] ON OFF 1 0	400
[:SENSe]:NFIGure:CORRection:TCOLd:SNS[:STATe]?	400
[:SENSe]:NFIGure:CORRection:TCOLd:USER:SET	400
[:SENSe]:NFIGure:CORRection:TCOLd?	399
[:SENSe]:NFIGure:CORRection:TEMPerature:AFTer <value>	412
[:SENSe]:NFIGure:CORRection:TEMPerature:AFTer?	412

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[[:SENSe]:NFIGure:CORRection:TEMPerature:BEFore <temperature>	410
[[:SENSe]:NFIGure:CORRection:TEMPerature:BEFore?	410
[[:SENSe]:NFIGure:DETEctor[:FUNction] AVERAge	503
[[:SENSe]:NFIGure:DETEctor[:FUNction]?	503
[[:SENSe]:NFIGure:FREQuency:CENTer < freq >	258
[[:SENSe]:NFIGure:FREQuency:CENTer?	258
[[:SENSe]:NFIGure:FREQuency:FIXed <freq>	259
[[:SENSe]:NFIGure:FREQuency:FIXed?	259
[[:SENSe]:NFIGure:FREQuency:LIST:COUNT?	261
[[:SENSe]:NFIGure:FREQuency:LIST:DATA <frequency>, ([, <frequency>])*	261
[[:SENSe]:NFIGure:FREQuency:LIST:DATA?	261
[[:SENSe]:NFIGure:FREQuency:MODE SWEpt FIXed LIST	255
[[:SENSe]:NFIGure:FREQuency:MODE?	255
[[:SENSe]:NFIGure:FREQuency:SPAN <freq>	495
[[:SENSe]:NFIGure:FREQuency:SPAN?	495
[[:SENSe]:NFIGure:FREQuency:STARt <freq>	256
[[:SENSe]:NFIGure:FREQuency:STARt <freq>	455
[[:SENSe]:NFIGure:FREQuency:STARt <freq>	457
[[:SENSe]:NFIGure:FREQuency:STARt?	256
[[:SENSe]:NFIGure:FREQuency:STARt?	455
[[:SENSe]:NFIGure:FREQuency:STARt?	457
[[:SENSe]:NFIGure:FREQuency:STOP <freq>	257
[[:SENSe]:NFIGure:FREQuency:STOP <freq>	456
[[:SENSe]:NFIGure:FREQuency:STOP <freq>	457
[[:SENSe]:NFIGure:FREQuency:STOP?	257
[[:SENSe]:NFIGure:FREQuency:STOP?	456
[[:SENSe]:NFIGure:FREQuency:STOP?	457
[[:SENSe]:NFIGure:MODE:DIAGram CALibration MEASurement	452
[[:SENSe]:NFIGure:MODE:DIAGram?	452
[[:SENSe]:NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:FREQuency <freq>	456
[[:SENSe]:NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:FREQuency?	456

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[:SENSe]:NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:OFFSet LSB USB DSB	451
[:SENSe]:NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:OFFSet?	451
[:SENSe]:NFIGure:MODE:DOWNconv UPConv SYSTem:IF:FREQuency <freq>	458
[:SENSe]:NFIGure:MODE:DOWNconv UPConv SYSTem:IF:FREQuency?	458
[:SENSe]:NFIGure:MODE:DUT AMPLifier UPConv DOWNconv	448
[:SENSe]:NFIGure:MODE:DUT:LOSCillator FIXed SWEPT	450
[:SENSe]:NFIGure:MODE:DUT:LOSCillator?	450
[:SENSe]:NFIGure:MODE:DUT?	448
[:SENSe]:NFIGure:MODE:FREQuency:CONText RF IF LO	452
[:SENSe]:NFIGure:MODE:FREQuency:CONText?	452
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:AUXiliary <string>	465
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:AUXiliary?	465
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:FREQuency:PREFix <string>	464
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:FREQuency:PREFix?	464
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:FREQuency:SUFFix <string>	464
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:FREQuency:SUFFix?	464
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:POWer:PREFix <string>	463
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:POWer:PREFix?	463
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:POWer:SUFFix <string>	463
[:SENSe]:NFIGure:MODE:LOSCillator:COMMand:POWer:SUFFix?	463
[:SENSe]:NFIGure:MODE:LOSCillator:CONTRol[:STATe] ON OFF 1 0	459
[:SENSe]:NFIGure:MODE:LOSCillator:CONTRol[:STATe]?	459
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MAXimum[:FREQuency] <freq>	466
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MAXimum[:FREQuency]?	466
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MINimum[:FREQuency] <freq>	465
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MINimum[:FREQuency]?	465
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier:DENominator <int>	462
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier:DENominator?	462
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier:NUMerator <int>	461
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier:NUMerator?	461
[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:POWer[:LEVel] <float>	460

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[[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:POWer[:LEVel]?	460
[[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:SETTling[:TIME] <float>.	460
[[:SENSe]:NFIGure:MODE:LOSCillator:PARAmeter:SETTling[:TIME]?	460
[[:SENSe]:NFIGure:MODE:LOSCillator:TYPE SCPI CUSTom	462
[[:SENSe]:NFIGure:MODE:LOSCillator:TYPE?	462
[[:SENSe]:NFIGure:MODE:SYSTem:DOWNconv[:STATe] ON OFF 1 0	449
[[:SENSe]:NFIGure:MODE:SYSTem:DOWNconv[:STATe]?	449
[[:SENSe]:NFIGure:NSSTime <time>	422
[[:SENSe]:NFIGure:NSSTime?	422
[[:SENSe]:NFIGure:POWer[:RF]:ATTenuation <float>.	238
[[:SENSe]:NFIGure:POWer[:RF]:ATTenuation?	238
[[:SENSe]:NFIGure:POWer[:RF]:GAIN[:STATe] OFF ON 0 1	247
[[:SENSe]:NFIGure:POWer[:RF]:GAIN[:STATe]?	247
[[:SENSe]:NFIGure:PRESelector:OPTimize	421
[[:SENSe]:NFIGure:SWEEP:POINTS <integer>	498
[[:SENSe]:NFIGure:SWEEP:POINTS?	498
[[:SENSe]:NFIGure:SWEEP:TIME <time>	497
[[:SENSe]:NFIGure:SWEEP:TIME:AUTO ON OFF 1 0	497
[[:SENSe]:NFIGure:SWEEP:TIME:AUTO?	497
[[:SENSe]:NFIGure:SWEEP:TIME?	497
[[:SENSe]:POWer[:RF]: RFPSelector [:STATe] 1 0 ON OFF.	270
[[:SENSe]:POWer[:RF]: RFPSelector [:STATe]?	270
[[:SENSe]:RECORDing:ABORt	318
[[:SENSe]:RECORDing:INITiate[:IMMEDIATE]	318
[[:SENSe]:RECORDing:LENGth <real>,SECOnds RECOrds POINTS.	319
[[:SENSe]:RECORDing:LENGth:STATe MAX MANual	319
[[:SENSe]:RECORDing:LENGth:STATe?	319
[[:SENSe]:RECORDing:LENGth:UNIT?	320
[[:SENSe]:RECORDing:LENGth:VALue?	319
[[:SENSe]:ROSCillator:BANDwidth WIDE NARRow	334
[[:SENSe]:ROSCillator:BANDwidth?	334

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[:SENSe]:ROSCillator:COUPLing NORMal NACquisition	336
[:SENSe]:ROSCillator:COUPLing?	336
[:SENSe]:ROSCillator:EXTernal:FREQuency <freq>	334
[:SENSe]:ROSCillator:EXTernal:FREQuency?	334
[:SENSe]:ROSCillator:SOURce INTernal EXTernal	332
[:SENSe]:ROSCillator:SOURce:TYPE INTernal EXTernal SENSe.	332
[:SENSe]:ROSCillator:SOURce:TYPE?	332
[:SENSe]:ROSCillator:SOURce?	332
[:SENSe]:SIDentify:MODE ISUPpress ISHift	289
[:SENSe]:SIDentify:MODE?	289
[:SENSe]:SIDentify[:STATe] OFF ON 0 1	288
[:SENSe]:SIDentify[:STATe]?	288
[:SENSe][:NFIGure]:CORRection:TCOLd:USER:VALue <value>.	399
[:SENSe][:NFIGure]:CORRection:TCOLd:USER:VALue?	399
OUTPut:ANALog:AUTO OFF ON 0 1	341
OUTPut:ANALog:AUTO?	341
SYSTem:PDOWn [NORMal FORCe].	205

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 39](#).

Structure of Help

See [“How Help is Organized” on page 36](#).

Navigating Help

- If the instrument has an attached mouse, see [“Navigating Help with a Mouse” on page 42](#).
- If the instrument does not have an attached mouse, see [“Navigating Help Without a Mouse” on page 43](#).

For specific details of how to navigate to topics, see [“Finding a Topic” on page 47](#).

- 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 50](#).

Locating Other Documentation

See [“Other Help Resources” on page 52](#).

Key Path	Front-panel key
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How Help is Organized

This topic includes:

- “Help Contents Listing” on page 36
- “Key Descriptions for Each Measurement” on page 37
- “Key Information for Softkeys” on page 37
- “Common Measurement Functions” on page 38

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 38, and are included here for convenience.

7. Measurement Functions

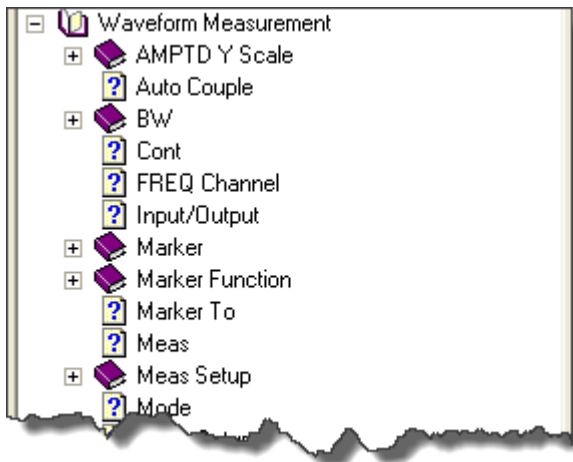
See “[Key Descriptions for Each Measurement](#)” on page 37 below.

8. Common Measurement Functions

See “[Common Measurement Functions](#)” on page 38 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 37 below.

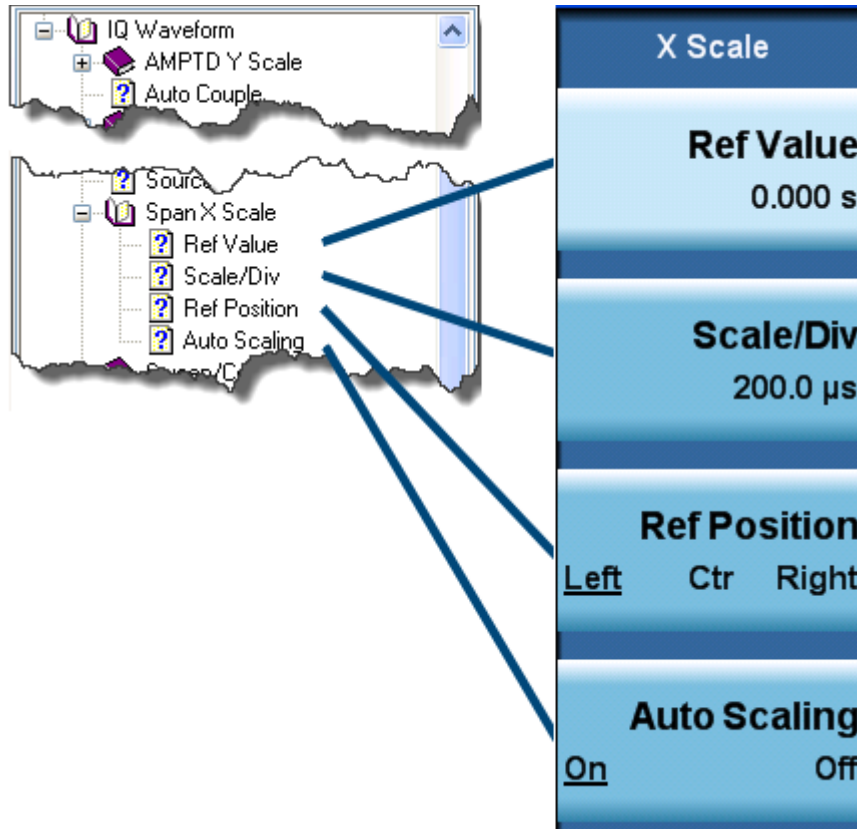
If you don't see a topic for a front-panel key in the Measurement-specific section, then it is located in the System Functions section.

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 40.
9	Alt	Navigates within the Help system, in conjunction with other keys. See “Navigating the Help Files” on page 40.
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 40
- “Basic Help Window Operations” on page 41
- “Navigating Help with a Mouse” on page 42

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 41](#)
- [“Getting Help for a Specific Key” on page 41](#)
- [“Closing Help” on page 41](#)
- [“Viewing Help on Using Help” on page 41](#)

For more Help window operations, see [“Navigating Help Without a Mouse” on page 43](#).

To locate the keys mentioned in this section, see [“Front Panel Keys used by the Help System” on page 39](#).

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 41](#)), 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 40](#).

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.

Using Help

Navigating the Help Files

To exit Help on Using Help, press the **Bk Sp** key, or see “[Topic Pane Operations](#)” on page 45 for equivalent methods.



Navigating Help with a Mouse

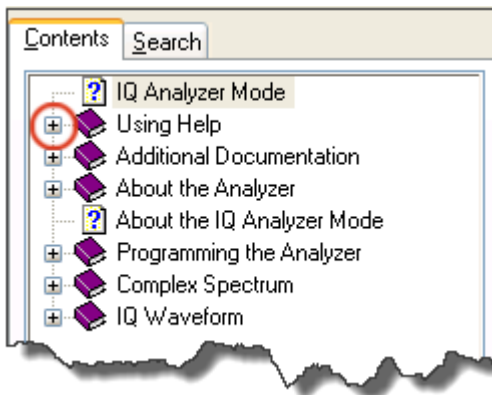
When Help is open, you can point-and-click to navigate, as you would when using Help for any Microsoft Windows computer application.

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 43.

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 41, 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.

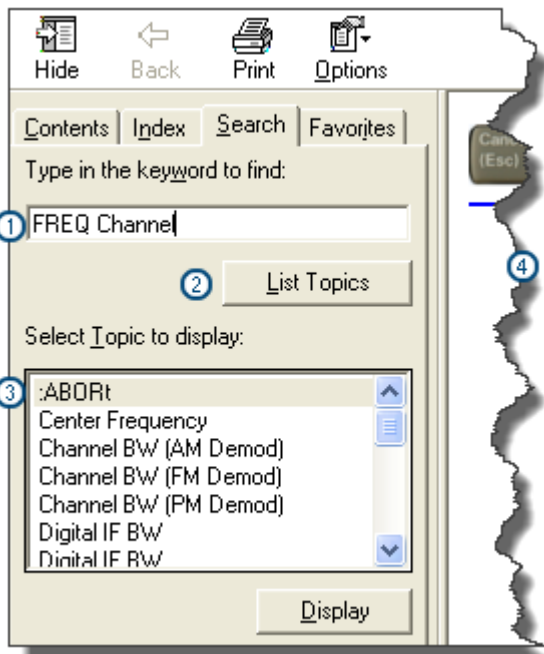


- To move to the next or previous page within a topic, click the **Next Page** or **Previous Page** keys (at the top right of the **Topic** Pane), as shown below.



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 47.

This topic includes:

- [“Next Window Key”](#) on page 44
- [“Contents Tab \(Navigation Pane\) Operations”](#) on page 44
- [“Topic Pane Operations”](#) on page 45
- [“Selecting a Hyperlink”](#) on page 46

Using Help
Navigating the Help Files

- “Finding a Topic” on page 47

To locate all the keys mentioned in this section, see “Front Panel Keys used by the Help System” on page 39.

Next Window Key

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

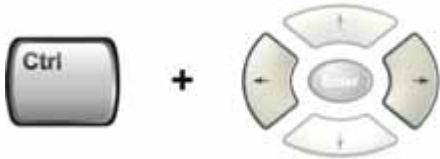


Contents Tab (Navigation Pane) Operations

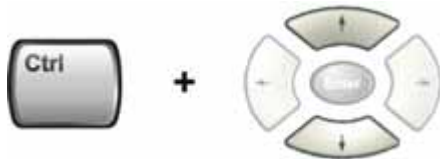
- To switch the active tab, hold down the **Ctrl** key, then press either the **Forward Tab** or **Backward Tab** key.



- 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.

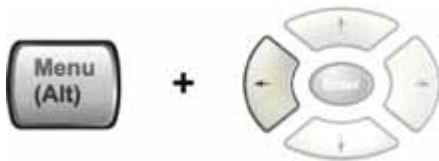


Topic Pane Operations

- 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:

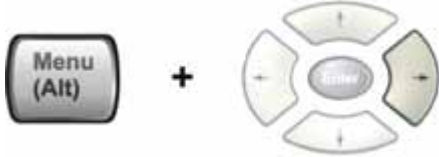
Press the **Bk Sp** key.



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 51](#) 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 52](#).

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 53 .
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.

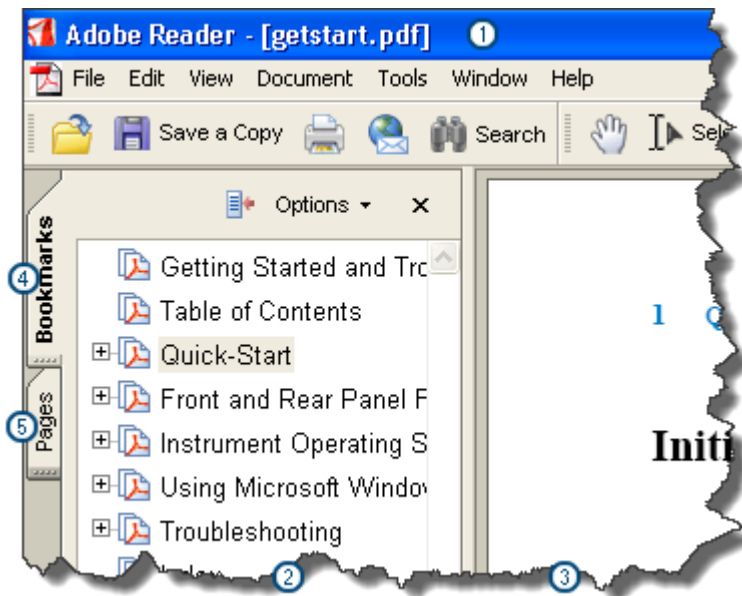
The Adobe Reader user interface differs from the Windows Help interface. For full details, see [“Navigating Acrobat \(PDF\) Files” on page 52](#) and [“Printing Acrobat Files” on page 53](#).

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.

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.

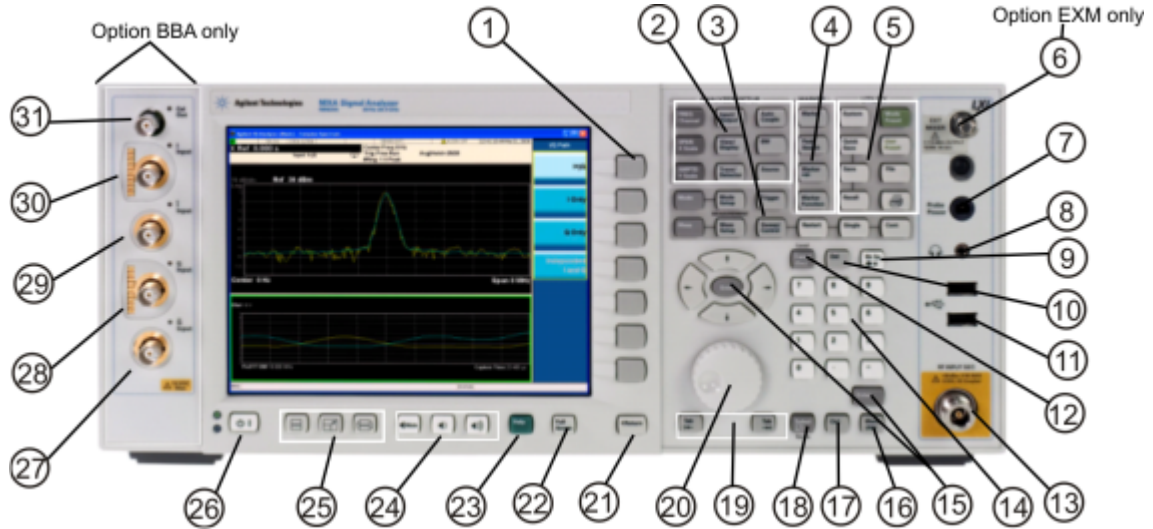
For CXA,

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

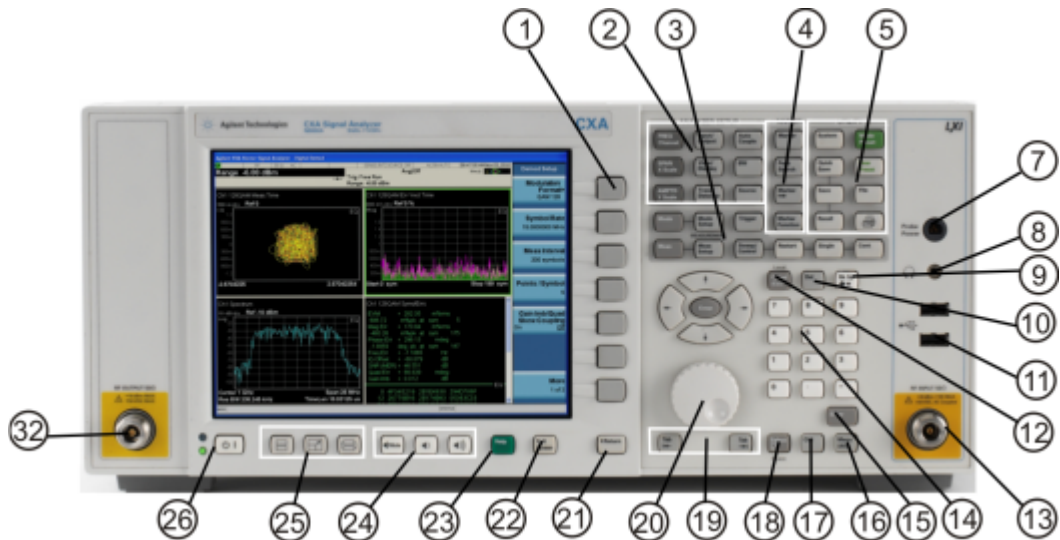
Select the **CXA N9000A, Options and Measurement Applications** link on the top of the page.

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 Analyzer
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 Analyzer
Front-Panel Features

Item		Description
#	Name	
27	\bar{Q} Input	Input port for the \bar{Q} channel when in differential mode. ¹
28	Q Input	Input port for the Q channel for either single or differential mode. ¹
29	\bar{I} Input	Input port for the \bar{I} channel when in differential mode. ¹
30	I Input	Input port for the I channel for either single or differential mode. ¹
31	Cal Out	Output port for calibrating the I, \bar{I} , Q and \bar{Q} inputs and probes used with these inputs. ¹
32	RF Out	Output port for Options T03/07 (CXA only)

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

Overview of key types

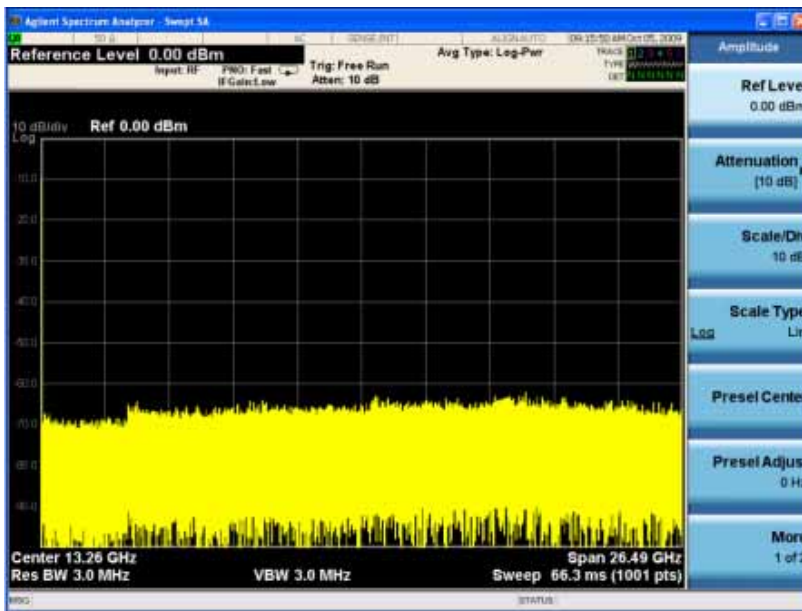
The keys labeled **FREQ Channel**, **System**, and **Marker Functions** are all examples of front-panel keys.



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

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

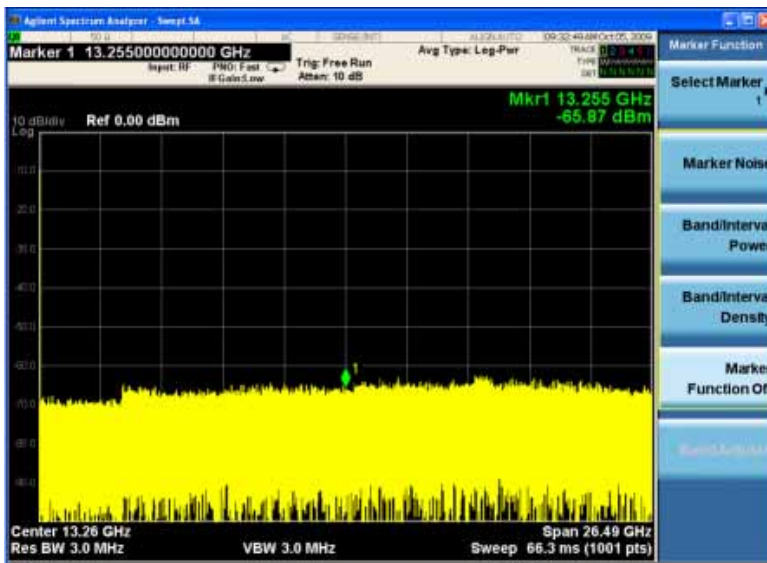
If the numeric value of a menu key function can be changed, it is called an active function. The function label of the active function is highlighted after that key has been selected. For example, press **AMPTD Y Scale**. This calls up the menu of related amplitude functions. The function labeled **Ref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



Some menu keys have multiple choices on their label, such as **On/Off**, **Auto/Man**, or **Log/Lin** (as shown above). The different choices are selected by pressing the key multiple times. For example, the Auto/Man type of key. To select the function, press the menu key and notice that Auto is underlined and the key becomes highlighted. To change the function to manual, press the key again so that Man is underlined. If there are more than two settings on the key, keep pressing it until the desired selection is underlined.

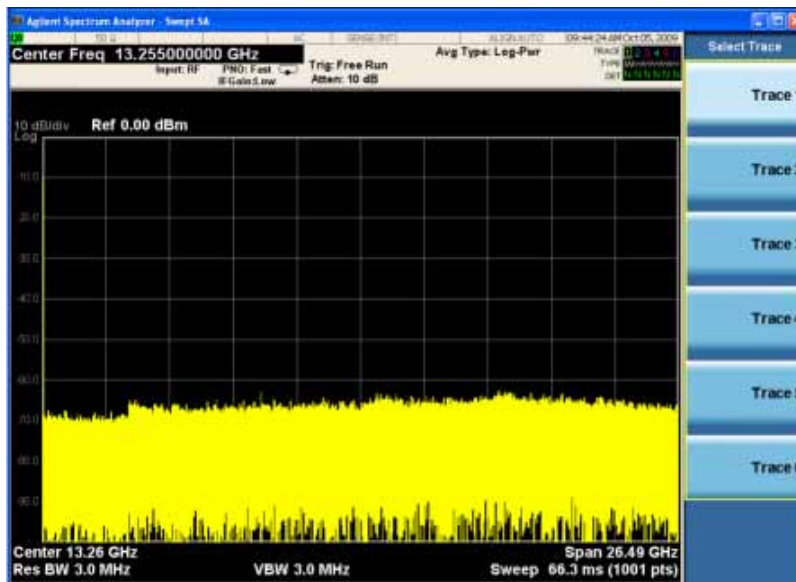
About the Analyzer Front-Panel Features

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.

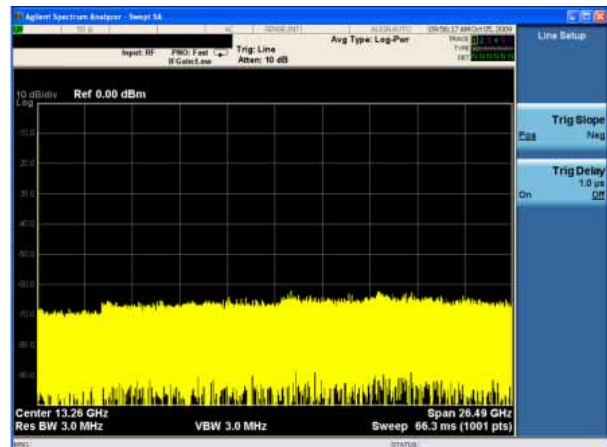
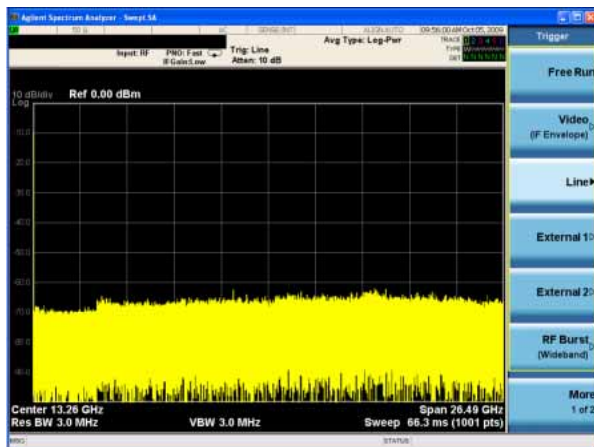
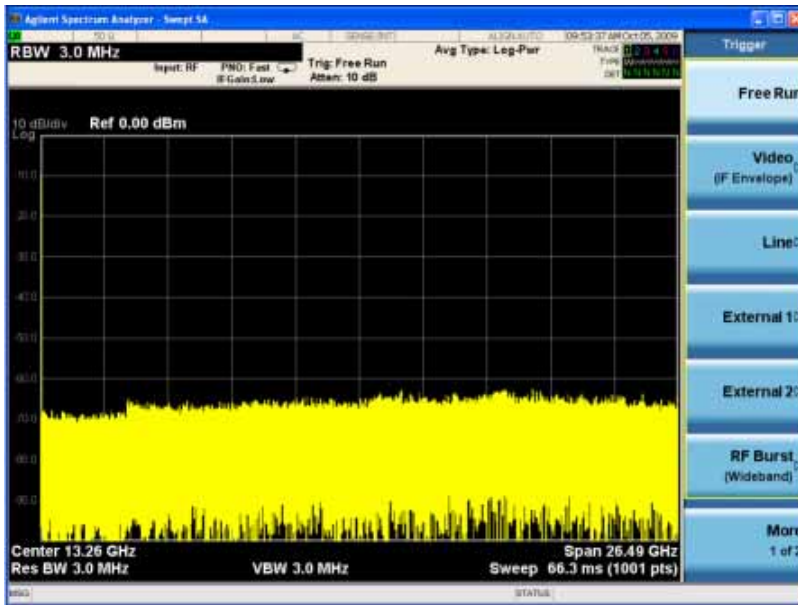


Some of the menu keys are grouped together by a yellow bar running behind the keys near the left side or by a yellow border around the group of keys. When you press a key within the yellow region, such as **Marker Noise**, the highlight moves to that key to show it has been selected. The keys that are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

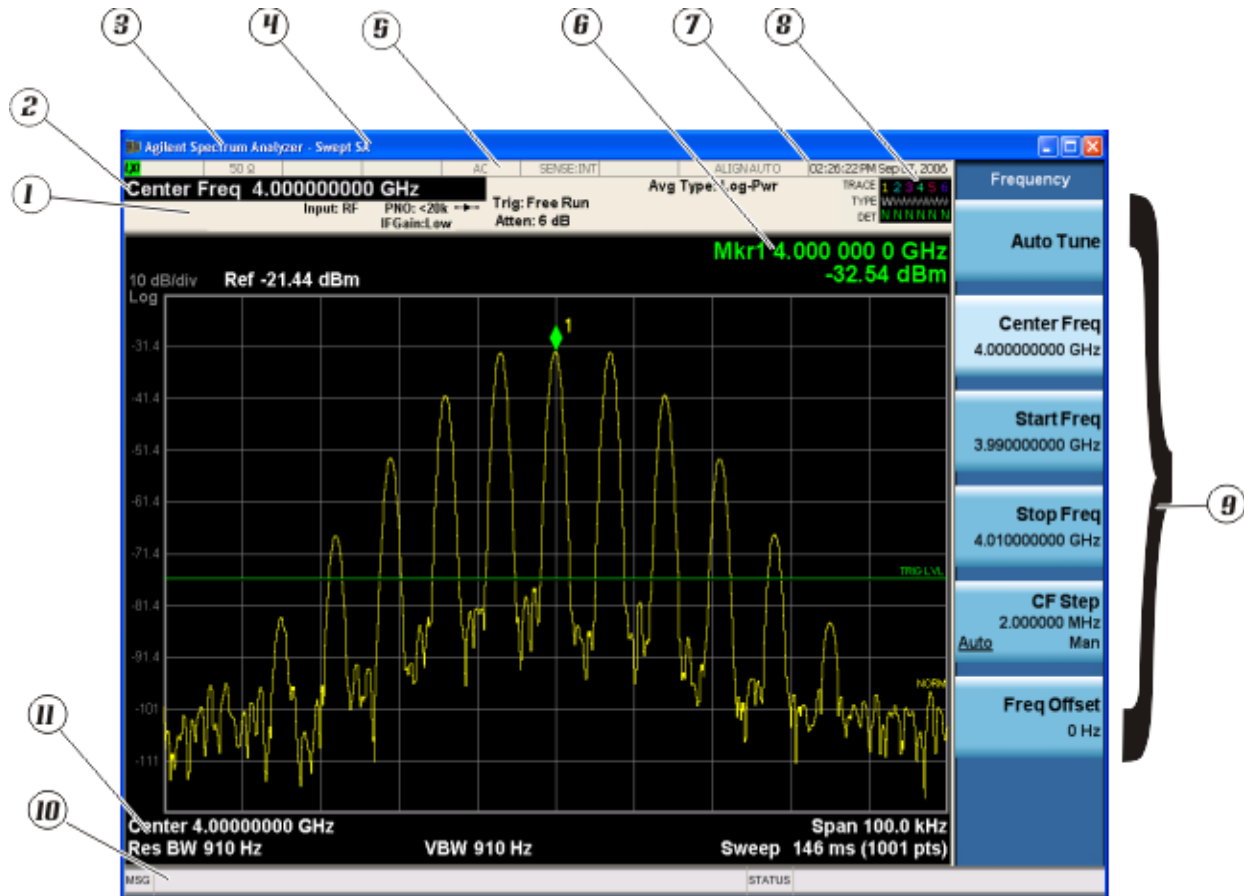



If a displayed key label shows a small solid-black arrow tip pointing to the right, it indicates that additional key menus are available. If the arrow tip is not filled in solid then pressing the key the first time selects that function. Now the arrow is solid and pressing it again brings up an additional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

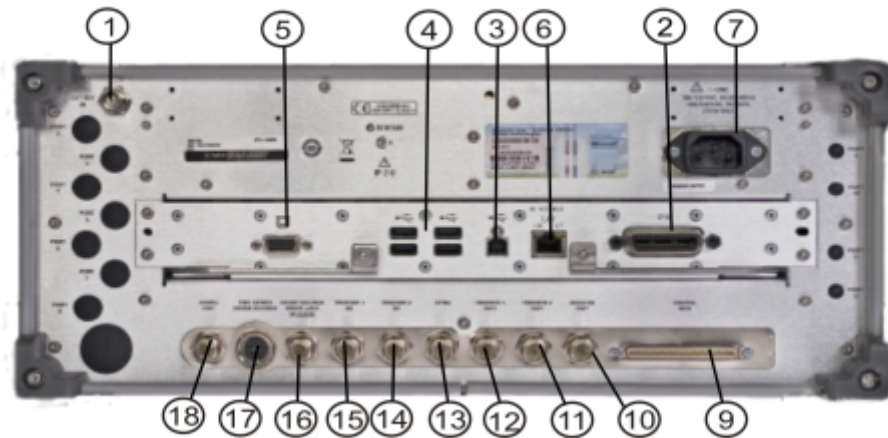
Item	Description	Function Keys
5	Settings panel - displays system information that is not specific to any one application. <ul style="list-style-type: none"> • Input/Output status - green LXI indicates the LAN is connected. RLTS indicate Remote, Listen, Talk, SRQ • Input impedance and coupling • Selection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



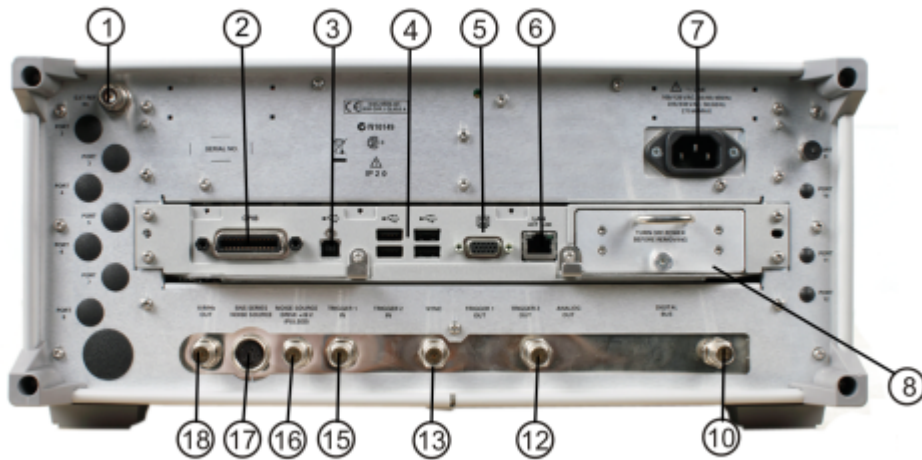
Older MXA and EXA



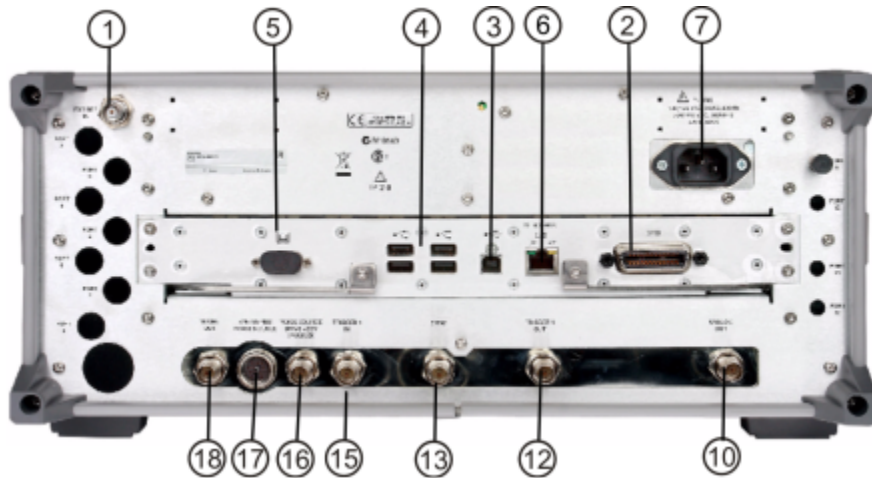
Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For PXA – 1 to 50 MHz For MXA – 1 to 50 MHz For EXA – 10 MHz.
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.

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)

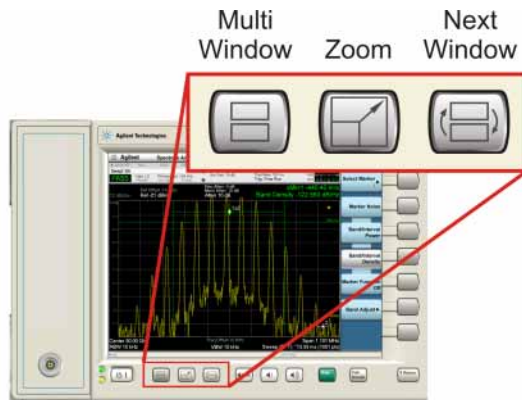


Item		Description
#	Name	
1	EXT REF IN	Input for an external frequency reference signal: For CXA – 10 MHz.
2	GPIB	A General Purpose Interface Bus (GPIB, IEEE 488.1) connection that can be used for remote analyzer operation.

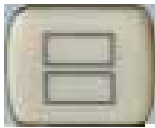
Item		Description
#	Name	
3	USB Connector	USB 2.0 port, Type B. USB TMC (test and measurement class) connects to an external pc controller to control the instrument and for data transfers over a 480 Mbps link.
4	USB Connectors	Standard USB 2.0 ports, Type A. Connect to external peripherals such as a 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.

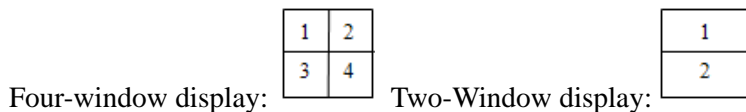
NOTE Data acquisition and processing for the other windows continues while a window is zoomed, as does all SCPI communication with the other windows.

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

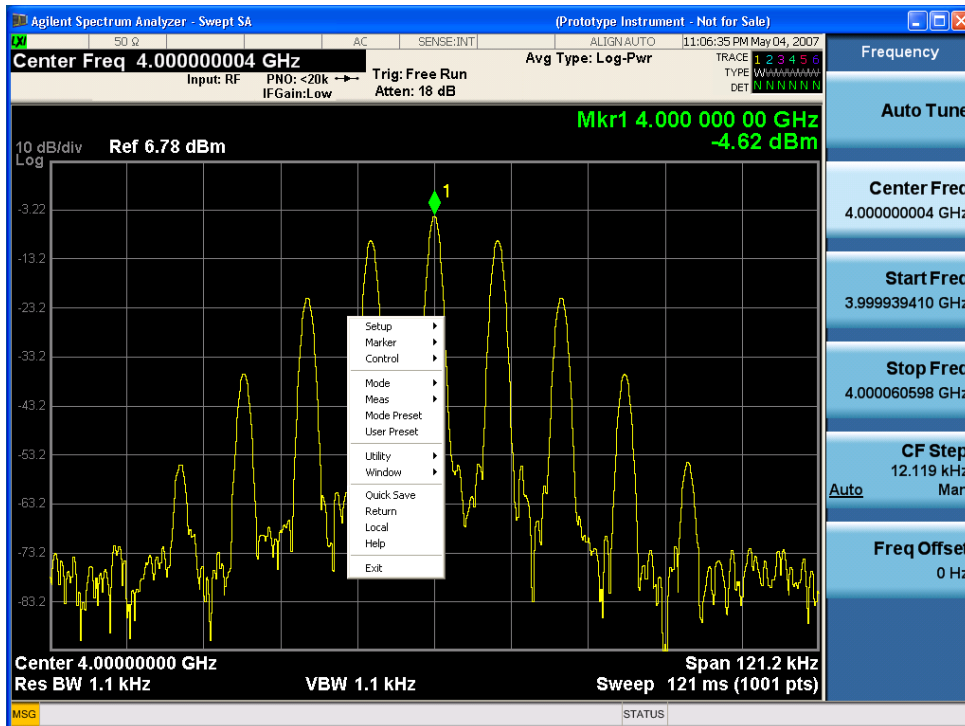
contents window and the topic pane window.

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.

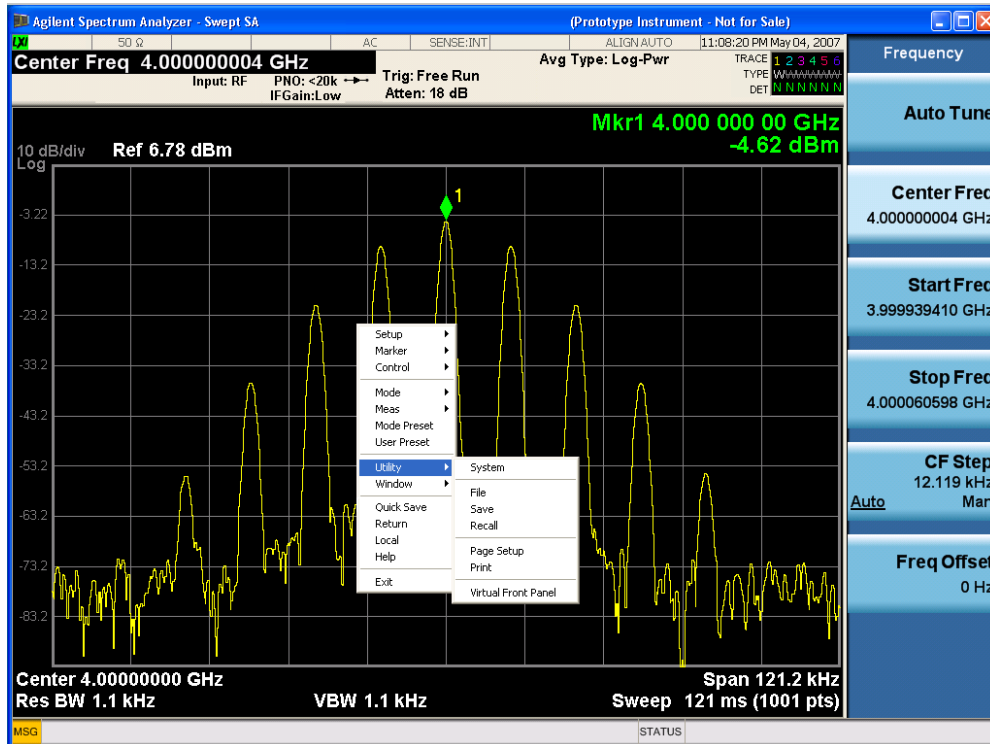
Right-Click

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



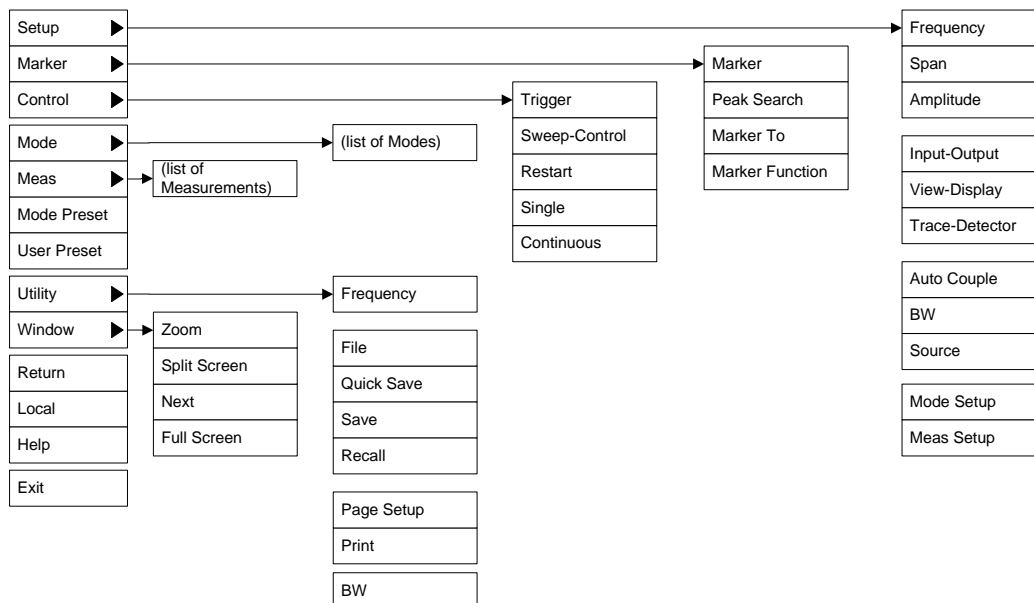
Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:

About the Analyzer Mouse and Keyboard Control



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

The array of keys thus available is shown below:



PC Keyboard

If you have a PC keyboard plugged in (or via Remote Desktop), certain key codes on the PC keyboard

map to front-panel keys on the GPSA front panel. These key codes are shown below:

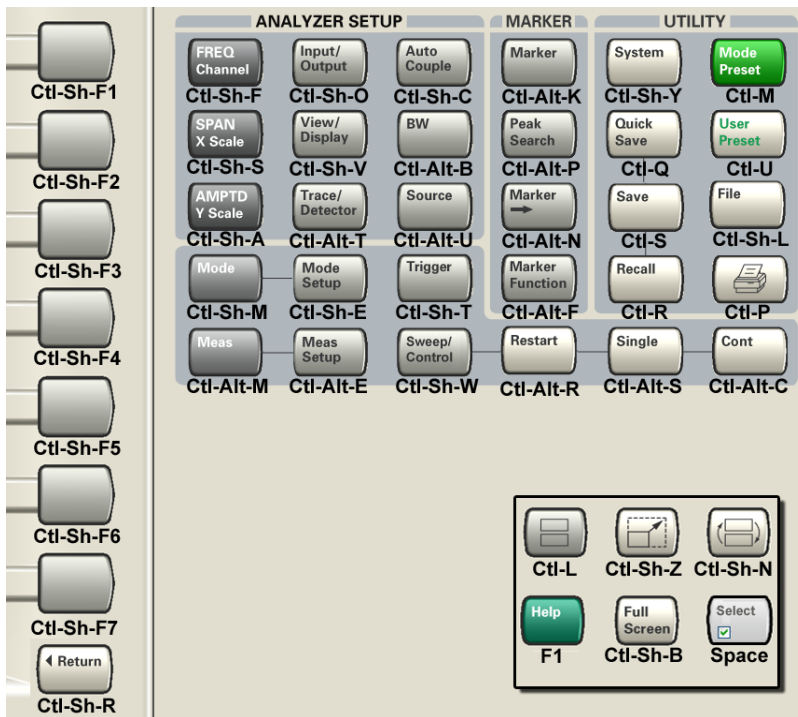
Front-panel key	Key code
Frequency	CTRL+SHIFT+F
Span	CTRL+SHIFT+S
Amplitude	CTRL+SHIFT+A
Input/Output	CTRL+SHIFT+O
View/Display	CTRL+SHIFT+V
Trace/Detector	CTRL+ALT+T
Auto Couple	CTRL+SHIFT+C
Bandwidth	CTRL+ALT+B
Source	CTRL+SHIFT+E
Marker	CTRL+ALT+K
Peak Search	CTRL+ALT+P
Marker To	CTRL+ALT+N
Marker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

Mouse and Keyboard Control

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

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 Noise Figure Measurement Application

This section provides information on using the Noise Figure Measurement Application in your Agilent X-Series Signal Analyzer (PXA/MXA/EXA/CXA).

What Does Noise Figure Mode Do?

The Noise Figure mode enables you to make a number of individual noise figure measurements over the range of frequencies specified by the frequency parameters. After each frequency point has been measured, the results are displayed.

The measurement includes the following functionality:

- Averaging
- Storage of a comma delimited results file to disk
- Multiple data views; Graphic, Meter and Table
- Result types including Noise Figure, Gain, Y-Factor, Effective Temp, P hot and P cold
- Supports Smart Noise Sources (SNS)
- Supports external source control using LAN

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 155 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

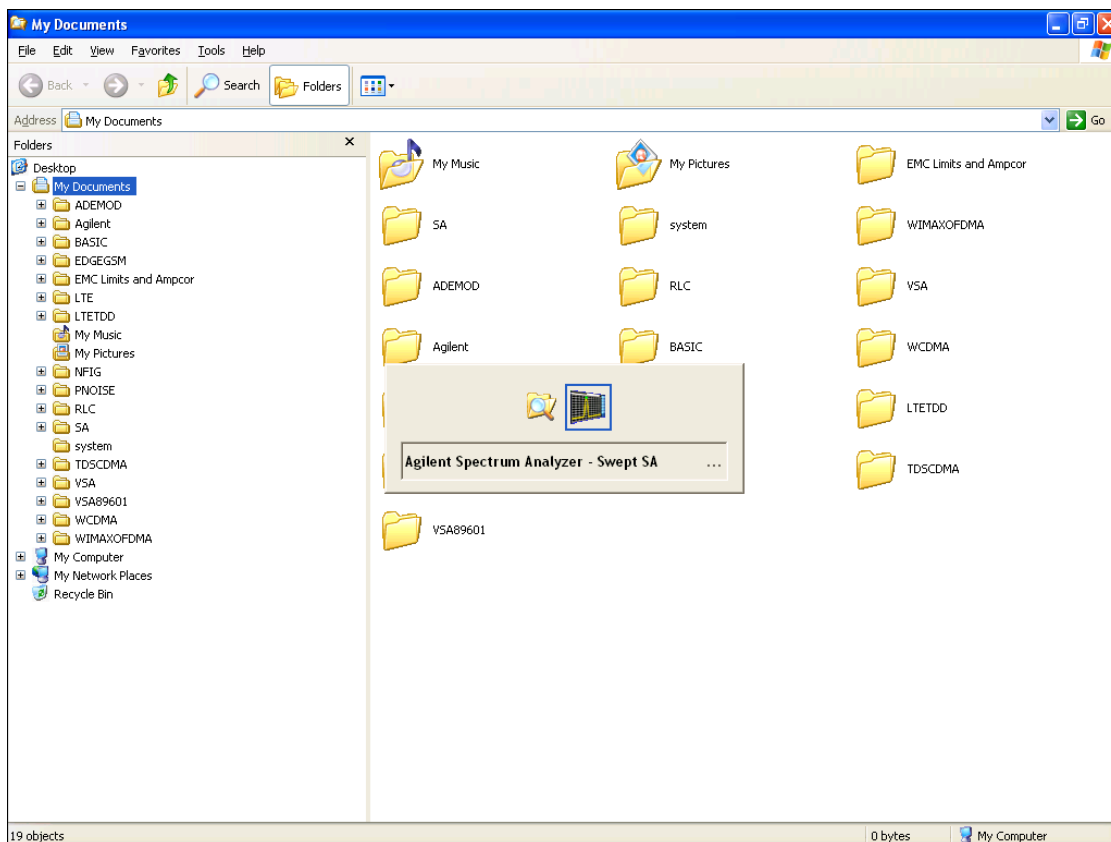
Key Path	Front-panel key
Initial S/W Revision	Prior to A.02.00


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.

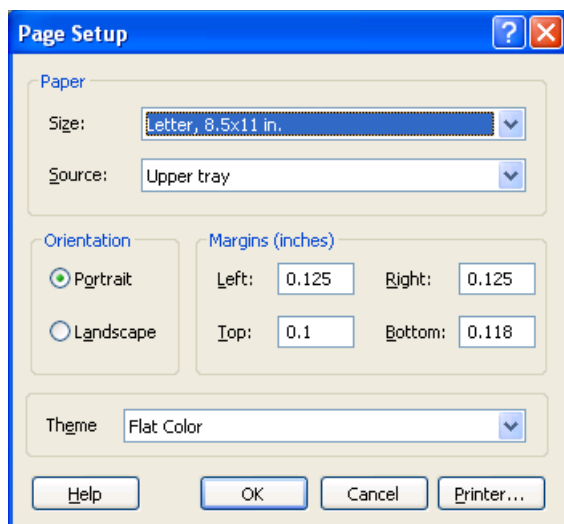
Key Path	File
Initial S/W Revision	Prior to A.02.00

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

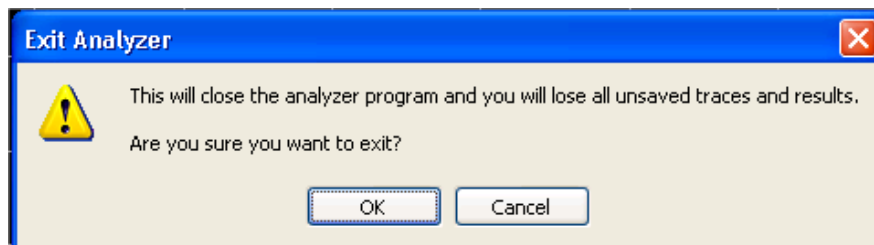
The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see

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 99](#) 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

System Functions
Mode Preset

state.

Remote Command	*RST
Example	*RST
Notes	Sequential Clears all pending OPC bits and the Status Byte is set to 0.
Couplings	A *RST will cause the currently running measurement to be aborted and cause the default measurement to be active. *RST gets the mode to a consistent state with all of the default couplings set.
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 107](#).

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 109 .
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.

System Functions
Recall

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 115](#).

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

Open

The recalling State function must first verify the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, and then loading the State from the saved state file to as close as possible to the context in which the save occurred. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.

If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and it returns a warning message of what it did.

NOTE No Trace data is loaded when recalling a State File. Measurements that support loading of trace data will include a Trace key in the Recall menu and will load State + Trace data from .trace files under that key.

Key Path	Recall, State, From File...
Remote Command	:MMEMory:LOAD:STATe <filename>
Example	:MMEM:LOAD:STAT "myState.state" recalls the file myState.state on the default path

System Functions
Recall

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
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

Recall

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 115.

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 109](#) for details.

Key Path	Recall, Trace, Open...
Remote Command	:MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <filename> :MMEMory:LOAD:TRACe:REGister TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6, <integer>
Example	:MMEM:LOAD:TRAC TRACE2,"myState.trace" recalls the file myState.trace on the default path; if it is a "single trace" save file, that trace is loaded to trace 2, and is set to be not updating. :MMEM:LOAD:TRAC:REG TRACE1,2 restores the trace data in register 2 to Trace 1
Notes	Auto return to the Trace menu and the Open dialog goes away. Advisory Event "Recalled File <file name>" after recall is complete. Some modes and measurements do not have available all 6 traces. Phase Noise mode command, for example, is: MMEMory:LOAD:TRACe TRACE1 TRACE2 TRACE3,<filename> The load trace command actually performs a load state, which in the Swept SA measurement includes the trace data. However it looks in the recalled state file to see how it was flagged at save time. The possibilities are: If the trace file was saved using one of the TRACE# enums, it is flagged as a single trace save file. The trace that was flagged as the one that was saved, is loaded to the trace specified. The trace is loaded with update off and display on, and none of the other traces are loaded. If the trace file was saved using one the ALL enum, it is flagged as an "all traces" file. And all traces will be loaded. All of the traces are loaded with Update=Off to keep them from updating, regardless of the setting of "Recall State w/Trace Update".

Initial S/W Revision	Prior to A.02.00
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Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce the same type of data. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open key is pressed.

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

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
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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.

Recall

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

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

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

By Name

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

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

By Extension

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

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

By Size

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

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

Ascending

This causes the display of the file list to be sorted, according to the sort criteria, in ascending order.

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

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

System Functions

Recall

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 125 .
Initial S/W Revision	Prior to A.02.00

Register 1 thru Register 6

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified.

These 6 registers are all that is available from the front panel for all modes in the instrument. There are not 6 registers available for each mode. From remote, 127 Registers are available. Registers are files that

System Functions
Save

are visible to the user in the My Documents\System folder.

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

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

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

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

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

Key Path	Save, State
Mode	All
Example	*SAV 6
Readback	Date and time with seconds resolution are displayed on the key, or "(empty)" if no prior save operation performed to this register.
Initial S/W Revision	Prior to A.02.00

To File . . .

Accesses a menu that enables you to select the location for saving the State. This menu is similar to a standard Windows® **Save As** dialog.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer). This path is the **Save In:** path in the **Save As** dialog for all State Files when they first enter this dialog.

Key Path	Save, State
Mode	All
Notes	Brings up Save As dialog for saving a State Save Type
Initial S/W Revision	Prior to A.02.00

Save As . . .

Accesses a menu that enables you to select the location where you can save the State. This menu is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name softkey. See the Quick Save key documentation for more on the automatic file naming algorithm.

The default path for all State Files is:

My Documents\<<mode name>\state

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

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

Key Path	Save, State
Mode	All

System Functions
Save

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
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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
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
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System Functions
Save

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	Some modes and measurements do not have available all 6 traces. The Phase Noise mode command, for example, is: MMEMory:STORe:TRACe TRACE1 TRACE2 TRACE3 ALL,<filename> This command actually performs a save state, which in the Swept SA measurement includes the trace data. However it flags it (in the file) as a "save trace" file of the specified trace (or all traces). The range for the register parameter is 1–5 If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote. Auto return to the State menu and the Save As dialog goes away.
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.

System Functions

Save

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

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

Save As . . .

This menu lets you select the location where you can save Data Type files. It is a standard Windows® dialog with Save As menu keys. The "File Name" field in the Save As dialog is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the Quick Save key documentation for more on the automatic file naming algorithm.

When you first enter this dialog, the path in the Save In: field depends on the data type. The only files that are visible are the files with the corresponding data type suffix, and the **Save As** type lists the same suffix.

For example, if the Data Type is **Amplitude Corrections**, the file suffix is .csv and the *.csv files are the only visible files in the **Save As** dialog and .csv is the Save As Type.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

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

Save

Saves the specified Data Type. This section describes any specific save behavior relevant to Data that is common to all modes.

When a Save of a specific Data File is requested, the specified data is saved to the specified or selected file. The save is performed immediately and does not wait until the measurement is complete.

If the file already exists, a dialog will appear that allows you to replace the existing file by selecting **OK** or you can Cancel the request.

While the save is being performed, the floppy icon will show up in the settings bar near the Continuous/Single icon. After a register save completes, the corresponding register softkey annotation is updated with the date the time and an advisory message that the file was saved appears in the message bar.

Key Path	Save, Data, Save As...
Notes	If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during 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.

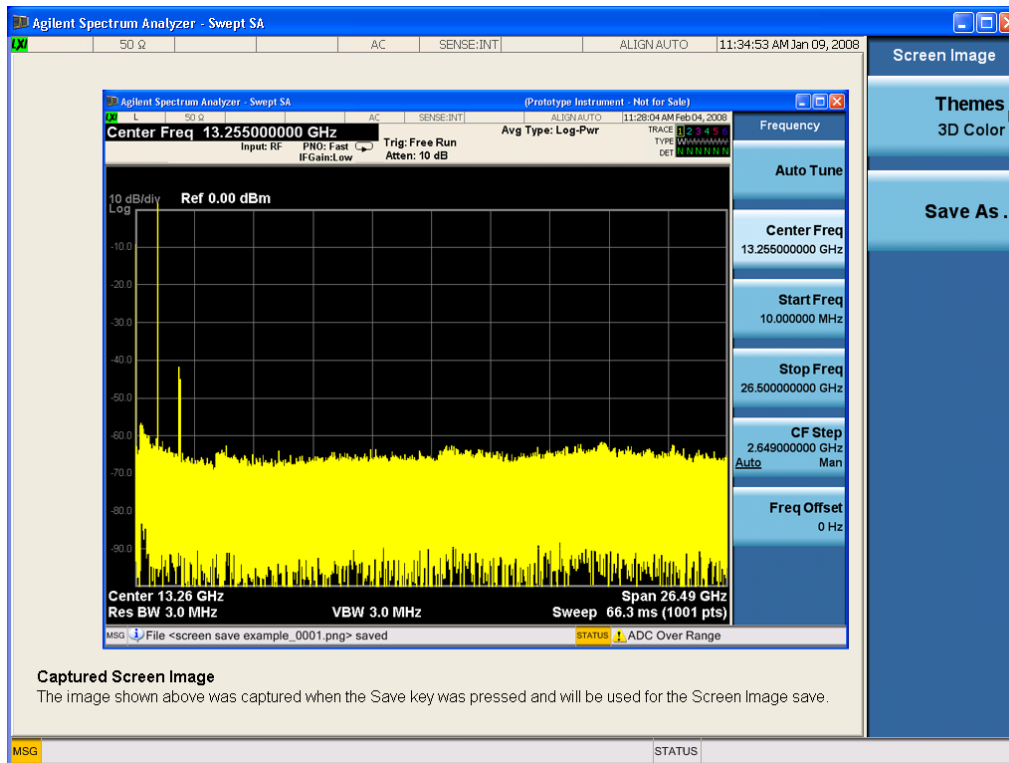
Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

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,

System Functions

Save

a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the **Save As** menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the **Save** menus.

After you have completed the save, the **Quick Save** front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

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

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

Key Path	Save, Screen Image
Remote Command	:MMEMory:STORe:SCReen:THEME TDCoLor TDMonochrome FCoLoR FMONochrome :MMEMory:STORe:SCReen:THEME?
Example	:MMEM:STOR:SCR:THEM TDM
Preset	3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes.
Readback	3D Color 3D Mono Flat Color Flat Mono
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.
Initial S/W Revision	Prior to A.02.00

3D Color

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

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDC
Readback	3D Color
Initial S/W Revision	Prior to A.02.00

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM TDM
Readback	3D Mono
Initial S/W Revision	Prior to A.02.00

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FCOL
Readback	Flat Color
Initial S/W Revision	Prior to A.02.00

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

Key Path	Save, Screen Image, Themes
Example	MMEM:STOR:SCR:THEM FMON
Readback	Flat Mono
Initial S/W Revision	Prior to A.02.00

Save As...

Accesses a menu that enables you to select the location where you can save the Screen Image. This menu is a standard Windows® dialog with Save As menu keys. The **Save As** dialog is loaded with the file information related to the Screen Image Type. The filename is filled in using the auto file naming algorithm for the Screen Image Type and is highlighted. The only files that are visible are the *.png files and the Save As Type is *.png, since .png is the file suffix for the Screen Image Type.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

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

This path is the **Save In:** path in the **Save As** dialog for all Screen Files when you first enter this dialog.

Key Path	Save, Screen Image
Notes	Brings up Save As dialog for saving a Screen Image Save Type
Initial S/W Revision	Prior to A.02.00

Save

Saves the screen image to the specified file using the selected theme. The image that is saved is the measurement display prior to when the **Save As** dialog appeared. The save is performed immediately and does not wait until the measurement is complete.

Key Path	Save, Screen Image, Save As...
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Remote Command	:MMEMory:STORe:SCReen <filename>
Example	:MMEM:STOR:SCR "myScreen.png"
Notes	<p>If the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over remote.</p> <p>Auto return to the Screen Image menu and the Save As dialog goes away.</p> <p>Advisory Event "File <file name> saved" after save is complete.</p>
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	<p>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.</p> <p>Advisory Event "File <file name> saved" after save is complete.</p>
Initial S/W Revision	Prior to A.02.00

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file.

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

File Name

Accesses the Alpha Editor. Use the knob to choose the letter to add and the Enter front-panel key to add the letter to the file name. In addition to the list of alpha characters, this editor includes a **Space** key and a **Done** key. The **Done** key completes the filename, removes the Alpha Editor and returns back to the **File Open** dialog and menu, but does not cause the save to occur. You can also use **Enter** to complete the file name entry and this will cause the save to occur.

Key Path	Save, <various>, Save As...
Notes	Brings up the Alpha Editor. Editor created file name is loaded in the File name field of the Save As dialog.
Initial S/W Revision	Prior to A.02.00

Save As Type

This key corresponds to the **Save As Type** selection in the dialog. It follows the standard Windows® supported **Save As Type** behavior. It shows the current file suffix that corresponds to the type of file you have selected to save. If you navigated here from saving State, "State File (*.state)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from saving Trace, "Trace+State File (*.trace)" is in the dialog selection and is the only type available under the pull down menu. If you navigated here from exporting a data file, "Data File (*.csv)" is in the dialog and is available in the pull down menu. Modes can have other data file types and they would also be listed in the pull down menu.

Key Path	Save, <various>, Save As...
Notes	Pressing this key causes the pull down menu to list all possible file types available in this context. All types available are loaded in a 1-of-N menu key for easy navigation.
Initial S/W Revision	Prior to A.02.00

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. It follows the standard Windows® supported **Up One Level** behavior. When pressed, it causes the file and

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

Key Path	Save, <various>, Save As...
Notes	When pressed, the file and folder list is directed up one level of folders and the new list of files and folders is displayed
Initial S/W Revision	Prior to A.02.00

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. It follows the standard Windows® supported **Create New Folder** behavior. When pressed, a new folder is created in the current directory with the name **New Folder** and allows you to enter a new folder name using the Alpha Editor.

Key Path	Save, <various>, Save As...
Notes	Creates a new folder in the current folder and lets the user fill in the folder name using the Alpha Editor.
Initial S/W Revision	Prior to A.02.00

Cancel

This key corresponds to the **Cancel** selection in the dialog. It follows the standard Windows supported **Cancel** behavior. It causes the current **Save As** request to be cancelled.

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

Mass Storage Catalog (Remote Command Only)

Remote Command	:MMEMory:CATalog? [<directory_name>]
Notes	<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>]
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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>
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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	<p>:MMEMory:DATA <file_name>, <data></p> <p>:MMEMory:DATA? <file_name></p>
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.

The fields on the Errors display are:

System Functions
System

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	<p>The return string has the format: “<Error Number>,<Error>”</p> <p>Where <Error Number> and <Error> are those shown on the Show Errors screen</p>
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
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Next Page

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

- If on the last page of the log, the Next Page key is grayed out
- If on the first page of the log, the Previous Page key is grayed out.
- If there is only one page, both keys are grayed out.

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

Previous Page

See .

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

History

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

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

Status

See [“History” on page 139](#).

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.

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:

<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,

Example	SYST:SHOW HARD
Initial S/W Revision	Prior to A.02.00

LXI

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

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

LXI Event Log

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

The fields recorded in the Event Log are:

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

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

Next Page

See .

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

Previous Page

See

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

Circular

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

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

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:CIRCular[:ENABLE] ON OFF 1 0 :LXI:EVENT:LOG:CIRCular[:ENABLE]?
Example	:LXI:EVEN:LOG:CIRC 1
Preset	Not affected by a Preset. The default value of "ON" can be restored by pressing System, Restore Defaults, Misc.
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Initial S/W Revision	Prior to A.02.00

Clear

Clears the event log of all entries.

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

Size

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

Key Path	System, Show, LXI, LXI Event Log
Remote Command	:LXI:EVENT:LOG:SIZE <size> :LXI:EVENT:LOG:SIZE?
Example	:LXI:EVEN:LOG:SIZE 256

Preset	Not affected by a Preset. The default value of "64" can be restored by pressing System, Restore Defaults, Misc.
State Saved	Saved in instrument state.
Range	>= 0
Initial S/W Revision	Prior to A.02.00

Enabled

Enables and disables the logging of LXI Events.

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

Count (Remote Command Only)

Returns the number of entries currently in the LXI Event Log.

Remote Command	:LXI:EVENT:LOG:COUNT?
Example	:LXI:EVENT:LOG:COUN?
Range	0 – Size
Initial S/W Revision	Prior to A.02.00

Next Entry (Remote Command Only)

Returns the oldest entry from the LXI Event Log and removes it from the log. If the log is empty, an empty string is returned.

Remote Command	:LXI:EVENT:LOG[:NEXT]?
Example	:LXI:EVENT:LOG?
Initial S/W Revision	Prior to A.02.00

All (Remote Command Only)

Non-destructively retrieves the entire contents of the event log. Entries are returned as separate strings, surrounded

System Functions

System

by double quote marks, and separated by a comma. Fields within each entry are also comma delimited.

Remote Command	:LXI:EVENT:LOG:ALL?
Example	:LXI:EVENT:LOG:ALL? Returns the entire event log contents. An example may look like the following: "11/12/2007,18:14:10.770385,Error,LogOverwrite,Rise,,,,","11/12/2007,18:14:10.592105,Status,Measuring,Rise,,,,","11/12/2007,18:14:10.597758,Status,Measuring,Fall,,,,","11/12/2007,18:14:10.597786,Status,Sweeping,Fall,,,,","11/12/2007,18:14:10.599030,Status,WaitingForTrigger,Rise,,,," The contents of the Event Log vary, based on the operation of the instrument.
Initial S/W Revision	Prior to A.02.00

Specific Entry (Remote Command Only)

Non-destructively retrieves a specifically indexed entry from the event log. Fields within an entry are comma delimited.

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

Beginning Entry (Remote Command Only)

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

Remote Command	:LXI:EVENT:LOG:CIRCULAR:FBENTR
Example	:LXI:EVENT:LOG:CIRC:FBEN
Initial S/W Revision	Prior to A.02.00

Power On

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

Key Path	System
Mode	All

Remote Command	:SYSTem:PON:TYPE MODE USER LAST :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	<code>SYST:PON:TYPE LAST</code>
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 <code>:SYSTem:PDOWn</code> 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 <code>SYST:PRESET:TYPE MODE</code> with <code>SYST:PON:PRESET</code>) You can power-on the analyzer in the last mode the instrument was running in its last state (<code>SYST:PON:TYPE LAST</code>), or you can specify the mode to power-up in its preset state (<code>SYST:PON:MODE <mode></code>).
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
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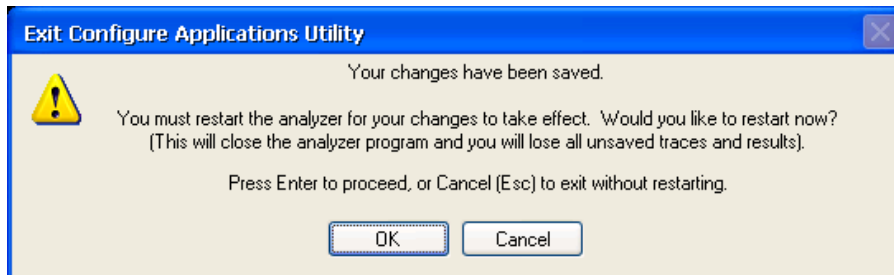
System Functions
System

Initial S/W Revision	A.02.00
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Save Changes and Exit

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

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



Key Path	System, Power On, Configure Applications
Remote Command	:SYSTem:PUP:PROcEss
Example	:SYST:PUP:PROC This is the SCPI command for restarting the analyzer. You must Wait after this command for the instrument application to restart
Notes	The softkey will be grayed-out when the virtual memory of the selected applications exceeds 100% of the limit.
Notes	You cannot use *WAI or *OPC? to synchronize operation after a restart. This command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded.
Initial S/W Revision	A.02.00
Modified at S/W Revision	A.04.00

Exit Without Saving

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

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

Configure Applications - Instrument boot-up

At start-up of the analyzer programa dialog box similar to the one under the **System, Power On,**

Configure Applications key will be displayed allowing you to choose which licensed applications are to be loaded. This dialog will only be displayed if the memory required to pre-load all of the licensed applications exceeds the Virtual Memory available.

Configure Applications - Windows desktop

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



double-clicking the icon on the desktop, which brings-up a dialog box similar to the one under the **System, Power On, Configure Applications** key, allowing you to choose which licensed applications are to be loaded 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 153](#)
- [“Configuration Memory Available \(Remote Command Only\)” on page 154](#)
- [“Configuration Memory Total \(Remote Command Only\)” on page 154](#)
- [“Configuration Memory Used \(Remote Command Only\)” on page 154](#)
- [“Configuration Application Memory \(Remote Command Only\)” on page 154](#)

Configuration list (Remote Command Only)

This remote command is used to set or query the list of applications to be loaded in-memory.

Remote Command	:SYSTem:PON:APPLication:LLIST <string of INSTRument:SElect names> :SYSTem:PON:APPLication:LLIST?
Example	:SYST:PON:APPL:LLIS "SA,BASIC,WCDMA"
Notes	<string of INSTRument:SElect names> are from the enums of the :INSTRument:SElect command. The order of the <INSTRument:SElect names> is the order in which the applications are loaded into memory, and the order in which they appear in the Mode Menu. Error 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.
Preset	Not affected by Preset
State Saved	Not saved in instrument state

Initial S/W Revision	A.02.00
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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

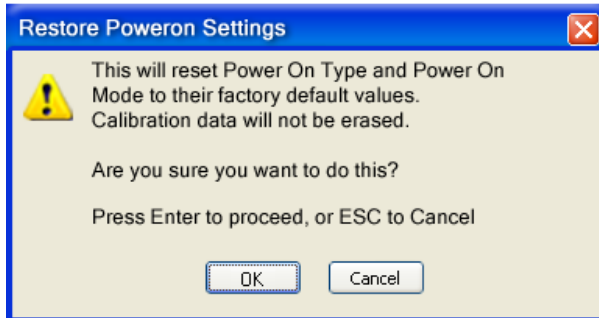
Configuration Application Memory (Remote Command Only)

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

System Functions
System

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	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. 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 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.
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
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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.

System Functions
System

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
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
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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
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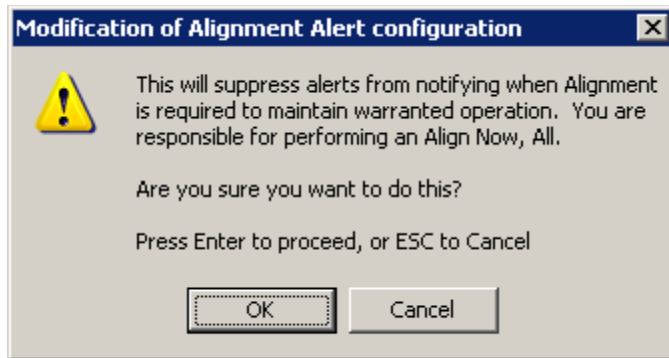
System Functions
System

Mode	All
Example	:CAL:AUTO:ALERTTEM
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”.

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



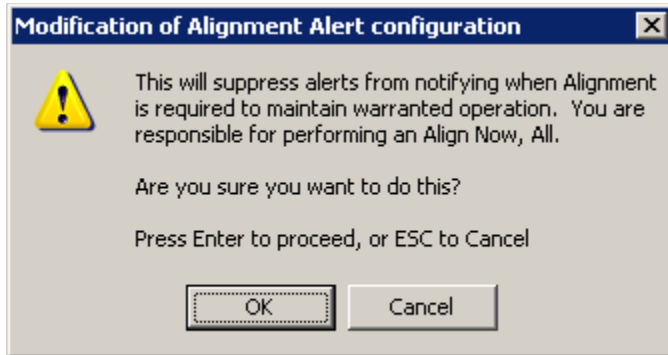
No confirmation is required when Alert is configured through a remote command.

Key Path	System, Alignments, Auto Align, Alert
Mode	All
Example	:CAL:AUTO:ALERTDAY
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:



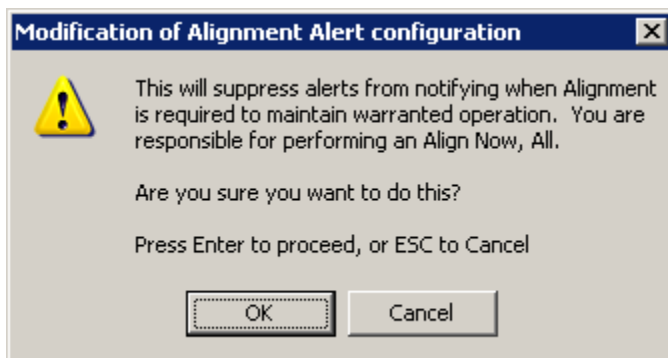
No confirmation is required when Alert is configured through a remote command.

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
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System Functions

System

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	:CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed.
Couplings	Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature.
Status Bits/OPC dependencies	Bits 11, 12, or 14 may be set in the Status Questionable Calibration register.
Initial S/W Revision	Prior to A.02.00

Mode	All
Remote Command	*CAL?
Example	*CAL?

Notes	<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 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	<p>:CALibration:NRF? returns 0 if successful</p> <p>:CALibration:NRF? returns 1 if failed</p> <p>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.</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 and set bit 12 if invoked with “Align Now, All required”.</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>
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	<p>:CALibration:RF</p> <p>:CALibration:RF?</p>

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

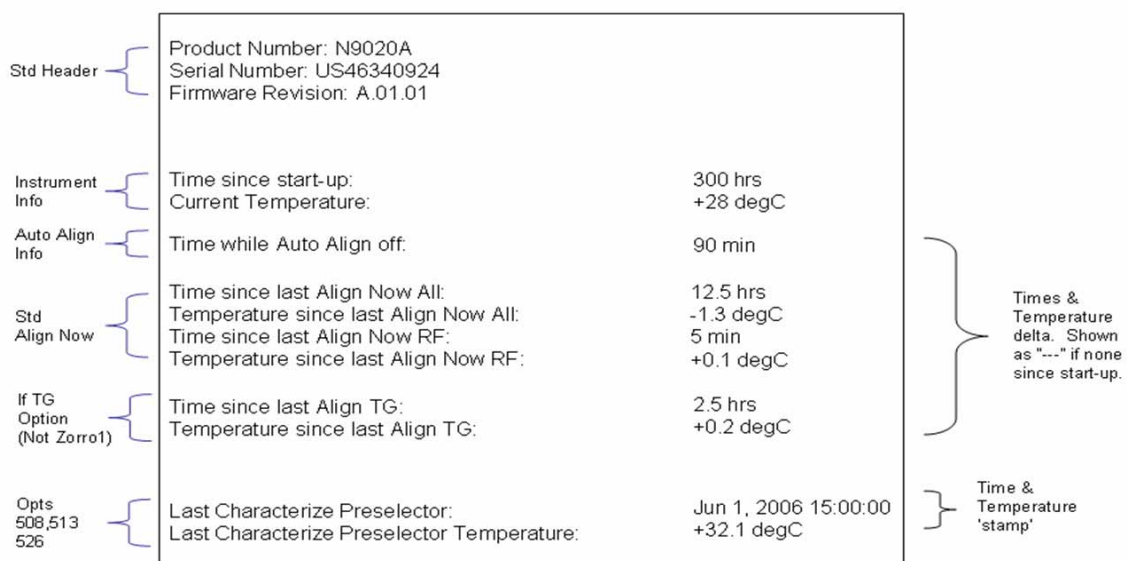
Notes	<p>:CAL:EMIX? returns 0 if successful</p> <p>:CAL:EMIX? returns 1 if failed</p> <p>While Align Now, Ext Mix is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register.</p> <p>This command is sequential; 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:



System Functions
System

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
System

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:RFPSelector: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:RFPSelector: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:RFPSelector: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:RFPSelector:LRADiated?
Example	:CAL:TEMP:RFPS:LRAD?

System Functions
System

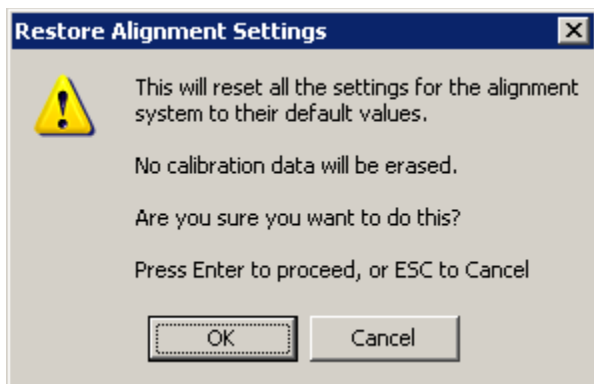
State Saved	No
Restriction and Notes	Value is in degrees Centigrade at which the last successful Align Now, 30 MHz – 3.6 GHz was executed.

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.

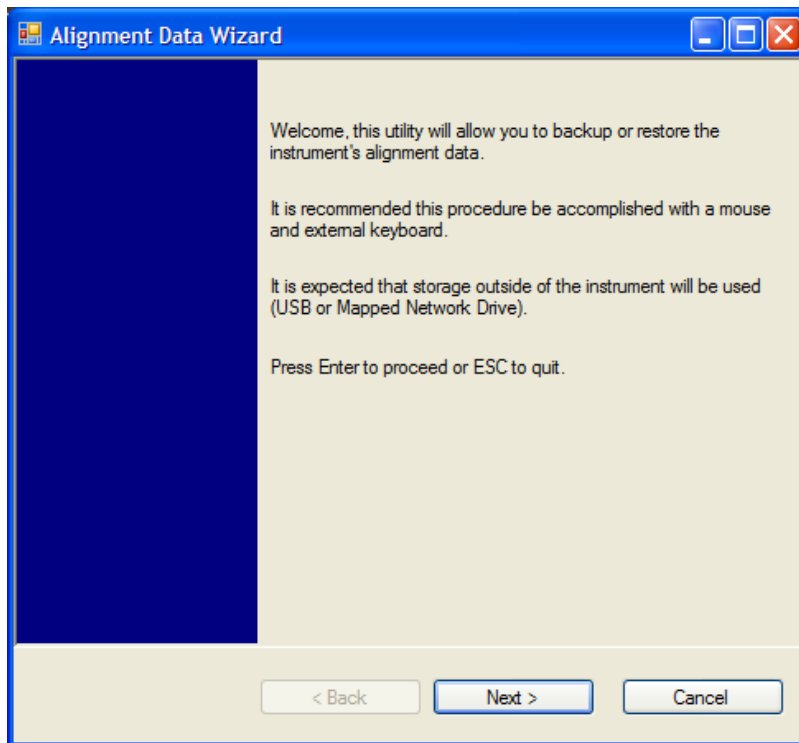
Key Path	System, Alignments
Initial S/W Revision	A.02.00

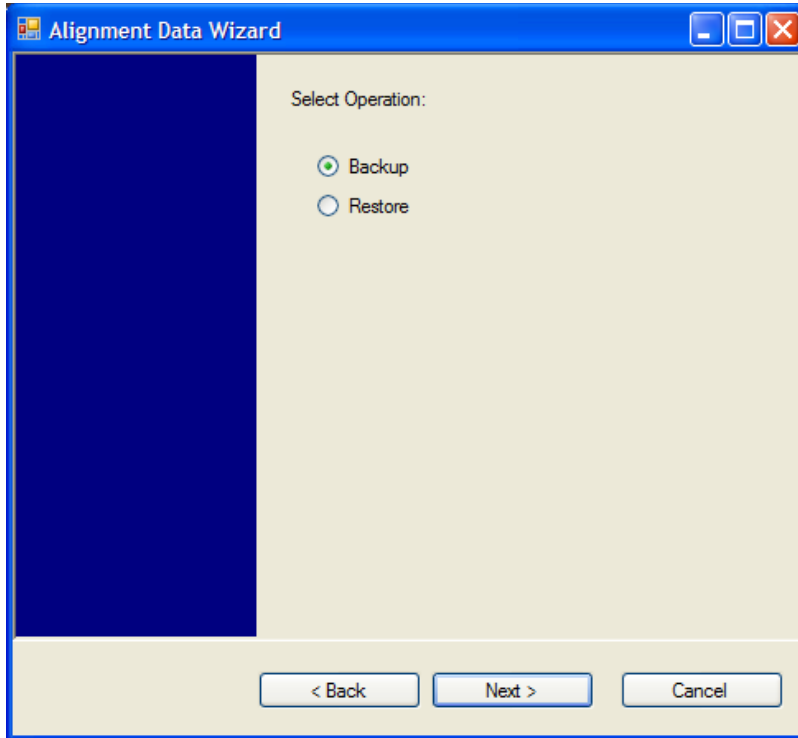
Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:DATA:DEFault
Example	:CAL:DATA:DEF
Couplings	Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition message “Align Now, All required” is generated.
Initial S/W Revision	Prior to A.02.00

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.

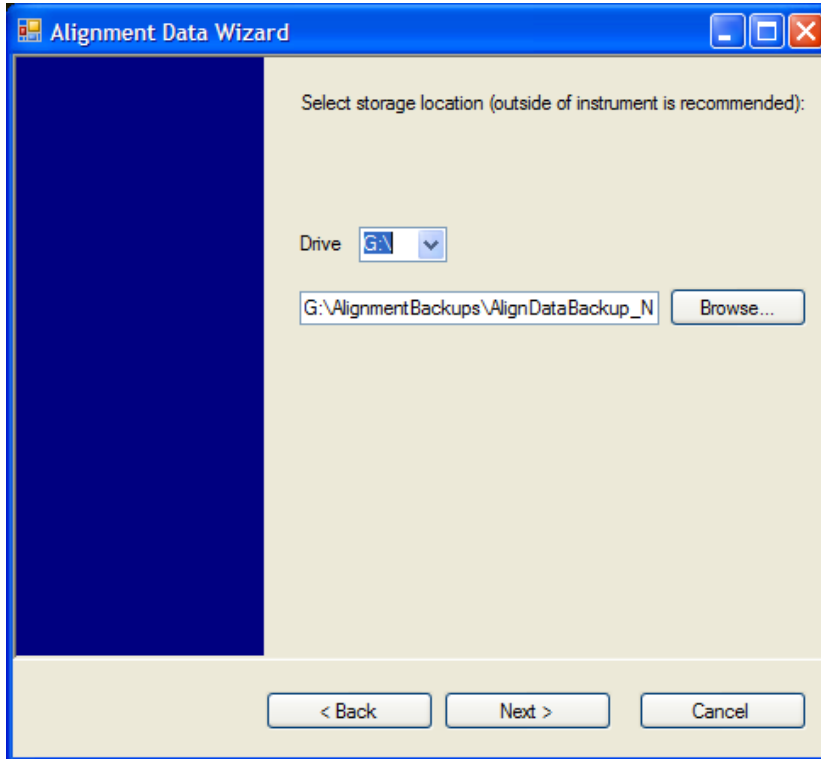




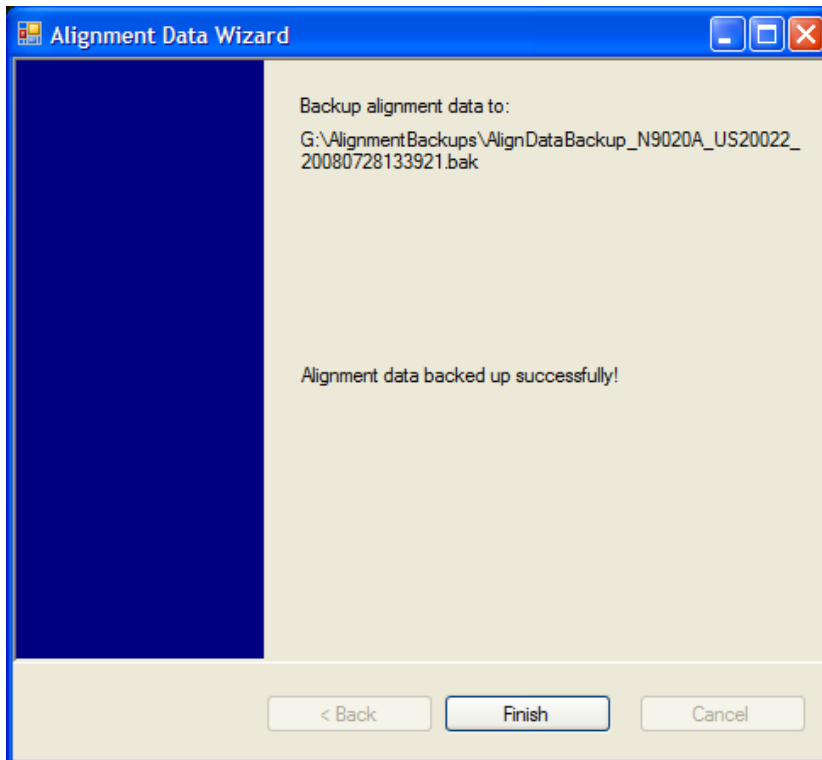
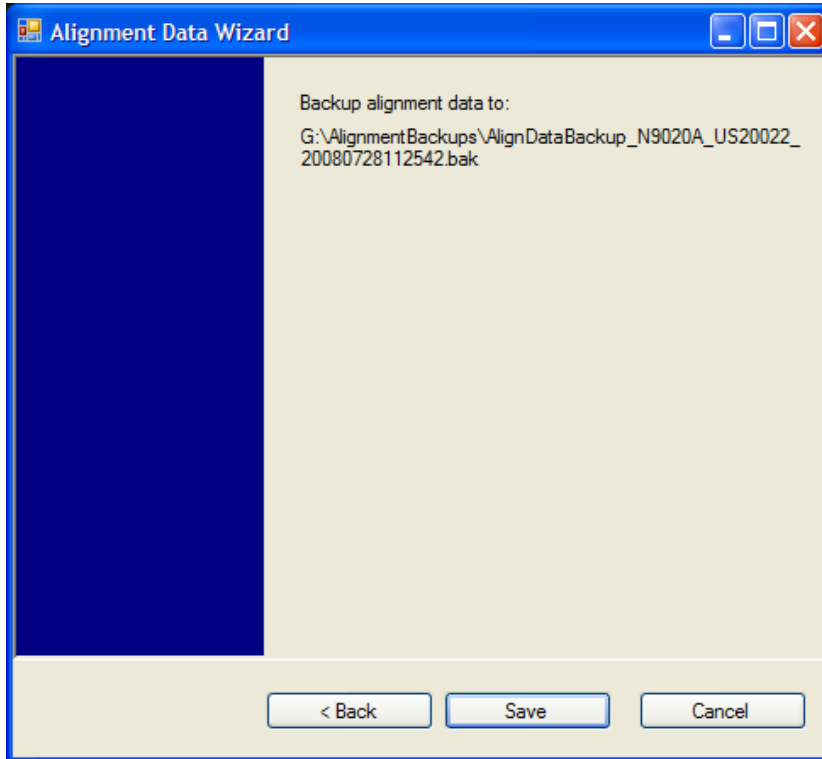
The backup screen will indicate the approximate amount of space required to contain the backup file.

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.



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.



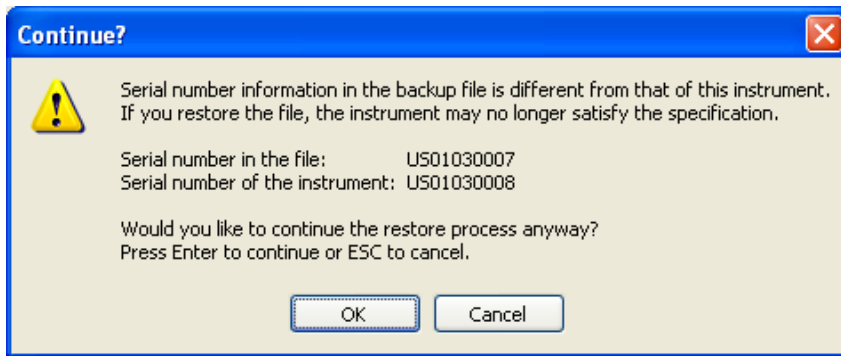
The restore operation will check the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.

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

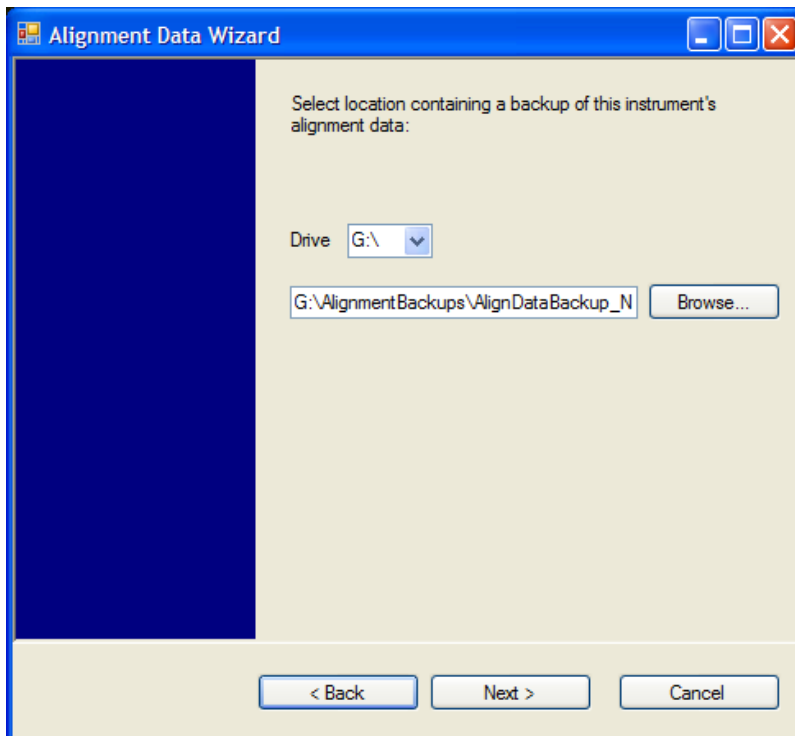
System Functions

System

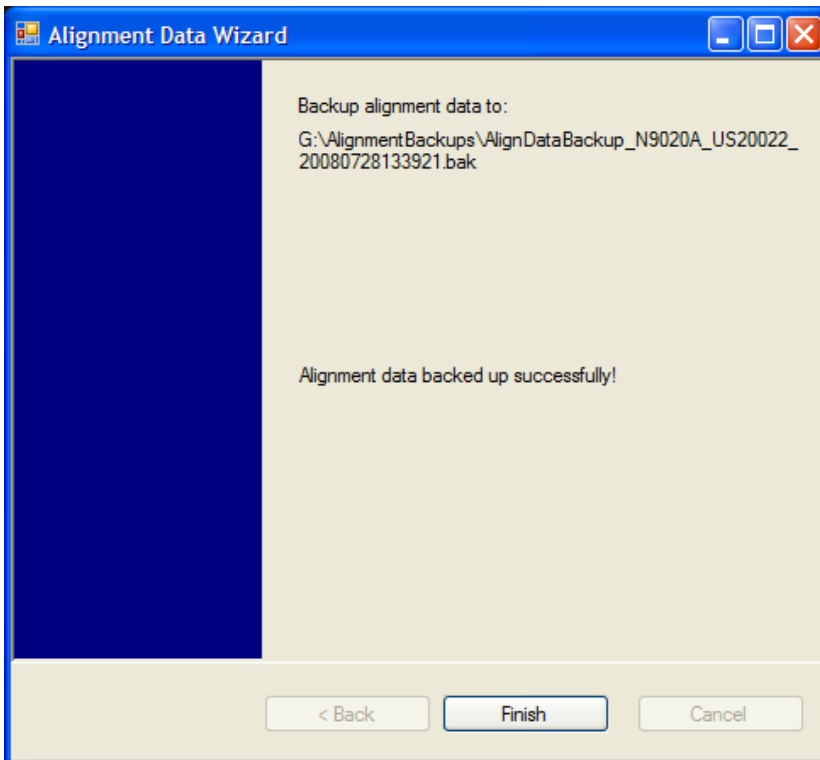
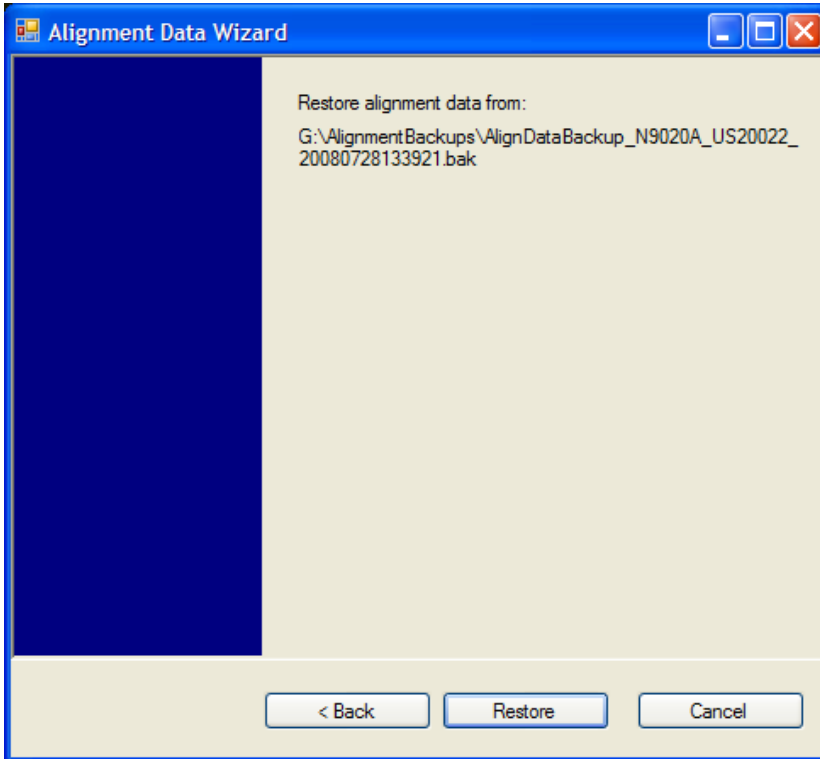
the following message appears (the serial number shown are examples):



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.



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.

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	:CALibration:YTF? returns 0 if successful :CALibration:YTF? returns 1 if failed (including interfering user signal) While Advanced, Characterize Preselector is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORT command. Successful completion will clear bit 9 in the Status Questionable Calibration register. A failure encountered during alignment will generate the Error Condition message “Characterize Preselector failed” and set bit 9 in the Status Questionable Calibration register. For Options that support frequencies > 3.6 GHz only.
Dependencies	This key does not appear in models that do not contain preselectors. In these models the SCPI command is accepted without error but no action is taken.
Couplings	Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature.

System Functions
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Initial S/W Revision	Prior to A.02.00
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Timebase DAC

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

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

Key Path	System, Alignments
Mode	All
Remote Command	:CALibration:FREQuency:REFeRence:MODE CALibrated USER :CALibration:FREQuency:REFeRence:MODE?
Example	:CAL:FREQ:REF:MODE CAL
Notes	If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due.
Preset	This is unaffected by Preset but is set to CALibrated on a “Restore System Defaults->Align”.
State Saved	No
Initial S/W Revision	Prior to A.02.00

Calibrated

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

Key Path	System, Alignments, Timebase DAC
Mode	All
Example	:CAL:FREQ:REF:MODE CAL
Readback Text	[xxx] < where xxx is the calibrated value
Initial S/W Revision	Prior to A.02.00

User

Allows setting the Timebase DAC to a value other than the value established during the factory or field calibration. The value displayed on the menu key is the calibrated value.

Key Path	System, Alignments, Timebase DAC
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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	<p>:CALibration:RFPSelector:RADiated? Return 0 if successful</p> <p>:CALibration:RFPSelector:RADiated? Return 1 if failed</p> <p>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.</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. Successful completion will clear bit 2 in the Status Questionable Calibration Extended Needed register and bit 1 in Status Questionable Calibration Extended Failure register.</p> <p>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.</p> <p>For model N9038A only.</p>
Dependencies	<p>This key does not appear in other than N9038A models, setting or querying the SCPI will generate an error.</p>
Couplings	<p>Initializes the time for the Last Align Radiated Now, Radiated Time.</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 2 may be set in the Status Questionable Calibration Extended Needed register.</p> <p>Bit 1 may be set in the Status Questionable Calibration Extended Failure register.</p>
Initial S/W Revision	<p>A.08.00</p>

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:RFPSelector: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:RFPSelector:FULL :CALibration:RFPSelector:FULL?
Example	:CAL:RFPS:FULL
Notes	:CALibration:RFPSelector:FULL? Return 0 if successful :CALibration:RFPSelector: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	Initializes the time for the Last Align Conducted Now, Conducted Time. Initializes the time for the Last Align Radiated Now, Radiated Time. Records the temperature for the Last Align Conducted Now, Conducted Temperature. 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 1 and 2 may be set in the Status Questionable Calibration Extended Needed register. Bit 0 and 1 may be set in the Status Questionable Calibration Extended Failure register.
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:RFPSelector:ALERT ON OFF 0 1 :CALibration:RFPSelector:ALERT?
Example	:CAL:RFPS:ALER OFF
Notes	For model N9038A only. Error Condition will be generated when the alert is On and any of the RF Preselector alignments has expired.
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

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:RFPSelector:SCHeduler:TASK T1 T2 T3 :CALibration:RFPSelector: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:RFPSelector:SCHeduler:TIME:START "date", "time" :CALibration:RFPSelector: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	“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.
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

System Functions System

scheduler is the same; however, they each have their own front panel control.

Key Path	System, Alignments, RF Preselector, Schedule Setup, Date/Time
Notes	See “Date/Time ” on page 189 . For model N9038A only.
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	See “Date/Time ” on page 189 . For model N9038A only.
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

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:RFPreselector:Scheduler:REcurrence DAY WEEK OFF :CALibration:RFPreselector: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

System Functions
System

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:SCHeuler:STATe ON OFF 0 1 :CALibration:RFPSelector:SCHeuler: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

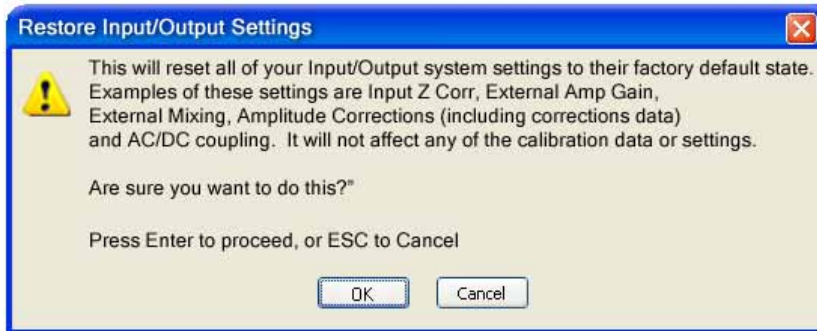
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back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

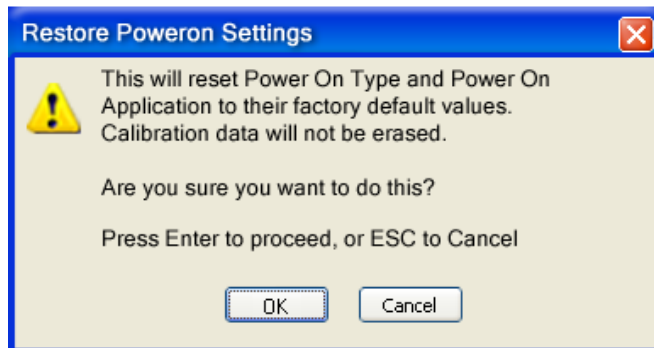


Key Path	System, Restore System Defaults
Example	:SYST:DEF INP
Initial S/W Revision	Prior to A.02.00

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

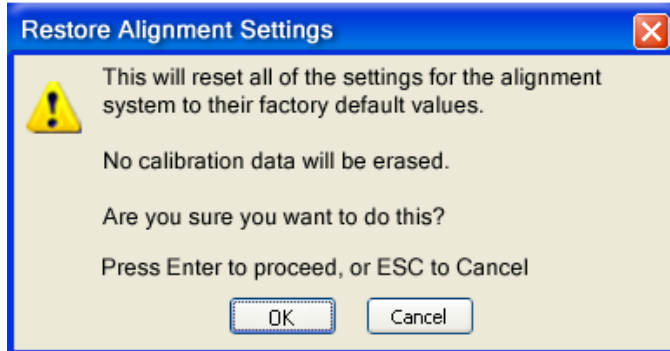
This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

System Functions

System

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

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



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

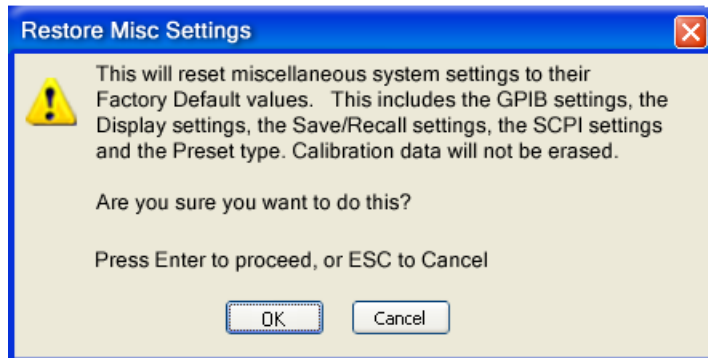
Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

Miscellaneous Setting	Default Value
Verbose SCPI	Off
GPIB Address	18
Auto File Name Number	000
Save Type	State
State Save To	Register 1
Screen Save To	SCREEN000.png
DISP:ENABle	ON
Full Screen	Off
SCPI Telnet	ON
SCPI Socket	ON
SICL Server	ON

Display Intensity	100
Display Backlight	ON
Display Theme	TDColor
System Annotation	ON
The SYST:PRES:TYPE	MODE

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

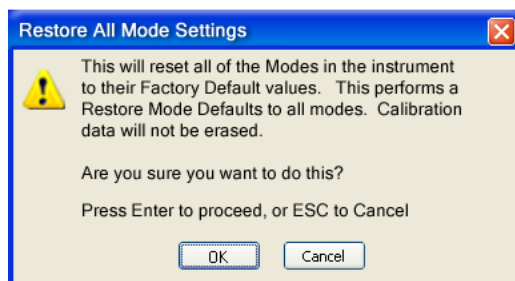


Key Path	System, Restore System Defaults
Example	:SYST:DEF MISC
Initial S/W Revision	Prior to A.02.00

Restore Mode Defaults (All Modes)

This selection resets all of the modes in the instrument back to their default state just as a Restore Mode Defaults does and it switches the instrument to the power-on mode and causes the default measurement for the power-on mode to be active. This level of Restore System Defaults does not affect any system settings, but it does affect the state of all modes and does cause a mode switch unless the instrument was already in the power-on mode.

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



Key Path	System, Restore System Defaults
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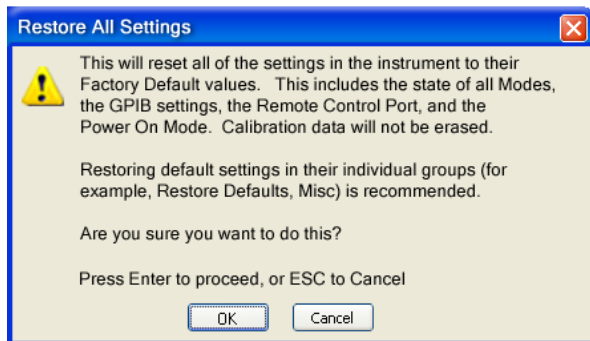
System Functions
System

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

All

This is the catastrophic function that does a comprehensive reset of ALL analyzer settings to their factory default values. It resets all of the system setting groups, causes a Restore Mode Defaults for all modes in the instrument, and switches back to the power-on mode. It does not affect the User Preset file or any user saved files.

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



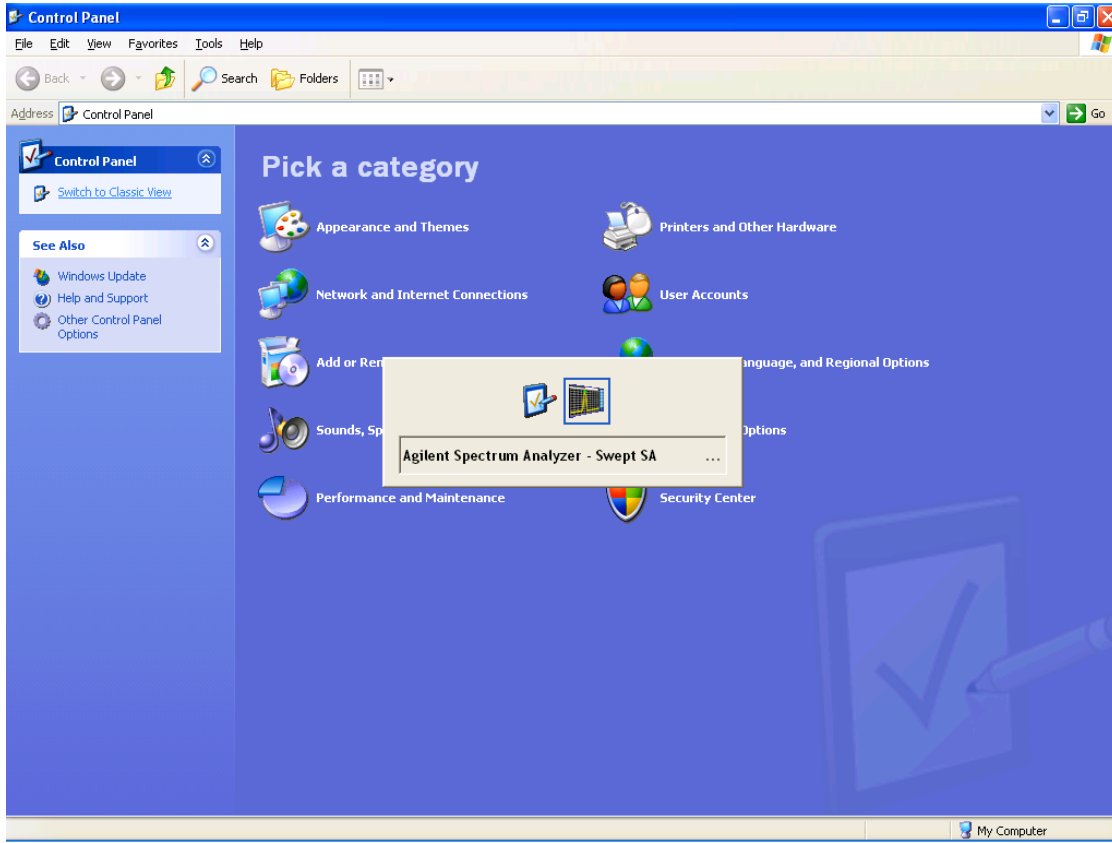
Key Path	System, Restore System Defaults
Example	:SYST:DEF ALL
Couplings	An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings.
Initial S/W Revision	Prior to A.02.00


Control Panel...

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

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

Exit the Control Panel by clicking on the red X in the upper right hand corner, with a mouse



Or use Alt-Tab: press and hold the Alt  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

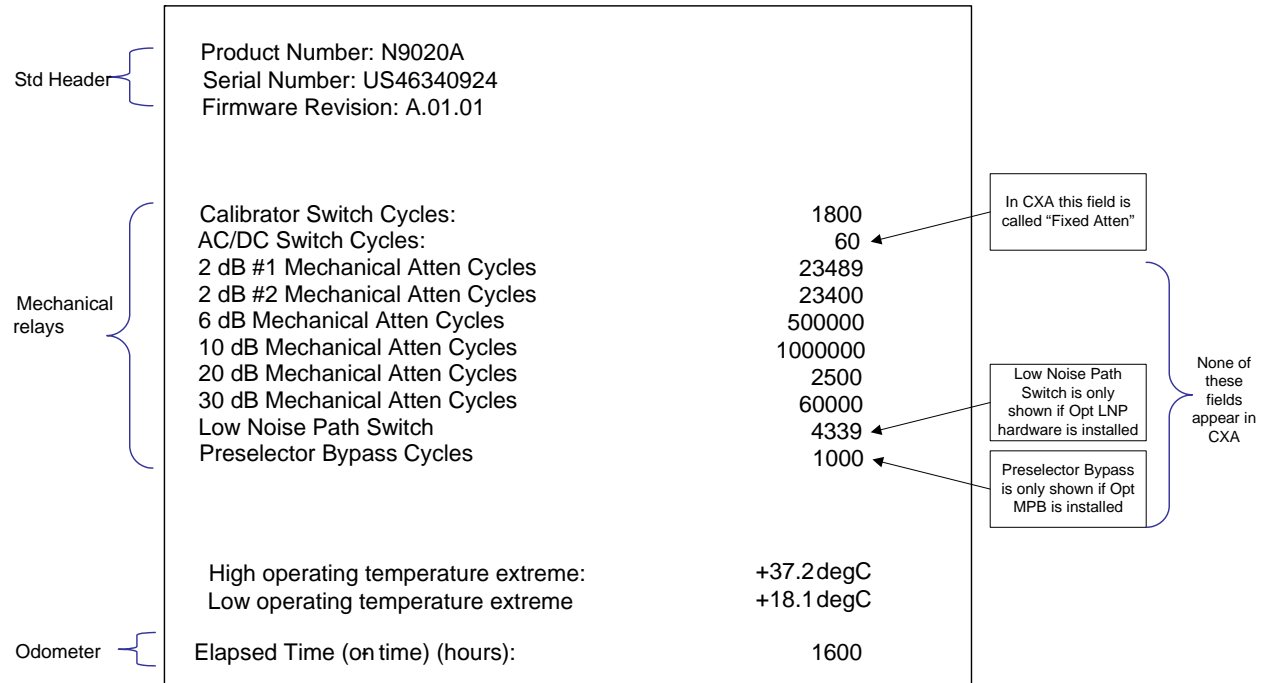
Show Hardware Statistics

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 202
- “Query the Operating Temperature Extremes” on page 203
- “Query the Elapsed Time since 1st power on” on page 203

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.

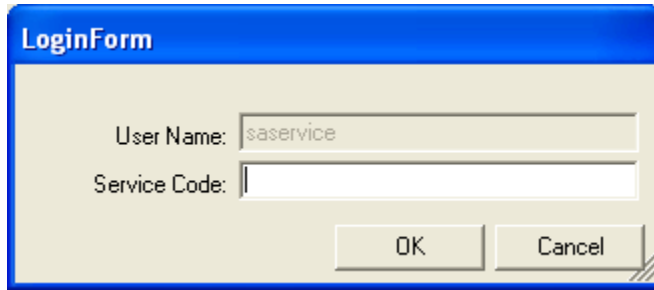
Remote Command	:SYSTem:PON:ETIMe?
Example	:SYST:PON:ETIM?
Notes	Query Only

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

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

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

SCPI Telnet

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

Key Path	System, I/O Config, SCPI LAN
Mode	All
Remote Command	:SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?
Example	:SYST:COMM:LAN:SCPI:TELN:ENAB OFF
Preset	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

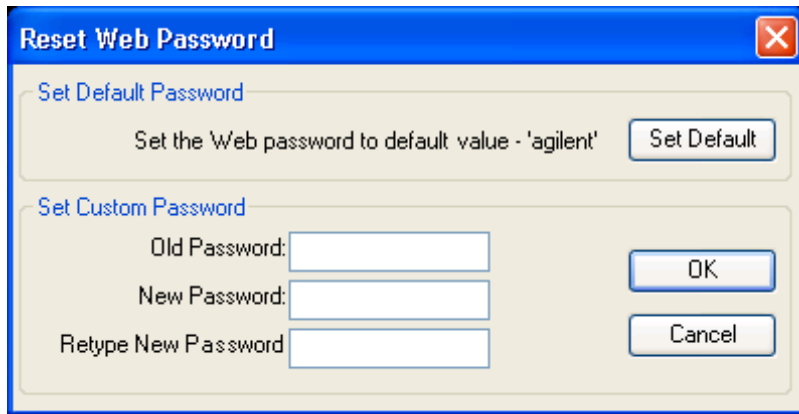
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Preset	This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc”
State Saved	No
Range	On Off
Initial S/W Revision	Prior to A.02.00

Reset Web Password

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

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



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

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

LXI

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

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

LAN Reset

Resets the LAN connection.

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

LXI Domain

The instrument only receives LXI LAN Events sent by members of the same LXI Domain. Conversely, LXI Output LAN Events sent by the instrument can only be received by members of the same LXI Domain..

Key Path	System, I/O Config, LXI
Remote Command	:LXI:EVENT:DOMain <intDomain> :LXI:EVENT:DOMain?
Example	:LXI:EVEN:DOM 128 :LXI:EVEN:DOM?
Preset	Not affected by a Preset. The default value of "0" can be restored by pressing Restore Defs, Input/Output Settings
State Saved	Saved in instrument state.
Range	0–255
Initial S/W Revision	Prior to A.02.00

LXI Output LAN Events

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

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

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

Disable All

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

Key Path	System, I/O Config, LXI, LXI Output LAN Events
Remote Command	:LXI:EVENT[:OUTPut]:LAN:DISable:ALL
Example	:LXI:EVEN:LAN:DIS:ALL

Initial S/W Revision	Prior to A.02.00
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Output LAN Event List

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

Key Path	System, I/O Config, LXI, LXI Output LAN Events
Remote Command	:LXI:EVENT[:OUTPUT]:LAN:LIST?
Example	:LXI:EVEN:LAN:LIST? Returns the complete list of Output LAN Events which is, at minimum: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"
Preset	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings. Preset/Default values: "LAN0", "LAN1", "LAN2", "LAN3", "LAN4", "LAN5", "LAN6", "LAN7", "WaitingForTrigger", "Measuring", "Sweeping", "OperationComplete", "Recalling"
State Saved	Saved in instrument state.
Readback Text	Displays the value of the LXI Output LAN Event Enabled parameter (Enabled Disabled). Also displays the value of the LXI Output LAN Event Source parameter (WaitingForTrig Sweeping Measuring OpComplete Recalling)
Initial S/W Revision	Prior to A.02.00

Add (Remote Command Only)

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

Remote Command	:LXI:EVENT[:OUTPUT]:LAN:ADD "LANEVENT"
Example	:LXI:EVEN:LAN:ADD "LANEVENT"
Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and added to the LXI Output LAN Event list. No event is added if the LAN Event already exists.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol except for comma or semicolon
Initial S/W Revision	Prior to A.02.00

Remove (Remote Command Only)

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

Remote Command	:LXI:EVENT[:OUTPut]:LAN:REMOve[:EVENT] "LANEVENT"
Example	:LXI:EVEN:LAN:REM "LANEVENT"
Notes	The maximum length of the string is 16 characters. Longer strings are concatenated and the resulting LAN Event is removed from the LXI Output LAN Event list. Nothing happens if the LAN event was not introduced using the Add command.
State Saved	No
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

Remove All (Remote Command Only)

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

Remote Command	:LXI:EVENT[:OUTPut]:LAN:REMOve:ALL
Example	:LXI:EVEN:LAN:REM:ALL
Notes	Only LAN Events added with the Add command are removed. Default events cannot be removed.
Initial S/W Revision	Prior to A.02.00

Source

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

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

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

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

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

OperationComplete is low when a measurement operation is underway. For example, OperationComplete is low

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

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

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

The default list of available Input LAN Events is:

- “LAN0”
- “LAN1”
- “LAN2”
- “LAN3”
- “LAN4”
- “LAN5”
- “LAN6”
- “LAN7”

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE "LANEVENT", "SourceEvent" :LXI:EVENT[:OUTPut]:LAN[:SET]:SOURCE? "LANEVENT"
Example	:LXI:EVEN:LAN:SOUR "LANEVENT","WaitingForTrigger"
Notes	The maximum length of the string is 45 characters.
Preset	Not affected by a Preset. The default values can be restored by pressing Restore Defs, Input/Output Settings. Preset/Default values: “Sweeping” (The Output LAN Events “WaitingForTrigger”, “Sweeping”, “Measuring”, “OperationComplete”, and “Recalling” all have default source parameters that match their names)
State Saved	Saved in instrument state.
Range	“WaitingForTrigger” “Sweeping” “Measuring” “OperationComplete” “Recalling” “LAN0” “LAN1” “LAN2” “LAN3” “LAN4” “LAN5” “LAN6” “LAN7” any user-added Input LAN Event
Initial S/W Revision	Prior to A.02.00

Destination (Remote Command Only)

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

Examples:

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

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination "LANEVENT", "destinationExpression" :LXI:EVENT[:OUTPut]:LAN[:SET]:DESTination? "LANEVENT"
Example	:LXI:EVEN:LAN:DEST "LANEVENT", "host1, 192.168.0.1:80"
Notes	The maximum length of the string is 45 characters.
Preset	Not affected by a Preset. The default value of "ALL" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

Drive

Determines the behavior of an output event.

- Normal designates typical operation, where both edges of the instrument event are transmitted,
- Off disables the LAN event.
- Wired-OR causes only one edge to be transmitted.

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE "LANEVENT", OFF NORMAl WOR :LXI:EVENT[:OUTPut]:LAN[:SET]:DRIVE? "LANEVENT"
Example	:LXI:EVEN:LAN:DRIV "LANEVENT",WOR
Preset	Not affected by a Preset. The default value of "NORMAl" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	OFF NORMAl WOR
Initial S/W Revision	Prior to A.02.00

Slope

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

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

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

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

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

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe "LANEVENT", POSitive NEGative :LXI:EVENT[:OUTPut]:LAN[:SET]:SLOPe? "LANEVENT"
Example	:LXI:EVENT:LAN:SLOP "LANEVENT",POS
Preset	Not affected by a Preset. The default value of "Positive" can be restored by using the command: :SYSTEM:DEFAULT INPut
State Saved	Saved in instrument state.
Range	POSitive NEGative
Initial S/W Revision	Prior to A.02.00

Timestamp Delta

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

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

Enabled

If this parameter is set to ON, this LAN Event is sent when the selected Source instrument event occurs.

Otherwise, this LAN Event is never output.

Key Path	System, I/O Config, LXI, LXI Output LAN Events, LAN[n]
Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled "LANEVENT", ON OFF 1 0 :LXI:EVENT[:OUTPut]:LAN[:SET]:ENABled? "LANEVENT"
Example	:LXI:EVEN:LAN:ENAB "LAN0",ON
Preset	Not affected by a Preset. The default value of "OFF" can be restored by using the command: :SYSTem:DEFault INPut
State Saved	Saved in instrument state.
Range	OFF ON 0 1
Initial S/W Revision	Prior to A.02.00

Count (Remote Command Only)

Returns the number of items in the LXI Output LAN Event List.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:COUNT?
Example	:LXI:EVEN:LAN:COUN?
Initial S/W Revision	Prior to A.02.00

Configure (Remote Command Only)

Allows the configuration of some parameters from a single SCPI command.

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

Send (Remote Command Only)

Forces the instrument to send the requested LAN Event. The LAN Event must be enabled, otherwise this command is ignored.

Remote Command	:LXI:EVENT[:OUTPut]:LAN:SEND "LANEVENT", RISE FALL
Example	:LXI:EVEN:LAN:SEND "LANEVENT", FALL
Initial S/W Revision	Prior to A.02.00

Identifier (Remote Command Only)

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

Remote Command	:LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier "LANEVENT", "identifier" :LXI:EVENT[:OUTPut]:LAN[:SET]:IDENTifier? "LANEVENT"
Example	:LXI:EVEN:LAN:IDEN"LAN0","debugstring"
Notes	The maximum length of the string is 16 characters. Nothing happens if the LAN event does not exist. The default value is that the identifier is equivalent to the name of the LAN Event.
State Saved	Saved in instrument state.
Range	Uppercase, Lowercase, Numeric, Symbol
Initial S/W Revision	Prior to A.02.00

System IDN Response

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

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

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

Key Path	System, I/O Config
Mode	All
Remote Command	:SYSTem:IDN <string> :SYSTem:IDN?
Notes	<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.

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	<p>NONE – Indicates no USB connection has been made.</p> <p>LSPeed – Indicates a USB low speed connection (1.5 Mbps).</p> <p>This is reserved for future use, the T+M488 protocol is not supported on low speed connections.</p> <p>HSPeed – Indicates that a USB high speed connection (480 Mbps) has been negotiated.</p> <p>FSPeed – Indicates that a USB full speed connection (12 Mbps) has been negotiated.</p>
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> <ul style="list-style-type: none"> The bus is not connected to any controller The controller is currently powered off The controller has explicitly placed the USB device into the suspended state. <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

The Noise Figure measurement makes a number of individual noise figure measurements over the range of frequencies specified by the frequency parameters. After each frequency point has been measured, the results are displayed on screen. See [“Measurement Results” on page 228](#) for more information.

For information on how to make Noise Figure measurement using the X-Series Signal Analyzer, see: Measurement Guide [n9069-90006.pdf].

Remote Commands:

The following commands are used to retrieve the measurement results:

:CONF:NFIGure

:FETCh:NFIGure?

:INITiate:NFIGure

:MEASure:NFIGure?

:READ:NFIGure?

For more measurement related commands, see, [“Remote Measurement Functions” on page 373](#).

Key Path	Meas
Mode	Noise Figure
Initial S/W Revision	Prior to A.04.00

Measurement Results

There are many types of measurement results.

[“Initiate \(remote command only\)” on page 229](#)

[“Read/Meas/Fetch All \(remote command only\)” on page 229](#)

[“T Cold” on page 230](#)

[“Corrected Results” on page 230](#)

[“Uncorrected Results” on page 231](#)

Result Types

There are 6 result types supported by the Noise Figure measurement:

Noise Figure –Of an active device, over the bandwidth of interest, the contribution by the device itself to thermal noise at the device output. The noise figure is usually expressed in decibels (dB), and is with respect to thermal noise power at the system impedance, at a standard noise temperature (usually 290 K) over the bandwidth of interest. It is determined by (a) measuring (determining) the ratio, usually expressed in dB, of the thermal noise power at the output, to that at the input, and (b) subtracting from that result, the gain, in dB, of the system. Typical noise figures range from 0.5 dB for very low noise devices, to 4 to 8 dB. In some systems (for example: heterodyne systems) total output noise power includes noise from other than thermal sources, such as spurious contributions from image-frequency transformation, but noise from these sources is not considered in determining the noise figure. In this example, the noise figure is determined only with respect to that noise that appears in the output via the principal frequency transformation of the system, and excludes noise that appears via the image frequency transformation.

Noise Factor - Noise Figure expressed using Linear units rather than dB.

Gain – The amplification factor, also called gain, is the extent to which an analog amplifier boosts the strength of a signal. Amplification factors are usually expressed in terms of power.

The decibel (dB), a logarithmic unit, is the most common way of quantifying the gain of an amplifier. For power, doubling the signal strength (an output-to-input power ratio of 2:1) translates into a gain of 3 dB; a tenfold increase in power (output-to-input ratio of 10:1) equals a gain of 10 dB; a hundredfold increase in power (output-to-input ratio of 100:1) represents 20 dB gain. If the output power is less than the input power, the amplification factor in decibels is negative. If the output-to-input signal power ratio is 1:1, then the amplification factor is 0 dB.

Power amplifiers typically have gain figures from a few decibels up to about 20 dB. Sensitive amplifiers used in wireless communications equipment can show gain of up to about 30 dB. If higher gain is needed, amplifiers can be cascaded, that is, hooked up one after another. But there is a limit to the amplification that can be attained this way. When amplifiers are cascaded, the later circuits receive noise at their inputs along with the signals. This noise can cause distortion. Also, if the amplification factor is too high, the slightest feedback can trigger oscillation, rendering an amplifier system inoperative.

Y-Factor – Y-factor is a ratio of two noise power levels, one measured with the noise source ON, and the other with the noise source OFF (for example: $Y=NON/NOFF$). Because noise power is proportional to noise temperature, it can be stated that $Y=TON/TOFF$. The Y-factor measurement is the most common method of measuring the quantities required to calculate the noise figure and gain results.

Effective Temperature – All types of random noise can be expressed as the equivalent amount of thermal noise that would be generated at a physical temperature T_e . Generally the word effective (or equivalent) is taken as understood, and the normal term is simply ‘noise temperature’.

Hot/Cold Power Density – The level of the noise floor observed on a spectrum analyzer depends, in part, on the selected bandwidth of the measurement. The wider the bandwidth, the more noise is measured for each data point. If the instrument can display noise density, it simply normalizes the power measurements to a 1 Hz bandwidth and references it to $kTB -173.88$ dBm/Hz; the displayed function is equivalent to power spectral density referenced to kTB . For example: 15 dB would mean the power spectral density = 158.88 dBm/Hz.

Hot Power Density simply refers to the power density measured when the noise source is turned on, and Cold Power Density is the same thing but with the noise source turned off.

The calculation of these results is described in detail in the Agilent Application Note 57–2, literature number 5952–3706E.

Initiate (remote command only)

Sets the active measurement to the Noise Figure measurement when in Noise Figure mode.

Remote Command:	:INITiate:NFIGure
Backwards Compatibility SCPI:	:INITiate[:NFIGure]
Initial S/W Revision:	Prior to A.04.00

Read/Meas/Fetch All (remote command only)

Returns 13 comma separated results in the following order:

T cold Scalar Value

Corrected scalar results for:

Noise Figure

Noise Factor

Gain

Effective Temperature

Hot Power Density

Cold Power Density

Uncorrected scalar results for:

Noise Figure

Noise Figure Measurement Measurement Results

Noise Factor

Y-Factor

Effective Temperature

Hot Power Density

Cold Power Density

Remote Command:	:FETCh MEASure READ:NFIGure?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure]?
Initial S/W Revision:	Prior to A.04.00

T Cold

The most recently used T Cold value for a swept or fixed measurement can be accessed using the following commands.

This topic contains the following sections:

[“Array \(remote command only\)” on page 230](#)

[“Scalar \(remote command only\)” on page 230](#)

Array (remote command only)

Returns an array of the most recently used T Cold values from the last swept measurement. One value is returned for each frequency point measured.

Remote Command:	:FETCh MEASure READ:NFIGure[:ARRay][:DATA]:TCOLd?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure][:ARRay][:DATA]:TCOLd?
Initial S/W Revision:	Prior to A.04.00

Scalar (remote command only)

Returns the most recently used T Cold value from the last fixed measurement.

Remote Command:	:FETCh MEASure READ:NFIGure:SCALar[:DATA]:TCOLd?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure]:SCALar[:DATA]:TCOLd?
Initial S/W Revision:	Prior to A.04.00

Corrected Results

Invalid or incalculable results will be represented using the numerical ‘SCPI Not-a-number’ value. See [“Measurement Results” on page 228](#) for detailed descriptions.

See also:

[“Array \(remote command only\)” on page 231](#)

[“Scalar \(remote command only\)” on page 231](#)

Array (remote command only)

Returns an array of the most recently completed data from the last swept measurement, taking account of correction data. One value is returned for each frequency point measured.

Remote Command:	:FETCh MEASure READ:NFIGure[:ARRay][:DATA]:CORReCted:NFIGure NFACTOR GAIN TEFFective PHOT PCOLd?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure][:ARRay][:DATA]:CORReCted:NFIGure NFACTOR GAIN TEFFective PHOT PCOLd?
Initial S/W Revision:	Prior to A.04.00

Scalar (remote command only)

Returns the most recently completed data from the last fixed measurement, taking account of correction data.

Remote Command:	:FETCh MEASure READ:NFIGure:SCALar[:DATA]:CORReCted:NFIGure NFACTOR GAIN TEFFective PHOT PCOLd?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure]:SCALar[:DATA]:CORReCted:NFIGure NFACTOR GAIN TEFFective PHOT PCOLd?
Initial S/W Revision:	Prior to A.04.00

Uncorrected Results

Invalid or incalculable results will be represented using the numerical ‘SCPI Not-a-number’ value. See [“Result Types” on page 228](#) for detailed descriptions.

See also:

[“Array \(remote command only\)” on page 231](#)

[“Scalar \(remote command only\)” on page 231](#)

Array (remote command only)

Returns an array of the most recently completed data from the last swept measurement. One value is returned for each frequency point measured.

Remote Command:	:FETCh MEASure READ:NFIGure[:ARRay][:DATA]:UNCORReCted:NFIGure NFACTOR YFACTOR TEFFective PHOT PCOLd?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure][:ARRay][:DATA]:UNCORReCted:NFIGure NFACTOR YFACTOR TEFFective PHOT PCOLd?
Initial S/W Revision:	Prior to A.04.00

Scalar (remote command only)

Returns the most recently completed data from the last fixed measurement.

Remote Command:	:FETCh MEASure READ:NFIGure:SCALar[:DATA]:UNCorrected:NFIGure NFACTOR YFACTOR TEFFective PHOT PCOLD?
Backwards Compatibility SCPI:	:FETCh MEASure READ[:NFIGure]:SCALar[:DATA]:UNCorrected:NFIGure NFACTOR YFACTOR TEFFective PHOT PCOLD?
Initial S/W Revision:	Prior to A.04.00

Remote Results For Meter View with N9069A/W9069A-AFP

We will get a minimum Noise Figure remote result and Noise Figure Array remote results:

Minimum Noise Figure – the current measured minimum Noise Figure value within 61 results in fixed freq mode, expressed in decibels (dB), this value only available in Fixed Freq Mode.

Noise Figure Array- the current measured 61 Noise Figure Values in fixed freq mode, expressed in decibels (dB), this array results only available in Fixed Freq Mode.

Minimum Noise Figure

Return the current measured minimum noise figure within 61 results in fixed freq mode

Remote Command	:FETCh READ[:NFIGure]:METer:MINimum?
Couplings	If not in Fixed Freq Mode, this value will return NaN
Initial S/W Revision	A.10.01

Noise Figure Array

Return the measured 61 noise figure results in fixed freq mode

Remote Command	:FETCh READ[:NFIGure]:METer?
Couplings	If not in Fixed Freq Mode, all return values will be NaN
Initial S/W Revision	A.10.01

Amplitude (AMPTD) Y Scale

AMPTD Y Scale (Amplitude/Y Scale)

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Select Trace

Selects the trace, 1 or 2, which the settings in the amplitude menu apply to. The values and units of the Ref Level, Scale/Div and Ref Position will be loaded according to which result type is currently displayed on the selected trace.

In Split Graph mode, this also toggles the next window function.

NOTE Data1 is always shown on trace 1 and Data2 is always shown on trace 2.

Initial S/W Revision	Prior to A.04.00
Key Path	AMPTD Y Scale
Mode	NF
Preset	A
State Saved	Saved in instrument state.
Range	1 2

Ref Value

Sets the reference value to be used in the graph window specified by <result>. If the graph window is not currently visible (you need to be using the SCPI command), the new reference value will take effect next time the window is displayed. Values entered via SCPI here are in the default units only. The front panel allows you to enter log or linear units but converts these to the default unit for each result type. In the case of T effective you can only enter values of K or Kelvin.

Result	Noise Figure / Noise Factor	Gain	Y-Factor	T Effective	P hot	P cold
Default:	4.00 dB / 2.51189	15.00 dB	5.00 dB	1000.0 K	5.00 dB	5.00 dB

Amplitude (AMPTD) Y Scale

Result	Noise Figure / Noise Factor	Gain	Y-Factor	T Effective	P hot	P cold
Range (Min):	-100.0 dB / 0	-100.0 dB	-100.0 dB	-100000000K	-100.0 dB	-100.0 dB
Range (Max):	100.0 dB / 1E9	100.0 dB	100.0 dB	100000000K	100.0 dB	100.0 dB
Step:	0.1 dB / 1, 1.5, 2, 3, 5, 7.5, 10	0.1 dB	0.1 dB	1, 1.5, 2, 3, 5, 7.5, 10	0.1 dB	0.1 dB
RPG:	0.01 dB / 1, 1.5, 2, 3, 5, 7.5, 10	0.01 dB	0.01 dB	1, 1.5, 2, 3, 5, 7.5, 10	0.01 dB	0.01 dB
Resolution:	0.001 dB	0.001 dB	0.001 dB	2 decimal	0.001 dB	0.001 dB

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLd:Y[:SCALE]:RLEVEL <value> :DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLd:Y[:SCALE]:RLEVEL?
Example	:DISP:NFIG:TRAC:NFIG:Y:RLEV 10dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	Depending on Type of Result
State Saved	Saved in instrument state.
Range	Depending on Type of Result

Mode	NF
Remote Command	:DISPlay[:NFIGure]:TRACe:Y[:SCALE]:RLEVEL:VALue NFACTOR GAIN YFACTOR TEFFective PHOT PCOLd,<float> :DISPlay[:NFIGure]:TRACe:Y[:SCALE]:RLEVEL:VALue? NFACTOR GAIN YFACTOR TEFFective PHOT PCOLd
Example	:DISP:NFIG:TRAC:Y:RLEV:VAL? NFIG
Initial S/W Revision	Prior to A.04.00

Ref Value (Noise Figure Result) See “Ref Value” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALE]:RLEVel?
Coupling	Noise Figure needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:NFIG:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	4.0 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Ref Value (Noise Factor Result) See “Ref Value” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALE]:RLEVel?
Coupling	Noise Factor needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:NFAC:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	2.5
State Saved	Saved in instrument state.
Range	0 to 1E9

Ref Value (Gain Result) See “Ref Value” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:GAIN:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:GAIN:Y[:SCALE]:RLEVel?
Coupling	Gain needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:GAIN:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF

Amplitude (AMPTD) Y Scale

Preset	15 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Ref Value (Y Factor Result) See “[Ref Value](#)” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:RLEVel?
Coupling	Y Factor needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:YFAC:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	5 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Ref Value (T Effective Result) See “[Ref Value](#)” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALE]:RLEVel?
Coupling	T Effective needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:TEFF:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1000.0
State Saved	Saved in instrument state.
Range	-100000000K to 100000000K

Ref Value (P Hot Result) See “[Ref Value](#)” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:PHOT:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:PHOT:Y[:SCALE]:RLEVel?
Coupling	P Hot needs to be selected as one of the displayed results.

Example	:DISP:NFIG:TRAC:PHOT:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	5 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Ref Value (P Cold Result) See “Ref Value” on page 233 for more information.

Remote Command	:DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALE]:RLEVel?
Coupling	P Cold needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:PCOL:Y:RLEV?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	5 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Ref Value (Meter View with N9069A/W9069A-AFP)

Key Path	Amplitude
Mode	NF
Remote Command	:DISPlay:NFIGure:TRACe:METer:Y[:SCALE]:RLEVel <value> :DISPlay:NFIGure:TRACe:METer:Y[:SCALE]:RLEVel?
Example	:DISP:NFIG:TRAC:MET:Y:RLEV 10dB
Preset	0.0 dB
State Saved	Saved in instrument state.
Range	-10.0 – 50 dB
Initial S/W Revision	A.10.01

Amplitude (AMPTD) Y Scale

Attenuation

This key controls only the mechanical attenuator. The electronic attenuator - which is limited to below 3.6GHz - is disabled in the Noise Figure Application.

The default input attenuation calibration range is:

MXA	0 dB to 8 dB, and a step size of 4 dB
EXA	0 dB to 10 dB, and a step size of 10 dB

In this application, the attenuators cannot autorange. There is therefore a risk of overdriving the analyzer. In most cases, 0 dB attenuation is adequate. To check for overdriving of the analyzer - that is, compression occurring at the preamp stage - set the attenuation to 0 dB and note the noise figure of your DUT. Now increase the attenuation by one step. If your noise figure changes by more than 0.5 dB, attenuation is required. Repeat this process until you have found the lowest level of attenuation that gives you a stable noise figure result, and use this attenuation level for your measurements.

Remote Command	<code>[:SENSe] :NFIGure:POWer [:RF] :ATTenuation <float></code> <code>[:SENSe] :NFIGure:POWer [:RF] :ATTenuation?</code>
Restriction and Notes	Attenuation steps are HW Dependent: MXA - Can only be set to multiples of 4. EXA: - Can only be set to multiples of 10
Example	<code>:NFIG:POW:ATT 4dB</code> <code>:NFIG:POW:ATT?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	0 dB
State Saved	Saved in instrument state.
Range	0 dB to 40 dB
Backwards Compatibility SCPI	<code>:INPut[:NFIGure]:ATTenuation:VALue</code> <code>[:SENSe] [:NFIGure]:MANual:RF:FIXed</code> <code>[:SENSe] [:NFIGure]:MANual:MWAVE:FIXed</code>

Scale/Div

Sets the scaling to be used in the graph window specified by <result>. If the graph window is not currently visible (you need to be using the SCPI command), the new scaling will take effect next time the window is displayed. Values entered via SCPI here are in the default units only. The front panel will allow log or linear units but will convert to the default unit for each result type. In the case of T effective,

you can only enter values of Kelvin.

Result	Noise Figure/ Noise Factor	Gain	Y-Factor	T effective	P hot	P cold
Default:	1.00 dB / 0.71489	5.00 dB	1.00 dB	200.0 K	1.00 dB	1.00 dB
Min:	0.001 dB / 0.001	0.001 dB	0.001 dB	0.1 K	0.001 dB	0.001 dB
Max:	20.0 dB / 100	20.0 dB	20.0 dB	20000000 K	20.0 dB	20.0 dB
Step:	0.1 dB / 1, 1.5, 2, 3, 5, 7.5, 10	0.1 dB	0.1 dB	1, 1.5, 2, 3, 5, 7.5, 10	0.1 dB	0.1 dB
RPG:	0.01 dB / 1, 1.5, 2, 3, 5, 7.5, 10	0.01 dB	0.01 dB	1, 1.5, 2, 3, 5, 7.5, 10	0.01 dB	0.01 dB
Resolution	0.001 dB	0.001 dB	0.001 dB	2 decimal	0.001 dB	0.001 dB

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLD:Y[:SCALE]:PDIVision <value> :DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLD:Y[:SCALE]:PDIVision?
Example	:DISP:NFIG:TRAC:NFIG:Y:PDIV 2dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	Depending on Type of Result
State Saved	Saved in instrument state.
Range	Depending on Type of Result

Mode	NF
Remote Command	:DISPlay[:NFIGure]:TRACe:Y[:SCALE]:PDIVision NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLD, <float> :DISPlay[:NFIGure]:TRACe:Y[:SCALE]:PDIVision? NFIGure NFACTOR GAIN YFACTOR TEFFective PHOT PCOLD
Example	:DISP:NFIG:TRAC:Y:PDIV? NFIG

Amplitude (AMPTD) Y Scale

Initial S/W Revision	Prior to A.04.00
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Scale/Div (Noise Figure Result)

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALe]:PDIVision?
Coupling	Noise Figure needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:NFIG:Y:PDIV 2dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1.0 dB
State Saved	Saved in instrument state.
Range	0.001 dB to 20 dB

Scale/Div (Noise Factor Result)

Remote Command	:DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALe]:PDIVision?
Coupling	Noise Factor needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:NFAC:Y:PDIV 2
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	0.7
State Saved	Saved in instrument state.
Range	0.001 to 100

Scale/Div (Gain Result)

Remote Command	:DISPlay:NFIGure:TRACe:GAIN:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:GAIN:Y[:SCALe]:PDIVision?
Coupling	Gain needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:GAIN:Y:PDIV 3dB

Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1.0 dB
State Saved	Saved in instrument state.
Range	0.001 dB to 20 dB

Scale/Dive (Y Factor Result)

Remote Command	:DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:PDIVision <value> :DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:PDIVision?
Coupling	Y Factor needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:YFAC:Y:PDIV 2dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1.0 dB
State Saved	Saved in instrument state.
Range	0.001 dB to 20 dB

Scale/Div (T Effective Result)

Remote Command	:DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALE]:PDIVision <value> :DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALE]:PDIVision?
Coupling	T Effective needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:TEFF:Y:PDIV 10K
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	200 K
State Saved	Saved in instrument state.
Range	0.1 K to 20000000 K

Amplitude (AMPTD) Y Scale

Scale/Div (P Hot Result)

Remote Command	:DISPlay:NFIGure:TRACe:PHOT:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:PHOT:Y[:SCALe]:PDIVision?
Coupling	P Hot needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:PHOT:Y:PDIV 2dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1.0 dB
State Saved	Saved in instrument state.
Range	0.001 dB to 20 dB

Scale/Div (P Cold Result)

Remote Command	:DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALe]:PDIVision?
Coupling	P Cold needs to be selected as one of the displayed results.
Example	:DISP:NFIG:TRAC:PCOL:Y:PDIV 2dB
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	1.0 dB
State Saved	Saved in instrument state.
Range	0.001 dB to 20 dB

Scale/Div (Meter View with N9069A/W9069A-AFP)

Key Path	Amplitude
Mode	NF
Remote Command	:DISPlay:NFIGure:TRACe:METer:Y[:SCALe]:PDIVision <value> :DISPlay:NFIGure:TRACe:METer:Y[:SCALe]:PDIVision?
Example	:DISP:NFIG:TRAC:MET:Y:PDIV 2dB
Preset	1.0 dB

State Saved	Saved in instrument state.
Range	0.1 dB – 5 dB
Initial S/W Revision	A.10.01

Ref Position

Sets the reference position to be used in the graph window. The reference value is positioned relative to this point on the graph. If the graph window is not currently visible, the new reference position will take effect next time the window is displayed.

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEF Fective PHOT PCOLd:Y[:SCALE]:RPOSITION TOP CENTER BOTTom :DISPlay:NFIGure:TRACe:NFIGure NFACTOR GAIN YFACTOR TEF Fective PHOT PCOLd:Y[:SCALE]:RPOSITION?
Example	:DISP:NFIG:TRAC:NFIG:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTER
State Saved	Saved in instrument state.
Range	TOP CENTER BOTTom

Ref Position (Noise Figure Result)

Remote Command	:DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALE]:RPOSITION TOP CENTER BOTTom :DISPlay:NFIGure:TRACe:NFIGure:Y[:SCALE]:RPOSITION?
Example	:DISP:NFIG:TRAC:NFIG:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTER
State Saved	Saved in instrument state.
Range	TOP CENTER BOTTom

Amplitude (AMPTD) Y Scale

Ref Position (Noise Factor Result)

Remote Command	:DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALE]:RPOsition TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:NFACTOR:Y[:SCALE]:RPOsition?
Example	:DISP:NFIG:TRAC:NFAC:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTer
State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Ref Position (Gain Result)

Remote Command	:DISPlay:NFIGure:TRACe:GAIN:Y[:SCALE]:RPOsition TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:GAIN:Y[:SCALE]:RPOsition?
Example	:DISP:NFIG:TRAC:GAIN:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTer
State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Ref Position (Y Factor Result)

Remote Command	:DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:RPOsition TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:YFACTOR:Y[:SCALE]:RPOsition?
Example	:DISP:NFIG:TRAC:YFAC:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTer

State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Ref Position (T Effective Result)

Remote Command	:DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALe]:RPOStion TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:TEFFective:Y[:SCALe]:RPOStion?
Example	:DISP:NFIG:TRAC:TEFF:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTer
State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Ref Position (P Hot Result)

Remote Command	:DISPlay:NFIGure:TRACe:PHOT:Y[:SCALe]:RPOStion TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:PHOT:Y[:SCALe]:RPOStion?
Example	:DISP:NFIG:TRAC:PHOT:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2
Mode	NF
Preset	CENTer
State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Ref Position (P Cold Result)

Remote Command	:DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALe]:RPOStion TOP CENTer BOTTom :DISPlay:NFIGure:TRACe:PCOLd:Y[:SCALe]:RPOStion?
Example	:DISP:NFIG:TRAC:PCOL:Y:RPOS TOP
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2

Amplitude (AMPTD) Y Scale

Mode	NF
Preset	CENTer
State Saved	Saved in instrument state.
Range	TOP CENTer BOTTom

Auto Scaling

Automatically sets the ref level and scale per division parameters based on the current trace data. These are set such that the trace fills 90% of the graticule.

Remote Command	:DISPlay:NFIGure:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le 0 1 OFF ON :DISPlay:NFIGure:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUP le?
Coupling	When Auto Scaling is On, and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Level manually, Auto Scaling automatically changes to Off.
Remote Command Notes	:DISP:NFIG:VIEW:WIND:TRAC:Y:COUP ON :DISP:NFIG:VIEW:WIND:TRAC:Y:COUP?
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude
Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Backwards Compatibility SCPI	:DISPlay[:WINDow]:TRACe[1] 2:Y[:SCALe]:AUTO :DISPlay:WINDow1:TRACe[1] 2:Y[:SCALe]:AUTO

Auto Scaling (Meter View with N9069A/W9069A-AFP)

Key Path	Amplitude
Mode	NF
Remote Command	:DISPlay:NFIGure:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON : :DISPlay:NFIGure:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPlE ?
Remote Command Notes	:DISP:NFIG:VIEW3:WIND:TRAC:Y:COUP ON : :DISP:NFIG:VIEW3:WIND:TRAC:Y:COUP?
Preset	On
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.10.01
Coupling	When Auto Scaling is On, this function automatically determines the scale per division to be 1/8 of the highest value in the strip chart, and sets the Ref Level to 0.0 dB. When you set a value to either Scale/Div or Ref Level manually, Auto Scaling automatically changes to Off.

Internal Preamp

Allows the user to turn the internal preamp on or off. Turning the Internal Preamp on gives a better noise figure and thus better uncertainties. In some cases, with high gain DUTs, especially when tested with wide RBWs, noise compression may occur. In this case, increasing the input attenuation or turning off the preamp are recommended.

If the current IF frequency range falls completely or partially outside the internal preamp range, a warning message will be displayed.

Note that the default input attenuation calibration range is:

MXA	0 dB to 8 dB, and a step size of 4 dB
EXA	0 dB to 10 dB, and a step size of 10 dB

Remote Command	[:SENSE]:NFIGure:POWer[:RF]:GAIN[:STATE] OFF ON 0 1 : [:SENSE]:NFIGure:POWer[:RF]:GAIN[:STATE] ?
Example	POW:GAIN OFF
Initial S/W Revision	Prior to A.04.00
Key Path	Amplitude, More 2 of 2

Amplitude (AMPTD) Y Scale

Mode	NF
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:POWer[:RF]:GAIN[:STATe] :INPut:GAIN:STATe

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement which have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See [“More Information” on page 249](#)

Key Path	Front-panel key
Remote Command	:COUPle ALL NONE
Example	:COUP ALL
Notes	:COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements.
Initial S/W Revision	Prior to A.02.00

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between "Auto" (where the parameter is automatically coupled to the other parameters it is dependent upon) and "Man" (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either "Auto" or "Man" underlined as illustrated below.

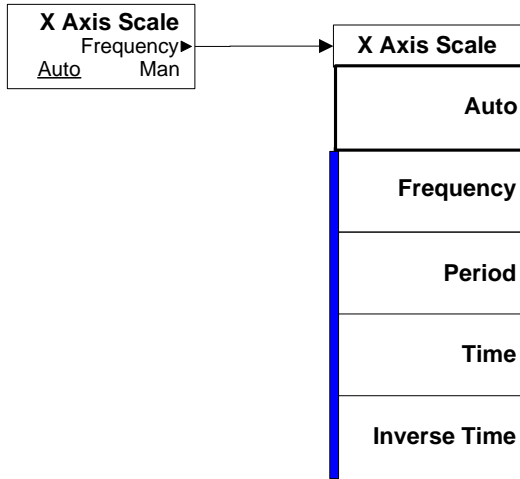
Sweep Time	
66.24 ms	
<u>Auto</u>	Man

vsd07

Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in "Auto" in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

Auto Couple



vsd08

BW

Opens the menu containing the Instrument Bandwidth settings. In the Noise Figure measurement, only the Resolution Bandwidth can be altered.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Res BW (Auto/Man)

Determines control for setting the resolution bandwidth to automatic or manual.

When this function is set to **Auto** (default setting), the bandwidth is set automatically, and is dependent on the measurement frequency.

At measurement frequencies of 8 MHz or above, the resolution bandwidth is set automatically to 4 MHz.

At measurement frequencies less than 8 MHz, the resolution bandwidth is set automatically to approximately one third of the measurement frequency.

When the resolution bandwidth is set to manual (**Man**), you can manually specify the resolution bandwidth from a minimum of 1 Hz to a maximum of 8 MHz. The lower the resolution bandwidth setting, the longer the measurement will take. With a resolution bandwidth setting of 1 Hz, each measurement point may take up to 6000 seconds.

Refer to your X-Series measurement guide for more information on setting the resolution bandwidth.

Remote Command	<pre>[:SENSe] :NFIGure:BWIDth BANDwidth[:RESolution] <freq> [:SENSe] :NFIGure:BWIDth BANDwidth[:RESolution]? [:SENSe] :NFIGure:BWIDth BANDwidth[:RESolution]:AUTO ON OFF 1 0 [:SENSe] :NFIGure:BWIDth BANDwidth[:RESolution]:AUTO?</pre>
Coupling	When the IF freq goes lower than 8 MHz the Res BW needs to be reduced to prevent the LO feedthrough affecting results.
Example	<pre>:BWID:RES 1 MHz NFIG:BWID:AUTO OFF NFIG:BWID?</pre>
Initial S/W Revision	Prior to A.04.00
Key Path	BW
Mode	NF
Preset	4 MHz ON

BW

State Saved	Saved in instrument state.
Range	1 Hz to 8 MHz
Backwards Compatibility SCPI	[[:SENSe][:NFIGure]:BWIDth BANDwidth[:RESolution] (Default RBW in PSA ESA apps was 1 MHz)

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.

Frequency (FREQ) Channel

Accesses the menu that enables you to set the desired frequency settings, including custom swept frequency lists.

The parameters defined in the frequency menu are used to construct a list of frequency points at which the measurement will be carried out. A separate set of frequency parameters and frequency lists exist for each frequency context (RF, IF, and LO). The parameters displayed under the frequency menu depend on the current context (selected under the Mode Setup, DUT Setup menu). The current context is displayed in the Noise Figure Settings Panel on the measurement bar.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Freq Mode

The frequency mode determines how the list of frequencies to be measured is calculated. The options are:

Swept – Points are linearly distributed between Start and Stop Frequency, where the number of points is determined by the Points parameter. Start Freq, Stop Freq, Center Freq, and Span parameters are coupled.

In this mode, Fixed Freq is grayed out (disabled).

Fixed – A single frequency (supplied by the Fixed Freq parameter) is measured. Meter View is ideal for this mode.

In this mode, the Start/Stop/Center Freq, Span, and Points parameters are grayed out (disabled).

List – A user-specified list of frequencies is measured. The list of frequencies can be supplied using the respective SCPI commands, loading the frequency list from file, or by entering the data manually into the frequency list. Duplicate frequencies are not acceptable. See "" for more information on entering data manually.

In this mode, the Start/Stop/Center/Fixed Freq, Span, and Points parameters are grayed out (disabled).

When the Frequency Mode is LIST and the context changes, the list values are recalculated to satisfy the new context.

Remote Command	[:SENSe] :NFIGure:FREQuency:MODE SWEPT FIXEd LIST [:SENSe] :NFIGure:FREQuency:MODE?
Coupling	See above.
Remote Command Notes	SWEPT parameter replaces SWEep
Example	FREQ:MODE FIX
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency

Frequency (FREQ) Channel

Mode	NF
Preset	SWEpt
State Saved	Saved in instrument state.
Range	SWEpt FIXed LIST
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:MODE

Start Frequency

Sets the Start Frequency that will be used when the **Swept** key is selected in the Freq Mode menu, or when selecting the **Fill Using Start and Stop Freq** key in the Frequency List. A separate start frequency is maintained for each frequency context (RF, LO, IF). The softkey displays and controls the start frequency for the current context.

The Start, Stop, Center, and Span frequencies are all coupled. Altering one causes the others to be recalculated to satisfy the equations:

$$\text{Span} = \text{Stop} - \text{Start}$$

$$\text{Center} = \text{Start} + (\text{Span} / 2)$$

Remote Command	[:SENSe] :NFIGure:FREQuency:STARt <freq> [:SENSe] :NFIGure:FREQuency:STARt?
Coupling	This allows you to set the frequency at which the swept measurement starts. Active only when freq mode is set to Swept. Coupled to stop freq, center freq, and span. When the selected cal/meas freq goes below 10MHz the AC flag displays the exclamation mark to warn you of inaccurate results. Mirror of Start Frequency for current context in DUT Setup Form.
Example	NFIG:FREQ:STAR 11 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF
Preset	10 MHz
State Saved	Saved in instrument state.
Range	-325 GHz to 325 GHz
Min	10 kHz

Max	<p>There are a few conditions where the max will be 325 GHz less the min span of 10 Hz.</p> <p>When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input"</p> <p>When DUT is a Downconverter and the frequency context is set to "RF DUT Input"</p>
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:STARt

Stop Freq

Sets the Stop Frequency that will be used when Freq Mode is set to 'Swept', or when using the 'Fill Using Start and Stop Freq' option in the Frequency List. A separate stop frequency is maintained for each frequency context (RF, LO, IF). The softkey displays and controls the stop frequency for the current.

The Start, Stop, Center, and Span frequencies are all coupled. Altering one causes the others to be recalculated to satisfy the equations:

$$\text{Span} = \text{Stop} - \text{Start}$$

$$\text{Center} = \text{Start} + (\text{Span} / 2)$$

Remote Command	<pre>[:SENSe] :NFIGure:FREQuency:STOP <freq> [:SENSe] :NFIGure:FREQuency:STOP?</pre>
Coupling	Active only when freq mode is set to Swept. Coupled to stop freq, center freq and span.
Example	NFIG:FREQ:STOP 11 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF
Preset	3.0 GHz
State Saved	Saved in instrument state.
Range	-325 GHz to 325 GHz
Min	10.01 kHz
Max	<p>There are a few conditions the max will be 325 GHz.</p> <p>When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input"</p> <p>When DUT is a Downconverter and the frequency context is set to "RF DUT Input"</p>
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:STOP

Frequency (FREQ) Channel

Center Freq

Sets the Center Frequency that will be used when **Swept** is selected in the Freq Mode menu.

The Start, Stop, Center, and Span frequencies are all coupled. Altering one causes the others to be recalculated to satisfy the equations:

$$\text{Span} = \text{Stop} - \text{Start}$$

$$\text{Center} = \text{Start} + (\text{Span} / 2)$$

NOTE Unless the number of Points is an odd number, the Center Frequency will not actually be measured since the measured points are evenly distributed between the Start and Stop Frequencies.

Remote Command	<code>[:SENSe] :NFIGure:FREQuency:CENTer < freq ></code> <code>[:SENSe] :NFIGure:FREQuency:CENTer?</code>
Coupling	This allows you to set the center frequency for a swept measurement. Active only when freq mode is set to Swept. Coupled to stop freq, center freq, and span.
Example	<code>:NFIG:FREQ:CENT 1.5 GHz</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF
Preset	1.505 GHz
State Saved	Saved in instrument state.
Range	-325 GHz to 325 GHz
Min	10.005 kHz
Max	There are a few conditions the max will be 325 Hz less half of the min span of 10 Hz. When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input" When DUT is a Downconverter and the frequency context is set to "RF DUT Input"
Backwards Compatibility SCPI	<code>[:SENSe] [:NFIGure]:FREQuency:CENTer</code>

Points

This is a shortcut to the 'Points' parameter under the Sweep/Control front-panel key.

Key Path	Frequency
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Initial S/W Revision	Prior to A.04.00
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Fixed Freq

Sets the Fixed Frequency that will be measured when Freq Mode is set to 'Fixed'.

Remote Command	[:SENSe] :NFIGure :FREQuency :FIXed <freq> [:SENSe] :NFIGure :FREQuency :FIXed?
Coupling	Active if freq mode is set to Fixed: Warning -221.5528 displayed otherwise.
Example	:NFIG:FREQ:FIX 2 GHz
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF
Preset	1.505 GHz
State Saved	Saved in instrument state.
Range	-325 GHz to 325 GHz
Min	10 kHz
Max	There are a few conditions the max will be 325 GHz less half of the min span of 10 Hz. When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input" When DUT is a Downconverter and the frequency context is set to "RF DUT Input"
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:FIXed

Edit Frequency List

When frequency list mode is active, this menu allows the user to enter a list of frequencies to be measured. The current entries in the frequency list will be using the table editor (see section "[Table Editor](#)" on page 423).

Entered frequencies can be arbitrary values within the frequency range of the current frequency context. Values will be displayed in sorted order.

Once a new list is entered, the application will store this table in non-volatile memory, to allow restoring after a power cycle.

If the frequency context changes while Freq Mode is LIST, the frequency list values must be recalculated to satisfy the new context.

Duplicates are NOT allowed in the frequency list.

Frequency (FREQ) Channel

Frequency List
Frequency
1.000000000 GHz
1.100000000 GHz
1.200000000 GHz
1.300000000 GHz
1.400000000 GHz
1.500000000 GHz
1.600000000 GHz

Coupling	<ol style="list-style-type: none"> 1. Error 171 is displayed if Freq Mode = LIST and there is no data in the table. Refer to the X-Series Instrument Messages Guide which can be accessed by pressing the green Help key, then selecting the "Additional Documentation" page in the table of contents pane of the Help window. 2. Table displayed dependent on frequency context.
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF

Edit

Opens the frequency list editor softkey menu which enables you to enter discrete values into the frequency list. See section [“Table Editor” on page 423](#) for information regarding the keys in the Edit menu.

Coupling	Error 171.0001 displayed if Freq Mode = LIST and no data in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency, Edit Frequency List
Mode	NF

Frequency No Equivalent SCPI Command (See Setting Frequency List Table Remotely below)

Enables you to enter the frequency.

Coupling	Parameter coupled to currently selected frequency in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency, Edit Frequency List, Edit
Mode	NF

Preset	10 kHz
State Saved	Saved in instrument state.
Range	10 kHz to 325 GHz
Max	There are a few conditions the max will be 325 GHz less half of the min span of 10 Hz. <ol style="list-style-type: none"> 1. When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input" 2. When DUT is a Downconverter and the frequency context is set to "RF DUT Input"

Setting Frequency List Table Remotely (remote command only) The frequency list can be specified remotely. This command will clear any current Frequency List and overwrite it with the list specified.

Mode	NF
Remote Command	[:SENSE] :NFIGure :FREQuency :LIST :DATA <frequency>, ([, <frequency>]) * [:SENSE] :NFIGure :FREQuency :LIST :DATA?
Example	NFIG:FREQ:LIST:DATA 1000000, 2000000, 3000000, 4000000
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:LIST:DATA
Initial S/W Revision	Prior to A.04.00

Table Entry Count (remote command only) Returns an integer representing the number of frequency points that are currently loaded into the table. Min 0, Max 501. If the table is empty then the table size will be 0

Mode	NF
Remote Command	[:SENSE] :NFIGure :FREQuency :LIST :COUNt?
Preset	0
Range	0 to 501
Example	:NFIG:FREQ:LIST:COUN?
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:LIST:COUNt?
Initial S/W Revision	Prior to A.04.00

Fill Using Start and Stop Freq

No Equivalent SCPI Command (See "[Setting Frequency List Table Remotely \(remote command only\)](#)" on page 261(remote command only)").

Clears the existing frequency list table, and replaces it with an auto-generated table based upon the 'Swept' Freq Mode settings. The frequency points will be linearly distributed, between the start and stop frequencies, and the number of points generated is determined by the current setting of the Points

Frequency (FREQ) Channel

parameter.

NOTE This function can be used to set the template frequencies which can then be modified for the exact "sweet spots" in the DUT.

Initial S/W Revision	Prior to A.04.00
Key Path	Frequency, Edit Frequency List
Mode	NF

Clear Table

This function clears all data from the Frequency List.

Restriction and Notes	Clears all entries in the Frequency List table.
Initial S/W Revision	Prior to A.04.00
Key Path	FREQ Channel, Edit Frequency List
Mode	NF

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 265](#)

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, dBμV, dBμA, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohms. Setting the computational input impedance to 75 ohms is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with a 50 ohm input impedance.

There are a variety ways to make 50 to 75 ohm transitions, such as impedance transformers or minimum loss pads. The choice of the solution that is best for your measurement situation requires balancing the amount of loss that you can tolerate with the amount of measurement frequency range that you need. If you are using one of these pads/adaptors with the **Input Z Corr** function, you might also want to use the **Ext Gain** key. This function is used to set a correction value to compensate for the gain (loss) through your pad. This correction factor is applied to the displayed measurement values.

Key Path:	Input/Output, RF Input
Remote Command:	[:SENSE] :CORRection:IMPedance [:INPut] [:MAGNitude] 50 75 [:SENSE] :CORRection:IMPedance [:INPut] [:MAGNitude] ?
Example:	CORR:IMP 75 sets the input impedance correction to 75 ohms. CORR:IMP?
Preset:	This is unaffected by a Preset but is set to 50 ohms on a "Restore Input/Output Defaults" or "Restore System Defaults->All" Some instruments/options may have 75 ohms available.
State Saved:	Saved in instrument state
Readback:	50 Ω or 75 Ω. Current setting reads back to the RF key.
Initial S/W Revision:	Prior to A.02.00

RF Coupling

Specifies alternating current (AC) or direct current (DC) coupling at the analyzer RF input port. Selecting AC coupling switches in a blocking capacitor that blocks any DC voltage present at the

analyzer input. This decreases the input frequency range of the analyzer, but prevents damage to the input circuitry of the analyzer if there is a DC voltage present at the RF input.

In AC coupling mode, you can view signals below the corner frequency of the DC block, but below a certain frequency the amplitude accuracy is not specified. The frequency below which specifications do not apply is:

X-Series Model	Lowest Freq for meeting specs when AC coupled	Lowest Freq for meeting specs when DC coupled
N9000A	100 kHz	n/a
N9010A	10 MHz	9 kHz
N9020A	10 MHz	3 Hz
N9030A	10 MHz	3 Hz

Some amplitude specifications apply only when coupling is set to DC. Refer to the appropriate amplitude specifications and characteristics for your analyzer.

When operating in DC coupled mode, ensure protection of the analyzer input circuitry by limiting the DC part of the input level to within 200 mV of 0 Vdc. In AC or DC coupling, limit the input RF power to +30 dBm (1 Watt).

Key Path:	Input/Output, RF Input
Remote Command:	:INPut:COUPling AC DC :INPut:COUPling?
Example:	INP:COUP DC
Dependencies:	This key does not appear in models that are always AC coupled. When the SCPI command to set DC coupling is sent to these models, it results in the error “Illegal parameter value;This model is always AC coupled” In these models, the SCPI query INP:COUP? always returns AC. 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

RF Input Port

Specifies the RF input port used. The RF Input Port key only appears on units with multiple inputs, and

Input/Output

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

Input/Output

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:	<code>[:SENSe] :POWer [:RF] : RFPSelector [:STATe] 1 0 ON OFF</code> <code>[:SENSe] :POWer [:RF] : RFPSelector [:STATe] ?</code>
Example:	<code>:POW:RFPS 1</code>
Example:	<code>:INP:PRES:STAT ON</code>
Notes:	<code>[:SENSe] :POWer [:RF] : RFPSelector [:STATe] 1 ON</code> . Sets to full compliance measurement. <code>[:SENSe] :POWer [:RF] : RFPSelector [:STATe] 0 OFF</code> . 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:	<code>INPut<1 2>:PRESelection[:STATe] ON OFF</code> <code>INPut<1 2>:PRESelection[:STATe]?</code> included for R&S ESU compatibility

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.

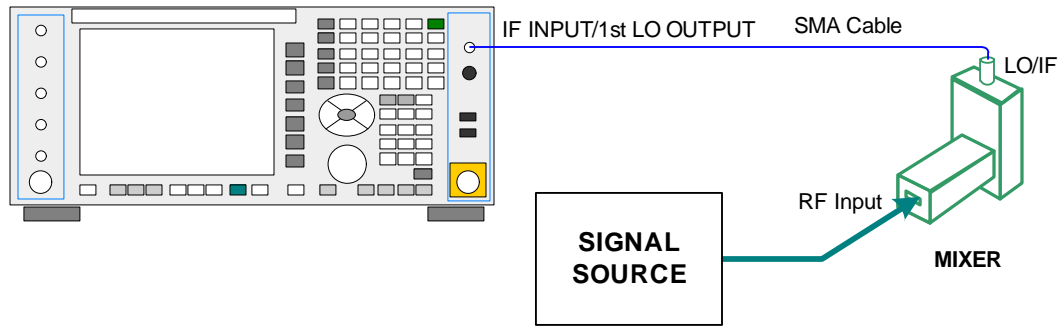
See [“More Information” on page 271](#)

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

More Information

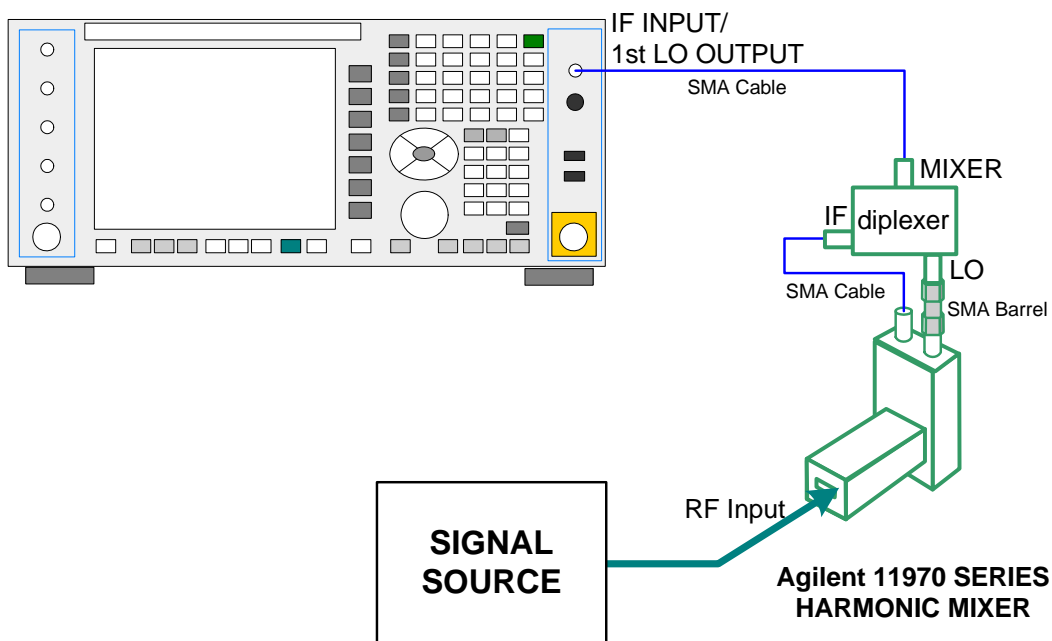
X-series analyzers have a combined LO Out/IF In connection, whereas earlier analyzers used separate ports for the LO Out and the IF in. Internal diplexers in the analyzer and the mixer simplify the connection for the user – only a single SMA cable is required.

Input/Output



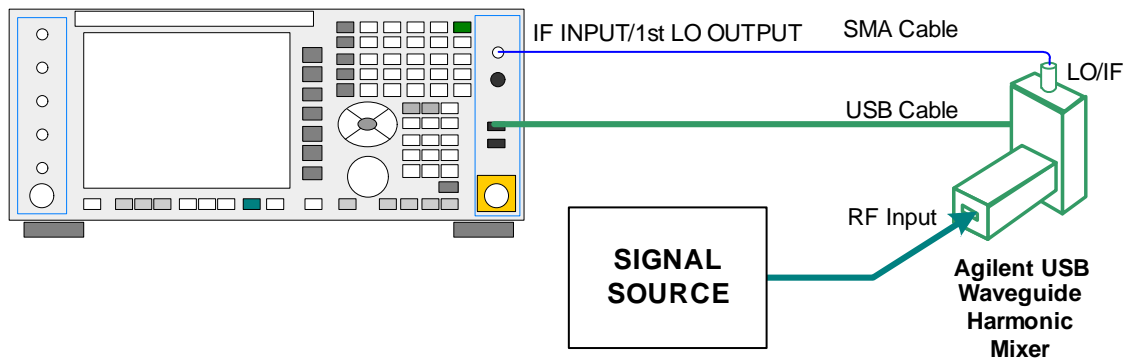
Legacy HP/Agilent and some third party mixers have separate LO In and IF out connections. This requires you to use an external diplexer to connect these mixers. A diplexer can easily be purchased for this purpose (for example, Diplexer Model # DPL.26 or # DPL.313B from OML Inc., Morgan Hill CA)

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
	List Sweep	N
Phase Noise	Monitor Spectrum	Y
	Log Plot	Y
	Spot Frequency	N
	Waveform	N
I/Q Analyzer	Complex Spectrum	N
	Waveform	N

- * the Swept SA measurement also supports Image Shift

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

Input/Output

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 screenshot shows the 'External Mixer Setup' window in the Agilent Spectrum Analyzer. At the top, there are various status indicators and settings like 'Gate: LO LNP', 'NFE SIG TRK', 'PNO: Fast IFGain:Low', 'Trig Delay: 1.0 μs', 'Trig: External1', 'Atten: 52 dB', 'Avg Type: Log-Pwr', 'AvgHold: -100', and 'Ext Gain: 7.00 dB'. The 'Mixer Selection' is set to 'K-band Single Harmonic w/ Doubler'. Below this is the 'Harmonic Table' with the following data:

Harmonic	LO Doubler	Min Freq	Max Freq
-2	On	18.0 GHz	26.5 GHz

At the bottom of the setup area, there is a 'USB Mixer' section with a USB icon and a warning message: 'USB Mixer not detected'. The right side of the screen has a vertical menu with options like 'Ext Mix Setup', 'Mixer Presets', 'Mixer Bias' (set to 0.00 mA), and 'Edit Harmonic Table'. The bottom status bar shows 'MSG' and 'STATUS'.

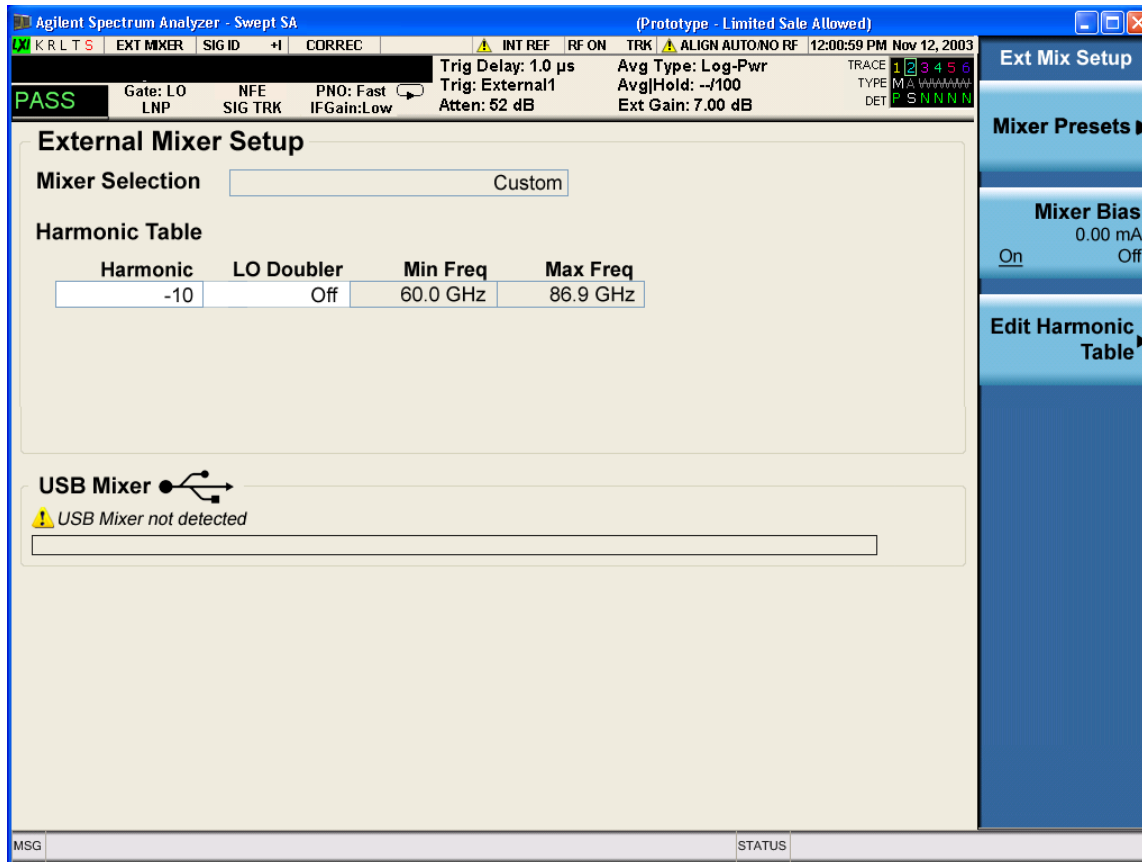
The current Mixer selection (the current or most recently connected USB Mixer, or the most recent Mixer Preset, or “Custom” if the user has modified the setup) reads out at the top of this screen.

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.

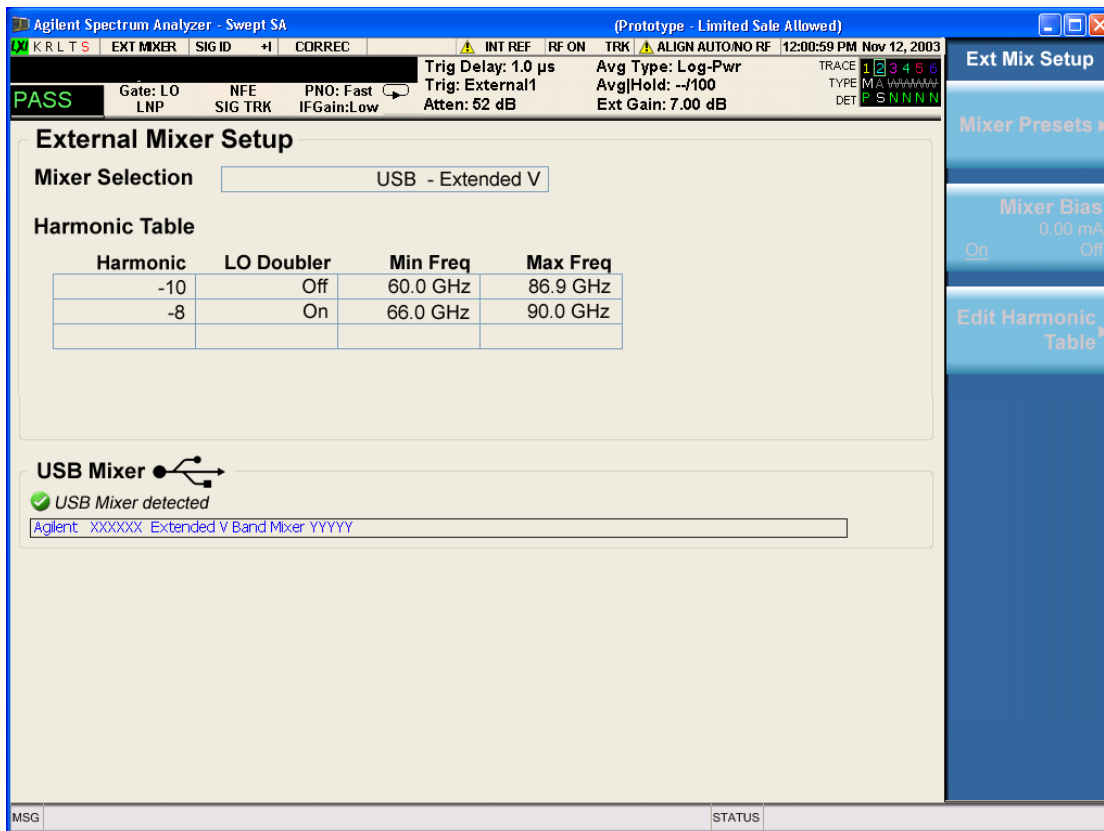
The analyzer assumes that if you plug a mixer into the USB, that is the mixer you want to use. Therefore:

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.

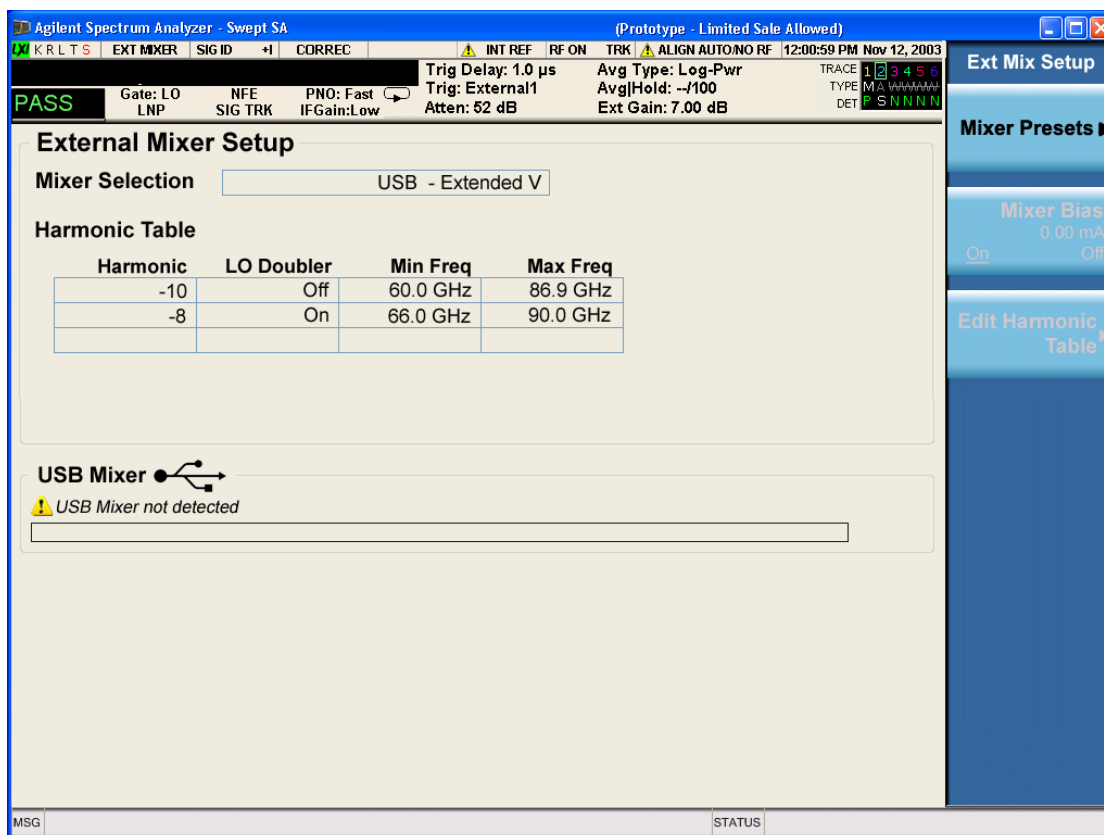
When **Restore Input/Output Defaults** is performed, if an Agilent USB Mixer is plugged into the analyzer's USB port, the Mixer Selection remains unchanged.

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 281](#)

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 #	Dblr ?	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:	<code>[:SENSe] :MIXer :TTYPe SINGle HARMonic DOUBLer</code> <code>[:SENSe] :MIXer :TTYPE?</code>
Example:	<code>:MIX:TTYP SING</code>
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:	<code>:MIX:TTYP SING</code>
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:	<code>:MIX:TTYP HARM</code>
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

Input/Output

conversion loss.

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_ampl> [: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 292 is installed.

Selects the front-panel I/Q input ports to be the analyzer signal input. If I/Q is already selected, pressing

Input/Output

this key accesses the I/Q setup menu.

Key Path:	Input/Output
Mode:	BASIC, CDMA2K, EDGE/GSM, TDSCDMA, 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.

Input/Output

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 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:BALanced[: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

Input/Output

Remote Command:	: INPut [1] : IQ:TYPE IQ I Q : INPut [1] : IQ:TYPE?
Notes:	For R&S FSQ-B71 compatibility
Preset:	IQ
Initial S/W Revision:	Prior to A.02.00

I+jQ

Sets the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

Key Path:	Input/Output, I/Q, I/Q Path
Example:	Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ
Initial S/W Revision:	Prior to A.02.00

I Only

Sets the signal input to be only the I channel. The Q channel will be ignored. The data collected is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

Key Path:	Input/Output, I/Q, I/Q Path
Example:	Set the input to be only the I channel. FEED:IQ:TYPE IONL
Initial S/W Revision:	Prior to A.02.00

Q Only

Sets the signal input to be only the Q channel. The I channel will be ignored. The Q channel will be sent to the digital receiver block as $Q+j0$. The receiver's output is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant. Note that since the receiver's real output is displayed as the "I" data, when the center frequency is 0, the Q Only input appears as the "I" data.

Key Path:	Input/Output, I/Q, I/Q Path
Example:	Set the input to be only the Q channel. FEED:IQ:TYPE QONL
Initial S/W Revision:	Prior to A.02.00

Independent I and Q

Sets the signal input to be both the I and Q channels, but as independent inputs. It is equivalent to treating

I as channel 1 and Q as channel 2 in an oscilloscope. Each channel's data is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

This selection is only available in VXA.

Key Path:	Input/Output, I/Q, I/Q Path
Example:	Turn on both I and Q channels and treat I as channel 1 and Q as channel 2. FEED:IQ:TYPE IND
Notes:	The Independent I and Q selection is only available in GPVSA
Readback Text:	Ind I/Q
Initial S/W Revision:	Prior to A.02.00

I Setup

Access the channel setup parameters for the I channel.

Key Path:	Input/Output, I/Q
Initial S/W Revision:	Prior to A.02.00

I Differential Input

Selects differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

Key Path:	Input/Output, I/Q, I Setup
Remote Command:	:INPut:IQ[:I]:DIFFerential OFF ON 0 1 :INPut:IQ[:I]:DIFFerential?
Example:	Put the I channel in Differential Input mode INP:IQ:DIFF ON
Notes:	When I Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When I Differential Input = On, and IQ Path is I+jQ, the Q Differential input must also be On. Similarly, when I Differential Input = Off, and IQ Path is I+jQ, the Q Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential.

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 Q Same as I is On, the value set for I will also be copied to Q.
Preset:	Off
State Saved:	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range:	Off On
Initial S/W Revision:	Prior to A.02.00

Remote Command:	: INPut [1] : IQ: BALanced [: STATE] OFF ON 0 1 : INPut [1] : IQ: BALanced [: STATE] ?
Notes:	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 303](#).

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

Input/Output

Combined Differential/Input Z (Remote Command Only)

This is Remote Command only (no front panel) and is for backwards compatibility only. It combines the Differential Input and Input Z selections into a single SCPI command.

Remote Command:	:INPut:IMPedance:IQ U50 B50 U1M B1M :INPut:IMPedance:IQ?
Example:	:INPut:IMPedance:IQ U50 This is equivalent to the following two SCPI commands: :INP:IQ:DIFF OFF :INP:IQ:IMP 50
Notes:	Provided for E4406A code compatibility. The enum values translate as follows: U50: Differential Input = Off, Input Z = 50Ω B50: Differential Input = On, Input Z = 50Ω U1M: Differential Input = Off, Input Z = 1 MΩ B1M: Differential Input = On, Input Z = 1 MΩ This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) parameter with the Differential Input (Off = "Unbalanced", On = "Balanced") parameter into a single enumeration. This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On. Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has "IQ" before "IMP" while this command has that order reversed.
Couplings:	This command does not have an independent parameter, but instead is tied to the Differential Input and Input Z parameters. The coupling for those parameters apply to this command too.
Preset:	U50
Initial S/W Revision:	Prior to A.02.00

Q Setup

Access the channel setup parameters for the Q channel.

Key Path:	Input/Output, I/Q
Readback Text:	When Q Same as I is On the readback is "Q Same as I".
Initial S/W Revision:	Prior to A.02.00

Q Same as I

Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel parameters to be mirrored from the I channel. That way 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

Input/Output

Notes:	<p>When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set.</p> <p>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.</p>
Couplings:	<p>Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use).</p> <p>When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On.</p>
Preset:	Off
State Saved:	<p>On</p> <p>This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"</p>
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:	<p>: INPut [1] : IQ:Q:IMPedance LOW HIGH</p> <p>: INPut [1] : IQ:Q:IMPedance?</p>
Example:	<p>Set the Q channel input impedance to 1 MΩ</p> <p>INP:IQ:Q:IMP HIGH</p>
Notes:	<p>LOW = 50 Ω HIGH = 1 MΩ</p> <p>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.</p>
Couplings:	<p>Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe.</p> <p>When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On.</p>

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 303.

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

Input/Output

will be "<ch>: <probe id>", where "<ch>" is either "I" or "Q" and "<probe id>" is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be "I: 1130A".

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe type "Unknown" is used, and this is also treated like a probe type with its own calibration data. When a probe is changed, the calibration data for that probe type for that port is restored. An advisory message will be displayed showing the new probe type and the calibration status. The calibration data is stored permanently (survives a power cycle) and is not affected by a Preset or any of the Restore commands. When the probe has EEPROM identification (most newer Agilent probes have this), the calibration data is stored by probe serial number and port, so if you have two probes of the same type, the correct calibration data will be used for each. For probes that do not have EEPROM identification, the calibration data is stored by probe type and port and the instrument cannot distinguish between different probes of the same type. In all cases (with or without EEPROM identification), the calibration data is port specific, so it will not follow a specific probe from port to port if the probe is moved.

The "Unknown" probe type is used whenever no probe is sensed. When no calibration data exists for "Unknown" the latest cable calibration data is used (see Section [“I/Q Guided Calibration” on page 349](#)).

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?

Input/Output

Example:	Set the probe to low frequency rejection below 1.7 Hz. INP:COUP:I LFR1
Notes:	Only some probe types support Coupling. For those that do, each probe type has its own Coupling setting. As probes are changed the Coupling value will reflect the new probe's setting. Changing the Coupling affects only the current probe type's setting and leaves all others unchanged.
Preset:	DC
State Saved:	Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore.
Range:	DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2
Readback Text:	DC LFR1 LFR2
Initial S/W Revision:	Prior to A.02.00

DC

Turns off low frequency rejection, allowing signals down to DC.

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example:	Turn off low frequency rejection on the I channel INP:COUP:I DC
Initial S/W Revision:	Prior to A.02.00

LFR1

Turns on low frequency rejection, rejecting signal component lower than 1.7 Hz.

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example:	Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1
Initial S/W Revision:	Prior to A.02.00

LFR2

Turns on low frequency rejection, rejecting signal component lower than 0.14 Hz.

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Example:	Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2
Initial S/W Revision:	Prior to A.02.00

Calibrate

Invokes the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See [“I/Q Guided Calibration” on page 349](#).

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling
Readback Text:	The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM
Initial S/W Revision:	Prior to A.02.00

Clear Calibration

Clears the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe. The probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

Key Path:	Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe
Remote Command:	:CALibration:IQ:PROBe:I Q:CLEar
Example:	Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE
Initial S/W Revision:	Prior to A.02.00

Reference Z

Sets the value of the impedance to be used in converting voltage to power for the I and Q channels. This does not change the hardware's path impedance (see [“I Input Z” on page 298](#)).

Key Path:	Input/Output, I/Q
Remote Command:	:INPut:IMPedance:REFerence <integer> :INPut:IMPedance:REFerence?

Input/Output

Example:	Set the I/Q reference impedance to 50 Ω INP:IMP:REF 50
Preset:	50 Ω
State Saved:	Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
Range:	1 Ω to 1 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 350](#) 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

Input/Output

Modified at S/W Revision:	A.03.00
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Off

Switches the input back to the selected input (RF or I/Q)

Key Path:	Input/Output, RF Calibrator
Example:	:FEED:AREF OFF
Readback:	Off
Initial S/W Revision:	Prior to A.02.00

External Gain

Compensates for gain or loss in the measurement system outside the spectrum analyzer. The External Gain is subtracted from the amplitude readout (or the loss is added to the amplitude readout). So, the displayed signal level represents the signal level at the output of the device-under-test, which can be the input of an external device that provides gain or loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc., are all affected by External Gain. Changing the External Gain, even on a trace which is not updating, will immediately change all of the above, without new data needing to be taken.

NOTE	Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep. 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
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Input/Output

Remote Command:	<code>[:SENSe] :CORRection:MS [:RF] :GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:MS [:RF] :GAIN?</code>
Example:	<code>CORR:MS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:MS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.)
Notes:	Does not auto return.
Dependencies:	The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support MS.
Preset:	This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in instrument state.
Min:	-100 dB
Max:	100 dB
Readback:	MS, <Ext Gain value> dB
Initial S/W Revision:	Prior to A.02.00

Remote Command:	<code>[:SENSe] :CORRection:MS [:RF] :LOSS <rel_ampl></code> <code>[:SENSe] :CORRection:MS [:RF] :LOSS?</code>
Example:	<code>CORR:MS:LOSS 10</code> sets the Ext Gain value to -10 dB, and subsequently querying <code>:LOSS</code> will give 10 dB <code>CORR:MS:LOSS -10</code> sets the Ext Gain value to 10 dB, and subsequently querying <code>:LOSS</code> 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 <code>:LOSS</code> is set it sets <code>:GAIN</code> to the negative value of the parameter sent. Anytime <code>:LOSS</code> is queried it gives the negative of <code>:GAIN</code>
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

Input/Output

Initial S/W Revision:	Prior to A.02.00
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I Ext Gain

This function affects only the I channel input, except when the Input Path is I+jQ. In I+jQ this setting is applied to both I and Q channel inputs. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path:	Input/Output, External Gain
Remote Command:	[[:SENSE]:CORRection:IQ:I:GAIN <rel_ampl> [:SENSE]:CORRection:IQ:I:GAIN?
Example:	Set the I Ext Gain to 10 dB CORR:IQ:I:GAIN 10 Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:I:GAIN -10
Notes:	Not available unless option BBA is installed
Preset:	0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in instrument state.
Min:	-100 dB
Max:	100 dB
Readback Text:	I Gain, <I Ext Gain> dB
Initial S/W Revision:	Prior to A.02.00

Q Ext Gain

This function affects only the Q channel input and only when the Input Path is not I+jQ. It is not available unless the Baseband I/Q option (BBA) is installed.

Key Path:	Input/Output, External Gain
Remote Command:	[[:SENSE]:CORRection:IQ:Q:GAIN <rel_ampl> [:SENSE]:CORRection:IQ:Q:GAIN?
Example:	Set the Q Ext Gain to 10 dB CORR:IQ:Q:GAIN 10 Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:Q:GAIN -10
Notes:	Not available unless option BBA is installed.

Preset:	0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in instrument state.
Min:	-100 dB
Max:	100 dB
Readback Text:	Q Gain, <I Ext Gain> dB
Initial S/W Revision:	Prior to A.02.00

Restore Input/Output Defaults

This selection causes the group of settings and data associated with the **Input/Output** key to be a reset to their default values. In addition, when a Source is installed, licensed and selected, Restore Input/Output defaults will initiate a Source Preset.

This level of Restore System Defaults does not affect any other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key, including Input Corrections and Data (described in the Corrections section).

Key Path:	Input/Output
Example:	:SYST:DEF INP presets all the Input/Output variables to their factory default values.
Notes:	Refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEFault INPut: command.
Initial S/W Revision:	Prior to A.02.00

Data Source

Gives you the choice of either using a hardware input signal as the input or raw data stored in a data storage buffer from an earlier acquisition. You can also share raw data across certain measurements that support this feature. The measurements must be capable of storing raw data. There are three choices under this menu. You can select "Inputs" which is the same as selecting one of the inputs from the input port, for example RF, AREF, I/Q, or IFAlign. Selecting "Capture Buffer" allows you to use data that has been stored earlier in the same measurement or from a previous measurement using the "Current Meas -> Capture Buffer" feature. Selecting "Recorded Data" allows you to playback long data capture records stored in the record buffer.

When you make a recording (see ["Record Data Now" on page 317](#)) 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
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Input/Output

Remote Command:	[:SENSe] :FEED:DATA INPut STORed RECORded [:SENSe] :FEED:DATA?
Example:	FEED:DATA REC FEED:DATA?
Notes:	INPutS = Inputs STORed = Capture Buffer RECORded = Record Data Buffer
Dependencies:	Not all inputs are available in all modes. Unavailable keys are grayed out.
Preset:	This is unaffected by Preset but is set to INPut on a "Restore Input/Output Defaults" or "Restore System Defaults->All"
State Saved:	Saved in instrument state
Readback:	Variable
Backwards Compatibility SCPI:	[:SENSe]:FEED:SOURce INPut STORed [:SENSe]:FEED:SOURce?
Initial S/W Revision:	Prior to A.02.00

Inputs

Sets the measurement to use the input selections (RF, AREF, I/Q)

Key Path:	Input/Output, Data Source
Example:	FEED:DATA INP causes the measurement to look at the input selection
Notes:	Does not auto return.
Readback:	Inputs
Initial S/W Revision:	Prior to A.02.00

Capture Buffer

Some WCDMA and demod measurements support this feature. This allows sharing of the raw data across certain measurements. If you want to make another measurement on the same signal, you would store that raw data using the "Current Meas -> Capture Buffer" key. Then the data is available for the next measurement to use. You must have raw data stored in the instrument memory before the Capture Buffer choice is available for use.

Key Path:	Input/Output, Data Source
Example:	FEED:DATA STOR causes stored measurement data to be used with a different measurement that supports this.

Notes:	Does not auto return. This key is grayed out when you switch to a measurement that does not support this feature.
Dependencies:	If you switch to a measurement that does not support this feature, then the instrument switches to use "Inputs" and grays out this key. If the grayed out key is pressed, it generates a message.
Readback:	Stored Data
Initial S/W Revision:	Prior to A.02.00

Recorded Data

Directs the instrument to get data from the record data buffer in the measurement, rather than from the RF Input Signal.

Key Path:	Input/Output, Data Source
Example:	FEED:DATA REC causes the measurement to extract data from the record data buffer.
Notes:	Does not auto return.
Dependencies:	Grayed out in the SA measurement.
Readback:	Recorded Data
Initial S/W Revision:	Prior to A.02.00

Current Meas -> Capture Buffer

Pressing this key stores the raw data of one measurement in the internal memory of the instrument where it can then be used by a different measurement by pressing "Stored Data". When raw data is stored, then the data source selection switch automatically changes to "Stored Data". Stored raw data cannot be directly accessed by a user. There is no save/recall function to save the raw data in an external media. However if you want to get the stored raw data, you must first perform a measurement using the stored raw data. Now you can access the used raw data, which is the same as stored raw data, using the FETCh or READ commands.

Key Path:	Input/Output, Data Source
Remote Command:	[:SENSe] :FEED:DATA:STORe
Example:	FEED:DATA:STOR stores recorded data
Notes:	This is command only, there is no query
Dependencies:	Grayed out in the SA measurement.
Backwards Compatibility SCPI:	[:SENSe]:FEED:SOURce:STORe
Initial S/W Revision:	Prior to A.02.00

Record Data Now

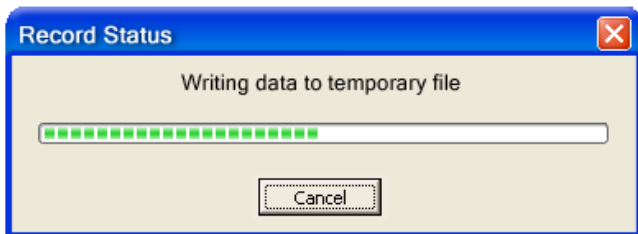
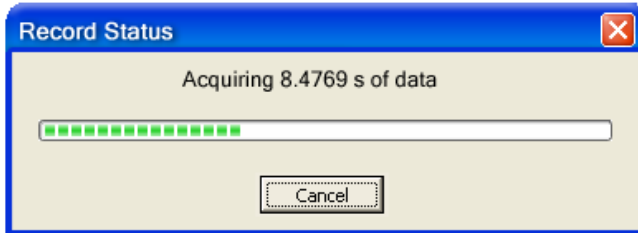
This causes the data source to change to Inputs (if it is not already set) and a recording is made with the

Input/Output

current instrument setup. The length of the recording must be specified in advance.

This key changes to **Abort Recording** once the recording process has started. It changes back when the recording is complete.

The following dialogs show the progress of the recording:



This key is also available in the Sweep/Control menu.

Key Path:	Input/Output, Data Source
Mode:	VSA
Remote Command:	[:SENSe] :RECOrding:INITiate [:IMMediate]
Example:	REC:INIT
Notes:	This is command only, there is no query. See the Recall functionality to access previously saved data.
Dependencies:	Grayed out in the SA measurement.
Couplings:	Changes Data source to Recorded Data.
Initial S/W Revision:	Prior to A.02.00

Key Path:	Input/Output, Data Source
Remote Command:	[:SENSe] :RECOrding:ABORt
Example:	REC:ABOR
Notes:	This is command only, there is no query. The command does nothing if it is sent when there is no recording in progress.
Initial S/W Revision:	Prior to A.02.00

Record Length

This specifies the length of the next recording. (You cannot use this to modify the length of the current recording.) The length defaults to seconds, but you can also specify it in points at the current sample rate, or in time records at the current time record length.

Key Path:	Input/Output, Data Source
Mode:	VSA
Remote Command:	[:SENSe] :RECOrding:LENGth <real>, SECOnds RECOrds POINts [:SENSe] :RECOrding:LENGth:STATe MAX MANUal [:SENSe] :RECOrding:LENGth:STATe?
Example:	REC:LENG 20,REC REC:LENG 4.1E-4,SEC REC:LENG:STAT MAX REC:LENG:STAT?
Notes:	There is no default unit. The unit must be specified. The length command does not have a query form. Length information is queried using the two commands following this table. If set to MAX, all of the available "recording memory" 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
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Input/Output

Remote Command:	[:SENSe] :RECOrding:LENGth:UNIT?
Example:	REC:LENG:UNIT?
Notes:	Query Only Returns the second parameter of the most recent [:SENSe]:RECOrding:LENGth command. Possible values are SEC REC POIN. If no second parameter was sent, then the return value is SEC.
Preset:	RECOrcs
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
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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

Input/Output

State Saved:	Saved in instrument state.
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 324](#)

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

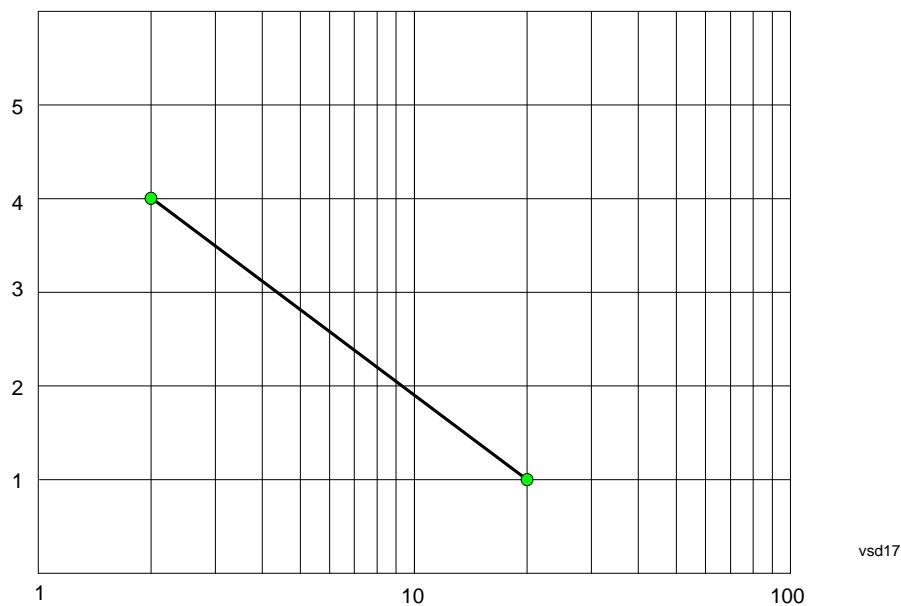
For each bucket processed by the application, all of the correction factors at the frequency of interest (center frequency of each bucket) are summed and added to the amplitude. All trace operations and post processing treat this post-summation value as the true signal to use.

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

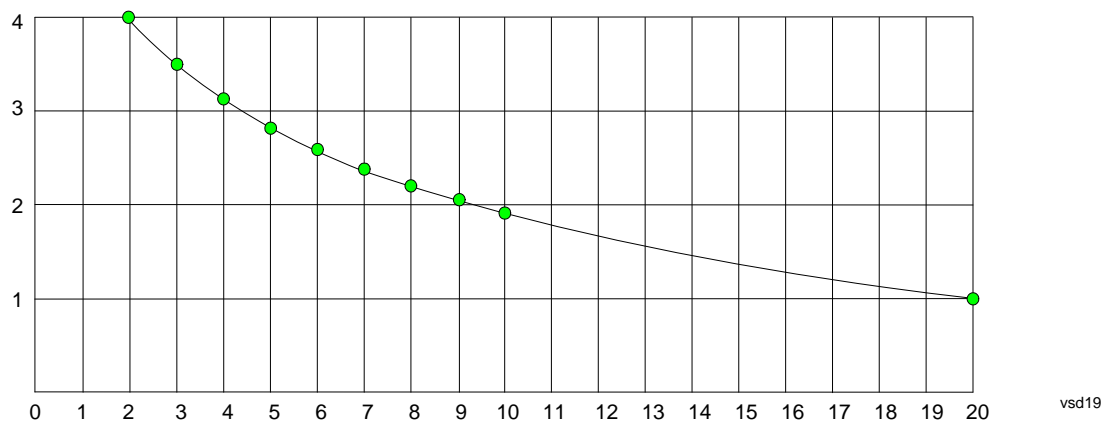
used to apply corrections on a bucket by bucket basis to the data traces.

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:

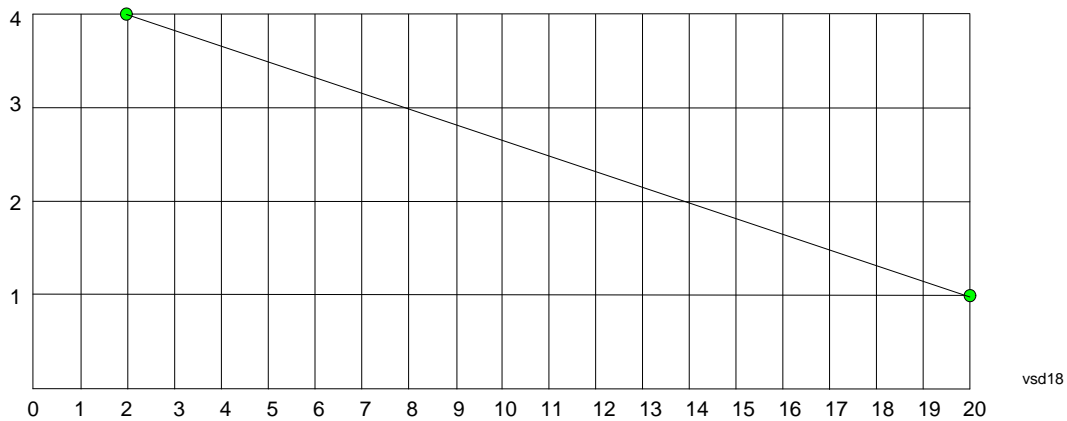


On a linear scale (like that of the spectrum analyzer), this translates to:



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:	<code>[:SENSe] :CORRection:CSET [1] 2 3 4 5 6 :DESCRiption "text"</code> <code>[:SENSe] :CORRection:CSET [1] 2 3 4 5 6 :DESCRiption?</code>
Example:	<code>:CORR:CSET1:DESC "11941A Antenna correction"</code>
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:	<code>[:SENSe] :CORRection:CSET [1] 2 3 4 5 6 :COMMeNT "text"</code> <code>[:SENSe] :CORRection:CSET [1] 2 3 4 5 6 :COMMeNT?</code>
Example:	<code>:CORR:CSET1:COMM "this is a comment"</code>
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 321](#)) 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.

If an external frequency reference is being used, you must enter the frequency of the external reference if

Input/Output

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
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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.

Input/Output

See “More Information” on page 340

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 342, 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
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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
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

Input/Output

Initial S/W Revision:	A.04.00
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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.

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

Input/Output

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 361).
Initial S/W Revision:	Prior to A.02.00

I/Q Isolation Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

Remote Command:	:CALibration:IQ:ISOLation:TIME?
Example:	:CAL:IQ:ISOL:TIME?
Notes:	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial S/W Revision:	A.02.00

I/Q Cable Calibrate...

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide the user through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both softkeys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. The user will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:I|IB|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

Key Path:	Input/Output, I/Q
Initial S/W Revision:	Prior to A.02.00

I Port

The I port calibration is performed with the front panel's I port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path:	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision:	Prior to A.02.00

Next

Perform the I port calibration.

Key Path:	Input/Output, I/Q, I/Q Cable Calibrate...
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Input/Output

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 361).
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...
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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 361).
Initial S/W Revision:	Prior to A.02.00

Q Port

The Q port calibration is performed with the front panel's Q port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

Key Path:	Input/Output, I/Q, I/Q Cable Calibrate...
Notes:	Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step.
Initial S/W Revision:	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path:	Input/Output, I/Q, I/Q Cable Calibrate...
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Input/Output

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 361).
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...
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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 361).
Initial S/W Revision:	Prior to A.02.00

I/Q Cable Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Cable Calibration was performed for a specific port. This is a remote query command only.

Remote Command:	:CALibration:IQ:FLATness:I IBAR Q QBAR:TIME?
Example:	:CAL:IQ:FLAT:I:TIME?
Notes:	This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0.
Initial S/W Revision:	A.02.00

I/Q Probe Calibration

The I/Q probe calibration creates correction data for one of the front panel I/Q channels. When the probe has EEPROM identification, the data is unique to that specific probe. When the probe does not have EEPROM identification, the data will be used for all probes of the same type. The data is also unique to the channel, so calibration data for the I channel will not be used for the Q channel and vice versa.

The guided calibration (front panel only) will show connection diagrams and guide the user through the I/Q Isolation Calibration and through calibrating each port. The calibration data for each port is stored

Input/Output

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 361](#).

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
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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 361).
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 361](#).

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

Input/Output

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:	CAL:IQ:PROB:IB
Notes:	The I-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved:	No
Initial S/W Revision:	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path:	Input/Output, I/Q, I Setup, I Probe, Calibrate
Notes:	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 361).
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 361](#).

Key Path:	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes:	Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached.
Initial S/W Revision:	Prior to A.02.00

Back

Return to the prior step in the calibration procedure.

Key Path:	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Initial S/W Revision:	Prior to A.02.00

Next

Perform the Q port calibration.

Key Path:	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Remote Command:	:CALibration:IQ:PROBe:Q
Example:	CAL:IQ:PROB:Q
Notes:	The Q port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands.
State Saved:	No
Initial S/W Revision:	Prior to A.02.00

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

Key Path:	Input/Output, I/Q, Q Setup, Q Probe, Calibrate
Notes:	Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see “Exit Confirmation” on page 361).
Initial S/W Revision:	Prior to A.02.00

Input/Output

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 361](#).

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 361).
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 menus that enables you to select, set up and control the markers for the current measurement.

Markers can be used on the graphical views (Overlaid Traces, split) in the Noise Figure measurement to show precise results at any frequency point or between two frequency points. Four markers can be active at any one time.

NOTE When the Noise Figure measurement is initialized, all markers are turned off. When the measurement is reloaded, all markers are restored to the state they were in when the measurement was last running.

See also:

[“Marker X Axis Value \(Remote Command only\)” on page 364](#)X Axis Value (Remote Command only)

[“Marker X Axis Position \(Remote Command only\)” on page 365](#)X Axis Position (Remote Command only)

[“Marker Y Axis Value \(Remote Command only\)” on page 365](#)Y Axis Value (Remote Command only)

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Select Marker

Specifies the marker to be defined and/or acted upon. Four markers are supported in the Noise Figure measurement. All front panel operations are performed on the ‘Selected Marker’. When using SCPI, the marker onto which the command is performed must be specified explicitly with each command sent.

Remote Command Notes	No SCPI. Front panel only.
Initial S/W Revision	Prior to A.04.00
Key Path	Marker
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 2 3 4
Readback Text	Readback selection

Marker Type

There are 3 settings for markers.

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.

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

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

Off: Turns off the selected marker and its marker function setting, if any. However, Off does not affect which marker is selected.

Remote Command:	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MODE POSITION DELta OFF :CALCulate:NFIGure:MARKer [1] 2 3 4 :MODE?
Key Path:	Marker
Preset:	OFF
Remote Command Notes:	This command (not the query) causes the specified marker to become selected
Example:	CALC:NFIG:MARK:MODE POS
Backwards Compatibility SCPI:	:CALCulate[:NFIGure]:MARKer [1] 2 3 4 :MODE
Initial S/W Revision:	Prior to A.04.00

Marker X Axis Value (Remote Command only)

The command below sets and queries a marker's X value.

Remote Command:	:CALCulate:NFIGure:MARKer [1] 2 3 4 :X <freq> :CALCulate:NFIGure:MARKer [1] 2 3 4 :X?
Preset:	Defaults to the current 'start frequency'.
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
Example:	CALC:NFIG:MARK[2]:X 1GHz
Backwards Compatibility SCPI:	:CALCulate[:NFIGure]:MARKer [1] 2 3 4 :X
Initial S/W Revision:	Prior to A.04.00

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is **Off**, but is the SCPI equivalent of entering a value if the control mode is **Normal** or **Delta** - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

Mode	NF
Remote Command	:CALCulate:NFIGure:MARKer[1] 2 3 4:X:POSition <real> :CALCulate:NFIGure:MARKer[1] 2 3 4:X:POSition?
Preset	After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN).
State Saved	No
Min	0
Max	'sweep points' value
Coupling	Coupled to number of sweep points.
Restriction and Notes	The query returns the marker's absolute X Axis value in trace points if the control mode is Normal , or the offset from the marker's reference marker in trace points, if the control mode is Delta . The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points (see "Fractional Trace Points", above). If the marker is Off the response is not a number (NAN).
Example	CALC:NFIG:MARK4:X:POS 0.0
Initial S/W Revision	Prior to A.04.00

Marker Y Axis Value (Remote Command only)

The command below queries a marker's Y axis value.

Remote Command:	:CALCulate:NFIGure:MARKer[1] 2 3 4:Y?
Preset:	Defaults to the measurement result at the default X value.
Remote Command Notes:	The query is returned in the fundamental units for the current marker Y Axis scale.
Example:	CALC:NFIG:MARK2:Y?
Backwards Compatibility SCPI:	:CALCulate[:NFIGure]:MARKer[1] 2 3 4:Y?
Initial S/W Revision:	Prior to A.04.00

Marker

Properties

Opens the properties menu for the currently selected marker.

Initial S/W Revision	Prior to A.04.00
Key Path	Marker
Mode	NF

Select Marker

Specifies the marker to be defined and/or acted upon. Four markers are supported in the Noise Figure measurement. All front panel operations are performed on the 'Selected Marker'. When using SCPI, the marker onto which the command is performed must be specified explicitly with each command sent.

Remote Command Notes	No SCPI. Front panel only.
Initial S/W Revision	Prior to A.04.00
Key Path	Marker, Properties
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 2 3 4
Readback Text	Readback selection

Relative To

Assigns the reference marker for a marker in Delta mode.

Remote Command:	<code>:CALCulate:NFIGure:MARKer [1] 2 3 4 :REFerence <int></code> <code>:CALCulate:NFIGure:MARKer [1] 2 3 4 :REFerence?</code>
Preset:	By default, marker X is relative to marker X+1 except for marker 4 which is relative to marker 1.
Key Path:	Marker, Properties
Preset:	By default, marker X is relative to marker X+1 except for marker 4 which is relative to marker 1.
Remote Command Notes:	This command (not the query) causes the specified marker to become selected.
Example:	<code>CALC:NFIG:MARK[3]:REF 2</code>
Initial S/W Revision:	Prior to A.04.00

Marker Trace

Assigns the specified marker to one of the traces. A marker can be assigned to any trace.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :TRACe TRACe1 TRACe2 :CALCulate:NFIGure:MARKer [1] 2 3 4 :TRACe?
Example	CALC:NFIG:MARK2:TRAC TRACe2 CALC:NFIG:MARK2:TRAC?
Initial S/W Revision	Prior to A.04.00
Key Path	Marker, Properties
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 2
Readback Text	Readback selection

Marker Table

When turned on, the marker table is displayed below the current graph measurement.

Key Path	Marker
Initial S/W Revision	Prior to A.04.00

Couple Markers

Toggles the state of the markers to be coupled On or Off. When this function is true (On), moving any marker causes an "equal X Axis movement" of every other marker which is active. By "equal X Axis movement" we mean that we preserve the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going offscreen.

Remote Command	:CALCulate:NFIGure:MARKer:COUple [:STATe] ON OFF 1 0 :CALCulate:NFIGure:MARKer:COUple [:STATe] ?
Restriction and Notes	Markers on both result graphs are coupled.
Example	CALC:NFIG:MARK:COUP ON
Initial S/W Revision	Prior to A.04.00
Key Path	Marker
Mode	NF

Marker

Preset	OFF
State Saved	Saved in instrument state.
Range	ON OFF 0 1

All Markers Off

Turns all markers off.

Key Path	Marker
Initial S/W Revision	Prior to A.04.00

Marker Function

This front-panel key has no function in the Noise Figure Measurement Application.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Marker Function

Marker To

This front-panel key has no function in the Noise Figure Measurement Application.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Marker To

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

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

Remote Measurement Functions

This section contains the following topics:

[“Measurement Group of Commands” on page 374](#)

[“Current Measurement Query \(Remote Command Only\) ” on page 376](#)

[“Limit Test Current Results \(Remote Command Only\)” on page 377](#)

[“Data Query \(Remote Command Only\)” on page 377](#)

[“Calculate/Compress Trace Data Query \(Remote Command Only\)” on page 377](#)

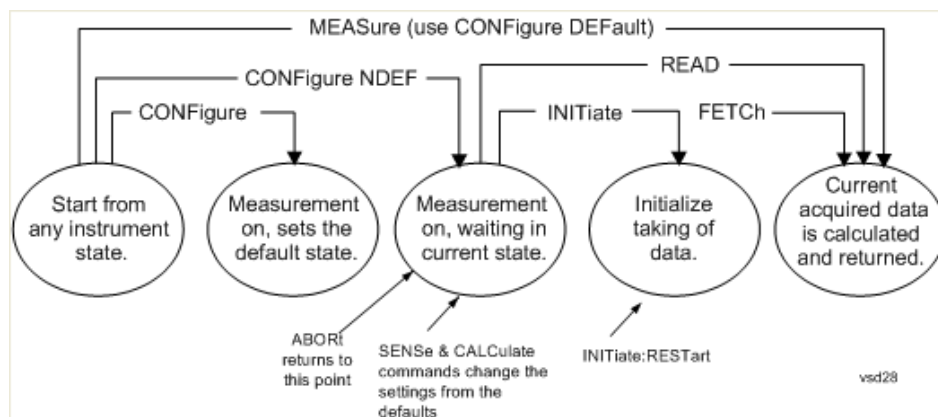
[“Calculate Peaks of Trace Data \(Remote Command Only\)” on page 382](#)

[“Format Data: Numeric Data \(Remote Command Only\)” on page 384](#)

[“Format Data: Byte Order \(Remote Command Only\)” on page 386](#)

Initial S/W Revision:	Prior to A.02.00
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Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command. The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Measure Commands:
Configure Commands:
<p>:CONFigure:<measurement></p> <p>This command stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.</p> <p>In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.</p> <p>:CONFigure:NDEFault<measurement> stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.</p> <p>The CONFigure? query returns the current measurement name.</p> <p>The CONFigure:CATalog? query returns a quoted string of all measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".</p>
Fetch Commands:
<p>:FETCh:<measurement>[n]?</p> <p>This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.</p> <p>If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.</p> <p>The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)</p> <p>FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.</p>
INITiate Commands:

Measure Commands:	
:INITiate:<measurement>	
<p>This command is not available for measurements in all the instrument modes:</p> <ul style="list-style-type: none"> • Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it. • For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement. • Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run. • If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete. 	
READ Commands:	
:READ:<measurement>[n]?	
<ul style="list-style-type: none"> • Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings. • Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results. <p>For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.</p> <ul style="list-style-type: none"> • Blocks other SCPI communication, waiting until the measurement is complete before returning the results <p>If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)</p>	

Initial S/W Revision:	Prior to A.02.00
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Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

Remote Command:	:CONFigure?
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Example:	CONF?
Initial S/W Revision:	Prior to A.02.00

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

Remote Command:	:CALCulate:CLIMits:FAIL?
Example:	CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails.
Initial S/W Revision:	Prior to A.02.00

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

Remote Command:	:CALCulate:DATA [n] ?
Notes:	The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCh:<measurement>? query where <measurement> is the current measurement.
Initial S/W Revision:	Prior to A.02.00

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst

Meas

in each frame. The command can also be used to identify the best curve fit for the data.

Remote Command:	:CALCulate:DATA<n>:COMPRESS? BLOCk CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMP le SDEVIation PPHase [,<soffset>[,<length>[,<roffset>[,<rlimit>]]]]
Example:	To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN,24e-6,526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.)
Notes:	The command supports 5 parameters. Note that the last 4 (<soffset>,<length>,<roffset>,<rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data.
Initial S/W Revision:	Prior to A.02.00

- **BLOCk** or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)
- **CFIT** or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- **MINimum** - returns the minimum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- **MAXimum** - returns the maximum data point (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.

NOTE

MEAN - returns a single value that is the arithmetic mean of the data point values

(in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i \quad \text{vsd27-1}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i| \quad \text{vsd27-2}$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right) \quad \text{vsd27-3}$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation.

This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

Meas

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

vsd27-4

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

vsd27-5

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- **SAMPLE** - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- **SDEViation** - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.

For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

vsd27-7

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region(s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

vsd27-8

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- **PPHase** - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every

specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

vsd27-9

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

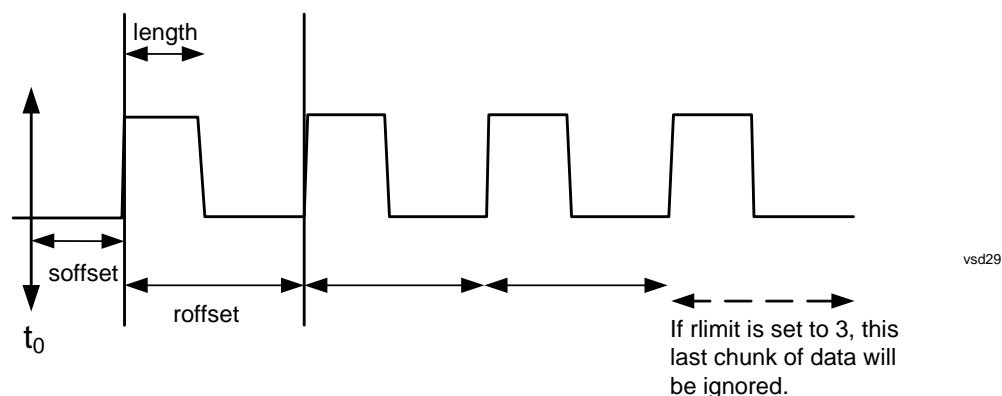
vsd27-10

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

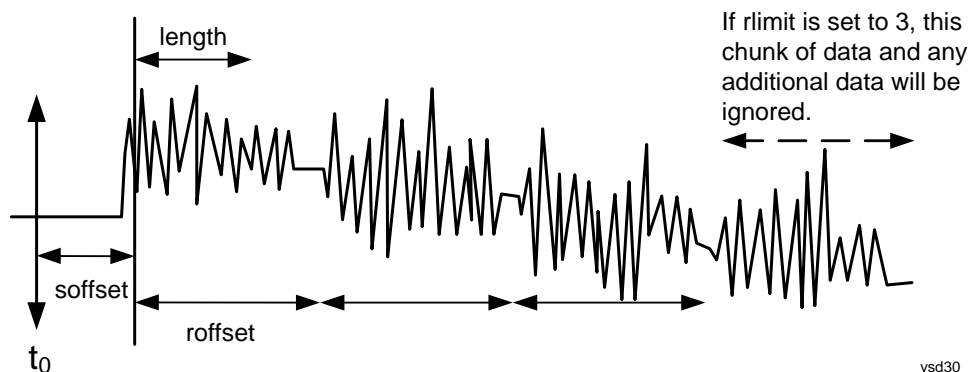
(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)

Meas



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)

- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

<p>Remote Command:</p>	<p>For Swept SA measurement:</p> <pre>:CALCulate:DATA [1] 2 3 4 5 6 : PEAKs? <threshold>, <excursion> [, AMPLitude FREQuency TIME [, ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA [1] 2 3 4 5 6 : PEAKs? <threshold>, <excursion> [, AMPLitude FREQuency TIME]</pre>
<p>Example:</p>	<p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40,10,FREQ,GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL,32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p>

<p>Notes:</p>	<p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the excursion value stored under the Peak Criteria menu.</p> <p>Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).</p> <p>Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported</p> <p>Sorting order:</p> <p>AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)</p> <p>FREQUENCY - lists the peaks in order of occurrence, left to right across the x-axis.</p> <p>TIME - lists the peaks in order of occurrence, left to right across the x-axis.</p> <p>Peaks vs. Display Line:</p> <p>ALL - lists all of the peaks found (default if optional parameter not sent).</p> <p>GTDLIne (greater than display line) - lists all of the peaks found above the display line.</p> <p>LTDLine (less than display line) - lists all of the peaks found below the display line.</p>
<p>Initial S/W Revision:</p>	<p>Prior to A.02.00</p>

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

<p>Remote Command:</p>	<p>:FORMat [:TRACe] [:DATA] ASCii INTeger, 32 REAL, 32 REAL, 64</p> <p>:FORMat [:TRACe] [:DATA] ?</p>
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Notes:	<p>The query response is:</p> <p>ASCii: ASC,8</p> <p>REAL,32: REAL,32</p> <p>REAL,64: REAL,64</p> <p>INTeger,32: INT,32</p> <p>When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).</p> <p>The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.</p>
Dependencies:	<p>Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).</p> <p>Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".</p>
Preset:	ASCii
Backwards Compatibility Notes:	Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.
Initial S/W Revision:	Prior to A.02.00

The specs for each output type follow:

ASCii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Meas

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

Remote Command:	:FORMat:BORDER NORMAL SWAPped :FORMat:BORDER?
Preset:	NORMal
Initial S/W Revision:	Prior to A.02.00

Meas Setup

Accesses menus that allow you to set measurement setup parameters.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Average Num

Sets the number of data acquisitions that will be averaged. Averaging can be turned on or off.

[“Avg Time/Point Auto/Man” on page 497](#)

NOTE During calibration the value you select for Average Count is translated into a sweep time for each point. An Average Count of 10 results in a sweep time of 160ms (160ms at each measurement point if you are using the default sweep time). There are 2 measurement points per freq point. One measurement for noise source off and one for On. If Averages (under Meas Setup) is set to on, then for a Cal the app uses effectively point type averaging and for meas, it reverts back to sweep type averaging.

Remote Command	[:SENSe]:NFIGure:AVERage:COUNT <integer> [:SENSe]:NFIGure:AVERage:COUNT? [:SENSe]:NFIGure:AVERage[:STATE] ON OFF 1 0 [:SENSe]:NFIGure:AVERage[:STATE]?
Example	:NFIG:AVER:COUN 100 :NFIG:AVER OFF
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup
Mode	NF
Preset	10 OFF
State Saved	Saved in instrument state.
Min	1
Max	10000
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:AVERage:COUNT [:SENSe]:SWEep:COUNT

Meas Setup

ENR

Accesses a menu of functions that determines how you load the ENR data.

For more information refer to the following sections:

[“Setting ENR Table Remotely \(remote command only\)” on page 394](#)

[“ENR Table Entry Count \(remote command only\)” on page 394](#)

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup
Mode	NF

ENR Mode

Selects between Table and Spot ENR operation.

- Table – ENR values are taken from the ENR table(s).
- Spot – a single ENR value is applied at all frequencies.
- Both Table and Spot ENR data can be configured side-by-side and this function can be used to toggle between them.

Remote Command	<code>[:SENSe] :NFIGure:CORRection:ENR:MODE TABLE SPOT</code> <code>[:SENSe] :NFIGure:CORRection:ENR:MODE?</code>
Example	<code>NFIG:CORR:ENR:MODE TABL</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF
Preset	TABLE
State Saved	Saved in instrument state.
Range	TABLE SPOT
Backwards Compatibility SCPI	<code>[:SENSe] [:NFIGure] :CORRection:ENR:MODE</code>

Use Meas Table Data for Cal

When turned on, the ENR data for both measurement and calibration is sourced from a combined ENR table. When turned off, the measurement and calibration ENR data is sourced from separate tables (See [“Meas Table” on page 389](#) and [“Cal Table ” on page 391](#)).

Remote Command	<code>[:SENSe] :NFIGure:CORRection:ENR:COMMon [:STATe]</code> <code>ON OFF 1 0</code> <code>[:SENSe] :NFIGure:CORRection:ENR:COMMon [:STATe] ?</code>
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Coupling	Cal table disabled when ON. Error message 171.0002 displayed if ON and no data in Meas Table or OFF and no data is Meas or Cal table
Example	NFIG:CORR:ENR:COMM ON
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:ENR:COMMOn[:STATE]

Meas Table

Brings up the ENR Table editor (see section [“Table Editor” on page 423](#) for details), which should contain the data for the noise source that is currently being used for the measurement. If no valid meas ENR data exists, a warning message (will be displayed and the ENR status area will display ‘ENR’ in red.

If Use Meas Table for Cal is turned ON, the ENR data for calibration and measurement are taken from this ENR Table.

Note, when each parameter in the table is entered the table is saved. Once a new ENR Table is entered, the application will store this table in non-volatile memory, to allow restoring after a power cycle.

Duplicates are NOT allowed in the frequency field of the Meas Table, but duplicate ENR values at different frequencies are acceptable.

Meas Setup

Meas Table	
Noise Source ID = 346B	
Noise Source Serial = 3228A10653	
Frequency	ENR Value
1.000000000 GHz	0.00 dB
1.100000000 GHz	10.80 dB
1.200000000 GHz	14.90 dB
1.300000000 GHz	16.20 dB
1.400000000 GHz	18.50 dB
1.500000000 GHz	20.00 dB
1.600000000 GHz	21.40 dB

Coupling	Error 171.0002 displayed if no data in table and Use Meas Table for Cal is ON.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF

Columns The Meas Table has two columns. The first (and leftmost) is titled 'Frequency' and uses frequency terminators. The second is titled 'ENR Value' and uses power terminators.

Frequency Enables you to enter the frequency component of a frequency/amplitude pair.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table, Edit
Mode	NF
Preset	10 Hz
State Saved	Saved in instrument state.
Range	10 kHz to 325 GHz

ENR Value Enables you to enter the amplitude component of a frequency/amplitude pair.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table, Edit
Mode	NF
Preset	0 dB
State Saved	Saved in instrument state.

Range	-200 to 200 dB
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Cal Table

Brings up the Cal Table editor (see section “[Table Editor](#)” on page 423 for details), which should contain the calibration ENR data for the noise source that is currently being used.

This softkey is only available when Use Meas Table for Cal is turned off. Once a new Cal Table is entered, the application should store this table in non-volatile memory, to allow restoring after a power cycle.

Duplicates are NOT allowed in the frequency field of the Cal Table, but duplicate ENR values at different frequencies are acceptable.

Cal Table	
Noise Source ID = 346B	
Noise Source Serial = 3228A10653	
Frequency	ENR Value
1.000000000 GHz	0.00 dB
1.100000000 GHz	10.80 dB
1.200000000 GHz	14.90 dB
1.300000000 GHz	16.20 dB
1.400000000 GHz	18.50 dB
1.500000000 GHz	20.00 dB
1.600000000 GHz	21.40 dB

Coupling	Only available when Use Meas Table for Cal is OFF. Error 171.0002 displayed if no data in table and Use Meas Table for Cal is OFF
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF

Columns The Cal Table has two columns. The first (and leftmost) is titled 'Frequency' and uses frequency terminators. The second is titled 'ENR Value' and uses power terminators.

Frequency Enables you to enter the frequency component of a frequency/amplitude pair.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Cal Table, Edit
Mode	NF
Preset	10 Hz

Meas Setup

State Saved	Saved in instrument state.
Range	10 kHz to 325 GHz

ENR Value Enables you to enter the amplitude component of a frequency/amplitude pair.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Cal Table, Edit
Mode	NF
Preset	0 dB
State Saved	Saved in instrument state.
Range	-200 to 200 dB

Editing the ENR Tables Selecting the 'Edit' key opens either ENR table for editing. This is displayed on the lefthand side of the current measurement view.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table Cal Table
Mode	NF

Serial # In order to obtain the best accuracy, ENR Data is uniquely derived for each noise source. This data can be found printed on the side of the source body in the case of Agilent Sources. It is a good idea to enter the serial number and model ID of the source into the table – this way you can tell 'at-a-glance' whether the data is valid for a specific source or not.

The Meas and Cal tables both have an independent serial number and model ID parameter.

Remote Command	<code>[:SENSE] :NFIGure:CORRection:ENR:MEASurement CALibration :TABLE:SERial:DATA <string></code> <code>[:SENSE] :NFIGure:CORRection:ENR:MEASurement CALibration :TABLE:SERial:DATA?</code>
Example	NFIG:CORR:ENR:MEAS:TABL:SER:DATA "4015A05450"
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table Cal Table
Mode	NF
Preset	""
State Saved	Saved in instrument state.
Range	a-zA-Z0-9

Model ID In order to obtain the best accuracy, ENR Data is uniquely derived for each noise source. This data can be found printed on the side of the source body in the case of Agilent Sources. It is a good

idea to enter the serial number and model ID of the source into the table – this way you can tell ‘at-a-glance’ whether the data is valid for a specific source or not.

The Meas and Cal tables both have an independent serial number and model ID parameter.

Remote Command	[:SENSe] :NFIGure :CORRection :ENR :MEASurement CALibration :TABLe :ID :DATA <string> [:SENSe] :NFIGure :CORRection :ENR :MEASurement CALibration :TABLe :ID :DATA?
Example	CORR:ENR:CAL:TABL:ID:DATA "346A"
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table
Mode	NF
Preset	""
State Saved	Saved in instrument state.
Range	a-zA-Z0-9

Fill Table From SNS This softkey can be used to invoke population of the Meas Table or Cal Table from an SNS. It is only available when an SNS is connected to the analyzer.

Remote Command	[:SENSe] :NFIGure :CORRection :ENR :MEASurement CALibration :TABLe :SNS
Example	NFIG:CORR:ENR:TABL:SNS
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Meas Table Cal Table
Mode	NF

Clear Table

Clear Meas ENR Table

This function clears all data from the Meas ENR table and removes the table’s backup from persistent storage.

Key Path	Meas Setup, ENR, Meas Table
Mode	NF
Remote Command	[:SENSe] :NFIGure :CORRection :ENR [:MEASurement] :TABLe :DAT A :DELeTe
Initial S/W Revision	Prior to A.04.00
Modified at S/W Revision	After A.09.01

Meas Setup

Restriction and Notes	Clears all entries in the Meas ENR table, this operation will interrupt the current measurement immediately
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Clear Cal ENR Table

This function clears all data from the ENR table and removes the table's backup from persistent storage.

Key Path	Meas Setup, ENR, Cal Table
Mode	NF
Remote Command	[:SENSe] :NFIGure:CORRection:ENR:CALibration:TABLE:DATA:DELeTe
Initial S/W Revision	Prior to A.04.00
Modified at S/W Revision	After A.09.01
Restriction and Notes	Clears all entries in the Cal ENR table. If the Cal ENR table data is being used in measurement, clear all the content will interrupt the current measurement immediately

Setting ENR Table Remotely (remote command only) Data can be entered into the current measurement or calibration ENR table using SCPI. Parameters are provided in frequency/amplitude pairs, the units being GHz and dB respectively. Up to 501 point-pairs will be accepted. See the above Frequency and ENR Value definitions for the acceptable parameter ranges.

Mode	NF
Remote Command	[:SENSe] :NFIGure:CORRection:ENR:MEASurement CALibration:TABLE:DATA <frequency>, <amplitude> ([, <frequency>, <amplitude>]) [:SENSe] :NFIGure:CORRection:ENR:MEASurement CALibration:TABLE:DATA?
Remote Command Notes	Between 1 and 501 points must be entered.
Example	NFIG:CORR:ENR:CAL:TABL:DATA 1000, -10, 2000, -8, 3000, -6, 10000, 5
Initial S/W Revision	Prior to A.04.00

ENR Table Entry Count (remote command only) The number of frequency/amplitude point-pairs in the current measurement or calibration table can be obtained using SCPI. If the table is empty, the size returned is 0.

Mode	NF
Remote Command	[:SENSe] :NFIGure:CORRection:ENR:MEASurement CALibration:TABLE:COUNT?
Preset	0
Range	0 – 501

Example	NFIG:CORR:ENR:MEAS:TABL:COUNT?
Initial S/W Revision	Prior to A.04.00

Loading and Saving ENR Data Files Agilent Noise Sources are delivered complete with a floppy disk containing ENR Data particular to that source. It is possible to read this data directly into the measurement, and even save the data in the same format if changes are required, or if the disk has been lost. The ENR Data can be copied onto a USB flash drive for loading onto the instrument using a PC equipped with a floppy drive and USB support

Refer to the section, "Entering Excess Noise Ratio (ENR) Data" in the Measurement Guide and Programming Examples Manual . This can be accessed by pressing the green Help key, then selecting the "Additional Documentation" page in the Table of Contents on the left side of the display. Scroll down to locate the Noise Figure section and you will see the Measurement Guide and Programming Examples button which when selected opens the PDF of this book.

SNS Setup

Accesses the Smart Noise Source setup menu.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF

Noise Source Preference Selects the noise source preference. This feature allows you to select which noise source you would prefer to use (if present). If two noise sources are connected (SNS and Normal), this parameter will decide which one is used for measurement and calibration.

If set to SNS(Auto), an SNS noise source will be used if one is present. If an SNS is not present or preference is set to normal then a normal noise source will be used.

If set to NORMAL, the SNS T cold and User T cold From SNS parameters are disabled.

On connection of an SNS when Preference is set to SNS, if Auto Load ENR is ON, Use Meas Table for Cal will be switched ON and the Meas Table will be automatically populated from the Noise Source. If SNS T cold is set to ON, the T cold parameter will also be populated automatically from the SNS before every sweep.

NOTE This parameter is a **preference** and will not be altered automatically when an SNS is connected/disconnected.

Remote Command	[:SENSe] :NFIGure:CORREction:ENR:PREFErence NORMAL SNS [:SENSe] :NFIGure:CORREction:ENR:PREFErence?
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Meas Setup

Coupling	When set to SNS and Auto Load ENR is ON, connection of SNS to instrument sets Use Meas Table for Cal to ON and populates Meas Table from SNS data. SNS T cold and User T cold From SNS parameters are disabled when set to NORMal See above for more details.
Remote Command Notes	:New SCPI – taken out of source node.
Example	NFIG:CORR:ENR:PREF NORM
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, SNS Setup
Mode	NF
Preset	SNS
State Saved	Saved in instrument state.
Range	NORMal SNS
Backwards Compatibility SCPI	SOURce[:NFIGure]:NOISe[:PREFerence]

Auto Load ENR If Preference is set to SNS and Auto Load ENR is ON, upon connection of an SNS Use Meas Table for Cal will be switched ON and ENR data will be automatically loaded into the Meas Table from the SNS, overwriting any existing data.

If set to OFF, the Use Meas Table for Cal ON/OFF parameter will not be modified and no data will be loaded into any ENR table automatically. ENR tables can still be populated from the SNS data using the ‘Fill Table from SNS’ softkey under the appropriate table softpanel.

Remote Command	[:SENSe] :NFIGure:CORRection:ENR:AUTO [:STATe] ON OFF 1 0 [:SENSe] :NFIGure:CORRection:ENR:AUTO [:STATe] ?
Coupling	See above.
Example	NFIG:CORR:ENR:AUTO OFF NFIG:CORR:ENR:AUTO?
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, SNS Setup
Mode	NF
Preset	ON
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	[:SENSe] [:NFIGure]:CORRection:ENR:AUTO[:STATe]

SNS Attached (remote command only) Returns 1 if an SNS is attached otherwise 0.

Mode	NF
Remote Command	[:SENSE] :NFIGure:CORRection:ENR:SNS:ATTached?
State Saved	Saved in instrument state.
Restriction and Notes	If an SNS is present the command will return 1 otherwise it will return 0. This function does not consider the Noise Source Preference.
Remote Command Notes	Query Only RUI only. :New SCPI – taken out of source node.
Example	NFIG:CORR:ENR:SNS:ATT?
Backwards Compatibility SCPI	SOURce:NOISe:SNS:ATTached?
Initial S/W Revision	Prior to A.04.00

Spot

When the ENR Mode parameter is set to Spot, the parameters under this menu can be used to apply one value, either in dB or Kelvin, instead of an ENR table.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF
Readback Text	Selected Spot Value (Spot ENR Spot T hot)

Spot State This parameter toggles the Spot value applied to the measurement between Spot ENR (in dB) and Spot Thot (in K).

Remote Command	[:SENSE] :NFIGure:CORRection:SPOT:MODE ENR THOT [:SENSE] :NFIGure:CORRection:SPOT:MODE?
Example	NFIG:CORR:SPOT:MODE ENR
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF
Preset	ENR
State Saved	Saved in instrument state.
Range	ENR THOT
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:SPOT:MODE

Spot ENR Set the ENR value used when the ENR Mode is Spot and the Spot State is ENR. Spot ENR values have units of decibels (dB).

Meas Setup

ENR values are the best way to enter the noise of the most common noise sources, solid state noise sources. Solid state noise sources have an output noise that is the sum of the attenuated noise of a noise diode and the noise of the output attenuator. When the ambient temperature experienced by that output attenuator changes, it changes the output noise in both the cold (off) and hot states of the noise source by the same amount of power. ENR is defined in terms of the difference between T_{hot} and T_{cold} , and thus remains constant as T_{cold} changes.

Remote Command	<code>[:SENSE] :NFIGure:CORRection:ENR:SPOT <value></code> <code>[:SENSE] :NFIGure:CORRection:ENR:SPOT?</code>
Example	<code>CORR:ENR:SPOT 10 dB</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Spot
Mode	NF
Preset	15.200 dB
State Saved	Saved in instrument state.
Range	-17 dB to 50 dB
Backwards Compatibility SCPI	<code>[:SENSe] [:NFIGure] :CORRection:ENR:SPOT</code>

Spot T hot Set the ENR value used when Spot State is THOT.

Setting T_{hot} is the best way to enter the noise temperature of a noise source that has separate hot and cold loads. Such noise sources are commonly used in national standards laboratories but not by normal users.

Unlike the case with solid state noise sources, with hot and cold loads, the T_{hot} does not change due to changes in T_{cold} . Therefore, when the user sets T_{hot} , the analyzer does not adjust the T_{hot} according to changes in T_{cold} .

Remote Command	<code>[:SENSE] :NFIGure:CORRection:ENR:THOT <temperature></code> <code>[:SENSE] :NFIGure:CORRection:ENR:THOT?</code>
Example	<code>NFIG:CORR:ENR:THOT 200.5 K</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, Spot
Mode	NF
Preset	9892.80 K
State Saved	Saved in instrument state.
Range	0 K – 29650000 K
Backwards Compatibility SCPI	<code>[:SENSe] [:NFIGure] :CORRection:ENR:THOT</code>

T Cold Mode

This parameter determines which T cold value is used in the measurement.

User: a custom T cold value input by the user will be used.

Default: the default T cold of 296.50 K will be used.

If an SNS is connected and SNS T Cold is ON, the T Cold value used for the NF measurement will be read from the SNS at the beginning of every sweep and the T Cold Mode parameter will be disabled. The User T cold value can also be read once from an SNS (if connected) using the 'User T cold from SNS' parameter.

Remote Command	[:SENSe] :NFIGure:CORRection:TCOLd USER DEFAult [:SENSe] :NFIGure:CORRection:TCOLd?
Coupling	When SNS T Cold is ON and SNS is connected, parameter (and selection keys) is Disabled.
Example	NFIG:CORR:TCOL: DEF
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR
Mode	NF
Preset	DEFAult
State Saved	Saved in instrument state.
Range	USER DEFAult
Readback Text	Second line reads back T cold value. Third line reads back T cold mode.

User T cold Value Sets the T cold value which is applied when adjusting the ENR values for the current temperature.

Remote Command	[:SENSe] [:NFIGure] :CORRection:TCOLd:USER:VALue <value> [:SENSe] [:NFIGure] :CORRection:TCOLd:USER:VALue?
Coupling	Disabled when SNS T Cold is ON and SNS is attached.
Example	:NFIG:CORR:TCOL:USER:VAL 290K
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, T cold
Mode	NF
Preset	296.50 K
State Saved	Saved in instrument state.
Range	0 K to 29650000 K

Meas Setup

Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:TCOLd:USER:VALue [:SENSe]:CORRection:TEMPerature
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SNS T Cold State When set to ON and an SNS is connected, the T Cold values used in the NF measurement are read from the SNS at the beginning of every sweep. This parameter can be set to ON in anticipation of an SNS being connected (even when SNS is not currently connected). User and Default TCold mode selections are disabled when the is ON and SNS is connected.

Remote Command	[:SENSe] :NFIGure :CORRection :TCOLd :SNS [:STATe] ON OFF 1 0 [:SENSe] :NFIGure :CORRection :TCOLd :SNS [:STATe] ?
Coupling	When ON and SNS is attached, TCold mode selections (USER, DEFault) are disabled.
Example	CORR:TCOL:SNS ON
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, T Cold
Mode	NF
Preset	Off
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Readback Text	When ON and SNS is attached, TCold key reads back SNS temperature value and "SNS" and the SNS T Cold key will display the current SNS temperature on the key and in the Settings area. If ON and an SNS is not attached, "---" will be displayed on the softkey and the TCold mode parameter will be enabled and used for measurements.
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:TCOLd:SNS[:STATe]

User T cold From SNS Takes a temperature reading from the SNS and sets the User T cold parameter. This is only available when T cold Mode is USER.

Remote Command	[:SENSe] :NFIGure :CORRection :TCOLd :USER :SET
Coupling	Loads User T cold from any connected SNS. Sets T cold Mode to ON. Only enabled when SNS is connected. Only enabled when T cold Mode is USER.
Example	:NFIG:CORR:TCOL:USER:SET
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, ENR, T cold
Mode	NF

Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:TCOLd:USER:SET
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Cal Setup

Opens a menu that enables you to configure the calibration setup.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup
Mode	NF

User Cal

User cal is the "normal" calibration technique which requires the user to connect the noise source directly to the analyzer input i.e. remove the DUT from the input circuit, and perform a calibration.

Once the calibration is complete, the DUT can be inserted back into the input circuit and the measurement can proceed using the acquired calibration data.

Coupling	<ol style="list-style-type: none"> 1. When a calibration completes and is valid, "Apply Calibration" will be set to "YES", if previously NO. 2. When the User Cal is selected and valid, the NF Status field in the Meas bar shows "CAL". When cal data is invalid "UNCAL" is shown in the NF Status field. When the User Cal has been interpolated or adjusted, the NF Status field will show "~CAL". 3. See Cal Type section.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Cal Setup
Mode	NF
State Saved	Saved in instrument state.

Invalidating User Cal Should certain measurement parameters change when user cal is selected and valid, the current calibration data will become invalid and a new user calibration is required before calibrated measurements will result. If the User Cal is selected and invalid the results will show uncalibrated data.

In this case the Noise Figure State Meas bar flag changes from green "Cal" to red "UnCal".

Change To Parameters that will Invalidate User Cal:

1. **Frequency:** Setting the frequency outside the current valid user cal set (for example: If the current sweep range is 2 to 3GHz, then setting the start frequency to 1.9 GHz will invalidate the current user cal. Other frequency changes that will invalidate the user cal are:
2. If the cal was performed at a fixed frequency and you change this frequency.
3. If you are in "Freq List" mode and you change it to extend beyond the current user cal range. In this case you will see an error message.

Meas Setup

4. DUT Type: If the DUT Type parameter changes, causing the measurement frequencies to be pushed outside the current cal.
5. Attenuation: If a setting of attenuator has been selected but not been cal'ed.
6. Preamp: If set to condition different from current cal settings for example: if cal'ed with preamp on, turning off will invalidate cal.
7. **Points:** Changing the number of measured frequency points can make the stored preselector offsets become inaccurate and hence invalidate the calibration: This occurs when the following conditions exist:
 - a. A successful calibration has been performed.
 - b. Some measured freq points are > 3.6 GHz
 - c. The new points > 3.6 GHz are located more than 50 MHz away from the current calibration points
8. For freq pts. measured above 3.6 GHz

Interpolating User Cal The measurement has the ability to interpolate calibration. For example: if the frequency range changes it can 'guess' the correct values; however this will only work provided the new frequency range is a subset of the calibrated range.

In this case the NF State Meas bar flag will show in yellow as "~Cal" and a warning message will be displayed.

Change To Parameters that will Interpolate User Cal:

1. Frequency: If the frequency changes such that it is inside the current user cal settings. For example: if frequency sweep was from 1 to 2 GHz, and the user changed the start frequency to 1.1 GHz.
2. Number of Points: No restrictions.
3. RBW: This strictly does not interpolate the cal, it adjusts it. See section below.

Adjusting User Cal for RBW changes. When you change the RBW away from the user cal setting, the cal data is adjusted. Each cal point is normalized to a 1 Hz BW and then multiplied by the new RBW to determine the **new** (interpolated) cal data.

In this case the NF State Meas bar flag again shows in yellow as "~Cal" and a warning message is displayed.

Min (RF/Microwave) Attenuation To ensure the best accuracy at all times, the calibration process can be performed at multiple attenuation settings. Ideally it would be performed at all available attenuation settings, but in practice this would take far too long and is unnecessary for most applications. For this reason it is possible to limit the range of calibrated attenuation settings to a sensible range. This command operates in conjunction with Max RF Atten to set the range of attenuation used during the calibration process.

Refer to ["Attenuation" on page 238](#) under the AMPTD/Y Scale menu) for more information. The default input attenuation calibration range is:

PXA	0 dB to 8 dB, and a step size of 4 dB
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MXA	0 dB to 8 dB, and a step size of 4 dB
EXA	0 dB to 10 dB, and a step size of 10 dB
CXA	0 dB to 8 dB, and a step size of 4 dB

Remote Command	[:SENSE] :NFIGure:CALibration:USER:ATTenuation:MINimum <integer> [:SENSE] :NFIGure:CALibration:USER:ATTenuation:MINimum?
Coupling	If the set value exceeds the MAX attenuation setting, MAX attenuation is set so that MIN is always less than or equal to MAX.
Restriction and Notes	Attenuation steps are HW Dependent: PXA: Can only be set to multiples of 4. MXA: Can only be set to multiples of 4. EXA: Can only be set to multiples of 10. CXA: Can only be set of multiples of 4.
Example	:NFIG:CAL:USER:ATT:MIN 20 dB
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Cal Setup, Input Cal
Mode	NF
Preset	0 dB
State Saved	Saved in instrument state.
Range	0 to 40 dB
Backwards Compatibility SCPI	:INPut[:NFIGure]:ATTenuation[:RF][:MINimum] :INPut[:NFIGure]:ATTenuation:MWAVE[:MINimum]

Max (RF/Microwave) Attenuation To ensure the best accuracy at all times, the calibration process is performed at multiple attenuation settings. Ideally it would be performed at all available attenuation settings, but in practice this would take far too long; and is overkill for most applications. For this reason it is possible to limit the range of calibrated attenuation settings to a sensible range. This command operates in conjunction with Min RF Atten to set the range of attenuation used during the calibration process.

Refer to [“Attenuation” on page 238](#) under the AMPTD/Y Scale menu) for more information. The default input attenuation calibration range is:

PXA	0 dB to 8 dB, and a step size of 4 dB
MXA	0 dB to 8 dB, and a step size of 4 dB
EXA	0 dB to 10 dB, and a step size of 10 dB
CXA	0 dB to 8 dB, and a step size of 4 dB

Meas Setup

Remote Command	[:SENSe]:NFIGure:CALibration:USER:ATTenuation:MAXimum <integer> [:SENSe]:NFIGure:CALibration:USER:ATTenuation:MAXimum?
Coupling	If the set value is below the MIN attenuation setting, MIN attenuation is set so that MAX is always greater than or equal to MIN.
Restriction and Notes	Attenuation steps are HW Dependent: PXA: Can only be set to multiples of 4. MXA: Can only be set to multiples of 4. EXA: Can only be set to multiples of 10. CXA: Can only be set to multiples of 4.
Example	:NFIG:CAL:USER:ATT:MAX 40dB
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Cal Setup, Input Cal
Mode	NF
Preset	For EXA the default will be 10dB (2 cal stages not 3).
State Saved	Saved in instrument state.
Range	0 dB to 40 dB
Backwards Compatibility SCPI	:INPut[:NFIGure]:ATTenuation[:RF]:MAXimum :INPut[:NFIGure]:ATTenuation:MWAVE:MAXimum

Internal Cal (PXA Only)

This cal type allows the user to skip the calibration phase of a noise figure measurement, hence removing the need to mechanically change connection settings. This will only be useful for users that would normally connect the noise source directly to the instrument RF port. Any test beds fixtures that would normally require calibrating out in the calibrate step cannot use this calibration type. In some cases the user could put the test bed fixture data into the Loss Comp tables, but would require precise measurement data from test fixture. Also for the case when the user chooses a DUT type of "Amplifier" plus "System Downconverter", the "Internal Cal" choice will be disabled.

Internal Cal makes use of the internal Cal Files stored in the instrument during manufacturing. The information contained therein allows Aramis to calculate the Pcold and Phot levels normally obtained from a User Cal. These values are compensated for frequency and temperature. The RBW at each freq point is part of the algorithm to obtain the Phot and Pcold values. To obtain the Phot value, the user is still required to have valid ENR data before the measurement can proceed.

Instrument uncertainty specs will apply to the User Cal only, however Internal Cal will be very close assuming the conditions for using an internal cal are kept. Also this cal type will be valid in the hi band (>3.6GHz), but due to preselector uncertainties will not be as close to the specs for User cal. In summary

– if user is very concerned about getting accurate data, then the "User Cal" should be used.

Coupling	<ol style="list-style-type: none"> 1. Couple to "Calibrate" part of the 1 of N – callback to Calibrate key. 2. Disabled when DUT=Amp, and System Downconverter = ON: display error message –221.5523 3. When selected and current cal type selected is User then the Apply Calibration will be set to "YES". 4. Error message 66 displayed when selected and internal cal data does not exist. 5. See Cal Type section
Restriction and Notes	Inst Uncert Spec's will apply to the User Cal only, however Internal Cal will be very close assuming the conditions for using an internal cal are kept.
Remote Command Notes	The feature is available for PXA signal analyzers.
Initial S/W Revision	A.04.00
Key Path	Meas Setup, Cal Setup
Mode	NF
State Saved	Saved in instrument state.

Apply Calibration

Enables or disables the application of calibration data to the measurement to derive corrected results. If User Cal is selected and no valid calibration data exists (for example: when a calibration has not been performed or when a frequency parameter is changed), this parameter will be disabled and status message 0.2208 will alert the user that a "Calibrate Now" is required. This parameter will also be set to OFF if a user cancels a User Calibration before it is completed.

Remote Command	<pre>[:SENSE] :NFIGure:CALibration:STATe ON OFF 1 0 [:SENSE] :NFIGure:CALibration:STATe?</pre>
Coupling	<ol style="list-style-type: none"> 1. Only enabled when valid calibration data exists. 2. Set to OFF if a calibration is cancelled before it is completed. 3. Set to ON when a calibration is successfully completed. 4. Warning message –221.5524 displayed when set to Yes and no valid cal exists. 5. NF Status panel displays "UNCAL" when OFF and message 0.2208 is displayed.
Example	NFIG:CAL:STAT ON
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Cal Setup
Mode	NF

Meas Setup

Preset	OFF
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	:DISPlay[:NFIGure]:DATA:CORRections[:STATe] :DISPlay:DATA:CORRections[:STATe] [:SENSe]:CORRection[:STATe]

Clear User Cal Data

This softkey clears any user cal data currently stored both in working memory and on the hard drive of the analyzer. The path for the Cal Data file is:

D:\User_My_Documents\Instrument\My Documents FIGure\state\Corr.STA.

An 'Are you sure?' dialogue is provided as a safety mechanism when this key is pressed.

Remote Command	[:SENSe] :NFIGure:CALibration:DElete
Coupling	Grayed if no user calibration data exists: status message "No User Calibration data exists".
Example	:NFIG:CAL:DEL
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Cal Setup
Mode	NF

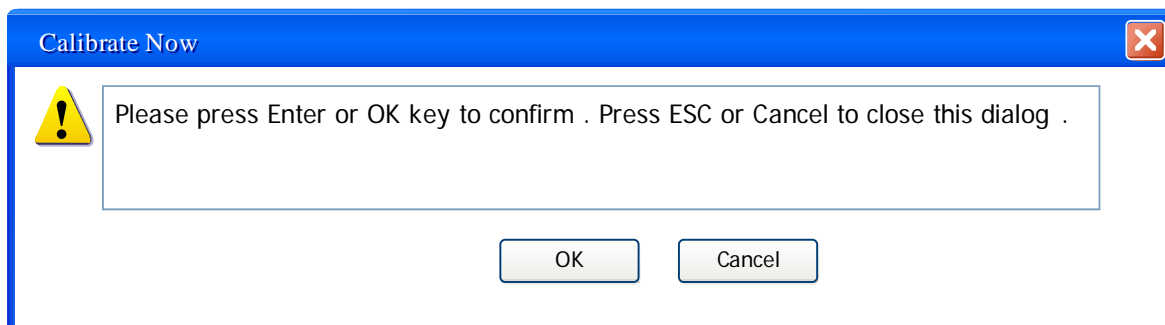
Calibrate Now

Performs a User Calibration on the current DUT setup using the ENR data in the Meas Table (if 'Use Meas Table Data for Cal' is ON) or the ENR data in the Cal Table (if 'Use Meas Table Data for Cal' is turned OFF). Cal data will be collected for each attenuation setting set in the User Setup parameters. For example, in X-Series Analyzers, if Max Atten is set to 8dB and Min set to 0dB then a set of calibration data will be taken for 0dB, 4dB and 8dB. You can then choose any of these attenuation settings when the measurement is performed, and corrected results will be made. If you want attenuation settings outside this range, they need to be set in Max/Min prior to performing a Calibration.

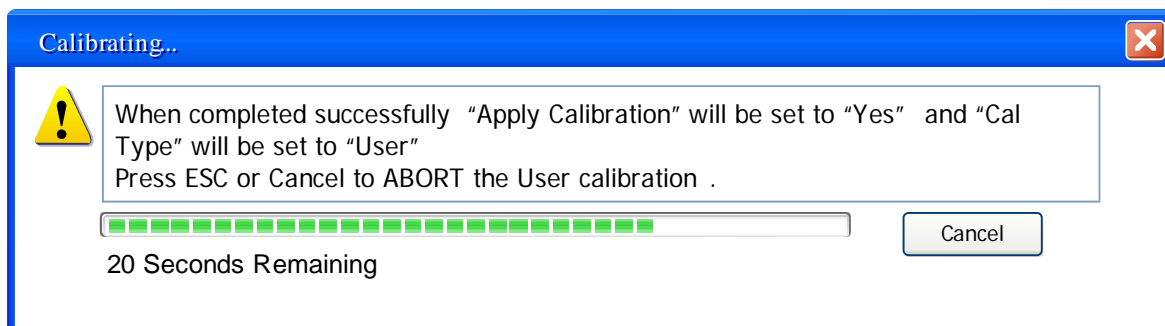
During calibration the value you select for Average Count is translated into a sweep time for each point. So an Average Count of 10 results in a sweep time of 160 ms (160 ms at each measured frequency point if using the default sweep time). There are 2 measurement points per freq point. One measurement for noise source off and one for On.

Once the calibration step has been performed successfully, the calibration data (including ENR cal data) is stored in a 'power on persistent' state. A mode preset or power cycle will not erase the cal data. An advisory message will alert the user that cal is valid and they need to toggle "Apply Calibration" to 'On' to restore corrected data. If, after a mode preset, the DUT/measurement setup has changed such that the saved calibration data is invalid, the "Apply Calibration" setting is set to "No", but can be restored if setup during cal is set again, or the original setup with cal is stored in a state and recalled again.

NOTE If any input frequencies are in high band, for example: above 3.6 GHz, then the “Calibrate Now” process optimizes the preselector at these frequencies and stores the preselector offset values. It uses these offsets in the cal acquisition results and also when acquiring the measurement results. This reduces the error for corrected results since the preselector is set at the same place for acquiring the cal and meas results. The ‘Optimize Preselector’ function allows the offset values to be collected again without the cal acquisition results



Once a calibration has completed successfully, Apply Calibrations is set to YES.



To abort a Cal while it is running, press ESC or Cancel. This will stop the action and not store any data collected. The previous data is erased and the "Apply Calibration" parameter will be set to "No". If a valid User Cal is still stored, the user can then turn Apply Calibration back on, by setting "Apply Calibration" to "Yes". Note that aborting the calibration operates in both Single and Continuous modes of use.

Remote Command	[:SENSe]:NFIGure:CALibration:INITiate
-----------------------	---------------------------------------

Meas Setup

Coupling	<ol style="list-style-type: none"> 1. When a calibration has completed, Apply Calibration will be set to YES and Cal Type will be set to USER. 2. If the calibration is canceled before it has completed, Apply Calibration will be set to NO. 3. Attenuation min/max: calibration performed for each attenuation step (PXA: 4dB step; MXA: 4dB step; EXA:10dB step; CXA: 4dB step). Default would be 3 stages for PXA (0, 4, 8), MXA (0, 4, 8), CXA (0, 4, 8) and 2 for EXA (0, 10). 4. Disabled if no valid ENR data (in Meas table when 'Use Meas Table for Cal Data' is ON or Cal table when OFF or Spot ENR): error message -221.5533.
Remote Command Notes	Error -221.5525 displayed when this command is issued and Cal Type is USER.
Example	:NFIG:CAL:INIT
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup
Mode	NF

Cancel (frontpanel only)

To abort a Cal while it is running, press Cancel. This will stop the action and not store any data collected. The previous data will be unaffected and the "Apply Calibration" parameter will be set to "No". If a valid User Cal is still stored, the user can then turn Apply Calibration back on, by setting "Apply Calibration" to "Yes".

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Calibrate Now
Mode	NF

Loss Comp

The Loss Compensation menu controls the amount of loss compensation to be applied both before and after the Device Under Test. The loss compensation can be supplied as a fixed value for all frequencies, or a table of frequency/amplitude pairs that will be interpolated to find the most accurate compensation value for the measurement that is underway.

NOTE You may not use List mode to set loss compensation.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup

Mode	NF
------	----

Before DUT

Controls the type of Loss Compensation to be applied before the Device Under Test.

Remote Command	[:SENSe] :NFIGure:CORRection:LOSS:BEFore:MODE OFF FIXEd TABLE [:SENSe] :NFIGure:CORRection:LOSS:BEFore:MODE?
Example	NFIG:CORR:LOSS:BEF:MODE FIX NFIG:CORR:LOSS:BEF:MODE?
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp
Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF FIXEd TABLE
Readback Text	Setting read back and fixed value (when set to FIXEd): [Fixed: 3.00 dB]
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:LOSS:BEFore:MODE

Off

Key Path	Meas Setup, Loss Comp, Before DUT,
Initial S/W Revision	Prior to A.04.00

Before DUT Fixed Value Allows entry of a single loss compensation value that will be applied before the device under test at all measured frequencies. Will only take effect if the loss compensation before DUT is set to 'Fixed'.

Remote Command	[:SENSe] :NFIGure:CORRection:LOSS:BEFore:VALue <value> [:SENSe] :NFIGure:CORRection:LOSS:BEFore:VALue?
Coupling	Only active when Loss Compensation Before DUT Mode is FIXEd.
Remote Command Notes	Error -221.5526 displayed if attempt to set Fixed value when Before DUT mode is LIST or OFF.
Example	:NFIG:CORR:LOSS:BEF:VAL 20 dB
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT
Mode	NF

Meas Setup

Preset	0 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB
Backwards Compatibility SCPI	[[:SENSe][:NFIGure]:CORRection:LOSS:BEFore:VALue [:SENSe]:CORRection:LOSS:INPut:SPOT

Before DUT Temperature Sets the before DUT correction temperature in units of Kelvin. In loss compensation if the user just puts in the gain loss (fixed value in dB), while setting the noise temperature of the attenuator to 0 K, then the noise figure of that loss is not taken into account. It is seen as a "purely reflective (non-dissipative)" loss. In most cases the loss is a dissipative loss hence the temperature at that loss is required and normally is set at To 290K. For example if I have an attenuator of 3dB before the DUT and the "Before DUT Temp" is set to 0.0K then only the expected transmission gain to the noise source declines by 3dB in the results; any noise added by the attenuator is attributed to the DUT instead of the attenuator. If the loss before temp = To = 290K, then the NF results are computed assuming a noise contribution from the attenuator. This is then equivalent to adding in a 3dB loss pad.

Remote Command	[[:SENSe]:NFIGure:CORRection:TEMPerature:BEFore <temperature> [:SENSe]:NFIGure:CORRection:TEMPerature:BEFore?
Remote Command Notes	Only K unit suffix is supported
Example	:NFIG:CORR:TEMP:BEF 0.15 K
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT
Mode	NF
Preset	290.00
State Saved	Saved in instrument state.
Range	0 K to 29650000 K
Backwards Compatibility SCPI	[[:SENSe][:NFIGure]:CORRection:TEMPerature:BEFore

After DUT

Controls the type of Loss Compensation to be applied after the Device Under Test.

Remote Command	[[:SENSe]:NFIGure:CORRection:LOSS:AFTer:MODE OFF FIXed TABLE [:SENSe]:NFIGure:CORRection:LOSS:AFTer:MODE?
Example	:NFIG:CORR:LOSS:AFT:MODE FIX
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp

Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	OFF FIXEd TABLe
Readback Text	Setting read back and fixed value (when set to FIXEd): [Fixed: 3.00 dB]
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:LOSS:AFTer:MODE

Off

Key Path	Meas Setup, Loss Comp, After DUT,
Initial S/W Revision	Prior to A.04.00

After DUT Fixed Value Allows entry of a single loss compensation value that will be applied after the device under test at all measured frequencies. Will only take effect if the loss compensation after DUT is set to 'Fixed'.

Remote Command	[:SENSe]:NFIGure:CORRection:LOSS:AFTer:VALue <value> [:SENSe]:NFIGure:CORRection:LOSS:AFTer:VALue?
Coupling	Only active when Loss Compensation After DUT Mode is FIXEd. Automatically sets After DUT Mode to ON.
Remote Command Notes	Error -221.5526 displayed if attempt to set Fixed value when After DUT mode is LIST or OFF.
Example	:NFIG:CORR:LOSS:AFT:VAL 20 dB
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, After DUT
Mode	NF
Preset	0 dB
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:LOSS:AFTer:VALue [:SENSe]:CORRection:LOSS:OUTPut:SPOT

After DUT Temperature Sets the After DUT correction temperature in units of Kelvin. In loss compensation if the user just puts in the gain loss (fixed value in dB), while setting the noise temperature of the attenuator to 0 K, then the noise figure of that loss is not taken into account. It is seen as a "purely reflective (non-dissipative)" loss. In most cases the loss is a dissipative loss hence the temperature at that loss is required and normally is set at To 290K. For example if I have an attenuator of 3dB After the DUT and the "After DUT Temp" is set to 0.0K then only the expected transmission gain to the noise

Meas Setup

source declines by 3dB in the results; any noise added by the attenuator is attributed to the DUT instead of the attenuator. If the loss After temp = To = 290K, then the NF results are computed assuming a noise contribution from the attenuator. This is then equivalent to adding in a 3dB loss pad.

Remote Command	<code>[:SENSe] :NFIGure:CORRection:TEMPerature:AFTer <value></code> <code>[:SENSe] :NFIGure:CORRection:TEMPerature:AFTer?</code>
Example	<code>:NFIG:CORR:TEMP:AFT 0.15 K</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, After DUT
Mode	NF
Preset	290.00 K
State Saved	Saved in instrument state.
Range	0 K to 29650000 K
Backwards Compatibility SCPI	<code>[:SENSe][:NFIGure] :CORRection:TEMPerature:AFTer</code>

Loss Table

The loss compensation tables are used as a means of entering correction data that will be used to improve the accuracy of measurements. Where a specific measured frequency does not have an exact match in the table, the loss compensation value will be interpolated linearly on the dB scale between the two closest data points.

The table will be displayed on the left side the current measurement in the format shown below. When number of entries in the table cannot all be displayed at once, the table can be navigated using the tab keys. The table will be sorted in ascending order using the frequency as a key. The table will disappear from view upon exit from the Loss Table menu.

Duplicates are NOT allowed in the frequency fields of the Loss Table but duplicate Loss Values at different frequencies are acceptable.

NOTE: Data entered into this table will have no effect unless the Loss Compensation Before/After Mode is set to TABLE.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT
Mode	NF

Editing the Loss Table Selecting the 'Edit' key opens the Loss Compensation table for editing. This is displayed on the lefthand side of the current measurement view.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT, Table
Mode	NF

Columns

The Loss Table has two columns. The first (and leftmost) is titled 'Frequency' and uses frequency terminators. The second is titled 'Loss Value' and uses power terminators

Frequency Enables you to enter the frequency component of a frequency/amplitude pair.

Coupling	Parameter coupled to currently selected frequency in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT After DUT, Table
Mode	NF
Preset	<blank>
State Saved	Saved in instrument state.
Range	10 Hz to 325 GHz

Loss Value Enables you to enter the amplitude component of a frequency/amplitude pair.

Coupling	Parameter coupled to currently selected Loss Value in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Loss Comp, Before DUT After DUT, Table
Mode	NF
Preset	0
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Clear Table

Clear Loss Before DUT Table

This function clears all data from the Loss Comp table and removes the table's backup from persistent storage.

Key Path	Meas Setup, Loss Comp, Before DUT, Table
Mode	NF
Remote Command	[:SENSe] :NFIgure :CORRection :LOSS :BEFOre :TABLE :DATA :DELe te
Initial S/W Revision	Prior to A.04.00
Modified at S/W Revision	After A.09.01

Meas Setup

Restriction and Notes	Clear all entries in the Loss Before DUT Comp table. If current Loss Before DUT is selected "Table", clear the Loss Before DUT table contents will make the measurement hang, and "Insufficient Data; Loss table empty" error will be prompted.
-----------------------	---

Clear Loss After DUT Table

This function clears all data from the Loss Comp table and removes the table's backup from persistent storage.

Key Path	Meas Setup, Loss Comp, After DUT, Table
Mode	NF
Remote Command	<code>[:SENSe] :NFIGure:CORRection:LOSS:AFTer:TABLE:DATA:DELet e</code>
Initial S/W Revision	Prior to A.04.00
Modified at S/W Revision	After A.09.01
Restriction and Notes	Clears all entries in the Loss After DUT Comp table. If current Loss After DUT is selected "Table", clear the Loss After DUT table contents will make the measurement hang, and "Insufficient Data; Loss table empty" error will be prompted.

Setting Loss Compensation Table Remotely (remote command only)

Data can be entered into the current loss compensation table using SCPI. Parameters are provided in frequency/amplitude pairs, the units being GHz and dB respectively. Up to 501 point-pairs will be accepted. See the above Frequency and Loss Value definitions for the acceptable parameter ranges.

Mode	NF
Remote Command	<code>[:SENSe] :NFIGure:CORRection:LOSS:BEFOre AFTer:TABLE:DATA <frequency>, <amplitude> ([, <frequency>, <amplitude>]) *</code> <code>[:SENSe] :NFIGure:CORRection:LOSS:BEFOre AFTer:TABLE:DATA?</code>
Example	<code>:NFIG:CORR:LOSS:BEF:TABL:DATA 1000, -10 2000, -8 3000, -6 10000, 5</code>
Backwards Compatibility SCPI	<code>[:SENSe] [:NFIGure] :CORRection:LOSS:BEFOre AFTer:TABLE:DATA</code>
Initial S/W Revision	Prior to A.04.00

Table Entry Count (Remote Command Only)

The number of frequency/amplitude point-pairs in the current measurement or loss compensation table can be obtained using SCPI. If the table is empty, the size returned is 0.

Mode	NF
------	----

Remote Command	[:SENSe] :NFIGure:CORRection:LOSS:BEFore AFTer:TABLE:COU Nt?
Preset	0
Range	0 to 501
Example	:NFIG:CORR:ENR:MEAS:TABL:COUN?
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:CORRection:LOSS:BEFore AFTer:TABLE:COUNT?
Initial S/W Revision	Prior to A.04.00

Loading and Saving ENR Data Files

Agilent Noise Sources are delivered complete with a floppy disk containing ENR Data particular to that source. It is possible to read this data directly into the measurement, and even save the data in the same format if changes are required, or if the disk has been lost. The ENR Data can be copied onto a USB flash drive for loading onto the instrument using a PC equipped with a floppy drive and USB support

Refer to the section, "Entering Excess Noise Ratio (ENR) Data" in the Measurement Guide and Programming Examples Manual . This can be accessed by pressing the green Help key, then selecting the "Additional Documentation" page in the Table of Contents on the left side of the display. Scroll down to locate the Noise Figure section and you will see the Measurement Guide and Programming Examples button which when selected opens the PDF of this book.

Limits

Enables you to enter upper and lower limits for results data.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, More
Mode	NF

Select Limit

Specifies the selected limit. The term "selected limit" is used throughout this section to specify which limit will be affected by the functions. Four limits are available for selection.

Key Path	Meas Setup, Limits,
Initial S/W Revision	Prior to A.04.00

Limit/On/Off

Selects whether the limit and margin are displayed. If Test All Limits is on, this also determines whether the test trace will be tested against the limit. If Limit On/Off is on, the following occurs:

The limit trace is displayed

Meas Setup

The trace is tested if Test Limits is on

Remote Command:	:CALCulate:NFIGure:LLINE [1] 2 3 4 :DISPlay OFF ON 0 1 :CALCulate:NFIGure:LLINE [1] 2 3 4 :DISPlay?
Example:	:CALC:NFIG:LLIN2:DISP ON
Couplings:	Limit display ON selects the limit. Testing is done on all displayed limits if "Test All Limits" is ON. Entering the limit menu from the GUI turns on the selected limit.
Key Path:	Meas Setup, Limits,
Preset:	Off (all limits)
State Saved:	Saved in State.
Backwards Compatibility SCPI:	CALCulate [:NFIGure] :LLINE [1] 2 3 4 [:STATE] CALCulate [:NFIGure] :LLINE [1] 2 3 4 :DISPlay [:STATE]
Initial S/W Revision:	Prior to A.04.00

Properties

The properties of each limit line can be defined in this menu.

Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, More, Limits
Mode	NF

Select Limit Specifies the selected limit. The term "selected limit" is used throughout this section to specify which limit will be affected by the functions. Four limits are available for selection.

Key Path	Meas Setup, Limits,
Initial S/W Revision	Prior to A.04.00

Test Trace Selects the trace you want the limit to test. A limit is applied to one and only one trace; each trace can have both an upper and a lower limit. When executing Limit Test, the limit is applied only to the specified trace.

Remote Command:	:CALCulate:NFIGure:LLINE [1] 2 3 4 :TRACe 1 2 :CALCulate:NFIGure:LLINE [1] 2 3 4 :TRACe?
Key Path:	Meas Setup, Limits, Properties
Example:	:CALC:NFIG:LLIN3:TRAC 2 applies limit 3 to trace 2.
Couplings:	This matters when testing a trace or limit line for failure, via :CALC:NFIG:LLIN3:FAIL? or :CALC:NFIG:TRAC2:FAIL?

Preset:	Limits 1 and 2 default to 1, Limits 3 and 4 default to 2, Not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State.
Readback:	Trace 1 2
Initial S/W Revision:	Prior to A.04.00

Limit Type Selects whether the limit you are editing is an upper or lower limit. An upper limit fails if the trace exceeds the limit. A lower limit fails if the trace falls below the limit.

Remote Command:	:CALCulate:LLINe [1] 2 3 4 :TYPE UPPer LOWer :CALCulate:LLINe [1] 2 3 4 :TYPE?
Example:	:CALC:NFIG:LLIN2:TYPE LOW sets limit line 2 to act as a lower limit.
Couplings:	If a margin has already been set for this limit line, and this key is used to change the limit type, then the margin value will reverse sign.
Key Path:	Meas Setup, Limits, Properties
Preset:	Upper for Line 1, 3; Lower for Line 2, 4 Not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State.
Backwards Compatibility SCPI:	:CALCulate [:NFIGure] :LLINe [1] 2 3 4 :TYPE
Initial S/W Revision:	Prior to A.04.00

Edit Limit Line

Opens the Table Editor for the selected limit line. See [“Table Editor” on page 423](#) for details.

NOTE If a limit frequency point is outside the current displayed frequency range of measurement, the line connecting this point to the next one does not appear on the display. Adjust all limit frequency points to be within the current measurement range.

Example	To setup a straight line, simple 3 dB limit from 1 to 3 GHz, send this command: :CALCulate:NFIGure:LLINe1:DATA 1e9, 3, 1, 3e9, 3, 1
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, More, Limits
Couplings	A remote user can enter or access limit line data via :CALCulate:NFIGure:LLINe[1] 2 3 4:DATA See "Remote Command Notes", for more information.

Meas Setup

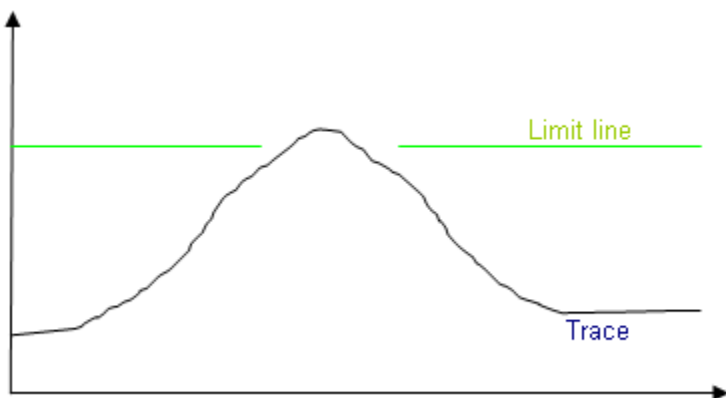
Remote Command Notes

A remote user can enter or access limit line data by using this remote command:

```
:CALCulate:NFIGure:LLINe[1]|2|3|4:DATA  
<freq1>,<amp;pl1>,<connected1>,<freq2>,<amp;pl2>,<connected2>...
```

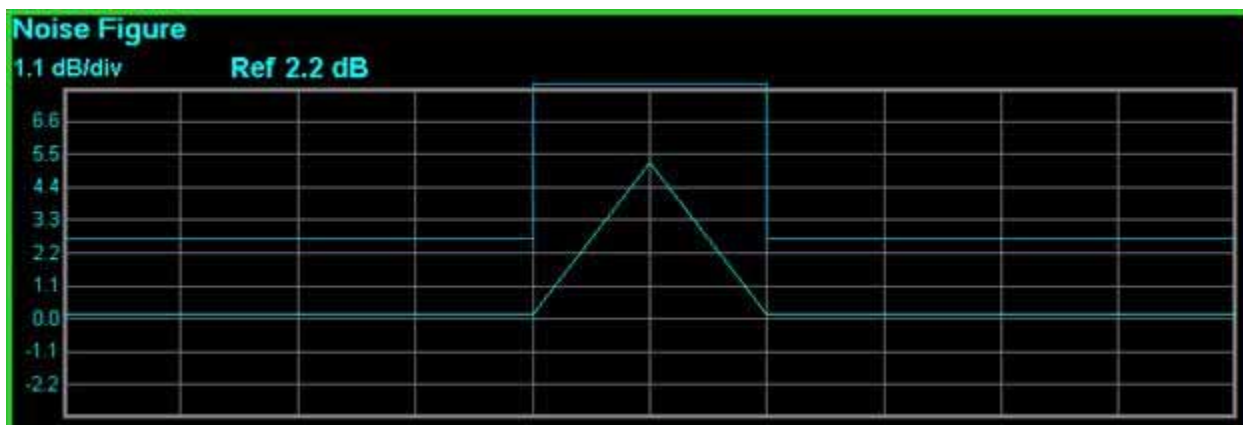
The application of this command is especially useful when setting limits that are not connected. The third parameter (connected) determines whether the current segment is connected to the previous segment. This parameter is a 1 if the segment is connected to the previous limit segment and zero if it is not connected to the previous segment. (The "connected" value for the first segment is ignored.) A zero is used when you have an open "limitless" frequency band where you expect a signal to exist. The instrument sees this "limitless" portion as either positive or negative depending upon whether you are defining an upper or lower limit, respectively.

Here is an example. You wish to allow this peak to pass the limits test.



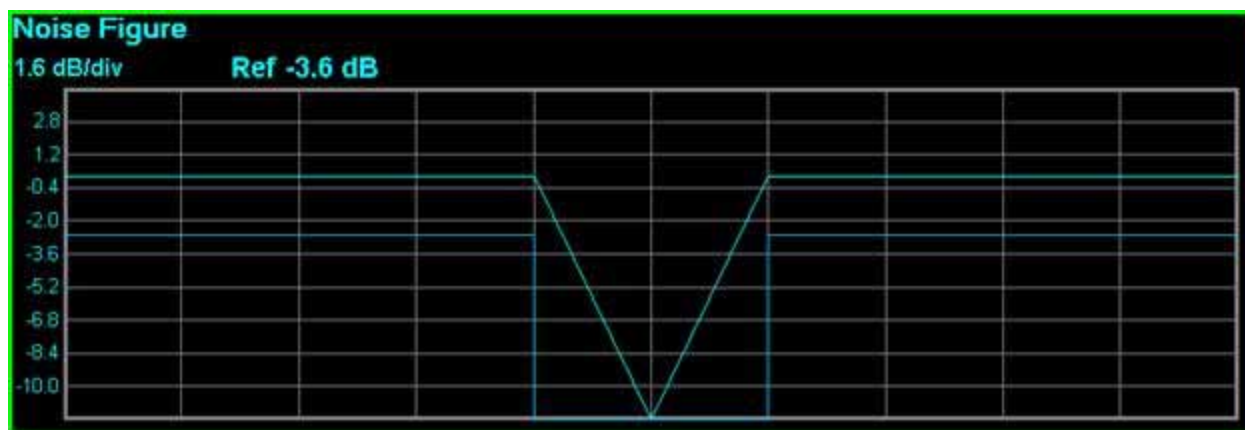
In this case you would specify the upper limit by sending this command:

```
CALC:NFIG:LLIN:DATA 10000000, 2.7, 1, 1206000000, 2.7, 1, 1804000000, 2.7, 0, 3000000000, 2.7, 1.
```



or When defining a lower limit, you would send this command:

```
CALC:NFIG:LLIN:DATA 10000000, -2.7, 1, 1206000000, -2.7, 1, 1804000000, -2.7, 0, 3000000000, -2.7, 1.
```



Limits Table

The limits table is used as a means of entering limit line data that will be used in the measurements.

The table will be displayed on the left side the current measurement in the format shown below. When number of entries in the table cannot all be displayed at once, the table can be navigated using the tab keys. The table will be sorted in ascending order using the frequency as a key. The table will disappear from view upon exit from the Limits Edit menu.

Duplicates are allowed in the X field of the Limits Table but only one duplicate per X value is allowed (subsequent entries would be redundant)

Columns The Limits Table has two columns. The first (and leftmost) is titled "X" and uses frequency terminators. The second is titled "Y" and uses power terminators

X Value Enables you to enter the frequency component of a frequency/amplitude pair.

Coupling	Parameter coupled to currently selected X value in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Limits, Edit
Mode	NF
Preset	<blank>
State Saved	Saved in instrument state.
Range	10 Hz to 325 GHz

Y Value Enables you to enter the amplitude component of a frequency/amplitude pair.

Coupling	Parameter coupled to currently selected Y value in table.
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, Limits, Edit
Mode	NF

Meas Setup

Preset	0
State Saved	Saved in instrument state.
Range	-100 dB to 100 dB

Delete Limit Deletes the currently selected limit line. Pressing Delete Limit purges the data from the limit line tables.

Limit data – including secondary parameters such as description, margin value, etc. - will be cleared and returned to factory preset settings.

Remote Command:	:CALCulate:NFIGure:LLINe [1] 2 3 4 :DELeTe
Example:	:CALC:NFIG:LLIN2:DEL
Key Path:	Meas Setup, More, Limits
Initial S/W Revision:	Prior to A.04.00

Test All Limits Selects whether displayed traces are tested against displayed limits (i.e. those for which Limit On/Off is set to On).

For each displayed trace, a message will be displayed in the upper-left corner of the graticule to notify whether the trace passes or fails the limits.

If the trace is at or within the bounds of all applicable limits and margins, the text "TRACE 1|2|3|4 PASS <list>" will be displayed in green, where <list> is a comma-separated list of the numbers (1 through 4) of all tested limits.

If the trace is outside the bounds of some applicable limits, the text "TRACE 1|2|3|4 FAIL" will be displayed.

If the trace has no applicable displayed limits, no message is displayed for that trace.

If two amplitude values are entered for the same frequency, a single vertical line is the result. In this case, if an upper line is chosen, the lesser amplitude is tested. If a lower line is chosen, the greater amplitude is tested.

This command only affects the display, and has no impact on remote performance.

Remote Command:	:CALCulate:NFIGure:LLINe:TEST OFF ON 0 1 :CALCulate:NFIGure:LLINe:TEST?
Example:	:CALC:NFIG:LLIN:TEST ON
Preset:	On, not affected by Mode Preset, preset by Restore Mode Defaults.
State Saved:	Saved in State
Key Path:	Meas Setup, More, Limits, More
Remote Command Notes:	When the command below is used to turn an individual limit line test ON, the test for all limits will be turned ON. This is consistent with GPSA's behaviour.

Backwards Compatibility SCPI:	:CALCulate[:NFIGure]:LLINe[1] 2 3 4:TEST[:STATe]
Initial S/W Revision:	Prior to A.04.00

Delete All Limits Deletes all limit lines. Pressing Delete All Limits purges the data from all limit line tables.

All limit data will be cleared and returned to factory preset settings–.

Remote Command:	:CALCulate:NFIGure:LLINe:ALL:DELeTe
Example:	:CALC:NFIG:LLIN:ALL:DEL
Key Path:	Meas Setup, More, Limits, More
Initial S/W Revision:	Prior to A.04.00

Optimize Preselector

This key runs through the current setup's frequency points optimising the preselector. This may be required if the calibration step was performed some time ago and the preselector drift is impacting the measurement (for example: higher errors than expected).

When selected the following pop-up box will appear, with an estimate of the time expected to complete.

Remote Command	[:SENSe] :NFIGure:PRESelector:OPTimize
Coupling	Disabled when instrument tuned frequencies are below 3.6GHz, i.e. in low band When instrument tuned frequencies are above 3.6GHz but don't span > 50MHz, then one YTF adjust parameter will be obtained and used for all frequencies in high band. When instrument tuned frequencies are above 3.6GHz and span > 50MHz, then a table of YTF adjust parameters will be obtained and used for each frequency in high band.
Restriction and Notes	This key will disappear in CXA platform
Example	:NFIG:PRES:OPT
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, More
Mode	NF

Noise Source Settling Time

SNS's delays are taken into account internally. When an SNS is used, this would only apply to a DUT that requires a delay.

For the 346 series of noise sources the switching speeds were:

Switching speed:

Meas Setup

For repetitive operation (in previous state for less than 5 seconds):

Turn-on: < 20 μ s

Turn-off: <80 μ s

For single-shot operation (in previous state more than 5 seconds):

Turn-on: < 3 ms

Turn-off: <80 μ s

The above times are set in the application, so for normal noise sources or DUT's that require longer settling times, the time would be entered in this parameter.

Remote Command	<code>[:SENSe] :NFIGure:NSSTime <time></code> <code>[:SENSe] :NFIGure:NSSTime?</code>
Example	NFIG:SWE:NSST 64 ms
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup, More
Mode	Noise figure
Preset	0 s
State Saved	Saved in instrument state.
Min	0 s
Max	5 sec
Backwards Compatibility SCPI	SYST:CONF:DUT:STIM

Meas Preset

Restores all the measurement local parameters to their default values, with the exception of ENR Tables, Limit Line Data, and Loss Comp Table Data.. They remain unchanged, however the limit lines and loss comp will be turned off.

Remote Command	<code>:CONFIGure:NFIGure</code>
Coupling	Loads default values of all parameters.
Restrictions and Notes	Due to Base Infrastructure and CDF provided code we are unable to support the following command; <code>[:SENSe] :CONFIGure[:NFIGure]</code> <code>[:SENSe] :CONFIGure:NFIGure</code>
Example	CONF:NFIG
Initial S/W Revision	Prior to A.04.00
Key Path	Meas Setup

Mode	NF
------	----

Table Editor

Table Editor Operation Only one table editor can be on at any time; turning on the Table Editor for any item turns off all other table editors that are open.

The Table Editor shows the current state of the internal database being edited. If the Table Editor is turned off the internal database remains intact and when is again visible, reflects any updates that were made remotely or by the front-panel access.

When the table editor is turned on, it appears as a window pane to the left of the main window. This pane contains the table being edited. The table editor softkey menu will vary somewhat depending on the number and title of the columns being edited.

See also:

[“Navigating” on page 423](#)

[“Editing” on page 423](#)

Key Path	<p>Freq/Channel, Edit Freq List, Edit</p> <p>Meas Setup, ENR, Meas Table, Edit</p> <p>Meas Setup, ENR, Cal Table, Edit</p> <p>Meas Setup, Limits, Edit</p> <p>Meas Setup, Loss Comp, Before DUT, Table, Edit</p> <p>Meas Setup, Loss Comp, After DUT, Table, Edit</p>
Initial S/W Revision	Prior to A.04.00

Navigating When navigate is highlighted, the selected row is highlighted, per the figure below.

The Up arrow key moves up one row, while the down arrow keys move down one row. Enter moves down one row. The front-panel knob and Left and Right arrow keys are also available to navigate the table.

The blank row is automatically displayed if there are no points in the table. In this case, the default values are specified by the measurement (typically measurements will use the center frequency as the default value, and some benign default Y value such as 0 dB for correction data).

Editing When one of the column keys (for example: Frequency or Amplitude) is highlighted, the relevant field in the current row is highlighted.

Numeric keys, Up, Down, Left and Right arrow keys, and the front-panel knob change the data in the appropriate column. The step size for the front-panel knob and arrow keys, and the units for numeric entry, vary by application. The changes are immediately reflected in the active function area, and also in the table itself. In the case of numeric entry, changes to the table are not confirmed until the user presses "Enter" or a terminator key. Front-panel knob-initiated changes are confirmed immediately.

Meas Setup

Confirmed changes to the independent variable (usually Frequency) immediately sorts the selected row into the appropriate position in the table. If another point has the same frequency, and duplicates are allowed, the new point maintains the same relative position in the table. For example, if you are editing point 1, and give it the same frequency as point 7, the row is sorted just before point 7. If you are editing point 9, and give it the same frequency as point 7, the row is sorted just after point 7.

If the user presses "Enter" or a terminator key, the next column in the table is edited. If the last column in the table is being edited, a new point is inserted (exactly as if the user had pressed "Insert Point Below").

The table is set up to disallow duplicate independent variables. For example: if you set a value for an independent variable that is the same as an already existing value, the duplicate is deleted upon completion of editing.

Table Editor Softpanel

Navigate Enables you to move around in the table editor using the up and down arrow keys.

Restriction and Notes	Note that the arrow keys always navigate between rows.
Remote Command Notes	No SCPI. Front panel only.
Initial S/W Revision	Prior to A.04.00
Key Path	Freq, Edit Freq List, Edit Meas Setup, ENR, Meas Table, Edit Meas Setup, ENR, Cal Table, Edit Meas Setup, Limits, Edit Meas Setup, Loss Comp, Before DUT, Table, Edit Meas Setup, Loss Comp, After DUT, Table, Edit
Mode	NF
Preset	Navigate
State Saved	No
Range	Navigate Frequency Amplitude (optional) Range of enumerates can be 2 or 3, depending on current use, but first member will always be Navigate. Additional members are provided by the user of the Common Table Editor

Insert Point Below Inserts point below the currently selected row.

Restriction and Notes	If the currently-selected point is being edited, the point is completed. A new point is inserted below the currently-selected point; the data in the new point is copied from the current point. The independent variable (usually Frequency) is highlighted for edit.
Initial S/W Revision	Prior to A.04.00

Key Path	Freq, Edit Freq List, Edit Meas Setup, ENR, Meas Table, Edit Meas Setup, ENR, Cal Table, Edit Meas Setup, Limits, Edit Meas Setup, Loss Comp, Before DUT, Table, Edit Meas Setup, Loss Comp, After DUT, Table, Edit
Mode	NF

Delete Point Deletes currently selected row in the table editor.

Restriction and Notes	It will immediately delete the currently-selected point, whether or not that point is being edited, and select Navigate. The point following the currently-selected point (or the point proceeding if there is none) will be selected.
Initial S/W Revision	Prior to A.04.00
Key Path	Freq, Edit Freq List, Edit Meas Setup, ENR, Meas Table, Edit Meas Setup, ENR, Cal Table, Edit Meas Setup, Limits, Edit Meas Setup, Loss Comp, Before DUT, Table, Edit Meas Setup, Loss Comp, After DUT, Table, Edit
Mode	NF

Meas Setup

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 428](#)

Key Path:	Front panel key
Remote Command:	:INSTrument [:SElect] SA SEQAN EMI BASIC WCDMA EDGEgSM WIMAXOFDMA VSA PNOISE NFIGURE ADEM0D 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 434](#) 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:REVersion? <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 and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path:	Mode
Example:	INST:SEL 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

Mode

it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

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

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
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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

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility

Mode

for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path:	Mode
Example:	INST:SEL RLC Or INST:NSEL 266
Initial S/W Revision:	Prior to A.02.00

SCPI Language Compatibility

The SCPI Language Compatibility mode provides remote language compatibility for SCPI-based instruments, such as the Rohde and Schwartz FSP and related series of spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

Key Path:	Mode
Example:	INST:SEL SCPILC Or INST:NSEL 270
Initial S/W Revision:	A.06.00

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
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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

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

Mode

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

Mode Setup opens a menu of keys that allows you to specify parameters of the mode.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

DUT Setup

The DUT Setup form enables the user to prepare the application for measuring specific devices and setups. It also provides information about how to set up the instrumentation for calibration and measurement.

Key Path	Mode Setup
Mode	Noise Figure
Initial S/W Revision	Prior to A.04.00

DUT: Down Converter

Sys Downconverter : Off

Sideband: LSB

LO Freq Mode: Fixed

Ext LO Control: Off

Ext LO Power: 10.00 dBm

Freq Mode: Swept

Freq Context : RF - DUT Input

Diagram: Measurement

RF

Start: 200.000000 MHz

Stop: 290.000000 MHz

LO

Fixed: 300.000000 MHz

IF

Start: 100.000000 MHz

Stop: 10.0000000 MHz

Mode Setup

Figure 0-1: DUT Setup Form (Shown for a downconverter – fixed LO)

The active parameter field in the form is highlighted in blue. The tab front-panel keys can be used to navigate through the fields and load the corresponding softkey menus. Fields which do not apply to the current DUT type are disabled and cannot be accessed via the tab front-panel keys.

When the frequencies are fixed the labels are changed to "Fixed".

The blue eye ball icon goes with the Frequency Context parameter, when Frequency Context = RF, the eye ball will be situated near the DUT input. Similarly for IF and LO, the eye ball will be near the Analyzer's Input and the DUT LO input respectively.

Navigation of this form with a mouse is also possible. Where the field can be clicked, the appropriate menu comes up. The softkeys can also be clicked to select 1 of N selections or allow number entry.

DUT

Opens a menu of softkeys that allows you to select the type of DUT to be measured: [“Amplifier” on page 448](#), [“Up Converter” on page 449](#), and [“Down Converter” on page 449](#).

Remote Command	[:SENSE] :NFIGure:MODE:DUT AMPLifier UPConv DOWNconv [:SENSE] :NFIGure:MODE:DUT?
Coupling	<ol style="list-style-type: none"> Ext LO Frequency, Power Level, Control, Sideband and Frequency Context are disabled (grayed) when DUT is AMPLifier and System Downconverter = Off. System Downconverter is disabled (grayed) when DUT is UPConv or DOWNconv. When DUT is UpConverter, the DSB sideband option is disabled.
Example	:NFIG:MODE:DUT AMPL :NFIG:MODE:DUT?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup
Mode	NF
Preset	AMPLifier
State Saved	Saved in instrument state.
Range	AMPLifier UPConv DOWNconv
Backwards Compatibility SCPI	[:SENSE] :CONFIGure:MODE:DUT (PSA/ESA/NFA/FSP)

Amplifier Straightforward device that performs no internal frequency conversion. Can be used with or without an external system downconverter.

Key Path	Mode Setup, Dut
Initial S/W Revision	Prior to A.04.00

Up Converter Device performs internal frequency upconversion. Cannot be used in conjunction with a system downconverter.

Key Path	Mode Setup, Dut
Initial S/W Revision	Prior to A.04.00

Down Converter Device performs internal frequency downconversion. Cannot be used in conjunction with a system downconverter.

Key Path	Mode Setup, Dut
Initial S/W Revision	Prior to A.04.00

System Downconverter

Selects whether or not the system downconverter is active. A system downconverter effectively increases the range of the measurement by downconverting high frequencies to those that the analyzer can measure. The system downconverter is similar to the standard downconverting DUT, although because it is not actually a part of the DUT it can be calibrated out of the measurement. This is used normally for testing amplifiers outside the range of the signal analyzer or possibly to move the frequencies into the range of specified (not nominal specs) signal analyzer frequencies.

Remote Command	[:SENSe] :NFIGure:MODE:SYSTem:DOWNconv [:STATe] ON OFF 1 0 [:SENSe] :NFIGure:MODE:SYSTem:DOWNconv [:STATe] ?
Coupling	1. Disabled (grayed) when DUT is DOWNconv or UPConv.
Example	:NFIG:MODE:SYST:DOWN ON :NFIG:MODE:SYST:DOWN?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	[:SENSe]:CONFigure:MODE:SYSTem:DOWNconv[:STATe] (ESA/PSA/NFA)

External LO Frequency Mode

Sets the mode of the external LO frequency. This can be fixed, where a constant LO frequency is being

Mode Setup

used, or swept, where the LO frequency changes between sweep points.

Remote Command	<code>[[:SENSe]:NFIGure:MODE:DUT:LOSCillator FIXed SWEPT [:SENSe]:NFIGure:MODE:DUT:LOSCillator?</code>
Coupling	<ol style="list-style-type: none">1. When set to SWEPT (IF is fixed), the Frequency Context parameter is set to RF.2. When changed from SWEPT to FIXed and DUT = Up or Down, then the frequency context gets set to IF.3. When set to SWEPT and context = RF, External LO Frequency start stop are auto calculated from the RF and IF frequencies. When the context is LO, then the RF frequencies are auto calculated from the RF and IF frequencies.
Example	<code>:NFIG:MODE:DUT:LOSC FIX :NFIG:MODE:DUT:LOSC?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	FIXed
State Saved	Saved in instrument state.
Range	FIXed SWEPT
Backwards Compatibility SCPI	<code>[[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator (FSP) [:SENSe]:CONFigure:MODE:DUT:LOSCillator (ESA/PSA/NFA)</code>

External LO Control (on/off)

Toggles external LO control via LAN on/off. This softkey provides a shortcut to [“External LO Control \(on/off\)” on page 459](#) [“External LO Control \(on/off\)” on page 459](#).

External LO Power

This softkey provides a shortcut to the ‘External LO Power Level’ .

Sideband

Sets the LO offset of the device specified by the above SCPI command (DOWNconv | SYSTem | UPConv).

LSB – Lower Sideband (Signal Frequency < LO Frequency)

USB – Upper Sideband (Signal Frequency > LO Frequency)

DSB – Double Sideband (Only available either when DUT = DownConv, or when DUT = Amplifier +

System Downconverter = On). Double sideband means both upper and lower sidebands.

Remote Command	[:SENSe] :NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:OFFSet LSB USB DSB [:SENSe] :NFIGure:MODE:DOWNconv SYSTem UPConv:LOSCillator:OFFSet?
Coupling	<ol style="list-style-type: none"> 1. Disabled (grayed) when DUT is Amplifier and system downconverter is turned off. 2. DSB choice is disabled when the DUT is an Up converter. 3. When Sideband, context and LO Frequency are disabled and tried to be set remotely, then an advisory message will appear "Settings conflict; Parameter only available when frequency converter is in use." number -221 5502. 4. When DSB is selected, advisory msg 0.2191 is shown. 5. IF DSB is selected and DUT changes to Upconverter, LSB is selected by default.
Example	:NFIG:MODE:DOWN:LOSC:OFFS LSB :NFIG:MODE:DOWN:LOSC:OFFS?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	LSB
State Saved	Saved in instrument state.
Range	LSB DSB USB
Backwards Compatibility SCPI	[:SENSe]:CONFigure:MODE:DOWNconv SYSTem UPConv:LOSCillator:OFFSet (ESA/PSA/NFA)

Frequency Mode

This softkey provides a shortcut to the [“Freq Mode” on page 255](#) parameter.

Frequency Context

Defines the way frequencies are shown in the results view to the user when using a frequency converting device:

RF – Frequencies are displayed as they are before they enter the DUT and before any frequency conversion takes place. In the case of system downconverters, this means before the downconverter. In the case of Sideband = DSB measurements, the RF frequencies represented are only that of the LSB Start and Stop range. If a freq conversion is taking place then the RF frequencies are not the ones being measured at the signal analyzer RF input port.

IF – Frequencies are displayed as they are when they leave the DUT and enter the analyzer after the frequency conversion takes place. These are the frequencies that the analyzer is physically measuring. In

Mode Setup

the case of a system downconverter, this means after the downconverter.

LO – Frequencies at the external LO are displayed. These are NOT the frequencies that the analyzer is physically measuring. This context lets you review the LO frequencies required to program the external LO or those set by the analyzer. LO context is only selectable when the LO mode is SWEPT.

Remote Command	<code>[:SENSE] :NFIGure:MODE:FREQuency:CONText RF IF LO</code> <code>[:SENSE] :NFIGure:MODE:FREQuency:CONText?</code>
Coupling	<ol style="list-style-type: none"> 1. Disabled (grayed) when DUT is Amplifier and system downconverter is turned off. Context in this case defaults to RF. 2. When system downconv is turned on the context is enabled and defaults to RF. 3. When DUT is set to DownConv or UpConv, and LO is fixed then the context defaults to IF. When LO is Swept, the context defaults to RF. 4. Coupled with the ‘eye’ in the Calibration/Setup Diagram. 5. The frequencies under the Frequency softkey are changed to match the frequencies of the selected context. For example: if context is IF, and changed to RF, then the RF frequencies shown in the diagram remain the same, but the frequencies set under the freq key change to reflect RF frequencies. 6. Only when External LO State is set to SWEPT, and DUT is a freq converter, can the context be set to LO. 7. Annunciator in the Meas Bar displays the context.
Example	<code>:NFIG:MODE:FREQ:CONT RF</code> <code>:NFIG:MODE:FREQ:CONT?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	RF (Amplifier & System Down Conv), IF (Downconv Fixed LO), RF (Downconv, Swept LO) IF (Upconv, fixed LO), RF (Upconv Swept LO)
Range	IF RF LO
Backwards Compatibility SCPI	<code>[:SENSE] :CONFIGure:MODE:DOWNconv SYSTEM UPConv:FREQuency:CONText</code>

Diagram

Opens a menu that enables you to select either the Calibration or Measurement diagram.

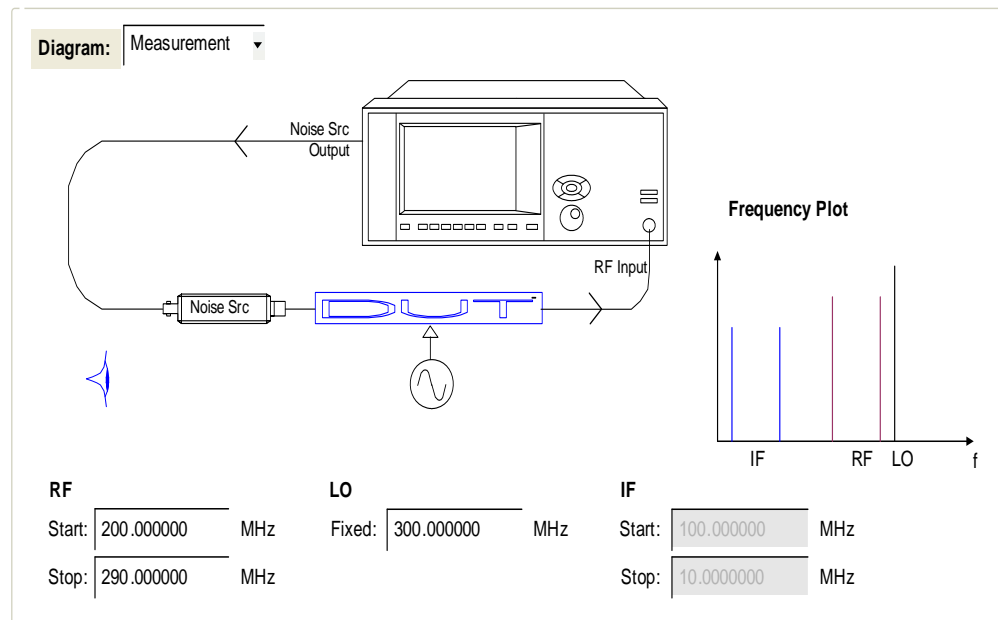
See “LO” on page 455 for more information.

Remote Command	<code>[:SENSE] :NFIGure:MODE:DIAGram CALibration MEASurement</code> <code>[:SENSE] :NFIGure:MODE:DIAGram?</code>
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Example	:NFIG:MODE:DIAG CAL :NFIG:MODE:DIAG?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	Measurement
State Saved	No
Range	CALibration MEASurement

Connecting Different Device Types The Noise Figure measurement application is capable of measuring a wide range of different device types. Figuring out how to hook up each of these devices for calibration and measurement is not immediately obvious, so to simplify things, some diagrams are provided.

Figure 1 Calibration/Setup Diagram Layout



The IF/RF frequencies are displayed below the diagram (and the LO frequency if appropriate). A small ‘eye’ icon is displayed next to the frequencies that are used. This can be toggled between RF/IF/LO using the frequency context parameter.

The diagrams update in real-time as the settings on the form are changed, and the respective Calibration or Measurement diagram is displayed depending on the selection made in the form.

Figure 2 Calibration Diagram

Mode Setup

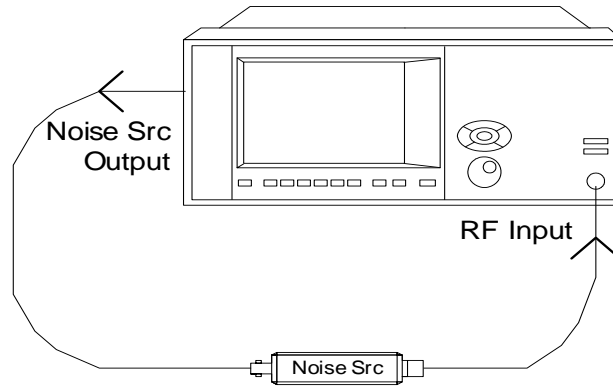


Figure 3 Amplifier Measurement Diagram

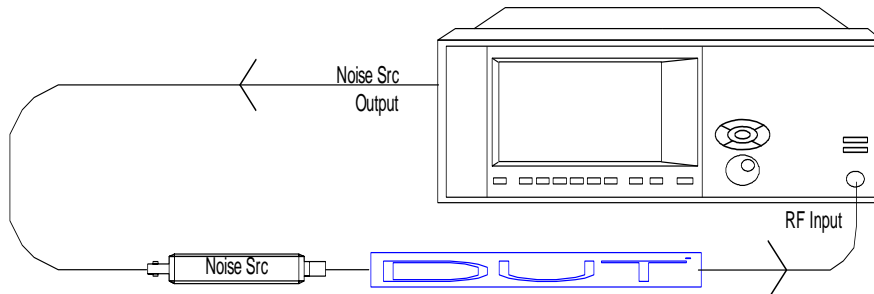


Figure 4 Frequency Converter Measurement Diagram

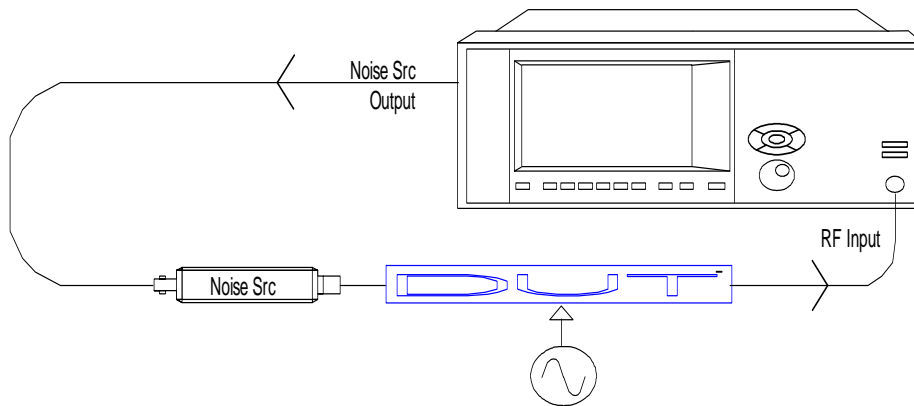
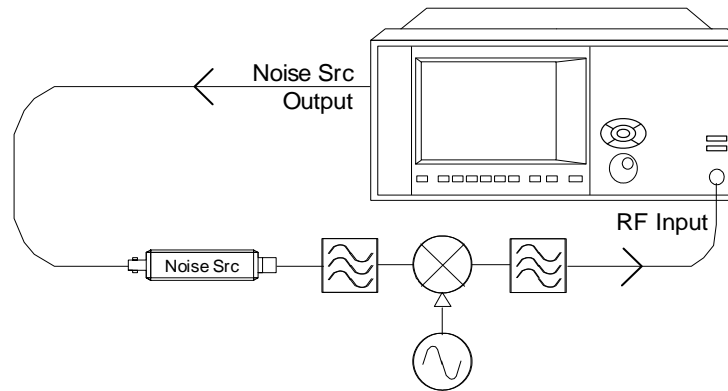
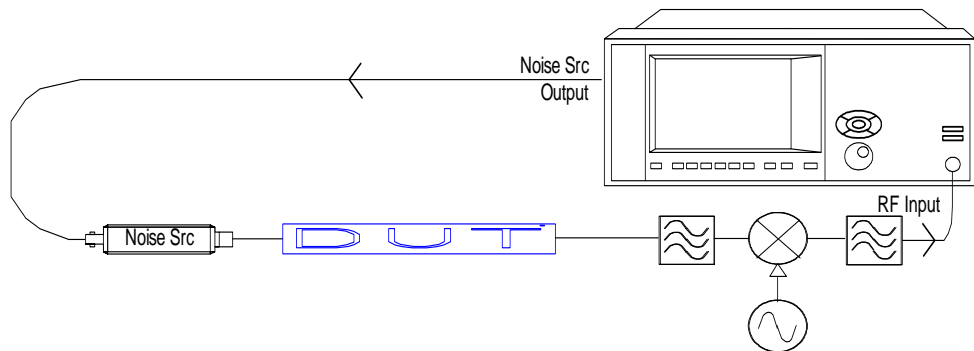


Figure 5 System Downconverter Calibration Diagram



For DSB measurements in System Downconverter mode, the filter at the RF port is removed from the diagram – it is misleading since this filter is normally used to remove one of the sidebands. In some cases the LPF at the output of the mixer is not needed if the 3.6GHz LPF in the RF front end of signal analyzer will suffice.

Figure 6 System Downconverter Measurement Diagram



For DSB measurements in System Downconverter mode, the filter at the RF port will be removed from the diagram – it is misleading since this filter is normally used to remove one of the sidebands. In some cases the LPF at the output of the mixer is not needed if the 3.6GHz LPF in the RF front end of the signal analyzer will suffice.

LO

LO Start Frequency Sets the start frequency for a swept LO.

Remote Command	[:SENSE] :NFIGure:FREQuency:STARt <freq> [:SENSE] :NFIGure:FREQuency:STARt?
Coupling	Disabled and hidden when LO Frequency Mode is FIXed. Coupled to IF and RF frequencies.
Example	FREQ:NFIG:STAR 11 MHz
Initial S/W Revision	Prior to A.04.00

Mode Setup

Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	Dependent on IF/RF Frequencies and only displayed when External LO Frequency Mode = SWEPT (Preset is FIXEd).
State Saved	Saved in instrument state.
Range	1 Hz to 324.999999990 GHz

LO Stop Frequency Sets the stop frequency for a swept LO.

Remote Command	[:SENSe] :NFIGure:FREQuency:STOP <freq> [:SENSe] :NFIGure:FREQuency:STOP?
Coupling	Disabled and hidden when LO Frequency Mode is FIXEd. Coupled to IF and RF frequencies.
Example	FREQ:NFIG:STOP 11 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	Dependent on IF/RF Frequencies and only displayed when External LO Frequency Mode = SWEPT (Preset is FIXEd).
State Saved	Saved in instrument state.
Range	2 Hz to 325 GHz

External LO Fixed Frequency Sets the External LO frequency when the LO Freq Mode is set to Fixed, and when measuring frequency converting devices, or when a system downconverter is in use. This parameter should be set to the same value as the LO in the system downconverter, or the DUT's LO, otherwise the wrong calibration/ENR values are used (and the wrong range of frequencies measured).

When using a fixed LO, this parameter becomes active along with the frequency in context (RF or IF). The frequencies used in the measurement can then be set between this parameter and the RF/IF. When a Swept LO is selected, this parameter is disabled and hidden and the LO Start and Stop frequency boxes are enabled and displayed to allow swept frequency adjustments.

Remote Command	[:SENSe] :NFIGure:MODE:DOWNConv SYSTem UPConv:LOSCillato r:FREQuency <freq> [:SENSe] :NFIGure:MODE:DOWNConv SYSTem UPConv:LOSCillato r:FREQuency?
Coupling	Disabled (grayed) when DUT is Amplifier and system downconverter is turned off. Only available when External LO Frequency Mode is FIXEd Coupled to IF and RF frequencies.

Example	:NFIG:MODE:DOWN:LOSC:FREQ 10 MHz :NFIG:MODE:DOWN:LOSC:FREQ?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	30 GHz
State Saved	Saved in instrument state.
Range	1 Hz to 325 GHz
Readback Text	Value shown on DUT Setup Form.
Backwards Compatibility SCPI	[:SENSe]:CONFigure:MODE:DOWNconv SYSTem UPConv:LOSCillator:F REQuency (PSA/NFA/FSP)

IF

IF Start Frequency Sets the start frequency for a swept IF. This parameter is only available when LO Frequency Mode = FIXEd and RF/IF Frequency mode = SWEPT.

Remote Command	[:SENSe] :NFIGure:FREQuency:STARt <freq> [:SENSe] :NFIGure:FREQuency:STARt?
Coupling	Disabled and hidden when LO Frequency Mode is SWEPT. Disabled and/or hidden when the frequency mode is Fixed. Coupled to RF and LO frequencies. Grayed out when Frequency Mode is LIST.
Example	FREQ:NFIG:STAR 11 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	10 MHz
State Saved	Saved in instrument state.
Range	1 Hz to 26.4 GHz

IF Stop Frequency Sets the stop frequency for a swept IF. This parameter is only available when LO Frequency Mode = FIXEd and RF/IF Frequency Mode = SWEPT.

Remote Command	[:SENSe] :NFIGure:FREQuency:STOP <freq> [:SENSe] :NFIGure:FREQuency:STOP?
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Mode Setup

Coupling	Disabled and hidden when LO Frequency Mode is SWEPT. Disabled and/or hidden when the frequency mode is Fixed. Coupled to RF and LO frequencies. Grayed out when Frequency Mode is LIST.
Example	FREQ:NFIG:STOP 11 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	3 GHz
State Saved	Saved in instrument state.
Range	2 Hz to 26.5 GHz

IF Fixed Frequency Sets the tuned frequency at the input of the Analyzer. This parameter is only available when External LO Frequency is SWEPT, or Frequency Mode is set to Fixed.

Remote Command	[:SENSe] :NFIGure:MODE:DOWNconv UPConv SYSTem:IF:FREQuency <freq> [:SENSe] :NFIGure:MODE:DOWNconv UPConv SYSTem:IF:FREQuency?
Example	:NFIG:MODE:SYST:IF:FREQ 15 GHz :NFIG:MODE:SYST:IF:FREQ?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	None – only displayed when DUT is a mixing device (Upconverter, downconverter). Default DUT is AMPLifier.
State Saved	Saved in instrument state.
Range	Depends on the frequency range of purchased model.
Min	1 Hz
Max	Depends on the frequency range of purchased model.
Backwards Compatibility SCPI	[:SENSe] :CONFigure:MODE:DOWNconv UPConv SYSTem:IF:FREQuency (NFA)

External LO Configuration

Opens external LO setup menu.

Key Path	Mode Setup
Mode	Noise Figure
Initial S/W Revision	Prior to A.04.00

Source Address

Allows you to input the IP address of the source. To confirm the IP address, select the **Done** softkey. Following the entry on an IP address, `:*IDN?`, `:FREQ? MAX` and `:FREQ? MIN` SCPI commands are sent. The model number of an Agilent source or the first six characters after the first `,` of any other source are displayed as readback text. If a valid (real number) reply is received for MIN and MAX, the Min Frequency and Max Frequency parameters are automatically populated with the appropriate values.

Remote Command	<code>:SYSTem:COMMunicate:LAN:SOURce:EXTernal:IP <string></code> <code>:SYSTem:COMMunicate:LAN:SOURce:EXTernal:IP?</code>
Coupling	This parameter is coupled to the Min Frequency and Max Frequency parameters if the IP address entered is that of a SCPI compliant Signal Source. In this case, the Min and Max Frequency parameters are set according to the results of a <code>FREQ? MIN</code> and <code>FREQ? MAX</code> query.
Restriction and Notes	String entered must correspond to a valid IP address i.e. X.X.X.X where 0 X 255.
Example	<code>SYST:COMM:LAN:SOUR:EXT:IP "192.168.0.1"</code> <code>SYST:COMM:LAN:SOUR:EXT:IP?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, External L.O. Control
Mode	NF
Preset	""
State Saved	Saved in instrument state.
Range	Numeric
Readback Text	The first 6 characters after the first <code>,</code> string of the <code>*IDN?</code> query are shown as readback. For Agilent sources this is the model number.

External LO Control (on/off)

Toggles external LO control via LAN on/off.

Remote Command	<code>[:SENSE] :NFIGure:MODE:LOSCillator:CONTRol [:STATe]</code> <code>ON OFF 1 0</code> <code>[:SENSE] :NFIGure:MODE:LOSCillator:CONTRol [:STATe] ?</code>
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Mode Setup

Example	:NFIG:MODE:LOSC:CONT OFF :NFIG:MODE:LOSC:CONT?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	ON OFF
Backwards Compatibility SCPI	:SYSTem[:NFIGure]:CONFIGure:LOSCillator:CONTrol[:STATe] (NFA/PSA) :SYSTem:CONFIGure:GENerator:CONTrol:STATe

External LO Power Level

Sets the fixed signal generator LO drive level into the frequency converter device.

Remote Command	[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:POWer [:LEVe l] <float> [:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:POWer [:LEVe l] ?
Example	:NFIG:MODE:LOSC:PAR:POW 22.25 dBm :NFIG:MODE:LOSC:PAR:POW?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, DUT Setup, FORM
Mode	NF
Preset	0.00 dBm
State Saved	Saved in instrument state.
Range	-100 dBm to 100 dBm
Backwards Compatibility SCPI	:SYSTem:CONFIGure:LOSCillator:PARAmeter:POWer[:LEVel] (NFA) :SOURce:EXTernal:POWer[:LEVel] (FSP)

Settling Time

Controls the grace period allocated for the LO to settle between issue of commands.

Remote Command	[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:SETTling [:T IME] <float> [:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:SETTling [:T IME] ?
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Example	:NFIG:MODE:LOSC:PAR:SETT 150 ms :NFIG:MODE:LOSC:PAR:SETT?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control
Mode	NF
Preset	100 ms
State Saved	Saved in instrument state.
Range	0 – 1000 ms
Backwards Compatibility SCPI	:SYSTem:CONFigure:LOSCillator:PARameter:SETTling[:TIME]

Multiplier Numerator

This sets the External Local Oscillator frequency multiplier. If an external frequency multiplier is used in conjunction with the External Local Oscillator then the values of the multiplier should be set to the external frequency multiplier's multiplying factor. Alternatively, this value can be used when custom commands are used to drive the External Local Oscillator and the frequency suffix is not 'Hz'. In this case enter the power of ten equivalent to the frequency scaling implied by the suffix. For example: if the suffix is "GHz" then enter 1000000000. The maximum is high in the case where you are using a non-SCPI source whose input is given in GHz. In such a case enter 1E9 here to convert between Hz (the units of the measurement) and GHz (the units of the source). However, if the source is followed by a doubler for high-frequency measurement, the proper conversion factor is 2E9, so enter that value.

Remote Command	[:SENSe] :NFIGure:MODE:LOSCillator:PARameter:MULTiplier: NUMerator <int> [:SENSe] :NFIGure:MODE:LOSCillator:PARameter:MULTiplier: NUMerator?
Example	:NFIG:MODE:LOSC:PAR:MULT:NUM 1000 :NFIG:MODE:LOSC:PAR:MULT:NUMerator?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 – 20000000000
Backwards Compatibility SCPI	:SYSTem:CONFigure:LOSCillator:PARameter:MULTiplier (NFA) :SOURce:EXTernal:FREQuency[:FACTor]:NUMerator (FSP)

Multiplier Denominator

This sets the External Local Oscillator frequency divider value. If an external frequency divider is used

Mode Setup

in conjunction with the External Local Oscillator then the values of the multiplier denominator should be set to the external frequency divider's dividing factor.

Remote Command	<code>[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier: DENominator <int></code> <code>[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:MULTiplier: DENominator?</code>
Example	<code>:NFIG:MODE:LOSC:PAR:MULT:DEN 1000</code> <code>:NFIG:MODE:LOSC:PAR:MULT:DEN?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 – 20000000000
Backwards Compatibility SCPI	<code>:SOURce:EXTernal:FREQuency[:FACTor]:DENominator (FSP)</code>

Command Set

Selects the command set used to control the external LO. Standard SCPI commands are used by default and will work with all Agilent Signal Sources and other SCPI compliant sources. Non SCPI compliant sources may be controlled using custom commands defined by the LO Commands parameter. The custom commands will be stored with the State, but if you do not store the state prior to 'Restore Mode Defaults', then the custom settings will be lost. If you change from using SCPI commands to using custom commands without saving the state of the instrument, the custom commands will be preserved and will be recalled when you move back to custom commands.

Remote Command	<code>[:SENSe] :NFIGure:MODE:LOSCillator:TYPE SCPI CUSTom</code> <code>[:SENSe] :NFIGure:MODE:LOSCillator:TYPE?</code>
Coupling	LO Commands parameter is disabled when set to SCPI.
Example	<code>:NFIG:MODE:LOSC:TYPE CUST</code> <code>:NFIG:MODE:LOSC:TYPE?</code>
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, External LO Control
Mode	NF
Preset	SCPI
State Saved	Saved in instrument state.
Range	SCPI CUSTom

Backwards Compatibility SCPI	:SYSTem:CONFigure:LOSCillator:TYPE
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LO Commands

Allows the commands used to control the external LO to be customized.

Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control
Mode	NF

Power Prefix Specifies a custom command to be used for setting external LO power.

Remote Command	[:SENSe] :NFIGure:MODE:LOSCillator:COMManD:POWer:PREFix <string> [:SENSe] :NFIGure:MODE:LOSCillator:COMManD:POWer:PREFix?
Coupling	Disabled when LO commands set to SCPI. If tried to be changed, then an advisory message will appear Settings conflict; custom LO commands only available when command set is custom." number –221 5505.
Example	:NFIG:MODE:LOSC:COMM:POW:PREF "power" :NFIG:MODE:LOSC:COMM:POW:PREF?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control, LO Commands
Mode	NF
Preset	"POW"
State Saved	Saved in instrument state.
Range	Alphanumeric
Readback Text	Value
Backwards Compatibility SCPI	:SYSTem:CONFigure:LOSCillator:COMManD:POWer:PREFix

Power Suffix Specifies a custom command to be used for setting external LO power units.

Remote Command	[:SENSe] :NFIGure:MODE:LOSCillator:COMManD:POWer:SUFFix <string> [:SENSe] :NFIGure:MODE:LOSCillator:COMManD:POWer:SUFFix?
Coupling	Disabled when LO commands set to SCPI
Example	:NFIG:MODE:LOSC:COMM:POW:SUFF "W" :NFIG:MODE:LOSC:COMM:POW:SUFF?
Initial S/W Revision	Prior to A.04.00

Mode Setup

Key Path	Mode Setup, Ext LO Control, LO Commands
Mode	NF
Preset	"DBM"
State Saved	Saved in instrument state.
Range	Alphanumeric
Readback Text	Value
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:COMMand:POWEr:SUFFix

Frequency Prefix Specifies a custom command to be used for setting external LO frequency.

Remote Command	[:SENSe] :NFIgure:MODE:LOSCillator:COMMand:FREQuency:PREFix <string> [:SENSe] :NFIgure:MODE:LOSCillator:COMMand:FREQuency:PREFix?
Coupling	Disabled when LO commands set to SCPI
Example	:NFIG:MODE:LOSC:COMM:FREQ:PREF "FREQuency" :NFIG:MODE:LOSC:COMM:FREQ:PREF?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control, LO Commands
Mode	NF
Preset	"FREQ"
State Saved	Saved in instrument state.
Range	Alphanumeric
Readback Text	Value
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:COMMand:FREQuency:PREFix

Frequency Suffix Specifies a custom command to be used for setting external LO frequency units.

Remote Command	[:SENSe] :NFIgure:MODE:LOSCillator:COMMand:FREQuency:SUFFix <string> [:SENSe] :NFIgure:MODE:LOSCillator:COMMand:FREQuency:SUFFix?
Coupling	Disabled when LO commands set to SCPI
Example	:NFIG:MODE:LOSC:COMM:FREQ:SUFF "MHz" :NFIG:MODE:LOSC:COMM:FREQ:SUFF?
Initial S/W Revision	Prior to A.04.00

Key Path	Mode Setup, Ext LO Control, LO Commands
Mode	NF
Preset	"Hz"
State Saved	Saved in instrument state.
Range	Alphanumeric
Readback Text	Value
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:COMMand:FREQuency:SUFFix

Auxiliary Specifies a custom command to be used between setting the power and setting the frequency. By default it is used to ensure the RF signal is switched ON. Several commands can be chained together using the standard semicolon. The NFA allows this.

Remote Command	[:SENSE] :NFIgure:MODE:LOSCillator:COMMand:AUXiliary <string> [:SENSE] :NFIgure:MODE:LOSCillator:COMMand:AUXiliary?
Coupling	Disabled when LO commands set to SCPI
Example	:NFIg:MODE:LOSC:COMM:AUX "RF ON" :NFIg:MODE:LOSC:COMM:AUX?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, Ext LO Control, LO Commands
Mode	NF
Preset	"OUTP:STAT ON"
State Saved	Saved in instrument state.
Range	Alphanumeric
Readback Text	Value
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:COMMand:AUXiliary

Min Frequency

Sets the minimum frequency of the external source. Attempting to set the external source less than this will result in an error message and clipping to this value.

Remote Command	[:SENSE] :NFIgure:MODE:LOSCillator:PARAmeter:MINimum [: FREQuency] <freq> [:SENSE] :NFIgure:MODE:LOSCillator:PARAmeter:MINimum [: FREQuency] ?
-----------------------	---

Mode Setup

Coupling	<ol style="list-style-type: none"> 1. Automatically populates when the IP address of a SCPI compliant source is entered into the Source Address parameter. 2. The LO frequency cannot be set to lower than this value.
Example	:NFIG:MODE:LOSC:PAR:MIN 100 kHz :NFIG:MODE:LOSC:PAR:MIN?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, External LO Control
Mode	NF
Preset	10 MHz
State Saved	Saved in instrument state.
Range	1 Hz to 324.999999999 GHz
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:PARAmeter:MINimum[:FREQuency]

Max Frequency

Sets the maximum frequency of the external source. Attempting to set the external source greater than this will result in an error message and clipping to this value.

Remote Command	<pre>[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:MAXimum [:FREQuency] <freq></pre> <pre>[:SENSe] :NFIGure:MODE:LOSCillator:PARAmeter:MAXimum [:FREQuency] ?</pre>
Coupling	<ol style="list-style-type: none"> 1. Automatically populates when the IP address of a SCPI compliant source is entered into the Source Address parameter. 2. The LO frequency cannot be set to higher than this value.
Example	:NFIG:MODE:LOSC:PAR:MAX 100 kHz :NFIG:MODE:LOSC:PAR:MAX?
Initial S/W Revision	Prior to A.04.00
Key Path	Mode Setup, External LO Control
Mode	NF
Preset	10 MHz
State Saved	Saved in instrument state.
Range	2 Hz to 325 GHz
Backwards Compatibility SCPI	:SYSTem:CONFIgure:LOSCillator:PARAmeter:MAXimum[:FREQuency]

Uncertainty Calculator Form

The uncertainty calculator is based largely upon the Java uncertainty calculator that can be found on the

customer-facing website at

<http://www.tm.agilent.com/data/static/eng/tmo/Notes/interactive/an-NFUCal/NFUcalc.html>.

The figure below shows the layout of the uncertainty calculator form.

Noise Source

Noise Source Model: Agilent 346B ENR Uncertainty: 0.20 dB Match *: 1.15000

	DUT	Instrument
Noise Figure:	3.00 dB	6.00 dB
Noise Figure Uncertainty:		0.05 dB
Gain:	20.00 dB	
Gain Uncertainty:		0.17 dB
Input Match *:	1.5000	1.60000
Output Match *:	1.5000	

RSS Noise Figure Uncertainty

0.24 dB

Contributors

$\frac{F12}{F1}$	Noise Source -> DUT Mismatch MXA Noise Figure Meas Uncert	0.1336 dB
$\frac{F2}{F1G1}$	Noise Source -> MXA Mismatch MXA Noise Figure Meas Uncert	0.0030 dB
$\frac{F2-1}{F1G1}$	Noise Source -> DUT Mismatch Noise Source -> MXA Mismatch DUT -> MXA Mismatch MXA Gain Meas Uncert	0.0071 dB
$\frac{F12}{F1} - \frac{F2}{F1G1}$	Noise Source ENR Uncert	0.1990 dB

* May be entered as Return Loss (-xx.x dB), VSWR or Refl Coefficient

Use the Tab key to move through each parameter of the form. Each parameter is highlighted when it is active.

Mode	Noise Figure
Key Path	Mode Setup

Noise Source Model

Selects the noise source model in use and loads the appropriate ENR Uncertainty and Match values into the calculator. Alternatively, a “User Defined” model can be selected and the user can manually enter ENR uncertainty and match values.

Mode Setup

The following noise source models are available for selection:

Model Number	ENR Uncertainty	Match
User Defined	N/A	N/A
Agilent 346A	0.20 dB	1.1500
Agilent 346B	0.20 dB	1.1500
Agilent 346C	0.20 dB	1.2500
Agilent N4000A	0.15 dB	1.1300
Agilent N4001A	0.15 dB	1.2000
Agilent N4002A	0.15 dB	1.2200

Mode	NF
Remote Command	:CALCulate:UNCertainty:SOURce:TYPE USER A346A A346B A346C AN4000A AN4001A AN4002A :CALCulate:UNCertainty:SOURce:TYPE?
Example	:CALC:UNC:SOUR:TYPE A346B :CALC:UNC:SOUR:TYPE?
Dependencies/Couplings	Coupled to the ENR uncertainty and Match fields in the calculator.
Preset	A346B
State Saved	Saved in instrument state.
Range	USER A346A A346B A346C AN4000A AN4001A AN4002A
Key Path	Mode Setup, Uncertainty Calculator, FORM

ENR Uncertainty

Selects the ENR Uncertainty used in the uncertainty calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:SOURce:ENR <value> :CALCulate:UNCertainty:SOURce:ENR?
Example	:CALC:UNC:SOUR:ENR 1.25dB :CALC:UNC:SOUR:ENR?
Dependencies/Couplings	Only enabled when Noise Source Model is set to 'User Defined'
Preset	Noise Source Model Dependent. See Noise Source Model section.above.
State Saved	No
Range	0 dB to 100 dB

Key Path	Mode Setup, Uncertainty Calculator, FORM
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Noise Source Match

Selects the match value used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:SOURce:MATCh <value> :CALCulate:UNCertainty:SOURce:MATCh?
Example	:CALC:UNC:SOUR:MATC 5.55 :CALC:UNC:SOUR:MATC?
Dependencies/Couplings	Only enabled when Noise Source Model is set to 'User Defined'
Preset	Noise Source Model dependent. See Noise Source Model section.above.
State Saved	No
Range	-100 to 100
Key Path	Mode Setup, Uncertainty Calculator, FORM

DUT Noise Figure

Selects the DUT noise figure to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:DUT:NFIGure <value> :CALCulate:UNCertainty:DUT:NFIGure?
Example	:CALC:UNC:DUT:NFIG 25.2dB :CALC:UNC:DUT:NFIG?
Preset	3 dB
State Saved	No
Range	-100 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

Instrument Noise Figure

Selects the instrument noise figure to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:INSTRument:NFIGure <value> :CALCulate:UNCertainty:INSTRument:NFIGure?

Mode Setup

Example	:CALC:UNC:INST:NFIG 25.2dB :CALC:UNC:INST:NFIG?
Preset	9 dB
State Saved	No
Range	-100 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

Instrument Noise Figure Uncertainty

Selects the instrument noise figure uncertainty to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:INSTrument:NFIGure:UNCertainty <value> :CALCulate:UNCertainty:INSTrument:NFIGure:UNCertainty?
Example	:CALC:UNC:INST:NFIG:UNC 25.2dB :CALC:UNC:INST:NFIG:UNC?
Preset	0.05 dB
State Saved	No
Range	0 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

DUT Gain

Selects the DUT gain to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:DUT:GAIN <value> :CALCulate:UNCertainty:DUT:GAIN?
Example	:CALC:UNC:DUT:GAIN 25.2dB :CALC:UNC:DUT:GAIN?
Preset	20 dB
State Saved	No
Range	-100 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

Instrument Gain Uncertainty

Selects the instrument gain uncertainty to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:INSTrument:GAIN <value> :CALCulate:UNCertainty:INSTrument:GAIN?
Example	:CALC:UNC:INST:GAIN 25.2dB :CALC:UNC:INST:GAIN?
Preset	0.15 dB
State Saved	No
Range	0 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

DUT Input Match

Selects the DUT input match to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:DUT:MATCh[:INPut] <value> :CALCulate:UNCertainty:DUT:MATCh[:INPut]?
Example	:CALC:UNC:DUT:MATC 25.5 :CALC:UNC:DUT:MATC?
Preset	1.5
State Saved	No
Range	-100 to 100
Key Path	Mode Setup, Uncertainty Calculator, FORM

Instrument Input Match

Selects the instrument input match to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:INSTrument:MATCh[:INPut] <value> :CALCulate:UNCertainty:INSTrument:MATCh[:INPut]?
Example	:CALC:UNC:INST:MATC 25.5 :CALC:UNC:INST:MATC?
Preset	1.6

Mode Setup

State Saved	No
Range	-100 to 100
Key Path	Mode Setup, Uncertainty Calculator, FORM

DUT Output Match

Selects the DUT output match to be used in the calculator.

Mode	NF
Remote Command	:CALCulate:UNCertainty:DUT:MATCh:OUTPut <value> :CALCulate:UNCertainty:DUT:MATCh:OUTPut?
Example	:CALC:UNC:DUT:MATC:OUTP 25.5 :CALC:UNC:DUT:MATC:OUTP?
Preset	0.24 dB
State Saved	No
Range	-100 to 100
Key Path	Mode Setup, Uncertainty Calculator, FORM

RSS Uncertainty

Returns the RSS Uncertainty value – a simple +/- dB value that can be used to determine the overall uncertainty of the noise figure measurement. This value will be updated whenever any of the other parameters under the :CALCulate:UNCertainty:scpi node change.

This parameter is never editable from the front panel or via SCPI but is auto calculated from the other parameters in the DUT setup form.

Mode	NF
Remote Command	:CALCulate:UNCertainty:RSS?
Example	:CALC:UNC:RSS?
Restriction and Notes	Automatically calculated from other uncertainty calculator values.
Dependencies/Couplings	Always read only – calculated from other uncertainty calculator values.
Remote Command Notes	Read only.
Preset	0.2 dB
State Saved	No
Range	0 dB to 100 dB
Key Path	Mode Setup, Uncertainty Calculator, FORM

Advanced

Accesses advanced features. These features are recommended for use only by advanced users.

Key Path	Mode Setup
Initial S/W Revision	A.06.00

Marker Compatibility

This parameter controls whether you want to ask the current active marker's readout to be two comma separated values or only one marked trace value. This parameter not only takes effect on UI, but also in remote command system. Marker Compatibility value will be automatically stored on the instrument's persistent storage whenever a change is made. This enables the Marker Compatibility value to be reloaded when the instrument powers up. A mode preset or power cycle will not erase the data.

Key Path	Mode Setup, Advanced
Mode	Noise Figure
Remote Command	:CALCulate[:NFIGure]:MARKer:COMPAtible OFF ON 0 1 :CALCulate[:NFIGure]:MARKer:COMPAtible?
Example	CALC:MARK:COMP ON CALC:MARK:COMP?
Notes	This command will affect all the markers in Noise Figure Mode, and it will also affect the marker table view. If this parameter is set to ON, marker table will display all the two traces' values; if this parameter is set to OFF, marker table will only display the marked trace's value
Preset	OFF
State Saved	Saved in instrument state.
Range	On Off
Initial S/W Revision	A.06.00

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 performing a Mode Preset.

Key Path	Mode Setup
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Mode Setup

Peak Search

Accesses Peak Search settings and performs a peak search.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MAXimum
Example	CALC:NFIG:MARK2:MAX
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search
Mode	NF

Next Peak

Moves the selected marker to the peak that has the next highest amplitude that is less than the marker's current value.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MAXimum:NEXT
Example	CALC:NFIG:MARK2:MAX:NEXT
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search
Mode	NF

Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker, which meets all enabled peak criteria.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MAXimum:RIGHT
Example	CALC:NFIG:MARK2:MAX:RIGH
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search
Mode	NF

Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker, which meets all enabled peak criteria.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MAXimum:LEFT
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Peak Search

Example	CALC:NFIG:MARK2:MAX:LEFT
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search
Mode	NF

Marker Delta

Performs the same function as the Delta 1-of-N selection key in the Marker menu. This sets the control mode for the selected marker to Delta mode.

Key Path	Peak Search
Initial S/W Revision	Prior to A.04.00

Peak Criteria

Selects the type of peak search to be performed when the 'Peak Search' front-panel key is pressed. Min performs a Min Search, Max performs a Max Search and PkToPk performs a Pk-Pk Search.

Remote Command	:CALCulate:NFIGure:MARKer:SEARch:TYPE :CALCulate:NFIGure:MARKer:SEARch:TYPE?
Coupling	Performing a PTPeak search will turn a marker's relative marker on if it is currently off.
Example	CALC:NFIG:MARK:SEAR:TYPE MIN
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search, More
Mode	NF
Preset	MAXimum
State Saved	Saved in instrument state.
Range	MINimum MAXimum PTPeak
Backwards Compatibility SCPI	:CALCulate[:NFIGure]:MARKer:SEARch:TYPE

Continuous Peak Search

Sets Continuous Peak Search to On or Off. When Continuous Peak Search is set to On, a peak search is automatically performed for the selected marker after each sweep. The rules for finding the peak are exactly the same as for **Peak Search**, including the peak criteria rules. If no valid peak is found, warning -200.2020 is generated after each sweep. If a valid peak is found, message 0.1400 is displayed

after each sweep.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :CPEak [:STATE] ON OFF 1 0 :CALCulate:NFIGure:MARKer [1] 2 3 4 :CPEak [:STATE] ?
Example	CALC:NFIG:MARK:CPE ON
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search, More
Mode	NF
Preset	OFF
State Saved	Saved in instrument state.
Range	Off On
Backwards Compatibility SCPI	:CALCulate [:NFIGure] :MARKer [1] 2 3 4 :SEARCh:CONTinuous [:STATE]

Pk-Pk Search

Finds and displays the amplitude and frequency differences between the highest and lowest Y-axis value.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :PTPeak
Coupling	This key is not available (key is grayed out) when Coupled Markers is on.
Restriction and Notes	Turns on the Marker Δ active function.
Example	CALC:NFIG:MARK:PTP
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search, More
Mode	NF

Min Search

Moves the selected marker to the minimum y-axis value of the current trace.

Remote Command	:CALCulate:NFIGure:MARKer [1] 2 3 4 :MINimum
Example	CALC:NFIG:MARK:MIN
Initial S/W Revision	Prior to A.04.00
Key Path	Peak Search, More
Mode	NF

Peak Search

Recall

Most Recall functionality is common across multiple Modes and Measurements. The common functions are described in “[Recall](#)” on page 106. Recall functions that are unique to the Noise Figure Measurement Application are described here.

The Recall feature prompts you to answer the questions: What do you want to recall? And to where do you want to recall it? Once these questions are answered the recall can occur. The options in this menu answer the question "What do you want to Recall?" The options are **State**, **Trace** and **Data**. (**Screen Image** can be saved, but not recalled.) The default paths for **Recall** are data type dependent and are the same as for **Save**.

Key Path	Front-panel key
Remote Command Notes	No remote command directly controls the Recall Type that this key controls. The Recall type is a node in the :MMEM:LOAD command. An example is :MMEM:LOAD:STATe <filename>.
Initial S/W Revision	Prior to A.04.00

Data

Opens the menu where you can select the type of data you would like to import.

Key Path	Recall
Initial S/W Revision	Prior to A.04.00

Limits

This option sets the import file type to Limits and determines which limit the data is to be recalled to..

Remote Command	:MMEMory:LOAD:LIMit LLINE1 LLINE2 LLINE3 LLINE4 , <file_name>
Example	:MMEM:LOAD:LIM LLINE1, "C:\Limit1.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Recall, Data
Mode	NF

ENR Table

This option sets the import file type to ENR Meas Table or to ENR Cal Table.

Remote Command	:MMEMory: LOAD:ENR MEASurements CALibration, <file_name>
-----------------------	--

Recall

Remote Command Notes	:MMEMory: LOAD:ENR MEASurements,<file_name> used to Recall ENR Meas Table :MMEMory: LOAD:ENR CALibration,<file_name> used to Recall ENR Cal Table
Example	:MMEM: LOAD:ENR MEAS,"C:\ENRTable.csv" :MMEM: LOAD:ENR CAL,"C:\CalTable.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Recall, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:LOAD:ENR

Loss Comp

This option sets the import file type to Loss Compensation Before DUT Table or to Loss Compensation After DUT Table.

Remote Command	:MMEMory: LOAD:LOSS BEFore AFTer, <file_name>
Example	:MMEM: LOAD:LOSS BEF,"C:\LossBefore.csv" :MMEM: LOAD:LOSS AFT,"C:\LossAfter.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Recall, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:LOAD:LOSS

FreqList

This option sets the import file type to Frequency List. When a frequency list is imported, the frequency list is populated and the context is set to the stored values. If the Frequency List file does not contain a context, the frequency context parameter is not changed.

Remote Command	:MMEMory: LOAD:FREquency <file_name>
Example	:MMEM:LOAD:FREQ "C:\FrequencyList.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Recall, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:LOAD:FREquency

Open...

Opens a file open dialogue box where you can select the file you wish to import.

Key Path	Recall, Data
Initial S/W Revision	Prior to A.04.00

Recall

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

Key Path:	Front panel key
Remote Command:	:INITiate[:IMMEDIATE] :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

Most Save functionality is common across multiple Modes. The common functions are described in [“Recall” on page 106](#). Save functions that are unique to the Noise Figure Measurement Application are described here.

The Save feature prompts you to answer the questions: What do you want to save? And where do you want to save it? Once these questions are answered the save can occur.

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.

Mode	All
Key Path	Front-panel key
Remote Command Notes	No remote command for this key specifically.
Initial S/W Revision	Prior to A.04.00

Data

Opens the menu where you can select the type of data you would like to export.

Key Path	Save
Initial S/W Revision	Prior to A.04.00

Export Limits

This option selects the Limit Line values to be exported for external viewing/editing or recall at a later date.

Remote Command	:MMEMory:STORe:LIMit LLINE1 LLINE2 LLINE3 LLINE4 , <file_name>
Restriction and Notes	Limit specified must contain data otherwise error –250.3007 will be displayed
Example	MMEM:STOR:LIM LLINE2, "C:\Limit2.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Save, Data
Mode	NF

Export Meas Results

Results are exported in .csv format. See the [“List of Parameters” on page 486](#) which are saved as part of

Save

the measurement results.

Remote Command	:MMEMory:STORe:RESults <file_name>
Example	:MMEM:STORe:RESults "C:\MeasResults.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Save, Data
Mode	NF

List of Parameters Parameters appended with '*' are only saved when applicable to the current measurement. The result data is split into six sections as follows:

General Information:

- Application Name
- Measurement Name
- Date
- Time

DUT Setup Parameters:

- DUT Type
- System Downconverter Status*
- Side Band*

External LO Parameters*:

- Ext LO Control State*
- Ext LO Fixed Frequency*
- Ext LO Power*
- Ext LO Start Frequency*
- Ext LO Stop Frequency*
- LO Frequency Mode*
- Multiplier Demoninator*
- Multiplier Numerator*
- Noise Spurce Settling Time*
- Source Address*

Measurement Parameters:

- Average State
- Cal Tcold

- ENR Mode
- Ext LO Start Frequency
- Ext LO Stop Frequency
- Frequency Context*
- Frequency Mode
- Internal Preamp State
- Meas Tcold
- Number of Averages
- Resolution Bandwidth
- Spot State
- Spot ENR
- Spot Thot
- Sweep Points

Corrected Measurement Results*:

Measurement results after calibration data has been accounted for at each frequency point. Column headers are RF Frequency (Hz), IF Frequency (Hz), LO Frequency (Hz)**, Noise Figure (dB), Noise Factor (lin), Gain (dB), Effective Temperature (K), Phot (dB), Pcold (dB), T cold (K).

** Only reported when Freq Context = LO

Uncorrected Measurement Results:

Measurement results before calibration data has been accounted for at each frequency point. Column headers as above, with the exception of Gain. Uncorrected results will report Y Factor 9 (dB) in place of Gain.

Export ENR Data

This option selects :

- the current ENR Meas Table values to be exported for external viewing/editing or recall at a later date

or

- the current ENR Calibration Table values to be exported for external viewing/editing or recall at a later date.

Remote Command	:MMEMory: STORE:ENR MEASurements CALibration,<file_name>
Restriction and Notes	Meas/Cal Table must contain data otherwise error -250.3007 will be displayed

Save

Remote Command Notes	:MMEMory: STORE:ENR MEASurements,<file_name> to Exporting ENR Meas Table :MMEMory: STORE:ENR CALibration,<file_name> used to Export ENR Cal Table
Example	:MMEM:STORE:ENR MEAS,"C:\ENRTable.csv" :MMEM:STORE:ENR CAL,"C:\CalTable.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Save, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:STORE:ENR

Export Loss Comp

This option selects:

- the current Loss Compensation Before DUT values to be exported for external viewing/editing or recall at a later date

or

- the current Loss Compensation After DUT values to be exported for external viewing/editing or recall at a later date.

Remote Command	:MMEMory: STORE:LOSS BEFore AFTer,<file_name>
Restriction and Notes	Loss Comp Before/After DUT Table must contain data otherwise error -250.3007 will be displayed.
Remote Command Notes	:MMEMory: STORE:LOSS BEFore,<file_name> used to export Loss Comp Before DUT :MMEMory: STORE:LOSS AFTer,<file_name> used to export Loss Comp After DUT
Example	:MMEM: STOR:LOSS BEF,"C:\LossBefore.csv" :MMEM: STOR:LOSS AFT,"C:\LossAfter.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Save, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:STORE:LOSS

Export Frequency List

This option selects the current Frequency List values and current frequency context to be exported for external viewing/editing or recall at a later date.

Remote Command	:MMEMory: STORE:FREQuency <file_name>
-----------------------	---------------------------------------

Restriction and Notes	Frequency List Table must contain data otherwise error –250.3007 will be displayed.
Example	:MMEM:STOR:FREQ "C:\FrequencyList.csv"
Initial S/W Revision	Prior to A.04.00
Key Path	Save, Data, More
Mode	NF
Backwards Compatibility SCPI	:MMEMory:STORe:FREQuency

Save As...

Opens a dialogue box that enables you to select the file you wish to save.

Key Path	Save, Data
Initial S/W Revision	Prior to A.04.00

Save

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing **Single** does a Resume.

Key Path:	Front panel key
Example:	:INIT:CONT OFF
Notes:	See Cont key description.
Backwards Compatibility Notes:	<p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including Max Hold and Min Hold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p>
Initial S/W Revision:	Prior to A.02.00

Single (Single Measurement/Sweep)

Source

If you wish to make manual Noise Figure measurements, switch to Spectrum Analyzer Mode and select the Noise Source softkey located under Meas Setup in the Swept SA Measurement.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Source

SPAN X Scale

The Span key activates the Span function and displays the menu of span functions.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Span

Sets the displayed frequency range symmetrically about the center frequency.

Remote Command	[:SENSe] :NFIGure:FREQuency:SPAN <freq> [:SENSe] :NFIGure:FREQuency:SPAN?
Coupling	This allows you to set the span at which the measurement sweeps. Active only when freq mode is set to Swept. Coupled to Start Freq, stop freq and center freq.
Example	FREQ:SPAN 10 MHz
Initial S/W Revision	Prior to A.04.00
Key Path	Span
Mode	NF
Preset	2.99GHz
State Saved	Saved in instrument state.
Range	-325 GHz to 325 GHz
Min	10 kHz
Max	There are a few conditions the max will be 325 GHz less the min span of 10 Hz. When DUT is an Amplifier with System Downconverter 'On' and the frequency context is set to "RF DUT Input" When DUT is a Downconverter and the frequency context is set to "RF DUT Input"
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:FREQuency:SPAN

SPAN X Scale

Sweep/Control

Accesses the functions to control the sweep.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Avg Time/Point Auto/Man

Avg Time/Pt is the measurement duration for each of the two states (noise source on and noise source off) that occur at each frequency point. Therefore, for one result trace, the time required will change by 2 times the number of frequency points times the change in the Avg Time/Pt.

Longer settings of Avg Time/Pt reduce the variance of the results, but slow the throughput. The Auto setting sets Avg Time/Pt according to this formula:

$$\text{Avg Time/Pt} = 64 \text{ ks} / \text{RBW}$$

The default RBW is 4 MHz so the Avg Time/Pt default is 16 ms. At this sweep time, the variance of the trace point results under best-case circumstances (high DUT output noise levels) is such that 95% of all results will have an error due to this variance that is similar to the Instrument Uncertainty for Noise Figure. Therefore, the overall uncertainties do not improve much for longer averaging times. Averaging times much shorter than 16 ms will cause the throughput to be dominated by overheads of computation and settling. Thus, the default is often a good tradeoff between speed and variance.

One use of shorter settings of Avg Time/Pt is for testing DUTs that operate in a pulsed mode.

Avg Time/Pt is one way to reduce variance. Another is setting the "Avg Num" parameter in the Meas Setup menu. When averaging traces with the Avg Num set higher than one, the time to achieve a given variance is longer because the overhead time at each point is experienced during each sweep, thus increasing Avg Time/Pt is more efficient. But a shorter Avg Time/Pt with a higher Avg Num gives more interactive results, with an earlier first view of the results.

This trade-off between AvgTime/Pt and Avg Num is analogous to the trade-off between "point" and "sweep" averaging modes in the Agilent NFA.

Remote Command	<pre>[:SENSe] :NFIGure :SWEep :TIME <time> [:SENSe] :NFIGure :SWEep :TIME? [:SENSe] :NFIGure :SWEep :TIME :AUTO ON OFF 1 0 [:SENSe] :NFIGure :SWEep :TIME :AUTO?</pre>
Example	<pre>NFIG:SWE:TIME 64 ms :NFIG:SWE:TIME:AUTO OFF</pre>
Initial S/W Revision	Prior to A.04.00

Sweep/Control

Key Path	Sweep
Mode	Noise figure
Preset	16 ms ON
State Saved	Saved in instrument state.
Min	1 us
Max	6 ks
Backwards Compatibility SCPI	[:SENSe]:SWEep:TIME

Points

Sets the number of frequency points that will be used when Freq Mode (FREQ Channel menu) is set to 'Swept'. The frequency points are distributed evenly between the Start and Stop Frequencies (see section [“Frequency \(FREQ\) Channel” on page 255](#)).

Remote Command	[:SENSe]:NFIGure:SWEep:POINts <integer> [:SENSe]:NFIGure:SWEep:POINts?
Coupling	Coupled to max value of Position parameter (under View/Display key)
Example	SWE:POIN 201
Initial S/W Revision	Prior to A.04.00
Key Path	Frequency
Mode	NF
Preset	11
State Saved	Saved in instrument state.
Min	2
Max	501
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:SWEep:POINts

Trace/Detector

Opens a menu that enables you to set the parameters for Trace and Detector.

Initial S/W Revision	Prior to A.04.00
Key Path	Trace/Detector
Mode	NF

Select Trace (frontpanel only)

This key select which trace other parameters under the Trace/Detector menu will apply to.

Coupling	Coupled to 'Next Window' key in Split Graph view.
Remote Command Notes	No SCPI. Front panel only.
Initial S/W Revision	Prior to A.04.00
Key Path	Trace/Detector
Mode	NF
Preset	1
State Saved	Saved in instrument state.
Range	1 2

Select Readout (Meter View with N9069A/W9069A-AFP)

This key select which trace other parameters under the Trace/Detector menu will apply to.

Key Path	Trace/Detector
Mode	NF
Remote Command Notes	No SCPI. Front panel only.
Preset	1
State Saved	Saved in instrument state.
Range	1 2
Initial S/W Revision	Prior to A.04.00
Modified at SW Revision	A.10.01
Coupling	Coupled to 'Next Window' key in Split Graph view. If the current view is "Meter", the Softkey Label will be changed to "Select Readout"

Trace/Detector

Data (Result Type)

Sets the selected result to be displayed on the Selected Trace, or in the corresponding column in the table or meter views.

The result can be one of:

NFIGure – Noise Figure

NFACTOR – Noise Factor (Linear Noise Figure)

GAIN – Gain

YFACTOR – Y-Factor

TEFFECTive – Effective Temperature

PHOT – Hot Power Density

PCOLD – Cold Power Density

After a preset Trace 1 defaults to Noise Figure and Trace 2 defaults to Gain.

Remote Command	:DISPlay:NFIGure:DATA:TRACe [1] 2 NFIGure NFACTOR GAIN YFACTOR TEFFECTive PHOT PCOLD :DISPlay:NFIGure:DATA:TRACe [1] 2?
Example	:DISP:NFIG:DATA:TRAC1 NFIG
Initial S/W Revision	Prior to A.04.00
Key Path	Trace/Detector
Mode	NF
Preset	NFIGure for Trace 1 and Gain for Trace 2
State Saved	Saved in instrument state.
Range	NFIGure NFACTOR GAIN YFACTOR TEFFECTive PHOT PCOLD
Backwards Compatibility SCPI	:DISPlay[:NFIGure]:DATA:TRACe[1] 2[:RESult]

View/Blank

This key lets you set the state of the two trace variables, Update and Display. The four choices available in this 1-of-N menu are:

- Trace On: Update and Display both On
- View: Update Off and Display On
- Blank: Update Off and Display Off
- Background: Update On, Display Off (this allows a trace to be blanked and continue to update “in the background”)

A trace with Display Off is indicated by a strikethrough thru the type letter in the trace annotation panel

in the Measurement bar. A trace with Update Off is indicated by dimming the type letter in the trace annotation panel in the Measurement bar. So in the example below, Traces 3, 4, 5 and 6 have Update Off and Traces 4 and 6 have Display Off.

TRACE	1 2 3 4 5 6
TYPE	W W M A m W
DET	N f P S p N

See “Trace Update State On/Off” on page 502.

See “Trace Display State On/Off” on page 502.

See “More Information” on page 502.

Dependencies/Couplings	<p>Selecting a trace type (Clear Write, Trace Average, Max Hold, Min Hold) for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in Trace On (Update On and Display On), even if that trace type was already selected.</p> <p>Selecting a detector for a trace (pressing the key or sending a [:SENS]:DET:TRAC command) puts the trace in Trace On (Update On and Display On), even if that detector was already selected.</p> <p>Selecting a math mode other than Off for a trace (pressing the key or sending the equivalent SCPI command) puts the trace in Trace On (Update On and Display On), even if that math mode was already selected.</p> <p>Loading a trace from a file puts that trace in View regardless of the state it was in when it was saved; as does being the target of a Copy or a participant in an Exchange.</p>
Key Path	Trace/Detector
Instrument S/W Revision	Prior to A.02.00

Trace Update State On/Off

Remote Command:	:TRACe [1] 2 3 4 5 6 :UPDate [:STATe] ON OFF 0 1 :TRACe [1] 2 3 4 5 6 :UPDate [:STATe] ?
Example:	TRAC2:UPD 0 Makes trace 2 inactive (stops updating)
Dependencies/Couplings:	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset:	1 0 0 0 0 0 (On for Trace 1; Off for 2–6)
State Saved:	Saved in Instrument State
Key Path:	Trace/Detector
Instrument S/W Revision:	Prior to A.02.00

Trace Display State On/Off

Remote Command:	:TRACe [1] 2 3 4 5 6 :DISPlay [:STATe] ON OFF 0 1 :TRACe [1] 2 3 4 5 6 :DISPlay [:STATe] ?
Example:	TRAC2:DISP,1 Makes trace 2 visible TRAC3:DISP,0 Blanks trace 3
Dependencies/Couplings:	Whenever you set Update to On for any trace, the Display is set to On for that trace.
Preset:	1 0 0 0 0 0 (On for Trace 1; Off for 2–6)
State Saved:	Saved in Instrument State
Key Path:	Trace/Detector
Instrument S/W Revision:	Prior to A.02.00

More Information

When a trace becomes inactive, the following things happen:

Any update from the SENSE system (detectors) immediately stops (does not wait for end of sweep)

The trace is displayed at half intensity (as long as it stays inactive)

Inactive traces display across the entire X Axis of the instrument. Their horizontal placement does not change even if X Axis settings subsequently are changed, although Y-axis settings will affect the vertical placement of data.

In most cases, inactive traces are static and unchanging; however, there are cases when an inactive trace will update, specifically:

- if data is written to that trace from remote
- if trace data is loaded from mass storage

- if the trace is the target of a Copy or participant in an Exchange
- if the trace is cleared using the Clear Trace function (below)

When a trace becomes active (Update=On), the trace is cleared, the average count is reset, and a new sweep is initiated.

Traces which are blanked (Display=off) do not display nor appear on printouts but are otherwise unaffected. They may be queried and markers may be placed on them.

Note that the action of putting a trace in Display=Off and/or Update=Off does not restart the sweep and does not restart Averaging or Hold functions for any traces.

Note also that whenever you set **Update** to **On** for any trace, **Display** is set to **On** for that trace.

All Traces On

This new key allows the user to set the NF measurement going again, without having the pain of having to select each trace and set to "Trace On".

Remote Command	:TRACe:NFIGure:WRITe:ALL
Remote Command Notes	Immediate action. : New command Immediate Action, Set only.
Example	:TRAC:NFIG:WRITE:ALL
Initial S/W Revision	Prior to A.04.00
Key Path	Sweep/Control
Mode	NF

Detector

This softkey is grayed out in Noise Figure Mode. This is a query only SCPI command.

Remote Command	[:SENSe] :NFIGure:DETEctor [:FUNction] AVERAge [:SENSe] :NFIGure:DETEctor [:FUNction] ?
Restriction and Notes	Can only be set to AVERAge. Command (not query) provided for BWCC.
Remote Command Notes	Query Only
Example	:NFIG:DET AVER :NFIG:DET?
Initial S/W Revision	Prior to A.04.00
Key Path	Trace/Det
Mode	NF
Preset	AVERAge
State Saved	Saved in instrument state.

Trace/Detector

Range	AVERAge
Backwards Compatibility SCPI	[:SENSe][:NFIGure]:DETEctor[:FUNction]

Trigger

No trigger functionality is supported in the Noise Figure measurement. Pressing this hardkey will display a blank Trigger menu.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Trigger

View/Display

Accesses a menu of functions that enable you to control the measurement views and instrument display.

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

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

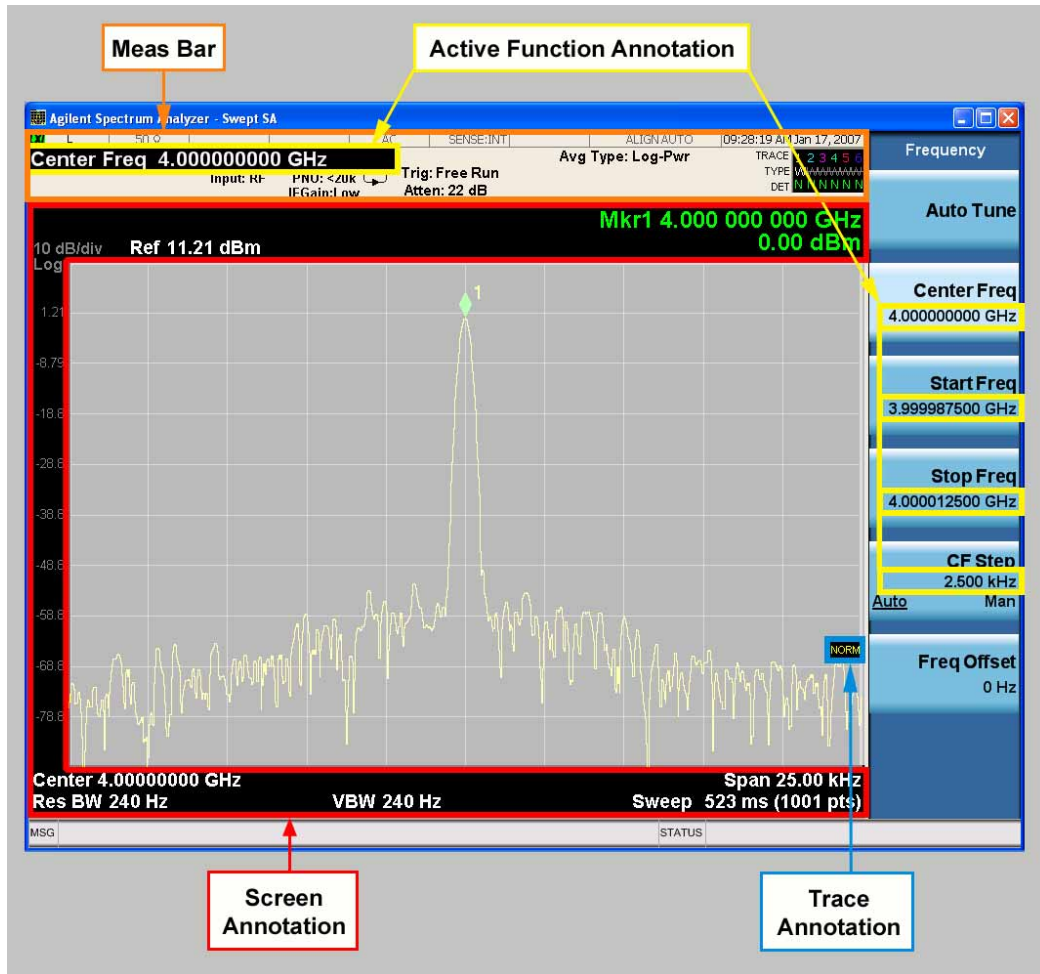
Annotation

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.
3. **Trace annotation:** these are the labels on the traces, showing their detector (or their math mode).
4. **Active Function annotation:** this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

View/Display



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.

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.
Key Path:	View/Display, Display, Annotation
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.

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.
Key Path:	View/Display, Display, Annotation
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.

Remote Command:	:DISPlay:ANNotation:TRACe[:STATe] ON OFF 1 0 :DISPlay:ANNotation:TRACe[:STATe] ?
Example:	DISP:ANN:TRAC OFF
Preset:	Off
State Saved:	Saved in instrument state.
Key Path:	View/Display, Display, Annotation
Initial S/W Revision:	Prior to A.02.00

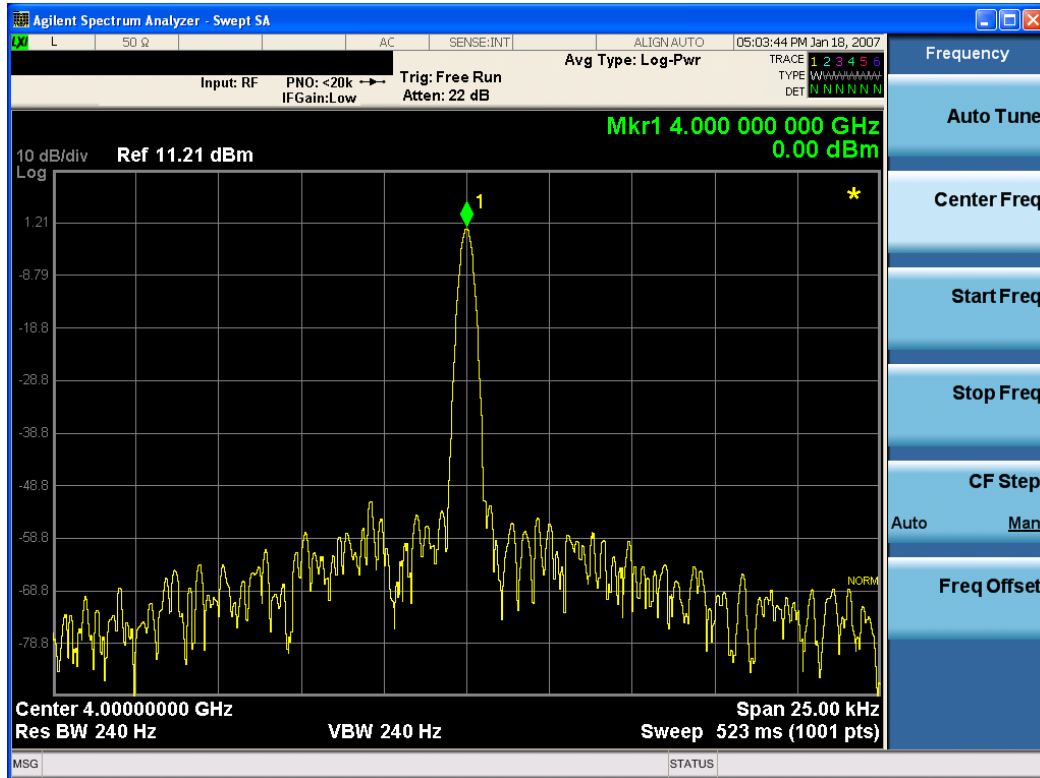
Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values

View/Display

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..



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.
Key Path:	View/Display, Display, Annotation
Initial S/W Revision:	Prior to A.02.00

Title

Displays menu keys that enable you to change or clear a title on your display.

Key Path	View/Display, Display
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Initial S/W Revision	Prior to A.02.00
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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.

Remote Command	:DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA?
Example	DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title
Initial S/W Revision	Prior to A.02.00
Key Path	View/Display, Display, Title
Mode	All
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.

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is

View/Display

cleared, the current Measurement Name replaces it in the title bar.

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.
Key Path:	View/Display, Display, Title
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.

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
Key Path:	View/Display, Display
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.

Remote Command:	:DISPlay:WINDow[1]:TRACe:Y:DLINe <ampl> :DISPlay:WINDow[1]:TRACe:Y:DLINe? :DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:Y:DLINe:STATe?
Example:	DISP:WIND:TRAC:Y:DLIN:STAT ON DISP:WIND:TRAC:Y:DLIN:STAT -32 dBm
Preset:	Set the Display Line to Off and -25 dBm on Preset. When the Display Line goes from Off to On, if it is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was. The Display Line's value does not change when it is turned off.
State Saved:	Saved in instrument state.
Min:	-∞ (minus infinity) in current units
Max:	+∞ (plus infinity) in current units
Key Path:	View/Display, Display
Default Unit:	Depends on the current selected Y axis unit
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.

Remote Command:	:DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]?
Example:	:DISP:WIND:ANN OFF

View/Display

Preset:	On (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	View/Display, Display, System Display Settings
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.

Remote Command:	:DISPlay:THEME TDColor TDMonochrome FCOLor FMONochrome :DISPlay:THEMe?
Preset:	TDColor (Set by Restore Misc Defaults)
State Saved:	Not saved in instrument state.
Key Path:	View/Display, Display, System Display Settings
Notes:	TDColor – 3D is the standard color theme with filling and shading TDMonochrome – is similar to 3D color, but only black is used FCOLor – flat color is intended for inkjet printers to conserve ink. It uses a white background instead of black. FMONochrome – is like flat color, but only black is used
Example:	DISP:THEM TDM sets the display theme to 3D Monochrome.
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.

Remote Command:	:DISPlay:BACKlight ON OFF :DISPlay:BACKlight?
Preset:	ON (Set by Restore Misc Defaults)
Key Path:	View/Display, Display, System Display Settings
Initial S/W Revision:	Prior to A.02.00

On

Turns the display backlight on.

Example:	DISP:BACK ON
Key Path:	View/Display, Display, System Display Settings, Backlight
Readback:	On
Initial S/W Revision:	Prior to A.02.00

Off

Turns the display backlight off.

Example:	DISP:BACK OFF
Key Path:	View/Display, Display, System Display Settings, Backlight
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.

Remote Command:	:DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity?
Example:	DISP:BACK:INT 50
Preset:	100 (Set by Restore Misc Defaults)
Min:	0
Max:	100
Key Path:	View/Display, Display, System Display Settings
Initial S/W Revision:	Prior to A.02.00

Layout

Layout selects the format in which the measurement results should be displayed on screen. Results can be displayed in Graph, Table or Meter form. Auto option will make the layout coupled with Freq Mode.

Key Path	View
Mode	NF
Remote Command	:DISPlay:NFIGure:FORMat GRAPH TABLE METer :DISPlay:NFIGure:FORMat?

View/Display

Example	:DISP:NFIG:FORM GRAP
Preset	GRAPh
State Saved	Saved in instrument state.
Range	GRAPh TABLE METer
Backwards Compatibility SCPI	:DISPlay[:NFIGure]:FORMat
Initial S/W Revision	Prior to A.04.00
Modified at SW Revision	A.10.01
Coupling	The Auto rules would select Graph when the Freq Mode is swept; use Table when Freq Mode is List and use Meter when Freq Mode is Fixed. If customer change the layout selection manually, the Auto selection will become Man, and there will be no coupling between Freq Mode and Layout anymore

Auto

Sets the Layout to Auto which will align the layout selection with the Freq Mode switch.

Key Path	View/Display Layout
Mode	NF
Remote Command	:DISPlay:NFIGure:FORMat:AUTO ON OFF 1 0 :DISPlay:NFIGure:FORMat:AUTO?
Example	DISP:NFIG:FORM:AUTO ON DISP:NFIG:FORM:AUTO?
Couplings	The Auto rules would select Graph when the Freq Mode is swept; use Table when Freq Mode is List and use Meter when Freq Mode is Fixed. If customer change the layout selection manually, the Auto selection will become Man, and there will be no couples between Freq Mode and Layout anymore
Preset	ON
State Saved	Saved in instrument state.
Initial S/W Revision	A.10.01

Graph View

Graph View (Split)

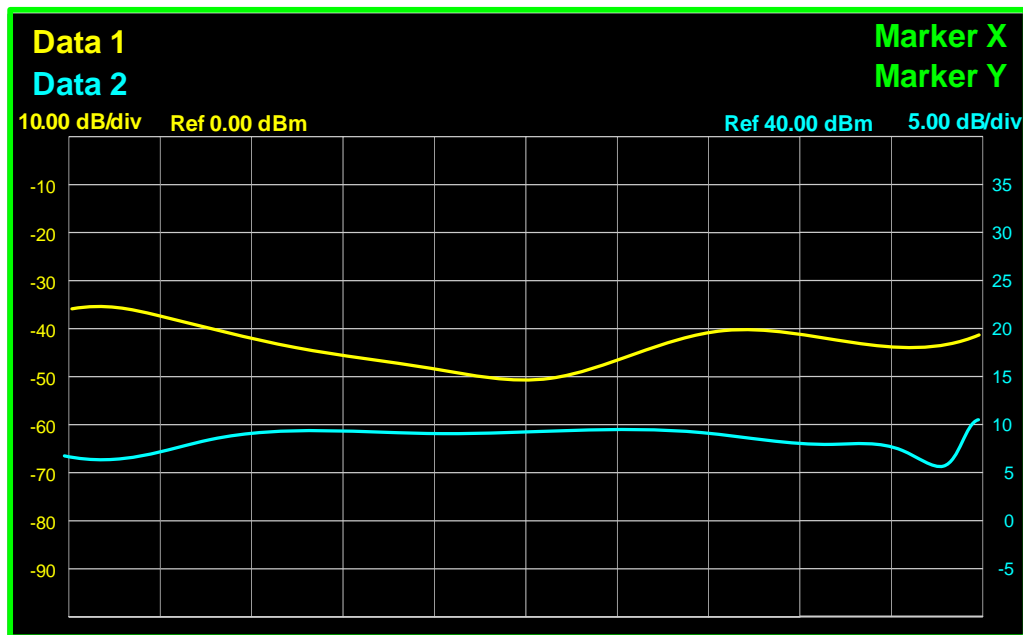
This view draws the 'Data1 and 'Data2 results on two graphs in window 1 (top) and window 2 (bottom) respectively. A caret (^) is displayed below each trace at the position of the current measurement when the total sweep time exceeds 300 ms (total sweep time = avg sweep time per point * number of points).

In Graph View mode, "Data 1" and "Data 2" will show the current result type.

Graph View (Overlaid Traces)

This view draws both results as two traces on the same graph with two sets of Y-axis notation. This view

can be useful for printing both results together on a bigger graph. A caret (^) is displayed below each trace at the position of the current measurement.



In Overlaid Traces view mode, "Data 1" and "Data 2" will show the current result type. All annotation in yellow refers to Trace 1 (displaying Data1) and all annotation in blue refers to Trace 2 (displaying Data2)

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Table View

The table view shows discrete results for each frequency point in a tabular form. The 'Data 1' and 'Data 2' headings show the data types selected and the data within the table shows the results for each data type at the given frequency point. All values will be displayed according to their defined 'Display Format' (see appropriate SCPI table).

Frequency	Data 1	Data 2
Freq 1	Data1 1	Data2 1
Freq 2	Data1 2	Data2 2
Freq 3	Data1 3	Data2 3
Freq 4	Data1 4	Data2 4
Freq 5	Data1 5	Data2 5
Freq 6	Data1 6	Data2 6
Freq 7	Data1 7	Data2 7
Freq 8	Data1 8	Data2 8
Freq 9	Data1 9	Data2 9
Freq 10	Data1 10	Data2 10
Freq 11	Data1 11	Data2 11
Freq 12	Data1 12	Data2 12
Freq 13	Data1 13	Data2 13

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Meter View (without N9069A/W9069A-AFP)

The Meter view shows the 'Data1 and 'Data2' results in a large font for one frequency point. The results are updated for each frequency in turn as they are measured. The 'Data 1' and 'Data 2' headings show the data type and the 'Data1' and 'Data2' fields show the results for each data type at the frequency point shown in the 'Freq' field. All values will be displayed according to their defined 'Display Format' (see appropriate SCPI table).



Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Meter View (with N9069A/W9069A-AFP)

- The metric window shows the ‘Data1 and ‘Data2’ results in a large font for one frequency point. The results are updated for each frequency in turn as they are measured. The ‘Data 1’ and ‘Data 2’ headings show the data type and the ‘Data1’ and ‘Data2’ fields show the results for each data type at the frequency point shown in the ‘Freq’ field. Note, only the latest measured Data1 and Data2 values will be displayed on the screen.
- The graphic window will contain two graphs, strip chart and bar graph, the displayed data is always Noise Figure, regardless of the selection of the two elements in the textual display, and both of the graphs will use the same Y-Axis Scale settings. Note, there is no horizontal scale in Strip chart, the displayed points will always be 61.
- We will get 4 readouts on the strip chart’s top area, they are “Max NF”, “Avg NF”, “Max-to-Min” and “Min NF”. No marker will be provided in strip chart. All readouts will be only one line, with 0.001dB resolution, like “Max NF: 12.300 dB”
- The bar chart will draw a black line at the minimum level, and with two hollow yellow triangle indicator on the both sides. On the top of this bar, the min value of Noise Figure will be displayed, it can help customer to get the min value directly
- Trace/Detector menu, first key’s text “Select Trace” will be changed to “Select Readout” if the current view layout is Meter View. And all “View/Blank” settings only take effect for Readout Results, not affect the strip chat and bar graph.

View/Display

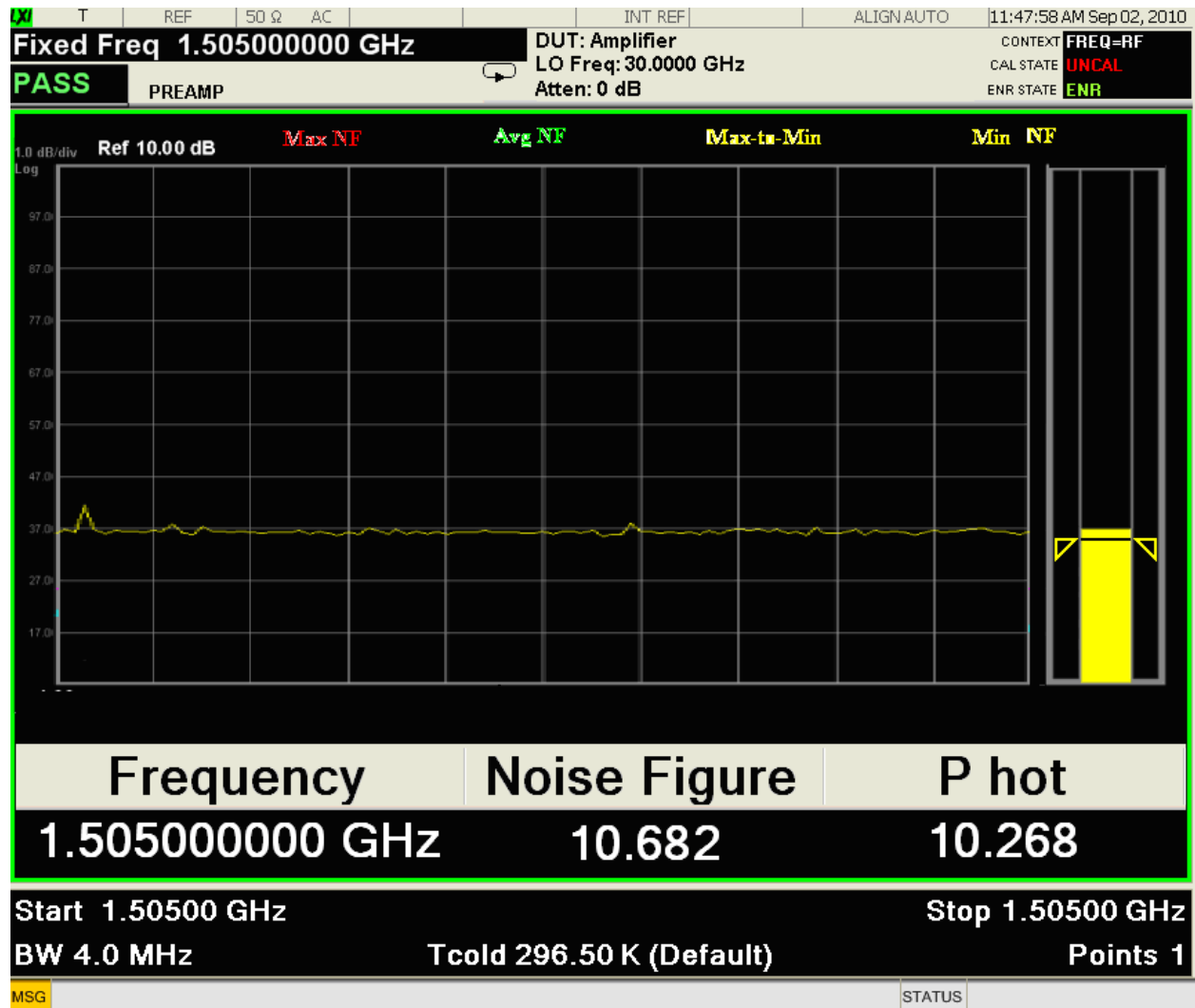


Figure 3 Meter View

Key Path	Front-Panel
Initial S/W Revision	Prior to A.04.00

Table Position

This function sets the view position in the current measurement. This has different visual effects for each Meas View.

In Graph View (Overlaid Traces or Split), this parameter has no effect.

In Table View, this parameter controls the selected row in the table. If the selected row is not currently displayed on-screen, the table will automatically scroll so that the selected row is centered.

In Meter View, this parameter controls the frequency point and corresponding results currently shown on

the meter display.

Coupling	Max value coupled to Frequency Points parameter (under FREQ Channel key)
Initial S/W Revision	Prior to A.04.00
Key Path	View/Display
Mode	NF
Preset	1
State Saved	No
Range	1 – #Frequency Points

Overlaid Traces Graph

Toggles Overlaid Traces On/Off. This switches between the Split graph view and Overlaid Traces graph view. This is available when the Layout parameter is set to GRAPh.

If Overlay Trace is ON, it will have the current two traces on the screen, yellow one will represent trace 1 and blue one will represent trace 2. Each trace will have its own data type name on the right side of the trace, two sets of graph annotation use the same color as its trace.

Key Path	View, Layout
Mode	NF
Remote Command	:DISPlay:NFIGure:TRACe:COMBined[:STATe] ON OFF 1 0 :DISPlay:NFIGure:TRACe:COMBined[:STATe] ?
Example	:DISP:NFIG:TRAC:COMB:STAT ON
Preset	OFF
State Saved	Saved in instrument state.
Range	ON OFF 1 0
Backwards Compatibility SCPI	:DISPlay[:NFIGure]:TRACe:COMBined[:STATe]
Initial S/W Revision	A.06.00
Coupling	Only enabled when Meas View selected is Graph.