

MX269036A
Measurement Software for MediaFLO
Operation Manual
Remote Control

Second 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 Signal Analyzer Operation Manual (Mainframe Operation) and MX269036A Measurement Software for MediaFLO Operation Manual (Operation). Please also refer to these documents before using the equipment.
- Keep this manual with the equipment.


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These indicate that the marked part should be recycled.

MX269036A

Measurement Software for MediaFLO
Operation Manual Remote Control

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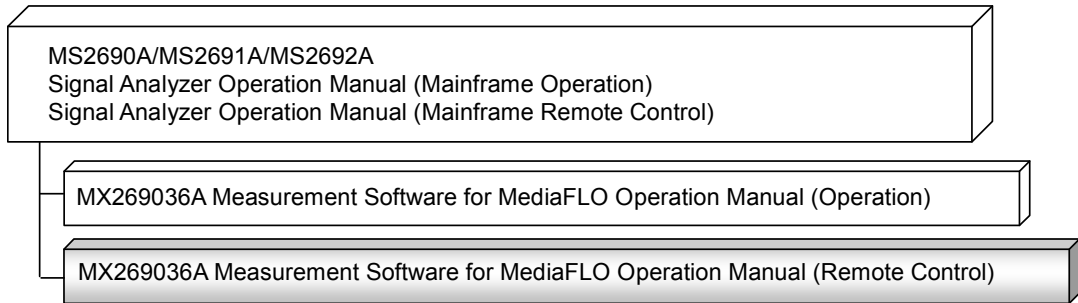
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About This Manual

■ Composition of Operation Manuals

The operation manuals for MX269036A Measurement Software for MediaFLO are comprised as shown in the figure below.



- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)

These manuals describe basic operating methods, maintenance procedures, common functions, and common remote control of the signal analyzer mainframe.

- MX269036A Measurement Software for MediaFLO Operation Manual (Operation)

This manual describes operating methods of the MX269036A Measurement Software for MediaFLO.

- MX269036A Measurement Software for MediaFLO Operation Manual (Remote Control) <This document>

This manual describes remote control of the MX269036A Measurement Software for MediaFLO.

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Chapter 1 Outline

This chapter provides an overview of the remote control of the MX269036A Measurement Software for MediaFLO (hereinafter, referred to as “this application”).

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Outline


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1.1 Outline

This application can be controlled from an external controller (PC) by remote control commands using the MS2690A/MS2691A/MS2692A Signal Analyzer (hereafter referred to as “this instrument”). Remote control commands for this application are in the SCPI format defined by the SCPI Consortium.

1.1.1 Interface

This instrument has GPIB, Ethernet, and USB interfaces for remote control. Only one interface can be used at a time.

The interface is determined automatically when a command is received at the start of communication. The interface enters the remote state when a remote command is detected from the external controller (PC). At remote-interface operation, the front panel  lamp lights; the lamp is off at local-interface Operation.

Refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for more details about remote control and interface setting.

1.1.2 Controlled Application

Two kinds of remote control commands can be used with this instrument: commands that are common to all applications (hereafter common commands), and other commands unique to a specific application. Common commands can be executed at any time and do not depend on the currently controlled application. However, when a command unique to a specific application is executed at another application, the command is not executed and an error occurs.

In this instrument, multiple applications can be activated at the same time. Only one application resource can be executed per piece of hardware at one time. This application performs a measurement for 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. In order to execute a function unique to the application by using remote control, you need to select this application once it has been activated. Furthermore, this application can be executed at the same time as another application that uses by itself a resource not used by this application, such as the MS2690A/MS2691A/MS2692A Option 020 Vector Signal Generator (hereinafter referred to as “Option 020”).

1.2 Basic Flow of Control

This part explains the basic remote control command programming for measuring a MediaFLO signal.

Figure 1.2-1 shows the control flow for a basic test. Note the parameter settings for the measurement, type of measurement function, and measurement execution order (although the measurement order can change).

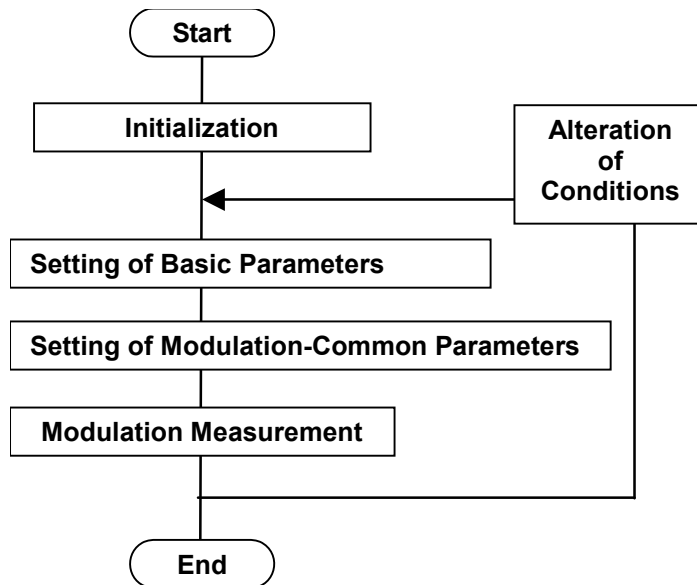



Figure 1.2-1 Flow of Basic Test


(1) Initialization

The communication interface and the parameters are initialized, the communication mode is set, and the application is started and selected.

 1.2.1 Initialization


(2) Setting of Basic Parameters

The parameters used in common by all measurement functions to be executed in this application are set, including the carrier frequency and input level.

 1.2.2 Setting of Basic Parameters


(3) Setting of Modulation-Common Parameters

The parameters used in common by the modulation measurement function to be executed in this application are set. These parameters are used to set a trigger, modulation mode, bandwidth, and other items.

 1.2.3 Setting of Modulation-Common Parameters

(4) Modulation Measurement

The measurement functions to be executed in this application are executed. First, the modulation measurement function is selected. Next, the storage mode and other items are set for each measurement function, and then the measurement is executed and the measurement results are read.

 1.2.4 Modulation Measurement

1.2.1 Initialization

As part of the initial settings, perform the preparations for using the measuring instrument and the application. The following actions are included in the initial settings.

- (1) Initialization of Communication Interface
The remote control interface to be used is initialized so sending and receiving of commands can start. Refer to the operation manual of the interface used, for details about the remote control interface.
- (2) Setting Language Mode and Response Mode
The language mode and the response mode used to communicate are set. Refer to the “MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control)” for details about the language mode and response mode.
- (3) Starting Application
The application is started.
- (4) Selecting Application
The application is selected.
- (5) Initialization
All parameters and states are reset at initialization.
- (6) Setting Measurement Mode
After initialization, the measurement mode is at continuous measurement mode. Switch to the single measurement mode if necessary.

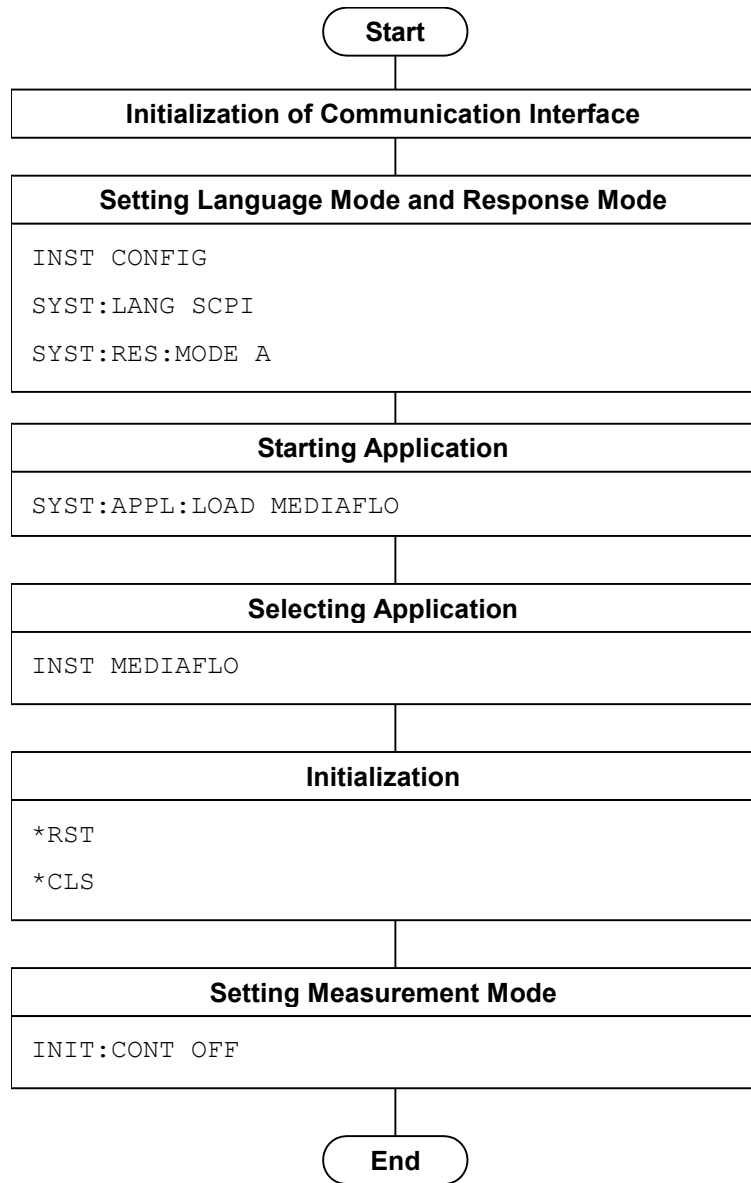


Figure 1.2.1-1 Initialization Flow and Command Example

1.2.2 Setting of Basic Parameters

Set the parameters used in common for to all measurements using this application. The basic parameters include the following.

- (1) Carrier Frequency
- (2) Input Level (Reference Level/Attenuator)
- (3) Level Offset
- (4) Pre-Amp (Option)

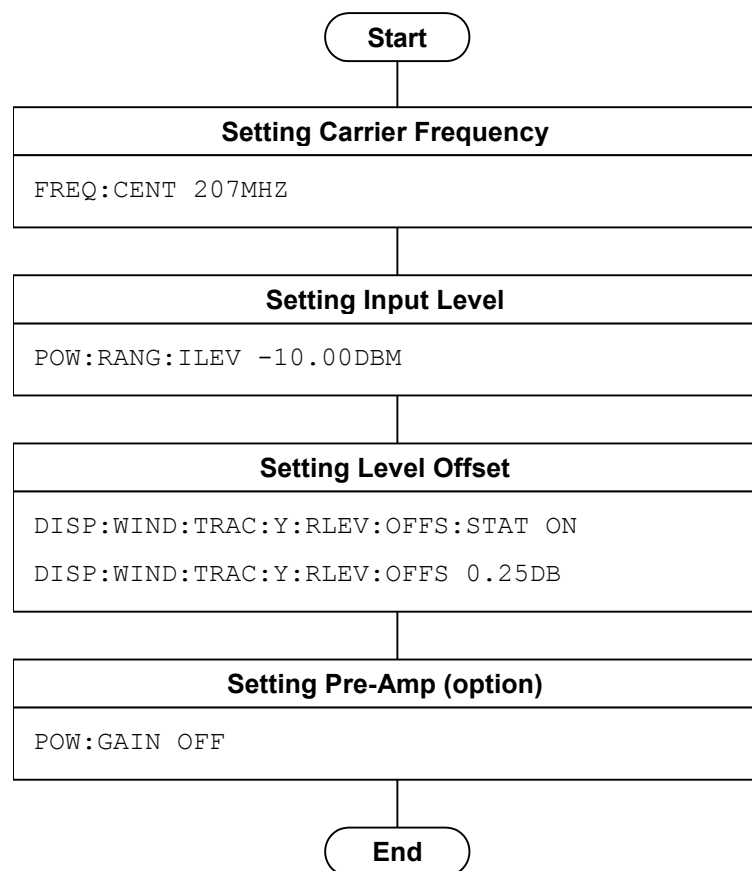


Figure 1.2.2-1 Flow of Basic Parameter Setting and Command Example

1.2.3 Setting of Modulation-Common Parameters

Set the parameters used in common for the Modulation measurement functions executed in this application. Unless specified, there is no specific parameter setting order.

- (1) Trigger
 - (a) Trigger Switch
 - (b) Trigger Source
 - (c) Trigger Slope
 - (d) Trigger Delay
- (2) Channel Bandwidth
- (3) Tracking Mode
- (4) Modulation
- (5) SPC Presence
- (6) FFT Size
- (7) Cyclic Prefix
- (8) Slot to Interlace
- (9) PPC Presence
- (10) PPC / RS Number
- (11) Wide-area Data Symbols
- (12) WID
- (13) LID

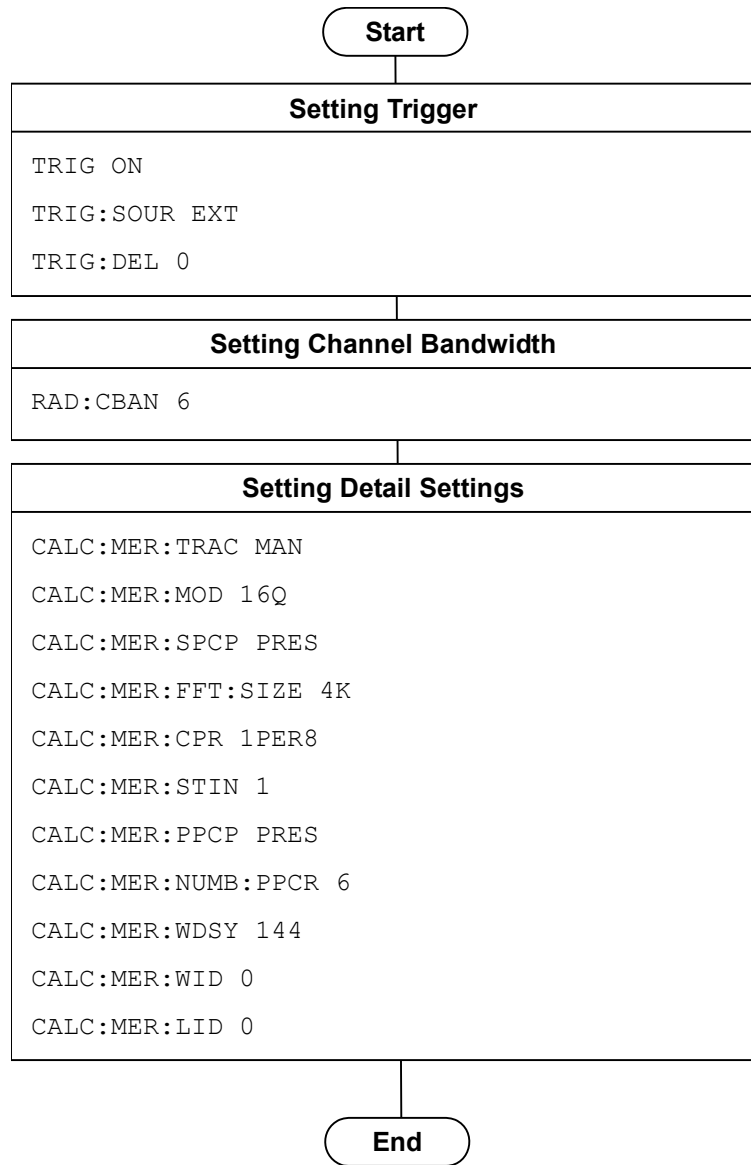


Figure 1.2.3-1 Flow of Common Settings for Modulation and Command Example

1.2.4 Modulation Measurement

The Modulation measurement is executed in the following order:

- (1) Setting the measurement parameters

The following parameters are used only for the Modulation measurement.

- (a) End Symbol
- (b) Storage

- (2) Executing measurement and querying the result

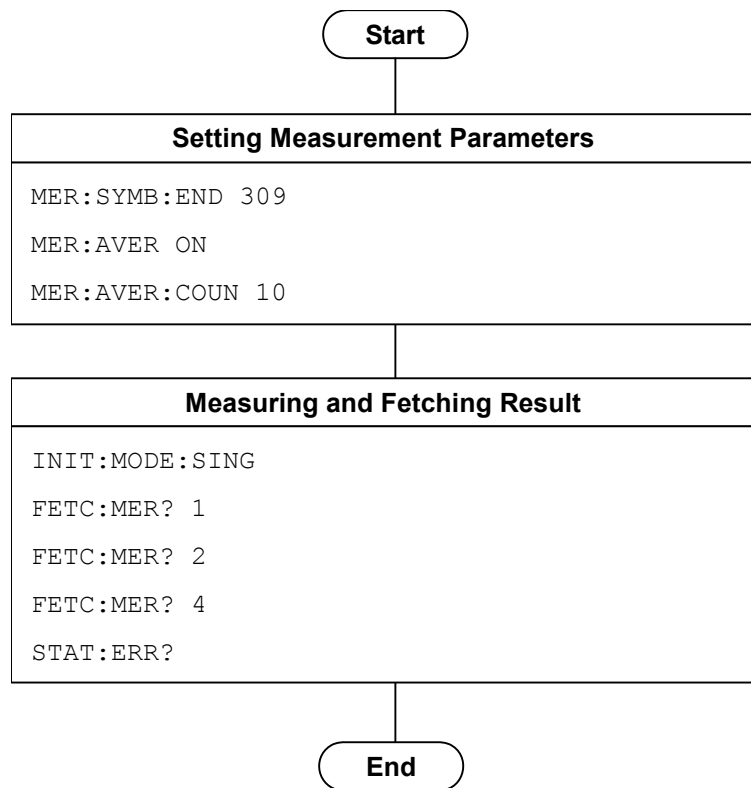


Figure 1.2.4-1 Flow of Modulation Measurement and Command Example

1.3 How to use the Native Mode

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

(1) SCPI Mode

Processes commands conforming to the grammar/document format defined in SCPI (ver1999.0). In the SCPI mode, you can use the character string in long/short form format and can omit angled bracket ([]) definition character strings.

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

(2) Native Mode

Processes commands that are in this instrument’s own definition type. Unless otherwise specified, the character string of the command header is fix. If a command of the application is only defined by SCPI mode, the character string converted by the conversion rule will be the command in the Native mode. For programming, you cannot use the grammar of SCPI mode, such as character string in long/short form format and cannot omit any angled bracket ([]) definition character strings.

Note:

The `STATus:QUESTionable` register command and `STATus:OPERation` command cannot be used in the Native mode, even if they are converted following the conversion rule described below.

The Native mode is automatically set after transmitting command `SYST:LANG NAT`.

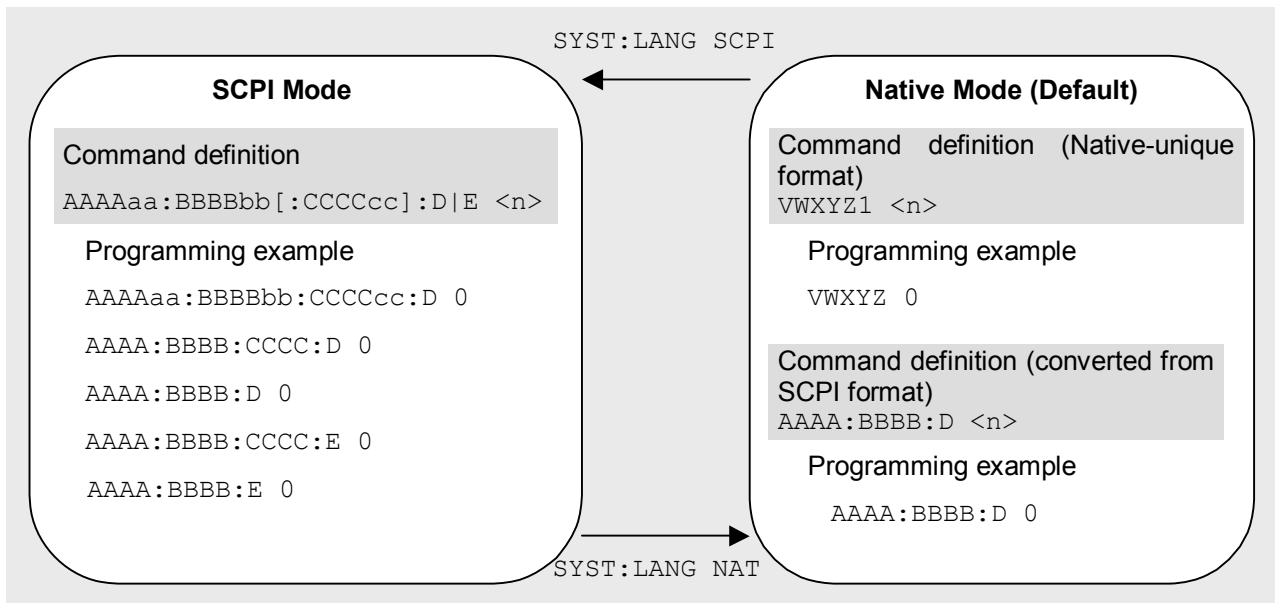


Figure 1.3-1 SCPI mode and Native mode

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

Conversion rule

1. Delete the numeric parameter in the program header of an SCPI mode, and describe the argument corresponding to the numeric parameter as the first argument. If the argument can have only one numeric value and the argument can be omitted, omit it. Describe the argument if it cannot be omitted.
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 1

Convert `:CALCulate:MARKer[1]|2[:SET]:CENTer`
into a Native mode.

1. Put a numeric parameter of the program header at the head of the argument.

```
:CALCulate:MARKer[1]|2[:SET]:CENTer
```

↓

```
:CALCulate:MARKer[:SET]:CENTer <integer>
```

(the argument `<integer>` represents the numeric value 1 or 2)

2. Delete the layers that can be deleted.

```
:CALCulate:MARKer[:SET]:CENTer <integer>
```

↓

```
:CALCulate:MARKer:CENTer <integer>
```

3. Alter all long forms into short forms.

```
:CALCulate:MARKer:CENTER <integer>
```

↓

```
:CALC:MARK:CENT <integer>
```

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

```
_CALC:MARK:CENT <integer>
```

↓

```
CALC:MARK:CENT <integer>
```

Example 2

Convert [:SENSe]:BPOWer|:TXPower[:STATe]?
into a Native mode.

1. Use the leading one if multiple nodes can be selected.
[:SENSe]:BPOWer|:TXPower[:STATe]?
↓
[:SENSe]:BPOWer[:STATe]?
2. Delete the layers that can be deleted.
[:SENSe]:BPOWer[:STATe]?
↓
:BPOWer?
3. Alter all long forms into short forms.
:BPOWer?
↓
:BPOW?
4. Delete the colon mark (":") at the head.
:BPOW?
↓
BPOW?

Example 3

:Convert FETCh|:MER[n]? into a Native mode command.

1. Put a numeric parameter of the program header at the head of the argument.
:FETCh:MER[n]?
↓
:FETCh:MER? <integer>
2. Alter all the long forms into the short ones.
:FETCh:MER? <integer>
↓
:FETC:MER? <integer>
3. Omit the colon (":") at the head of the command.
:FETCh:MER? <integer>
↓
FETC:MER? <integer>
4. Set the value of arguments.
FETCh:MER? <integer>
↓
FETC:MER? 1

1.4 Character Programs Available for Setting Numeric Program Data

The following character programs can be used for setting numeric program data (numeric parameter) and is applicable only when using the SCPI mode.

(1) DEFault

When DEFault is specified for numeric program data, the initial value is set for the target parameter.

(2) MINimum

When MINimum is specified for numeric program data, the minimum value is set for the target parameter.

(3) MAXimum

When MAXimum is specified for numeric program data, the maximum value is set for the target parameter.

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

<freq>

<real>

<rel_power>

<integer>

<time>

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 function. Refer to the “MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control)” for detailed specifications of the IEEE488.2 common device messages and application common device messages.

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2.1 Selecting applications

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

Table 2.1-1 Device Messages for Selecting Application

Function	Device Message
Load Application	:SYSTem:APPLication:LOAD MEDIAFLO
Unload Application	:SYSTem:APPLication:UNLoad MEDIAFLO
Application Switch	:INSTrument[:SElect] MEDIAFLO CONFIG
	:INSTrument[:SElect]?
Application Status	:INSTrument:SYSTem MEDIAFLO, [ACTive] INACTive MINimum
	:INSTrument:SYSTem? MEDIAFLO
Initialization	:INSTrument:DEFault
	:SYSTem:PRESet

2.1.1 Launching Applications

:SYSTem:APPLication:LOAD MEDIAFLO

Load Application

Function

This command loads this application.

Command

```
:SYSTem:APPLication:LOAD MEDIAFLO
```

Details

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

This function is available when the control-targeted application is Config.

Immediately after closing this application, wait approximately 30 seconds before starting it up.

Example of Use

To load this application.

```
SYST:APPL:LOAD MEDIAFLO
```

:SYSTem:APPLication:UNLoad MEDIAFLO

Unload Application

Function

This command exits this application.

Command

```
:SYSTem:APPLication:UNLoad MEDIAFLO
```

Details

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

This function is available when the control-targeted application is Config.

Example of Use

To exit this application.

```
SYST:APPL:UNL MEDIAFLO
```

2.1.2 Selecting applications

:INSTrument[:SElect] MEDIAFLO|CONFIG

Application Switch

Function

This command selects the controlled application.

Command

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

Parameter

<apl_name>	Application
MEDIAFLO	This application
CONFIG	Config

Example of Use

To switch the control target to this application.
INST MEDIAFLO

:INSTrument[:SElect]?

Application Switch Query

Function

This command queries the controlled application.

Query

`:INSTrument[:SElect]?`

Response

`<apl_name>`

Parameter

<code><apl_name></code>	Application
<code>MEDIAFLO</code>	This application
<code>SIGANA</code>	Signal Analyzer
<code>SPECT</code>	Spectrum Analyzer
<code>CONFIG</code>	Config

Details

`MEDIAFLO` is returned when a measurement function of this application is selected.

Example of Use

To query the controlled application.

```
INST?
> MEDIAFLO
```

:INSTrument:SYSTem MEDIAFLO,[ACTive]|INACTive|MINimum

Application Switch And Window Status

Function

This command selects the window status of this application.

Command

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

Parameter

<window>	Window status
ACTive	Active
INACTive	Inactive
MINimum	Minimized
When omitted	Active

Example of Use

To set the window status of this application to the active state.

```
INST:SYST MEDIAFLO,ACT
```


:INSTrument:SYSTem? MEDIAFLO

Application Switch And Window Status Query

Function

This command queries the status of this application.

Query

`:INSTrument:SYSTem? MEDIAFLO`

Response

`<status>, <window>`

Parameter

<code><status></code>	Status of this application
CURR	Executed and targeted for control
RUN	Executed but not targeted for control
IDLE	Loaded but not executed
UNL	Not loaded
<code><window></code>	Window status
ACT	Active
INAC	Inactive
MIN	Minimized
NON	Window not displayed

Example of Use

To query the status of this application.

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

2.1.3 Initialization

:INSTrument:DEFault

Preset Current Application

Function

This command initializes the settings and status of the currently selected application.

Command

```
:INSTrument:DEFault
```

Example of Use

To initialize the settings and status of the currently selected application.
INST:DEF

:SYSTem:PRESet

Preset Current Application

Function

This command initializes the settings and status of the currently selected application.

Refer to the description of the :INSTrument:DEFault command.

Example of Use

To initialize the settings and status of the currently selected application.
SYST:PRES

2.2 Setting Basic Parameters

Table 2.2-1 lists the parameters applied in common to this application, such as frequency and level.

Table 2.2-1 Device Messages for Setting Basic Parameters

Parameter	Device Message
Carrier Frequency	<code>[:SENSE] :FREQUency:CENTer <freq></code>
	<code>[:SENSE] :FREQUency:CENTer?</code>
RF Spectrum	<code>[:SENSE] :MER:SPECTrum NORMal REVerse</code>
	<code>[:SENSE] :MER:SPECTrum?</code>
Input Level	<code>[:SENSE] :POWer [:RF] :RANGE:ILEVel <real></code>
	<code>[:SENSE] :POWer [:RF] :RANGE:ILEVel?</code>
Level Offset	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel:OFFSet <rel_power></code>
	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel:OFFSet?</code>
Level Offset State	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel:OFFSet:STATe OFF ON 0 1</code>
	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel:OFFSet:STATe?</code>
Pre-Amp State	<code>[:SENSE] :POWer [:RF] :GAIN[:STATe] OFF ON 0 1</code>
	<code>[:SENSE] :POWer [:RF] :GAIN[:STATe]?</code>

2.2.1 Carrier Frequency

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

Carrier Frequency

Function

This command sets the carrier frequency of the measured signal.

Command

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

Parameter

<code><freq></code>	Carrier frequency
Range	30 MHz to 6 GHz (MS2690A) 30 MHz to 13.5 GHz (MS2691A) 30 MHz to 26.5 GHz (MS2692A)
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ Hz is used when omitted.
Default	207 MHz

Example of Use

To set the carrier frequency to 1.000 GHz.

`FREQ:CENT 1.000GHZ`

[:SENSE] :FREQUENCY :CENTER ?

Carrier Frequency Query

Function

This command queries the carrier frequency of the measured signal.

Query

`[:SENSE] :FREQUENCY :CENTER ?`

Response

`<freq>`

Parameter

<code><freq></code>	Carrier frequency
Range	30 MHz to 6 GHz (MS2690A) 30 MHz to 13.5 GHz (MS2691A) 30 MHz to 26.5 GHz (MS2692A)
Resolution	1 Hz
	Value is returned in Hz units.

Example of Use

To query the carrier frequency.

```
FREQ:CENT?
> 6000000000
```

2.2.2 RF Spectrum

[[:SENSE]:MER:SPECTrum NORMal|REVerse

RF Spectrum

Function

This command sets whether to reverse the input signal spectrum.

Command

```
[[:SENSE]: MER:SPECTrum <mode>
```

Parameter

<mode>	Spectrum reverse
NORMal	Disabled (Default)
REVerse	Enabled

Example of Use

To enable the Spectrum Reverse function.

```
MER:SPEC REV
```

[[:SENSE]:MER:SPECTrum?

RF Spectrum Query

Function

This command queries the spectrum reverse function of the input signal spectrum.

Query

```
[[:SENSE]:MER:SPECTrum?
```

Response

```
<mode>
```

Parameter

<mode>	Spectrum reverse
NORM	Disbaled
REV	Enabled

Example of Use

To query the spectrum reverse function of the input signal spectrum.

```
MER:SPEC?
> REV
```

2.2.3 Input Level**[[:SENSE]:POWER[:RF]:RANGE:ILEVel <real>**

Input Level

Function

This command sets the input level of RF signals.

Command

```
[[:SENSE]:POWER[:RF]:RANGE:ILEVel <real>
```

Parameter

<real>	Input level
Range	(-60.00 + level offset) to (30.00 + level offset) dBm (Pre-Amp Off) (-80.00 + level offset) to (10.00 + level offset) dBm (Pre-Amp On)
Resolution	0.01 dB
Unit	1 dBm
Suffix code	DBM

Default dBm is used when omitted.
 – 10.00 dBm

Details

The setting range when Pre Amp is Off is applied if the MS2690A/MS2691A/MS2692A Option 008 6 GHz Preamplifier (hereinafter referred to as “Option 008”) is not installed.

Example of Use

To set the input level to 0 dBm.
POW:RANG:ILEV 0

[[:SENSE]:POWER[:RF]:RANGE:ILEVEL?

Input Level Query

Function

This command queries the input level of RF signals.

Query

`[[:SENSE]:POWER[:RF]:RANGE:ILEVEL?`

Response

`<real>`

Parameter

<code><real></code>	Input level
Range	(-60.00 + level offset) to (30.00 + level offset) dBm (Pre-Amp Off) (-80.00 + level offset) to (10.00 + level offset) dBm (Pre-Amp On)
Resolution	0.01 dB
	Value is returned in dBm units.

Example of Use

```
To query the input level.
POW:RANG:ILEV?
> -15.00
```

2.2.4 Level Offset

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

Level Offset Value

Function

This command sets the input level offset value.

Command

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

Parameter

<code><rel_power></code>	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 input level offset value to +10 dB.
`DISP:WIND:TRAC:Y:RLEV:OFFS 10`

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

Level Offset Value Query

Function

This command queries the input level offset value.

Query

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

Response

```
<rel_power>
```

Parameter

<code><rel_power></code>	Offset value
Range	-99.99 to +99.99 dB
Resolution	0.01 dB

Example of Use

To query the input level offset value.
`DISP:WIND:TRAC:Y:RLEV:OFFS?`
> 10.00

2.2.5 Level Offset State

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

Level Offset State

Function

This command enables/disables the offset function of the input level.

Command

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

Parameter

<switch>	Enable/disable input level offset function
OFF 0	Disabled (Default)
ON 1	Enabled

Example of Use

To enable the input level offset function.
 DISP:WIND:TRAC:Y:RLEV:OFFS:STAT ON

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

Level Offset State Query

Function

This command queries the state of the input level offset function.

Query

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

Response

```
<switch>
```

Parameter

<switch>	Enable/disable input level offset function
0	Disabled
1	Enabled

Example of Use

To query the state of the input level offset function.
 DISP:WIND:TRAC:Y:RLEV:OFFS:STAT?
 > 1

2.2.6 Pre Amp

[[:SENSE]:POWER[:RF]:GAIN[:STATE] OFF|ON|0|1

Pre Amp

Function

This command sets Pre-Amp to On/Off.

Command

`[[:SENSE]:POWER[:RF]:GAIN[:STATE] <switch>`

Parameter

<code><switch></code>	Pre-Amp On/Off
<code>OFF 0</code>	Off (Default)
<code>ON 1</code>	On

Details

This command is invalid when the Option 008 is not installed.

Example of Use

To set Pre-Amp to On.
`POW:GAIN ON`

[[:SENSE]:POWER[:RF]:GAIN[:STATE]?

Pre Amp Query

Function

This command queries the state of Pre-Amp.

Query

`[[:SENSE]:POWER[:RF]:GAIN[:STATE]?`

Response

`<switch>`

Parameter

<code><switch></code>	Pre-Amp On/Off
<code>0</code>	Off
<code>1</code>	On

Details

Off is returned when the Option 008 is not installed.

Example of Use

To query the state of Pre-Amp.
`POW:GAIN?`
> 1

2.3 Setting System Parameters

Table 2.3-1 lists the device messages for the communication system of the measurement target.

Table 2.3-1 Device Messages for Setting System Parameters

Parameter	Device Message
Channel Bandwidth	[:SENSE] :RADio :CBANdwidth 5 6 7 8
	[:SENSE] :RADio :CBANdwidth ?
Tracking Mode	:CALCulate :MER :TRACking MANual ESTimation
	:CALCulate :MER :TRACking ?
Modulation	:CALCulate :MER :MODulation QPSK 16Qam ER_6
	:CALCulate :MER :MODulation ?
SPC Presence	:CALCulate :MER :SPCPresence ABSent PREsent 0 1
	:CALCulate :MER :SPCPresence ?
FFT Size	:CALCulate :MER :FFT :SIZE 2K 4K 8K
	:CALCulate :MER :FFT :SIZE ?
Cyclic Prefix	:CALCulate :MER :CPRefix 1PER16 1PER8 3PER16 1PER4
	:CALCulate :MER :CPRefix ?
Slot to Interlace	:CALCulate :MER :STINterlace 1 2
	:CALCulate :MER :STINterlace ?
PPC Presence	:CALCulate :MER :PPCPresence ABSent PREsent 0 1
	:CALCulate :MER :PPCPresence ?
PPC / RS Number	:CALCulate :MER :NUMBer :PPCRs 2 6 10 14
	:CALCulate :MER :NUMBer :PPCRs ?
Wide-area Data Symbols	:CALCulate :MER :WDSYmbols <integer>
	:CALCulate :MER :WDSYmbols ?
WID	:CALCulate :MER :WID <integer>
	:CALCulate :MER :WID ?
LID	:CALCulate :MER :LID <integer>
	:CALCulate :MER :LID ?
Channel Estimation	:CALCulate :MER :CHANnel :ESTimation OFF ON 0 1
	:CALCulate :MER :CHANnel :ESTimation ?
End Symbol	[:SENSE] :MER :SYMBol :END <integer>
	[:SENSE] :MER :SYMBol :END ?
Frame Select	[:SENSE] :MER :FSElect MANual OIS 1 2 3 4
	[:SENSE] :MER :FSElect ?

2.3.1 Channel Bandwidth

`[[:SENSe]:RADio:CBANdwidth 5|6|7|8`

Channel Bandwidth

Function

This command sets the band of the measured signal.

Command

```
[[:SENSe]:RADio:CBANdwidth <mode>
```

Parameter

<mode>	Bandwidth for signal to be measured
5	Sets 5 MHz band signal for analysis.
6	Sets 6 MHz band signal for analysis. (Default)
7	Sets 7 MHz band signal for analysis.
8	Sets 8 MHz band signal for analysis.

Example of Use

To set the band to 5 MHz.
`RAD:CBAN 5`

`[[:SENSe]:RADio:CBANdwidth?`

Channel Bandwidth Query

Function

This command queries the setting of the band.

Query

```
[[:SENSe]:RADio:CBANdwidth?
```

Response

```
<mode>
```

Parameter

<mode>	Bandwidth for signal to be measured
5	Sets 5 MHz band signal for analysis.
6	Sets 6 MHz band signal for analysis.
7	Sets 7 MHz band signal for analysis.
8	Sets 8 MHz band signal for analysis.

Example of Use

To query the setting of the band.
`RAD:CBAN?`
> 5

2.3.2 Tracking Mode

:CALCulate:MER:TRACking MANual|ESTimation

Tracking Mode

Function

This command sets the Tracking Mode.

Command

```
:CALCulate:MER:TRACking MANual|ESTimation <mode>
```

Parameter

<mode>	Tracking Mode
MANual	Manually sets the Tracking Mode (Default).
ESTimation	Sets the Tracking Mode to modulation method estimation.

Example of Use

To set the Tracking Mode to modulation method estimation.
 CALC:MER:TRAC EST

:CALCulate:MER:TRACking?

Tracking Mode Query

Function

This command queries the Tracking Mode.

Query

```
:CALCulate:MER:TRACking?
```

Response

```
<mode>
```

Parameter

<mode>	Tracking Mode
MAN	Manually sets the Tracking Mode
EST	Sets the Tracking Mode to modulation method estimation.

Example of Use

To query the Tracking Mode.
 CALC:MER:TRAC?
 > EST

2.3.3 Modulation

:CALCulate:MER:MODulation QPSK|16Qam|ER_6

Modulation

Function

This command sets the modulation mode.

Command

:CALCulate:MER:MODulation <mode>

Parameter

<mode>	Modulation method
QPSK	Sets QPSK modulation method for analysis.
16Qam	Sets 16QAM/Layered (ER=4) modulation method for analysis. (Default)
ER_6	Sets Layered (ER=6.25) modulation method for analysis.

Details

Available when Tracking Mode is set to Manual.

Example of Use

To set the modulation method to QPSK.

CALC:MER:MOD QPSK

:CALCulate:MER:MODulation?

Modulation Query

Function

This command queries the modulation mode.

Query

:CALCulate:MER:MODulation?

Response

<mode>

Parameter

<mode>	Modulation method
QPSK	Sets QPSK modulation method for analysis.
16Q	Sets 16QAM/Layered (ER=4) modulation method for analysis.
ER_6	Sets Layered (ER=6.25) modulation method for analysis.
***	Estimates modulation method for analysis

Details

Returns "***" when Tracking Mode is set other than Manual.

Example of Use

To query the modulation method.
 CALC:MER:MOD?
 > QPSK

2.3.4 SPC Presence

:CALCulate:MER:SPCPresence ABSent|PREsent|0|1

SPC Presence

Function

This command sets SPC to be present or absent.

Command

```
:CALCulate:MER:SPCPresence <switch>
```

Parameter

<switch>	SPC Presence
ABSent 0	Absent (Disabled)
PREsent 1	Present (Enabled) (Default)

Example of Use

To set SPC to be absent (disabled).
CALC:MER:SPCP ABS

:CALCulate:MER:SPCPresence?

SPC Presence Query

Function

This command queries SPC presence/absence.

Query

```
:CALCulate:MER:SPCPresence?
```

Response

```
<switch>
```

Parameter

<switch>	SPC Presence
ABS	Absent (Disabled)
PRES	Present (Enabled)

Example of Use

To query SPC presence/absence.
CALC:MER:SPCP?
> ABS

2.3.5 FFT Size

:CALCulate:MER:FFT:SIZE 2K|4K|8K

FFT Size

Function

This commands sets the FFT Size.

Command

:CALCulate:MER:FFT:SIZE <mode>

Parameter

<mode>	FFT Size
2K	Analyses FFT size as 2K.
4K	Analyses FFT size as 4K. (Default)
8K	Analyses FFT size as 8K.

Details

Available when SPC Presence is Present.

Example of Use

To set the FFT Size to 2K.
CALC:MER:FFT:SIZE 2K

:CALCulate:MER:FFT:SIZE?

FFT Size Query

Function

This commands queries the FFT Size.

Query

:CALCulate:MER:FFT:SIZE?

Response

<mode>

Parameter

<mode>	FFT Size
2K	Analyses FFT size as 2K.
4K	Analyses FFT size as 4K.
8K	Analyses FFT size as 8K.

Details

Returns 4K when SPC Presence is Absent.

Example of Use

To query the FFT Size.
CALC:MER:FFT:SIZE?
> 2K

2.3.6 Cyclic Prefix

:CALCulate:MER:CPRefix 1PER16|1PER8|3PER16|1PER4

Cyclic Prefix

Function

This command sets the Cyclic Prefix.

Command

:CALCulate:MER:CPRefix <mode>

Parameter

<mode>	Cyclic Prefix
1PER16	Analyses Cyclic Prefix as 1/16.
1PER8	Analyses Cyclic Prefix as 1/8. (Default)
3PER16	Analyses Cyclic Prefix as 3/16.
1PER4	Analyses Cyclic Prefix as 1/4.

Details

Available when SPC Presence is Present.

Example of Use

To set the Cyclic Prefix to 1/16.
CALC:MER:CPR 1PER16

:CALCulate:MER:CPRefix?

Cyclic Prefix Query

Function

This command queries the Cyclic Prefix.

Query

:CALCulate:MER:CPRefix?

Response

<mode>

Parameter

<mode>	Cyclic Prefix
1PER16	Analyses Cyclic Prefix as 1/16.
1PER8	Analyses Cyclic Prefix as 1/8.
3PER16	Analyses Cyclic Prefix as 3/16.
1PER4	Analyses Cyclic Prefix as 1/4.

Details

Returns 1PER8 when SPC Presence is Absent.

Example of Use

To query the Cyclic Prefix.
CALC:MER:CPR?
> 1PER16

2.3.7 Slot to Interlace

:CALCulate:MER:STINterlace 1|2

Slot to Interlace

Function

This command sets the Slot to Interlace.

Command

```
:CALCulate:MER:STINterlace <mode>
```

Parameter

<mode>	Slot to Interlace
1	Analyses Slot to Interlace as Pattern1. (Default)
2	Analyses Slot to Interlace as Pattern2.

Details

Available when SPC Presence is Present.

Example of Use

To set Slot to Interlace to Pattern2.
CALC:MER:STIN 2

:CALCulate:MER:STINterlace?

Slot to Interlace Query

Function

This command queries the Slot to Interlace.

Query

:CALCulate:MER:STINterlace?

Response

<mode>

Parameter

<mode>	Slot to Interlace
1	Analyses Slot to Interlace as Pattern1.
2	Analyses Slot to Interlace as Pattern2.

Details

Returns 1 when SPC Presence is Absent.

Example of Use

To query Slot to Interlace.
CALC:MER:STIN?
> 2

2.3.8 PPC Presence

:CALCulate:MER:PPCPresence ABSent|PREsent|0|1

PPC Presence

Function

This command sets PPC to be present or absent.

Command

```
:CALCulate:MER:PPCPresence <switch>
```

Parameter

<switch>	PPC Presence
ABSent 0	Absent (Disabled)
PREsent 1	Present (Enabled) (Default)

Example of Use

To set PPC to be absent (disabled).
 CALC:MER:PPCP ABS

:CALCulate:MER:PPCPresence?

PPC Presence Query

Function

This command queries PPC presence/absence.

Query

```
:CALCulate:MER:PPCPresence?
```

Response

```
<switch>
```

Parameter

<switch>	PPC Presence
ABS	Absent (Disabled)
PRES	Present (Enabled)

Example of Use

To query PPC presence/absence.
 CALC:MER:PPCP?
 > ABS

2.3.9 PPC / RS (Reserved OFDM Symbol) Number

:CALCulate:MER:NUMBER:PPCRs 2|6|10|14

PPC / RS (Reserved OFDM Symbol) Number

Function

This command sets PPC or RS Number.

Command

:CALCulate:MER:NUMBER:PPCRs <mode>

Parameter

<mode>	PPC / RS Number
2	Analyses PPC / RS Number as 2.
6	Analyses PPC / RS Number as 6. (Default)
10	Analyses PPC / RS Number as 10.
14	Analyses PPC / RS Number as 14.

Details

Available when SPC Presence is Absent.

However, the number cannot be set to 2 when PPC Presence is Present.

Example of Use

To set the PPC / RS Number to 10.

CALC:MER:NUMB:PPCR 10

:CALCulate:MER: NUMBer:PPCRs?

PPC / RS (Reserved OFDM Symbol) Number Query

Function

This command queries PPC or RS Number.

Query

`:CALCulate:MER:NUMBer:PPCRs?`

Response

<mode>

Parameter

<mode>	PPC / RS Number
0	Does not use PPC / RS Number.
2	Analyses PPC / RS Number as 2.
6	Analyses PPC / RS Number as 6.
8	Analyses PPC / RS Number as 8.
10	Analyses PPC / RS Number as 10.
14	Analyses PPC / RS Number as 14.
16	Analyses PPC / RS Number as 16.

Details

Returns 0 when SPC Presence is Present and PPC Presence is Absent.

Returns the following value that depends on FFT Size when SPC Presence and PPC Presence are Present:

Returns 16 when FFT Size is 2K.

Returns 8 when FFT Size is 4K or 8K.

Example of Use

To query the PPC / RS Number.

`CALC:MER:NUMB:PPCR?``> 10`

2.3.10 Wide-area Data Symbols

:CALCulate:MER:WDSYmbols <integer>

Wide-area Data Symbols

Function

This command sets the Wide-area Data Symbols.

Command

:CALCulate:MER:WDSYmbols <integer>

Parameter

<integer>	Wide-area Data Symbols
Range	
When SPC Presence is Absent:	
0 to	$\frac{(\text{Superframe Symbol} - 18 - \text{PPC} / \text{RS Number})}{4}$ - 4
When SPC Presence is Present:	
0 to	(Conforms to TIA-1099-A)
Resolution	1
Suffix code	None
Default	288

Example of Use

To set Wide-area Data Symbols to 150.
CALC:MER:WDSY 150

:CALCulate:MER:WDSYmbols?

Wide-area Data Symbols Query

Function

This command queries the Wide-area Data Symbols.

Query

`:CALCulate:MER:WDSYmbols?`

Response

`<integer>`

Parameter

`<integer>` Wide-area Data Symbols

Range

When SPC Presence is Absent:

$$0 \text{ to } \frac{(\text{Superframe Symbol} - 18 - \text{PPC} / \text{RS Number})}{4} - 4$$

When SPC Presence is Present:

0 to (Conforms to TIA-1099-A)

Resolution 1

Example of Use

To query the Wide-area Data Symbols.

```
CALC:MER:WDSY?
> 150
```

2.3.11 WID

:CALCulate:MER:WID <integer>

WID

Function

This command sets WID.

Command

`:CALCulate:MER:WID <integer>`

Parameter

<code><integer></code>	WID
Range	0 to 15
Resolution	1
Suffix code	None
Default	15

Example of Use

To set WID to 1.
`CALC:MER:WID 1`

:CALCulate:MER:WID?

WID Query

Function

This command queries WID.

Query

`:CALCulate:MER:WID?`

Response

`<integer>`

Parameter

<code><integer></code>	WID
Range	0 to 15
Resolution	1

Example of Use

To query WID.
`CALC:MER:WID?`
`> 1`

2.3.12 LID

:CALCulate:MER:LID <integer>

LID

Function

This command sets LID.

Command

```
:CALCulate:MER:LID <integer>
```

Parameter

<integer>	LID
Range	0 to 15
Resolution	1
Suffix code	None
Default	10

Example of Use

To set LID to 1.
CALC:MER:LID 1

:CALCulate:MER:LID?

LID Query

Function

This command queries LID.

Query

```
:CALCulate:MER:LID?
```

Response

```
<integer>
```

Parameter

<integer>	LID
Range	0 to 15
Resolution	1

Example of Use

To query LID.
CALC:MER:LID?
> 1

2.3.13 Channel Estimation

:CALCulate:MER:CHANnel:ESTimation OFF|ON|0|1

Channel Estimation

Function

This command sets the Channel Estimation function to On/Off.

Command

```
:CALCulate:MER:CHANnel:ESTimation <switch>
```

Parameter

<switch>	Channel Estimation On/Off
OFF 0	Off
ON 1	On (Default)

Example of Use

To set Channel Estimation to Off
CALC:MER:CHAN:EST OFF

:CALCulate:MER:CHANnel:ESTimation?

Channel Estimation Query

Function

This command queries the setting of the Channel Estimation function.

Query

```
:CALCulate:MER:CHANnel:ESTimation?
```

Response

```
<switch>
```

Parameter

<switch>	Channel Estimation On/Off
0	Off
1	On

Example of Use

To query the setting of the Channel Estimation function.
CALC:MER:CHAN:EST?
> 0

2.3.14 End Symbol

`[[:SENSE]:MER:SYMBOL:END <integer>`

End Symbol

Function

This command sets End Symbol.

Command

`[[:SENSE]:MER:SYMBOL:END <integer>`

Parameter

<code><integer></code>	End Symbol
Range	FRAME OIS terminal symbol to (Superframe Symbol – PPC/SPC Symbol – 1)
Resolution	1
Suffix code	None
Default	17Symbol

Example of Use

To set End Symbol to 20.
`MER:SYMB:END 20`

`[[:SENSE]:MER:SYMBOL:END?`

End Symbol Query

Function

This command queries End Symbol.

Query

`[[:SENSE]:MER:SYMBOL:END?`

Response

`<integer>`

Parameter

<code><integer></code>	End Symbol
Range	FRAME OIS terminal symbol to (Superframe Symbol – PPC/SPC Symbol – 1)
Resolution	1

Example of Use

To query End Symbol.
`MER:SYMB:END?`
> 20

2.3.15 Frame Select

`[[:SENSe]:MER:FSElect MANual|OIS|1|2|3|4`

Frame Select

Function

This command sets Frame Select.

Changing the Frame Select setting changes the value of End Symbol.

Command

`[[:SENSe]:MER:FSElect <mode>`

Parameter

<mode>	Frame Select
MANual	Manually set End Symbol.
OIS	Sets End Symbol so that processing is performed up to FRAME OIS. (Default)
1	Sets End Symbol so that processing is performed up to FRAME 1.
2	Sets End Symbol so that processing is performed up to FRAME 2.
3	Sets End Symbol so that processing is performed up to FRAME 3.
4	Sets End Symbol so that processing is performed up to FRAME 4.

Example of Use

To set Frame Select to FRAME 1.

`MER:FSEL 1`

[[:SENSe]:MER:FSElect?

Frame Select Query

Function

This command queries Frame Select setting.

Query

[:SENSe]:MER:FSElect?

Response

<mode>

Parameter

<mode>	Frame Select
MAN	Manually set End Symbol.
OIS	End Symbol specifies processing up to FRAME OIS. (Default)
1	End Symbol specifies processing up to FRAME 1.
2	End Symbol specifies processing up to FRAME 2.
3	End Symbol specifies processing up to FRAME 3.
4	End Symbol specifies processing up to FRAME 4.

Example of Use

To query Frame Select setting.

MER:FSEL?

> 1

2.4 Common Measurement Function

Table 2.4-1 lists the device messages for performing operations common to the measurement functions.

Table 2.4-1 Device Messages for 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]
Trigger Switch	:TRIGger[:SEQuence][:STATe] ON OFF 1 0
	:TRIGger[:SEQuence][:STATe]?
Trigger Source	:TRIGger[:SEQuence]:SOURce EXTernal[1] SG
	:TRIGger[:SEQuence]:SOURce?
Trigger Slope	:TRIGger[:SEQuence]:SLOPe POSitive NEGative
	:TRIGger[:SEQuence]:SLOPe?
Trigger Delay	:TRIGger[:SEQuence]:DELay <time>
	:TRIGger[:SEQuence]:DELay?

Note:

The trigger settings are separately retained for each application, and are commonly applied to the measurement functions within the application.

2.4.1 Measurement and Control

:INITiate:CONTinuous OFF|ON|0|1

Continuous Measurement

Function

This command sets continuous or single measurement mode.

Command

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

Parameter

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

Details

A continuous measurement starts when it is set to On and in Continuous. No measurement starts when set to Off and in Single.

Example of Use

To make a continuous measurement.
INIT:CONT ON

:INITiate:CONTinuous?

Continuous Measurement Query

Function

This command queries the measurement mode.

Query

```
:INITiate:CONTinuous?
```

Response

```
<switch>
```

Parameter

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

Example of Use

To query the measurement mode.
INIT:CONT?
> 1

:INITiate:MODE:CONTinuous

Continuous Measurement

Function

This command starts continuous measurement.

Command

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

Example of Use

To start continuous measurement.

```
INIT:MODE:CONT
```

:INITiate:MODE:SINGLE

Single Measurement

Function

This command starts single measurement.

Command

```
:INITiate:MODE:SINGLE
```

Example of Use

To start a single measurement.

```
INIT:MODE:SING
```

:INITiate[:IMMEDIATE]

Initiate

Function

Measurement starts with the current measurement mode.

Command

```
:INITiate[:IMMEDIATE]
```

Example of Use

To start the measurement in the current measurement mode.

```
INIT
```

2.4.2 Trigger Switch

:TRIGger[:SEQuence][:STATe] OFF|ON|0|1

Trigger Switch

Function

This command sets the trigger wait state On/Off.

Command

```
:TRIGger[:SEQuence][:STATe] <switch>
```

Parameter

<switch>	Trigger wait state On/Off
OFF 0	Off (Default)
ON 1	On

Example of Use

To set the trigger wait state to On.
TRIG ON

:TRIGger[:SEQuence][:STATe]?

Trigger Switch Query

Function

This command queries the trigger wait state On/Off.

Query

```
:TRIGger[:SEQuence][:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Trigger wait state On/Off
0	Off
1	On

Example of Use

To query the trigger wait state setting.
TRIG?
> 0

2.4.3 Trigger Source

:TRIGger[:SEQuence]:SOURce EXTernal[1]| SG

Trigger Source

Function

This command selects the trigger signal source.

Command

:TRIGger[:SEQuence]:SOURce <mode>

Parameter

<mode>	Trigger signal source
EXTernal[1]	External input (External) (Default)
SG	SG Marker

Details

SG marker can be selected only when the Option 020 is installed.

Example of Use

To set the trigger signal source to External input.
TRIG:SOUR EXT

:TRIGger[:SEQuence]:SOURce?

Trigger Source Query

Function

This command queries the trigger signal source.

Query

`:TRIGger[:SEQuence]:SOURce?`

Response

`<mode>`

Parameter

<code><mode></code>	Trigger signal source
EXT	External input (External)
SG	SG Marker

Details

SG marker is returned only when Option 020 is installed.

Example of Use

```
To query the trigger signal source.  
TRIG:SOUR?  
> EXT
```

2.4.4 Trigger Slope

:TRIGger[:SEQuence]:SLOPe POSitive|NEGative

Trigger Slope

Function

This command sets the trigger detection mode (rising or falling).

Command

```
:TRIGger[:SEQuence]:SLOPe <mode>
```

Parameter

<mode>	Trigger detection mode
POSitive	Detects a trigger at the rising edge (Default).
NEGative	Detects a trigger at the falling edge.

Example of Use

To detect a trigger at the rising edge.
TRIG:SLOP POS

:TRIGger[:SEQuence]:SLOPe?

Trigger Slope Query

Function

This command queries the trigger detection mode (rising or falling).

Query

```
:TRIGger[:SEQuence]:SLOPe?
```

Response

```
<mode>
```

Parameter

<mode>	Trigger detection mode
POS	Detects a trigger at the rising edge (default value).
NEG	Detects a trigger at the falling edge.

Example of Use

To query the trigger detection mode.
TRIG:SLOP?
> POS

2.4.5 Trigger Delay

:TRIGger[:SEQuence]:DELay <time>

Trigger Delay

Function

This command sets the delay time from generation of a trigger to start of the capture operation.

Command

```
:TRIGger[:SEQuence]:DELay <time>
```

Parameter

<time>	Delay time from generation of trigger to start of capture
Range	−2 to 2 seconds
Resolution	50 nanoseconds
Suffix code	NS, US, MS, S
	Second is used when omitted.
Default	0 second

Example of Use

To set the trigger delay time to 20 ms.
TRIG:DEL 20MS

:TRIGger[:SEQuence]:DELay?

Trigger Delay Query

Function

This command queries the delay time from generation of a trigger to start of the capture operation.

Query

:TRIGger[:SEQuence]:DELay?

Response

<time>

Parameter

<time>

Delay time from generation of trigger to start of capture

Range -2 to 2 seconds

Resolution 50 nanoseconds

Value is returned in seconds.

Example of Use

To query the delay time.

```
TRIG:DEL?
```

```
> 0.02000000
```

2.5 Modulation Measurement Function

This section describes device messages for Modulation measurement.

Table 2.5-1 lists device messages for executing Modulation measurement and querying the result.

Table 2.5-1 Device Messages for Modulation Measurement Functions

Function	Device Message
Fetch	:FETCh:MER[n]?

Table 2.5-2 lists device messages on Parameter Setting for Modulation Measurement

Table 2.5-2 Modulation Measurement Parameter Settings

Parameter	Device Message
Storage Mode	[:SENSe] :MER:AVErAge [:STATe] OFF ON AMAXimum 0 1 2
	[:SENSe] :MER:AVErAge [:STATe] ?
Storage Count	[:SENSe] :MER:AVErAge:COUnT <integer>
	[:SENSe] :MER:AVErAge:COUnT ?
Graph View Setting	:CALCulate:MER:WINDow2:MODE EACH AVErAge
	:CALCulate:MER:WINDow2:MODE ?

2.5.1 Measure

:FETCh:MER[n]?

Modulation Query

Function

This command queries the result of the Modulation measurement.

Query

:FETCh:MER[n]?

Response

See Table 2.5-3.

Details

-999.0 is returned when no measurement is made or an error occurs. Note, however, that “999999999999” is returned in the case of a Frequency Error.

Example of Use

To query the result of the Modulation measurement.

FETC:MER? 1

Table 2.5-3 lists the responses to query parameter n.

Table 2.5-3 Responses to Modulation Measurement Results

n	Result Mode	Response
1 or omitted	A/B	Returns with comma-separated value formats in the following order: <ol style="list-style-type: none"> 1. Frequency Error (Average) [Hz] 2. Frequency Error (Maximum) [Hz] 3. Frequency Error PPM (Average) [ppm] 4. Frequency Error PPM (Maximum) [ppm] 5. Output Power (Average) [dBm] 6. Output Power (Maximum) [dBm] 7. Transmitter Timing (Average) [ns] 8. Transmitter Timing (Maximum) [ns]
2	A/B	Returns with comma-separated value formats in the following order: <ol style="list-style-type: none"> 1. Carrier Suppression (Average) [dB] 2. Carrier Suppression (Maximum) [dB] 3. MER DATA (Average) [dB] 4. MER DATA (Maximum) [dB] 5. MER TDM1 (Average) [dB] 6. MER TDM1 (Maximum) [dB] 7. MER WIC (Average) [dB] 8. MER WIC (Maximum) [dB] 9. MER LIC (Average) [dB] 10. MER LIC (Maximum) [dB] 11. MER TDM2 (Average) [dB] 12. MER TDM2 (Maximum) [dB] 13. MER PPC (Average) [dB] 14. MER PPC (Maximum) [dB] 15. MER SPC (Average) [dB] 16. MER SPC (Maximum) [dB] 17. MER Total (Average) [dB] 18. MER Total (Maximum) [dB] 19. MER DATA & OIS Channel (Average) [dB] 20. MER DATA & OIS Channel (Maximum) [dB] 21. MER Pilot (Average) [dB] 22. MER Pilot (Maximum) [dB]
4	A/B	The MER (rms) vs Subcarrier graph display data is returned with comma-separated value formats in the following order: <ol style="list-style-type: none"> 1. MER (rms) of the 0th subcarrier 2. MER (rms) of the 1st subcarrier ... N. MER (rms) of the (N-1)th subcarrier N: Number of Subcarriers determined by FFT size.

For details on Result Mode, refer to the description of the `:SYSTEM:RESULT:MODE` command in the “MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control)”.

2.5.2 Storage Mode

`[[:SENSE]:MÉR:AVERage[:STATe] OFF|ON|AMAXimum|0|1|2`

Storage Mode

Function

This command sets the storage mode.

Command

`[[:SENSE]:MÉR:AVERage[:STATe] <mode>`

Parameter

<mode>	Storage Mode
OFF 0	Off (Default)
ON 1	Average
AMAXimum 2	Average & Max

Example of Use

To set the storage mode to Average.
`MÉR:AVER ON`

`[[:SENSE]:MÉR:AVERage[:STATe]?`

Storage Mode Query

Function

This command queries the setting of the storage mode.

Query

`[[:SENSE]:MÉR:AVERage[:STATe]?`

Response

<mode>

Parameter

<mode>	Storage Mode
0	Off
1	Average
2	Average & Max

Example of Use

To query the setting of the storage mode.
`MÉR:AVER?`
 > 1

2.5.3 Storage Count

`[:SENSe] :MER :AVERage :COUNT <integer>`

Storage Count

Function

This command sets the storage count.

Command

`[:SENSe] :MER :AVERage :COUNT <integer>`

Parameter

<code><integer></code>	Storage Count
Range	2 to 9999
Resolution	1
Default	10

Example of Use

To set the storage count to 10.
`MER :AVER :COUN 10`

`[:SENSe] :MER :AVERage :COUNT?`

Storage Count Query

Function

This command queries the storage count.

Query

`[:SENSe] :MER :AVERage :COUNT?`

Response

`<integer>`

Parameter

<code><integer></code>	Storage Count
Range	2 to 9999
Resolution	1

Example of Use

To query the storage count.
`MER :AVER :COUN?`
> 10

2.5.4 Graph View Setting

:CALCulate:MER:WINDow2:MODE EACH|AVERAge

MER vs Subcarrier View

Function

This command sets whether to display the averaged or unaveraged MER vs Subcarrier.

Command

```
:CALCulate:MER:WINDow2:MODE <mode>
```

Parameter

<mode>	Averaging of MER vs Subcarrier
EACH	Displays the unaveraged MER vs Subcarrier.
AVERAge	Displays the averaged MER vs Subcarrier (Default).

Example of Use

To display the unaveraged MER vs Subcarrier.
 CALC:MER:WIND2:MODE EACH

:CALCulate:MER:WINDow2:MODE?

MER vs Subcarrier View Query

Function

This command queries whether the MER vs Subcarrier is averaged.

Query

```
:CALCulate:MER:WINDow2:MODE?
```

Response

```
<mode>
```

Parameter

<mode>	Averaging of MER vs Subcarrier
EACH	Displays the unaveraged MER vs Subcarrier.
AVER	Displays the averaged MER vs Subcarrier

Example of Use

To query whether the MER vs Subcarrier is averaged.
 CALC:MER:WIND2:MODE?
 > EACH

2.6 Saving Measurement Result

Table 2.6-1 lists device messages for saving measurement results.

Table 2. 6-1 Saving Measurement Result Function

Function	Device Message
Save All Results	:MMEMOry:STORe:RESult [<filename>[,<device>]]
Save as Type	:MMEMOry:STORe:RESult:MODE XML CSV
	:MMEMOry:STORe:RESult:MODE?

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

Save All Results Data

Function

This command saves a measurement result in a file.

Command

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

Parameter

<code><filename></code>	<p>Target file name</p> <p>Character string within 32 characters enclosed by double quotes (" ") or single quotes (' ')</p> <p>The following characters cannot be used: \ / : * ? " ' < > </p> <p>Automatically named "MEDIAFLO date_sequential number.csv". MEDIAFLO20080617_00.xml</p>
<code><device></code>	<p>Drive name</p> <p>A, B, D, E, F, . . .</p> <p>D drive is used when omitted.</p>

Details

A number from 00 to 99 is sequentially affixed to the name if the file name is omitted. No more files can be saved if numbers up to 99 are already used.

Files are saved to the following directory in the specified drive.
\Anritsu Corporation\Signal Analyzer\User Data\Measurement Results\MediaFLO

Up to 100 files can be saved in a folder.

Example of Use

To save a measurement result with the file name "TEST" to the internal hard disk of the MS2690A/MS2691A/MS2692A.

```
MMEM:STOR:RES "TEST",D
```

:MMEMory:STORe:RESult:MODE XML|CSV

Save as Type

Function

This sets the type of file to save.

Command

```
:MMEMory: STORe:RESult:MODE <mode>
```

Parameter

<mode>	File type
XML	xml format (Default)
CSV	csv format

Example of Use

To set the type of the file to be saved to csv format.

```
MMEM:STOR:RES:MODE CSV
```

:MMEMory:STORe:RESult:MODE?

Save as Type Query

Function

This command queries the type of the file to be saved.

Query

```
:MMEMory:STORe:RESult:MODE?
```

Response

```
<mode>
```

Parameter

<mode>	File type
XML	xml format
CSV	csv format

Example of Use

To query the type of the file to be saved.

```
MMEM:STOR:RES:MODE?
```

```
> CSV
```

Chapter 3 *SCPI Status Register*

This chapter explains the SCPI commands used to read the state of the application and the status register.

3.1	Reading Measurement Status.....	3-2
	:STATus:ERRor?	3-2
3.2	STATus:QUEStionable Register	3-3
	:STATus:QUEStionable[:EVENT]?	3-5
	:STATus:QUEStionable:CONDition?	3-5
	:STATus:QUEStionable:ENABle <integer>	3-6
	:STATus:QUEStionable:ENABle?	3-6
	:STATus:QUEStionable:NTRansition <integer>	3-7
	:STATus:QUEStionable:NTRansition?	3-7
	:STATus:QUEStionable:PTRansition <integer>	3-8
	: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
	:STATus:QUEStionable:MEASure:NTRansition?	3-11
	:STATus:QUEStionable:MEASure:PTRansition <integer>	3-12
	:STATus:QUEStionable:MEASure:PTRansition?	3-12
3.3	STATus:OPERation Register	3-13
	:STATus:OPERation[:EVENT]?	3-14
	:STATus:OPERation:CONDition?	3-14
	:STATus:OPERation:ENABle <integer>	3-15
	:STATus:OPERation:ENABle?	3-15
	:STATus:OPERation:NTRansition <integer>	3-16
	:STATus:OPERation:NTRansition?	3-16
	:STATus:OPERation:PTRansition <integer>	3-17
	:STATus:OPERation:PTRansition?	3-17

3.1 Reading Measurement Status

:STATus:ERRor?

Measurement Status Error Query

Function

This command queries a measurement error.

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: $2^0 = 1$	No measurement
bit1: $2^1 = 2$	Level Over
bit2: $2^2 = 4$	(Not Used)
bit3: $2^3 = 8$	(Not Used)
bit4: $2^4 = 16$	(Not Used)
bit5: $2^5 = 32$	(Not Used)
bit6: $2^6 = 64$	(Not Used)
bit7: $2^7 = 128$	(Not Used)
bit8: $2^8 = 256$	(Not Used)
bit9: $2^9 = 512$	(Not Used)
bit10: $2^{10} = 1024$	(Not Used)
bit11: $2^{11} = 2048$	(Not Used)
bit12: $2^{12} = 4096$	(Not Used)
bit13: $2^{13} = 8192$	(Not Used)
bit14: $2^{14} = 16384$	(Not Used)
bit15: $2^{15} = 32768$	(Not Used)

Range

0 to 255

Details

0 is returned at normal termination.

Usage Example

To query a measurement error.

STAT:ERR?

> 0

3.2 STATus:QUEStionable Register

The hierarchical structure of the QUEStionable Status register is described in Figures 3.2-1 and 3.2-2, and Tables 3.2-1 and 3.2-2.

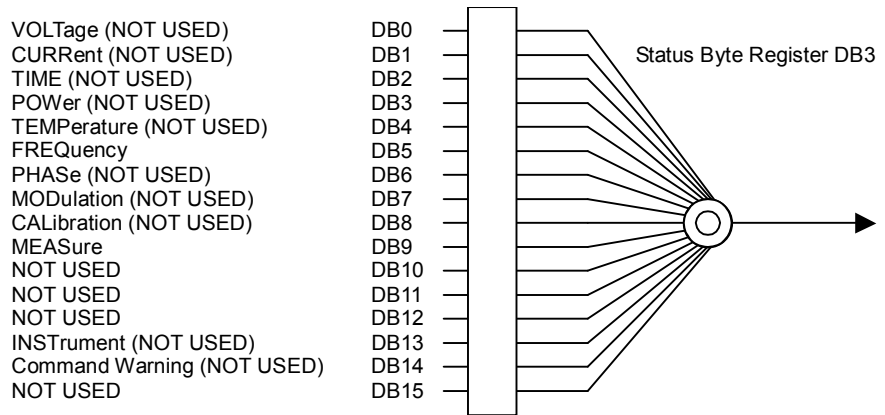


Figure 3.2-1 QUEStionable Status Register

Table 3.2-1 Bit Definition of QUEStionable Status Register

Bit	Definition
DB5	Reference Clock Unlock
DB9	QUEStionable Measure Register Summary

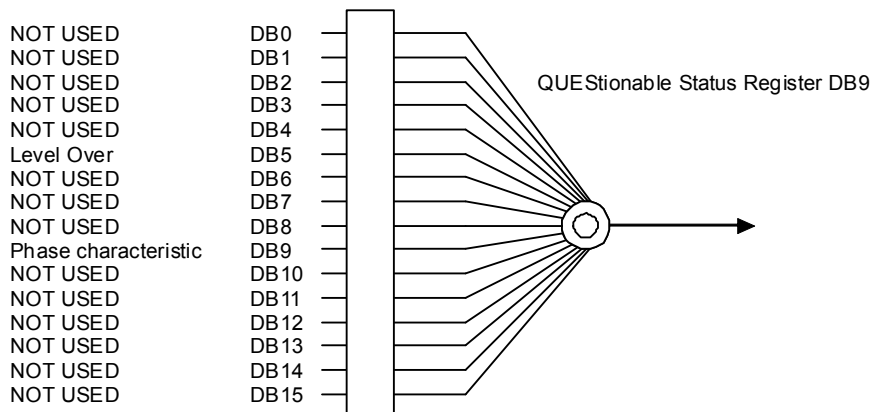


Figure 3.2-2 QUEStionable Measure Register

Table 3.2-2 Bit Definition of QUEStionable Measure Register

Bit	Definition
DB5	Level Over
DB9	Phase characteristic unsynchronized.

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

This command queries Event register of QUEStionable Status register.

Query

`:STATus:QUEStionable[:EVENT]?`

Response

`<integer>`

Parameter

<code><integer></code>	Bit Sum Total of Event Register
Resolution	1
Range	0 to 65535

Usage Example

To query event register of QUEStionable Status register.

`STAT:QUES?``> 0`**:STATus:QUEStionable:CONDition?**

Questionable Status Register Condition

Function

This command queries Condition register of QUEStionable Status register

Query

`:STATus:QUEStionable:CONDition?`

Response

`<integer>`

Parameter

<code><integer></code>	Bit Sum Total of Condition Register
Resolution	1
Range	0 to 65535

Usage Example

To query Condition register of QUEStionable Status register.

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

:STATus:QUEStionable:ENABle <integer>

Questionable Status Register Enable

Function

This command sets Event Enable register of QUEStionable Status register.

Command

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

Parameter

<integer>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To set value of Event Enable register of QUEStionable Status register to 16.

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

:STATus:QUEStionable:ENABle?

Questionable Status Register Enable Query

Function

This command queries Event Enable register of QUEStionable Status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event Enable register of QUEStionable Status register.

```
STAT:QUES:ENAB?
```

```
> 16
```

:STATUS:QUESTIONABLE:NTRANSITION <integer>

Questionable Status Register Negative Transition

Function

This command sets transition filter (Negative Transition) of QUESTIONABLE Status register.

Command

```
:STATUS:QUESTIONABLE:NTRANSITION <integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Negative Transition) of QUESTIONABLE Status register to 16.

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

:STATUS:QUESTIONABLE:NTRANSITION?

Questionable Status Register Negative Transition Query

Function

This command queries transition filter (Negative Transition) of QUESTIONABLE Status register.

Query

```
:STATUS:QUESTIONABLE:NTRANSITION?
```

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Negative Transition) of QUESTIONABLE Status register.

```
STAT:QUES:NTR?
```

```
> 16
```

:STATus:QUEStionable:PTRansition <integer>

Questionable Status Register Positive Transition

Function

This command sets transition filter (Positive Transition) of QUEStionable Status register.

Command

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

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Positive Transition) of QUEStionable Status register to 16.

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

:STATus:QUEStionable:PTRansition?

Questionable Status Register Positive Transition Query

Function

This command queries transition filter (Positive Transition) of QUEStionable Status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Positive Transition) of QUEStionable Status register.

```
STAT:QUES:PTR?
```

```
> 16
```

:STATus:QUEStionable:MEASure[:EVENT]?

Questionable Measure Register Event

Function

This command queries Event register of QUEStionable Measure register.

Query

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

Response

`<integer>`

Parameter

<code><integer></code>	Bit Sum Total of Event Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event register of QUEStionable Measure register.

`STAT:QUES:MEAS?``> 0`**:STATus:QUEStionable:MEASure:CONDition?**

Questionable Measure Register Condition

Function

This command queries Condition register of QUEStionable Measure register.

Query

`:STATus:QUEStionable:MEASure:CONDition?`

Response

`<integer>`

Parameter

<code><integer></code>	Bit Sum Total of Condition Register
Resolution	1
Range	0 to 65535

Usage Example

To query Condition register of QUEStionable Measure register.

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

:STATus:QUEStionable:MEASure:ENABle <integer>

Questionable Measure Register Enable

Function

This command sets Event Enable register of QUEStionable Measure register.

Command

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

Parameter

<integer>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To set a value of Event Enable register of QUEStionable Measure register to 16.

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

:STATus:QUEStionable:MEASure:ENABle?

Questionable Measure Register Enable Query

Function

This command queries Event Enable register of QUEStionable Measure register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event Enable register of QUEStionable Measure register.

```
STAT:QUES:MEAS:ENAB?
```

```
> 16
```


:STATus:QUEStionable:MEASure:NTRansition <integer>

Questionable Measure Register Negative Transition

Function

This command sets transition filter (Negative Transition) of QUEStionable Measure register.

Command

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

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Negative Transition) of QUEStionable Measure register to 16.

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

:STATus:QUEStionable:MEASure:NTRansition?

Questionable Measure Register Negative Transition Query

Function

This command queries transition filter (Negative Transition) of QUEStionable Measure register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Negative Transition) of QUEStionable Measure register.

```
STAT:QUES:MEAS:NTR?
```

```
> 16
```

:STATus:QUEStionable:MEASure:PTRansition <integer>

Questionable Measure Register Positive Transition

Function

This command sets transition filter (Positive Transition) of QUEStionable Measure register.

Command

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

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Positive Transition) of QUEStionable Measure register to 16.

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

:STATus:QUEStionable:MEASure:PTRansition?

Questionable Measure Register Positive Transition Query

Function

This command queries transition filter (Positive Transition) of QUEStionable Measure register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Positive Transition) of QUEStionable Measure register.

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

3.3 STATUS:OPERation Register

The hierarchical structure of the OPERATION Status register is described in Figure 3.3-1 and Table 3.3-1.

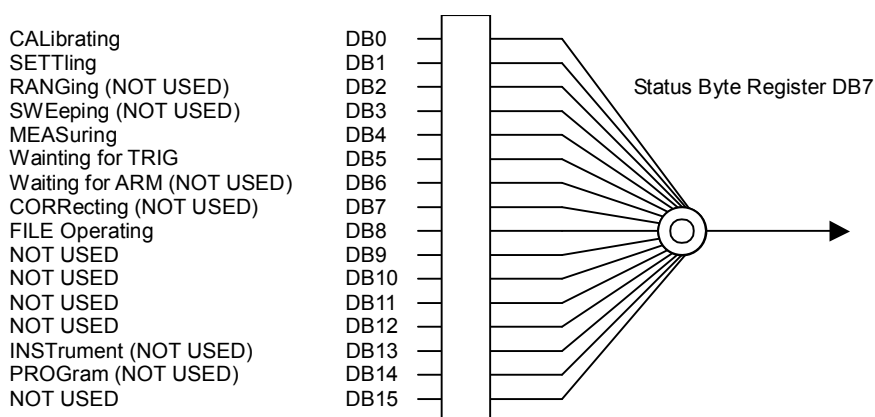


Figure 3.3-1 OPERATION Status Register

Table 3.3-1 Bit Definition for OPERATION Status Register

Bit	Definition
DB0	CAL Executed
DB1	Warm-up displayed
DB4	Capture executed (Always 1 at Continuous measurement)
DB5	Waiting for trigger signal
DB8	Operating on 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

This command queries Event register of OPERATION Status register.

Query

```
:STATus:OPERation[:EVENT]?
```

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Event Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event register of OPERATION Status register.

```
STAT:OPER?
```

```
> 0
```

:STATus:OPERation:CONDition?

Operation Status Register Condition

Function

This command queries Event register of OPERATION Condition register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Condition Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event register of OPERATION Condition register.

```
STAT:OPER:COND?
```

```
> 0
```

:STATus:OPERation:ENABLE <integer>

Operation Status Register Enable

Function

This command sets Event Enable register of OPERation Status register.

Command

`:STATus:OPERation:ENABle <integer>`

Parameter

<code><integer></code>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To set Event Enable register of OPERation Status register to 16.
`STAT:OPER:ENAB 16`

:STATus:OPERation:ENABLE?

Operation Status Register Enable Query

Function

This command queries Event Enable register of OPERation Status register.

Query

`:STATus:OPERation:ENABle?`

Response

`<integer>`

Parameter

<code><integer></code>	Bit Sum Total of Event Enable Register
Resolution	1
Range	0 to 65535

Usage Example

To query Event Enable register of OPERation Status register.
`STAT:OPER:ENAB?`
`> 16`

:STATus:OPERation:NTRansition <integer>

Operation Status Register Negative Transition

Function

This command sets transition filter (Negative Transition) of OPERATION Status register.

Command

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

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Negative Transition) of OPERATION Status register to 16.

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

:STATus:OPERation:NTRansition?

Operation Status Register Negative Transition Query

Function

This command queries transition filter (Negative Transition) of OPERATION Status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Negative Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Negative Transition) of OPERATION Status register.

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

:STATus:OPERation:PTRansition <integer>

Operation Status Register Positive Transition

Function

This command sets transition filter (Positive Transition) of OPERATION Status register.

Command

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

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To set transition filter (Positive Transition) of OPERATION Status register to 16.

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

:STATus:OPERation:PTRansition?

Operation Status Register Positive Transition Query

Function

This command queries transition filter (Positive Transition) of OPERATION Status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit Sum Total of Transition Filter (Positive Transition)
Resolution	1
Range	0 to 65535

Usage Example

To query transition filter (Positive Transition) of OPERATION Status register.

```
STAT:OPER:PTR?
```

```
> 16
```

