Noise Figure Analyzers
NFA Series

Programmer's Reference

Manufacturing Part Number: N8972-90081

May 2001

Safety Notices

The information contained in this document is subject to change without notice.

Agilent Technologies makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

WARNING

***Warning* denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION

Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

NOTE

Note calls out special information for the user's attention. It provides operational information or additional instructions of which the user should be aware.

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of three years from date of shipment. During the warranty period, Agilent Technologies Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. AGILENT TECHNOLOGIES SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. AGILENT TECHNOLOGIES SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Where to Find the Latest Information

Documentation is updated periodically. For the latest information about Agilent Noise Figure Analyzers, including firmware upgrades and application information, please visit the following Internet URL:

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

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

1 Programming Fundamentals

This chapter serves as a reminder of SCPI (Standard Commands for Programmable Instruments) fundamentals to those who have previous experience in programming SCPI. Note that this chapter is not intended to teach you everything about the SCPI programming language.

The SCPI Consortium or IEEE can provide detailed information on the subject of SCPI programming. Refer to IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*. New York, NY, 1987, or to IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. New York, NY, 1992.

Topics included in this chapter are:

NOTE The commands in this chapter are used for the purpose of illustrating certain key concepts related to SCPI and may not be available on your particular instrument.

Creating Valid Commands

Commands are not case sensitive and there are often many different ways of writing a particular command. These are examples of valid commands for a given command syntax:

Command Syntax	Sample Valid Commands
`[:SENSe]:BANDwidth[:RESolution] <freq>`	• `:Sense:Band:Res 1700` • `:BANDWIDTH:RESOLUTION 1.7e3` • `:sens:band 1.7KHZ` • `:SENS:band 1.7E3Hz` • `:band 1.7kHz` • `:bandwidth:RES 1.7e3Hz`
`[:SENSe]:CORRection:ENR:MODE TABLe|SPOT`	• `CORR:ENR:MODE TABL` • `:SENSe:CORRection:ENR:MODE TABLe`
`:INITiate:CONTinuous OFF|ON|0|1`	• `:INIT:CONT ON` • `:init:continuous 1`

Command Notation Syntax

A typical command is made up of keywords separated by colons. The keywords are followed by parameters that can be followed by optional units.

Example: **DISPlay:ANNotation:CLOCk:DATE:FORMat MDY|DMY**

The instrument does not distinguish between upper and lower case letters. In the documentation, upper case letters indicate the short form of the keyword. The upper and lower case letters, together, indicate the long form of the keyword. Either form may be used in the command.

Example: **Disp:Ann:Cloc:Date:Form MDY|DMY** is the same as **display:annotation:clock:date:format mdy|dmy**.

The command **DISPL:Annotation:Clock:Date:Form MDY|DMY** is not valid because DISPL is neither the long, nor the short form of the command.

Special Characters in Commands

NOTE There is no guarantee that the example commands detailed are used in this series of Noise Figure Analyzers.

Special Character	Meaning	Example

|	A vertical stroke between parameters indicates alternative choices. The effect of the command is different depending on which parameter is selected.
	
	A vertical stroke between keywords indicates that the words are synonyms and identical effects exist for several keywords. Only one of these keywords is used at a time. The command functions the same for either keyword.
		Command:
		`[:SENSe]:DETector[:FUNCtion] NEGative|POSitive|SAMPle`
		The choices are neg, pos, and samp.
		`:SENSe:DETector:FUNCtion SAMPle`
		is one possible command choice.
		Command:
		`[:SENSe]:ACPower:BANDwidth|BWIDth:ACHannel`
		Two identical commands are:
		`:SENSe:ACPower:BANDwidth:ACHannel`
		`:SENSe:ACPower:BWIDth:ACHannel`

[ ]	keywords in square brackets are optional when composing the command. These implied keywords will be executed even if they are omitted.	Command:
		`[:SENSe]:ACPower:AVERage[:STATe]OFF|ON|0|1`
		The following commands are all valid and have identical effects:
		`:SENSe:ACPower:AVERage:STATe OFF`
		`:ACPower:AVERage:STATe OFF`
		`ACPower:AVERage OFF`

Special Character	Meaning	Example
< >	Angle brackets around a word, or words, indicates they are not to be used literally in the command. They represent the needed item.	Command: **:SENSe:ACPower:CSPacing <freqency>** In this command example the word <freqency> should be replaced by an actual frequency: **:SENSe:ACPower:CSPacing 9.7MHz**

{ }	Braces, or curly brackets, indicate an optional repeating sequence and are used to enclose one or more parameters that may be included zero or more times.	Command:
		`[SENSe:]CORRection:CSET[1]|2|3|4:DATA:MERGe <frequency>,<rel_ampl>{,<frequency>,<rel_ampl>}`
		A valid form of this command is:
		`[SENSe:]CORRection:CSET1:DATA:MERGe 740000,.94 1250000,.31 3320000,1.7`

Parameters in Commands

There are five basic types of parameters:

- Boolean
- Block Program Data
- Keyword
- Units
- Variable

Boolean The <Boolean> expression OFF | ON | 0 | 1 is a two state type parameter. The numeric value 0 is equivalent to OFF. Any numeric value other than 0 is equivalent to ON. The numeric values of 0 or 1 are commonly used in the command instead of OFF or ON, and queries of the parameter always return a numeric value of 0 or 1.

Block Program Data Definite length arbitrary block response data is defined in section 8.7.9.2 of IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. New York, NY, 1992.

<block> It allows data to be transmitted over the system interface as a series of 8 bit data bytes. This element is particularly useful for sending large quantities of data, 8 bit extended ASCII codes, or other data that are not able to be directly displayed.

Keyword The parameter keywords that are allowed for a particular command are defined in the command description and are separated with a vertical slash.

Units	Numerical variables may include units. The valid units for a command depends on the variable type being used. If no units are sent, the indicated default units will be used. Units can follow the numerical value with, or without, a space.
Variable	Anything that appears in angle brackets < > after a command or query header represents a User supplied parameter.

SCPI Termination and Separator Syntax

A terminator must be provided when an instrument is controlled using RS-232. There are several issues to be understood about choosing the proper SCPI terminator and separator when this is the case. There is no current SCPI standard for RS-232. Although one intent of SCPI is to be interface independent, <END> is only defined for IEEE 488 operation. At the time of this writing, the RS-232 terminator issue was in the process of being addressed in IEEE standard 1174.

A semicolon (;) is not a SCPI terminator, it is a separator. The purpose of the separator is to queue multiple commands or queries in order to obtain multiple actions and/or responses. Make sure that you do not attempt to use the semicolon as a terminator when using RS-232 control.

Basically all binary trace and response data is terminated with <NL><END>, as defined in Section 8.5 of IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. New York, NY, 1992.

Improving the NFA's Performance

Measurement Speed

Disabling the Noise Figure Analyzer display increases the measurement response time and as a result makes the remote command processing faster.

See "Turn Display On or Off" on page 32 for an explanation of this feature.

Copying Commands

If you want to cut and paste the command text when programming, there is a file on the CD-ROM called `Commands.txt` this is provided for this purpose.

2 IEEE 488.2 Common Commands

The common commands are as specified in IEEE 488.2.

IEEE 488.2 Common Commands

Instrument Calibration Query

*CAL?

This command is included for compatibility reasons only. It has no effect. The return value is always 0.

Clear Status

*CLS

Clears the status byte. It does this by emptying the error queue and clearing all bits in all of the event registers.

See *STB?

Event Status Enable Register

*ESE <integer>

Sets the bits in the standard event status enable register. This register monitors GP-IB errors and synchronization conditions such as operation complete, request control, query error, device dependent error, execution error, command error and power on. A summary bit is generated on execution of the command.

Valid input range

Integer, 0 to 255

Query command

*ESE?

Query returns the state of the standard event status enable register.

The bits defined in this register are:

Table 2-1 Standard event status enable register bits

Bit	Meaning when bit asserted
0	Operation complete
2	Query error
3	Device dependent error
4	Execution error
5	Command error
6	User request
7	Power on

Event Status Register Query

*ESR?

Queries and clears the standard event status register. (This is a destructive read.)

Valid input range

Integer, 0 to 255

Table 2-2 Standard event status register

Bit	Meaning when bit asserted
0	Operation complete
1	Request bus control
2	Query control
3	Device dependent error
4	Execution error
5	Command error
6	User request (not used)
7	Power on

Instrument Identification Query

***IDN?**

Returns an instrument identification information string to GP-IB. 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

For example:

Agilent Technologies, N8975A, GB40390000, A.04.06

Learn String Query

***LRN?**

Returns current instrument state data. The information is in a machine readable format only. Sending the query returns the following:

`SYST:SET #NMMM<state_data>`

You can set the state by sending this block of data to the instrument:

`SYST:SET #NMMM<state_data>`

Operation Complete

*OPC

Supports operations within the operation status register by setting bit 0 in the standard event status register to '1' when all pending operations have finished.

Query command

*OPC?

The query stops any new commands from being processed until the current processing is complete. Then it returns a '1', and the program continues. This query can be used to synchronize events of other instruments on the external bus.

State Recall

*RCL <register>

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

Valid input range

Integer, 2 to 99

Instrument Reset

*RST

This command presets the instrument to a factory pre-defined condition.

State Save

*SAV <register>

This command saves the instrument state to the specified instrument memory register.

Valid input range

Integer, 2 to 99

Service Request Enable

*SRE <integer>

This command sets the value of the service request enable register. Setting a bit in this register means that the corresponding bit in the Status Byte causes a service request when set.

Valid input range

Integer, 0 to 63 and 128 to 191

Query command

*SRE?

The query returns the value of the register.

Status Byte Query

*STB?

Returns the value of the status byte register. The status byte registers summarize the states of the other registers and are also responsible for generating service requests.

Table 2-3 Status byte register bits

Bit	Meaning when bit asserted
3	Questionable status summary
5	Standard event status summary
6	Request service summary
7	Operation status summary

See `*CLS`

Trigger

*TRG

This command is included for compatibility reasons only. It has no effect.

See also the `INITiate:IMMediate` command in the trigger subsystem.

Self Test Query

***TST?**

This query runs the instrument self-test and returns the results.

The returned value is a bitmask:

A return value of 0 means that all self tests passed.

Table 2-4 Bit Meaning when bit asserted

Bit	Meaning
0	IF gain out of range.
1	IF attenuator value(s) out of range.
2	RF attenuator value(s) out of range.
3	ADC test failure.

NOTE See “Initiate a Measurement” on page 193 for an explanation on the command needed to be sent after the *TST? command has been executed in order to restart the sweep.

Wait

***WAI**

This command causes the instrument to wait until all pending commands are completed before executing any additional commands.

IEEE 488.2 Common Commands

3 CALCulate Subsystem

The CALCulate Subsystem commands are used to perform post-acquisition data processing. In effect, the collection of new data triggers the CALCulate subsystem. In the Noise Figure Analyzer, the primary functions in this subsystem are limits.

Limit Line Commands

Number Of Points

`CALCulate:LLINe[1]|2|3|4:COUNt?`

Description Returns the number of points in the selected limit line.

Valid return range 0 to 201 points

Query command `CALCulate:LLINe2:COUNt?`

Limit Line Data

CALCulate:LLINe[1]|2|3|4:DATA<frequency>,<ampl>,<connected>,<frequency>,<ampl>,<connected>{,<frequency>,<ampl>,<connected>}

Description Defines limit line values.

The amplitude values of the limit lines have no units of their own. Instead they take on the units of the graph to which the limit line is applied. If the units of the graph are changed then the limit line values take on the new units without rescaling.

- <frequency> - is a frequency in Hz. Frequency values do not allow units (e.g. MHz) to be specified, they are always in Hz.
- <ampl> - amplitude values are unitless.
- <connected> - connected values are either 0 or 1. A 1 means this point is connected to the previously defined point to define the limit line. A 0 means this is a point of discontinuity and is not connected to the preceding point.

Limit lines 1 and 2 apply to the trace that is displayed in the upper graph. Limit lines 3 and 4 apply to the trace that is displayed in the lower graph.

Valid input range 1 to 201 points

Default Limit lines are empty.

Query command CALCulate:LLINe[1]|2|3|4:DATA?

Display Control

CALCulate:LLINe[1]|2|3|4:DISPlay[:STATe]OFF|ON|0|1

NOTE Limit lines are only valid for graphical displays.

Description Controls whether or not the given limit line is displayed.

Default Off

Query command CALCulate:LLINe[1]|2|3|4:DISPlay[STATe]?

Limit Test Control

CALCulate:LLINe[1]|2|3|4[:STATe]OFF|ON|0|1

Description This command turns the limit testing on or off for the given limit line. The results of the limit testing can be obtained from the Questionable Integrity Status Register.

Default Off

Query command CALCulate:LLINe[1]|2|3|4[:STATe]?

Limit Type

CALCulate:LLINe[1]|2|3|4:TYPE UPPer|LOWer

Description Sets the limit line type. An upper line will be used as the maximum allowable value when comparing with the data. A lower limit line defines the minimum allowable value.

Default UPPer

Query command CALCulate:LLINe1:TYPE?

4 CALibration Subsystem

The CALibration Subsystem commands control the self-alignment and self-diagnostic processes.

Calibration Commands

Auto Alignment Control

CALibration:AUTO[:STATe] OFF|ON|0|1

Description Turns the automatic alignment routines on and off. These are run in the background. See also “Auto Alignment Mode”.

Default On

Query command CALibration:AUTO[:STATe]?

Auto Alignment Mode

CALibration:AUTO:MODE POINt|SWEep

Description The automatic alignment routines run in the background. This allows you to choose when an alignment occurs.

- POINt - after each point in a sweep or between successive measurements when making fixed frequency measurements.
- SWEep - at start of each sweep. This is equivalent to POINt when making fixed frequency measurements.

Default SWEep

Query command CALibration:AUTO:MODE?

Frequency Calibration Source Query

`CALibration:FREQuency:REFerence?`

Description Returns the source of the active calibration frequency reference.

The following can be returned:

- `INT` — the source is internal
- `EXT` — the source is external

Frequency Calibration Coarse Adjustment

`CALibration:FREQuency:REFerence:COARse <integer>`

Description Performs the frequency calibration DAC coarse adjustment.

Valid input range 0 to 255

Default value Factory set

Query command `CALibration:FREQuency:REFerence:COARse?`

Frequency Calibration Fine Adjustment

`CALibration:FREQuency:REFerence:FINE <integer>`

Description Performs the frequency calibration DAC fine adjustment.

Valid input range 0 to 255

Default value Factory set

Query command `CALibration:FREQuency:REFerence:FINE?`

NOTE YTF settings are only applicable to models N8974A and N8975A.

Calibrate YIG Tuned Filter

CALibration:YTF

Description Performs an alignment of the YIG tuned filter. The results are not permanently stored by this command and will not survive a power cycle.

NOTE To save the results run the command CALibration:YTF:STORe

.

Store YIG Tuned Filter Calibration Results

CALibration:YTF:STORe

Description Permanently stores the current set of YIG tuned filter results so that they will survive a power cycle.

5 DISPlay Subsystem

The DISPlay Subsystem controls the selection and presentation of the measurement results.

Display Commands

Adjust Viewing Angle

`DISPlay:ANGLe <integer>`

Description Changes the viewing angle for better viewing in different environments.

Valid input range 1 to 7

Default 4

Query command `DISPlay:ANGLe?`

Turn Display On or Off

`DISPlay:ENABle[:STATe] OFF|ON|0|1`

Description Turns the display on or off. Turning off the display prolongs its life.

Default On

Query command `DISPlay:ENABle[:STATe]?`

Turn Full Screen On or Off

DISPlay:FULLscreen[:STATe] OFF|ON|0|1

Description Turns the full screen display on and off.

Default Off

Query command DISPlay:FULLscreen[:STATe]?

Display Format

DISPlay:FORMat GRAPh|TABLe|METer

Description Sets the format of the display to either graph, table or meter.

Default GRAPh

Query command DISPlay:FORMat?

Date Display Format

DISPlay:ANNotation:CLOCk:DATE:FORMat MDY|DMY

Description Allows you to set the format in which the date is displayed. To set the date refer to “System Date” on page 176.

Default MDY

Query command DISPlay:ANNotation:CLOCk:DATE:FORMat?

Clock Display Control

DISPlay:ANNotation:CLOCk[:STATe] OFF|ON|0|1

Description Used to turn the date and time display on and off.

Default On

Query command DISPlay:ANNotation:CLOCk[:STATe]?

Result Display Units

`DISPlay:DATA:UNITs <result>,<units>`

Description Set the units with which the given measurement is reported. The set of applicable units depends on the measurement, they are:

Table 5-1 Set of applicable measurement units

DATA	<result>	<units>	Default
Noise Figure	NFIGure	DB|LINear[a]	DB
Gain	GAIN	DB|LINear	DB
Y Factor	YFACtor	DB|LINear	DB
Effective Temp.[b]	TEFFective	K|CEL|FAR	K
Hot Power Density[c]	PHOT	DB | LINear	DB
Cold Power Density[c]	PCOLd	DB | LINear	DB

a. Linear noise measurements are also known as noise factor.
b. CEL and FAR represent °C and °F respectively.
c. Hot and cold power values represent a value proportional to input power.

Query command `DISPlay:DATA:UNITs?<result>`

Corrected Result Display Control

DISPlay:DATA:CORRections[:STATe] OFF|ON|0|1

Description Enables or disables the display of corrected data.

Until a user calibration has been performed then attempting to turn corrections on results in the SCPI error `-221, Settings conflict`.

Default Off

Query command `DISPlay:DATA:CORRections[:STATe]?`

Select Result For Display

DISPlay:DATA:TRACe[[1]|2] <result>

NOTE Trace 1 and trace 2 must not be set to show the same result.

Description Sets the selected result to be displayed in the selected trace. Trace 1 is the upper trace in graph mode, the center column in table mode and the center value in meter mode. Trace 2 is the lower trace in graph mode, the right-hand column in table mode and the right-hand value in meter mode.

Result The result can be one off:

- NFIGure — Noise Figure
- GAIN — Gain
- YFACtor — Y Factor
- TEFFective — Effective temperature
- PHOT — Hot power density
- PCOLd — Cold power density

Default TRACe1 is NFIGure

TRACe2 is GAIN

Query command DISPlay:DATA:TRACe[[1]|2]?

Graphical Display Format Commands

The commands in this section are specific to the graphical display format.

The graph limits and levels affect the data display only and do not affect the measurement process or results. The applicable range depends on the selected measurement.

Graph Annotation Control

`DISPlay:ANNotation[:STATe] OFF|ON|0|1`

Description Turns the screen annotation on or off.

Default On

Query command `DISPlay:ANNotation[:STATe]?`

Graph Graticule Control

`DISPlay:GRATicule[:STATe] OFF|ON|0|1`

Description Turns the graticule on or off.

Default On

Query command `DISPlay:GRATicule[:STATe]?`

Graph Window Zoom

DISPlay:ZOOM:WINDow OFF|UPPer|LOWer

Description Expands the selected window to fill the whole display. The windows correspond to the upper and lower graphs in the dual graph display.

Options
- OFF — Returns the display to dual graph.
- UPPer — Zoom the upper window.
- LOWer — Zoom the lower window.

Default Off

Query command DISPlay:ZOOM:WINDow?

The query returns one of the three options detailed above.

Combined Graph Display

DISPlay:TRACe:COMBined[:STATe] OFF|ON|0|1

Description Enables or disables combined graph display when in graph display mode. When enabled (On), the combined graph display combines the two displayed traces into the same graph. When disabled (Off) returns any zoomed display back to dual graph format.

Default Off

Query command DISPlay:TRACe:COMBined[:STATe]?

Reference Level Value

`DISPlay:TRACe:Y[:SCALe]:RLEVel:VALue <result>,<value>`

Description Sets the value of the display reference level. The result value can be one of the following:

NOTE The reference level is limited to the current scale upper and lower limit values.

- `NFIGure` — Noise Figure
- `GAIN` — Gain
- `YFACtor` — Y-Factor
- `TEFFective` — Effective Temp
- `PHOT` — Hot Power Density
- `PCOLd` — Cold Power Density

Valid input range The valid input range for each result is as follows:

- Noise Figure — -100.0 to 100.0dB
- Gain — -100.0 to 100.0dB
- Y Factor — -100.0 to 100.0dB
- Effective Temp — -100000000 to 100000000K
- Hot Power Density — -100.0 to 100.0dB
- Cold Power Density — -100.0 to 100.0dB

Default

- Noise Figure — 4.0dB
- Gain — 15.000dB
- Y Factor — 5.000dB
- Effective Temp — 1000.0 K
- Hot Power Density — 5.000dB
- Cold Power Density — 5.000dB

Query command `DISPlay:TRACe:Y[:SCALe]:RLEVel:VALue? <result>`

Reference Level Control

DISPlay:TRACe:Y[:SCALe]:RLEVel[:STATe]<result>,OFF|ON|0|1

Description Determines whether or not the specified result's reference level line will be shown when the result is displayed graphically.

Default OFF

Query command DISPlay:TRACe:Y[:SCALe]:RLEVel[:STATe]? <result>

Graph Scale Per Division

`DISPlay:TRACe:Y[:SCALe]:PDIVision <result>,<value>`

Description

Sets the per-division display scaling for the selected result. The options available are as follows:

- `NFIGure` — Noise Figure
- `GAIN` — Gain
- `YFACtor` — Y-Factor
- `TEFFective` — Effective Temp
- `PHOT` — Hot Power Density
- `PCOLd` — Cold Power Density

Valid input range

- Noise Figure — 0.001 to 20.0dB
- Gain — 0.001 to 20.0dB
- Y Factor — 0.001 to 20.0dB
- Effective Temp — 0.1 to 20000000K
- Hot Power Density — 0.001 to 20.0dB
- Cold Power Density — 0.001 to 20.0dB

Default

- Noise Figure — 1.0dB
- Gain — 5.0dB
- Y Factor — 1.0dB
- Effective Temp — 200K
- Hot Power Density — 1.0dB
- Cold Power Density — 1.0dB

Query command

`DISPlay:TRACe:Y[:SCALe]:PDIVision? <result>`

Graph Lower Limit

DISPlay:TRACe:Y[:SCALe]:LOWer <trace>,<value>

Description

Sets the lower limit for the selected trace. The options available are as follows:

- NFIGure — Noise Figure
- GAIN — Gain
- YFACtor — Y-Factor
- TEFFective — Effective Temp
- PHOT — Hot Power Density
- PCOLd — Cold Power Density

Valid input range

- Noise Figure — -100 to 99.99dB
- Gain — -100 to 99.99dB
- Y Factor — -100 to 99.99dB
- Effective Temp — -100000000 to 99990000K
- Hot Power Density — -100 to 99.99dB
- Cold Power Density — -100 to 99.99dB

Default

- Noise Figure — -1.0dB
- Gain — -10.0dB
- Y Factor — 0.0dB
- Effective Temp — 0.0K
- Hot Power Density — 0.0dB
- Cold Power Density — 0.0dB

Query command

DISPlay:TRACe:Y[:SCALe]:LOWer? <trace>

Graph Upper Limit

`DISPlay:TRACe:Y[:SCALe]:UPPer <trace>,<value>`

Description

Sets the upper limit for the selected trace. The options available are as follows:

- `NFIGure` — Noise Figure
- `GAIN` — Gain
- `YFACtor` — Y-Factor
- `TEFFective` — Effective Temp
- `PHOT` — Hot Power Density
- `PCOLd` — Cold Power Density

Valid input range

- Noise Figure — -99.99 to 100.0dB
- Gain — -99.99 to 100.0dB
- Y Factor — -99.99 to 100.0dB
- Effective Temp — -99990000 to 100000000K
- Hot Power Density — -99.99 to 100.0dB
- Cold Power Density — -99.99 to 100.0dB

Default

- Noise Figure — 9.0dB
- Gain — 40.0dB
- Y Factor — 10.0dB
- Effective Temp — 2000.0K
- Hot Power Density — 10.0dB
- Cold Power Density — 10.0dB

Query command

`DISPlay:TRACe:Y[:SCALe]:UPPer? <trace>`

6 HCOPy Subsystem

The HCOPy subsystem controls the setup of printing to an external device.

Hardcopy Commands

Abort Printout

HCOPy:ABORt

Description The HCOPy:ABORt command aborts hard copy printout of results. This is equivalent to pressing the ESC hardkey when a print is in progress.

Printer Type

HCOPy:DEVice:TYPE AUTO|CUSTom|NONE

Description The HCOPy:DEVice:TYPE command sets up the printer by selecting the printer type. The following options are available:

- AUTO - the instrument queries the printer to determine it's type and automatically sets itself for that printer
- CUSTom - allows you to select a printer type if your printer is not auto-configurable.
- NONE - tells the instrument that the hardcopy output device is not a printer

Query command HCOPy:DEVice:TYPE?

Default AUTO

Print Command

HCOPy[:IMMediate]

Description The HCOPy[:IMMediate] command initiates printing of the current display data.

Printer Color Control

HCOPy:IMAGe:COLor[:STATe] OFF|ON|0|1

Description HCOPy:IMAGe:COLor[:STATe] selects between color and monochrome mode for hardcopy output.

Default ON

Query command HCOPy:IMAGe:COLor[:STATe]?

Form Feed

HCOPy:ITEM:FFEed[:IMMediate]

Description Sends the printer a form feed command.

Page Orientation

HCOPy:PAGE:ORIentation LANDscape|PORTrait

Description Specifies the orientation of the print.

Default LANDscape

Query command HCOPy:PAGE:ORIentation?

Prints Per Page

HCOPy:PAGE:PRINts <integer>

Description HCOPy:PAGE:PRINts sets the number of display print outputs sent to print on one piece of paper, before a form feed is sent.

Valid input range Integer, 1 or 2

Default 1

Query command HCOPy:PAGE:PRINts?

7 INPut Subsystem

The INPut subsystem allows you to set maximum and minimum values of selected attenuators used when calibrating the NFA.

Input Commands

Maximum RF Attenuator Setting

`INPut:ATTenuation[:RF]:MAXimum <integer>`

Description Selects the maximum RF attenuator setting when a calibration is performed.

Valid input range 0 to 40 dB in steps of 5 dB

Query command `INPut:ATTenuation[:RF]:MAXimum?`

Minimum RF Attenuator Setting

`INPut:ATTenuation[:RF][:MINimum] <integer>`

Description Selects the minimum RF attenuator setting when a calibration is performed.

Valid input range 0 to 40 dB in steps of 5 dB

Query command `INPut:ATTenuation[:RF][:MINimum]?`

NOTE Microwave (MWAVe) attenuation settings are only applicable to models N8974A and N8975A.

Maximum Microwave Attenuator Setting

`INPut:ATTenuation:MWAVe:MAXimum <integer>`

Description Selects the maximum microwave attenuator setting when a calibration is performed.

Valid input range 0 to 30 dB in 15 dB steps

Default 0 dB

Query command `INPut:ATTenuation:MWAVe:MAXimum?`

Minimum Microwave Attenuator Setting

`INPut:ATTenuation:MWAVe[:MINimum] <integer>`

Description Selects the minimum microwave attenuator setting when a calibration is performed.

Valid input range 0 to 30 dB in 15 dB steps

Default 0 dB

Query command `INPut:ATTenuation:MWAVe[:MINimum]?`

8 MEASure Subsystem

The MEASure Subsystem allows you to retrieve measurement data from the NFA.

NOTE Commands in this subsystem use the SCPI NAN value (9.91E+37) to indicate that there has been a problem in performing the calculation of the requested result. This typically happens when an attempt is made to retrieve corrected data without first performing a user calibration.

FETCh Commands

FETCh commands retrieve results for the most recently completed fixed frequency or swept measurement. When no result is available, but a measurement is in progress, the command will not return until the measurement completes.

When no result is available and there is no measurement in progress, no data is returned and error -230,"Data corrupt or stale" is placed in the error queue.

Sweep results are returned as a list of comma separated values, one value for each measurement frequency.

FETCh output is terminated with the ASCII NL character.

Fetch Swept Frequency Results

Gain Measurement

FETCh[:ARRay][:DATA]:CORRected:GAIN? [DB|LINear]

Description Return the gain values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example

```
FETC:CORR:GAIN? LIN
```

Corrected Noise Figure Measurement

FETCh[:ARRay][:DATA]:CORRected:NFIGure? [DB|LINear]

Description Return the corrected noise figure values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example

```
FETC:CORR:NFIG?
```

Corrected Cold Power Measurement

FETCh[:ARRay][:DATA]:CORRected:PCOLd? [DB|LINear]

Description Return the corrected cold power values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example
```
FETC:CORR:PCOL?
```

Corrected Hot Power Measurement

FETCh[:ARRay][:DATA]:CORRected:PHOT [DB|LINear]

Description Return the corrected hot power values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example
```
FETC:CORR:PHOT? DB
```

Corrected Effective Temperature Measurement

FETCh[:ARRay][:DATA]:CORRected:TEFFecive [K|CEL|FAR]

Description Return the corrected effective temperature values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example `FETC:CORR:TEFF? CEL`

T_{cold} Values

FETCh[:ARRay][:DATA]:TCOLD? [K|CEL|FAR]

Description Return the T_{cold} values used in calculating swept measurement results. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example `FETC:TCOLD?`

Uncorrected Noise Figure Measurement

FETCh[:ARRay][:DATA]:UNCorrected:NFIGure? [DB|LINear]

Description Return the uncorrected noise figure values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example FETC:UNC:NFIG?

Uncorrected Cold Power Measurement

FETCh[:ARRay][:DATA]:UNCorrected:PCOLd? [DB|LINear]

Description Return the uncorrected cold power values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example FETC:UNC:PCOL?

Uncorrected Hot Power Measurement

FETCh[:ARRay][:DATA]:UNCorrected:PHOT [DB|LINear]

Description Return the uncorrected hot power values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example `FETC:UNC:PHOT? DB`

Uncorrected Effective Temperature Measurement

FETCh[:ARRay][:DATA]:UNCorrected:TEFFecive [K|CEL|FAR]

Description Return the uncorrected effective temperature values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example `FETC:UNC:TEFF? CEL`

Y-Factor Measurement

FETCh[:ARRay][:DATA]:UNCorrected:YFACtor? [DB|LINear]

Description Return the Y-factor values from the most recently completed swept frequency measurement. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example `FETC:CORR:YFAC? LIN`

Fetch Fixed Frequency Results

Gain Measurement

FETCh:SCALar[:DATA]:CORRected:GAIN? [DB|LINear]

Description Return the gain value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example `FETC:SCAL:CORR:GAIN? LIN`

Corrected Noise Figure Measurement

FETCh:SCALar[:DATA]:CORRected:NFIGure? [DB|LINear]

Description Return the corrected noise figure value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example `FETC:SCAL:CORR:NFIG?`

Corrected Cold Power Measurement

FETCh:SCALar[:DATA]:CORRected:PCOLd? [DB|LINear]

Description Return the corrected cold power value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example FETC:SCAL:CORR:PCOL?

Corrected Hot Power Measurement

FETCh:SCALar[:DATA]:CORRected:PHOT [DB|LINear]

Description Return the corrected hot power value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example FETC:SCAL:CORR:PHOT? DB

Corrected Effective Temperature Measurement

FETCh:SCALar[:DATA]:CORRected:TEFFecive [K|CEL|FAR]

Description Return the corrected effective temperature value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example FETC:SCAL:CORR:TEFF? CEL

T_{cold} Value

FETCh:SCALar[:DATA]:TCOLD? [K|CEL|FAR]

Description Return the T_{cold} value used in calculating fixed frequency measurement results. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example FETC:SCAL:TCOLD?

Uncorrected Noise Figure Measurement

FETCh:SCALar[:DATA]:UNCorrected:NFIGure? [DB|LINear]

Description Return the uncorrected noise figure value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example FETC:SCAL:UNC:NFIG?

Uncorrected Cold Power Measurement

FETCh:SCALar[:DATA]:UNCorrected:PCOLd? [DB|LINear]

Description Return the uncorrected cold power value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example FETC:SCAL:UNC:PCOL?

Uncorrected Hot Power Measurement

FETCh:SCALar[:DATA]:UNCorrected:PHOT [DB|LINear]

Description Return the uncorrected hot power value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example `FETC:SCAL:UNC:PHOT? DB`

Uncorrected Effective Temperature Measurement

FETCh:SCALar[:DATA]:UNCorrected:TEFFecive [K|CEL|FAR]

Description Return the uncorrected effective temperature value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example `FETC:SCAL:UNC:TEFF? CEL`

Y-Factor Measurement

FETCh:SCALar[:DATA]:UNCorrected:YFACtor? [DB|LINear]

Description Return the Y-factor value from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example
```
FETC:SCAL:UNC:YFAC? LIN
```

READ Commands

The READ commands initiate a measurement and retrieve the results.

Sweep results are returned as a list of comma separated values, one value for each measurement frequency.

READ output is terminated with the ASCII NL character.

Read Swept Frequency Results

Gain Measurement

READ[:ARRay][:DATA]:CORRected:GAIN? [DB|LINear]

Description Initiate a swept frequency measurement and return the gain results. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example

```
READ:CORR:GAIN? LIN
```

Corrected Noise Figure Measurement

READ[:ARRay][:DATA]:CORRected:NFIGure? [DB|LINear]

Description Initiate a swept frequency measurement and return the corrected noise figure results. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example

```
READ:CORR:NFIG?
```

Corrected Cold Power Measurement

READ[:ARRay][:DATA]:CORRected:PCOLd? [DB|LINear]

Description Initiate a swept frequency measurement and return the corrected cold power results. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:CORR:PCOL?

Corrected Hot Power Measurement

READ[:ARRay][:DATA]:CORRected:PHOT [DB|LINear]

Description Initiate a swept frequency measurement and return the corrected hot power results. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:CORR:PHOT? DB

Corrected Effective Temperature Measurement

READ[:ARRay][:DATA]:CORRected:TEFFecive [K|CEL|FAR]

Description Initiate a swept frequency measurement and return the corrected effective temperature results. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example `READ:CORR:TEFF? CEL`

T_{cold} Values

READ[:ARRay][:DATA]:TCOLD? [K|CEL|FAR]

Description Initiate a swept frequency measurement and return the T_{cold} values used in calculating measurement results. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example `READ:TCOLD? CEL`

Uncorrected Noise Figure Measurement

READ[:ARRay][:DATA]:UNCorrected:NFIGure? [DB|LINear]

Description Initiate a swept frequency measurement and return the uncorrected noise figure results. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example READ:UNC:NFIG?

Uncorrected Cold Power Measurement

READ[:ARRay][:DATA]:UNCorrected:PCOLd? [DB|LINear]

Description Initiate a swept frequency measurement and return the uncorrected cold power results. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:UNC:PCOL?

Uncorrected Hot Power Measurement

READ[:ARRay][:DATA]:UNCorrected:PHOT [DB|LINear]

Description Initiate a swept frequency measurement and return the uncorrected hot power results. The returned values are in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example
```
READ:UNC:PHOT? DB
```

Uncorrected Effective Temperature Measurement

READ[:ARRay][:DATA]:UNCorrected:TEFFecive [K|CEL|FAR]

Description Initiate a swept frequency measurement and return the uncorrected effective temperature results. The returned values are in the specified units. If no units are specified then the default units are used.

Default K

Example
```
READ:UNC:TEFF? CEL
```

Y-Factor Measurement

READ[:ARRay][:DATA]:UNCorrected:YFACtor? [DB|LINear]

Description Initiate a swept frequency measurement and return the Y-factor results. The returned values are in the specified units. If no units are specified then the default units are used.

Default dB

Example

```
READ:CORR:YFAC? LIN
```

Read Fixed Frequency Results

Gain Measurement

READ:SCALar[:DATA]:CORRected:GAIN? [DB|LINear]

Description Initiate a fixed frequency measurement and return the gain results. Return the gain values from the most recently completed fixed frequency measurement. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example `READ:SCAL:CORR:GAIN? LIN`

Corrected Noise Figure Measurement

READ:SCALar[:DATA]:CORRected:NFIGure? [DB|LINear]

Description Initiate a fixed frequency measurement and return the corrected noise figure result. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example `READ:SCAL:CORR:NFIG?`

Corrected Cold Power Measurement

READ:SCALar[:DATA]:CORRected:PCOLd? [DB|LINear]

Description Initiate a fixed frequency measurement and return the corrected cold power result. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:SCAL:CORR:PCOL?

Corrected Hot Power Measurement

READ:SCALar[:DATA]:CORRected:PHOT [DB|LINear]

Description Initiate a fixed frequency measurement and return the corrected hot power result. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:SCAL:CORR:PHOT? DB

Corrected Effective Temperature Measurement

READ:SCALar[:DATA]:CORRected:TEFFecive [K|CEL|FAR]

Description Initiate a fixed frequency measurement and return the corrected effective temperature result. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example READ:SCAL:CORR:TEFF? CEL

T_{cold} Values

READ:SCALar[:DATA]:TCOLD? [K|CEL|FAR]

Description Initiate a fixed frequency measurement and return the T_{cold} value used in calculating measurement results. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example READ:SCAL:TCOLD?

Uncorrected Noise Figure Measurement

READ:SCALar[:DATA]:UNCorrected:NFIGure? [DB|LINear]

Description Initiate a fixed frequency measurement and return the uncorrected noise figure result. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example READ:SCAL:UNC:NFIG?

Uncorrected Cold Power Measurement

READ:SCALar[:DATA]:UNCorrected:PCOLd? [DB|LINear]

Description Initiate a fixed frequency measurement and return the uncorrected cold power result. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes cold power measurements with the noise source switched off. The reported value is a power level which is relative to the power at the input.

Default dB

Example READ:SCAL:UNC:PCOL?

Uncorrected Hot Power Measurement

READ:SCALar[:DATA]:UNCorrected:PHOT [DB|LINear]

Description Initiate a fixed frequency measurement and return the uncorrected hot power result. The returned value is in the specified units. If no units are specified then the default units are used.

The instrument makes hot power measurements with the noise source switched on. The reported value is a power level which is relative to the power at the input.

Default dB

Example `READ:SCAL:UNC:PHOT? DB`

Uncorrected Effective Temperature Measurement

READ:SCALar[:DATA]:UNCorrected:TEFFecive [K|CEL|FAR]

Description Initiate a fixed frequency measurement and return the uncorrected effective temperature result. The returned value is in the specified units. If no units are specified then the default units are used.

Default K

Example `READ:SCAL:UNC:TEFF? CEL`

Y-Factor Measurement

READ:SCALar[:DATA]:UNCorrected:YFACtor? [DB|LINear]

Description Initiate a fixed frequency measurement and return the Y-factor result. The returned value is in the specified units. If no units are specified then the default units are used.

Default dB

Example READ:SCAL:UNC:YFAC? LIN

9 MMEMory Subsystem

The MMEMory subsystem provides access to mass storage devices.

Mass Memory Subsystem

There are two types of mass storage device:

- the 3.5 inch disk drive (high-density, 2.0 MBytes) specified by A:
- an area of flash memory, specified by `C:`

The mass storage device is included at the beginning of the filename, for example, `'C:STATE1.STA'`. Mass storage device and file names are represented by strings and therefor must be enclosed in quotation marks.

Load Commands

Load Limit Line

MMEMory:LOAD:LIMit LLINe1|LLINe2|LLINe3|LLINe4,<file_name>

Description Load a limit line from the specified file.

The filename extension is .LIM. Specifying a different filename extension results in SCPI error +776,"Incorrect filename, allowable extension LIM".

Example

```
MMEM:LOAD:LIM LLINe2,'c:mylimit.lim'
```

Load Instrument State

MMEMory:LOAD:STATe 1,<file_name>

Description The contents of the file are loaded into the current instrument state. As well as instrument parameter values, the state information includes user calibration data and, if present, the reference (memory) trace.

The filename extension is .STA. Specifying a different filename extension results in SCPI error +777,"Incorrect filename, allowable extension STA".

NOTE Register 1 represents the active instrument settings.

Valid input range The only permissible register number is 1.

Example

```
MMEM:LOAD:STATE 1,'c:mystate.sta'
```

Load ENR Table

MMEMory:LOAD:ENR CALibration|MEASurement,<file_name>

Description Load an ENR table, from the specified file to either the calibration or measurement ENR tables. The filename extension is .ENR. Specifying a different filename extension results in SCPI error +770,"Incorrect filename, allowable extension ENR".

Example

```
MMEM:LOAD:ENR MEAS,'c:myenr.enr'
```

Load Frequency List

MMEMory:LOAD:FREQuency <file_name>

Description Load the frequency table from the specified file.

The filename extension is .LST. Specifying a different filename extension results in SCPI error +773,"Incorrect filename, allowable extension LST".

Example

```
MMEM:LOAD:FREQuency 'c:mylist.lst'
```

Load Loss Compensation Table

MMEMory:LOAD:LOSS BEFore|AFTer,<file_name>

Description Load the specified file as the Before or After DUT loss compensation table.

The filename has the extension LOS. Specifying a different filename extension results in SCPI error +781,"Incorrect filename, allowable extension LOS". A file that is corrupt or is not formatted correctly results in SCPI error +779,"Failed to load Loss Data".

Example

```
MMEM:LOAD:LOSS AFT,'a:myloss.los'
```

File Management Commands

The commands in this section are house keeping commands for the memory system.

Catalogue Device

MMEMory:CATalog? <msus>

Description List all files in the given mass storage device. <msus> is the mass storage device. The return data will be of the format:
<memory used>,<memory free> {,<file details>}

Each <file details> indicates the name and size of one file:
"<file_name>,,<file_size>"

Example

```
MMEM:CATalog? 'C:'
```

Delete File

MMEMory:DELete <file_name>

Description Delete a file.

Example

```
MMEM:DEL 'C:source.enr'
```

Copy File

MMEMory:COPY <file_name1>,<file_name2>

Description Copy the contents of file <file_name1> to file <file_name2>.

Example MMEM:COPY 'A:oldname.sta','A:newname.sta'

Store Data In File

MMEMory:DATA <file_name>,<data>

Description The command stores definite length arbitrary block data in the named file. The file is created if it does not exist.

Query command MMEMory:DATA? <file_name>

The query returns the contents of the specified file as a definite length arbitrary block.

Store Commands

Store Limit Line

`MMEMory:STORe:LIMit LLINe1|LLINe2|LLINe3|LLINe4,<file_name>`

Description Store a limit line to the specified file.

The filename extension is `.LIM`. Specifying a different filename extension results in SCPI error `+776,"Incorrect filename, allowable extension LIM"`.

Example

```
MMEM:STOR:LIM LLIN2,'a:mylimit.lim'
```

Store Screen Image

MMEMory:STORe:SCReen [NORMal|REVerse,]<file_name>

Description

Stores the current instrument screen image to a specified file. The available formats are:

- `GIF` - Unisys' Graphics Interchange Format
- `WMF` - Microsoft Windows Metafile Format.

The filename extension is `.GIF` or `.WMF` to match the specified graphics format. Specifying a different filename extension results in SCPI error `+763,"Incorrect filename, allowable extensions are GIF or WMF"`.

The optional first parameter is used to control the mapping of black and white information on the graphics portion of the display. REVerse causes black and white to be reversed. NORMal, the default, leaves the image unaltered.

Example 1

```
MMEM:STOR:SCR 'c:myscreen.gif'
```

Example 2

```
MMEM:STOR:SCR REV,'a:myscreen.wmf'
```

Store Loss Compensation Table

MMEMory:STORe:LOSS BEFore|AFTer,<filename>

Description Store the Before or After DUT loss compensation table in the specified file.

The filename requires the extension LOS. Specifying a different filename extension results in SCPI error +781,"Incorrect filename, allowable extension LOS". A file that is corrupt or not formatted correctly results in SCPI error +780,"Failed to save Loss Data".

Example

```
MMEM:STOR:LOSS BEF,'c:myloss.los'
```

Store Instrument State

MMEMory:STORe:STATe 1,<file_name>

Description Store the current instrument state to the named file. The state information includes user calibration data and, if present, the reference (memory) trace.

The file_name extension is .STA. Specifying a different filename extension results in SCPI error +777,"Incorrect filename, allowable extension STA".

NOTE MMEMory:STORe:STATe always stores instrument state from register 1.

Example

```
MMEM:STOR:STAT 1, 'c:mystate.sta'
```

Store ENR Table

MMEMory:STORe:ENR CALibration|MEASurement,<file_name>

Description Store the calibration or measurement ENR table to the specified file. The filename extension is .ENR. Specifying a different filename extension results in SCPI error .+770,"Incorrect filename, allowable extension ENR".

Example

```
MMEM:STOR:ENR CAL,'c:myenr.enr'
```

Store Frequency List

MMEMory:STORe:FREQuency <file_name>

Description Stores the frequency table to a file in memory.

The file_name extension is .LST. Specifying a different filename extension results in SCPI error +773,"Incorrect filename, allowable extension LST".

Example

```
MMEM:STOR:FREQ 'a:mylist.lst'
```

Store Trace Data

MMEMory:STORe:TRACe TRACE1|TRACE2|ALL,<file_name>

Description Stores the specified trace to a file as a list of comma separated values. The list of values are frequency amplitude pairs.

The file_name extension is .CSV. Specifying a different filename extension results in SCPI error +762, Incorrect filename, allowable extension CSV.

Example

```
MMEM:STOR:TRAC TRACE1,'c:mytrace.csv'
```

10 OUTPut Subsystem

The OUTPut Subsystem allows you to manually turn the noise select on and off.

OUTPut Commands

Noise Source Control

`OUTPut:MANual:NOISe[:STATe] OFF|ON|0|1`

Description Turn the noise source ON and OFF.

A settings conflict is occurs if manual measurement mode is OFF.

Default Off

Query `OUTPut:MANual:NOISe[:STATe]?`

Example `OUTP:MAN:NOIS ON`

11 SENSe Subsystem

The SENSe Subsystem commands control measurement specific parameters.

Configure Commands

Select DUT Type

`[:SENSe]:CONFigure:MODE:DUT AMPLifier|DOWNconv|UPConv`

Description Select the type of DUT to be measured.

Options
- `AMPLifier` — the DUT is an amplifier
- `DOWNconv` — the DUT shifts frequencies down
- `UPConv` — the DUT shifts frequencies up

Default `AMPlifier`

Query command `[:SENSe]:CONFigure:MODE:DUT?`

DUT LO Mode

[:SENSe]:CONFigure:MODE:DUT:LOSCillator FIXed|VARiable

NOTE This command is only used when measuring a frequency converting DUT.

Description States whether the LO in the frequency converting DUT is to be fixed or variable frequency. Note that having a fixed LO frequency implies that the IF frequency is variable, and having a variable LO frequency implies that the IF frequency is fixed.

Options
- FIXed - The LO frequency is to remain constant.
- VARiable - The LO is to be varied.

Default FIXed

Query command [:SENSe]:CONFigure:MODE:DUT:LOSCillator?

System Downconverter Control

[:SENSe]:CONFigure:MODE:SYSTem:DOWNconv[:STATe]OFF|ON|0|1

Description Select whether or not there is a system downconverter.

Options
- OFF or 0 - There is no system downconverter.
- ON or 1- There is a system downconverter.

Default OFF

Query command [:SENSe]:CONFigure:MODE:SYSTem:DOWNconv[:STATe]?

Downconverter Fixed IF Frequency

`[:SENSe]:CONFigure:MODE:DOWNconv:IF:FREQuency <frequency>`

Description Set the downconverter fixed IF frequency.

Valid input range
- N8972A — 10 MHz to 1.5 GHz
- N8973A — 10 MHz to 3.0 GHz
- N8974A — 10.0 MHz to 6.7 GHz
- N8975A —10.0 MHz to 26.5 GHz

Default 30 MHz

Query command `[:SENSe]:CONFigure:MODE:DOWNconv:IF:FREQuency?`

Downconverter Fixed LO Frequency

`[:SENSe]:CONFigure:MODE:DOWNconv:LOSCillator:FREQuency <frequency>`

Description Set the downconverter fixed LO frequency.

Valid input range 1 Hz to 300 GHz

Default
- N8972A — 5.0 GHz
- N8973A — 10.0 GHz
- N8974A — 20.0 GHz
- N8975A — 30.0 GHz

Query command `[:SENSe]:CONFigure:MODE:DOWNconv:LOSCillator:FREQuency?`

Downconverter LO Offset

[:SENSe]:CONFigure:MODE:DOWNconv:LOSCillator:OFFSet DSB|LSB|USB

Description Sets the frequency offset for the downconverter.

Options
- DSB - Double Sideband (no offset)
- LSB - Lower Sideband (Signal frequency < LO frequency)
- USB - Upper Sideband (Signal frequency > LO frequency)

Default LSB

Query command [:SENSe]:CONFigure:MODE:DOWNconv:LOSCillator:OFFSet?

System IF Fixed Frequency

[:SENSe]:CONFigure:MODE:SYSTem:IF:FREQuency <frequency>

Description Set the system IF frequency.

Valid input range
- N8972A - 10 MHz to 1.5 GHz
- N8973A - 10 MHz to 3.0 GHz
- N8974A - 10 MHz to 6.7 GHz
- N8975A - 10 MHz to 26.5 GHz

Default 30 MHz

Query command [:SENSe]:CONFigure:MODE:SYSTem:IF:FREQuency?

System LO Mode

[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator FIXed|VARiable

NOTE This command is only used when the measurement system contains a system downconverter.

Description States whether the system LO is to be fixed or variable frequency.

Note that having a fixed LO frequency implies that the IF frequency is variable, and having a variable LO frequency implies that the IF frequency is fixed.

Options

- `FIXed` — the LO frequency is to remain constant
- `VARiable` — the LO is to be varied

Default `FIXed`

Query command `[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator?`

System LO Fixed Frequency

[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator:FREQuency <frequency>

Description Sets the system fixed LO frequency.

Valid input range 1 Hz to 300 GHz

Default
- N8972A — 5.0 GHz
- N8973A — 10.0 GHz
- N8974A — 20.0 GHz
- N8975A — 30.0 GHz

Query command `[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator:FREQuency?`

System LO Offset

[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator:OFFSet DSB|LSB|USB

Description Sets the system LO offset.

Valid input range
- `DSB` - Double Sideband (no offset)
- `LSB` - Lower Sideband (Signal frequency < LO frequency)
- `USB` - Upper Sideband (Signal frequency >LO frequency)

Default `LSB`

Query command `[:SENSe]:CONFigure:MODE:SYSTem:LOSCillator:OFFSet?`

Upconverter Fixed IF Frequency

[:SENSe]:CONFigure:MODE:UPConv:IF:FREQuency <frequency>

Description Sets the upconverter fixed IF frequency.

Valid input range
- N8972A — 10 MHz to 1.5 GHz
- N8973A — 10 MHz to 3.0 GHz
- N8974A — 10 MHz to 6.7 GHz
- N8975A — 10 MHz to 26.5 GHz

Default 30.0 MHz

Query command `[:SENSe]:CONFigure:MODE:UPConv:IF:FREQuency?`

Upconverter Fixed LO Frequency

[:SENSe]:CONFigure:MODE:UPConv:LOSCillator:FREQuency <frequency>

Description Sets the upconverter fixed LO frequency.

Valid input range 1 Hz to 300 GHz

Default
- N8972A — 5.0 GHz
- N8973A — 10.0 GHz
- N8974A — 20.0 GHz
- N8975A — 30.0 GHz

Query command `[:SENSe]:CONFigure:MODE:UPConv:LOSCillator:FREQuency?`

Upconverter LO Offset

[:SENSe]:CONFigure:MODE:UPConv:LOSCillator:OFFSet DSB|LSB|USB

Description Sets the frequency offset for the upconverter.

Valid input range
- LSB - Lower Sideband (Signal frequency < LO frequency)
- USB - Upper Sideband (Signal frequency >LO frequency)

Default LSB

Query command [:SENSe]:CONFigure:MODE:UPConv:LOSCillator:OFFSet?

Correction, ENR Commands

Auto Load ENR Table

[SENSe:]CORRection:ENR:AUTO[:STATe] OFF|ON|0|1

Description When set to ON the measurement ENR table and associated data is loaded from an SNS noise source at the following times:

- when the SNS is first attached,
- on power up if a SNS is detected, or
- if an SNS is attached when this command is set ON.

Reset state When set OFF, ENR data is not automatically loaded.

Default Off

Query command [SENSe:]CORRection:ENR:AUTO[STATe] OFF|ON|0|1?

ENR Mode

[:SENSe]:CORRection:ENR:MODE TABLe|SPOT

Description Selects between spot and table ENR operation.

Options

- TABLe - ENR values are taken from the ENR table(s).
- SPOT - a single ENR value is applied at all frequencies.

Default TABLe

Query command [:SENSe]:CORRection:ENR:MODE?

Spot ENR Value

[:SENSe]:CORRection:ENR:SPOT <value>

Description Set the ENR value used when spot ENR is enabled.

The ENR data can be entered in units of dB, Kelvin (K), degrees Celsius (CEL) or degrees Fahrenheit (FAR). The default unit is dB.

For Thot values below 290K see the commands in “ENR Spot Mode” on page 105 and “ENR Thot Value” on page 106.

Valid input range -7 to 50 dB

Default 15.20 dB

Query command `[:SENSe]:CORRection:ENR:SPOT?`

ENR Spot Mode

[:SENSe]:CORRection:SPOT:MODE ENR|THOT

Description The command “Spot ENR Value” on page 105 cannot be used to enter values below 290K. The command “ENR Thot Value” on page 106 can enter temperature values below 290K. This command selects which value is used in making measurements.

Options

- `ENR` - the value entered via the SENSe:CORRection:ENR:SPOT command is used.
- `THOT` - the value entered via the SENSe:CORRection:ENR:THOT command is used.

Default ENR

Query command `[:SENSe]:CORRection:SPOT:MODE?`

ENR T_{hot} Value

[:SENSe]:CORRection:ENR:THOT

Description Set the ENR value used when spot ENR is enabled.

The ENR data can be entered in units of Kelvin (K), degrees Celsius (CEL) or degrees Fahrenheit (FAR). The default unit is Kelvin.

This command would normally be used to enter ENR values below 290K. See the commands under “Spot ENR Value” on page 105 and “ENR Thot Value” on page 106.

Default 9892.8K (equivalent to the Spot ENR default of 15.2 dB)

Calibration ENR Table Data

[:SENSe]:CORRection:ENR:CALibration:TABLe:DATA<frequency>,<value>
{,<frequency>,<value>}

Description Enters data into the current calibration ENR table. Once entered the table can be stored in a file.

It is not possible to specify units with this command and values are taken to be in Hz and dB. The query returns values in Hz and dB.

Valid input range 1 to 81 entries

Default units Hz and dB

Query command [:SENSe]:CORRection:ENR:CALibration:TABLe:DATA?

Calibration ENR Table ID

[:SENSe]:CORRection:ENR:CALibration:TABLe:ID:DATA <id>

Description Enters the ID of the noise source associated with the calibration ENR table. The ID is stored with the ENR table when saving it to file.

Valid input range Quoted string of up to 12 characters (e.g. '346B')

Query command [:SENSe]:CORRection:ENR:CALibration:TABLe:ID:DATA?

Calibration ENR Table Serial Number

[:SENSe]:CORRection:ENR:CALibration:TABLe:SERial:DATA <serial number>

Description Enters the serial number of the noise source associated with the ENR table used for calibration. The serial number is stored with the ENR table when saving it to file.

Valid input range Quoted string of up to 20 characters (e.g. '2037A00729').

Query command [:SENSe]:CORRection:ENR:CALibration:TABLe:SERial:DATA?

Load Calibration ENR Table From SNS Noise Source

[:SENSe]:CORRection:ENR:CALibration:TABLe:SNS

Description Causes the NFA to load ENR data into its calibration ENR table from the attached SNS noise source. Any measurement that is underway when the ENR data is loaded is restarted.

This command gives a settings conflict when no SNS noise source is connected.

Number of Entries in Calibration ENR Table

[:SENSe]:CORRection:ENR:CALibration:TABLe:COUNt?

Description Returns the number of entries in the calibration ENR table.

Return value 0 to 81 entries

Query command [:SENSe]:CORRection:ENR:CALibration:TABLe:COUNt?

Common ENR Table Control

[:SENSe]:CORRection:ENR:COMMon[:STATe] OFF|ON|0|1

Description When enabled, the measurement ENR table is used for both calibration and measurement. When disabled, calibration uses its own table.

Default ON

Query command [:SENSe]:CORRection:ENR:COMMon[:STATe]?

Measurement ENR Table Data

[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:DATA <frequency>,<value>{,<frequency>,<value>}

Description Enters data into the current measurement ENR table. Once loaded the table can be stored in a file.

The query returns values in Hz and dB respectively.

Valid input range 1 to 81 tuples

Default units Hz and dB

Query command [:SENSe]:CORRection:ENR:[:MEASurement]:TABLe:DATA?

Measurement ENR Table ID

[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:ID:DATA <ID>

Description Enters the ID of the noise source associated with the measurement ENR table. The ID is stored with the ENR table when saving it to file.

Valid input range Quoted string of up to 12 characters (e.g. '346B').

Query command `[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:ID:DATA?`

Measurement ENR Table Serial Number

[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:SERial:DATA <serial number>

Description Enters the serial number of the noise source associated with the measurement ENR table. The serial number is stored with the ENR table when saving it to file.

Valid input range Quoted string of up to 20 characters (e.g. '2037A00729')

Query command `[:SENSe]:CORRection:ENR:[MEASurement]:TABLe:SERial:DATA?`

Load Calibration ENR Table From SNS Noise Source

[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:SNS

Description Causes the NFA to load ENR data into its measurement ENR table from the attached SNS. Any measurement that is underway when the ENR data is loaded is restarted.

This command gives a settings conflict when no SNS is connected.

Number Of Entries In calibration ENR Table

[:SENSe]:CORRection:ENR[:MEASurement]:TABLe:COUNt?

Description Returns the number of entries in the measurement ENR table.

Return value 0 to 81

Query command [:SENSe]:CORRection:ENR[:MEASurement]:TABLe:COUNt?

Correction, Loss Compensation Commands

Before DUT Loss Compensation Control

[:SENSe]:CORRection:LOSS:BEFore[:STATe] OFF|ON|0|1

Description Enables or disables before DUT loss compensation.

Options
- OFF - loss compensation is disabled.
- ON - loss compensation is enabled.

Default OFF

Query command [:SENSe]:CORRection:LOSS:BEFore[:STATe]?

Before DUT Loss Compensation Mode

[:SENSe]:CORRection:LOSS:BEFore:MODE FIXed|TABLe

Description Sets the mode of operation for before DUT loss compensation.

Options
- FIXed - the before DUT fixed loss compensation value is used.
- TABLe - the before DUT loss compensation table is used.

Default FIXed

Query command [:SENSe]:CORRection:LOSS:BEFore:MODE?

Before DUT Loss Compensation Fixed Value

[:SENSe]:CORRection:LOSS:BEFore:VALue <value>

Description Set the before DUT loss compensation fixed value. This can be given in dB or linear units.

Valid input range -100 to 100 dB

Default 0 dB

Query command [:SENSe]:CORRection:LOSS:BEFore:VALue?

Before DUT Loss Compensation Table Data

[:SENSe]:CORRection:LOSS:BEFore:TABLe:DATA<frequency>,<value>
{,<frequency>,<value>}

Description Enters frequency/loss pairs into the before DUT loss compensation table. This can be up to a maximum of 201 pairs.

NOTE You cannot specify units with this command. Frequencies are assumed to be in Hz and loss values are in dB.

Valid frequency range 0 Hz to 100 GHz

Valid loss range -100 dB to 100 dB

Query command [:SENSe]:CORRection:LOSS:BEFore:TABLe:DATA?

Number of Entries In Before DUT Loss Compensation Table

[:SENSe]:CORRection:LOSS:BEFore:TABLe:COUNt?

Description Returns the number of entries in the before DUT loss compensation table.

Return value 0 to 201

Number of Entries In After DUT Loss Compensation Table

[:SENSe]:CORRection:LOSS:AFTer:TABLe:COUNt?

Description Returns the number of entries in the after DUT loss compensation table.

Return value 0 to 201

After DUT Loss Compensation Control

[:SENSe]:CORRection:LOSS:AFTer[:STATe] OFF|ON|0|1

Description Enables or disables after DUT loss compensation.

Options
- OFF - loss compensation is disabled.
- ON - loss compensation is enabled.

Default OFF

Query command [:SENSe]:CORRection:LOSS:AFTer[:STATe]?

After DUT Loss Compensation Mode

[:SENSe]:CORRection:LOSS:AFTer:MODE FIXed|TABLe

Description Sets the mode of operation for after DUT loss compensation.

Options
- FIXed - the after DUT fixed loss compensation value is used.
- TABLe - the after DUT loss compensation table is used.

Default FIXed

Query command [:SENSe]:CORRection:LOSS:AFTer:MODE?

After DUT Loss Compensation Fixed Value

`[:SENSe]:CORRection:LOSS:AFTer:VALue <value>`

Description Set the after DUT loss compensation fixed value. This can be given in units of dB.

Valid input range -100 to 100 dB

Default 0 dB

Query command `[:SENSe]:CORRection:LOSS:AFTer:VALue?`

After DUT Loss Compensation Table Data

`[:SENSe]:CORRection:LOSS:AFTer:TABLe:DATA <frequency>,<value>{,<frequency>,<value>}`

Description Enters frequency/loss pairs into the after DUT loss table. This can be up to a maximum of 201 pairs.

NOTE You cannot specify units with this command. Frequencies are assumed to be in Hz and loss values are in dB.

Frequency bound 0 Hz to 100 GHz

Loss bound -100 dB to 100 dB

Query command `[:SENSe]:CORRection:LOSS:AFTer:TABLe:DATA?`

Before DUT Temperature

[:SENSe]:CORRection:TEMPerature:BEFore <temperature>

Description Sets the before DUT temperature in units of Kelvin (K), degrees Celsius (CAL) or degrees Fahrenheit (FAR).

Valid input range 0K to 29650000K

Default 0K

Query command `[:SENSe]:CORRection:TEMPerature:BEFore?`

The query returns the value in K.

After DUT Temperature

[:SENSe]:CORRection:TEMPerature:AFTer <temperature>

Description Sets the after DUT temperature in units of Kelvin (K), degrees Celsius (CAL) or degrees Fahrenheit (FAR).

Valid input range 0K to 29650000K

Default 0K

Query command `[:SENSe]:CORRection:TEMPerature:AFTer?`

The query returns the value in K.

Correction, Calibration Commands

Initiate a User Calibration

`[:SENSe]:CORRection:COLLect[:ACQuire] STANdard`

Description Initiates a user calibration.

Correction, Tcold Commands

Automatically Read T_{cold} From SNS Noise Source

[SENSe:]CORRection:TCOLd:SNS[:STATe] OFF|ON|0|1

Description When ON, the NFA periodically obtains T_{cold} values from the attached SNS noise source.

When OFF, either a user specified value or a the default is used.

This command is disabled when no SNS is connected and any attempt to set this command under these circumstances generates a settings conflict.

Query command [SENSe:]CORRection:TCOLd:SNS[:STATe] OFF|ON|0|1?

Set User T_{cold} Value From SNS Noise Source

[SENSe:]CORRection:TCOLd:USER:SET

Description Reads a T_{cold} value from the attached SNS noise source and uses the value obtained the User T_{cold} value. See “User Tcold Value” on page 120.

This command is disabled when no SNS is connected. Any attempt to use this command under these circumstances generates a settings conflict.

User T_{cold} Value

[:SENSe]:CORRection:TCOLd:USER:VALue <temperature>

Description Sets the Tcold value in units of Kelvin (K), degrees Celsius (CAL) or degrees Fahrenheit (FAR). This is the applied value when User Tcold is enabled. User Tcold is overridden when taking temperature readings from the SNS.

Valid input range 0 to 29650000.0K

Default 296.5 K

Query command `[:SENSe]:CORRection:TCOLd:USER:VALue?`

The query returns the value in K.

User T_{cold} Control

[:SENSe]:CORRection:TCOLd:USER[:STATe] OFF|ON|0|1

Description Enables or disables the user Tcold value. When disabled, the default value of 296.5K is used. User Tcold is overridden when taking temperature readings from the SNS.

Default Off

Query command `[:SENSe]:CORRection:TCOLd:USER[:STATe]?`

Frequency Commands

Center Frequency Value

[:SENSe]:FREQuency:CENTer <frequency>|MINimum|MAXimum

Description Sets the center frequency.

The frequency can be entered in units of Hz, kHz, MHz or GHz. The query always returns the value in Hz.

Valid input range

- N8972A — 10.05 MHz to 1.49995 GHz
- N8973A — 10.05 MHz to 2.99995 GHz
- N8974A — 10.05 MHz to 6.69995 GHz
- N8975A — 10.05 MHz to 26.49995 GHz

Default

- N8972A — 0.755 GHz
- N8973A — 1.505 GHz
- N8974A — 1.505 GHz
- N8975A — 14.75 GHz

Query command `[:SENSe]:FREQuency:CENTer?`

Frequency Span Value

[:SENSe]:FREQuency:SPAN<frequency>|MINimum|MAXimum

Description Sets the frequency span.

The frequency can be entered in units of Hz, kHz, MHz or GHz. The query always returns the value in Hz.

Valid input range

- N8972A — 100.0 kHz to 1.49 GHz
- N8973A — 100.0 kHz to 2.99 GHz
- N8974A — 100.0 kHz to 6.69 GHz
- N8975A — 100.0 kHz to 26.49 GHz

Default

- N8972A — 1.49 GHz
- N8973A — 2.99 GHz
- N8974A — 2.99 GHz
- N8975A — 23.5 GHz

Query command [:SENSe]:FREQuency:SPAN?

Start Frequency Value

[:SENSe]:FREQuency:STARt<frequency>|MINimum|MAXimum

Description Sets the start frequency.

The frequency can be entered in units of Hz, kHz, MHz or GHz. The query always returns the value in Hz.

Valid input range

- N8972A — 10.0 MHz to 1.4999 GHz
- N8973A — 10.0 MHz to 2.9999 GHz
- N8974A — 10.0 MHz to 6.6999 GHz
- N8975A — 10.0 MHz to 26.4999 GHz

Default

- N8972A — 10.0 MHz
- N8973A — 10.0 MHz
- N8974A — 10.0 MHz
- N8975A — 3000000001Hz

Query command `[:SENSe]:FREQuency:STARt?`

Stop Frequency Value

[:SENSe]:FREQuency:STOP<frequency>|MINimum|MAXimum

Description

Sets the sweep stop frequency.

The frequency can be entered in units of Hz, kHz, MHz or GHz. The query always returns the value in Hz.

Valid input range

- N8972A — 10.1 MHz to 1.5 GHz
- N8973A — 10.1 MHz to 3.0 GHz
- N8974A — 10.1 MHz to 6.7 GHz
- N8975A — 10.1 MHz to 26.5 GHz

Default

- N8972A — 1.50 GHz
- N8973A — 3.00 GHz
- N8974A — 3.00 GHz
- N8975A — 26.5 GHz

Query command

[:SENSe]:FREQuency:STOP?

Frequency Mode

[:SENSe]:FREQuency:MODE SWEep|FIXed|LIST

Description Selects the method by which measurement frequencies are generated.

Options

- SWEep - frequency values are generated from the start frequency, stop frequency and number of points parameters
- FIXed - the fixed frequency value is used
- LIST - frequencies are taken from a User defined frequency list

Default SWEep

Query command [:SENSe]:FREQuency:MODE?

Fixed Frequency Value

[:SENSe]:FREQuency:FIXed <value>

Description

Sets the frequency used when fixed frequency mode is enabled.

The frequency can be entered in units of Hz, kHz, MHz or GHz. The query always returns the value in Hz.

Valid input range

- N8972A — 10.0 MHz to 1.5 GHz
- N8973A — 10.0 MHz to 3.0 GHz
- N8974A — 10.0 MHz to 6.7 GHz
- N8975A — 10.0 MHz to 26.5 GHz

Default

- N8972A — 0.755 GHz
- N8973A — 1.505 GHz
- N8974A — 1.505 GHz
- N8975A — 14.75 GHz

Query command

`[:SENSe]:FREQuency:FIXed?`

Frequency List Data

[:SENSe]:FREQuency:LIST:DATA <frequency>,<frequency>{,<frequency>}

Description Enters frequency values into the frequency table. The frequency table can hold up to 401 values and you must specify at least 2 values. Once loaded the table can be stored in a file.

You cannot specify units with this command and values are assumed to be Hz. The query returns values in Hz.

Valid input range 2 to 401 entries

Default units Hz

Query command [:SENSe]:FREQuency:LIST:DATA?

Number Of Entries In Frequency List

[:SENSe]:FREQuency:LIST:COUNt?

Description Returns the number of entries in the frequency list.

Return value 0 to 401

Query command [:SENSe]:FREQency:LIST:COUNt?

Sweep Commands

Number Of Points In Swept Measurement

`[:SENSe]:SWEep:POINts <number>`

Description Sets the number of points in a sweep.

Valid input range 2 to 401

Default 11

Query command `[:SENSe]:SWEep:POINts?`

Averaging Commands

Average Number

[:SENSe]:AVERage:COUNt <integer>

Description Specifies the number of times each measurement is sampled during averaging. If the count is 1 then no averaging is performed.

Valid input range 1 to 999

Default 1

Query command [:SENSe]:AVERage:COUNt?

Average Mode

[:SENSe]:AVERage:MODE POINt|SWEep

Description Averaging can be carried out by either averaging each point within a sweep, or by averaging each point over successive sweeps.

NOTE This command is not available in the N8972A Noise Figure Analyzer.

Options

- `POINt` - the selected number of averages are measured at each point before moving to the next point in the sweep. The masurement is complete after one sweep.
- `SWEep` - a single average is measured at each point in the sweep. The result at each point is built up by averaging the results of multiple sweeps until the selected number of averages have been measured at each point.

Default `POINt`

Query command `[:SENSe]:AVERage:MODE?`

Averaging Control

[:SENSe]:AVERage[:STATe] OFF|ON|0|1

Description Enables or disables averaging.

Options
- OFF or 0 - averaging is disabled
- ON or 1 - averaging is enabled

NOTE If averaging is enabled and the number of averages is set to 1, no averaging will take place.

Default OFF

Query command [:SENSe]:AVERage[:STATe]?

Measurement Bandwidth Commands

Measurement Bandwidth

[:SENSe]:BANDwidth|BWIDth[:RESolution]100kHz|200kHz|400kHz|1MHz|2MHz|4MHz

Description Specifies the measurement bandwidth.

NOTE This command is not available in the N8972A Noise Figure Analyzer.

Default 4MHz

Query command `[:SENSe]:BANDwidth|BWIDth[:RESolution]?`

Manual Measurement Commands

Accept Manual Measurement Reading

`[:SENSe]:MANual:ACCept`

Description Used to inform the NFA that the reading is settled and the current hot or cold power can be stored.

This command gives a settings conflict when manual measurement mode is OFF.

Manual Measurement Calibration Control

`[:SENSe]:MANual:CALibration[:STATe] OFF|ON|0|1`

Description When ON calibration is performed, and when OFF measurement is performed.

This command gives a settings conflict when manual measurement mode is OFF.

Default Off

Reset Off

Query command `[:SENSe]:MANual:CALibration[:STATe]?`

Manual Measurement IF Mode

[:SENSe]:MANual:IF:MODE AUTO|HOLD|FIXed

Description Used to control the IF attenuator setting as follows:

- When set to AUTO, the IF attenuator auto-ranging is enabled.
- When set to HOLD, the current IF attenuator setting is held until the selection is changed.
- When set to FIXed, the value specified in IF Attenuator Fixed Value is used.

Query command `[:SENSe]:MANual:IF:MODE?`

Default Auto

Manual Measurement RF Mode

[:SENSe]:MANual:RF:MODE AUTO|HOLD|FIXed

NOTE Microwave attenuators are not applicable to N8972A and N8973A models of NFA.

Description Used to control the RF and microwave attenuator setting as follows:

- when set to AUTO, the RF (or microwave) attenuator auto-ranging is enabled
- when set to HOLD, the current RF attenuator setting is held until the selection is changed
- when set to FIXed, one of the values specified in RF Attenuator Fixed Value or Microwave Attenuator Fixed Value

Default Auto

Query command `[:SENSe]:MANual:RF:MODE?`

Manual Measurement Control

`[:SENSe]:MANual[:STATe] OFF|ON|0|1`

Description Enables and disables Manual Measurement Mode.

When set to ON, the steps required to make a measrement are controlled by the other manual measurement commands.

When set to OFF, all manual measurement remote commands give a settings conflict.

Default Off

Query command `[:SENSe]:MANual[STATe]?`

Manual Measurement Point Select

`[:SENSe]:MANual:POINt <integer>`

Description Allows the user to specify the measurement point at which to make the manual measurement. The point referred to is that derived from the sweep points and frequency settings. This item is not applicable when fixed frequency is selected as this selection, or manual measurement mode being OFF, causes a settings conflict.

Range Lower bound is 1 while the upper bound is dependant on the number of measurement points.

Default `1`

Query command `[:SENSe]:MANual:POINt?`

Manual Measurement Power Query

[:SENSe]:MANual:POWer[:LEVel]?

Description Read the current P_{hot} or P_{cold} value.

Comparing successive results allows you to determine whether the manual power result is a P_{hot} or a P_{cold} reading.

This command gives a settings conflict when manual measurement mode is OFF.

Query command [:SENSe]:MANual:POWer[:LEVel]?

Manual Measurement Fixed RF Attenuator Value

[:SENSe]:MANual:RF:FIXed <ampl>

Description Allows you to specify the fixed RF attenuator setting in dB. The specified value is applied when the RF/Microwave Attenuator Control is set to FIXed and the frequency is less than or equal to 3 GHz.

Valid input range 0 to 40 dB in steps of 5 dB

Default 0 dB

Query command [:SENSe]:MANual:RF:FIXed?

Manual Measurement Fixed Microwave Attenuator Value

[:SENSe]:MANual:MWAVe:FIXed <ampl>

NOTE Microwave attenuators are not applicable to N8972A and N8973A models of NFA.

Description Allows you to specify the fixed microwave attenuator setting. The specified value is applied when FIXed is set and the frequency is above 3 GHz.

Valid input range 0 to 30 dB in steps of 15 dB

Default 0 dB

Query command [:SENSe]:MANual:MWAVe:FIXed?

Manual Measurement Fixed IF Attenuator Value

[:SENSe]:MANual:IF:FIXed <ampl>

Description Allows you to specify the fixed IF attenuator setting. When FIXed is set the specified value is applied.

Valid input range 0 to 70 dB

Default 59 dB

Query command [:SENSe]:MANual:IF:FIXed?

12 SOURce Subsystem

The SOURce Subsystem allows you to select the type of noise source used.

Source Commands

Noise Source Preference

`SOURce:NOISe[:PREFerence] NORMal|SNS`

Description

A NORMAL noise source and a SNS noise source can both be connected to the NFA at the same time. The NFA can only drive one of these sources at any one time. This function allows you to specify which noise source to use.

When set to NORMAL the BNC Noise Source Drive Output is used.

This command gives a settings conflict when no SNS is connected.

Options

- `NORMal` — selects the normal noise source.
- `SNS` — selects the SNS noise source if attached, otherwise the normal noise source is used.

Query command `SOURce:NOISe[:PREFerence]?`

13 STATus Subsystem

The STATus subsystem controls the SCPI defined status register hierarchy. For details on the NFA status registers, see Appendix B , “NFA Status Registers,” on page 233.

Operation Condition Register Commands

The bits defined in the Operation Status Register are:

Table 13-1 Operation Status Register bits

Bit	Meaning when bit asserted
3	Sweep in progress
4	Measurement in progress
7	User calibration in progress

Operation Status Condition Register

`STATus:OPERation:CONDition?`

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

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

Operation Status Enable Register

STATus:OPERation:ENABle <number>

Description This command determines what bits in the Operation Condition Register will set bits in the Operation Event register, which also sets the Operation Status Summary bit (bit 7) in the Status Byte Register. The parameter <number> is the sum of the decimal values of the bits you want to enable.

Valid input range 0 to 32767

Query command STATus:OPERation:ENABle?

Operation Status Event Register

STATus:OPERation[:EVENt]?

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

NOTE The register requires that the equivalent PTR or NTR bits be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the data is cleared.

Valid input range 0 to 32767

Query command STATus:OPERation[:EVENt]?

Operation Status Negative Transition Register

`STATus:OPERation:NTRansition <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST 0

Query command `STATus:OPERation:NTRansition?`

Operation Status Positive Transition Register

`STATus:OPERation:PTRansition <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST 32767 (all 1's)

Query command `STATus:OPERation:PTRansition?`

Questionable Correction Status Register

The bits defined in the Questionable Correction Status register are:

Table 13-2 Questionable Correction Status Register bits

Bit	Meaning when bit asserted
0	User calibration required
1	User calibration failed
2	Uncorrected measurement data
3	User calibration interpolated

Questionable Correction Condition Register

`STATus:QUEStionable:CORRection:CONDition?`

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

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

Questionable Correction Enable Register

STATus:QUEStionable:CORRection:ENABle <number>

Description This command determines what bits in the Questionable Correction Condition Register will set bits in the Questionable Correction Event register, which also sets the Correction Summary bit (bit 10) in the Questionable Status Register. The variable <number> is the sum of the decimal values of the bits you want to enable.

Valid input range 0 to 32767

Factory Preset and *RST 32767 (all 1's)

Query command STATus:QUEStionable:CORRection:ENABle?

Questionable Correction Event Register

STATus:QUEStionable:CORRection[:EVENt]?

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

NOTE The register requires that the equivalent PTR or NTR bits be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the data is cleared.

Questionable Correction Negative Transition Register

STATus:QUEStionable:CORRection:NTRansition <number>

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

Valid input range 0 to 32767

Factory Preset and *RST 0

Query command STATus:QUEStionable:CORRection:NTRansition?

Questionable Correction Positive Transition Register

STATus:QUEStionable:CORRection:PTRansition <number>

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

Valid input range 0 to 32767

Factory Preset and *RST 32767 (all 1's)

Query command STATus:QUEStionable:CORRection:PTRansition?

Questionable Frequency Status Register

The bits defined in this register are:

Table 13-3 Questionable Frequency Status Register bits

Bit	Meaning when bit asserted
1	Frequency reference is unlocked
4	Frequency synthesizer is unlocked

Questionable Frequency Condition Register

`STATus:QUEStionable:FREQuency:CONDition?`

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

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

Questionable Frequency Enable Register

STATus:QUEStionable:FREQuency:ENABle <number>

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

Factory Preset and *RST 32767 (all 1's)

Query command STATus:QUEStionable:FREQuency:ENABle?

Questionable Frequency Event Register

STATus:QUEStionable:FREQuency[:EVENt]?

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

NOTE The register requires that the equivalent PTR or NTR bits be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the data is cleared.

Questionable Frequency Negative Transition Register

`STATus:QUEStionable:FREQuency:NTRansition <number>`

Description This command determines what bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when that bit has a negative transition (1 to 0).

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

Factory Preset and *RST 0

Query command `STATus:QUEStionable:FREQuency:NTRansition?`

Questionable Frequency Positive Transition Register

`STATus:QUEStionable:FREQuency:PTRansition <number>`

Description This command determines what bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when that bit has a positive transition (0 to 1).

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

Factory Preset and *RST 32767 (all 1's)

Query command `STATus:QUEStionable:FREQuency:PTRansition?`

Questionable Status Register

The bits defined in the Questionable Status Register are:

Table 13-4 Questionable Status Register bits

Bit	Meaning when bit asserted
5	Questionable Frequency Event Register bit(s) set
9	Questionable Integrity Event Register bit(s) set
10	Questionable Correction Event Register bit(s) set

Questionable Status Condition Register

`STATus:QUEStionable:CONDition?`

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

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

Questionable Status Enable Register

STATus:QUEStionable:ENABle <number>

Description This command determines what bits in the Questionable Status Condition Register will set bits in the Questionable Status Event register, which also sets the Questionable Status Summary bit (bit3) in the Status Byte Register. The variable <number> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is to have all bits in this enable register set to 0. To have any Questionable Events reported to the Status Byte Register, 1 or more bits need to be set to 1. It is recommended that all bits be enabled in this register. The Status Byte Event Register should be queried after each measurement to check the Questionable Status Summary (bit 3). If it is equal to 1, there was some kind of condition during the test, that might make the test results invalid. If it is equal to 0, this indicates that no hardware problem, or measurement problem was detected by the analyzer that affected the result.

Valid input range 0 to 32767

Factory Preset and *RST: 0

Query command STATus:QUEStionable:ENABle?

Questionable Status Event Register

STATus:QUEStionable[:EVENt]?

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

NOTE The register requires that the equivalent PTR or NTR bits be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the data is cleared.

Questionable Status Negative Transition Register

STATus:QUEStionable:NTRansition <number>

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

Valid input range 0 to 32767

Factory Preset and *RST 0

Query command STATus:QUEStionable:NTRansition?

Questionable Status Positive Transition Register

`STATus:QUEStionable:PTRansition <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST: 32767 (all 1's)

Query command `STATus:QUEStionable:PTRansition?`

Questionable Integrity Status Register

The bits defined in the Questionable Integrity Status Register are:

Table 13-5 Questionable Integrity Status Register bits

Bit	Meaning when bit asserted
1	No result available
4	Phot less than or equal to Pcold
5	Overrange bit
6	Underrange bit
7	Limit line 1 test failed
8	Limit line 2 test failed
9	Limit line 3 test failed
10	Limit line 4 test failed
12	Invalid data

Questionable Integrity Condition Register

`STATus:QUEStionable:INTegrity:CONDition?`

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

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

Questionable Integrity Enable Register

`STATus:QUEStionable:INTegrity:ENABle <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST 32767 (all 1's)

Query command `STATus:QUEStionable:INTegrity:ENABle?`

Questionable Integrity Event Register

`STATus:QUEStionable:INTegrity[:EVENt]?`

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

NOTE The register requires that the equivalent PTR or NTR bits be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the data is cleared.

Questionable Integrity Negative Transition Register

`STATus:QUEStionable:INTegrity:NTRansition <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST 0

Query command `STATus:QUEStionable:INTegrity:NTRansition?`

Questionable Integrity Positive Transition Register

`STATus:QUEStionable:INTegrity:PTRansition <number>`

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

Valid input range 0 to 32767

Factory Preset and *RST 0

Query command `STATus:QUEStionable:INTegrity:PTRansition?`

Status Preset

Status Preset

STATus:PRESet

Description

Sets bits in the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEue, IEEE 488.2 ESE, and SRE Registers.

14 SYSTem Subsystem

The SYSTem Subsystem sets the controls and parameters associated with overall system communication. These functions are not related to instrument performance. Examples include functions for performing general housekeeping and global configuration settings.

External LO Control

External LO control

SYSTem:CONFigure:LOSCillator:CONTrol[:STATe] OFF|ON|0|1

Description Enables or disables external LO control.

Default 0

Query command SYSTem:CONFigure:LOSCillator:CONTrol[:STATe]?

External LO Type

SYSTem:CONFigure:LOSCillator:TYPE SCPI|CUSTom

Description Selects whether the LO is a SCPI device or it requires a custom setup.

Default SCPI

Query command SYSTem:CONFigure:LOSCillator:TYPE?

External LO Auxiliary Command

SYSTem:CONFigure:LOSCillator:COMMand:AUXiliary '<command>'

Description Defines the LO auxiliary command.

Valid input range Quoted string of up to 79 characters

Default 'OUTP:STAT ON'

Query command SYSTem:CONFigure:LOSCillator:COMMand:AUXiliary?

External LO Frequency Prefix

SYSTem:CONFigure:LOSCillator:COMMand:FREQuency:PREFix '<prefix>'

Description Defines the LO frequency command where the prefix precedes the frequency value to be sent to the LO.

Valid input range Quoted string of up to 79 characters

Default 'FREQ'

Query command SYSTem:CONFigure:LOSCillator:COMMand:FREQuency:PREFix?

External LO Frequency Suffix

SYSTem:CONFigure:LOSCillator:COMMand:FREQuency:SUFFix '<suffix>'

Description Defines the LO frequency command where the suffix is appended to the frequency value to be sent to the LO.

Valid input range Quoted string of up to 79 characters

Default ' HZ'

Query command SYSTem:CONFigure:LOSCillator:COMMand:FREQuency:SUFFix?

External LO Power Prefix

SYSTem:CONFigure:LOSCillator:COMMand:POWer:PREFix '<prefix>''

Description Defines the LO power command prefix where the prefix precedes the power value to be sent to the LO.

Valid input range Quoted string of up to 79 characters

Default 'POW'

Query command SYSTem:CONFigure:LOSCillator:COMMand:POWer:PREFix?

External LO Power Suffix

SYSTem:CONFigure:LOSCillator:COMMand:POWer:SUFFix '<suffix>'

Description Defines the LO power command suffix where the suffix is appended to the power value to be sent to the LO.

Valid input range Quoted string of up to 79 characters

Default ' DBM'

Query command SYSTem:CONFigure:LOSCillator:COMMand:POWer:SUFFix?

External LO Maximum Frequency

SYSTem:CONFigure:LOSCillator:PARameter:MAXimum[:FREQuency] <frequency>

Description Defines the maximum LO frequency.

The value can be given in units of Hz, kHz, MHz or GHz.

Valid input range 10.001 kHz to 300 GHz

Default 40.0 GHz

Query command SYSTem:CONFigure:LOSCillator:PARameter:MAXimum[:FREQuency]?

The query always returns the value in Hz.

External LO Minimum Frequency

SYSTem:CONFigure:LOSCillator:PARameter:MINimum[:FREQuency] <frequency>

Description Defines the minimum LO frequency. The value can be given in units of Hz, kHz, MHz or GHz.

Valid input range 1 Hz to 299.99999 GHz

Default 10.0 MHz

Query command SYSTem:CONFigure:LOSCillator:PARameter:MINimum[:FREQuency]?

The query always returns the value in Hz.

External LO Power Level

SYSTem:CONFigure:LOSCillator:PARameter:POWer[:LEVel] <ampl>

Description Defines the LO power level in dBm.

Valid input range -100 dBm to 100 dBm

Default 0.0 dBm

Query command SYSTem:CONFigure:LOSCillator:PARameter:POWer[:LEVel]?

External LO Settling Time

SYSTem:CONFigure:LOSCillator:PARameter:SETTling[:TIME] <time>

Description Defines the LO settling time in seconds.

Valid input range 0 to 100 seconds

Default 100.0 milliseconds

Query command SYSTem:CONFigure:LOSCillator:PARameter:SETTling[:TIMe]?

External LO Multiplier

SYSTem:CONFigure:LOSCillator:PARameter:MULTiplier <integer>

Description Defines the LO frequency multiplier value.

Valid input range Integer, 1 to 1000000000

Default 1

Query command SYSTem:CONFigure:LOSCillator:PARameter:MULTiplier?

GPIB and LO GPIB Commands

Instrument GPIB Address

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess <integer>

Description Sets the GPIB address of the noise figure analyzer.

Valid input range Integer, 0 to 29

Default 8

Query command SYSTem:COMMunicate:GPIB[:SELF]:ADDRess?

External LO GPIB Address

SYSTem:COMMunicate:GPIB:LOSCillator:ADDRess <integer>

Description Sets the GPIB address of the external LO.

Valid input range Integer, 0 to 30

Default 19

Query command SYSTem:COMMunicate:GPIB:LOSCillator:ADDRess?

LO GPIB Interface Address

SYSTem:COMMunicate:GPIB:LOGPib:ADDRess <integer>

Description Sets the GPIB address of the LO GPIB interface. This is the address that the system LO uses to communicate with the noise figure analyzer.

Valid input range Integer, 0 to 30

Default value 8

Query command SYSTem:COMMunicate:GPIB:LOGPib:ADDRess?

Power ON State Commands

Power On State

SYSTem:PON:TYPE PRESet|LAST

Description Sets the defined instrument conditions after a power-on or Preset.

- PRESet — the instrument state is either factory or user preset as set by the command listed in “Preset Type” on page 169
- LAST — presets the instrument to the conditions at the time of power down

Default PRESet

Query command SYSTem:PON:TYPE?

Instrument Preset

SYSTem:PRESet

Description Returns the instrument to a set of defined conditions. The particular set is selected by SYSTem:PRESet:TYPE. This command does not change any persistent parameters.

Preset Persistent State

SYSTem:PRESet:PERSistent

Description Sets the persistent state values to their factory defaults. These include for example, GPIB address, power-on type, and preset type.

Preset Type

SYSTem:PRESet:TYPE FACTory|USER

Description Selects the instrument state that is asserted after a preset.

- FACTory — the instrument factory defaults are used
- USER — the state that was active when the User last executed the command listed in “Save User Preset State” on page 169

Default Factory

Query command SYSTem:PRESet:TYPE?

Save User Preset State

SYSTem:PRESet[:USER]:SAVE

Description Saves the current instrument state as the user preset state.

Time Since Instrument Was Switched On

SYSTem:PON:TIME?

Description Returns the number of seconds since the instrument was last powered on.

Time Since Instrument Was Switched On For First Time

SYSTem:PON:ETIMe?

Description Returns the number of seconds since the instrument was powered on for the very first time.

Remote Interface Command

Communication Port Select

SYSTem:COMMunicate:PORT GPIB|SERial

Description Sets the remote interface communications port.

NOTE The settings take effect after the next power cycle (instrument power off, then power on).

Default value GPIB

Query command SYSTem:COMMunicate:PORT?

Serial Port Commands

Serial Port DTR Control

`SYSTem:COMMunicate:SERial:CONTrol:DTR OFF|ON|IBFull`

Description Controls the serial port DTR line.

Command options
- `OFF` - DTR is de-asserted (i.e. disable serial port)
- `ON` - DTR is asserted - (i.e. enable serial port)
- `IBFull` - DTR is used for receive data pacing

Default OFF

Query command `SYSTem:COMMunicate:SERial:CONTrol:DTR?`

Serial Port RTS Control

`SYSTem:COMMunicate:SERial:CONTrol:RTS OFF|ON|IBFull`

Description Controls the serial port RTS line.

Command options
- `OFF` — RTS is de-asserted (i.e. no transmission pending).
- `ON` — RTS is asserted (i.e. transmission pending).
- `IBFull` — RTS is used for receive data pacing.

Default OFF

Query command `SYSTem:COMMunicate:SERial:CONTrol:RTS?`

Serial Port Baud Rate

SYSTem:COMMunicate:SERial[:RECeive]:BAUD <integer>

Description Specifies the serial port baud rate

Valid input 1200 | 2400 | 4800 | 9600 | 19200 | 38400

Default 9600

Query command SYSTem:COMMunicate:SERial[:RECeive]:BAUD?

Serial Port Receive Pacing

SYSTem:COMMunicate:SERial[:RECeive]:PACE XON|NONE

Description Enable or disable XON/XOFF receive pacing.

Default Persistent State with factory default XON

Query command SYSTem:COMMunicate:SERial[:RECeive]:PACE?

Serial Port Transmit Pacing

SYSTem:COMMunicate:SERial:TRANsmit:PACE XON|NONE

Description Enable or disable XON/XOFF transmit pacing.

Default Persistent State with factory default of XON

Query command SYSTem:COMMunicate:SERial:TRANsmit:PACE?

System Configuration Commands

Hardware Configuration Query

SYSTem:CONFigure:HARDware?

Description

Returns string of information about the current hardware in the instrument.

System Configuration Query

SYSTem:CONFigure[:SYSTem]?

Description

Returns a fixed length arbitrary data block containing information about the current system settings of the instrument. The following is an example of what you should see:

- Product Number: N8975A
- Serial Number: GB40390000
- Firmware Revision: A.01.00
- Revision Date: Nov 17 2000 15:36:10
- Bootrom Revision:310
- ROM Size: 16777216

Instrument Options Query

SYSTem:OPTions?

Description Returns a quoted string containing a comma separated list of the options that are currently installed.

It is a comma separated list such as: “1DS,1D6,UTA,A4H,A4J,1DN”

SCPI Version Query

SYSTem:VERSion?

Description Returns the SCPI version number with which the instrument complies.

SCPI Commands Query

SYSTem:HELP:HEADers?

Description Outputs a fixed length arbitrary data block containing the list of SCPI commands that the instrument understands.

Error Queue Query

SYSTem:ERRor[:NEXT]?

Description This command queries the earliest entry to the error queue and then deletes that entry. *CLS clears the entire error queue.

System Date

SYSTem:DATE <year>,<month>,<day>

Description

- Year is a 4-digit integer
- Month is an integer 1 to 12
- Day is an integer 1 to 31 (depending on the month)

Sets the date of the real-time clock of the instrument.

Query command SYSTem:DATE?

System Time

SYSTem:TIME <hour>,<min>,<sec>

Description Sets the time of the real-time clock of the instrument in hours, minutes and seconds.

Valid input range
- Hour — integer, 0 to 23
- Minute — integer, 0 to 59
- Second — integer, 0 to 59

Query command SYSTem:TIME?

Set Instrument State

SYSTem:SET <state>

Description Sets the instrument state from the given state information. The command and state information are generated by the *LRN? command.

15 TRACe Subsystem

Trace Commands

Corrected Trace Amplitude Query

TRACe[:DATA]:CORRected:AMPLitude[:VALue]? <trace>,<frequency>[,<units>]

Description

Return the amplitude value of the given trace at the specified frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- GAIN - the units applicable to the gain trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.

Corrected Trace Maximum Query

TRACe[:DATA]:CORRected:AMPLitude:MAXimum? <trace>[,<units>]

Description

Returns the maximum amplitude of the given trace and the frequency at which it occurs. The returned values are comma separated and the amplitude value precedes the frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

The returned frequency value is in Hz.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- GAIN - the units applicable to the gain trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.

Corrected Trace Minimum Query

`TRACe[:DATA]:CORRected:AMPLitude:MINimum? <trace>[,<units>]`

Description

Returns the minimum amplitude of the given trace and the frequency at which it occurs. The returned values are comma separated and the amplitude value precedes the frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

The returned frequency is value is in Hz.

Options

Parameter <trace> is one of:

- `NFIGure` - the units applicable to the noise figure trace are `DB` or `LINear`. The default unit is `DB`.
- `GAIN` - the units applicable to the gain trace are `DB` or `LINear`. The default unit is `DB`.
- `PHOT` - the units applicable to the hot power trace are `DB` or `LINear`. The default unit is `DB`.
- `PCOLd` - the units applicable to the cold power trace are `DB` or `LINear`. The default unit is `DB`.
- `TEFFective` - the units applicable to the effective temperature trace are `K` (Kelvin), `CEL` (celsius) or `FAR` (fahrenheit). The default unit is `K`.

Corrected Trace Peak To Peak Query

TRACe[:DATA]:CORRected:PTPeak? <trace>[,<units>]

Description

Returns the difference between the maximum and minimum amplitude values on the given trace and the frequency difference between the two frequencies where the maximum and minimum amplitudes occur. The returned values are comma separated and the amplitude value precedes the frequency value.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- GAIN - the units applicable to the gain trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.

Corrected Trace Delta Query

TRACe[:DATA]:CORRected:DELTa?
<trace>,<frequency1>,<frequency2>[,<units>]

Description

Returns the value obtained by subtracting the amplitude at frequency1 from that at frequency2.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- GAIN - the units applicable to the gain trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.

Uncorrected Trace Amplitude Query

TRACe[:DATA]:UNCorrected:AMPLitude[:VALue]?
<trace>,<frequency>[,<units>]

Description

Returns the amplitude value of the given trace at the specified frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.
- YFACtor - the units applicable to the y-factor trace are DB or LINear. The default unit is DB.

Uncorrected Trace Maximum Query

TRACe[:DATA]:UNCorrected:AMPLitude:MAXimum? <trace>[,<units>]

Description

Returns the maximum amplitude of the given trace and the frequency point at which it occurs. The returned values are comma separated and the amplitude value precedes the frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.
- YFACtor - the units applicable to the y-factor trace are DB or LINear. The default unit is DB.

Uncorrected Trace Minimum Query

TRACe[:DATA]:UNCorrected:AMPLitude:MINimum? <trace>[,<units>]

Description

Returns the minimum amplitude of the given trace and the frequency point at which it occurs. The returned values are comma separated and the amplitude value precedes the frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.
- YFACtor - the units applicable to the y-factor trace are DB or LINear. The default unit is DB.

Uncorrected Trace Peak To Peak Query

TRACe[:DATA]:UNCorrected:PTPeak? <trace>[,<units>]

Description

Returns the difference between the maximum and minimum amplitude values on the given trace and the frequency difference between the two frequency points where the maximum and minimum occur. The returned values are comma separated and the amplitude value precedes the frequency.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.
- YFACtor - the units applicable to the y-factor trace are DB or LINear. The default unit is DB.

Uncorrected Trace Delta Query

TRACe[:DATA]:UNCorrected:DELTa?
<trace>,<frequency1>,<frequency2>[,<units>]

Description

Returns the value obtained by subtracting the amplitude at frequency1 from that at frequency2.

If the optional units parameter is supplied then the amplitude value will be returned in those units. If the units parameter is omitted then the amplitude value will be in the default units for the given trace.

Options

Parameter <trace> is one of:

- NFIGure - the units applicable to the noise figure trace are DB or LINear. The default unit is DB.
- PHOT - the units applicable to the hot power trace are DB or LINear. The default unit is DB.
- PCOLd - the units applicable to the cold power trace are DB or LINear. The default unit is DB.
- TEFFective - the units applicable to the effective temperature trace are K (Kelvin), CEL (celsius) or FAR (fahrenheit). The default unit is K.
- YFACtor - the units applicable to the y-factor trace are DB or LINear. The default unit is DB.

16 TRIGger Subsystem

Trigger Commands

Abort Measurement

ABORt

Description Stops any measurement in progress.

If INITiate:CONTinuous is OFF (single measurement mode), then INITiate:IMMediate will start a new single measurement. If INITiate:CONTinuous is ON (continuous measurement mode), a new measurement begins immediately.

Continuous Measurement Control

INITiate:CONTinuous[:ALL] OFF|ON|0|1

Description Selects whether a continuous measurement is initiated or not.

When set to ON, after each measurement another measurement is immediately initiated.

When set to OFF, the instrument remains in an “idle” state until CONTinuous is set to ON or an INITiate[:IMMediate] command is received. On receiving the INITiate[:IMMediate] command, the NFA will complete a single measurement and then return to the “idle” state.

Factory preset Continuous

Query command INITiate:CONTinuous[:ALL]?

Initiate a Measurement

`INITiate[:IMMediate]`

Description

Initiate a measurement.

If the instrument is measuring when this command is issued then the command is ignored and error -213,"Init ignored" is placed in the error queue.

See also "Trigger" on page 18 and "Initiate a User Calibration" on page 118.

A Error Messages

This chapter contains a description of each status and error message. Note that the messages are listed in alphabetical order.

Error Messages

The analyzer can generate various messages that appear on the display during operation. There are three types of messages.

- Informational Messages provide information that requires no intervention. These messages appear in the status line at the bottom of the display, in green if you have a color display. The message remains until you preset the analyzer, press **ESC**, or another message is displayed in the status line.
- User Error Messages appear when an attempt has been made to set a parameter incorrectly or an operation has failed (such as saving a file). These messages are often generated during remote operation when an invalid programming command has been entered. These messages appear in the status line at the bottom of the display, in yellow if you have a color display. The message will remain until you preset the analyzer, press **ESC**, or another message is displayed in the status line. A summary of the last 10 error messages may be viewed by pressing, **System** then **Show Errors**. When generated by activity on the remote interface, the messages are output to the remote bus. When output to the remote interface, they are preceded by an error number. Note that the error number is not displayed under the **System**, **Show Errors** key sequence.
- Pop-up Messages indicate a condition that may require intervention. They display in the middle of the display in a framed box. The message remains until the appropriate intervention has taken place or the condition is corrected.

Informational Messages

The following messages provide information that requires no intervention. The information provided in brackets, for example <filename> or <name> is a variable that represents a specific input provided previously.

`<filename> file loaded`

The filename indicated has been successfully loaded.

`<filename> file saved`

The filename indicated has been successfully saved.

`<filename> file copied`

The filename indicated has been successfully copied.

`<filename> file deleted`

The filename indicated has been successfully deleted.

`<filename1> file renamed to <filename2>`

Filename1 has been successfully renamed to filename2.

`Volume <name> formatted`

The indicated disk has been successfully formatted.

`Zoom active in graph mode only`

The  key is only active when display format is set to **Graph**.

`Zoom inactive when showing combined graph`

The  key is not active if the display format is set to **Combined**.

`User cal now valid`

Previously invalidated user cal is now valid due to change of instrument parameter(s).

`ENR table will be extrapolated`

The measurement requires ENR values beyond the limits of the existing ENR table.

`User cal will be interpolated`

For a corrected measurement, the measurement frequencies do not coincide with the user cal frequencies.

`Memory trace invalidated`

A change of instrument parameter has caused the memory trace to be invalidated (removed from screen and no longer selectable).

`Maximum number of entries in table reached`

The maximum number of entries in the ENR table, frequency list or limit line table has been reached.

`Duplicate frequency entered in table, old entry replaced`

A duplicate entry was made in either the ENR table, frequency list, limit line table or loss table. The previous entry is replaced with the new entry.

`Each result type selected must differ from all others`

An attempt was made to select the same result type for both of the two displayed result types.

Error Queues

When a user-error condition occurs in the instrument as a result of SCPI activity, it is reported to both the front-panel display-error queue and the SCPI (remote interface) error queue. If it is a result of front-panel activity it reports to the front panel display error queue, and may also report to the SCPI error queue depending on the error. These two queues are viewed and managed separately.

Error messages have a signed error number followed by some error text in double quotes. Negative error numbers are for predefined SCPI errors, for example error -350, “Queue overflow” which is issued if an error occurs when the error queue is already full. Positive errors are instrument specific.

The query used to get the head of the error queue is `SYSTEM:ERROR:NEXT?`. It can only retrieve one error at a time.

The special error message +0, “No error” indicates that the error queue is empty. You can query the error queue as often as you like, when it is empty you just keep getting +0, “No error”.

A single command or query can generate more than one error message. For this reason it is best to drain the error queue after each command or query. If not, you will lose track of what commands caused what errors.

Errors can occur that are not directly related to the last command issued. You can use status information to find out if your command generated an error. Status information can also tell you if some other type of error has occurred. However, if the status information indicates there are different types of error in the error queue, you cannot know which of the errors was caused by the last command unless it is obvious from the error itself.

Table A-1 Characteristics of the Error Queues

Characteristic	**Front Panel Display Error Queue**	**SCPI Remote Interface Error Queue**
Capacity (#errors)	10	30
Overflow Handling	Circular (rotating). Drops oldest error as new error comes in.	Linear, first-in/first-out. Replaces newest error with: `-350,Queue overflow`
Viewing Entries	Press: **System**, **Show Errors**	Use SCPI query `SYSTem:ERRor?`
Clearing the Queue	Press: **System**, **Show Errors**, **Clear Error Queue**	Power up Send a `*CLS` command Read last item in the queue

Error Message Format

The system-defined error numbers are chosen on an enumerated (“1 of N”) basis. The error messages are listed in alphabetical order within each error message type section.

In this chapter, an explanation is included with each error to further clarify its meaning. The last error described in each class (for example, -400, -300, -200, -100) is a “generic” error.

Error messages appear at the bottom of the display.

Error Message Types

Events do not generate more than one type of error. For example, an event that generates a query error will not generate a device-specific, execution, or command error.

Errors -499 to -400 These errors indicate that the instrument output queue control has detected a problem with the message exchange protocol described in IEEE 488.2, Chapter 6. Errors in this class set the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1). These errors correspond to message exchange protocol errors described in IEEE 488.2, 6.5. In this case:

- Either an attempt is being made to read data from the output queue when no output is either present or pending, or
- data in the output queue has been lost.

Errors -199 to -100 These errors indicate that the instrument parser detected an IEEE 488.2 syntax error. Errors in this class set the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1). In this case:

- Either an IEEE 488.2 syntax error has been detected by the parser (a control-to-device message was received that is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates device listening formats or whose type is unacceptable to the device.), or
- an unrecognized header was received. These include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.

Errors 201 to 799 These errors indicate that a device operation did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. Errors in this class set the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1).

The <error_message> string for a positive error is not defined by SCPI.

Errors -299 to -200 These errors indicate that an error has been detected by the instrument's execution control block. The occurrence of any error in this class shall cause the execution error bit (bit 4) in the event status register (IEEE 488.2, section 11.5.1) to be set. One of the following events has occurred:

- A <PROGRAM DATA> element following a header was evaluated by the device as outside of its legal input range or is otherwise inconsistent with the device's capabilities.
- A valid program message could not be properly executed due to some device condition.

Execution errors shall be reported by the device after rounding and expression evaluation operations have taken place. Rounding a numeric data element shall not be reported as an execution error. Events that generate execution errors shall not generate Command errors, device-specific errors, or Query errors.

No Error

Error 0

0 `No error`

The queue is empty. Every error in the queue has been read or the queue was purposely cleared by power-on or `*CLS`.

Query Errors

Errors -499 to -400

The instrument output queue control has detected a problem with the message exchange protocol described in IEEE 488.2, Chapter 6. Errors in this class set the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1). These errors correspond to message exchange protocol errors described in IEEE 488.2, 6.5.

In this case, either an attempt is being made to read data from the output queue when no output is either present or pending, or data in the output queue has been lost.

-440 `Query UNTERMINATED after indefinite response`

Indicates that a query was received in the same program message after a query requesting an indefinite response was executed (see IEEE 488.2, 6.3.7.5).

-430 `Query DEADLOCKED`

Indicates that a SCPI output queue has filled, preventing further SCPI command execution, and there is no more room left in the corresponding SCPI input queue to accept a query to read from the output queue. The system automatically discards output to correct the deadlock.

-420 `Query UNTERMINATED`

Indicates that a condition causing an UNTERMINATED query error occurred (see IEEE 488.2, 6.3.2.2). For example, the device was addressed to talk and an incomplete program message was received.

-410 `Query INTERRUPTED`

Indicates that a condition causing an INTERRUPTED query error occurred (see IEEE 488.2, 6.3.2.7). For example, a query was followed by `DAB` or `GET` before a response was completely sent.

-400 `Query Error`

This is a generic query error for devices that cannot detect more specific errors. The code indicates only that a query error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.

Command Errors

Errors -199 to -100

The instrument parser detected an IEEE 488.2 syntax error. Errors in this class set the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1). In this case:

- Either an IEEE 488.2 syntax error has been detected by the parser (a control-to-device message was received that is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates device listening formats or whose type is unacceptable to the device.), or
- an unrecognized header was received. These include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.

-178 `Expression data not allowed`

A legal expression data was encountered, but was not allowed by the device at this point in parsing.

-171 `Invalid expression`

The expression data element was invalid (see IEEE 488.2, 7.7.7.2). For example, unmatched parentheses or an illegal character.

-170 `Expression error`

This error, as well as error -178, is generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.

-168 `Block data not allowed`

A legal block data element was encountered, but not allowed by the device at this point in the parsing.

-161 `Invalid block data`

A block data element was expected, but was invalid (see IEEE 488.2, 7.7.6.2). For example, an `END` message was received before the end length was satisfied.

-160 `Block data error`

This error, as well as error -168, is generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error.

-158 `String data not allowed`

A string data element was encountered, but not allowed by the device at this point in the parsing.

-151 `Invalid string data`

A string data element was expected, but was invalid (see IEEE 488.2, 7.7.5.2). For example, an `END` message was received before the terminal quote character.

-150 `String data error`

This error, as well as error -158, is generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error.

-148 `Character data not allowed`

A legal character data element was encountered where prohibited by the device.

-144 `Character data too long`

The character data element contains more than twelve characters (see IEEE 488.2, 7.7.1.4).

-141 `Invalid character data`

Either the character data element contains an invalid character or the particular element received is not valid for the header.

-140 `Character data error`

This error, as well as errors -144 and -148, are generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.

-138 `Suffix not allowed`

A suffix was encountered after a numeric element which does not allow suffixes.

-134 `Suffix too long`

The suffix contained more than twelve characters (see IEEE 488.2, 7.7.3.4).

-131 `Invalid suffix`

The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.

-130 `Suffix error`

This error, as well as errors -134 and -138, are generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.

-128 `Numeric data not allowed`

A legal numeric data element was received, but the device does not accept one in this position for the header.

-124 `Too many digits`

The mantissa of a decimal-numeric data element contained more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).

-123 `Exponent too large`

The magnitude of an exponent was greater than 32000 (see IEEE 488.2, 7.7.2.4.1).

-121 `Invalid character in number`

An invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a “9” in octal data.

-120 `Numeric data error`

This error, as well as error -128, is generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error message is used if the device cannot detect a more specific error.

-114 `Header suffix out of range`

The value of a header suffix attached to a program mnemonic makes the header invalid.

-113 `Undefined header`

The header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device.

-112 `Program mnemonic too long`

The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).

-111 `Header separator error`

A character which is not a legal header separator was encountered while parsing the header.

-110 `Command header error`

An error was detected in the header. This message is used when the device cannot detect the more specific errors described for errors -111 through -119.

-109 `Missing parameter`

Fewer parameters were received than required for the header. For example, the `*ESE` common command requires one parameter, so receiving `*ESE` is not allowed.

-108 `Parameter not allowed`

More parameters were received than expected for the header. For example, the `*ESE` common command only accepts one parameter, so receiving `*ESE 0,1` is not allowed.

-105 `GET not allowed`

A Group Execute Trigger was received within a program message (see IEEE 488.2, 7.7). Correct the GPIB controller program so that the `GET` does not occur within a line of GPIB program code.

-104 `Data type error`

The parser recognized a data element that is not allowed. For example, numeric or string data was expected, but block data was encountered.

-103 `Invalid separator`

The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit.

-102 Syntax error

An unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.

-101 `Invalid character`

A syntactic command contains a character which is invalid for that type. For example, a header containing an ampersand, SETUP&. This error might be used in place of error numbers -114, -121, -141 and some others.

-100 `Command error`

This is a generic syntax error for devices that cannot detect more specific errors. The code indicates only that a command error as defined in IEE 488.2, 11.5.1.1.4 has occurred.

Device-Specific Errors

Errors -399 to -300

Some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. Errors in this class set the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1).

The <error_message> string for a *positive* error is not defined by SCPI.

-350 `Queue Overflow`

There is no room in the error queue and an error occurred but was not recorded.

-330 `Self-Test Failed`

A self-test error occurred due to one of the following reasons:

- `IF filter offset x out of range`
- `IF gain out of range`
- `IF pad[x][y] value out of range`
- `Microwave range change` *x* `to` *y*
- `RF amp[x] floor too high`
- `RF cal x out of range amp[y]`
- `RF gain (x) out of range`
- `RF pad[x] value out of range`
- `Tuner EEPROM cal value out of range`

Errors 201 to 799

216 `Invalid baud rate`

Attempt to use invalid baud rate. Refer to User's Guide for valid rates.

217 `RS-232 Interface Error`

An error occurred on the serial interface due to one of the following reasons:

- `Input data overrun`

  An error occurred on the serial interface.

- `Input data parity`

  An error occurred on the serial interface.

- `Input data framing`

  An error occurred on the serial interface.

- `Output data timeout`

  An error occurred on the serial interface

- `Command input timeout`

  An error occurred on the serial interface.

219 `Command not valid in this model`

Indicates that the command sent from the remote interface does not apply to this model number.

300 `IF autorange failed`

The IF section could not be autoranged because of one of the following:

- `RF att. is fixed`

  The IF section could not be autoranged because the RF front-end attenuation is fixed.

- `RF att. limit reached`

  The IF section could not be autoranged because the RF front-end attenuation limit is reached.

301 `LO GPIB error`

An LO GPIB error occurred because of one of the following:

- `Did not become system controller`

  An attempt to become system controller failed, possibly because another controller is present on the LO GPIB bus.

- `Need to be system controller`

  To perform the required action, the NFA needs to be the system controller on the LO GPIB bus and is not because a prior attempt to become the system controller failed.

- `Controller collision`

  Another controller on the LO GPIB has attempted to use the bus concurrently with the NFA.

- `Address bus timeout`

  Attempted to address bus and failed — check cabling connections.

- `Write command timeout`

  Attempt to write command to device failed — check device address is correct.

- `Read response timeout`

  Attempt to read response from device failed - check device address is not the same as the LO GPIB address.

302 `IF PLD error;Power detector read timed out`

A read of the IF section power detector timed out.

303 `User cal invalidated`

The existing user cal has been invalidated because of one of the following reasons:

- `Meas mode changed`

  The existing user cal has been invalidated because the measurement mode has been changed from that used for user cal.

- `Freq outside cal range`

  The existing user cal has been invalidated because the current measurement frequencies lie partially or wholly outside the range of frequencies used for user cal.

- `Fixed IF changed`

  The existing user cal has been invalidated because the fixed IF frequency has been changed from that used for user cal.

- `Fixed LO changed`

  The existing user cal has been invalidated because the fixed LO frequency has been changed from that used for user cal.

- `Sideband changed`

  The existing user cal has been invalidated because the sideband has been changed from that used for user cal.

304 `Alignment failed`

The alignment failed because of one of the following reasons:

- `Noise greater than signal`

  The reading at the IF detector was greater when only the noise floor of the instrument was present compared to when the alignment CW signal was present.

- `Gain less than 0`

  During alignment, the measured value of the IF section gain was less than 0.

305 `Mode setup error`

A mode setup error occurred because of one of the following:

- `System input frequency out of range`

  One or more system input frequencies are out of range. If using a frequency list, check that all entries are valid for current measurement mode.

- `External LO frequency out of range`

  One or more external LO frequencies are out of range. Check that the LO frequency limits are set correctly and check the entered measurement frequencies and measurement mode.

- `Stop freq must be less than fixed LO freq`

  The current measurement mode requires that the stop frequency must be less than the fixed LO frequency.

- `Start freq must be greater than start IF freq`

  The current measurement mode requires that the start RF (input to DUT) frequency must be greater than the start IF (output from DUT) frequency.

- `LO - Stop freq must be >= min system input freq`

  The current measurement mode requires that the stop RF (input to DUT) frequency must be more than the minimum system input frequency away from the fixed LO frequency.

- `Start freq must be greater than fixed LO freq`

  The current measurement mode requires that the start frequency must be greater than the fixed LO frequency.

- `Stop IF freq must be less than fixed LO freq`

  The current measurement mode requires that the stop IF (output to DUT) frequency must less than the fixed LO frequency.

- `Start - LO freq must be >= min system input freq`

  The current measurement mode requires that the start RF (input to DUT) frequency must be more than the minimum system input frequency away from the fixed LO frequency.

- `Stop freq must be less than stop RF freq`

  The current measurement mode requires that the stop IF (output to DUT) frequency must be less than the stop RF (input to DUT) frequency.

- `Start freq must be greater than start RF freq`

  The current measurement mode requires that the start IF (output to DUT) frequency must be greater than the start RF (input to DUT) frequency.

- `Stop RF freq must be less than fixed LO freq`

  The current measurement mode requires that the stop RF (input to DUT) frequency must be less than the fixed LO frequency.

- `Start freq must be greater than fixed IF freq`

  The current measurement mode requires that the start RF (input to DUT) frequency must be greater than the fixed IF frequency.

- `Start LO freq must be greater than fixed IF freq`

  The current measurement mode requires that the start LO frequency must be greater than the fixed IF frequency.

- `Stop freq must be less than fixed IF freq`

  The current measurement mode requires that the stop RF (input to DUT) frequency must be less than the fixed IF frequency.

- `Stop freq must be less than stop LO freq`

  The current measurement mode requires that the stop RF (input to DUT) frequency must be less than the stop LO frequency.

306 `Invalid input attenuation`

An attempt was made to set an invalid RF front-end attenuation limit for calibration.

307 `Input attenuation x dB not calibrated`

Corrected measurements have been requested and the required RF front-end attenuation setting of x dB has not been calibrated.

308 `Invalid frequency list for measurement mode`

A frequency within the frequency list cannot be used to make a measurement in the current mode.

309 `No entries in frequency list`

A measurement was attempted with List frequency mode or a SCPI query of the frequency list table was made and the frequency list table is empty.

310 `No entries in ENR table`

A measurement was attempted or a SCPI query of an ENR table was made and there were no entries in the relevant ENR table (Common, Meas or Cal).

311 `No entries in limit line table`

An attempt is made to either display or test against a limit line table, which has no entries.

312 `RF re-range required: Meas. restarted`

During a continuous measurement, a change of RF front-end attenuation was required. To do this the measurement needs to be restarted.

313 `IF over range req. RF re-range: Meas. restarted`

During a continuous measurement, a IF section over range condition occurred, requiring a change of RF front-end attenuation. To do this the measurement needs to be restarted.

314 `No entries in loss table`

A measurement is attempted or a SCPI query of a before of after loss table is made and there are no entries in the relevant loss table.

315 `Microwave input attenuation` *x* `dB not calibrated`

Corrected measurements have been requested and the required microwave front-end attenuation setting of *x* dB has not been calibrated.

316 `Thot must be greater than Tcold`

A spot Thot has been specified which is not greater than Tcold.

500 `Hardware config error`

A hardware configuration error occurred due to one of the following reasons:

- `Unknown product number`

  During start-up, an attempt to match the hardware found against the NFA's product number could not be made because the product number was unknown. This is a fatal hardware configuration error.

- `HW ID x in slot y not required`

  A card with ID x was found in slot y but for this product number is not required. This is a non-fatal hardware configuration error.

- `HW ID x is missing`

  A card with ID x was expected for this product number but was not found. This is a fatal hardware configuration error.

- `HW ID x must be in slot y, not z`

  A card with ID x was found in slot z but was expected to be found in slot y for this product number. This is a fatal hardware configuration error.

- `Measurement not possible`

  An attempt was made to perform a measurement but a previous fatal hardware configuration error has occurred, preventing measurements.

- `Option 'X' not installed`

  Software option 'X' must be enabled for this product number, but was not installed. This is a fatal hardware configuration error.

501 `SNS read failure`

An attempt to read from the SNS failed. This could be due to SNS cable problems such as poor connection or disconnection while reading.

502 `SNS write failure`

An attempt to write to the SNS failed. This could be due to SNS cable problems such as poor connection or disconnection while reading.

603 `Illegal MSDOS name given`

An invalid file name has been specified. Use filenames with a maximum of 8 characters (letters and digits only) and use a 3 character extension. Note that lowercase and uppercase are perceived as the same.

604 `File already exists`

Attempt to store to a file that already exists. Delete or rename the old file and try again.

605 `Media is protected`

A store was attempted to a write-protected device.

606 `Media is not writable`

A store was attempted to a read-only device.

607 `File name error`

An invalid file name has been specified. Use filenames with a maximum of 8 characters (letters and digits only) and use a 3 character extension. Note that lowercase and uppercase are perceived as the same.

610 `File access is denied`

The file is protected or hidden and cannot be accessed.

612 `File does not exist`

The file you were trying to recall could not be found.

614 `Bad or missing disk`

The floppy is not inserted or the directory could not be read. Insert a known good disk and try again.

615 `Corrupted file`

The file that you were trying to load is corrupt.

660 `YTF align error`

A YIG tuned filter alignment error has occurred because of one of the following reasons:

- `Peak power too low`

  During a YIG tuned filter alignment a peak was found but its level was below the expected threshold. If this error occurs then the quality of the YIG tuned filter alignment is questionable.

- `Peak/floor too small`

  During a YIG tuned filter alignment the level of a peak above the noise floor was too small. If this error occurs then the quality of the YIG tuned filter alignment is questionable.

- `Image/floor too small`

  During a YIG tuned filter alignment the level of an image response above the noise floor was too small. If this error occurs then the quality of the YIG tuned filter alignment is questionable.

700 `No printer response`

An attempt to identify the printer failed.

701 `Invalid printer response`

In attempting to identify the printer an invalid response was received. Check that you are using a supported printer. Be sure you are using the proper cable and that it is securely fastened.

702 `Unsupported printer`

A printer which is recognized, but known to be unsupported was identified. This printer cannot be used with the NFA. For example, a printer only supported by Microsoft Windows will generate this error.

704 `Printer interface error`

An error occurred while trying to print. Make sure the printer is turned on and properly connected.

703 `Unknown printer`

In attempting to identify the printer, a valid response was received but the printer is not known to the analyzer. Use the **Define Custom** printer menu under **Print Setup** to configure the printer.

705 `Printer type is none`

The current printer type is set to **None**, so no print operations are possible. Change the type in the **Print Setup** menu and try again.

751 `Instrument state may be corrupt, state reset to initial values`

An attempt was made to load a possibly corrupt state. The instrument state will be reset to the state prior to the attempt to load. If the state load was for a user preset, then the instrument state will be reset to the factory state.

752 `Unable to load state from file`

An attempt to load a state from the File Manager or through `MMEM:LOAD:STAT` failed. Preceding error messages may indicate the cause of failure.

753 `Unable to save state to file`

An attempt to save a state from the File Manager or through `MMEM:STOR:STAT` failed. Preceding error messages may indicate the cause of failure.

754 `File does not exist`

The state file you were trying to recall does not exist.

755 `Unable to load state from register`

An attempt to load a state from a register using the `*RCL` command failed. Preceding error messages may indicate the cause of failure.

756 `Unable to save state to register`

An attempt to save a state to a register using the `*SAV` command failed. Preceding error messages may indicate the cause of failure.

757 `Unable to load user preset state, factory preset state used`

An attempt to load the **User Preset** state failed, so the **Factory Preset** values are used instead.

758 `Unable to save user preset state`

An attempt to save the **User Preset** state failed.

759 `Unable to load state into instrument with older firmware date`

An attempt is made to load a state whose revision date is later than the instrument firmware revision date.

760 `Unable to query state from the remote`

A problem occurred while trying to query the instrument state as part of a `*LRN` command.

761 `Unable to set state from the remote`

A problem occurred while trying to set the instrument state as part of a `SYST:SET` command.

762 `Incorrect filename, allowable extension CSV`

Attempt to store a trace to a file with an incorrect extension.

763 `Incorrect filename, allowable extensions are GIF or WMF`

Attempt to store a screen image to a file with an incorrect extension.

764 `Unable to save file`

A problem occurred while attempting to save a file.

765 `Unable to load file`

A problem occurred when attempting to load a file.

766 `Unable to format drive`

A problem occurred when attempting to format a drive.

768 `Failed to load ENR data`

A problem occurred when attempting to load an ENR table.

769 `Failed to store ENR data`

A problem occurred when attempting to store an ENR table.

770 `Incorrect filename, allowable extension ENR`

Attempt to store an ENR table to a file with an incorrect extension.

771 `Failed to load Freq list`

A problem occurred when attempting to load a frequency list.

772 `Failed to store Freq list`

A problem occurred when attempting to store a frequency list.

773 `Incorrect filename, allowable extension LST`

Attempt to store frequency list data to a file with an incorrect extension.

774 `Failed to load Limit line`

A problem occurred when attempting to load a limit line.

775 `Failed to store Limit line`

A problem occurred when attempting to store a limit line.

776 `Incorrect filename, allowable extensions LIM`

Attempt to store limit line data to a file with an incorrect extension.

777 `Incorrect filename, allowable extension STA`

Attempt to store the instrument state to a file with an incorrect extension.

778 `Failed to store Trace`

A problem occurred when attempting to store a trace.

779 `Failed to load Loss data`

A problem occurred when attempting to load a loss data file.

780 `Failed to save Loss data`

A problem occurred when attempting to save a loss data file.

781 `Incorrect filename, allowable extension LOS`

Attempt to load/store loss data with an incorrect extension.

782 `Incorrect SNS data format`

Attempt to read SNS data failed either because the device attached was not an SNS or because the data was corrupt.

Execution Errors

Errors -299 to -200

-225 Out of memory

The analyzer has insufficient memory to perform the requested operation.

-224 `Illegal parameter value`

An unexpected value (i.e. a value other then the available options) was entered.

-223 `Too much data`

A block, expression or string parameter of a command or query contained more data than the analyzer could handle due to memory constraints.

-222 `Data out of range`

A parameter of a command or query was outside the defined range for that command or query.

-221 `Settings conflict`

A legal program data element was parsed but could not be executed due to the current device state.

B NFA Status Registers

This appendix describes what status registers are and how to use them. Also provided is a comprehensive description of all bits of the registers in NFA Noise Figure Analyzers.

Using the Analyzer Status Registers

The status system is comprised of multiple registers which are arranged in a hierarchical order. The lower-priority status registers propagate their data to the higher-priority registers in the data structures by means of summary bits. The status byte register is at the top of the hierarchy and contains the general status information for the Noise Figure Analyzer events and conditions. All other individual registers are used to determine the specific events or conditions.

You can determine the state of certain Noise Figure Analyzer hardware and firmware events and conditions by programming the status register system. The diagram on page 239 shows all the Noise Figure Analyzer status registers and their hierarchy.

Why Would You Use the Status Registers?

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

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

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

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

Use the SRQ method when:

— you need time-critical notification of changes
— you are monitoring more than one device which supports SRQs
— you need to have the controller do something else while waiting

— you can't afford the performance penalty inherent to polling

Use polling when:

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

To monitor a condition:

1. Determine which register contains the bit that reports the condition.
2. Send the unique SCPI query that reads that register.
3. Examine the bit to see if the condition has changed.

Using the Status Registers

Most monitoring of the Noise Figure Analyzer conditions is done at the highest level using the IEEE common commands indicated below. Complete command descriptions are available in Chapter 2 , "IEEE 488.2 Common Commands," on page 11:

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

*ESE, *ESE? (event status enable) sets and queries the bits in the enable register part of the standard event status register.

*ESR? (event status register) queries and clears the event register part of the standard event status register.

*OPC, *OPC? (operation complete) sets the standard event status register to monitor the completion of all commands. The query stops any new commands from being processed until the current processing is complete, then returns a '1'.

*SRE, *SRE? (service request enable) sets and queries the value of the service request enable register.

*STB? (status byte) queries the value of the status byte register without erasing its contents.

Individual status registers can be set and queried using the commands in the STATus subsystem of the language reference. A "status register" is actually composed of five physical registers: a condition register, two transition registers, an event enable register and an event register. You can use the :STATus commands to:

- Check the Noise Figure Analyzer hardware and firmware status.

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

- Monitor a particular bit (condition), or bits.

  Once you have enabled a bit, using the event enable register, the Noise Figure Analyzer will monitor that particular bit. If the bit becomes true in the event register, it will stay set until the event register is cleared. Querying the event register allows you to detect that this condition occurred even if the condition no longer exists. The event register can only be cleared by querying it or sending the *CLS command, which clears all event registers.

- Monitor a change in the condition of a particular bit, or bits.

  Once you have enabled a bit, the Noise Figure Analyzer will monitor it for a change in its condition. The transition registers are preset to register the conditions going from 0 to 1, positive transitions. This can be changed so that the selected bit is detected if it goes from true to false (negative transition), or if either transition occurs. Querying the event register allows you to detect that a change in this condition occurred. The event register can only be cleared by querying it or sending the *CLS command, which clears all event registers.

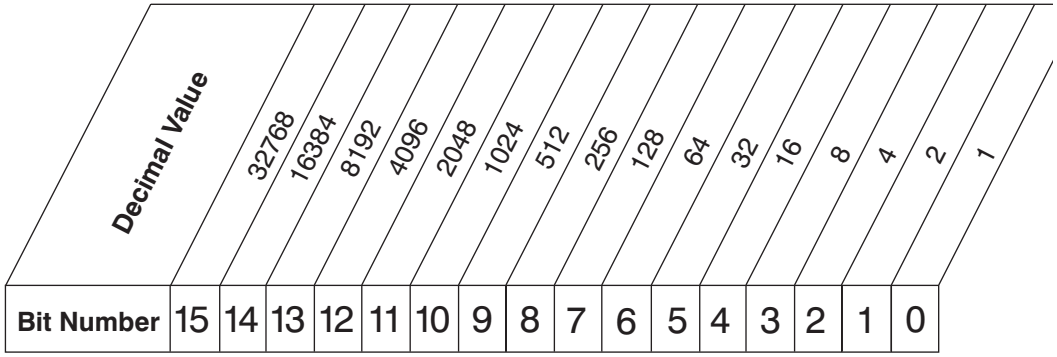
Setting and Querying the Registers

Each bit in a register is represented by a numerical value based on its location. See Figure B-1 below. This number is sent with the command, to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you are interested in.

For example, to enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 (1 + 64 = 65).

The results of a query are evaluated in a similar way. If the *STB? command returns a decimal value of 140, (140 = 128 + 8 + 4) then the bit 7 is true, bit 3 is true and bit 2 is true.

Figure B-1 Status Register Bit Values



Event Status Register and Status Bytes are only 8 bits in length. Other registers are 16 bits in length.

Using the Service Request (SRQ) Method

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

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

When the condition changes, the Noise Figure Analyzer sets the RQS bit and the GPIB SRQ line. The controller is informed of the change as soon as it occurs. The time the controller would otherwise have used to monitor the condition can now be used to perform other tasks. Your program determines how the controller responds to the SRQ.

Generating a Service Request

To use the SRQ method, you must understand how service requests are generated. Bit 6 of the status byte register is the request service (RQS) bit. The RQS bit is set whenever something (that it has been configured to report using *SRE) changes. It is cleared when the status byte register is queried using *SRE? (with a serial poll.) It can be queried without erasing the contents with *STB?.

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

- The corresponding bit of the service request enable register is set to 1.
- The analyzer has no service request pending. (A service request is considered to be pending between the time the analyzer SRQ process is initiated and the time the controller reads the status byte register.)

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

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

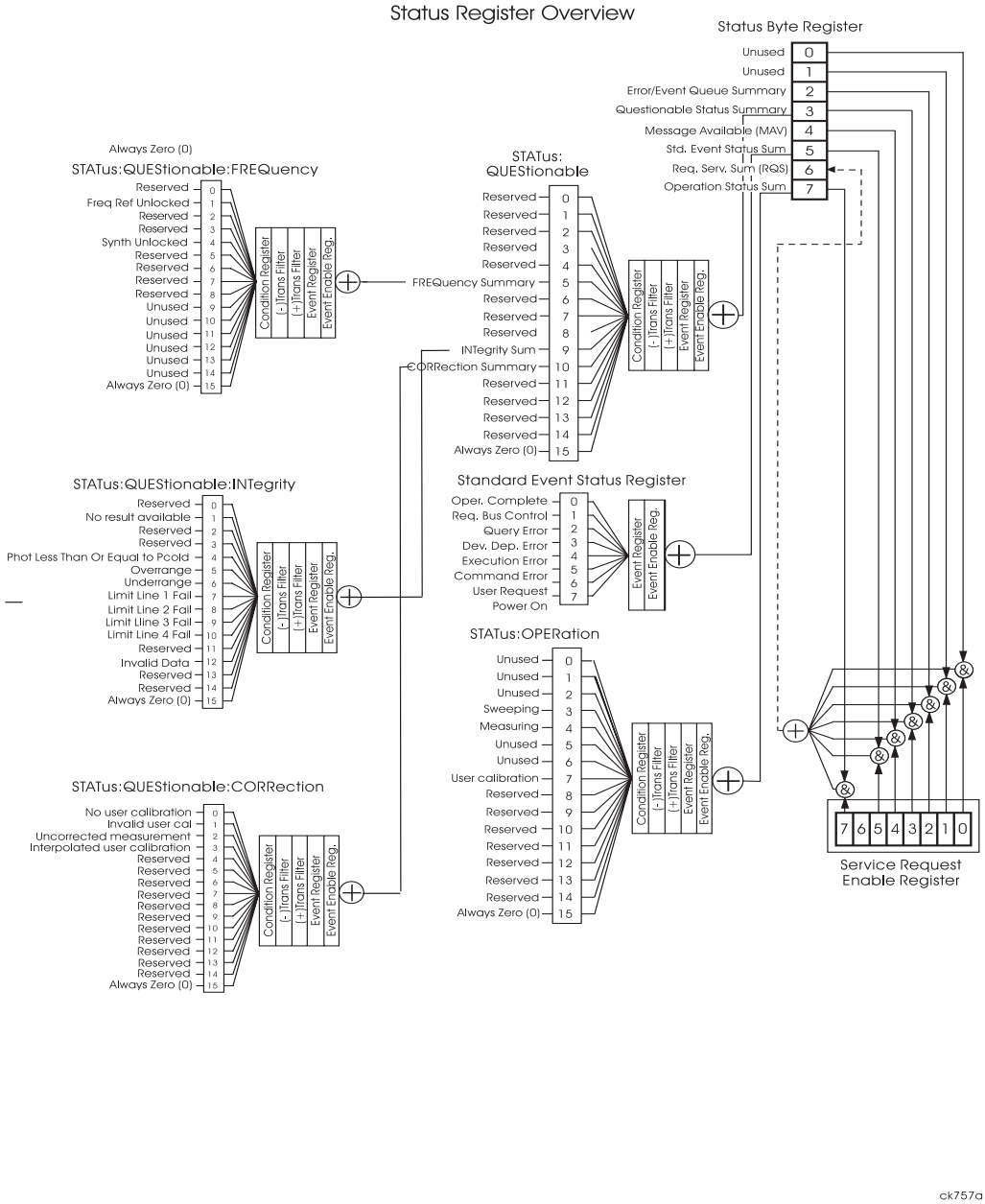
NOTE

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

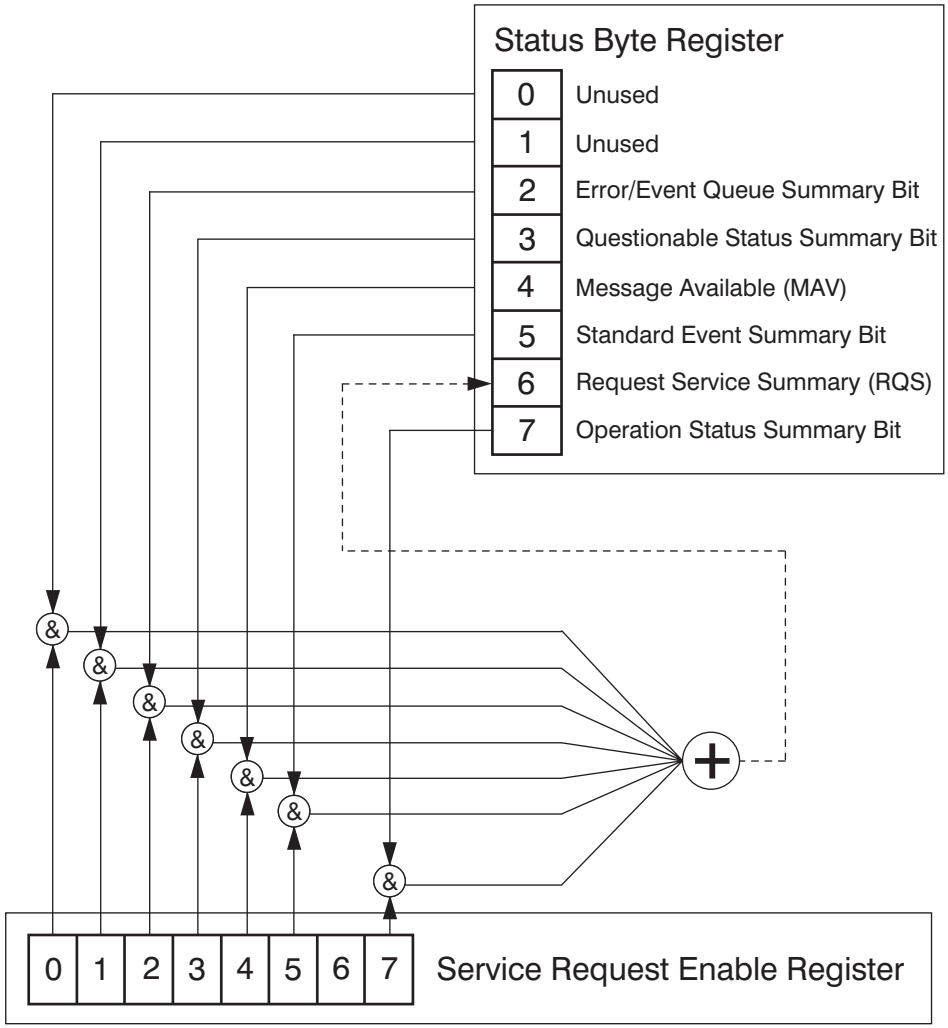
Restarting a measurement (:INITiate command) can cause the measuring bit to pulse low, which causes an SRQ if the status register is configured to SRQ on end-of-measurement. To avoid this:

- Set :INITiate:CONTinuous off.
- Set/enable the status registers.
- Restart the measurement (send :INITiate).

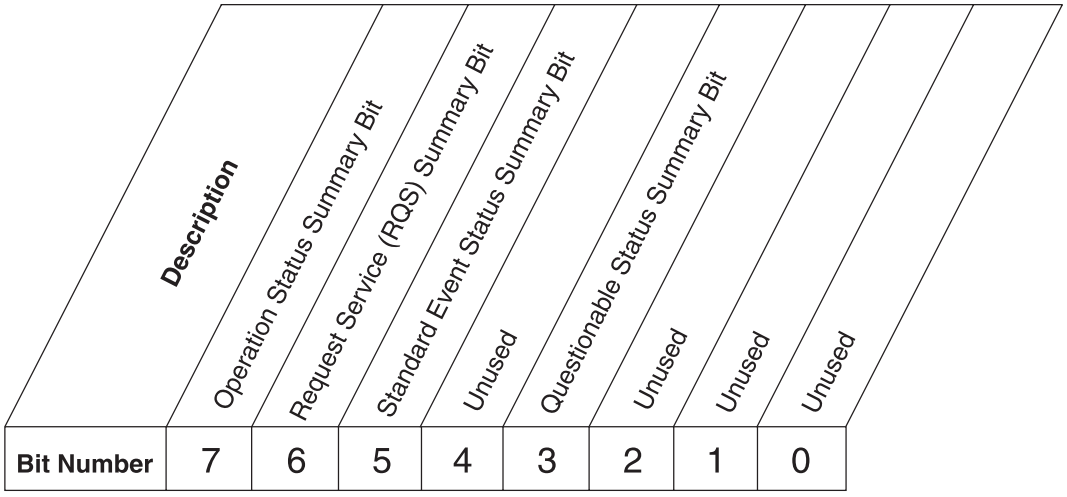
Overall Status Byte Register System



Status Byte Register



The status byte register contains the following bits:



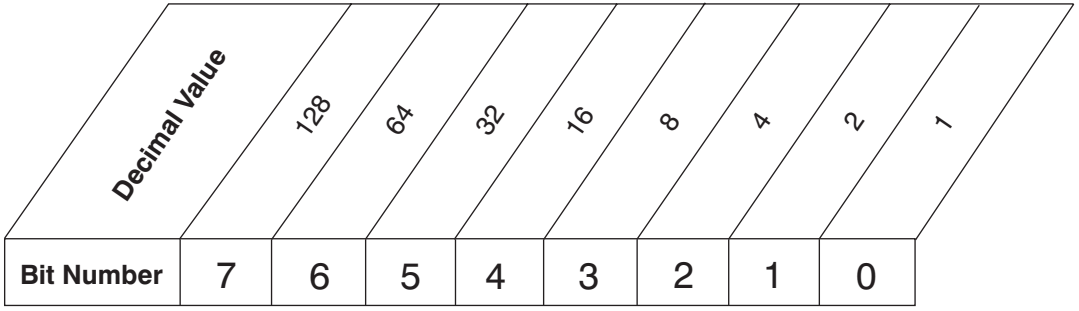
Status Byte Register

ck764a

Bit	Description
0, 1	These bits are always set to 0.
2	Not used.
3	A 1 in this bit position indicates that the questionable status summary bit has been set. The questionable status event register can then be read to determine the specific condition that caused this bit to be set.
4	Not used.
5	A 1 in this bit position indicates that the standard event status summary bit has been set. The standard event status register can then be read to determine the specific event that caused this bit to be set.
6	A 1 in this bit position indicates that the Noise Figure Analyzer has at least one reason to report a status change. This bit is also called the master summary status bit (MSS).
7	A 1 in this bit position indicates that the operation status summary bit has been set. The operation status event register can then be read to determine the specific event that caused this bit to be set.

To query the status byte register, send the command *STB? The response will be the *decimal* sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned.

The status byte service request enable register lets you choose which bits in the Status Byte Register will trigger a service request. Send the command *SRE <number> where <number> is the sum of the decimal values of the bits you want to enable plus the decimal value of bit 6. For example, assume that you want to enable bit 7 so that whenever the operation status summary bit is set to 1 it will trigger a service request. Send the command *SRE 192 (128 + 64). You must always add 64 (the numeric value of RQS bit 6) to your numeric sum when you enable any bits for a service request. The command *SRE? returns the decimal value of the sum of the bits previously enabled with the *SRE <number> command.



*SRE <num>
*SRE?

Service Request Enable Register

ck726a

Summary Status Bits

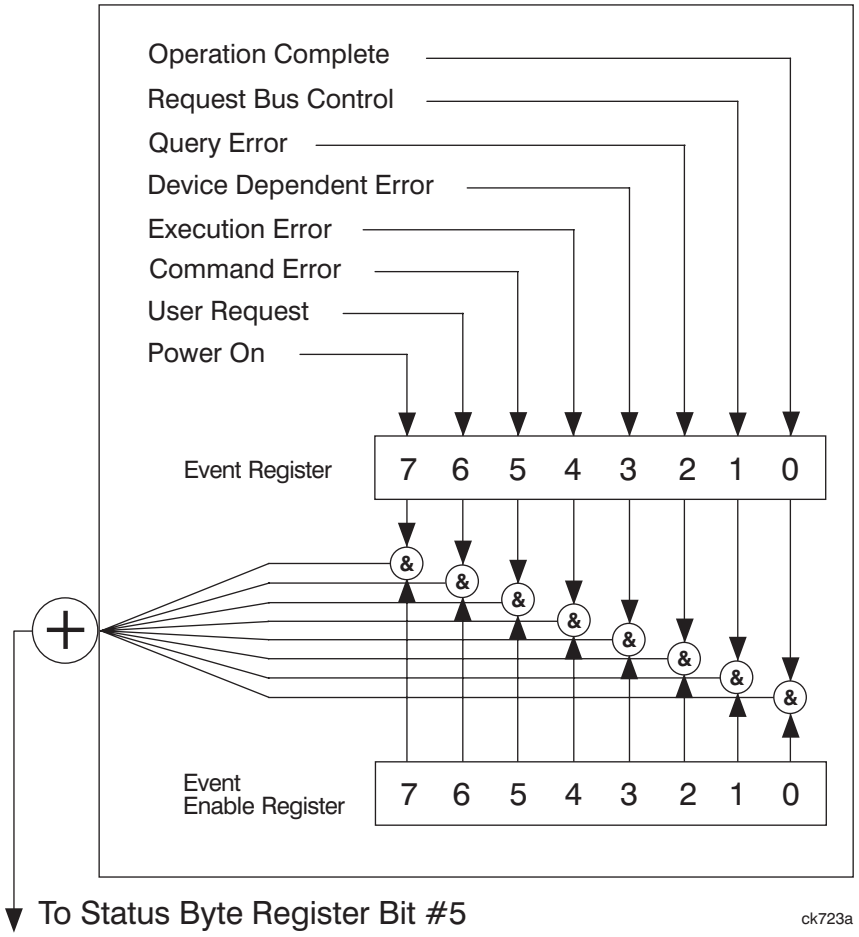
Status registers (except for the Status Byte Register) consist of registers whose contents are programmed in order to produce status summary bits. These summary bits are then manipulated as follows:

The condition register passes summary bits to the negative and positive transition filters, after which they are stored in the event register. The contents of the event register are logically ANDed with the contents of the event enable register and the result is logically ORed to produce a status summary bit. The status summary bit is then passed to the Status Byte Register directly, or through the Questionable Status register and then to the Status Byte Register.

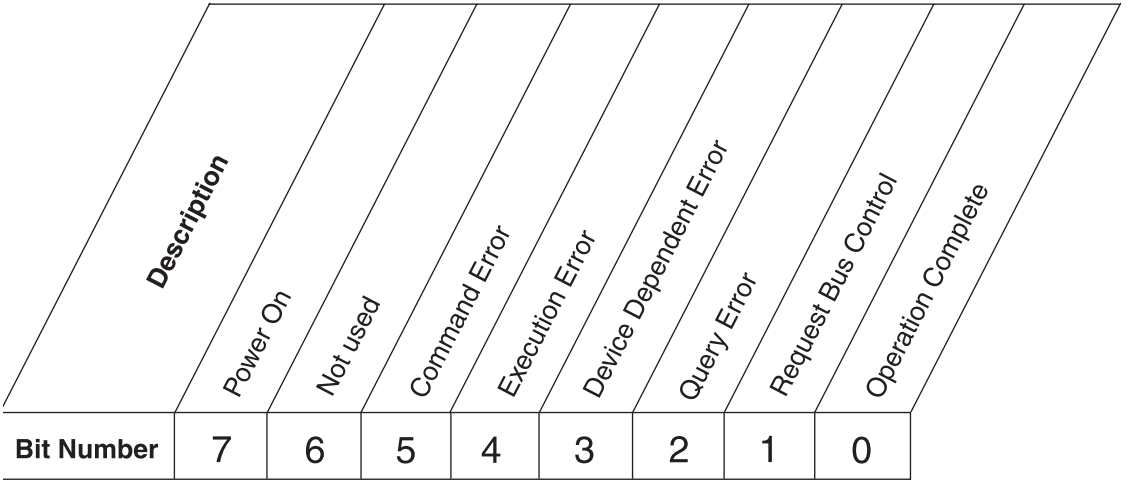
Condition Register	A condition register continuously monitors the hardware and firmware status of the Noise Figure Analyzer. There is no latching or buffering for a condition register. It is updated in real time.
Negative Transition Register	A negative transition register specifies the bits in the condition register that will set corresponding bits in the event register when the condition bit changes from 1 to 0.
Positive Transition Register	A positive transition register specifies the bits in the condition register that will set corresponding bits in the event register when the condition bit changes from 0 to 1.
Event Register	An event register latches transition events from the condition register as specified by the positive and negative transition filters. Bits in the event register are latched, and once set, they remain set until cleared by either querying the register contents or sending the *CLS command.
Event Enable Register	An enable register specifies the bits in the event

register that can generate a summary bit. Summary bits are, in turn, used by the status byte register.

Standard Event Status Register



The Standard Event Status Register is used to determine the specific event that sets bit 5 in the Status Byte Register. The Standard Event Status Register does not have negative and positive transition registers, nor a condition register. Use the IEEE common commands at the beginning of the "Language Reference" chapter in this guide to access the register. It contains the following bits:



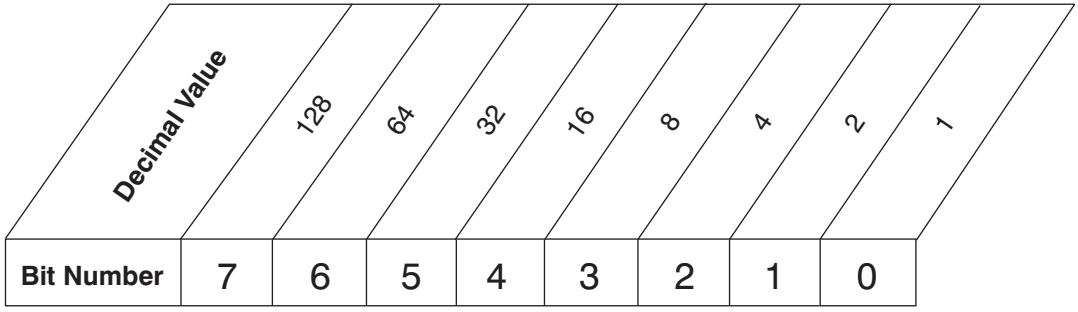
Standard Event Status Register

ck765a

Bit	Description
0	A 1 in this bit position indicates that all pending operations were completed following execution of the *OPC command.
1	This bit is always set to 0. (The Noise Figure Analyzer does not request control.)
2	A 1 in this bit position indicates that a query error has occurred. Query errors have SCPI error numbers from –499 to –400.
3	A 1 in this bit position indicates that a device dependent error has occurred. Device dependent errors have SCPI error numbers from –399 to –300 and 1 to 32767.
4	A 1 in this bit position indicates that an execution error has occurred. Execution errors have SCPI error numbers from –299 to –200.
5	A 1 in this bit position indicates that a command error has occurred. Command errors have SCPI error numbers from –199 to –100.
6	Not used.
7	A 1 in this bit position indicates that the Noise Figure Analyzer has been turned off and then on.

To query the Standard Event Status Register, send the command *ESR?.

The response will be the *decimal* sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned.



*ESE <num>
*ESE?

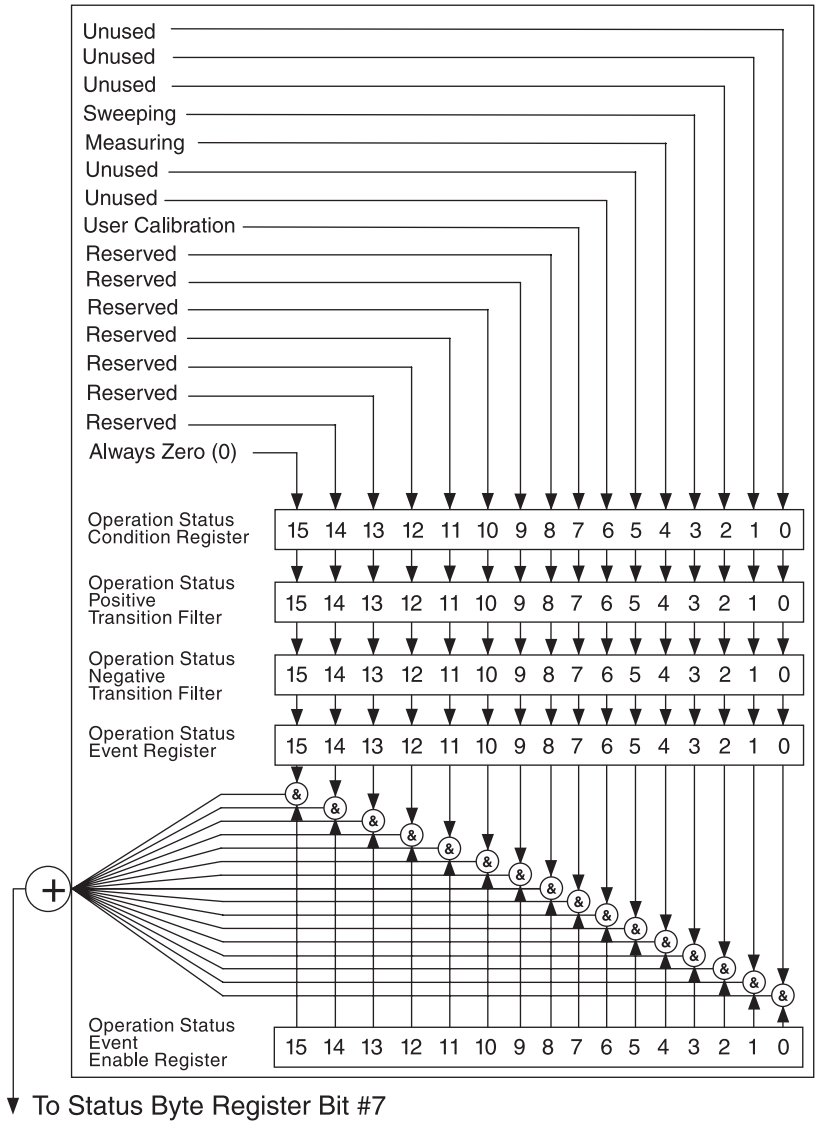
Standard Event Status Enable Register

ck728a

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

Operation Status Register

Figure B-2 Status Operation Register



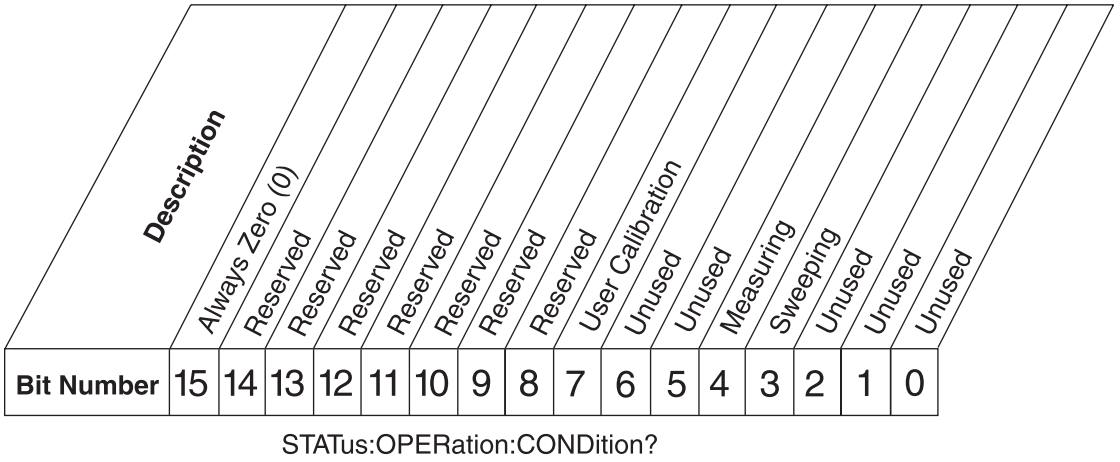
ck758a

The Operation Status Register is used to determine the specific event that sets bit 7 in the Status Byte Register. The Operation Status Register consists of the following registers:

Operation Status condition register
Operation Status positive transition filter
Operation Status negative transition filter
Operation Status event register
Operation Status event enable register

The Operation Status Condition Register contains the following bits:

Figure B-3 Status Operation Condition



STATus:OPERation:CONDition?

Operation Status Condition Register

ck766a

Bit	Description
0-2	Unused. These bits are always set to 0.
3	A 1 in this bit position indicates that a sweep is in progress.
4	A 1 in this bit position indicates that a measurement is in progress.
5,6	Not used.
7	Indicates that a user calibration is in progress.

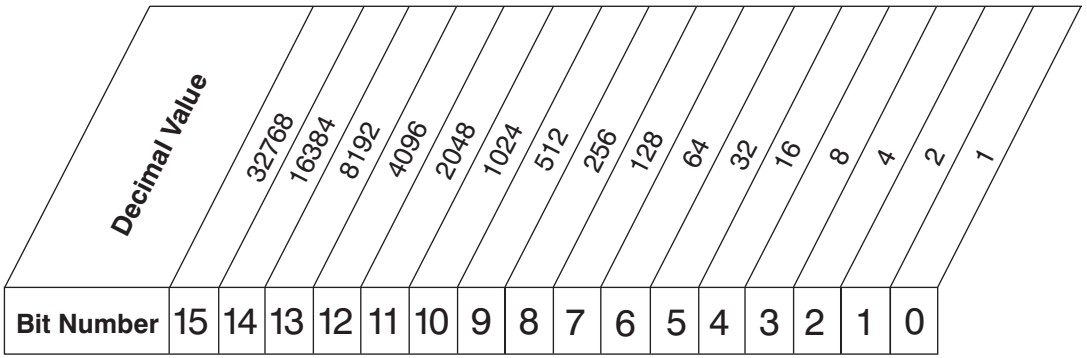
Bit	Description
8–14	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
15	Always Zero (0).

The Operation Status Register continuously monitors the operational status of the Noise Figure Analyzer, and is read-only. To query the register, send the command :STATus:OPERation:CONDition? The response will be the *decimal* sum of the bits which are set to 1. For example, if bit number 9 and bit number 3 are set to 1, the decimal sum of the 2 bits is 512 plus 8. So the decimal value 520 is returned.

The transition filter specifies which types of bit state changes in the condition register will set corresponding bits in the event register. The changes may be positive (from 0 to 1) or negative (from 1 to 0). Send the command :STATus:OPERation:NTRansition <num> (negative transition) or :STATus:OPERation:PTRansition <num> (positive transition) where <num> is the sum of the decimal values of the bits you want to enable.

The Operation Status Event Register latches transition events from the condition register as specified by the transition filters. Event registers are destructive read-only. Reading data from an event register will clear the content of that register. To query the event register, send the command :STATus:OPERation[:EVENt]?

Figure B-4 Status Opration Enable



STATus:OPERation:ENABle <num>
STATus:OPERation:ENABle?

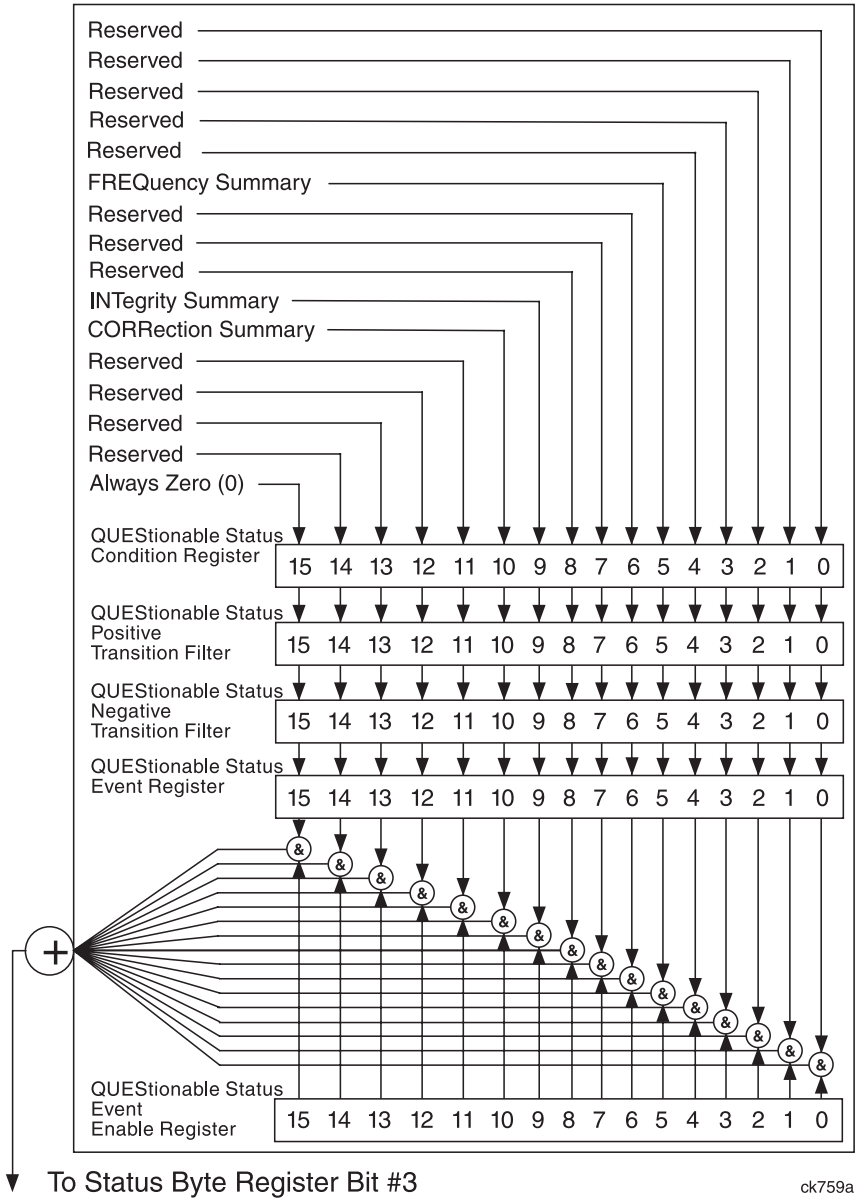
Operation Status Event Enable Register

ck767a

The Operation Status event enable register lets you choose which bits will set the Operation Status Summary bit (bit 7) of the Status Byte Register to 1. Send the command `:STATus:OPERation:ENABle <num>` where `<num>` is the sum of the decimal values of the bits you want to enable. For example, to enable bit 9 and bit 3 so that whenever either of those bits is set to 1, the operation status summary bit of the Status Byte Register will be set to 1, send the command `:STATus:OPERation:ENABle 520` (512 + 8). The command `:STATus:OPERation:ENABle?` returns the decimal value of the sum of the bits previously enabled with the `:STATus:OPERation:ENABle <num>` command.

Questionable Status Register

Figure B-5 Questionable Status Register

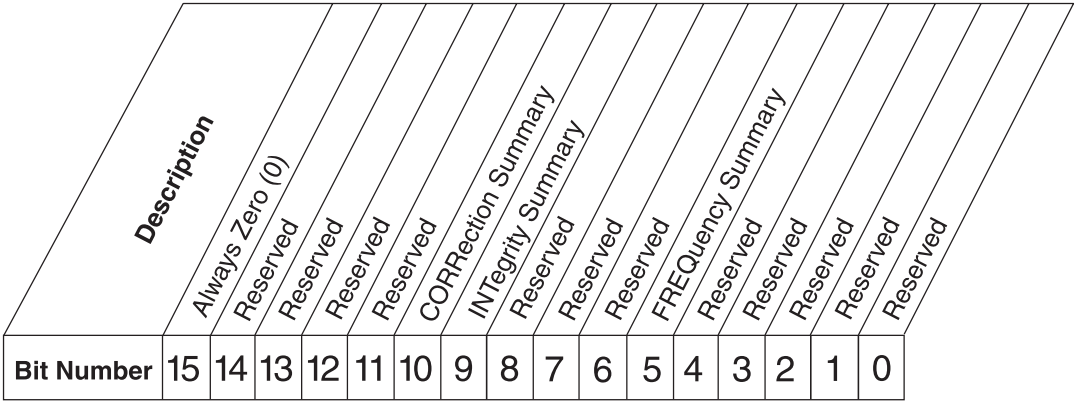


The Questionable Status Register is used to determine the specific event that sets bit 3 in the Status Byte Register. The Questionable Status Register consists of the following registers:

Questionable Status condition register
Questionable Statuse positive transition filter
Questionable Status negative transition filter
Questionable Status event register
Questionable Status event enable register

The Questionable Status condition register contains the following bits:

Figure B-6 Status Questionable Condition



STATus:QUEStionable:CONDition?

Questionable Status Condition Register

ck760a

Bit	Description
0–4	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
5	This is the summary bit for the Questionable Frequency Status Register.
6-8	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
9	This is the summary bit for the Questionable Integrity Status Register.
10	This is the summary bit for Questionable Correction Status Register.

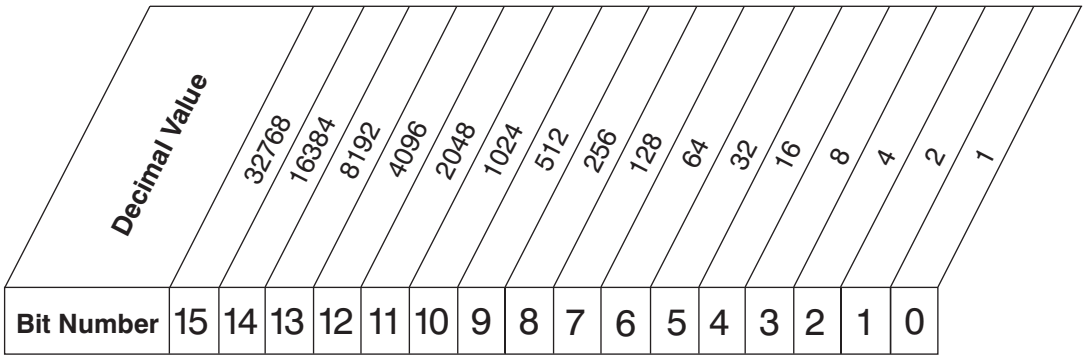
Bit	Description
11–14	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
15	Always Zero (0).

The Questionable Status condition register continuously monitors the hardware and firmware status of the Noise Figure Analyzer. Condition registers are read-only. To query the condition register, send the command `:STATus:QUEStionable:CONDition?` The response will be the *decimal* sum of the bits which are set to 1. For example, if bit number 9 and bit number 3 are set to 1, the decimal sum of the 2 bits is 512 plus 8. So the decimal value 520 is returned.

The transition filter specifies which types of bit state changes in the condition register will set corresponding bits in the event register. The changes may be positive (from 0 to 1) or negative (from 1 to 0). Send the command `:STATus:QUEStionable:NTRansition <num>` (negative transition) or `:STATus:QUEStionable:PTRansition <num>` (positive transition) where `<num>` is the sum of the decimal values of the bits you want to enable.

The Questionable Status event register latches transition events from the condition register as specified by the transition filters. Event registers are destructive read-only. Reading data from an event register will clear the content of that register. To query the event register, send the command `:STATus:QUEStionable[:EVENt]?`

Figure B-7 Status Questionable Enable



STATus:QUEStionable:ENABle <num>
STATus:QUEStionable:ENABle?

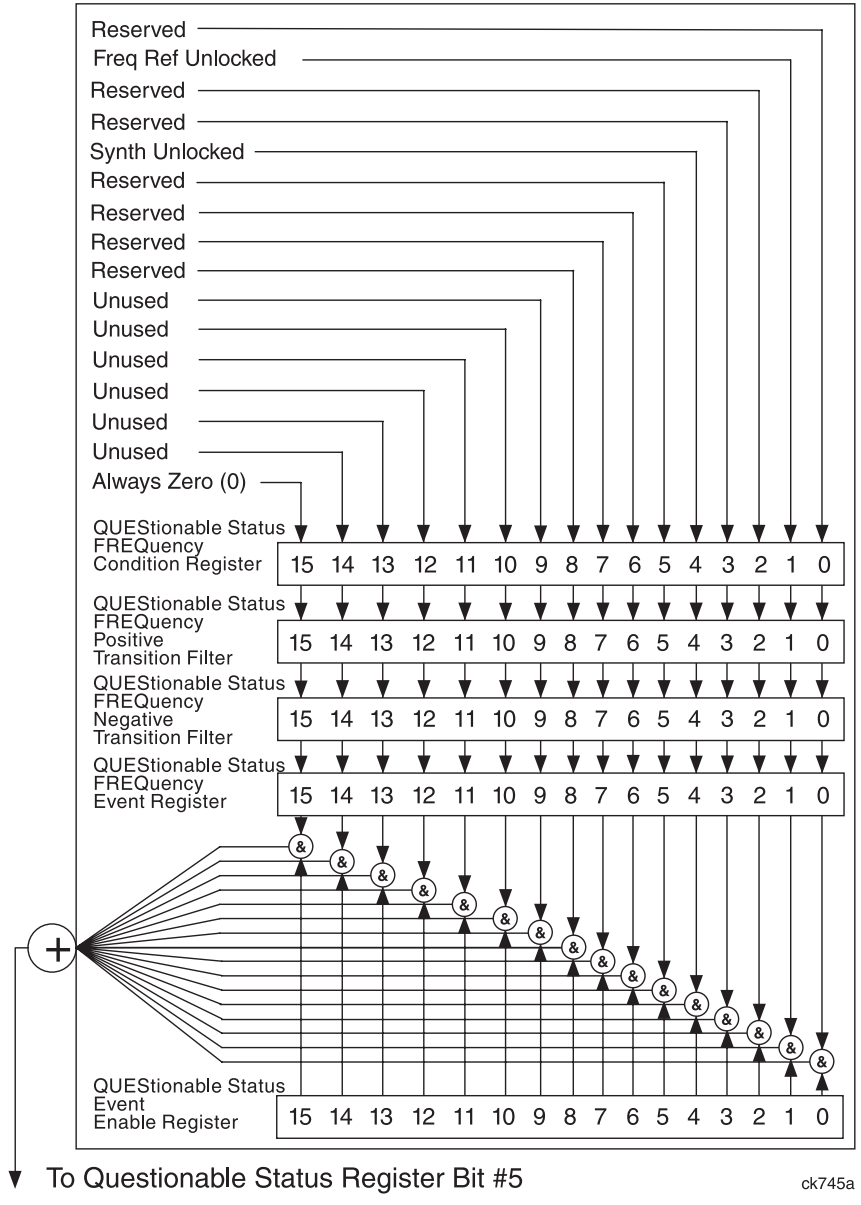
Questionable Status Event Enable Register

ck768a

The Questionable Status event enable register lets you choose which bits in the Questionable Status Event Register will set the summary bit (bit 3 of the Status Byte Register) to 1. Send the command :STATus:QUEStionable:ENABle <num> where <num> is the sum of the decimal values of the bits you want to enable. For example, to enable bit 9 and bit 3 so that whenever either of those bits is set to 1, the Questionable Status Summary bit of the Status Byte Register will be set to 1, send the command :STAT:QUES:ENAB 520 (512 + 8). The command :STATus:QUEStionable:ENABle? returns the decimal value of the sum of the bits previously enabled with the :STATus:QUEStionable:ENABle <num> command.

Questionable Status Frequency Register

Figure B-8 Questionable Status Frequency Register

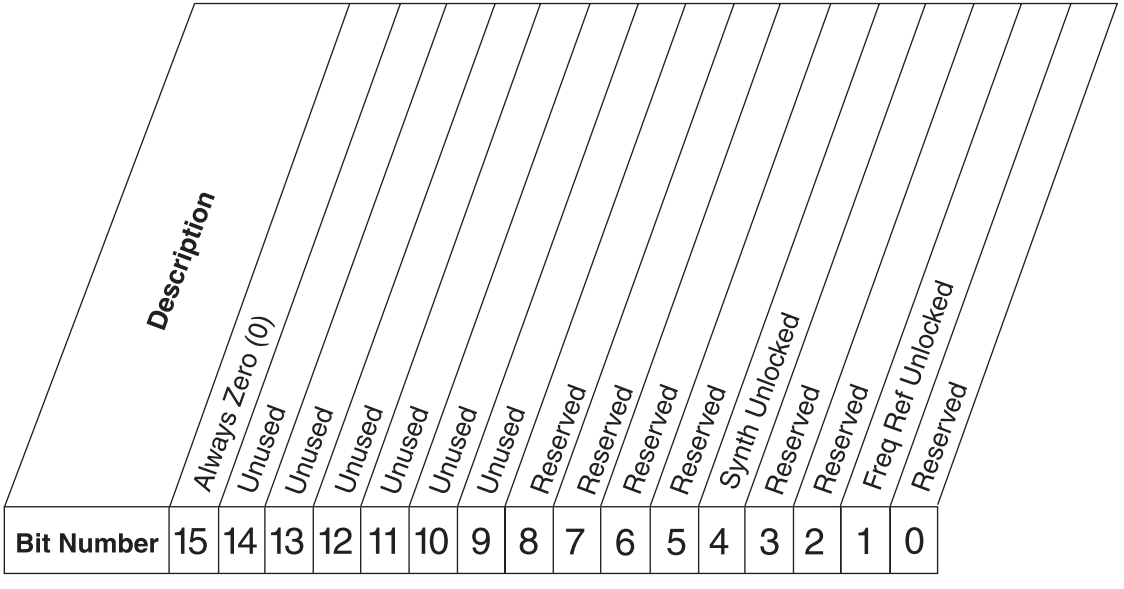


The Questionable Status Frequency Register is used to determine the specific event that sets bit 5 in the Questionable Status Register. The Questionable Status Frequency Register consists of the following registers:

Questionable Status Frequency condition register
Questionable Status Frequency positive transition filter
Questionable Status Frequency negative transition filter
Questionable Status Frequency event register
Questionable Status Frequency event enable register

The Questionable Status Frequency Condition Register contains the following bits:

Figure B-9 Status Questionable Frequency Condition



STATus:QUEStionable:FREQuency:CONDition?

Questionable Status Frequency Condition Register

ck772a

Bit	Description
0	Reserved.
1	A 1 in this bit position indicates that the Noise Figure Analyzer frequency reference is unlocked.

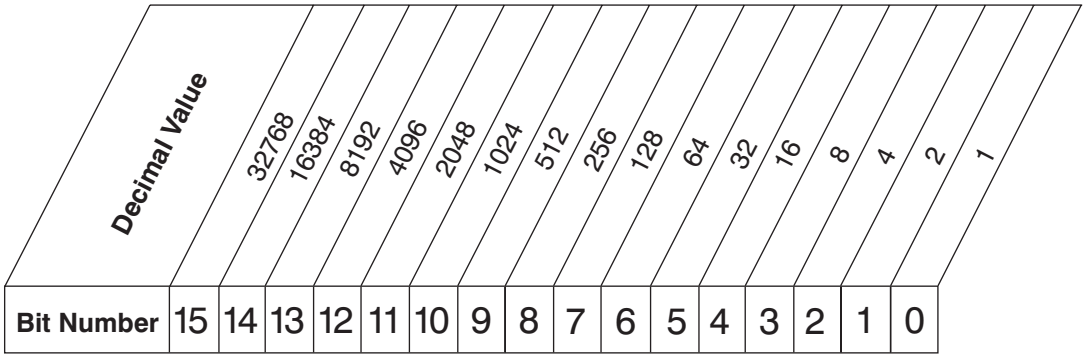
Bit	Description
2,3	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
4	A 1 in this bit position indicates that the Noise Figure Analyzer synthesizer is unlocked.
5–8	Reserved. These bits are not used by the Noise Figure Analyzer, but are for future use with other Agilent products.
9–14	Unused. These bits are always set to 0.
15	Always Zero (0).

The Questionable Status Frequency condition register continuously monitors output frequency status of the Noise Figure Analyzer. Condition registers are read-only. To query the condition register, send the command `:STATus:QUEStionable:FREQuency:CONDition?` The response will be the *decimal* sum of the bits which are set to 1.

The negative and positive transition filters specify which types of bit state changes in the condition register will set corresponding bits in the event register. The changes may be positive (from 0 to 1) or negative (from 1 to 0). Send the command `:STATus:QUEStionable:FREQuency:NTRansition <num>` (negative transition) or `:STATus:QUEStionable:FREQuency:PTRansition <num>` (positive transition) where `<num>` is the sum of the decimal values of the bits you want to enable.

The Questionable Status Frequency event register latches transition events from the condition register as specified by the transition filters. Event registers are destructive read-only. Reading data from an event register will clear the content of that register. To query the event register, send the command `:STATus:QUEStionable:FREQuency[:EVENt]?`

Figure B-10 Status Questionable Frequency Enable



STATus:QUEStionable:FREQuency:ENABle <num>
STATus:QUEStionable:FREQuency:ENABle?

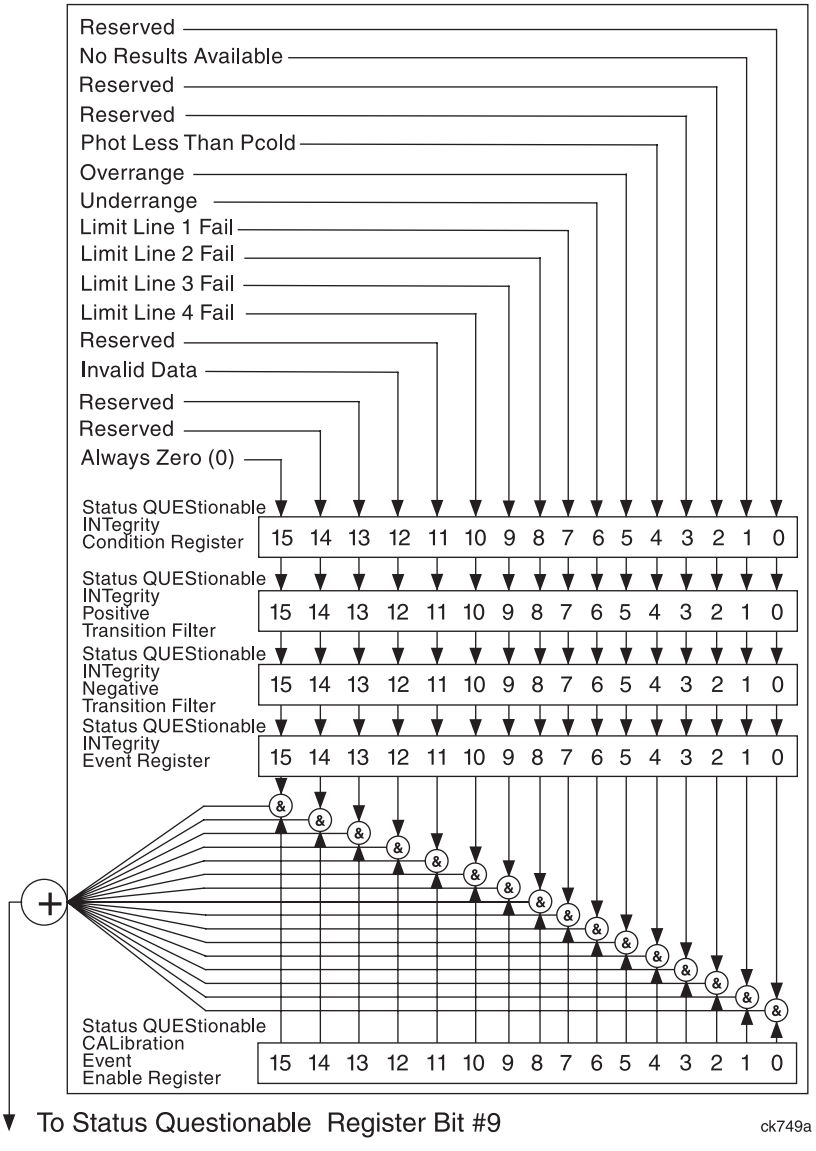
Questionable Status Frequency Event Enable Register

ck773a

The Questionable Status Frequency event enable register lets you choose which bits will set the summary bit (bit 5 of the Questionable Status Register) to 1. Send the command `:STATus:QUEStionable:FREQuency:ENABle <num>` where `<num>` is the sum of the decimal values of the bits you want to enable. For example, to enable bit 1 and bit 5 so that whenever either of those bits is set to 1, the Questionable Status Frequency summary bit of the Questionable Status Condition Register will be set to 1, send the command `:STATus:QUEStionable:FREQuency:ENABle 34` (32 + 2). The command `:STATus:QUEStionable:FREQ:ENABle?` returns the decimal value of the sum of the bits previously enabled with the `:STATus:QUEStionable:FREQuency:ENABle <num>` command.

Questionable Status Integrity Register

Figure B-11 Questionable Status Integrity Register



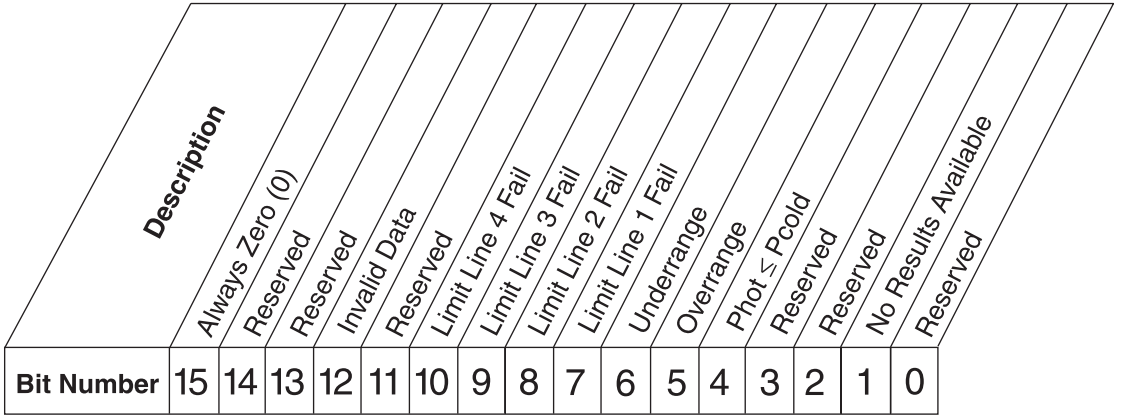
The Questionable Status Integrity Register is used to determine the specific event that sets bit 9 in the Questionable Status Register. The

Questionable Status Integrity Register consists of the following registers:

Questionable Status Integrity condition register
Questionable Status Integrity positive transition filter
Questionable Status Integrity negative transition filter
Questionable Status Integrity event register
Questionable Status Integrity event enable register

The Questionable Status Integrity Condition Register contains the following bits:

Figure B-12 Status Questionable Integrity Enable



STATus:QUEStionable:INTegrity:ENABle <num>
STATus:QUEStionable:INTegrity:ENABle?

Questionable Status Integrity Condition Register

ck753a

Bit	Description
0	Reserved.
1	No results available. A full sweep is not yet available (i.e. FETCh not possible). Set to 0 when end of first sweep reached. Reset to 1 on *RST or when a new measurement is started. Initial value is 1.
2-3	Reserved.
4	One or more points had Phot £ Pcold. Set to 0 at the start of each sweep. Will remain 0 until a point is measured where Phot is less than Pcold.

Bit	Description
5	RF or IF overrange occurred at one or more points. Set to 0 at the start of each sweep. Will remain zero until a point is measured where either an RF or IF over range occurs.
6	RF or IF under range occurred at one or more points. Set to zero at the start of each sweep. Will remain zero until a point is measured where either an RF or IF under range occurs.
7-10	Limit line 1, 2, 3 or 4 has failed test (bits 7, 8, 9 or 10 respectively). Set to 1 at end of sweep if test fails. Remains set to 1 until measurement restarted or limit line type or test on/off state changed or limit line edited.
11	Reserved.
12	One or more points had an invalid measurement result. Set to zero at the start of each sweep/redisplay of data. Will remain zero until a point is measured where the required result type gives an invalid result e.g. log() of a negative number.
13,14	Reserved.
15	Always Zero (0).

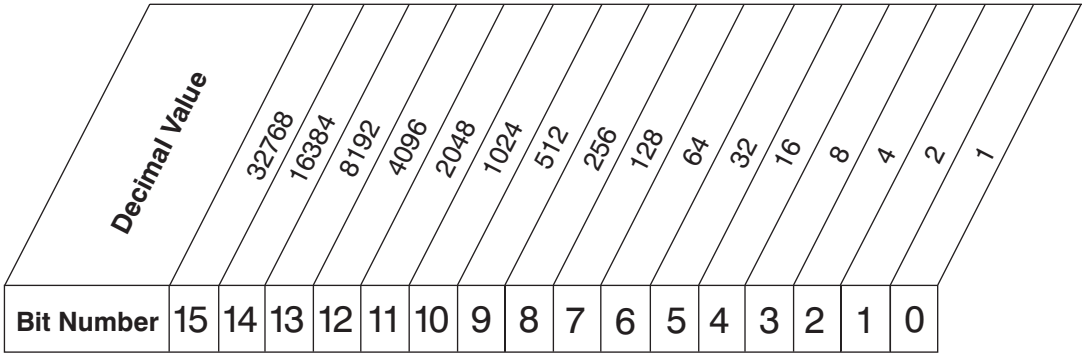
The Questionable Status Integrity Condition Register continuously monitors the status of the measurement results. Condition registers are read-only. To query the condition register, send the command `:STATus:QUEStionable:INTegrity:CONDition?` The response will be the *decimal* sum of the bits which are set to 1.

The transition filter specifies which types of bit state changes in the condition register will set corresponding bits in the event register. The changes may be positive (from 0 to 1) or negative (from 1 to 0). Send the command `:STATus:QUEStionable:INTegrity:NTRansition <num>` (negative transition) or `:STATus:QUEStionable:INTegrity:PTRansition <num>` (positive transition) where `<num>` is the sum of the decimal values of the bits you want to enable.

The Questionable Status Integrity Event Register latches transition events from the condition register as specified by the transition filters. Event registers are destructive read-only. Reading data from an event register will clear the content of that register. To query the event register, send the command

```
:STATus:QUEStionable:INTegrity[:EVENt]?
```

Figure B-13 Questionable Integrity Status Enable



STATus:QUEStionable:INTegrity:ENABle <num>
STATus:QUEStionable:INTegrity:ENABle?

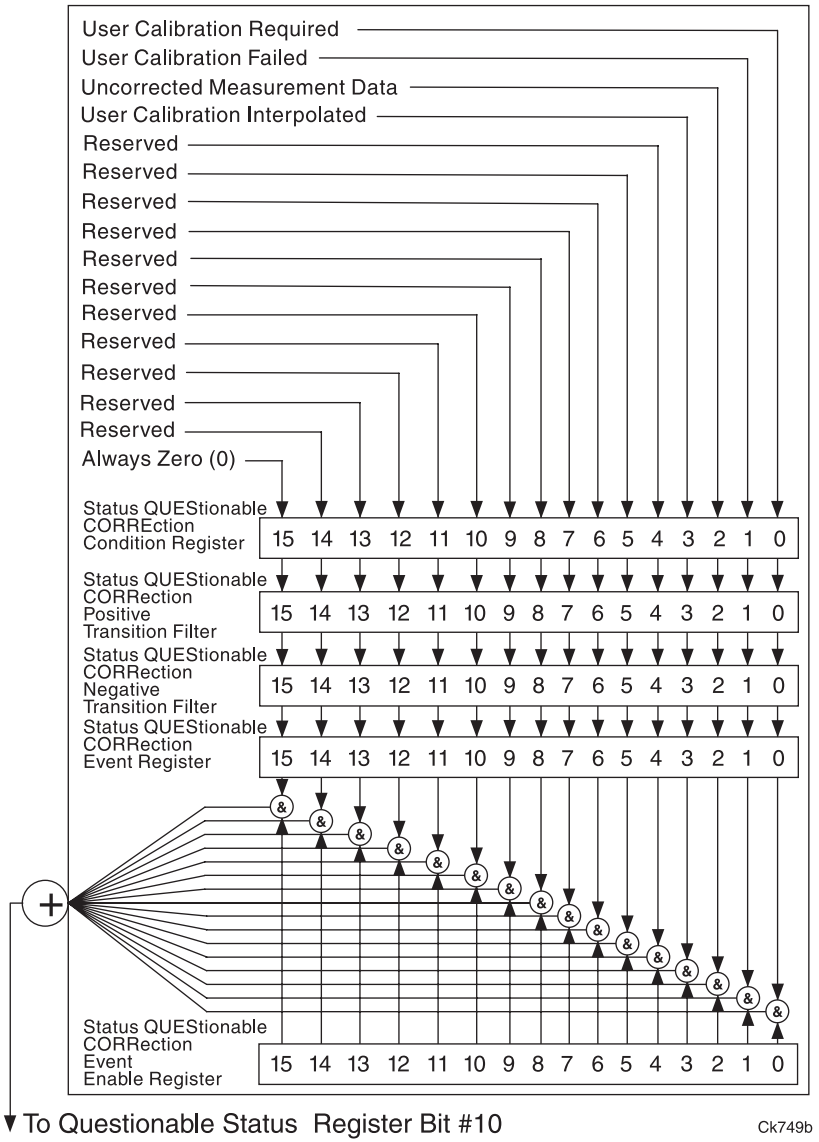
Status Questionable Integrity Event Enable Register

ck756a

The Questionable Status Integrity event enable register lets you choose which bits will set the integrity summary bit (bit 9) of the Questionable Status Register to 1. Send the command `:STATus:QUEStionable:INTegrity:ENABle <num>` where `<num>` is the sum of the decimal values of the bits you want to enable. For example, to enable bit 12 and bit 3 so that whenever either of those bits is set to 1, the Questionable Status Integrity summary bit of the Questionable Status condition register will be set to 1, send the command `:STATus:QUEStionable:INTegrity:ENABle 5104` (4096 + 8). The command `:STATus:QUEStionable:INTegrity:ENABle?` returns the decimal value of the sum of the bits previously enabled with the `:STATus:QUEStionable:INTegrity:ENABle <num>` command.

Questionable Correction Register

Figure B-14 Questionable Correction Register



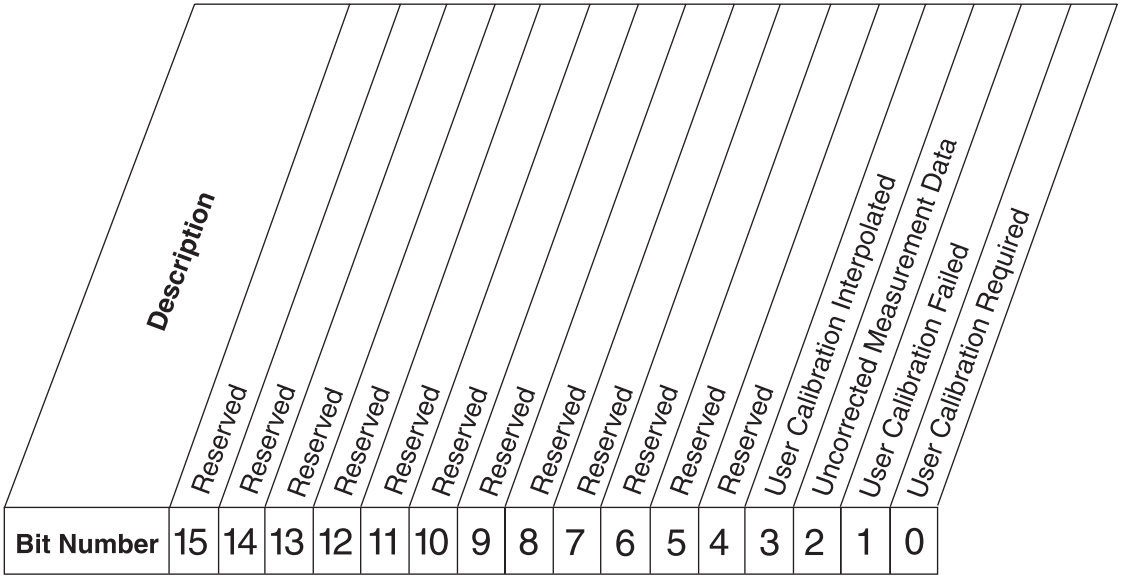
The Questionable Status Correction Registeris used to determine the specific event that sets bit 10 of the Questionable Status Register. The

Questionable Status Correction Register consists of the following registers:

Questionable Status Correction condition register
Questionable Status Correction positive transition filter
Questionable Status Correction negative transition filter
Questionable Status Correction event register
Questionable Status Correction event enable register

The Questionable Correction Register contains the following bits:

Figure B-15 Questionable Correction Status Condition



STATus:QUEStionable:CORRection:CONDition?

Questionable Status Correction Register

Ck779a

Bit	Description
0	User calibration is required (i.e. not done, or setup changed). Will remain 1 until a user calibration is done. Set to 1 at the start of a user calibration. It will go to 0 at the end of a user calibration only if at least all points on one range have been calibrated. Initial value is 1.

Bit	Description
1	One or more user calibration points are invalid. Will remain zero until a user calibration is done. Set to 0 at the start of a user calibration. It will go to 1 during a user calibration if an invalid calibration point is measured (typically Phot ≤ Pcold).
2	Uncorrected measurement data (one or more points could not be corrected using existing user calibration). Set to 0 at the start of each sweep/redisplay of result. Will remain zero until an attempt is made to correct a point and the calibration data does not exist (the required range has not been calibrated). Note that if no user calibration data exists, this bit will not be set when an attempt is made to make a corrected measurement — use Bit 0 to determine if a corrected measurement can be attempted.
3	User calibration interpolated. Set to 1 when corrected measurement is started and user cal will be interpolated. Set to zero if corrected measurement started and user cal will not be interpolated or uncorrected measurement started.
4-15	Reserved.

The Questionable Status Correction Register continuously monitors the status of the user calibration and its applicability to the current instrument settings.

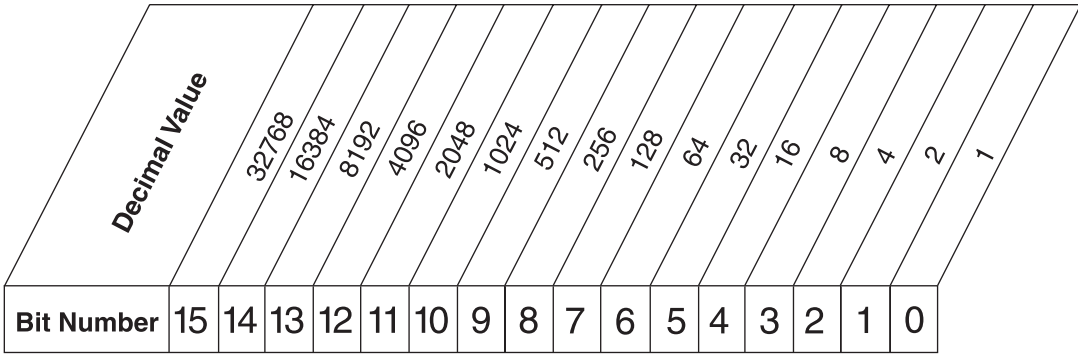
Condition registers are read-only. To query the condition register, send the command `:STATus:QUEStionable:CORRection:CONDition?` The result will be the decimal sum of the bits that are set.

The transition filter specifies which types of bit state changes in the condition register will set corresponding bits in the event register. The changes may be positive (from 0 to 1) or negative (from 1 to 0). Send the command `:STATus:QUEStionable:CORRection:NTRansition <num>` (negative transition) or `:STATus:QUEStionable:CORRection:PTRansition <num>` (positive transition) where `<num>` is the sum of the decimal values of the bits you want to enable.

The Questionable Status Correction Event Register latches transition events from the condition register as specified by the transition filters. Event registers are destructive read-only. Reading data from an event register will clear the content of that register. To query the event

register, send the command
`:STATus:QUEStionable:CORRection[:EVENt]?`

Figure B-16 Questionable Correction Status Enable



STATus:QUEStionable:CORRection:ENABle <num>
STATus:QUEStionable:CORRection:ENABle?

Status Questionable CORRection Event Enable Register Ck756b