MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Phase Noise Measurement Function Remote Control

12th Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MS2690A/MS2691A/MS2692A and MS2830A /MS2840A/MS2850A Signal Analyzer Operation Manual. Phase Noise Measurement Function Operation. Please also refer to it before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

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⚠ DANGER This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

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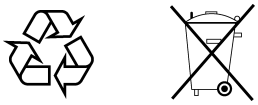

These indicate that the marked part should be recycled.

MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A
Signal Analyzer
Operation Manual Phase Noise Measurement Function Remote Control

25 April 2008 (First Edition)
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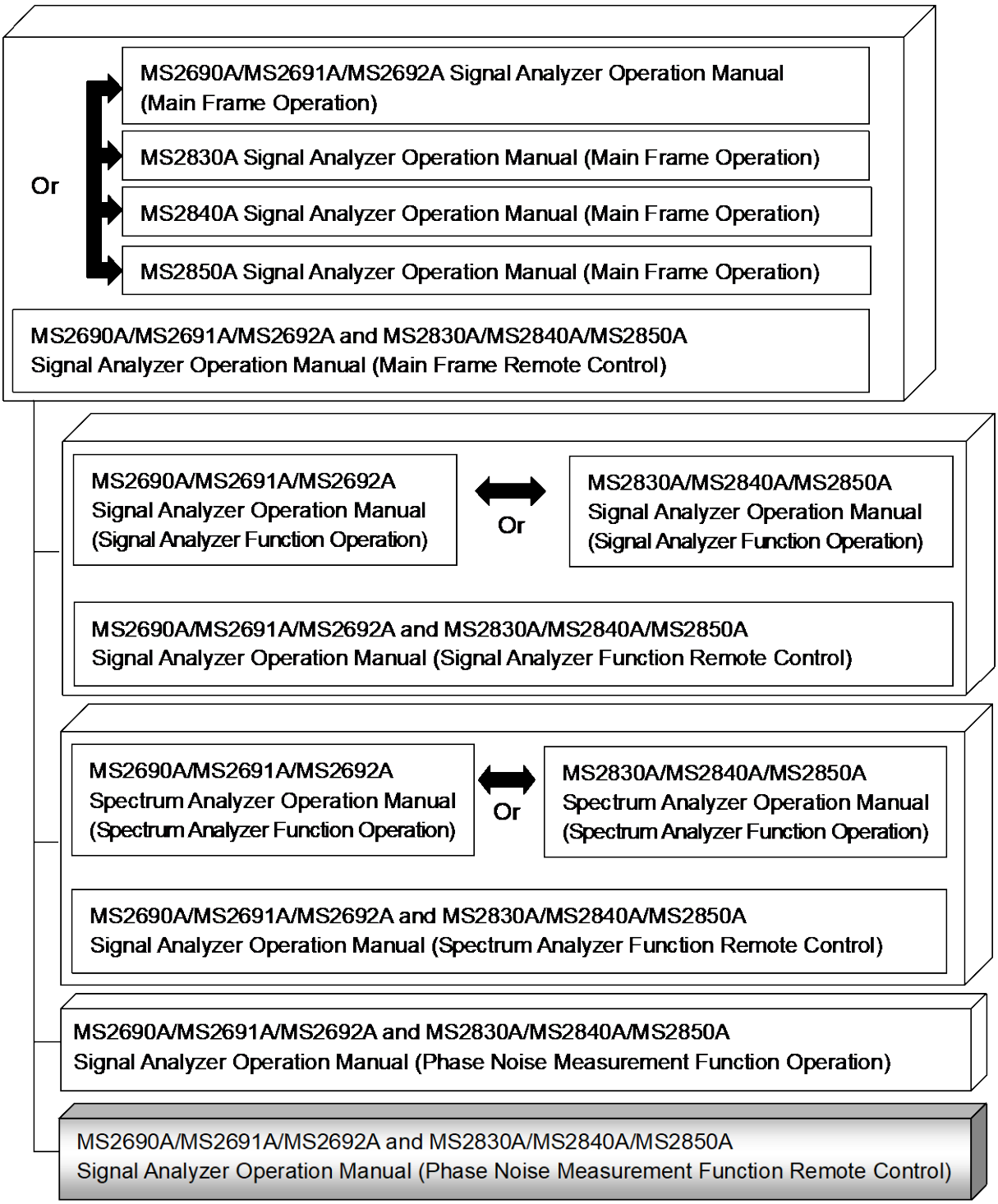
About This Manual

■ Associated Documents

The operation manual configuration of the MS2690A/MS2691A/MS2692A, MS2830A, MS2840A and MS2850A Signal Analyzer is shown below.



- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)
  Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe

- Signal Analyzer Operation Manual (Signal Analyzer Function)
- Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)
  Description of basic operations, functions and remote functions of the signal analyzer

- Signal Analyzer Operation Manual (Spectrum Analyzer Function)
- Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)
  Description of basic operations, functions and remote functions of the spectrum analyzer

- Signal Analyzer Operation Manual (Phase Noise Measurement Function)
- Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control) <This document>

Description of basic operations, functions and remote functions of the Phase Noise

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IV.

Chapter 1 Overview

This chapter provides an overview of the remote control of the Phase Noise Measurement Function (hereinafter, referred to as “this application”).

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1.1 Overview

This application can be controlled from an external controller (PC) by remote control commands using the MS2690/MS2691/MS2692A, MS2830A, MS2840A or MS2850A Signal Analyzer (hereinafter, referred to as “this instrument”). The remote control commands are defined by the SCPI format.

1.1.1 Interface

This instrument has GPIB, Ethernet, and USB interfaces for remote control. Those interfaces cannot be used at the same time.

The interface is automatically determined when a command is received at the start of communication. This instrument enters the remote state after the interface has been determined. The front panel Remote lamp lights during remote interface operation, and goes off during local-interface operation.

Refer to the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control)* for more details of the basic operations for remote control, such as interface setting.

1.1.2 Controlled Application

Two types of the remote control commands can be used with this instrument: commands that are commonly applied to this instrument itself or all the applications (hereinafter, referred to as “Common commands”), and the other commands unique to the applications. Common commands can be executed at any time and do not depend on the currently controlled application. However, commands unique to an application can be executed at the controlled application. If it is executed at another application, the command is not executed or an error occurs.

In this instrument, multiple applications can be activated at the same time. Only one application resource can be executed at one time per piece of hardware. This application measures an input signal by using the resource of RF Input. Thus, this application cannot be executed at the same time with another application using the same resource such as the signal analyzer function. In order to execute a function unique to the application by using the remote control, you need to select this application while it has been running. Furthermore, this application can be executed at the same time with another application that uses by itself a resource not used by this application, such as the Vector Signal Generator option.

1.2 Native Mode

In this instrument, the syntax/format types of the remote control commands are defined as "Language mode." The language mode has two modes: SCPI and Native.

(1) SCPI mode

The SCPI mode processes commands conforming to the syntax/format defined in SCPI (ver1999.0). For programming, you can use character strings in long/short form and can omit definition character strings within square brackets ([ ]).

On the Configuration screen, the SCPI mode is automatically set after transmitting command `SYST:LANG SCPI`.

(2) Native mode

The Native mode processes commands that are in this instrument's own definition type. Unless otherwise specified, the character string of a command header is fixed. If application commands are defined only by the SCPI mode, character strings converted according to the conversion rules are the commands in the Native mode. For programming, you cannot use the grammar of the SCPI mode, such as character strings in long/short form and cannot omit any definition character strings within square brackets ([ ]).

On the Configuration screen, the Native mode is automatically set after transmitting `SYST:LANG NAT`.

Note:

The `STATus:QUEStionable` and `STATus:OPERation` registers cannot be used in the Native mode, even if the corresponding commands are converted to Native-mode commands according to the conversion rules.

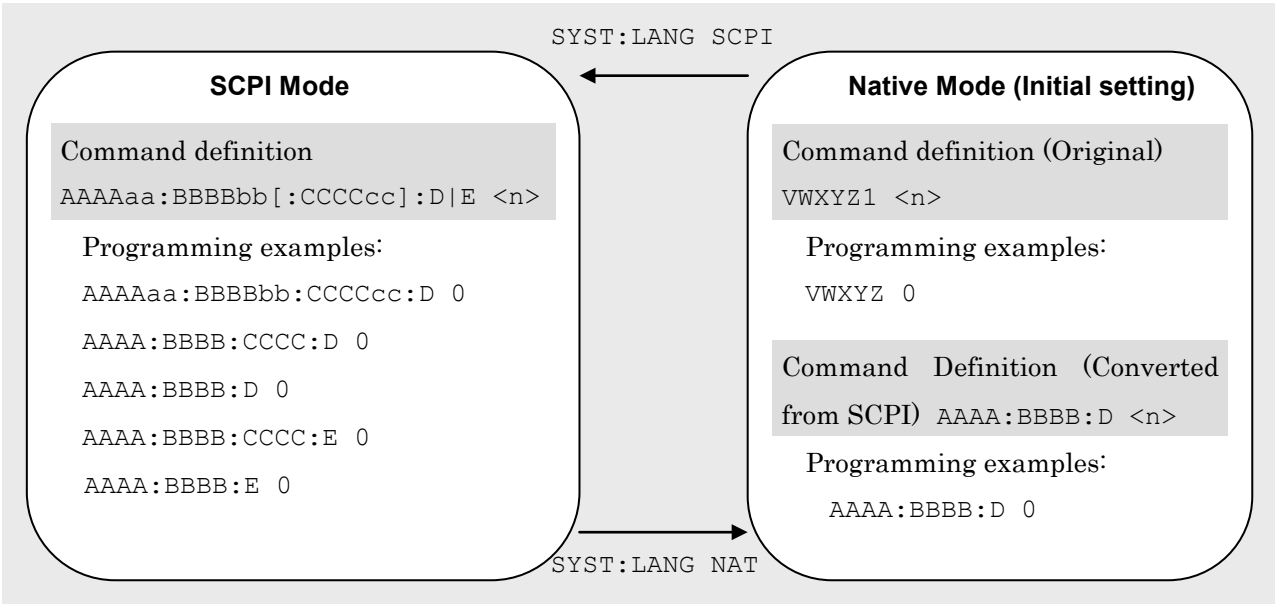

Figure 1.2-1 SCPI and Native modes

This application is only defined as the SCPI mode commands. You need to follow the conversion rules below in order to control this application by using the Native mode.

Conversion Rules

[1] Move the numeric parameter in the program header of an SCPI command before the argument. Delete a numeric parameter which only has one value and can be deleted. Describe the argument if it cannot be deleted.

[2] Use the first one if multiple nodes can be selected.

[3] Delete those layers which can be deleted.

[4] Alter all long forms into short forms.

[5] Delete the colon mark (":") at the head.

Example

To convert `:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>` into a Native mode command.

[1] Delete a numeric parameter in the program header which only has one value and can be deleted.

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
↓
:DISPlay:WINDow:TRACe:Y:[SCALe]:RLEVel <real>
```

[2] Delete those layers which can be deleted.

```
:DISPlay:WINDow:TRACe:Y[:SCALe]:RLEVel <real>
```

↓

```
:DISPlay:WINDow:TRACe:Y:RLEVel <real>
```

[3] Alter all long forms into short ones.

```
:DISPlay:WINDow:TRACe:Y:RLEVel <real>
```

↓

```
:DISP:WIND:TRAC:Y:RLEV <real>
```

[4] Delete the colon mark (":") at the head.

```
:DISP:WIND:TRAC:Y:RLEV <real>
```

↓

```
DISP:WIND:TRAC:Y:RLEV <real>
```

1.3 Setting Numeric Program Data

The following character programs can be used for setting numeric program data (numeric parameter).

(1) DEFault

After DEFault is set to numeric program data, the target parameter is set to the initial value.

(2) MINimum

After MINimum is set to numeric program data, the target parameter is set to the minimum value.

(3) MAXimum

After MAXimum is set to numeric program data, the target parameter is set to the maximum value.

In this application, DEFault, MINimum, and MAXimum can be used for the following parameters.

<freq>

<real>

<rel_ampl>

<rel_power>

<integer>

<rel_freq>

Chapter 2 SCPI Device Message Details

This chapter describes the detailed specifications of SCPI remote control commands for executing the functions of this application. The device messages are listed according to each function. Refer to the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control)* for the detailed specifications of the IEEE488.2 common device messages and application common device messages.

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2.1 Selecting Application

Table 2.1-1 lists the device messages for setup operations such as starting/selecting/initializing an application.

Table 2.1-1 Selecting Application

Parameter	Device Message
Load Application	:SYSTem:APPLication:LOAD PNOISE
Unload Application	:SYSTem:APPLication:UNLoad PNOISE
Application Switch	:INSTrument[:SELect] PNOISE
	:INSTrument[:SELect]?
Application Status	:INSTrument:SYSTem PNOISE,[ACTive]|INACtive|MINimum
	:INSTrument:SYSTem? PNOISE
Initialization	:INSTrument:DEFault
	:SYSTem:PRESet

2.1.1 Load Application

:SYSTem:APPLication:LOAD PNOISE

Load Application

Function

Activates this application.

Command

```
:SYSTem:APPLication:LOAD PNOISE
```

Details

This function activates an installed application and registers it to the Application Switch menu.

Example of Use

To activate this application.

```
SYST:APPL:LOAD PNOISE
```

:SYSTem:APPLication:UNLoad PNOISE

Unload Application

Function

Exits this application.

Command

```
:SYSTem:APPLication:UNLoad PNOISE
```

Details

This function exits the active application and deletes it from the Application Switch menu.

Example of Use

To exit this application.

```
SYST:APPL:UNL PNOISE
```

2.1.2 Selecting Application

:INSTrument[:SELect] PNOISE|SIGANA|SPECT|CONFIG

Application Switch

Function

Selects the control-targeted application.

Command

```
:INSTrument[:SELect] <apl_name>
```

Parameter

<apl_name>	Application name
PNOISE	Phase Noise
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config

Details

This function selects the control-targeted application.

Example of Use

To switch the control-targeted application into the phase noise measurement function.

```
INST PNOISE
```

:INSTrument[:SELect]?

Application Switch Query

Function

Reads out the control-targeted application.

Query

```
:INSTrument[:SELect]?
```

Response

```
<apl_name>
```

Parameter

<apl_name>	Application name
PNOISE	Phase Noise
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config

Example of Use

To read out the control-targeted application.

```
INST?
> PNOISE
```

:INSTrument:SYSTem PNOISE,[ACTive]|INACtive|MINimum

Application Status

Function

Selects the control-targeted application by specifying the window status.

Command

```
:INSTrument:SYSTem <apl_name>,<window>
```

Parameter

<apl_name>	Application name
PNOISE	Phase Noise
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config
<window>	Window status
ACTive	Active status
INACtive	Inactive status
MINimum	Minimized
When omitted	Active status

Example of Use

To select the phase noise measurement function while the window is active.

```
INST:SYST PNOISE,ACT
```

:INSTrument:SYSTem? PNOISE

Application Status Query

Function

Reads out the application status.

Query

```
:INSTrument:SYSTem? PNOISE
```

Response

```
<status>,<window>
```

Parameter

<status>	Application status
CURR	Executed and targeted for control
RUN	Executed but not targeted for control
IDLE	Loaded but not executed
UNL	Not loaded
<window>	Window status
ACTive	Active status
INACtive	Inactive status
MINimum	Minimized
NON	No window display

Example of Use

To read out the application status.

```
INST:SYST? PNOISE
> CURR,ACT
```

2.1.3 Initialization

:INSTrument:DEFault

Initialization

Function

Initializes the setting and the status of the selected application.

Command

```
:INSTrument:DEFault
```

Example of Use

To initialize the setting and the status of the selected application.

```
INST:DEF
```

:SYSTem:PRESet

Initialization

Function

This command initializes the setting and the status of the selected application.

Command

```
:SYSTem:PRESet
```

Example of Use

To initialize the setting and the status of the selected application.

```
SYST:PRES
```

2.2 Setting Basic Parameter

This section describes parameters commonly applied to this application, such as frequency and level.

Table 2.2-1 Basic Parameter Settings

Parameter	Device Message
Carrier Frequency	[:SENSe]:FREQuency:CENTer <freq>
	[:SENSe]:FREQuency:CENTer?
Frequency Start Offset	[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>
	[:SENSe]:FREQuency:OFFSet:STARt?
Frequency Stop Offset	[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>
	[:SENSe]:FREQuency:OFFSet:STOP?
Reference Level	:DISPlay:WINDow[1]:TRACe:Y:[:SCALe]:RLEVel <real>
	:DISPlay:WINDow[1]:TRACe:Y:[:SCALe]:RLEVel?
RF Attenuator	[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>
	[:SENSe]:POWer[:RF]:ATTenuation?
RF Attenuator Auto/Manual	[:SENSe]:POWer[:RF]:ATTenuation:AUTO ON|OFF|1|0
	[:SENSe]:POWer[:RF]:ATTenuation:AUTO?
Level Offset	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_power>
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?
Level Offset State	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe OFF|ON|0|1
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?
Pre-Amp State	[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1
	[:SENSe]:POWer[:RF]:GAIN[:STATe]?
Scale Lines	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?
Reference Value	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue?
External Mixer Mode	[:SENSe]:MIXer[:STATe] ON|OFF|1|0
	[:SENSe]:MIXer[:STATe]?
External Mixer Band	[:SENSe]:MIXer:BAND VHP|EHP
	[:SENSe]:MIXer:BAND?
External Mixer Select	[:SENSe]:MIXer:SELect <mode>
	[:SENSe]:MIXer:SELect?
External Mixer Band (Third Party External Mixer)	[:SENSe]:MIXer:TP:BAND <num>
	[:SENSe]:MIXer:TP:BAND?

2.2.1 Carrier Frequency

[:SENSe]:FREQuency:CENTer <freq>

Carrier Frequency

Function

Sets the carrier frequency.

Command

```
[:SENSe]:FREQuency:CENTer <freq>
```

Parameter

<freq>		Carrier frequency
	Range	10 MHz to the upper limit, depending on the main unit
	Resolution	1 Hz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ Hz is used when omitted.
	Default	2.000 GHz

Example of Use

To set the carrier frequency to 2.000 GHz.

```
FREQ:CENT 2.000GHZ
```

[:SENSe]:FREQuency:CENTer?

Carrier Frequency Query

Function

Reads out the set carrier frequency.

Query

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

Response

```
<freq>
```

Parameter

<freq>		Carrier frequency
	Range	10 MHz to the upper limit, depending on the main unit
	Resolution	1 Hz Value is returned in Hz units.

Example of Use

To read out the carrier frequency.

```
FREQ:CENT?
> 2000000000
```

2.2.2 Start Offset

[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>

Frequency Start Offset

Function

This command sets the start of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STARt <rel_freq>
```

Parameter

<freq>		Start of offset frequency.
	Range	10 Hz, 100 Hz, 1 kHz
	Suffix code	HZ, KHZ
		Hz is used when omitted.
	Default	10 Hz

Example of Use

To set the start of offset frequency to 100 Hz.

```
FREQ:OFFS:STAR 100HZ
```

[:SENSe]:FREQuency:OFFSet:STARt?

Frequency Start Offset Query

Function

This command queries the start of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STARt?
```

Response

```
<freq>
```

Parameter

<freq>		Start of offset frequency
	Range	10 Hz, 100 Hz, 1 kHz
		No suffix code. Value is returned in Hz units.

Example of Use

To query the start of offset frequency.

```
FREQ:OFFS:STAR?
> 1000
```

2.2.3 Stop Offset

[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>

Frequency Stop Offset

Function

This command sets the stop of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STOP <rel_freq>
```

Parameter

<rel_freq>		Stop of offset frequency
	Range	100 kHz, 1 MHz, 10 MHz
	Suffix code	HZ, KHZ, MHZ
		Hz is used when omitted.
	Default	10 MHz

Example of Use

To set the stop of offset frequency to 1 MHz.

```
FREQ:OFFS:STOP 1MHZ
```

[:SENSe]:FREQuency:OFFSet:STOP?

Frequency Stop Offset Query

Function

This command queries the stop of offset frequency.

Command

```
[:SENSe]:FREQuency:OFFSet:STOP?
```

Response

```
<rel_freq>
```

Parameter

<rel_freq>		Stop of offset frequency
	Range	100 kHz, 1 MHz, 10 MHz
		No suffix code. Value is returned in Hz units.

Example of Use

To query the stop of offset frequency.

```
FREQ:OFFS:STOP?
> 1000000
```

2.2.4 Reference Level

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>

Reference Level

Function

Sets the reference level.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
```

Parameter

<real>		Reference level
	Range	–120.00 + Offset to 50.00 + Offset (Pre-Amp Off)
		–120.00 + Offset to 30.00 + Offset (Pre-Amp On)
	Resolution	0.01 dB
	Suffix code	DBM
		dBm is used when omitted.
	Default	0 dBm

Details

The setting range Pre-Amp Off is applied
when MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 Preamplifier is not installed.

Example of Use

To set the reference level to –15.00 dBm.

```
DISP:WIND:TRAC:Y:RLEV -15.00
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?

Reference Level Query

Function

Reads out the reference level.

Query

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
```

Response

```
<real>
```

Parameter

<real>		Reference level
	Range	–120.00 + Offset to 50.00 + Offset (Pre-Amp Off)
		–120.00 + Offset to 30.00 + Offset (Pre-Amp On)
	Resolution	0.01 dB
		Value is returned in dBm units.

Example of Use

To read out the reference level.

```
DISP:WIND:TRAC:Y:RLEV?
> -15.00
```

2.2.5 RF Attenuator

[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>

RF Attenuator

Function

Sets the attenuator.

Command

```
[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>
```

Parameter

`<rel_ampl>`		Attenuator value
	Range	0 to 60 dB
	Resolution	2 dB step
	Suffix code	`DB`
		dB is used when omitted.
	Default	10 dB

Example of Use

To set the attenuator to 10 dB.

```
POW:ATT 10
```

[:SENSe]:POWer[:RF]:ATTenuation?

RF Attenuator Query

Function

Reads out the attenuation.

Query

```
[:SENSe]:POWer[:RF]:ATTenuation?
```

Response

```
<rel_ampl>
```

Parameter

`<rel_ampl>`		Attenuator value
	Range	0 to 60 dB
	Resolution	2 dB
		Value is returned in dB units.

Example of Use

To read out the attenuation.

```
POW:ATT?
> 10
```

2.2.6 RF Attenuator Auto/Manual

[:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF|ON|0|1

RF Attenuator Auto/Manual

Function

Enables/disables the automatic attenuation setting function.

Command

```
[:SENSe]:POWer[:RF]:ATTenuation:AUTO <switch>
```

Parameter

<switch>	Automatic attenuation setting function On/Off state
0|OFF	Disables the automatic attenuation setting function.
1|ON	Enables the automatic attenuation setting function (Default).

Example of Use

To enable the automatic attenuation setting function.

```
POW:ATT:AUTO ON
```

[:SENSe]:POWer[:RF]:ATTenuation:AUTO?

RF Attenuator Auto/Manual Query

Function

Reads out the automatic attenuation setting On/Off state.

Command

```
[:SENSe]:POWer[:RF]:ATTenuation:AUTO?
```

Response

```
<switch>
```

Parameter

<switch>	Automatic attenuation setting
0	The automatic attenuation setting is disabled.
1	The automatic attenuation setting is enabled.

Example of Use

To read out the automatic attenuation setting On/Off state.

```
POW:ATT:AUTO?
> 1
```

2.2.7 Level Offset

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_power>

Level Offset Value

Function

Sets the offset value of the reference level.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet
<rel_power>
```

Parameter

<rel_power>	Offset value
Range	–99.99 to +99.99 dB
Resolution	0.01 dB
Suffix code	DB
	dB is used when omitted.
Default	0 dB

Example of Use

To set the level offset to 0.5 dB.

```
DISP:WIND:TRAC:Y:RLEV:OFFS 0.5
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?

Level Offset Value Query

Function

Reads out the offset value of the reference level.

Query

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?
```

Response

```
<rel_power>
```

Parameter

<rel_power>	Offset value
Range	–99.99 to +99.99 dB
Resolution	0.01 dB

Example of Use

To read out the level offset setting.

```
DISP:WIND:TRAC:Y:RLEV:OFFS?
> 0.50
```

2.2.8 Level Offset State

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe OFF|ON|0|1

Level Offset State

Function

Enables/disables the offset value of the reference level.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe
<switch>
```

Parameter

<switch>	Level Offset State
OFF|0	Disabled (Default)
ON|1	Enabled

Example of Use

To enable the offset value of the reference level.

```
DISP:WIND:TRAC:Y:RLEV:OFFS:STAT ON
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?

Level Offset State Query

Function

Reads out the reference level offset function On/Off state.

Query

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?
```

Response

```
<switch>
```

Parameter

<switch>	Reference level offset function state
0	Disabled
1	Enabled

Example of Use

To read out the reference level offset function On/Off state.

```
DISP:WIND:TRAC:Y:RLEV:OFFS:STAT?
> 1
```

2.2.9 Pre Amp

[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1

Pre Amp State

Function

Sets Pre-amp to On/Off.

Command

```
[:SENSe]:POWer[:RF]:GAIN[:STATe] <switch>
```

Parameter

<switch>	Pre-amp On/Off
OFF|0	Off (Default)
ON|1	On

Details

This command is disabled when MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 is not installed.

Example of Use

To set Pre-amp to On.

```
POW:GAIN ON
```

[:SENSe]:POWer[:RF]:GAIN[:STATe]?

Pre Amp State Query

Function

Reads out Pre-amp On/Off.

Query

```
[:SENSe]:POWer[:RF]:GAIN[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Pre-amp On/Off
0	Off
1	On

Details

Returns "0" (Off) when MS2830A-008/108/068/168, MS2840A-008/108/068/168/069/169, or MS2850A-068/168 is not installed.

Example of Use

To read out the Pre-amp setting.

```
POW:GAIN?
> 1
```

2.2.10 Log Scale Line

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>

Scale Lines

Function

This command sets the Log Scale Line of level axis.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE <line>
```

Parameter

<line>	Line value
Range	10, 16
Default	10

Example of Use

To set the Log Scale Line to 16

```
DISP:WIND:TRAC:Y:SCAL:LINE 16
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?

Scale Lines

Function

This command queries the Log Scale Line of level axis.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:LINE?
```

Response

```
<line>
```

Parameter

<line>	Line value
Range	10, 16

Example of Use

To query the Log Scale Line of level axis.

```
DISP:WIND:TRAC:Y:LINE?
> 16
```

2.2.11 Reference Value

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>

Reference Value

Function

This command sets the upper limit of level axis.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue <real>
```

Parameter

<real>		Upper limit
	Range	–140 to –50 (Log Scale Line=10)
		–170 to –20 (Log Scale Line=16)
	Resolution	10 dBc/Hz
	Suffix code	DB
		dB is used when omitted.
	Default	–50 (Log Scale Line=10)
		–20 (Log Scale Line=16)

Example of Use

To set the Reference Value to –70.

```
DISP:WIND:TRAC:Y:SCAL:RVAL -70
```

:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue?

Scale Lines

Function

This command queries the upper limit of level axis.

Command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RVALue?
```

Response

```
<real>
```

Parameter

<real>		Reference Value
	Range	–140 to –50 (Log Scale Line=10)
		–170 to –20 (Log Scale Line=16)

Example of Use

To query the upper limit of level axis.

```
DISP:WIND:TRAC:Y:RVALue?
> -140
```

2.2.12 External Mixer

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

External Mixer Mode

Function

This command selects the internal mixer and external mixer.

Command

```
[:SENSe]:MIXer[:STATe] <switch>
```

Parameter

<switch>	External Mixer Switch
ON|1	Selects the external mixer.
OFF|0	Selects the internal mixer.

Details

This function is available only when MS2830A-044/045 is installed.
This function is available only when MS2840A-044/046 is installed.
This function is readily available for MS2850A.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control).*

Example of Use

To use the external mixer.

```
MIX ON
```

[:SENSe]:MIXer[:STATe]?

External Mixer Mode Query

Function

This command queries the current mixer mode.

Command

```
[:SENSe]:MIXer[:STATe]?
```

Response

```
<status>
```

Parameter

<status>	External Mixer Switch
1	Uses the external mixer.
0	Uses the internal mixer.

Details

This function is available only when MS2830A-044/045 is installed.
This function is available only when MS2840A-044/046 is installed.
This function is readily available for MS2850A.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, “Setting External Mixer” in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control).*

Example of Use

To query the current external mixer switch state.

```
MIX?
> 1
```

[:SENSe]:MIXer:BAND VHP|EHP

External Mixer Band

Function

This command selects the band for High Performance Waveguide Mixer.

Command

```
[:SENSe]:MIXer:BAND <band>
```

Parameter

<band>	High Performance Waveguide Mixer Band
VHP	Band VHP (50.0 to 75.0 GHz, 8+) (Default)
EHP	Band EHP (60.0 to 90.0 GHz, 12–)

Details

This function is available only when MS2830A-044/045 is installed.
This function is available only when MS2840A-044/046 is installed.
This function is readily available for MS2850A.
When using High Performance Waveguide Mixer, set the parameters of the external mixer by using the Spectrum Analyzer function of the mainframe.
For details, refer to 2.21, "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control).*

Example of Use

To set the band for High Performance Waveguide Mixer to Band EHP.

```
MIX:BAND EHP
```

[:SENSe]:MIXer:BAND?

External Mixer Band Query

Function

This command queries the band of the current High Performance Waveguide Mixer.

Command

```
[:SENSe]:MIXer:BAND?
```

Response

```
<band>
```

Parameter

<band>	High Performance Waveguide Mixer Band
VHP	Band VHP (50.0 to 75.0 GHz, 8+)
EHP	Band EHP (60.0 to 90.0 GHz, 12–)

Details

This function is available only when MS2830A-044/045 is installed.
This function is available only when MS2840A-044/046 is installed.
This function is readily available for MS2850A.

Example of Use

To query the band of the current High Performance Waveguide Mixer.

```
MIX:BAND?
> EHP
```

[:SENSe]:MIXer:SELect <mode>

External Mixer Select

Function

This command sets the External Mixer mode when using external mixer.

Command

```
[:SENSe]:MIXer:SELect <mode>
```

Parameter

<mode>	External Mixer Mode
0	Anritsu Mixer
1	Third-Party Mixer
Default	0

Details

Third-Party Mixer is available when MX284090A is installed.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, “Setting External Mixer” in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)*.

Example of Use

To set the External Mixer mode to third-party mixer.

```
MIX:SEL 1
```

[:SENSe]:MIXer:SELect?

External Mixer Select Query

Function

This command queries the type of the external mixer currently in use.

Query

```
[:SENSe]:MIXer:SELect?
```

Response

```
<mode>
```

Parameter

<mode>	External Mixer Mode
0	Anritsu Mixer
1	Third-Party Mixer

Details

Third-Party Mixer is available when MX284090A is installed.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, "Setting External Mixer" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)*.

Example of Use

To query the type of the external mixer currently in use:

```
MIX:SEL?
> 1
```

[:SENSe]:MIXer:TP:BAND <num>

External Mixer Band (Third Party External Mixer)

Function

This command sets the parameter patterns (frequency range, mixing order, polarity) for the third-party external mixier to use.

Command

```
[:SENSe]:MIXer:TP:BAND <num>
```

Parameter

<num>	Parameter patterns (Frequency, mixing order, polarity)
1	40.0 to 60.0 GHz, 8–
2	50.0 to 75.0 GHz, 8+
3	60.0 to 90.0 GHz, 12–
4	75.0 to 110.0 GHz, 12+
5	90.0 to 140.0 GHz, 16+
6	110.0 to 170.0 GHz, 18+
7	120.0 to 170.0 GHz, 24–
8	140.0 to 220.0 GHz, 24+
9	150.0 to 220.0 GHz, 24+
10	170.0 to 240.0 GHz, 24+
11	240.0 to 325.0 GHz, 48–
12	220.0 to 325.0 GHz, 36+
Default	1

Details

This command is available when the MX284090A is installed.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, “Setting External Mixer” in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)*.

Example of Use

To set the band of the external mixer to 40.0 to 60.0 GHz, 8–:

```
MIX:TP:BAND 1
```

[:SENSe]:MIXer:TP:BAND?

External Mixer Band (Third Party External Mixer) Query

Function

This command queries the parameter patterns (frequency range, mixing order, polarity) for the third-party external mixier currently in use.

Query

```
[:SENSe]:MIXer:TP:BAND?
```

Response

```
<num>
```

Parameter

<num>	Parameter patterns (Frequency, mixing order, polarity)
1	40.0 to 60.0 GHz, 8–
2	50.0 to 75.0 GHz, 8+
3	60.0 to 90.0 GHz, 12–
4	75.0 to 110.0 GHz, 12+
5	90.0 to 140.0 GHz, 16+
6	110.0 to 170.0 GHz, 18+
7	120.0 to 170.0 GHz, 24–
8	140.0 to 220.0 GHz, 24+
9	150.0 to 220.0 GHz, 24+
10	170.0 to 240.0 GHz, 24+
11	240.0 to 325.0 GHz, 48–
12	220.0 to 325.0 GHz, 36+

Details

This command is available when the MX284090A is installed.
To set the parameters related to the external mixer, use the Spectrum Analyzer function.
For details, refer to 2.21, “Setting External Mixer” in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)*.

Example of Use

```
To query the band of the external mixer currently in use:
MIX:TP:BAND?
> 1
```

2.3 Utility Function

Table 2.3-1 lists device messages for utility functions to be measured.

Table 2.3-1 Utility Function

Function	Device Message
Erase Warm Up Message	:DISPlay:ANNotation:WUP:ERASe
Display Title	:DISPlay:ANNotation:TITLe[:STATe] ON|OFF|1|0
	:DISPlay:ANNotation:TITLe[:STATe]?
Title Entry	:DISPlay:ANNotation:TITLe:DATA <string>
	:DISPlay:ANNotation:TITLe:DATA?

2.3.1 Erase Warm Up Message

:DISPlay:ANNotation:WUP:ERASe

Erase Warm Up Message

Function

Erases the warm-up messages displayed right after activation.

Command

```
:DISPlay:ANNotation:WUP:ERASe
```

Example of Use

To erase warm-up messages.

```
DISP:ANN:WUP:ERAS
```

2.3.2 Display Title

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

Display Title

Function

Displays/hides the title.

Command

```
:DISPlay:ANNotation:TITLe[:STATe] <switch>
```

Parameter

<switch>	Title display On/Off
OFF|0	Off
ON|1	On (Default)

Example of Use

To display the title.

```
DISP:ANN:TITL ON
```

:DISPlay:ANNotation:TITLe[:STATe]?

Display Title Query

Function

Reads out On/Off of the title display.

Query

```
:DISPlay:ANNotation:TITLe[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Title display On/Off
1	On
0	Off

Example of Use

To read out the title display setting.

```
DISP:ANN:TITL?
> 1
```

2.3.3 Title Entry

:DISPlay:ANNotation:TITLe:DATA <string>

Title Entry

Function

Registers the title character string.

Command

```
:DISPlay:ANNotation:TITLe:DATA <string>
```

Parameter

<string>	Character string within 32 characters enclosed by double quotation marks (" ") or single quotation marks (' ')

Example of Use

To set the title character string.

```
DISP:ANN:TITL:DATA 'TEST'
```

:DISPlay:ANNotation:TITLe:DATA?

Title Entry Query

Function

Reads out the title character string.

Query

```
:DISPlay:ANNotation:TITLe:DATA?
```

Response

```
<string>
```

Parameter

`<string>`	Character string within 32 characters enclosed by double quotation marks (“ ”) or single quotation marks (‘ ’)

Example of Use

To read out the title character string.

```
DISP:ANN:TITL:DATA?
> TEST
```

2.4 Common Measurement Function

Table 2.4-1 lists device messages for carrying out operations common to all the measurement functions.

Table 2.4-1 Common Measurement Function

Function	Device Message
Continuous Measurement	:INITiate:CONTinuous OFF|ON|0|1
	:INITiate:CONTinuous?
	:INITiate:MODE:CONTinuous
Single Measurement	:INITiate:MODE:SINGle
Initiate	:INITiate[:IMMediate]
Configure	:CONFigure?
Save Result Data	:MMEMory:STORe:TRACe [<filename>[,<device>]]

2.4.1 Measurement and Control

:INITiate:CONTinuous OFF|ON|0|1

Continuous Measurement

Function

Sets the measurement mode.

Command

```
:INITiate:CONTinuous <switch>
```

Parameter

<switch>	Measurement mode
0|OFF	Single measurement mode
1|ON	Continuous measurement mode (Default)

Details

When set to On, the Continuous measurement mode is set and continuous measurement is started. When set to Off, the Single measurement mode is set and no measurement is performed.

Example of Use

To perform continuous measurement.

```
INIT:CONT ON
```

:INITiate:CONTinuous?

Continuous Measurement Query

Function

Reads out the measurement mode.

Query

```
:INITiate:CONTinuous?
```

Response

```
<switch>
```

Parameter

<switch>	Measurement mode
0	Single measurement mode
1	Continuous measurement mode

Example of Use

To read out the measurement mode.

```
INIT:CONT?
> 0
```

:INITiate:MODE:CONTinuous

Continuous Measurement

Function

Starts continuous measurement.

Command

```
:INITiate:MODE:CONTinuous
```

Example of Use

To perform continuous measurement.

```
INIT:MODE:CONT
```

:INITiate:MODE:SINGle

Single Measurement

Function

Starts single measurement.

Command

```
:INITiate:MODE:SINGle
```

Details

This command is an asynchronous command.
Note that it does not support synchronized control in the continuous measurement mode.

Example of Use

To perform single measurement.

```
INIT:MODE:SING
```

:INITiate[:IMMediate]

Initiate

Function

Starts measurement in the selected measurement mode.

Command

```
:INITiate[:IMMediate]
```

Details

This command is an asynchronous command.
Note that it does not support synchronized control in the continuous measurement mode.

Example of Use

To start measurement in the selected measurement mode.

```
INIT
```

:CONFigure?

Configure Query

Function

Reads out the name of the current measurement function.

Query

```
:CONFigure?
```

Response

```
<mode>
```

Parameter

<mode>	Measurement function
LPLot	Log plot measurement

Example of Use

To read out the name of the measurement function.

```
CONF?
> LPL
```

2.4.2 Save Result Data

:MMEMory:STORe:TRACe [<filename>[,<device>]]

Save Result Data

Function

Saves the measurement result into a CSV file.

Command

```
:MMEMory:STORe:TRACe [<filename>[,<device>]]
```

Parameter

<filename>	File name Character string within 32 characters (not including an extension) enclosed by double quotation marks " ") or single quotation marks (' ') The following characters cannot be used: \ / : * ? " < > | When omitted, "WaveData date_sequencial number.csv" is automatically set.
<device>	Drive name A,B,D,E,F,... When omitted, drive D is automatically set.

Details

A sequential number from 00 to 99 is added to the file name when the file name is omitted. No more files can be saved if all the numbers through 99 have already been used.

The measurement result files are saved in the following directory of the specified drive:
/Anritsu Corporation/Signal Analyzer/User Data
/Trace Data/Phase Noise

Up to 1000 files can be saved in the folder.

Example of Use

To save the measurement result into a file under the name "trace" in drive E.

```
MMEM:STOR:TRAC "trace",E
```

2.5 Log Plot Measurement

This section describes the device messages related to log plot measurement.

Table 2.5-1 lists the commands to perform log plot measurement and the queries to read out the results.

Table 2.5-1 Device Messages for Log Plot Measurement

Function	Device Message
Configure	:CONFigure:LPLot
Initiate	:INITiate:LPLot
Fetch	:FETCh:LPLot[n]?
Read/Measure	:READ:LPLot[n]?
	:MEASure:LPLot[n]?

Table 2.5-2 lists responses to Parameter n on Table 2.5-1.

Table 2.5-2 Responses to Log Plot Measurement Result

n	Result Mode	Response
1 or omitted	A/B	The average values obtained through measurement for the average count are returned in the following order, in comma-separated value format. 1. Carrier Power[dBm] 2. Carrier Frequency[Hz] ***Note:*** Carrier Frequency is the total result of the set carrier frequency and the frequency error. 3. –999.0 4. –999.0 5. –999.0 6. Phase noise level at the minimum offset frequency [dBc/Hz] 7. Phase noise level at the maximum offset frequency [dBc/Hz]
2	A/B	The number of data displayed on the log plot graph is returned.
3	A/B	The data displayed on the log plot graph are returned in comma-separated value format. Unit: dBc/Hz

Table 2.5-3 lists the commands to set a parameter for log plot measurement.

Table 2.5-3 Device Messages for Setting for Log Plot Measurement Parameter

Parameter	Device Message
Average Count	[:SENSe]:LPLot:AVERage:COUNt <integer>
	[:SENSe]:LPLot:AVERage:COUNt?
Phase Noise Optimization	[:SENSe]:FREQuency:SYNThesis[:STATe] <integer>
	[:SENSe]:FREQuency:SYNThesis[:STATe]?

Table 2.5-4 lists the commands to set a marker and the queries to read out values at the marker position for log plot measurement.

Table 2.5-4 Device Messages for Marker of Log Plot Measurement

Parameter	Device Message
Marker Mode	:CALCulate:LPLot:MARKer[n]:MODE <mode>
	:CALCulate:LPLot:MARKer[n]:MODE?
Marker Width Start	:CALCulate:LPLot:MARKer[n]:WIDTh:STARt <rel_freq>
	:CALCulate:LPLot:MARKer[n]:WIDTh:STARt?
Marker Width Stop	:CALCulate:LPLot:MARKer[n]:WIDTh:STOP <rel_freq>
	:CALCulate:LPLot:MARKer[n]:WIDTh:STOP?
Marker Freq. Offset	:CALCulate:LPLot:MARKer[n]:X <rel_freq>
	:CALCulate:LPLot:MARKer[n]:X?
Marker Result	:CALCulate:LPLot:MARKer[n]:Y?
Marker Result Value	:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:VALue?

2.5.1 Measure

:CONFigure:LPLot

Configure

Function

Selects the log plot measurement function. No measurement is performed.

Command

```
:CONFigure:LPLot
```

Example of Use

To select the log plot measurement.

```
CONF:LPL
```

:INITiate:LPLot

Initiate

Function

Performs log plot measurement.

Command

```
:INITiate:LPLot
```

Example of Use

To perform log plot measurement.

```
INIT:LPL
```

:FETCh:LPLot[n]?

Fetch

Function

Reads out the result of the log plot measurement.

Query

```
:FETCh:LPLot[n]?
```

Response

```
<carrier_ power>,<carrier freq>,
-999.0,-999.0,-999.0,
<level_lower>,<level_upper>
```
(n = 1 or when omitted)
```
<data_point>
```
(n = 2)
```
<level_1>,<level_2>,<level_3>,
......
```
(n = 3)

Parameter

<carrier power>	Carrier power
<carrier freq>	Carrier frequency
<level_lower>	Phase noise level at the minimum offset frequency
<level_upper>	Phase noise level at the maximum offset frequency
<data_point>	Number of data
<level_n>	Phase noise level of the data n

Example of Use

To read out the result of the log plot measurement.

```
FETC:LPL?
> 0.00,2000000000,-999.0,-999.0,-999.0,-50.00,-150.00
```

:READ:LPLot[n]?

Read

Function

Reads out the result after the single measurement of the log plot is performed in the current setting value.

Query

```
:READ:LPLot[n]?
```

Response

Refer to `:FETCh:LPLot[n]?`

Example of Use

To perform the log plot measurement in order to read out the result.

```
READ:LPL?
```

Related Command

This command has the same function as the following one.

```
:MEASure:LPlot[n]?
```

:MEASure:LPLot[n]?

Measure

Function

Reads out the result after the single measurement of the log plot is performed in the current setting value.

Query

```
:MEASure:LPLot[n]?
```

Response

Refer to `:FETCh:LPLot[n]?`

Example of Use

To perform the log plot measurement in order to read out the result.

```
MEAS:LPL?
```

Related Command

This command has the same function as the following one.

```
:READ:LPLot[n]?
```

2.5.2 Average Count

[:SENSe]:LPLot:AVERage:COUNt <integer>

Average Count

Function

Sets the average count.

Command

```
[:SENSe]:LPLot:AVERage:COUNt <integer>
```

Parameter

<integer>	Average Count
Range	1 to 999
Resolution	1
Default	1

Example of Use

To set Average Count to 10.

```
LPL:AVER:COUN 10
```

[:SENSe]:LPLot:AVERage:COUNt?

Average Count Query

Function

Reads out the setting of the average count.

Query

```
[:SENSe]:LPLot:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>	Average Count
Range	1 to 999
Resolution	1

Example of Use

To read out the setting of the average count.

```
LPL:AVER:COUN?
> 50
```

2.5.3 Phase Noise Optimization

[:SENSe]:FREQuency:SYNThesis[:STATe] 0|1|2|3

Phase Noise Optimization

Function

Selects the optimization mode for the phase noise measurement.

Command

```
[:SENSe]:FREQuency:SYNThesis[:STATe] <mode>
```

Parameter

<mode>		Optimization mode for the phase noise measurement
[MS2840A, MS2850A]		
	0	Performs measurement by automatically switching the best loop filters for the phase noise measurement near and far from the carrier respectively. (Auto) (Default)
	1	Performs measurement by using the best close-in loop filter for the phase noise measurement near the carrier. (Best Close-in)
	2	Performs measurement by using the best wide-offset loop filter for the phase noise measurement far from the carrier. (Best Wide-offset)
	3	Performs measurement by using a balanced loop filter for the phase noise measurement both near and far from the carrier. (Balance)
[MS269xA, MS2830A]		
	3	Performs measurement by using a balanced loop filter for the phase noise measurement both near and far from the carrier. (Balance) (Default, Fixed)

Example of Use

To set the optimization mode for phase noise measurement to optimization of phase noise measurement far from the carrier.

```
FREQ:SYNT 2
```

[:SENSe]:FREQuency:SYNThesis[:STATe]?

Phase Noise Optimization

Function

Queries the optimization mode of the phase noise measurement.

Query

```
[:SENSe]:FREQuency:SYNThesis[:STATe]?
```

Response

```
<mode>
```

Parameter

<mode>		Optimization mode for the phase noise measurement
[MS2840A, MS2850A]		
	0	Performs measurement by automatically switching the best loop filters for the phase noise measurement near and far from the carrier respectively. (Auto)
	1	Performs measurement by using the best close-in loop filter for the phase noise measurement near the carrier. (Best Close-in)
	2	Performs measurement by using the best wide-offset loop filter for the phase noise measurement far from the carrier. (Best Wide-offset)
	3	Performs measurement by using a balanced loop filter for the phase noise measurement both near and far from the carrier. (Balance)
[MS269xA, MS2830A]		
	3	Performs measurement by using a balanced loop filter for the phase noise measurement both near and far from the carrier. (Balance) (Fixed)

Example of Use

To query the optimization mode of the phase noise measurement.

```
FREQ:SYNT?
> 2
```

2.5.4 Marker Mode

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:MODE NORMal|INTegralnoise|RMSNoise|JITTer|RESidualfm|OFF

Marker Mode

Function

Sets the marker mode for the log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:MODE <mode>
```

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

Note:

When Marker Mode is set to Integral Noise, RMS Noise, Jitter, or Residual FM, the marker is fixed to specified active marker.

<mode>	Marker mode	
NORMal	Normal	
INTegralnoise	Integral Noise	
RMSNoise	RMS Noise	
JITTer	Jitter	
RESidualfm	Residual FM	
OFF	Off	
Default	Normal	(Markers 1 to 7)
	Off	(Markers 8)

Example of Use

To set the mode of marker 8 to Normal.

```
CALC:LPL:MARK8:MODE NORM
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:MODE?

Marker Mode Query

Function

Reads out the marker mode for the log plot measurement.

Query

```
:CALCulate:LPLot:MARKer[n]:MODE?
```

Response

```
<mode>
```

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<mode>	Marker mode
NORM	Normal
INT	Integral Noise
RMSN	RMS Noise
JITT	Jitter
RES	Residual FM
OFF	Off

Example of Use

To read out the mode of marker 2.

```
CALC:LPL:MARK2:MODE?
> NORM
```

2.5.5 Analysis Width

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STARt <rel_freq>

Marker Width Start

Function

This command sets the starting position of marker range at log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:WIDTh:STARt <rel_freq>
```

Parameter

<n>		Marker Number
	1	Specifies marker 1
	2	Specifies marker 2
	3	Specifies marker 3
	4	Specifies marker 4
	5	Specifies marker 5
	6	Specifies marker 6
	7	Specifies marker 7
	8	Specifies marker 8
	When omitted	Specifies marker 1

<freq>		Frequency offset
	Range	10 Hz to 10 MHz
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 kHz to 10 kHz)
		1 kHz (10 kHz to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
	Default	1 kHz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.

Example of Use

To set the starting position of marker range of marker 1 to 5 kHz.

```
CALC:LPL:MARK1:WIDT:STAR 5KHZ
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STARt?

Marker Width Start Query

Function

This command queries the starting position of marker range at log plot measurement.

Query

```
:CALCulate:LPLot:MARKer[n]:WIDTh:STARt?
```

Response

```
<rel_freq>
```

Parameter

<n>		Marker Number
	1	Specifies marker 1
	2	Specifies marker 2
	3	Specifies marker 3
	4	Specifies marker 4
	5	Specifies marker 5
	6	Specifies marker 6
	7	Specifies marker 7
	8	Specifies marker 8
	When omitted	Specifies marker 1

<rel_freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 kHz to 10 kHz)
		1 kHz (10 kHz to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
		No suffix code. Value is returned in Hz units.

Example of Use

To query the starting position of marker range of marker 1.

```
CALC:LPL:MARK1:WIDT:STAR?
> 5000
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STOP <rel_freq>

Marker Width Stop

Function

This command sets the stop position of marker range at log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:WIDTh:STOP <rel_freq>
```

Parameter

<n>		Marker Number
	1	Specifies marker 1
	2	Specifies marker 2
	3	Specifies marker 3
	4	Specifies marker 4
	5	Specifies marker 5
	6	Specifies marker 6
	7	Specifies marker 7
	8	Specifies marker 8
	When omitted	Specifies marker 1

<freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 kHz to 10 kHz)
		1 kHz (10 kHz to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
	Default	100 kHz
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.

Example of Use

To set the stop position of marker range of marker 1 to 500 kHz.

```
CALC:LPL:MARK1:WIDT:STOP 500KHZ
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:WIDTh:STOP?

Marker Width Stop Query

Function

This command queries the stop position of marker range at log plot measurement.

Query

```
:CALCulate:LPLot:MARKer[n]:WIDTh:STOP?
```

Response

```
<rel_freq>
```

Parameter

<n>		Marker Number
	1	Specifies marker 1
	2	Specifies marker 2
	3	Specifies marker 3
	4	Specifies marker 4
	5	Specifies marker 5
	6	Specifies marker 6
	7	Specifies marker 7
	8	Specifies marker 8
	When omitted	Specifies marker 1

<rel_freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 kHz to 10 kHz)
		1 kHz (10 kHz to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
		No suffix code. Value is returned in Hz units.

Example of Use

To query the stop position of marker range of marker 1.

```
CALC:LPL:MARK1:WIDT:STOP?
> 500000
```

2.5.6 Marker Frequency Offset

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:X <rel_freq>

Marker Frequency Offset

Function

Sets the frequency offset of the marker for the log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:X <rel_freq>
```

Parameter

<n>		Marker number
	1	Marker 1
	2	Marker 2
	3	Marker 3
	4	Marker 4
	5	Marker 5
	6	Marker 6
	7	Marker 7
	8	Marker 8
	When omitted	Marker 1

<rel_freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 to 10 kHz)
		1 kHz (10 to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
	Default	10 Hz (Marker 1)
		100 Hz (Marker 2)
		1 kHz (Marker 3)
		10 kHz (Marker 4)
		100 kHz (Marker 5)
		1 MHz (Marker 6)
		10 MHz (Marker 7)
		10 MHz (Marker 8)
	Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
		Hz is used when omitted.

Example of Use

To set the frequency offset of marker 1 to 5 kHz.

```
CALC:LPL:MARK1:X 5KHZ
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:X?

Marker Frequency Offset Query

Function

Reads out the frequency offset of the marker for the log plot measurement.

Query

```
:CALCulate:LPLot:MARKer[n]:X?
```

Response

```
<rel_freq>
```

Parameter

<n>		Marker number
	1	Marker 1
	2	Marker 2
	3	Marker 3
	4	Marker 4
	5	Marker 5
	6	Marker 6
	7	Marker 7
	8	Marker 8
	When omitted	Marker 1

<rel_freq>		Frequency offset
	Range	Start Offset to Stop Offset
	Resolution	1 Hz (10 Hz to 100 Hz)
		10 Hz (100 Hz to 1 kHz)
		100 Hz (1 to 10 kHz)
		1 kHz (10 to 100 kHz)
		10 kHz (100 kHz to 1 MHz)
		100 kHz (1 MHz to 10 MHz)
		Value is returned in Hz units.

Example of Use

To read out the frequency offset of marker 1.

```
CALC:LPL:MARK1:X?
> 5000
```

2.5.7 Marker Result

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:Y?

Marker Result Query

Function

Reads out the phase noise level of the marker for the log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:Y?
```

Response

```
<level>
```

Parameter

<n>		Marker number
	1	Marker 1
	2	Marker 2
	3	Marker 3
	4	Marker 4
	5	Marker 5
	6	Marker 6
	7	Marker 7
	8	Marker 8
	When omitted	Marker 1
<level>		Phase noise level No suffix code. Value is returned in dBc/Hz units.

Example of Use

To read out the phase noise level of marker 2.

```
CALC:LPL:MARK2:Y?
> -150.0
```

:CALCulate:LPLot:MARKer[1]|2|3|4|5|6|7|8:VALue?

Marker Result Value Query

Function

Reads out the calculated value of the marker for the log plot measurement.

Command

```
:CALCulate:LPLot:MARKer[n]:VALue?
```

Response

```
<value>
```

Parameter

<n>	Marker number
1	Marker 1
2	Marker 2
3	Marker 3
4	Marker 4
5	Marker 5
6	Marker 6
7	Marker 7
8	Marker 8
When omitted	Marker 1

<value>	Calculated Value
Suffix code	None. Value is returned in units of Marker Mode.

Marker Mode	Unit
NORMal	dBc/Hz
INTegralnoise	dBc
RMSNoise	radian
JITTer	second
RESidualfm	Hz

Example of Use

To read out the calculated value of marker 2.

```
CALC:LPL:MARK2:VAL?
> -60.0
```

Chapter 3 SCPI Status Register

This chapter describes the SCPI commands and the Status register for querying application statuses.

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:STATus:QUEStionable:NTRansition?....3-7
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:STATus:QUEStionable:PTRansition?....3-8
:STATus:QUEStionable:MEASure[:EVENt]?....3-9
:STATus:QUEStionable:MEASure:CONDition?....3-9
:STATus:QUEStionable:MEASure:ENABle
<integer> 3-10
:STATus:QUEStionable:MEASure:ENABle?....3-10
:STATus:QUEStionable:MEASure:NTRansition
<integer> 3-11
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:STATus:QUEStionable:MEASure:PTRansition
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:STATus:OPERation:PTRansition?....3-17

3.1 Querying Measurement Status

:STATus:ERRor?

Measurement Status Query

Function

Queries the measurement status.

Query

```
:STATus:ERRor?
```

Response

```
<status>
```

Parameter

`<status>` Measurement status

Value = bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7 + bit8 + bit9 + bit10 + bit11 + bit12 + bit13 + bit14 + bit15

bit0 : 2^0 = 1	Not measured
bit1 : 2^1 = 2	Exceeded the level.
bit2 : 2^2 = 4	(Unused)
bit3 : 2^3 = 8	(Unused)
bit4 : 2^4 = 16	(Unused)
bit5 : 2^5 = 32	(Unused)
bit6 : 2^6 = 64	(Unused)
bit7 : 2^7 = 128	(Unused)
bit8 : 2^8 = 256	(Unused)
bit9 : 2^9 = 512	(Unused)
bit10 : 2^{10} = 1024	(Unused)
bit11 : 2^{11} = 2048	(Unused)
bit12 : 2^{12} = 4096	(Unused)
bit13 : 2^{13} = 8192	(Unused)
bit14 : 2^{14} = 16384	(Unused)
bit15 : 2^{15} = 32768	(Unused)

Range 0 to 65535

Details

0 is returned when terminated normally.

Example of Use

To query the measurement status.

```
:STAT:ERR?
> 0
```

3.2 STATus:QUEStionable Register

Figure 3.2-1, Table 3.2-1, Figure 3.2-2, and Table 3.2-2 show the layer structure of the QUEStionable Status register.

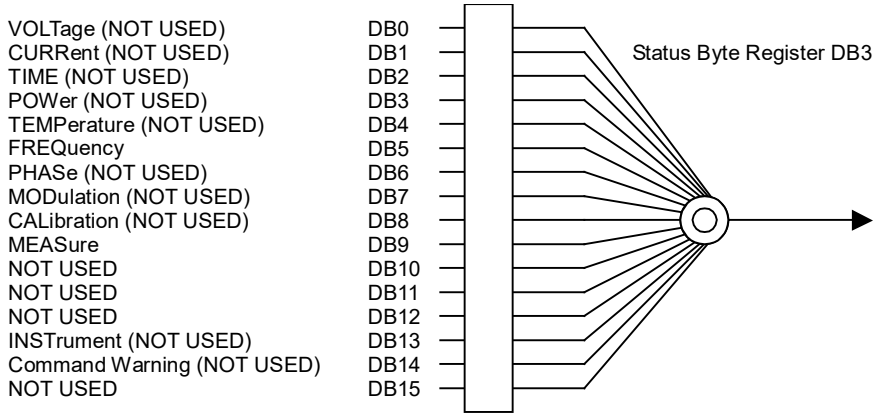

Figure 3.2-1 QUEStionable Status Register

Table 3.2-1 Bit Definition of QUEStionable Status Register

Bit	Definition
DB5	Unlock Reference Clock
DB9	QUEStionable Measure Register Summary

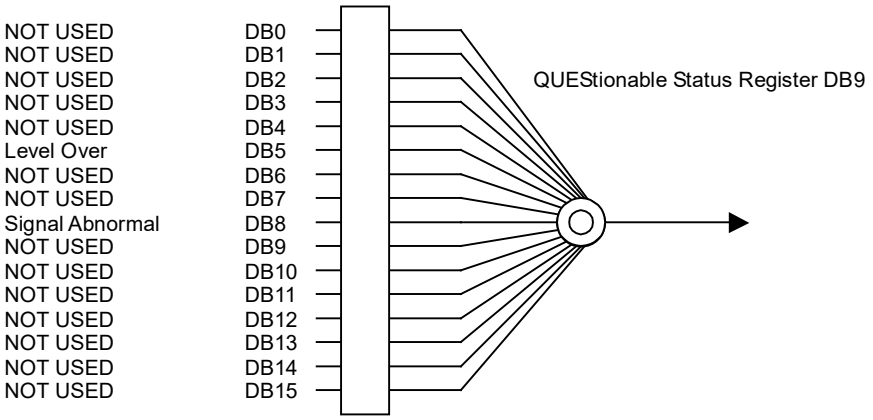

Figure 3.2-2 QUEStionable Measure Register

Table 3.2-2 Bit Definition of QUEStionable Measure Register

Bit	Definition
DB5	Exceeded the level.

Table 3.2-3 lists the device messages for the QUEStionable Status register.

Table 3.2-3 Device Messages for QUEStionable Status Register

Function	Device Message
Questionable Status Register Event	:STATus:QUEStionable[:EVENt]?
Questionable Status Register Condition	:STATus:QUEStionable:CONDition?
Questionable Status Register Enable	:STATus:QUEStionable:ENABle <integer>
	:STATus:QUEStionable:ENABle?
Questionable Status Register Negative Transition	:STATus:QUEStionable:NTRansition <integer>
	:STATus:QUEStionable:NTRansition?
Questionable Status Register Positive Transition	:STATus:QUEStionable:PTRansition <integer>
	:STATus:QUEStionable:PTRansition?
Questionable Measure Register Event	:STATus:QUEStionable:MEASure[:EVENt]?
Questionable Measure Register Condition	:STATus:QUEStionable:MEASure:CONDition?
Questionable Measure Register Enable	:STATus:QUEStionable:MEASure:ENABle <integer>
	:STATus:QUEStionable:MEASure:ENABle?
Questionable Measure Register Negative Transition	:STATus:QUEStionable:MEASure:NTRansition <integer>
	:STATus:QUEStionable:MEASure:NTRansition?
Questionable Measure Register Positive Transition	:STATus:QUEStionable:MEASure:PTRansition <integer>
	:STATus:QUEStionable:MEASure:PTRansition?

:STATus:QUEStionable[:EVENt]?

Questionable Status Register Event

Function

Queries the event register of the QUEStionable Status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Byte summation of event register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the contents of the event register of the QUEStionable Status register.

```
:STAT:QUES?
> 0
```

:STATus:QUEStionable:CONDition?

Questionable Status Register Condition

Function

Queries the condition register of the QUEStionable Status register.

Query

```
:STATus:QUEStionable:CONDition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the condition register of the QUEStionable Status register.

```
:STAT:QUES:COND?
> 0
```

:STATus:QUEStionable:ENABle <integer>

Questionable Status Register Enable

Function

Sets the event enable register of the QUEStionable Status register.

Command

```
:STATus:QUEStionable:ENABle <integer>
```

Parameter

<integer>		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To set the event enable register of the QUEStionable Status Register to 16.

```
:STAT:QUES:ENAB 16
```

:STATus:QUEStionable:ENABle?

Questionable Status Register Enable Query

Function

Queries the event enable register of the QUEStionable Status register.

Query

```
:STATus:QUEStionable:ENABle?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the event enable register of the QUEStionable Status Register.

```
:STAT:QUES:ENAB?
> 16
```

:STATus:QUEStionable:NTRansition <integer>

Questionable Status Register Negative Transition

Function

Sets the transition filter (negative transition) of the QUEStionable Status register.

Command

```
:STATus:QUEStionable:NTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (negative transition) of the QUEStionable Status register to 16.

```
:STAT:QUES:NTR 16
```

:STATus:QUEStionable:NTRansition?

Questionable Status Register Negative Transition Query

Function

Queries the transition filter (negative transition) of the QUEStionable Status register.

Query

```
:STATus:QUEStionable:NTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (negative transition) of the QUEStionable Status register.

```
:STAT:QUES:NTR?
> 16
```

:STATus:QUEStionable:PTRansition <integer>

Questionable Status Register Positive Transition

Function

Sets the transition filter (negative transition) of the QUEStionable Status register.

Command

```
:STATus:QUEStionable:PTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (positive transition) of the QUEStionable Status Register to 16.

```
:STAT:QUES:PTR 16
```

:STATus:QUEStionable:PTRansition?

Questionable Status Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the QUEStionable Status Register.

Query

```
:STATus:QUEStionable:PTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (positive transition) of the QUEStionable Status Register.

```
:STAT:QUES:PTR?
> 16
```

:STATus:QUEStionable:MEASure[:EVENt]?

Questionable Measure Register Event

Function

Queries the event register of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Byte summation of event register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the event register of the QUEStionable Measure Register.

```
:STAT:QUES:MEAS?
> 0
```

:STATus:QUEStionable:MEASure:CONDition?

Questionable Measure Register Condition

Function

Queries the condition register of the QUEStionable Measure register.

Query

```
:STATus:QUEStionable:MEASure:CONDition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the condition register of the QUEStionable Measure register.

```
:STAT:QUES:MEAS:COND?
> 0
```

:STATus:QUEStionable:MEASure:ENABle <integer>

Questionable Measure Register Enable

Function

Sets the event enable register of the QUEStionable Measure register.

Command

```
:STATus:QUEStionable:MEASure:ENABle <integer>
```

Parameter

<integer>	Byte summation of event enable register
Resolution	1
Range	0 to 65535

Example of Use

To set the event enable register of the QUEStionable Measure register to 16.

```
:STAT:QUES:MEAS:ENAB 16
```

:STATus:QUEStionable:MEASure:ENABle?

Questionable Measure Register Enable Query

Function

Queries the event enable register of the QUEStionable Measure register.

Query

```
:STATus:QUEStionable:MEASure:ENABle?
```

Response

```
<integer>
```

Parameter

<integer>	Byte summation of event enable register
Resolution	1
Range	0 to 65535

Example of Use

To query the event enable register of the QUEStionable Measure Register.

```
:STAT:QUES:MEAS:ENAB?
> 16
```

:STATus:QUEStionable:MEASure:NTRansition <integer>

Questionable Measure Register Negative Transition

Function

Sets the transition filter (negative transition) of the QUEStionable Measure register.

Command

```
:STATus:QUEStionable:MEASure:NTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (negative transition) of the QUEStionable Measure register to 16.

```
:STAT:QUES:MEAS:NTR 16
```

:STATus:QUEStionable:MEASure:NTRansition?

Questionable Measure Register Negative Transition Query

Function

Queries the transition filter (negative transition) of the QUEStionable Measure register.

Query

```
:STATus:QUEStionable:MEASure:NTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (negative transition) of the QUEStionable Measure register.

```
:STAT:QUES:MEAS:NTR?
> 16
```

:STATus:QUEStionable:MEASure:PTRansition <integer>

Questionable Measure Register Positive Transition

Function

Sets the transition filter (positive transition) of the QUEStionable Measure register.

Command

```
:STATus:QUEStionable:MEASure:PTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (positive transition) of the QUEStionable Measure register to 16.

```
:STAT:QUES:MEAS:PTR 16
```

:STATus:QUEStionable:MEASure:PTRansition?

Questionable Measure Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the QUEStionable Measure register.

Query

```
:STATus:QUEStionable:MEASure:PTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (positive transition) of the QUEStionable Measure register.

```
:STAT:QUES:MEAS:PTR?
> 16
```

3.3 STATus:OPERation Register

Figure 3.3-1 and Table 3.3-1 show the layer structure of the OPERation Status register.

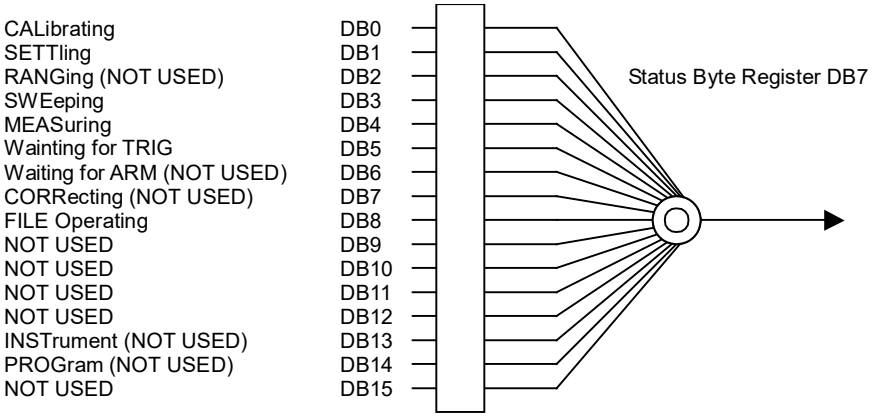

Figure 3.3-1 OPERation Status Register

Table 3.3-1 Bit Definition of OPERation Status Register

Bit	Definition
DB0	Executing CAL
DB1	Displaying Warm Up
DB3	Measuring (fixed to 1 in Continuous)
DB8	Manipulating file

Table 3.3-2 lists the device messages for the OPERation Status register.

Table 3.3-2 Device Messages for OPERation Status Register

Function	Device Message
Operation Status Register Event	`:STATus:OPERation[:EVENt]?`
Operation Status Register Condition	`:STATus:OPERation:CONDition?`
Operation Status Register Enable	`:STATus:OPERation:ENABle <integer>`
	`:STATus:OPERation:ENABle?`
Operation Status Register Negative Transition	`:STATus:OPERation:NTRansition <integer>`
	`:STATus:OPERation:NTRansition?`
Operation Status Register Positive Transition	`:STATus:OPERation:PTRansition <integer>`
	`:STATus:OPERation:PTRansition?`

:STATus:OPERation[:EVENt]?

Operation Status Register Event

Function

Queries the event register of the OPERation Status register.

Query

```
:STATus:OPERation[:EVENt]?
```

Response

```
<integer>
```

Parameter

`<integer>`		Byte summation of event register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the event register of OPERation Status register.

```
:STAT:OPER?
> 0
```

:STATus:OPERation:CONDition?

Operation Status Register Condition

Function

Queries the condition register of the OPERation Status Register.

Query

```
:STATus:OPERation:CONDition?
```

Response

```
<integer>
```

Parameter

`<integer>`		Byte summation of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the content of the condition register of the OPERation Status register.

```
:STAT:OPER:COND?
> 0
```

:STATus:OPERation:ENABle <integer>

Operation Status Register Enable

Function

Sets the event enable register of the OPERation Status register.

Command

```
:STATus:OPERation:ENABle <integer>
```

Parameter

<integer>		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To set the event enable register of the OPERation Status register to 16.

```
:STAT:OPER:ENAB 16
```

:STATus:OPERation:ENABle?

Operation Status Register Enable Query

Function

Queries the event enable register of the OPERation Status register.

Query

```
:STATus:OPERation:ENABle?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the event enable register of the OPERation Status register.

```
:STAT:OPER:ENAB?
> 16
```

:STATus:OPERation:NTRansition <integer>

Operation Status Register Negative Transition

Function

Sets the transition filter (negative transition) of the OPERation Status register.

Command

```
:STATus:OPERation:NTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (negative transition) of the OPERation Status register to 16.

```
:STAT:OPER:NTR 16
```

:STATus:OPERation:NTRansition?

Operation Status Register Negative Transition Query

Function

Queries the transition filter (negative transition) of the OPERation Status register.

Query

```
:STATus:OPERation:NTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (negative transition) of the OPERation Status register.

```
:STAT:OPER:NTR?
> 16
```

:STATus:OPERation:PTRansition <integer>

Operation Status Register Positive Transition

Function

Sets the transition filter (positive transition) of the OPERation Status register.

Command

```
:STATus:OPERation:PTRansition <integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To set the transition filter (positive transition) of the OPERation Status register to 16.

```
:STAT:OPER:PTR 16
```

:STATus:OPERation:PTRansition?

Operation Status Register Positive Transition Query

Function

Queries the transition filter (positive transition) of the OPERation Status register.

Query

```
:STATus:OPERation:PTRansition?
```

Response

```
<integer>
```

Parameter

<integer>		Byte summation of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

To query the transition filter (positive transition) of the OPERation Status register.

```
:STAT:OPER:PTR?
> 16
```