

**MX269028A**  
**WLAN (802.11) Measurement Software**  
**Operation Manual**  
**Remote Control**

**Third 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) or MS2830A Signal Analyzer Operation Manual (Mainframe Operation) and MX269028A WLAN (802.11) Measurement Software Operation Manual (Operation). Please also refer to these documents 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.

 **WARNING** This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

 **CAUTION** This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

## Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MX269028A  
WLAN (802.11) Measurement Software  
Operation Manual Remote Control

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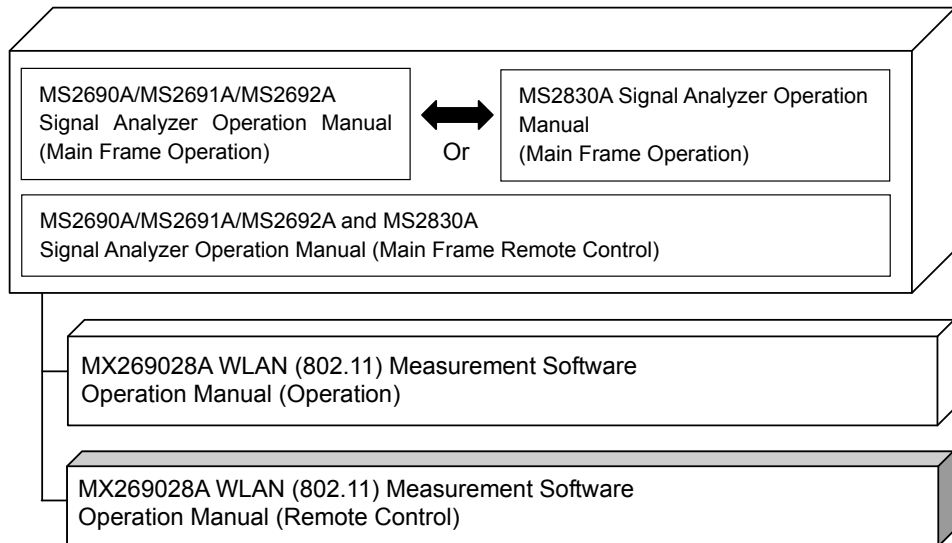
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# About This Manual

## ■ Composition of Operation Manuals

The operation manuals for MX269028A WLAN (802.11) Measurement Software 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.

- MX269028A WLAN (802.11) Measurement Software Operation Manual (Operation)

This manual describes operating methods of the MX269028A WLAN (802.11) Measurement Software.

- MX269028A WLAN (802.11) Measurement Software Operation Manual (Remote Control) <This document>

This manual describes remote control of the MX269028A WLAN (802.11) Measurement Software.

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# Chapter 1 Outline

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This chapter outlines the remote control operation of the MX269028A WLAN (802. 11) Measurement Software (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 MS269x Series and MS2830A Signal Analyzer (hereafter 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. Only one of these can be used at once.

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. At remote-interface operation, the front panel  lamp lights; the lamp is off at local-interface operation.

Refer to the *MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer 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, regardless of 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 loaded at the same time. Only one application resource can be executed per piece of hardware at one time. 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 as another application that uses by itself a resource not used by this application, such as the Vector Signal Generator.

## 1.2 Basic Flow of Control

This section describes the basic remote control command programming operations for measuring WLAN signals.

Figure 1.2-1 shows the control flow for a basic test. The order in which the measurement functions are executed can be rearranged, but the parameter settings and measurement function type that are applied to the measurement, and the measurement execution order cannot be changed.

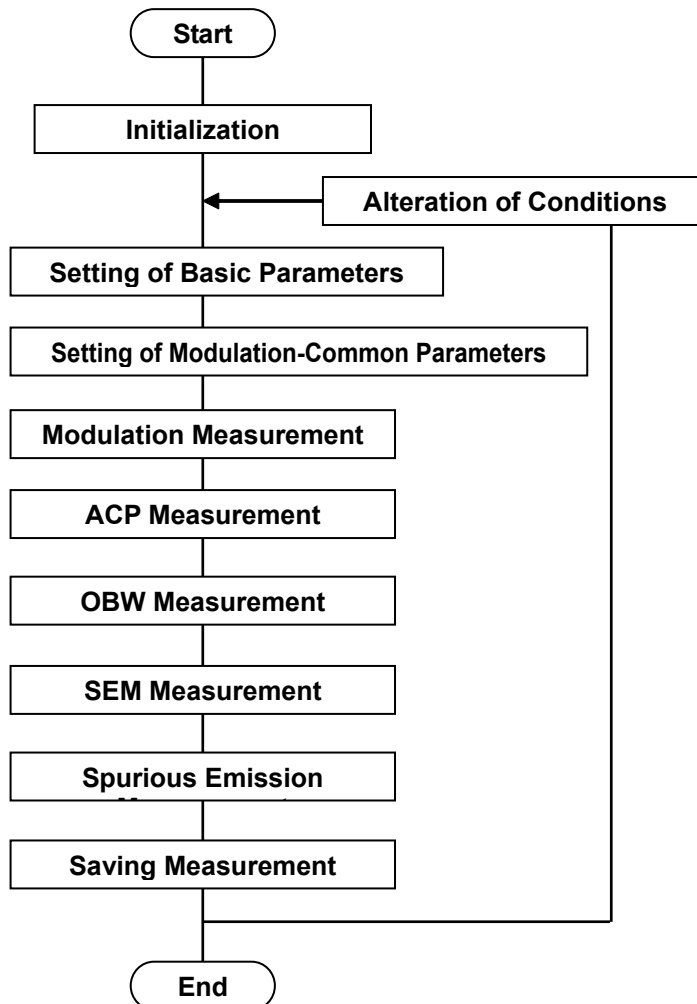


Figure 1.2-1 Flow of Basic Test

(1) Initialization

Initialize the communication interface and the parameters, and set the communication mode.

 1.2.1 "Initialization"

(2) Setting Basic Parameters

Set the parameters applied in common to all measurements, such as 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, select the measurement functions to be executed. Next, set the trace mode and storage mode for each measurement function. Finally perform the measurement and read out the measurement results.

 1.2.4 “Modulation Measurement”

(5) ACP/Channel Power/OBW/SEM Measurement

The measurement functions to be executed in the Signal Analyzer or Spectrum Analyzer are executed. First, set the parameters applied in common to the measurement functions. Next, set the applications used for each measurement, select the measurement functions, configure settings required for the measurement, such as the trigger mode, storage mode, BW, analysis time, sweep time, and trace point, then execute measurement, and read out the measurement results.

 1.2.5 “ACP (Adjacent Channel Power) Measurement”

 1.2.6 “OBW (Occupied Bandwidth) measurement”

 1.2.7 “SEM (Spectrum Emission Mask) measurement”

 1.2.8 “Spurious emission measurement”

(6) Saving Measurement Results

The measurement results obtained in this application are saved.

 1.2.9 “Saving measurement results”

## 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) **Initializing Communication Interface**  
The remote control interface to be used is initialized so sending and receiving of commands can start. For details, refer to MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer manual (Mainframe Remote Control).
- (2) **Setting Language Mode and Response Format**  
The language mode and the response format used to communicate are set. For details, refer to *MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer manual (Mainframe Remote Control)*.
- (3) **Starting the application**  
The application is loaded. In addition to this application, the Signal Analyzer and Spectrum Analyzer applications are also started.
- (4) **Selecting Application**  
The target application is selected.
- (5) **Initialization**  
All parameters and statuses are reset at initialization.
- (6) **Setting Measurement Mode**  
After initialization, the measurement mode is at continuous measurement mode. To select single measurement mode, switch to the single measurement mode.

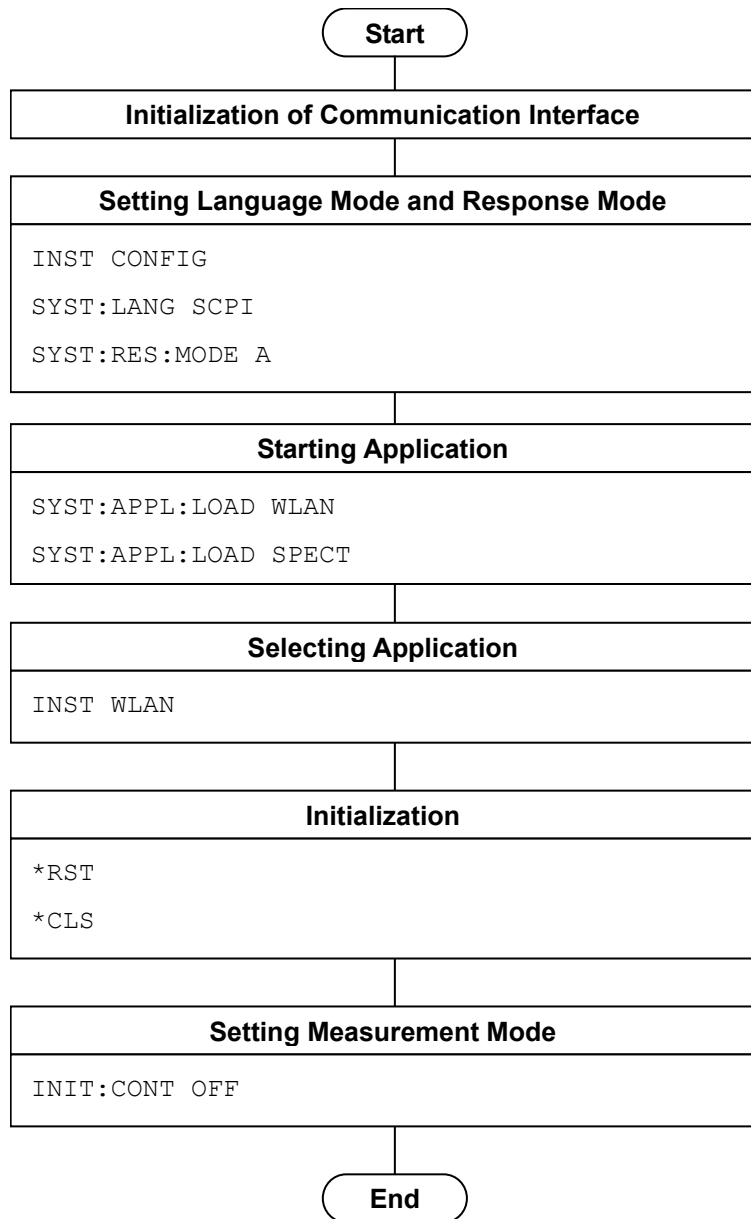


Figure 1.2.1-1 Initialization Flow and Command Example

## 1.2.2 Setting of Basic Parameters

Set the parameters used in common for to all measurements using this application, the Signal Analyzer, and the Spectrum Analyzer. The basic parameters include the following:

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

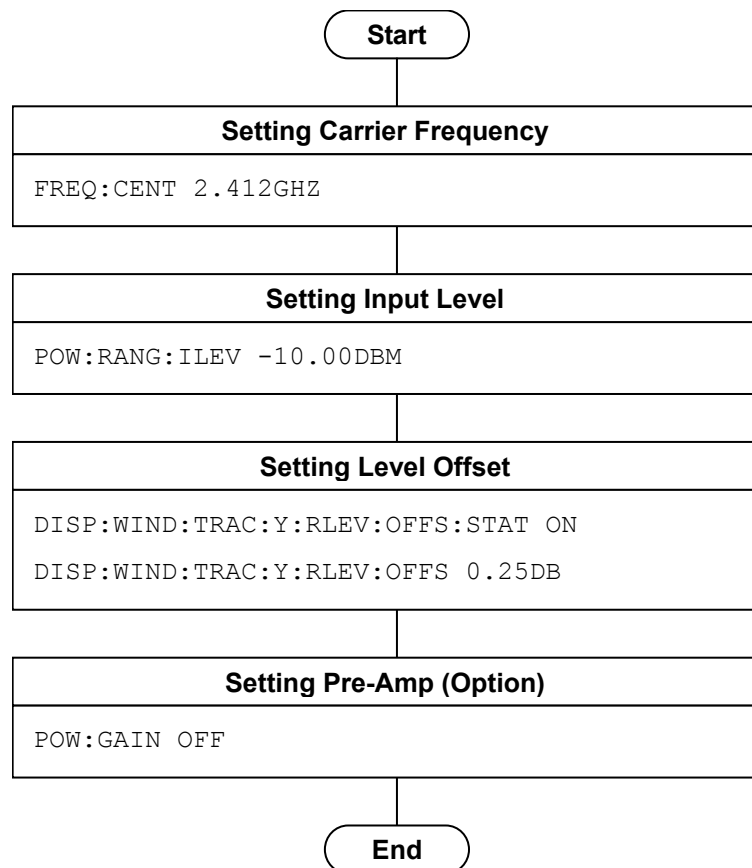


Figure 1.2.2-1 Flow of Basic Parameter Setting and Command Example

### 1.2.3 Setting of Modulation-Common Parameters

Set the parameters used in common for the Modulation measurement functions executed in this application. The parameters can be set in any order, unless otherwise specified.

- (1) Trigger
  - (a) Trigger Switch
  - (b) Trigger Source
  - (c) Trigger Slope
  - (d) Trigger Delay
- (2) Standard
- (3) Data Rate & Modulation
- (4) Burst Interval

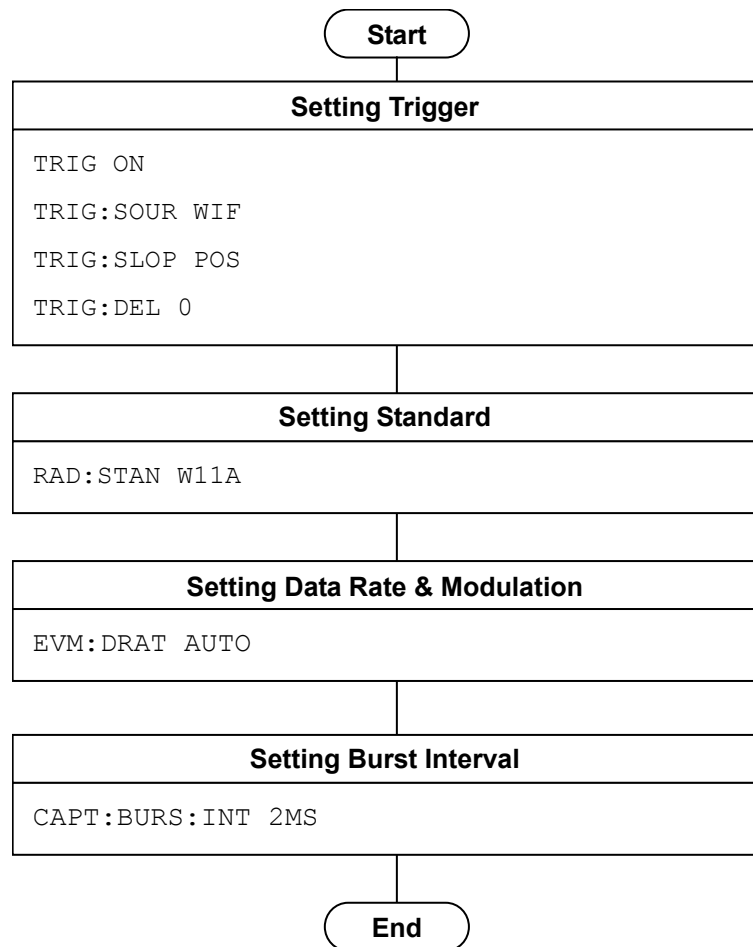


Figure 1.2.3-1 Flow of Common Settings for Modulation and Command Example



## 1.2.4 Modulation Measurement

This command executes the Modulation measurement function. The Modulation measurement is executed in the following order:

- (1) Selecting the measurement function.
- (2) Setting measurement parameters

The following parameters are only applied to Modulation measurement:

- (a) Analysis Length Setup
  - (b) Channel Estimation
  - (c) Amplitude Tracking
  - (d) Phase Tracking
- (3) Executing measurement and querying the result
  - (4) Setting contents to be displayed  
This control is not required when simply reading out the measurement results by using the remote control, but is used to display the measurement results on the screen in the same way as during manual operation.
    - (a) Trace Mode
    - (b) Scale

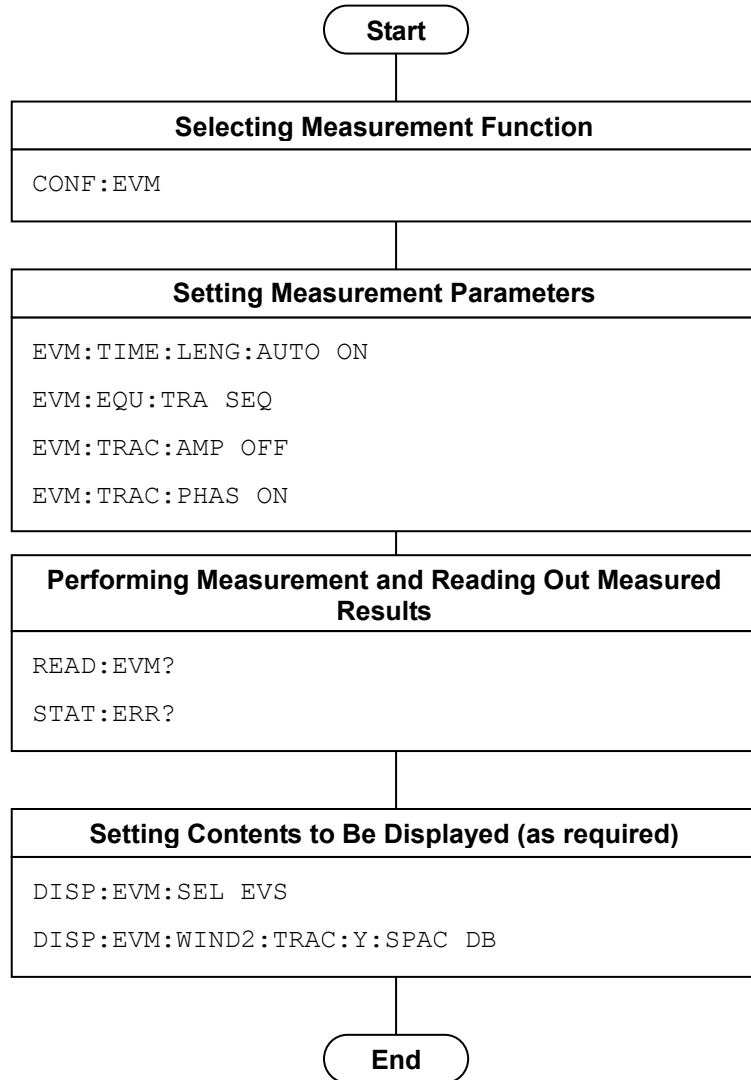


Figure 1.2.4-1 Flow of Common Settings for Modulation and Command Example

## 1.2.5 ACP (Adjacent Channel Power) Measurement

The ACP measurement is executed in the following order:

(1) Selecting the measurement function

Selecting the ACP measurement function makes the application switch to Spectrum Analyzer. The values of the basic parameters are applied to the Spectrum Analyzer. Subsequently, only the commands/queries available in the Spectrum Analyzer can be used.

(2) Setting measurement parameters

The following parameters apply only to the Spectrum Analyzer.

(a) Trigger

(b) Sweep Time, Filter Type, Storage, etc.

(3) Executing measurement and querying the result

(4) Setting Contents to be Displayed

This control is not required when simply reading out the measurement results by using the remote control, but is used to display the measurement results on the screen in the same way as during manual operation.

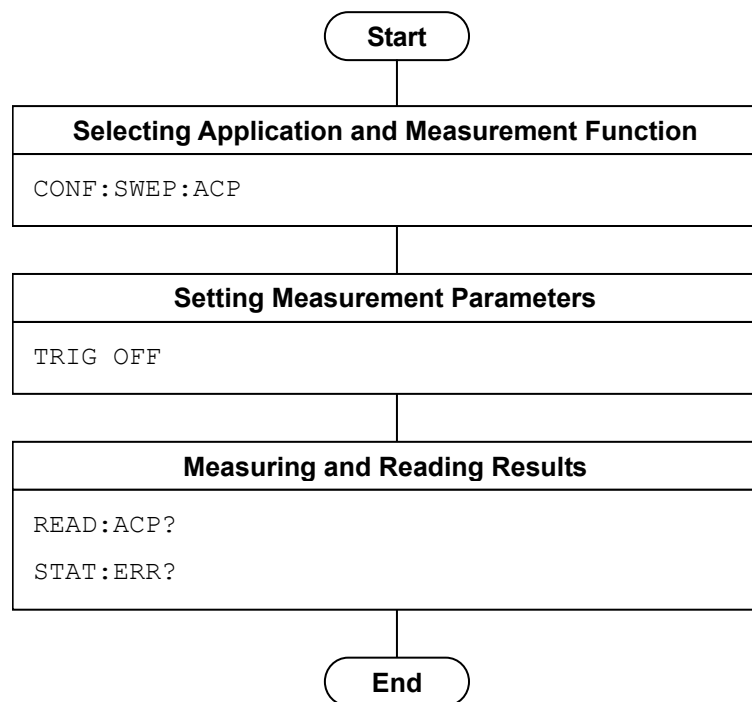


Figure 1.2.5-1 Flow of ACP Measurement using Spectrum Analyzer and Command Example

## 1.2.6 OBW (Occupied Bandwidth) measurement

OBW measurement is executed in the following order:

- (1) Selecting the measurement function  
Selecting the OBW measurement function makes the application switch to Spectrum Analyzer. The values of the basic parameters are applied to the Spectrum Analyzer. Subsequently, only the commands/queries available in the Spectrum Analyzer can be used.
- (2) Setting measurement parameters The following parameters apply only to the Spectrum Analyzer.
  - (a) Trigger
  - (b) Method, N% Ratio, and XdB Value
- (3) Executing measurement and querying the result
- (4) Setting Contents to be Displayed  
This control is not required when simply reading out the measurement results by using the remote control, but is used to display the measurement results on the screen in the same way as during manual operation.

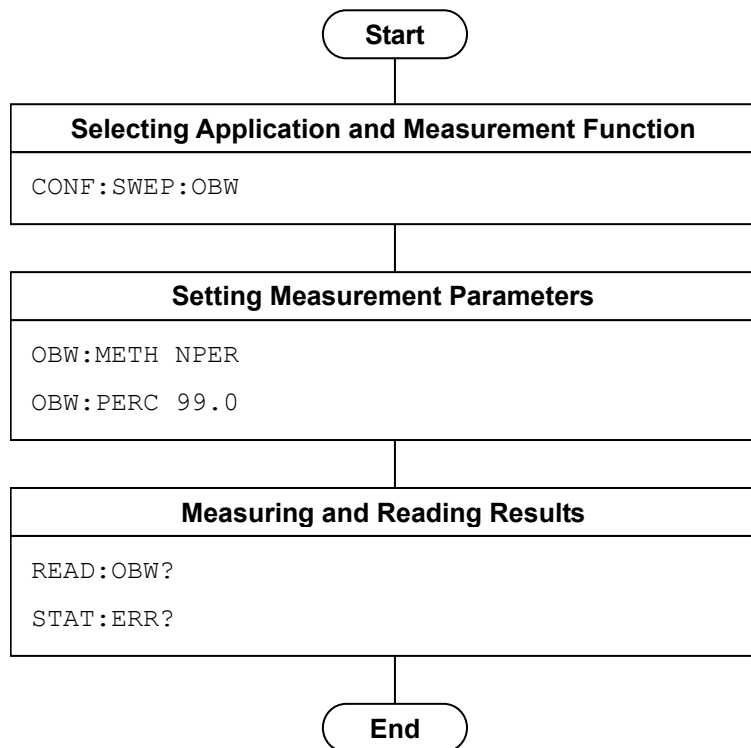


Figure 1.2.6-1 Flow of OBW Measurement using Signal Analyzer and Command Example

## 1.2.7 SEM (Spectrum Emission Mask) measurement

SEM measurement is executed in the following order:

- (1) Selecting the measurement function Selecting the SEM measurement function makes the application switch to Spectrum Analyzer. The values of the basic parameters are applied to the Spectrum Analyzer. Subsequently, only the commands/queries available in the Spectrum Analyzer can be used.
- (2) Setting measurement parameters The following parameters apply only to the Spectrum Analyzer.
  - (a) Trigger
  - (b) Limit Side, Filter Type, Storage
- (3) Executing measurement and querying the result
- (4) Setting Contents to be Displayed  
This control is not required when simply reading out the measurement results by using the remote control, but is used to display the measurement results on the screen in the same way as during manual operation.

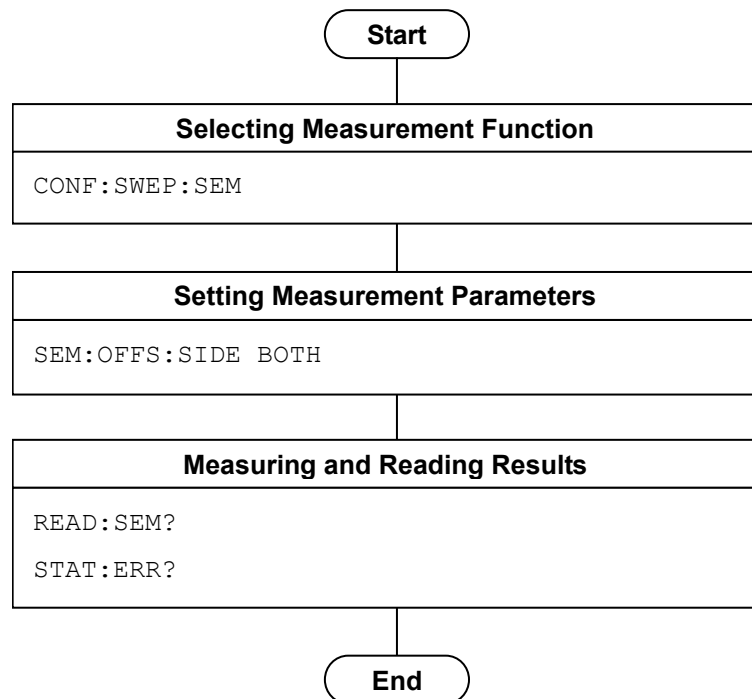


Figure 1.2.7-1 Flow of SEM Measurement using Spectrum Analyzer and Command Example

### 1.2.8 Spurious emission measurement

Spurious Emission measurement is executed in the following order:

- (1) Selecting the measurement function  
Selecting the Spurious Emission measurement function makes the application switch to Spectrum Analyzer. The values of the basic parameters are applied to the Spectrum Analyzer. Subsequently, only the commands/queries available in the Spectrum Analyzer can be used.
- (2) Setting measurement parameters The following parameters apply only to the Spectrum Analyzer.
  - (a) Trigger
  - (b) Sweep Time, Filter Type, Storage, etc.
- (3) Executing measurement and querying the result
- (4) Setting Contents to be Displayed  
This control is not required when simply reading out the measurement results by using the remote control, but is used to display the measurement results on the screen in the same way as during manual operation.

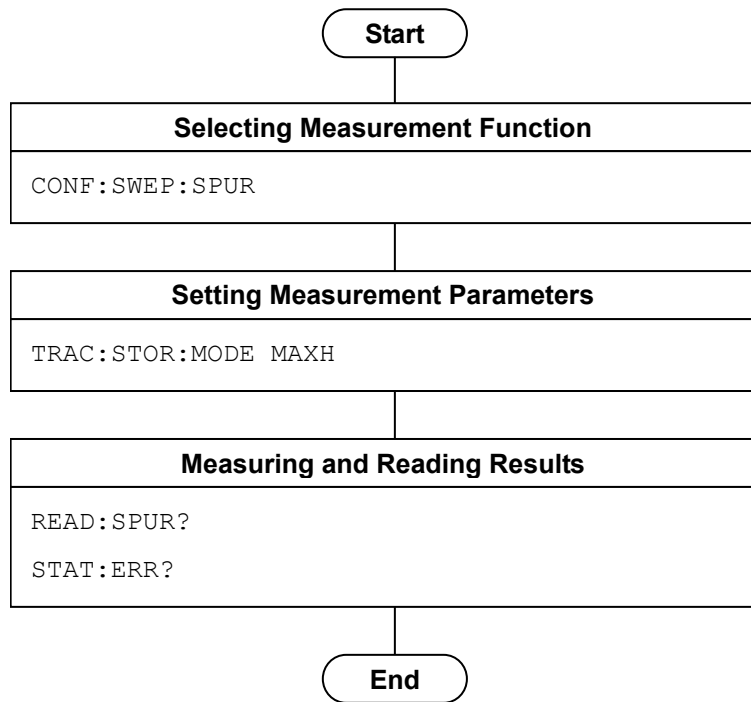


Figure 1.2.8-1 Flow of Spurious Emission Measurement using Spectrum Analyzer and Command Example

## 1.2.9 Saving measurement results

The measurement results are saved in the following order:

- (1) Selecting file format  
Select either xml or csv for the file format to save.
- (2) Saving measurement results  
Specify the drive and file name of the save destination as necessary.  
All measurement results of this application are saved.

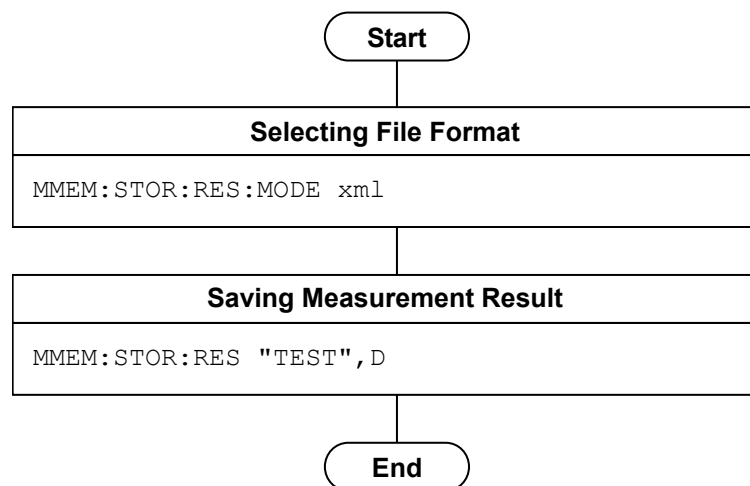
**Note:**

When a file name is not specified, the saved file is output under the name format of "WLANdate\_sequence number.xml." When measurement results are saved several times on the same date, the sequence number starting from "00" is suffixed to each file name, like "WLANdate\_00.xml," "WLANdate\_01.xml," "WLANdate\_02.xml."

The sequential numbers suffixed to a file name are 00 to 99.  
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\WLAN

Up to 100 files can be saved in a folder.



**Figure 1.2.9-1 Saving Measurement Results Flow and Command Example**

## 1.3 How to use Native Mode

This instrument defines the syntax/format types of the remote control commands 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 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 `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.

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

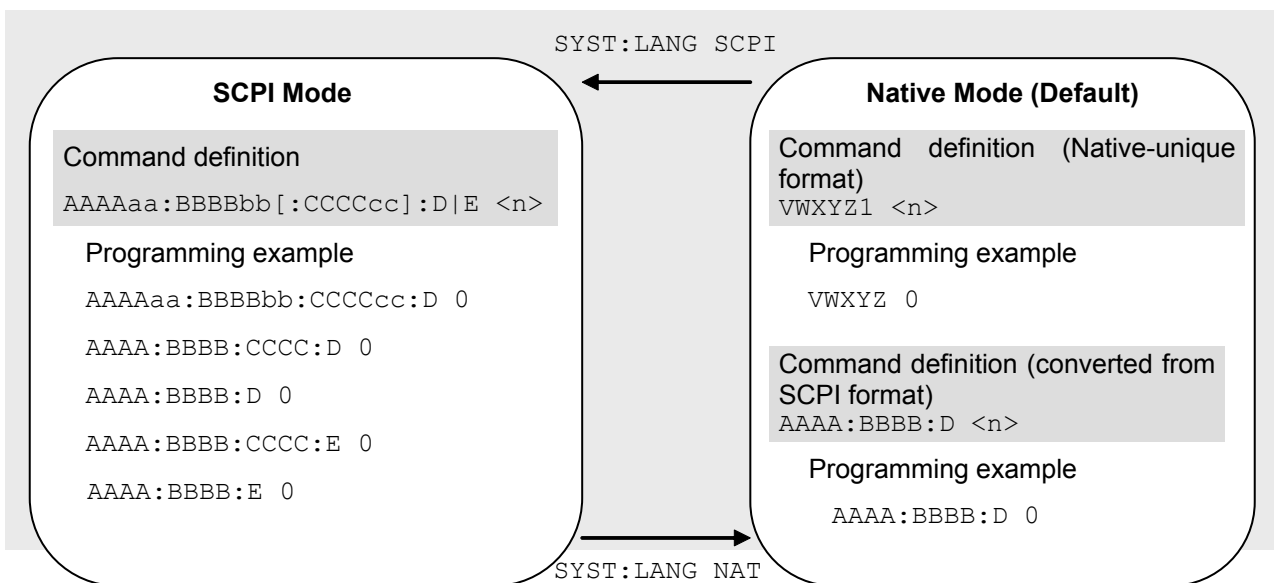


Figure 1.3-1 SCPI mode and Native mode



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>
```
- ① 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?

## 1.4 Character Programs Available for Setting Numeric Program Data

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

(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>

<ampl>



## 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 and MS2830A 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 Application

Table 2.1-1 lists the device messages used for setup applications, such as activation, selection, and initialization of the application.

**Table 2.1-1 Device Messages for Selecting Application**

Function	Device Message
Load Application	:SYSTem:APPLication:LOAD WLAN
Unload Application	:SYSTem:APPLication:UNLoad WLAN
Application Switch	:INSTRument[:SELection] WLAN CONFIG
	:INSTRument[:SELection]?
Application Switch and Window Status	:INSTRument:SYSTem WLAN, [ACTive] INACTive MINimum
	:INSTRument:SYSTem? WLAN
Preset Current Application	:INSTRument:DEFault
	:SYSTem:PRESet

### 2.1.1 Loading application

#### :SYSTem:APPLication:LOAD WLAN

Load Application

Function

This command loads this application.

Command

```
:SYSTem:APPLication:LOAD WLAN
```

Details

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

Example of Use

To load this application.  
`SYST:APPL:LOAD WLAN`

#### :SYSTem:APPLication:UNLoad WLAN

Unload Application

Function

This command exits this application.

Command

```
:SYSTem:APPLication:UNLoad WLAN
```

Details

This function exits the application being loaded, and removes it from the Application Switch menu.

Example of Use

To exit this application.  
`SYST:APPL:UNL WLAN`

## 2.1.2 Selecting application

### :INSTrument[:SElect] WLAN|CONFIG

Application Switch

Function

This command selects the controlled application.

Command

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

Parameter

<apl_name>	Application name
WLAN	This application
CONFIG	Config

Details

Use the following commands for selecting a measurement function of the Spectrum Analyzer from this application.

```
:CONFigure:SWEpt:ACP  
:CONFigure:SWEpt:OBWidth  
:CONFigure:SWEpt:SEMask  
:CONFigure:SWEpt:SPURious
```

Example of Use

To switch the control target to this application.

```
INST WLAN
```

**:INSTrument[:SElect]?**

Application Switch Query

## Function

This command queries the controlled application.

## Query

`:INSTrument[:SElect]?`

## Response

`<apl_name>`

## Parameter

<code>&lt;apl_name&gt;</code>	Application name
WLAN	This application
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config

## Details

WLAN is returned when a measurement function of this application is selected.

SPECT is returned when a measurement function such as ACP, OBW, SEM and Spurious Emission of the Spectrum Analyzer is selected.

## Example of Use

To query the controlled application.

```
INST?
> WLAN
```

## :INSTrument:SYSTem WLAN, [ACTive]|INACTive|MINimum

Application Switch and Window Status

### Function

This command selects the window status of this application.

### Command

```
:INSTrument:SYSTem WLAN, <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 WLAN,ACT
```



**:INSTrument:SYSTem? WLAN**

Application Switch and Window Status Query

## Function

This command queries the window status of this application.

## Query

`:INSTrument:SYSTem? WLAN`

## Response

`<status>, <window>`

## Parameter

<code>&lt;status&gt;</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>&lt;window&gt;</code>	Window status
ACT	Active
INAC	Inactive
MIN	Minimized
NON	Window not displayed

## Example of Use

To query the window status of this application.

```
INST:SYST? WLAN
> 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
```

Details

After transmitting `:INST:DEF` by this application, the parameters of the Spectrum Analyzer can also be initialized by selecting the ACP, OBW, SEM or Spurious Emssion measurement function with the following commands.

```
:CONFigure:SWEpt:ACP
```

```
:CONFigure:SWEpt:SPURious
```

```
:CONFigure:SWEpt:OBWidth
```

```
:CONFigure:SWEpt:SEMAsk
```

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 `:INSTrument:DEFault`.

Example of Use

To initialize the settings and status of the currently selected application.

```
SYST:PRES
```

## 2.2 Setting of 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 Messages
Carrier Frequency	<code>[ :SENSE ] :FREQUency:CENTer &lt;freq&gt;</code>
	<code>[ :SENSE ] :FREQUency:CENTer?</code>
Channel Map	<code>[ :SENSE ] :CHANnel:MAP NONE 2_4GBAND 5GBAND</code>
	<code>[ :SENSE ] :CHANnel:MAP?</code>
Channel Number	<code>[ :SENSE ] :CHANnel &lt;integer&gt;</code>
	<code>[ :SENSE ] :CHANnel?</code>
RF Spectrum	<code>[ :SENSE ] :SPECTrum NORMAl REVerse</code>
	<code>[ :SENSE ] :SPECTrum?</code>
Input Level	<code>[ :SENSE ] :POWER[:RF]:RANGE:ILEVel &lt;real&gt;</code>
	<code>[ :SENSE ] :POWER[:RF]:RANGE:ILEVel?</code>
Auto Range	<code>[ :SENSE ] :POWER[:RF]:RANGE:AUTO ONCE</code>
Reference Level	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel &lt;real&gt;</code>
	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?</code>
Level Offset Value	<code>:DISPlay:WINDow[1]:TRACe:Y[:SCALE]:RLEVel:OFFSet &lt;rel_power&gt;</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	<code>[ :SENSE ] :POWER[:RF]:GAIN[:STATe] OFF ON 0 1</code>
	<code>[ :SENSE ] :POWER[:RF]:GAIN[:STATe]?</code>
Lowest ATT Setting	<code>[ :SENSE ] :POWER[:RF]:ATTenuation:LOWest:SETTing 0dB 4dB</code>
	<code>[ :SENSE ] :POWER[:RF]:ATTenuation:LOWest:SETTing?</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>&lt;freq&gt;</code>	Carrier frequency
Range	100 MHz to the upper limit of the main unit
Resolution	1 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ Hz is used when omitted.
Default	2412 MHz

Details

This command is not available when the Replay function is executed.

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

`<freq>`

Carrier frequency

Range

100 MHz to the upper limit of the main unit

Resolution

1 Hz

Value is returned in Hz units.

## Example of Use

To query the start of offset frequency.

`FREQ :CENT ?``> 1000000000`

## 2.2.2 Channel Map

`[[:SENSe]:CHANnel:MAP NONE|2_4GBAND|5GBAND`

Channel Map

Function

This command sets the Channel Map.

Command

`[[:SENSe]:CHANnel:MAP <mode>`

Parameter

<mode>	Channel Map
NONE	Used to set frequency manually.
2_4GBAND	Sets Channel Map for the 2.4 GHz band. (Default)
5GBAND	Sets Channel Map for the 5 GHz band.

Details

When Carrier Frequency is changed, Channel Map is automatically changed to None. If the optional 3.6 GHz signal analyzer MS2830A-040 is active, the 5 GHz Band cannot be specified.

This command is not available when the Replay function is executed.

Example of Use

To set Channel Map to NONE.

`CHAN:MAP NONE`

**[ :SENSe]:CHANnel:MAP?**

Channel Map Query

Function

This command queries the Channel Map.

Query

`[ :SENSe]:CHANnel:MAP?`

Response

`<mode>`

Parameter

`<mode>`**Channel Map**

NONE

Used to set frequency manually.

2\_4GBAND

Sets Channel Map for the 2.4 GHz band.

5GBAND

Sets Channel Map for the 5 GHz band.

Example of Use

To query Channel Map.

`CHAN:MAP?``> NONE`

### 2.2.3 Channel Number

`[[:SENSe]:CHANnel <integer>`

Channel Number

Function

This command sets the carrier frequency according to the channel number.

Command

`[[:SENSe]:CHANnel <integer>`

Parameter

`<integer>` Channel number  
Range 0 to 200 (Channel Map: 5 GHz Band)  
1 to 14 (Channel Map: 2.4 GHz Band)  
Default 1

Details

This command is not available when Channel Map is None. Automatically set to 36 when Channel Map is changed to the 5 GHz Band.

Automatically set to 1 when Channel Map is changed to the 2.4 GHz Band. If the optional 3.6 GHz signal analyzer MS2830A-040 is active, the 5 GHz Band cannot be specified.

This command is not available when the Replay function is executed.

Example of Use

To set the channel number to 1.  
CHAN 1



## **[[:SENSE]:CHANnel?**

Channel Number Query

Function

This command queries the channel number setting.

Query

```
[[:SENSE]:CHANnel?
```

Response

```
<integer>
```

Parameter

```
<integer> Channel number  
Range 0 to 200 (Channel Map: 5 GHz Band)  
1 to 14 (Channel Map: 2.4 GHz Band)
```

Example of Use

```
To query the channel number setting.  
CHAN?  
> 1
```

## 2.2.4 RF Spectrum

### **[[:SENSE]:SPECTrum NORMal|REVerse**

RF Spectrum

Function

This command sets whether to perform Spectrum Reverse.

Command

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

Parameter

<mode>	Spectrum reverse
NORMal	Measures without IQ spectrum reverse (Default).
REVerse	Measures with IQ spectrum reverse.

Example of Use

To enable the Spectrum Reverse function.

```
SPEC NORM
```

### **[[:SENSE]:SPECTrum?**

RF Spectrum Query

Function

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

Query

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

Response

```
<mode>
```

Parameter

<mode>	Spectrum reverse
NORM	Measures without IQ spectrum reverse.
REV	Measures with IQ spectrum reverse.

Example of Use

To query the spectrum reverse function setting.

```
SPEC?
```

```
> NORM
```

## 2.2.5 Input Level

`[[:SENSe]:POWer[:RF]:RANGe:ILEV] <real>`

Input Level

Function

This command sets the input level of RF signals.

Command

`[[:SENSe]:POWer[:RF]:RANGe:ILEV] <real>`

Parameter

<code>&lt;real&gt;</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
Suffix code	DBM
	dBm is used when omitted.
Default	-10.00 dBm

Details

The setting range when Pre Amp is Off is applied if the MS2690A/MS2691A/MS2692A Option 008 6 GHz Preamplifier or MS2830A Option 008 Preamplifier (hereinafter referred to as “Option 008”) is not installed.

This command is not available when the Replay function is executed.

Example of Use

To set the input level to 0 dBm.

`POW:RANG:ILEV 0`

## `[[:SENSe]:POWer[:RF]:RANGe:ILEV?]`

Input Level Query

### Function

This command queries the input level of RF signals.

### Query

```
[[:SENSe]:POWer[:RF]:RANGe:ILEV?
```

### Response

```
<real>
```

### Parameter

<code>&lt;real&gt;</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
```

## `[[:SENSe]:POWer[:RF]:RANGe:AUTO ONCE`

Auto Range

Function

This command sets the optimum Input Level according to the input signal.

Command

```
[[:SENSe]:POWer[:RF]:RANGe:AUTO ONCE
```

Details

This command is not available when the Replay function is executed.

Example of Use

To auto-adjust the level.  
`POW:RANG:AUTO ONCE`

## 2.2.6 Reference Level

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

Reference Level

Function

This command sets the reference level for ACP/OBW/SEM/Spurious Emission measurements.

Command

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

Parameter

<code>&lt;real&gt;</code>	Reference level
Range	(Minimum input level + 14) to (Maximum input level + 14) dBm
Resolution	0.01 dB
Suffix code	DBM dBm is used when omitted.
Default	4.00 dBm

Details

Reference Level indicates the peak level of the input signal by using the internal parameter which is automatically calculated to Input Level and is not shown on the screen. This Reference Level value is applied to the measurement function when fetching ACP/OBW/SEM/Spurious Emission measurement functions. The Input Level value is also changed when the Reference Level is changed.

This command is not available when the Replay function is executed.

Example of Use

To set the reference level to 0.00 dBm.  
`DISP:WIND:TRAC:Y:RLEV 0.00DBM`

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

Reference Level Query

## Function

This command queries the reference level for ACP/OBW/SEM/Spurious Emission measurements.

## Query

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

## Response

```
<real>
```

## Parameter

<real>	Reference level
Range	(Minimum input level + 14) to (Maximum input level + 14) dBm
Resolution	0.01 dB
	Value is returned in dBm units.

## Example of Use

```
To query the reference level.
DISP:WIND:TRAC:Y:RLEV?
> 0.00
```

### 2.2.7 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>&lt;rel_power&gt;</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>&lt;rel_power&gt;</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



### 2.2.8 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

### 2.2.9 Pre Amp

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

Pre Amp

Function

This command sets On/Off of the Pre-Amp.

Command

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

Parameter

<code>&lt;switch&gt;</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. This command is not available when the Replay function is executed.

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 On/Off status of the Pre-Amp.

Query

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

Response

`<switch>`

Parameter

<code>&lt;switch&gt;</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`

### 2.2.10 Lowest ATT Setting

`[ :SENSE]:POWER[:RF]:ATTenuation:LOWest:SETTing 0dB|4dB`

Lowest ATT Setting

Function

This command sets the Lowest ATT Setting.

Command

`[ :SENSE]:POWER[:RF]:ATTenuation:LOWest:SETTing <mode>`

Parameter

<mode>	lowest ATT Setting
0DB	0 dB
4DB	4 dB (Default)

Example of Use

To sets the Lowest ATT Setting to 0 dB.

`POW:ATT:LOW:SETT 0DB`

`[ :SENSE]:POWER[:RF]:ATTenuation:LOWest:SETTing?`

Lowest ATT Setting Query

Function

This command queries the Lowest ATT Setting.

Query

`[ :SENSE]:POWER[:RF]:ATTenuation:LOWest:SETTing?`

Response

<mode>

Parameter

<mode>	lowest ATT Setting
0DB	0 dB
4DB	4 dB

Example of Use

To queries the Lowest ATT Setting.

`POW:ATT:LOW:SETT?`

>4DB

## 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 Messages
Standard	[ :SENSe ] :RADio:STANdard W11A W11B WGDSss WGOFdm WGDofdm W11N W11J W11P
	[ :SENSe ] :RADio:STANdard?
Measuring Object	[ :SENSe ] :RADio:MOBJect BURSt CONTInuous
	[ :SENSe ] :RADio:MOBJect?
PPDU Format	[ :SENSe ] :EVM:PFORmat NONHt MIXed GREenfield
	[ :SENSe ] :EVM:PFORmat?
Channel Bandwidth	[ :SENSe ] :EVM:CBANdwidth 5 10 20 40 40UPper 40Lower
	[ :SENSe ] :EVM:CBANdwidth?
Burst Interval	[ :SENSe ] :CAPTure:BURSt:INTerval <time>
	[ :SENSe ] :CAPTure:BURSt:INTerval?
Burst Threshold	[ :SENSe ] :CAPTure:BURSt:THReshold <integer>
	[ :SENSe ] :CAPTure:BURSt:THReshold?
Analysis Length Setup	[ :SENSe ] :EVM:TIME:LENGth[:STATe]:AUTO OFF ON 0 1
	[ :SENSe ] :EVM:TIME:LENGth[:STATe]:AUTO?
Analysis Length	[ :SENSe ] :EVM:TIME:LENGth <integer>
	[ :SENSe ] :EVM:TIME:LENGth?
Analysis Offset	[ :SENSe ] :EVM:TIME:OFFSet <integer>
	[ :SENSe ] :EVM:TIME:OFFSet?
Data Rate	[ :SENSe ] :EVM:DRATe AUTO 1MBPs 1M5Bps 2M25bps 2MBPs 3MBPs 4M5Bps 5M5Bps 6MBP  9MBPs 11MBps 12MBps 13M5bps 18MBps 24MBps 27MBps 36MBps  48MBps 54MBps
	[ :SENSe ] :EVM:DRATe?
MCS Setup	[ :SENSe ] :EVM:MCS[:STATe]:AUTO OFF ON 0 1
	[ :SENSe ] :EVM:MCS[:STATe]:AUTO?
MCS Index	[ :SENSe ] :EVM:MCS <integer>
	[ :SENSe ] :EVM:MCS?
Stream ID	[ :SENSe ] :EVM:SID AUTO 1 2 3 4
	[ :SENSe ] :EVM:SID?

Table 2.3-1 Device Messages for Setting System Parameters (Continued)

Parameter	Device Messages
Preamble	[ :SENSe ] :EVM:PREamble AUTO LONG SHORT
	[ :SENSe ] :EVM:PREamble?
Guard Interval	[ :SENSe ] :EVM:GI AUTO LONG SHORT
	[ :SENSe ] :EVM:GI?
EVM Calculation Method	[ :SENSe ] :EVM:CMETHOD STD1999 STD2007
	[ :SENSe ] :EVM:CMETHOD?
Target Field	[ :SENSe ] :EVM:TField PSDU PREamble
	[ :SENSe ] :EVM:TField?
Channel Estimation	[ :SENSe ] :EVM:EQualizer:TRaining SEQ SDATA
	[ :SENSe ] :EVM:EQualizer:TRaining?
Amplitude Tracking	[ :SENSe ] :EVM:TRACk:AMP OFF ON 0 1
	[ :SENSe ] :EVM:TRACk:AMP?
Phase Tracking	[ :SENSe ] :EVM:TRACk:PHASe OFF ON 0 1
	[ :SENSe ] :EVM:TRACk:PHASe?
Symbol Timing Adjustment	[ :SENSe ] :EVM:TADJust <integer>
	[ :SENSe ] :EVM:TADJust?
Filter Type	[ :SENSe ] :EVM:FILTer:REFerence NONE GAUSSian RCOSine
	[ :SENSe ] :EVM:FILTer:REFerence?
Alpha/BT	[ :SENSe ] :EVM:FILTer:ALPHa <real>
	[ :SENSe ] :EVM:FILTer:ALPHa?

### 2.3.1 Select Standard

`[[:SENSe]:RADio:STANdard W11A|W11B|WGDSss|WGOFdm|  
WGDofdm|W11N|W11J|W11P|W11AC`

Standard

Function

This command sets the WLAN standard.

Command

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

Parameter

<mode>	Standard of target signal
W11A	Analyzes as 802.11a signal
W11B	Analyzes as 802.11b signal
WGDSss	Analyzes as 802.11g (ERP-DSSS/CCK) signal
WGOFdm	Analyzes as 802.11g (ERP-OFDM) signal
WGDofdm	Analyzes as 802.11g (DSSS-OFDM) signal
W11N	Analyzes as 802.11n signal (default)
W11J	Analyzes as 802.11j signal
W11P	Analyzes as 802.11p signal
W11AC	Analyzes as 802.11ac signal

Example of Use

To select parameter that conforms to 802.11a.  
`RAD: STAN W11A`

**[[:SENSe]:RADio:STANdard?**

Standard Query

Function

This command queries the WLAN standard of the measured signal.

Query

`[[:SENSe]:RADio:STANdard?`

Response

`<mode>`

Parameter

<code>&lt;mode&gt;</code>	Standard of target signal
<code>W11A</code>	Analyzes as 802.11a signal
<code>WGDS</code>	Analyzes as 802.11g (ERP-DSSS/CCK) signal
<code>WGOF</code>	Analyzes as 802.11g (ERP-OFDM) signal
<code>WGD</code>	Analyzes as 802.11g (DSSS-OFDM) signal
<code>W11N</code>	Analyze as 802.11n signal
<code>W11J</code>	Analyzes as 802.11j signal
<code>W11P</code>	Analyzes as 802.11p signal
<code>W11AC</code>	Analyzes as 802.11ac signal

Example of Use

To query the WLAN standard setting.

```
RAD:STAN?
> W11A
```

### 2.3.2 Measuring Object

#### `[:SENSe]:RADio:MOBJect BURSt|CONTInuous`

Measuring Object

Function

This command sets the signals to be measured.

Command

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

Parameter

<code>&lt;mode&gt;</code>	Signals to be measured
<code>BURSt</code>	Sets burst signals, based on the various standards, as the target. (Default)
<code>CONTInuous</code>	Sets continuous signals, based on various standards, as the target.

Detail

Only Burst is available when the standard is 802.11ac.

Example of Use

To set the burst signals as the target.  
`RAD:MOBJ BURSt`

#### `[:SENSe]:RADio:MOBJect?`

Measuring Object Query

Function

This command queries the signals to be measured.

Query

```
[ :SENSe ] :RADio :MOBJect?
```

Response

```
<mode>
```

Parameter

<code>&lt;mode&gt;</code>	Signals to be measured
<code>BURSt</code>	Sets burst signals, based on various standards, as the target.
<code>CONT</code>	Sets continuous signals, based on various standards, as the target.

Example of Use



To query the signals to be measured.

```
RAD:MOBJ?
```

```
> BURS
```

### 2.3.3 PPDU Format

`[[:SENSe]:EVM:PFORmat NONHt|MIXed|GREenfield`

PPDU Format

Function

This command sets the PPDU format when the WLAN communication standard is set to 802.11n.

Command

```
[[:SENSe]:EVM:PFORmat <mode>
```

Parameter

<mode>	PPDU format
NONHt	Analyze as Non-HT
MIXed	Analyze as HT-Mixed (Default)
GREenfield	Analyze as HT-Greenfield
VHT	Analyze as VHT

Details

Non-HT, HT-Mixed, and HT-Greenfield are selectable for 802.11n. The format is fixed to VHT for 802.11ac and HT-Mixed for others.

This command is not available when Measuring Object is Continuous.

You cannot set to Non-HT when Channel Bandwidth is 40MHz (Upper) or 40MHz (Lower).

If changed to Non-HT when Channel Bandwidth is 40MHz (Upper) or 40MHz (Lower), HT-Mixed is automatically specified.

Example of Use

To set the PPDU format to HT-Mixed.

```
EVM:PFOR MIX
```

**[[:SENSE]:EVM:PFORmat?**

PPDU Format Query

## Function

This command queries the PPDU format setting.

## Query

[:SENSE]:EVM:PFORmat?

## Response

&lt;mode&gt;

## Parameter

<mode>	PPDU format
NONH	Analyze as Non-HT
MIX	Analyze as HT-Mixed
GRE	Analyze as HT-Greenfield
VHT	Analyze as VHT

## Example of Use

To query the PPDU format setting.

EVM:PFOR?

&gt; MIX

**2.3.4 Channel Bandwidth****[[:SENSE]:EVM:CBANDwidth 5|10|20|40|40UPper|40Lower|80|160**

Channel Bandwidth

## Function

This command sets the Channel Bandwidth when the WLAN standard is set to 802.11j, 802.11p, 802.11n, or 802.11ac.

## Command

[:SENSE]:EVM:CBANDwidth &lt;mode&gt;

## Parameter

When Standard is 802.11n:

<mode>	Channel Bandwidth
20	Analyzes as 20MHz (Default)
40	Analyzes as 40MHz
40UPper	Analyzes as 40 MHz Upper
40Lower	Analyzes as 40 MHz Lower

When Standard is 802.11j, 802.11p:

<mode>	Channel Bandwidth
5	Analyzes as 5MHz
10	Analyzes as 10MHz

20	Analyzes as 20MHz (Default)
When Standard is 802.11ac	
<mode>	Channel Bandwidth
20	Analyzes as 20MHz (Default)
40	Analyzes as 40MHz
80	Analyzes as 80MHz
160	Analyzes as 160MHz

#### Details

This setting is not available in the following case(s).

- When the selected Standard is 802.11a, 802.11b, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), or 802.11g (ERP-DSSS/CCK)

Automatically set to 10 MHz when Standard is changed to 802.11j or 802.11p.

Automatically set to 20 MHz when Standard is changed to 802.11n.  
Cannot be set to 40Upper or 40Lower when Measuring Object is Continuous.

Automatically set to 20 MHz when Measuring Object is changed to Continuous.

Automatically set to 20 MHz when Standard is changed to 802.11ac.  
80MHz is selectable only for the MS269xA or MS2830A with broadband analysis hardware installed. 160MHz is selectable only for the MS269xA with broadband analysis hardware installed.

#### Example of Use

To set Channel Bandwidth to 20 MHz.

```
EVM:CBAN 20
```

**[[:SENSe]:EVM:CBANdwidth?**

Channel Bandwidth Query

## Function

This command queries the setting of the Channel Bandwidth function.

## Query

[:SENSe]:EVM:CBANdwidth?

## Response

&lt;mode&gt;

## Parameter

When Standard is 802.11n:

<mode>	Channel Bandwidth
20	Analyzes as 20MHz
40	Analyzes as 40MHz
40UP	Analyzes as 40 MHz Upper
40L	Analyzes as 40 MHz Lower

When Standard is 802.11j, 802.11p:

<mode>	Channel Bandwidth
5	Analyzes as 5MHz
10	Analyzes as 10MHz
20	Analyzes as 20MHz

When Standard is 802.11ac:

<mode>	Channel Bandwidth
20	Analyzes as 20MHz (Default)
40	Analyzes as 40MHz
80	Analyzes as 80MHz
160	Analyzes as 160MHz

## Example of Use

To query the Channel Bandwidth setting.

```
EVM:CBAN?
> 20
```

### 2.3.5 Burst Interval

`[[:SENSE]:CAPTURE:BURST:INTERVAL <time>`

Burst Interval

Function

This command sets the burst interval.

Command

`[[:SENSE]:CAPTURE:BURST:INTERVAL <time>`

Parameter

<code>&lt;time&gt;</code>	Burst interval
Range	0.3 ms to 250 ms, or Capture Time Length/2, whichever smaller. (When Standard is 802.11ac and Channel Bandwidth is 80MHz or 160MHz) 0.3 ms to 1000 ms, or Capture Time Length/2, whichever smaller. (Others)
Resolution	0.1 ms
Suffix code	NS, US, MS, S S is used when the suffix code is omitted.
Default	10 ms

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous

Example of Use

To set the burst interval to 5 ms.

`CAPT:BURST:INT 5MS`

## [ :SENSe ] :CAPTure :BURSt :INTerval ?

Burst Interval Query

Function

This command queries the burst interval setting.

Query

```
[ :SENSe ] :CAPTure :BURSt :INTerval ?
```

Response

```
<time>
```

Parameter

Refer to the Burst Interval page.

Resolution      0.1 ms

Value is returned in s units.

Example of Use

To query the burst interval.

```
CAPT :BURSt :INT ?
```

```
> 0.0050
```

### 2.3.6 Burst Threshold

`[[:SENSE]:CAPTURE:BURSt:THReshold <integer>`

Burst Threshold

Function

This command sets the threshold for burst detection.

Command

`[[:SENSE]:CAPTURE:BURSt:THReshold <integer>`

Parameter

<code>&lt;integer&gt;</code>	Threshold for burst detection
Range	0 to 60 dB
Resolution	1 dB
Default	30 dB

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous

Example of Use

To set the threshold to 30 dB.  
`CAPT:BURS:THR 30`

`[[:SENSE]:CAPTURE:BURSt:THReshold?`

Burst Threshold Query

Function

This command queries threshold setting for burst detection.

Query

`[[:SENSE]:CAPTURE:BURSt:THReshold?`

Response

`<integer>`

Parameter

<code>&lt;integer&gt;</code>	Threshold for burst detection
Range	0 to 60 dB
Resolution	1 dB

Example of Use

To query the threshold setting.  
`CAPT:BURS:THR?`  
> 30



### 2.3.7 Analysis Length, Analysis Offset

`[[:SENSE]:EVM:TIME:LENGTH[:STATE]:AUTO OFF|ON|0|1`

Analysis Length Setup

Function

This command enables or disables the automatic setting of the analysis length.

Command

`[[:SENSE]:EVM:TIME:LENGTH[:STATE]:AUTO <switch>`

Parameter

<code>&lt;switch&gt;</code>	Analysis Length Setup On/Off
<code>OFF 0</code>	Manual setting
<code>ON 1</code>	Automatic setting (Default)

Details

This command is not available when Measuring Object is Continuous.

When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK), this is not available if Target Field is set to Preamble.

Example of Use

To enable the automatic setting of the analysis length.  
`EVM:TIME:LENG:AUTO ON`

`[[:SENSE]:EVM:TIME:LENGTH[:STATE]:AUTO?`

Analysis Length Setup Query

Function

This command queries whether the automatic setting of the analysis length is enabled.

Query

`[[:SENSE]:EVM:TIME:LENGTH[:STATE]:AUTO?`

Response

`<switch>`

Parameter

<code>&lt;switch&gt;</code>	Analysis Length Setup
<code>0</code>	Manual setting
<code>1</code>	Automatic setting

Example of Use

To query the settings of Analysis Length Setup.  
`EVM:TIME:LENG:AUTO?`  
`> 1`

## [[:SENSE]:EVM:TIME:LENGth <integer>

Analysis Length

Function

This command sets the analysis time length of EVM measurement.

Command

```
[[:SENSE]:EVM:TIME:LENGth <integer>
```

Parameter

When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j, or 802.11p:

<integer>	Number of analyzed symbols
Range	2 to (1367 - Analysis Offset) or (The maximum number of symbols in the Burst Interval (*) - Analysis Offset), whichever smaller
Resolution	1
Default	10

When Standard is 802.11b or 802.11g (ERP-DSSS/CCK) and Target Field is PSDU:

<integer>	Number of analyzed chips
Range	11 to (22000 - Analysis Offset) or (The maximum number of chips in the Burst Interval (*) - Analysis Offset), whichever smaller
Resolution	1
Default	1000

When Standard is 802.11n or 802.11ac:

<integer>	Number of analyzed symbols
Range	2 to (5000 - Analysis Offset) or (The maximum number of symbols in the Burst Interval (*) - Analysis Offset), whichever smaller
Resolution	1
Default	10

Details

This setting is not available when the selected WLAN standard is 802.11b or 802.11g (ERP-DSSS/CCK) and Target Field is set to Preamble.

This setting is not available when Analysis Length Setup is set to Auto.

When Standard is changed, if this setting falls out of range, it is set to the maximum value.

The value depends on the Burst Interval setting. (The maximum value will be the maximum number of symbols (chips) within the Burst Interval setting. )

- \* The maximum number of symbols (chips) within the Burst Interval setting will be the following value.

$$((\text{Burst Interval} * 10e3) - T_{\text{preamble}}) / L_{\text{dataunit}}$$

Here, Burst Interval is used in the unit of ms.  $T_{\text{preamble}}$  and  $L_{\text{dataunit}}$  will take the following values.

When using 802.11a, 802.11g (ERP-OFDM), 802.11j (Channel Bandwidth = 20 MHz) or 802.11p (Channel Bandwidth = 20 MHz):  $T_{\text{preamble}} = 20 \mu\text{s}$ ,  $L_{\text{dataunit}} = 4 \mu\text{s}$ .

When using 802.11j (Channel Bandwidth = 10 MHz) or 802.11p (Channel Bandwidth = 10 MHz):  $T_{\text{preamble}} = 40 \mu\text{s}$ ,  $L_{\text{dataunit}} = 8 \mu\text{s}$ .

When using 802.11j (Channel Bandwidth = 5 MHz) or 802.11p (Channel Bandwidth = 5 MHz):  $T_{\text{preamble}} = 80 \mu\text{s}$ ,  $L_{\text{dataunit}} = 16 \mu\text{s}$ .

When using 802.11b or 802.11g (ERP-DSSS/CCK):  $T_{\text{preamble}} = 192 \mu\text{s}$ ,  $L_{\text{dataunit}} = 0.0909 \mu\text{s}$ .

When using 802.11g (DSSS-OFDM):  $T_{\text{preamble}} = 204 \mu\text{s}$ ,  $L_{\text{dataunit}} = 4 \mu\text{s}$ .

When using 802.11n (other than Non-HT):  $T_{\text{preamble}} = 48 \mu\text{s}$ ,  $L_{\text{dataunit}} = 4 \mu\text{s}$ .

When using 802.11n (Non-HT):  $T_{\text{preamble}} = 20 \mu\text{s}$ ,  $L_{\text{dataunit}} = 4 \mu\text{s}$ .

When using 802.11ac :  $T_{\text{preamble}} = 40 \mu\text{s}$ ,  $L_{\text{dataunit}} = 4 \mu\text{s}$

#### Example of Use

To set the EVM analysis time length to 10.

```
EVM:TIME:LENG 10
```

## [[:SENSe]:EVM:TIME:LENGth?

Analysis Length Query

Function

This command queries the analysis time length of EVM measurement.

Query

```
[[:SENSe]:EVM:TIME:LENGth?
```

Response

```
<integer>
```

Parameter

Refer to the Analysis Length page.

Example of Use

```
To query the analysis time length of EVM measurement.  
EVM:TIME:LENG?  
> 10
```

## [[:SENSe]:EVM:TIME:OFFSet <integer>

Analysis Offset

Function

This command sets the offset of the EVM analysis range.

Command

```
[[:SENSe]:EVM:TIME:OFFSet <integer>
```

Parameter

When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j, or 802.11p:

<integer>	Number of analyzed symbols
Range	0 to (1367 or the maximum number of symbols in the Burst Interval (*), whichever smaller) - 2
Resolution	1
Default	0

When Standard is 802.11b or 802.11g (ERP-DSSS/CCK) and Target Field is PSDU:

<integer>	Number of analyzed chips
Range	0 to (220000 or the maximum number of chips in the Burst Interval (*), whichever smaller) - 11
Resolution	1
Default	0

When Standard is 802.11b or 802.11g (ERP-DSSS/CCK) and Target Field is Preamble:

<integer>	Number of analyzed chips
Range	0 to (1300 or the maximum number of chips in the Burst Interval (*), whichever smaller) - 11
Resolution	1
Default	0

When Standard is 802.11n or 802.11ac:

<integer>	Number of analyzed symbols
Range	0 to (5000 or the maximum number of symbols in the Burst Interval (*), whichever smaller) - 2
Resolution	1
Default	0

#### Details

If Target Field is Preamble, this setting is based on the start of the PLCP preamble. If Target Field is PSDU, this setting is based on the start of the PSDU.

When Standard is changed, if this setting falls out of range, it is set to the maximum value.

This setting is fixed to 0 s when Measuring Object is Continuous.

\* For details on the maximum number of symbols (chips) in Burst Interval, refer to the Analysis Length page.

#### Example of Use

To set the offset of the EVM analysis range to 10 symbols.  
EVM:TIME:OFFS 10

## `[ :SENSe ] :EVM :TIME :OFFSet ?`

Analysis Offset Query

Function

This command queries the offset of the EVM analysis range.

Query

```
[ :SENSe ] :EVM :TIME :OFFSet ?
```

Response

<integer>

Parameter

Refer to the Analysis Offset page.

Example of Use

```
To query the offset of the EVM analysis range.  
EVM :TIME :OFFS ?  
> 10
```

### 2.3.8 Data Rate

[[:SENSE]:EVM:DRATE

AUTO|1MBPs|1M5Bps|2M25bps|2MBPs|3MBPs|4M5Bps|5M5Bps|6MBPs|9MBPs|11MBPs|12MBps|13M5bps|18MBPs|24MBps|27MBps|36MBps|48MBps|54MBps

Data Rate

Function

This command sets the modulation method for the target of analysis.

Command

[[:SENSE]:EVM:DRATE <mode>

Parameter

<mode> Modulation method for target signal

When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j (Channel Bandwidth = 20 MHz), 802.11p (Channel Bandwidth = 20 MHz), or 802.11n (Channel Bandwidth = 20 MHz or 40 MHz), and PPDU Format is Non-HT:

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
6MBPs	BPSK 6Mbps
9MBPs	BPSK 9Mbps
12MBps	QPSK 12Mbps
18MBps	QPSK 18Mbps
24MBps	16QAM 24Mbps
36MBps	16QAM 36Mbps
48MBps	64QAM 48Mbps
54MBps	64QAM 54Mbps

When Standard is 802.11j (Channel Bandwidth = 10 MHz) or 802.11p (Channel Bandwidth = 10 MHz):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
3MBPs	BPSK 3Mbps
4M5Bps	BPSK 4.5Mbps
6MBPs	QPSK 6Mbps
9MBPs	QPSK 9Mbps
12MBps	16QAM 12Mbps
18MBps	16QAM 18Mbps
24MBps	64QAM 24Mbps
27MBps	64QAM 27Mbps

When Standard is 802.11j (Channel Bandwidth = 5 MHz) or 802.11p (Channel Bandwidth = 5 MHz):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
1M5Bps	BPSK 1.5Mbps
2M25bps	BPSK 2.25Mbps
3MBPs	QPSK 3Mbps
4M5Bps	QPSK 4.5Mbps
6MBPs	16QAM 6Mbps
9MBPs	16QAM 9Mbps
12MBps	64QAM 12Mbps
13M5bps	64QAM 13.5Mbps

When Standard is 802.11b or 802.11g (ERP-DSSS/CCK):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
1MBPs	DBPSK 1Mbps
2MBPs	DQPSK 2Mbps
5M5Bps	CCK 5.5Mbps
11MBps	CCK 11Mbps



Details

This setting is not available in the following case(s).

- When the selected Standard is 802.11n, and PPDU Format is set to HT-Mixed or HT-Greenfield.
- When the selected Standard is 802.11ac

The Auto setting is not available in the following case(s).

- When Measuring Object is set to Continuous

When this setting is set to Auto, and the Measuring Object is changed to Continuous, Data Rate (Modulation) will be automatically set to the value listed in the bottom of the relevant table.

If Standard is changed when Measuring Object is set to Burst, this setting will be automatically set to Auto.

If Standard is changed when Measuring Object is set to Continuous, this setting will be automatically set to the value listed in the bottom of the relevant table.

Example of Use

To set Data Rate to AUTO.  
EVM:DRAT AUTO

## [[:SENSe]:EVM:DRATE?

Data Rate Query

Function

This command queries the modulation method setting.

Query

[[:SENSe]:EVM:DRATE?

Response

<mode>

Parameter

<mode> Modulation method for target signal

When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j (Channel Bandwidth = 20 MHz), 802.11p (Channel Bandwidth = 20 MHz), or 802.11n (Channel Bandwidth = 20 MHz or 40 MHz), and PPDU Format is Non-HT:

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
6MBP	BPSK 6Mbps
9MBP	BPSK 9Mbps
12MB	QPSK 12Mbps
18MB	QPSK 18Mbps
24MB	16QAM 24Mbps
36MB	16QAM 36Mbps
48MB	64QAM 48Mbps
54MB	64QAM 54Mbps

When Standard is 802.11j (Channel Bandwidth = 10 MHz) or 802.11p (Channel Bandwidth = 10 MHz):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
3MBP	BPSK 3Mbps
4M5B	BPSK 4.5Mbps
6MBP	QPSK 6Mbps
9MBP	QPSK 9Mbps
12MB	16QAM 12Mbps
18MB	16QAM 18Mbps
24MB	64QAM 24Mbps
27MB	64QAM 27Mbps

When Standard is 802.11j (Channel Bandwidth = 5 MHz) or 802.11p (Channel Bandwidth = 5 MHz):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
1M5B	BPSK 1.5Mbps
2M25	BPSK 2.25Mbps
3MBP	QPSK 3Mbps
4M5B	QPSK 4.5Mbps
6MBP	16QAM 6Mbps
9MBP	16QAM 9Mbps
12MB	64QAM 12Mbps
13M5	64QAM 13.5Mbps

When Standard is 802.11b or 802.11g (ERP-DSSS/CCK):

Parameter	Modulation Mode to Analyze
AUTO	Auto Analysis (Default)
1MBP	DBPSK 1Mbps
2MBP	DQPSK 2Mbps
5M5B	CCK 5.5Mbps
11MB	CCK 11Mbps

Example of Use

To query the Data Rate setting of the measured signal.  
 EVM:DRAT?  
 > AUTO

### 2.3.9 MCS

`[[:SENSe]:EVM:MCS[:STATe]:AUTO OFF|ON|0|1`

MCS Setup

Function

This command enables/disables automatic setting of MCS (Modulation and Coding Scheme) for the measurement target signal.

Command

`[[:SENSe]:EVM:MCS[:STATe]:AUTO <switch>`

Parameter

<code>&lt;switch&gt;</code>	MCS On/Off
<code>OFF 0</code>	Manual setting
<code>ON 1</code>	Automatic setting (Default)

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When the selected Standard is 802.11n, and PPDU Format is set to the value other than HT-Mixed or HT-Greenfield.

Example of Use

To enable the automatic setting of MCS.

`EVM:MCS:AUTO ON`

**[[:SENSE]:EVM:MCS[:STATE]:AUTO?**

MCS Query

Function

This command queries the On/Off setting for automatic setting of MCS (Modulation and Coding Scheme) for the measurement target signal.

Query

```
[[:SENSE]:EVM:MCS[:STATE]:AUTO?
```

Response

```
<switch>
```

Parameter

<switch>	MCS
0	Manual setting
1	Automatic setting

Example of Use

To query the On/Off setting of MCS automatic setting.

```
EVM:MCS:AUTO?
> 1
```

**[[:SENSe]:EVM:MCS <integer>**

MCS Index

Function

This command sets the MCS Index.

Command

[[:SENSe]:EVM:MCS <integer>

Parameter

<integer> MCS Index  
 When Standard is 802.11n:  
     Range 0 to 76  
     Default 0

**Table 2.3.9-1 Transmitted Streams and Used Modulation Method for MCS Index**

MCS Index	Bandwidth	Transmitted streams	Modulation method
0 to 7	20M/40M	1	—
8 to 15	20M/40M	2	Same between different streams
16 to 23	20M/40M	3	Same between different streams
24 to 31	20M/40M	4	Same between different streams
32	40M	1	—
33 to 38	20M/40M	2	Different between different streams
39 to 52	20M/40M	3	Different between different streams
53 to 76	20M/40M	4	Different between different streams

When Standard is 802.11ac:  
     Range 0 to 9  
     Default 0

Details

Only 0 to 7 is available when Standard is 802.11n and Measuring Object is Continuous.

When Standard is 802.11ac, the setting range of MCS Index depends on the channel bandwidth and number of spatial stream.

**Table 2.3.9-2 Setting Range According to the MCS Index Setting  
(When Standard is 802.11ac .)**

Number of Spatial Stream	Channel Bandwidth			
	20MHz	40MHz	80MHz	160MHz
1	0 to 8	0 to 9	0 to 9	0 to 9
2	0 to 8	0 to 9	0 to 9	0 to 9
3	0 to 9	0 to 9	0 to 5, 7 to 9	0 to 8
4	0 to 8	0 to 9	0 to 9	0 to 9
5	0 to 8	0 to 9	0 to 9	0 to 9
6	0 to 9	0 to 9	0 to 8	0 to 9
7	0 to 8	0 to 9	0 to 5, 7 to 9	0 to 9
8	0 to 8	0 to 9	0 to 9	0 to 9

#### Example of Use

To set MCS Index to 0.  
EVM:MCS 0

## [[:SENSe]:EVM:MCS?

MCS Index Query

Function

This command queries the setting of MCS Index.

Query

```
[[:SENSe]:EVM:MCS?
```

Response

```
<integer>
```

Parameter

```
<integer>
```

MCS Index

Range

0 to 76 (When Standard is 802.11n)

0 to 9 (When Standard is 802.11ac)

Default

0

Example of Use

To query the setting of MCS Index.

```
EVM:MCS?
```

```
> 0
```



### 2.3.10 Stream ID

`[:SENSe]:EVM:SID AUTO|1|2|3|4`

Stream ID

Function

This command sets the Stream ID.

Command

`[:SENSe]:EVM:SID <mode>`

Parameter

<mode> Stream ID

**Table 2.3.10-1 Setting Range According to the MCS Index Setting (When Standard is 802.11n)**

MCS Index	Setting range
0 to 7	Auto / 1
8 to 15	Auto / 1 / 2
16 to 23	Auto / 1 / 2 / 3
24 to 31	Auto / 1 / 2 / 3 / 4
32	Auto / 1
33 to 38	Auto / 1 / 2
39 to 52	Auto / 1 / 2 / 3
53 to 76	Auto / 1 / 2 / 3 / 4

**Table 2.3.10-2 Setting Range According to the MCS Index Setting (When Standard is 802.11ac)**

Number of Spatial Stream	設定範囲
1	Auto / 1
2	Auto / 1 / 2
3	Auto / 1 / 2 / 3
4	Auto / 1 / 2 / 3 / 4
5	Auto / 1 / 2 / 3 / 4 / 5
6	Auto / 1 / 2 / 3 / 4 / 5 / 6
7	Auto / 1 / 2 / 3 / 4 / 5 / 6 / 7
8	Auto / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8

Details

Not available when Standard is 802.11n and MCS is Auto, or when Standard is 802.11ac and Number of Spatial Stream is Auto. (Stream ID is forcibly set to Auto.)

When this setting is set to Auto, and the Measuring Object is changed to Continuous, Stream ID will be automatically set to 1.

Example of Use

To set Stream ID to 1.  
EVM:SID 1

## [ :SENSe ] :EVM :SID ?

Stream ID Query

Function

This command queries the setting of Stream ID.

Query

```
[ :SENSe ] :EVM :SID ?
```

Response

```
<mode> Stream ID
```

Parameter

```
<mode>
```

Refer to table 2.3-2.

Example of Use

```
To query the setting of Stream ID.  
EVM :SID ?  
> 1
```

### 2.3.11 Number of Spatial Stream

**[[:SENSE]:SSTReam:NUMBer AUTO|1|2|3|4|5|6|7|8**

Number of Spatial Stream

Function

This command sets Number of Spatial Stream.

Command

[[:SENSE]:SSTReam:NUMBer <mode>

Parameter

<mode>	Number of Spatial Stream
Range	Auto, 1to8
Default	Auto

Details

This setting is not available, when Standard is not 802.11ac.

This setting is not available when MCS is set to Auto. (Number of Spatial Stream is forcibly set to Auto.)

Example of Use

To set Number of Spatial Stream to Auto.  
SSTR:NUMB AUTO

**[[:SENSE]:SSTReam:NUMBer?**

Number of Spatial Stream Query

Function

This command queries the Number of Spatial Stream setting.

Query

[[:SENSE]:SSTReam:NUMBer?

Response

<mode>

Parameter

<mode>	Number of Spatial Stream
--------	--------------------------

Example of Use

To query the Number of Spatial Stream setting.  
SSTR:NUMB?  
> 1

### 2.3.12 Preamble

`[[:SENSe]:EVM:PREamble AUTO|LONG|SHORT`

Preamble

Function

This command sets the preamble format.

Command

`[[:SENSe]:EVM:PREamble <mode>`

Parameter

<mode>	Preamble format
AUTO	Analyzes using the auto-detected preamble format. (Default)
LONG	Analyzes as the long frame format.
SHORT	Analyzes as the short frame format.

Details

This setting is not available in the following case(s).

- When the selected Standard is other than 802.11b, 802.11g (ERP-DSSS/CCK), or 802.11g (DSSS-OFDM)
- When Measuring Object is set to Continuous

Example of Use

To set the preamble format to the long frame format.

`EVM:PRE LONG`

## [:SENSe]:EVM:PREAmble?

Preamble Query

Function

This command queries the preamble format setting.

Query

```
[ :SENSe ] :EVM:PREAmble?
```

Response

```
<mode>
```

Parameter

<mode>	Preamble format
AUTO	Analyzes using the auto-detected preamble format.
LONG	Analyzes as the long frame format.
SHOR	Analyzes as the short frame format.

Example of Use

```
To query the preamble format setting.  
EVM:PRE?  
> LONG
```

### 2.3.13 Guard Interval

`[[:SENSE]:EVM:GI AUTO|LONG|SHORT`

Guard Interval

Function

This command sets the guard interval.

Command

`[[:SENSE]:EVM:GI <mode>`

Parameter

<code>&lt;mode&gt;</code>	Guard interval type
<code>AUTO</code>	Analyzes using the auto-detected guard interval. (Default)
<code>LONG</code>	Analyzes as the long guard interval.
<code>SHORT</code>	Analyzes as the short guard interval.

Details

This setting is not available in the following case(s).

- When Standard is 802.11n and PPDU Format is set to HT-Mixed or HT-Greenfield or when Standard is other than 802.11ac.
- When Measuring Object is set to Continuous  
When this setting is set to Auto, if Measuring Object is changed to Continuous, the guard interval will be automatically set to Long.

Example of Use

To set the guard interval to Long.  
`EVM:GI LONG`

## [[:SENSe]:EVM:GI?

Guard Interval Query

Function

This command queries the setting of the guard interval.

Query

```
[[:SENSe]:EVM:GI?
```

Response

```
<mode>
```

Parameter

<mode>	Guard interval type
AUTO	Analyzes using the auto-detected guard interval.
LONG	Analyzes as the long guard interval.
SHOR	Analyzes as the short guard interval.

Example of Use

```
To query the guard interval setting.  
EVM:GI?  
> LONG
```



### 2.3.14 EVM Calculation Method

#### [ :SENSe]:EVM:CMETHod STD1999|STD2007

EVM Calculation Method

##### Function

This command sets the EVM calculation method.

##### Command

```
[ :SENSe] :EVM:CMETHod <mode>
```

##### Parameter

<mode>	EVM calculation method
STD1999	Calculates EVM based on IEEE Std 802.11-1999
STD2007	Calculates EVM based on IEEE Std 802.11-2007 (Default)

##### Details

This setting is not available in the following case(s).

- When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK)

##### Example of Use

To set the EVM calculation method to IEEE Std 802.11-2007 version.  
 EVM:CMET STD2007

#### [ :SENSe]:EVM:CMETHod?

EVM Calculation Method Query

##### Function

This command queries the EVM calculation method.

##### Query

```
[ :SENSe] :EVM:CMETHod?
```

##### Response

```
<mode>
```

##### Parameter

<mode>	EVM calculation method
STD1999	Calculates EVM based on IEEE Std 802. 11-1999
STD2007	Calculates EVM based on IEEE Std 802.11-2007.

##### Example of Use

To query the EVM calculation method.  
 EVM:CMET?  
 > STD2007

### 2.3.15 Target Field

#### [ :SENSe ] :EVM :TFIeld PSDU|PREamble

Target Field

Function

This command sets the EVM calculation target.

Command

```
[ :SENSe ] :EVM :TFIeld <mode>
```

Parameter

<mode>	EVM calculation target
PSDU	EVM calculation is executed for the PSDU after the preamble. (Default)
PREamble	EVM calculation is executed for 1,000 chips of the preamble.

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK)

Example of Use

To set the EVM calculation target to PSDU.

```
EVM :TFI PSDU
```

**[[:SENSe]:EVM:TField?**

Target Field Query

## Function

This command queries the EVM calculation target.

## Query

`[[:SENSe]:EVM:TField?`

## Response

`<mode>`

## Parameter

`<mode>`

EVM Calculation target

`PSDU`

EVM calculation is executed for the PSDU after the preamble.

`PRE`

EVM calculation is executed for 1,000 chips of the preamble.

## Example of Use

To query the EVM calculation target.

`EVM:TField?``> PSDU`

## 2.3.16 Channel Estimation

### `[[:SENSE]:EVM:EQUalizer:TRAIning SEQ|SDATa`

Channel Estimation

Function

This command sets the target of channel estimation.

Command

```
[[:SENSE]:EVM:EQUalizer:TRAIning <mode>
```

Parameter

<mode>	Target of channel estimation
SEQ	Specifies long training sequences as the target. (Default)
SDATa	Specifies all packets as the target.

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)

Example of Use

To set the target of channel estimation to long training.  
`EVM:EQU:TRA SEQ`

### `[[:SENSE]:EVM:EQUalizer:TRAIning?`

Channel Estimation Query

Function

This command queries the target setting of channel estimation.

Query

```
[[:SENSE]:EVM:EQUalizer:TRAIning?
```

Response

```
<mode>
```

Parameter

<mode>	Target of channel estimation
SEQ	Specifies long training sequences as the target.
SDAT	Specifies all packets as the target.

Example of Use

To query the target setting of channel estimation.  
`EVM:EQU:TRA?`  
> SEQ

### 2.3.17 Tracking

`[[:SENSE]:EVM:TRACk:AMP OFF|ON|0|1`

Amplitude Tracking

Function

Enables or disables amplitude tracking.

Command

`[[:SENSE]:EVM:TRACk:AMP <switch>`

Parameter

<code>&lt;switch&gt;</code>	Enable/disable setting of the amplitude tracking function
<code>OFF 0</code>	Disabled (Default)
<code>ON 1</code>	Enabled

Details

This setting is not available in the following case(s).

- When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)

Example of Use

To enable the amplitude tracking function.

`EVM:TRAC:AMP ON`

`[[:SENSE]:EVM:TRACk:AMP?`

Amplitude Tracking Query

Function

Queries the enables/disable setting of amplitude tracking.

Query

`[[:SENSE]:EVM:TRACk:AMP?`

Response

`<switch>`

Parameter

<code>&lt;switch&gt;</code>	Enable/disable setting of the amplitude tracking function
<code>0</code>	Disabled
<code>1</code>	Enabled

Example of Use

To query the enable/disable setting of amplitude tracking

`EVM:TRAC:AMP?`

`> 1`

## [[:SENSE]:EVM:TRACk:PHASe OFF|ON|0|1

Phase Tracking

Function

Enables or disables phase tracking.

Command

```
[[:SENSE]:EVM:TRACk:PHASe <switch>
```

Parameter

<switch>	Enable/disable setting of the phase tracking function
OFF 0	Disabled
ON 1	Enabled (Default)

Details

This setting is not available in the following case(s).

- When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)

Example of Use

To enable the phase tracking function.  
EVM:TRAC:PHAS ON

## [[:SENSE]:EVM:TRACk:PHASe?

Phase Tracking Query

Function

Queries the enables/disable setting of phase tracking.

Query

```
[[:SENSE]:EVM:TRACk:PHASe?
```

Response

```
<switch>
```

Parameter

<switch>	Enable/disable setting of the phase tracking function
0	Disabled
1	Enabled

Example of Use

To query the enable/disable setting of phase tracking  
EVM:TRAC:PHAS?  
> 1

### 2.3.18 Symbol Timing Adjustment

`[[:SENSe]:EVM:TADJust <integer>`

Symbol Timing Adjustment

Function

Sets the timing of the FFT window during Modulation Analysis measurement.

Command

`[[:SENSe]:EVM:TADJust <integer>`

Parameter

`<integer>` Offset from the center of the guard interval  
Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p:

Range	-16 to 16
Resolution	1
Default	0

When Standard is 802.11n or 802.11ac and Guard Interval is set to Long:

Range	-16 to 16
Resolution	1
Default	0

When Standard is 802.11n or 802.11ac and Guard Interval is set to Short:

Range	-8 to 8
Resolution	1
Default	0

Details

This is not available when the selected Standard is 802.11n, and Guard Interval is set to Auto. (The setting is fixed to 0.)

This is not available when the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK).

Example of Use

To set the timing of the FFT window to an offset of 0 from the center of the guard interval.

`EVM:TADJ 0`

## [ :SENSe]:EVM:TADJust?

Symbol Timing Adjustment Query

### Function

This command queries the timing of the FFT window during Modulation Analysis.

### Query

[ :SENSe]:EVM:TADJust?

### Response

<integer>

### Parameter

<integer>	Offset from the center of the guard interval
Range	-16 to 16
Resolution	1

### Example of Use

To query the timing of the FFT window during EVM measurement.  
EVM:TADJ?  
> 0



### 2.3.19 Filter

`[[:SENSE]:EVM:FILTer:REFErence NONE|GAUSSian|RCOSine`

Filter Type

Function

This command sets the filter type to be used for EVM calculation.

Command

```
[[:SENSE]:EVM:FILTer:REFErence <mode>
```

Parameter

<mode>	Filter type
NONE	No filter
GAUSSian	Gaussian filter (Default)
RCOSine	Root Nyquist filter

Details

This setting is not available in the following case(s).

- When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK)

Example of Use

To set the filter type to the Gaussian filter.

```
EVM:FILT:REF GAUS
```

`[[:SENSE]:EVM:FILTer:REFErence?`

Filter Type Query

Function

This command queries the filter used for EVM calculation.

Query

```
[[:SENSE]:EVM:FILTer:REFErence?
```

Response

```
<mode>
```

Parameter

<mode>	Filter type
NONE	No filter
GAUS	Gaussian filter
RCOS	Root Nyquist filter

Example of Use

To query the filter type setting.

```
EVM:FILT:REF?
> GAUS
```

## `[[:SENSe]:EVM:FILTer:ALPHa <real>`

Alpha/BT

Function

This command sets the alpha value of the Root Nyquist filter or the BT product of the Gaussian filter.

Command

```
[[:SENSe]:EVM:FILTer:ALPHa <real>
```

Parameter

<code>&lt;real&gt;</code>	Alpha value or BT product
Range	0.3 to 1.0
Resolution	0.1
Default	0.5

Details

This setting is not available in the following case(s).

- When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK)
- When Filter Type is other than Gaussian or Root Nyquist

Example of Use

To set the BT product to 0.5.  
`EVM:FILT:ALPH 0.5`

## `[[:SENSe]:EVM:FILTer:ALPHa?`

Alpha/BT Query

Function

This command queries the alpha value of the Root Nyquist filter or the BT product of the Gaussian filter.

Query

```
[[:SENSe]:EVM:FILTer:ALPHa?
```

Response

```
<real>
```

Parameter

<code>&lt;real&gt;</code>	Alpha value or BT product
Range	0.3 to 1.0
Resolution	0.1

Example of Use

To query the BT product.  
`EVM:FILT:ALPH?`  
`> 0.5`

## 2.4 Utility Function

Table 2.4-1 lists the device messages used for the utility function.

**Table 2.4-1 Device Messages for Utility Function**

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

### 2.4.1 Erase Warm Up Message

:DISPlay:ANNotation:WUP:ERASe

Erase Warm Up Message

Function

This command erases the warmup message displayed immediately after startup.

Command

:DISPlay:ANNotation:WUP:ERASe

Example of Use

To erase the warmup message  
DISP:ANN:WUP:ERAS

### 2.4.2 Display Title

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

Display Title

Function

This command turns the title on/off.

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

This command queries whether the title display is enabled/disabled.

## Query

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

## Response

`<switch>`

## Parameter

<code>&lt;switch&gt;</code>	Title display On/Off
0	Off
1	On

## Example of Use

To query the title display On/Off state.

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

### 2.4.3 Title Entry

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

Title Entry

Function

This command sets the title character string.

Command

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

Parameter

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

Example of Use

To set the title character string.  
DISP:ANN:TITL:DATA 'TEST'

**:DISPlay:ANNotation:TITLe:DATA?**

Title Entry Query

Function

This command queries the title character string.

Query

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

Response

```
<string>
```

Parameter

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

Example of Use

To query the title character string.  
DISP:ANN:TITL:DATA?  
> TEST

## 2.5 Common Measurement Function

Table 2.5-1 lists the device messages used for performing operations common to measurement functions.

**Table 2.5-1 Device Messages for Operations Common to Measurement Functions**

Function	Device Messages
Continuous Measurement	:INITiate:CONTinuous OFF ON 0 1
	:INITiate:CONTinuous?
	:INITiate:MODE:CONTinuous
Single Measurement	:INITiate:MODE:SINGLE
Initiate	:INITiate[:IMMediate]
Calculate	:INITiate:CALCulate
Configure Query	:CONFigure?
Save Captured Data	:MMEMory:STORe:IQData <filename>,<device>
Cancel Execute Save Captured Data	:MMEMory:STORe:IQData:CANCeL
Output Rate for Save Captured Data	:MMEMory:STORe:IQData:RATE <freq>
	:MMEMory:STORe:IQData:RATE?
Capture Time Auto/Manual	[ :SENSe]:SWEep:TIME:AUTO OFF ON 0 1
	[ :SENSe]:SWEep:TIME:AUTO?
Capture Time Length	[ :SENSe]:SWEep:TIME <time>
	[ :SENSe]:SWEep:TIME?
Trigger Switch	:TRIGger[:SEQuence][:STATe] OFF ON 0 1
	:TRIGger[:SEQuence][:STATe]?
Trigger Source	:TRIGger[:SEQuence]:SOURce EXTernal[1] IMMediate SG WIF
	:TRIGger[:SEQuence]:SOURce?
Trigger Slope	:TRIGger[:SEQuence]:SLOPe POSitive NEGative
	:TRIGger[:SEQuence]:SLOPe?
Trigger Delay	:TRIGger[:SEQuence]:DELay <time>
	:TRIGger[:SEQuence]:DELay?
Wide IF Trigger Level	:TRIGger[:SEQuence]:WIF :RFBurst:LEVel:ABSolute <ampl>
	:TRIGger[:SEQuence]:WIF :RFBurst:LEVel:ABSolute?

**Note:**

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

## 2.5.1 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
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
1	Continuous measurement mode

##### Example of Use

To query the measurement mode.  
INIT:CONT?  
> 0



## :INITiate:MODE:CONTinuous

Continuous Measurement

Function

This command sets continuous or single measurement mode.

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
```

## :INITiate:CALCulate

Calculate

Function

This command executes analysis without capturing waveforms. This command is used when executing analysis for the same captured waveform by changing parameters.

Command

:INITiate:CALCulate

Details

If a waveform is not captured or if a parameter that requires waveform recapturing is changed, the waveform is captured before analysis is executed.

Another command or query can be accepted even if this function is being executed. Note, however, if a command that requires waveform recapturing or trace recalculation is received, this function is stopped and the received command is executed.

To query the measurement results after executing this command, use the \*WAI command to control synchronization.

Note that synchronization control during the Continuous mode is not supported.

Example of Use

To start the measurement in the current measurement mode.

```
INIT:CALC
```

**:CONFigure?**

Configure Query

Function

This command queries the name of the current measurement mode.

Query

:CONFigure?

Response

&lt;mode&gt;

Parameter

<mode>	Measurement function
EVM	Modulation measurement
PVT	Power vs Time measurement
ACP	ACP measurement
OBW	OBW measurement
SEM	SEM measurement
SPUR	Spurious emission measurement

Example of Use

To query the current measurement function.

CONF?

&gt; EVM

## :MMEMory:STORe:IQData <filename>, <device>

Save Captured Data

### Function

This command saves the captured waveform data in a file.

### Command

```
:MMEMory:STORe:IQData <filename>,<device>
```

### Parameter

<filename>	Name of the file to be saved Specify a character string enclosed by single ( ' ) or double ( " ) quotation marks.
<device>	Name of the drive to be saved Drive name: D, E

### Details

This function is available when the waveform is captured under the following conditions:

- A single measurement is completed.

Files are saved to the following directory in the specified drive.  
\\Anritsu Corporation\\Signal Analyzer\\User Data\\Digitized  
Data\\WLAN

Up to 100 files can be saved in a folder.

This setting is not available in the following case(s).executed

- Standard is 802.11ac and Channel Bandwidth is 160MHz.

### Example of Use

To save waveform data into drive D using the file name "DATA".

```
MMEM:STOR:IQD "DATA",D
```

## :MMEMory:STORe:IQData:CANCel

Cancel Execute Save Captured Data

### Function

This command cancels the saving of a waveform data file.

### Command

```
:MMEMory:STORe:IQData:CANCel
```

### Example of Use

To cancel digitizing.

```
MMEM:STOR:IQD:CANC
```

**:MMEMory:STORe:IQData:RATE <freq>**

Output Rate for Save Captured Data

## Function

This command saves the output rate when executing Save Captured Data.

## Command

```
:MMEMory:STORe:IQData:RATE <freq>
```

## Parameter

<freq>	Output rate
Range	20.0000 to 50.0000 MHz
Resolution	100 Hz
Default	50.0000 MHz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ Hz is used when omitted.

## Example of Use

To set 30 MHz for the output rate.  

```
MMEM:STOR:IQD:RATE 30MHZ
```

**:MMEMory:STORe:IQData:RATE?**

Output Rate for Save Captured Data

## Function

This command queries the output rate when executing Save Captured Data.

## Query

```
:MMEMory:STORe:IQData:RATE?
```

## Response

```
<freq>
```

## Parameter

<freq>	Output rate
Range	20.0000 to 50.0000 MHz
	No suffix code. Value is returned in Hz units.

## Example of Use

To query the output rate.  

```
MMEM:STOR:IQD:RATE?  
> 30000000
```

## `[[:SENSE]:SWEep:TIME:AUTO OFF|ON|0|1`

Capture Time Auto/Manual

### Function

This command selects whether the waveform capture time (Capture Time) is automatically or manually specified.

### Command

`[[:SENSE]:SWEep:TIME:AUTO <switch>`

### Parameter

<code>&lt;switch&gt;</code>	Automatic/Manual setting of Capture Time
<code>ON 1</code>	Automatic setting (Default)
<code>OFF 0</code>	Manual setting

### Details

This command is not available when the Replay function is executed.

### Example of Use

To set the waveform capture time automatically.  
`SWE:TIME:AUTO ON`

## `[ :SENSe ] :SWEep :TIME :AUTO ?`

Capture Time Auto/Manual Query

### Function

This command queries whether the waveform capture time (Capture Time) is set automatically or manually.

### Query

```
[ :SENSe ] :SWEep :TIME :AUTO ?
```

### Response

```
<switch>
```

### Parameter

<code>&lt;switch&gt;</code>	Automatic/Manual setting of Capture Time
1	Automatic setting
0	Manual setting

### Example of Use

To query whether the waveform capture time is set automatically or manually.

```
SWE : TIME : AUTO ?  
> 1
```

## [ :SENSE]:SWEep:TIME <time>

Capture Time Length

### Function

This command sets the capture time of the waveform.

### Command

```
[ :SENSE]:SWEep:TIME <time>
```

### Parameter

<time>	Capture time
Range/Resolution	For details, refer to <i>MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)</i> or <i>MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)</i> .
Suffix code	NS, US, MS, S S is used when the suffix code is omitted.

### Details

The automatic mode is switched to the manual mode when the capture time is set.

This command is not available when the Replay function is executed.

### Example of Use

To set two seconds for the capture time.

```
SWE:TIME 2.000000000
```



**[[:SENSE]:SWEep:TIME?**

Capture Time Length Query

## Function

This command queries the capture time of the waveform.

## Query

[:SENSE]:SWEep:TIME?

## Response

&lt;time&gt;

## Parameter

&lt;time&gt;

Capture time

Range/Resolution

For details, refer to

*MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)* or *MS2830A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)*.

## Example of Use

To query the capture time of the waveform.

SWE:TIME?

&gt; 2

## 2.5.2 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

<code>&lt;switch&gt;</code>	Trigger wait state On/Off
<code>OFF 0</code>	Off (Default)
<code>ON 1</code>	On

Details

This command is not available when the Replay function is executed.

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

<code>&lt;switch&gt;</code>	Trigger wait state On/Off
<code>0</code>	Off
<code>1</code>	On

Example of Use

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

### 2.5.3 Trigger Source

`:TRIGger[:SEQuence]:SOURce EXTernal[1]|IMMEDIATE|SG|WIF`

Trigger Source

Function

This command selects the trigger signal source.

Command

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

Parameter

<code>&lt;mode&gt;</code>	Trigger signal source
<code>EXTernal[1]</code>	External input (External) (Default)
<code>IMMEDIATE</code>	Free run
<code>SG</code>	SG Marker
<code>WIF</code>	Wide IF

Details

SG marker trigger can be selected only when the Vector Signal Generator option is installed.

This command is not available when the Replay function is executed.

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

<mode>	Trigger signal source
EXT	External input (External)
IMM	Free run
SG	SG Marker
WIF	Wide IF

### Details

No response is returned when SG marker is selected but without Vector Signal Generator installed.

### Example of Use

To query the trigger signal source.

```
TRIG:SOUR?
```

```
> EXT
```

## 2.5.4 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.

Details

This command is not available when the Replay function is executed.

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.
NEG	Detects a trigger at the falling edge.

Example of Use

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

## 2.5.5 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	-2.00000000 to 2.00000000 s
Resolution	20 ns
Suffix code	NS, US, MS, S S is used when the suffix code is omitted.
Default	0.00000000 s

Details

This command is not available when the Replay function is executed.

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

-2.00000000 to +2.00000000 s

Resolution

20 ns

Value is returned in s units.

## Example of Use

To query the delay time.

```
TRIG:DEL?
```

```
> 0.02000000
```

## :TRIGger[:SEQuence]:WIF|:RFBurst:LEVel:ABSolute <ampl>

Wide IF Trigger Level

### Function

This command sets the threshold value of the level at which capture starts in the Wide IF Video trigger.

### Command

```
:TRIGger[:SEQuence]:WIF|:RFBurst:LEVel:ABSolute <ampl>
```

### Parameter

<level>	Threshold value of level at which capture starts
Range	-60 to 50 dBm
Resolution	1 dB
Default	-20 dBm

### Details

This command is not available when the Replay function is executed.

### Example of Use

To set the threshold value of the Wide IF Video trigger level to 10 dBm.

```
TRIG:WIF:LEV:ABS 10
```



**:TRIGger[:SEQuence]:WIF[:RFBurst:LEVel:ABSolute]?**

Wide IF Trigger Level Query

## Function

This command queries the threshold value of the level at which capture starts in the Wide IF Video trigger.

## Query

```
:TRIGger[:SEQuence]:WIF[:RFBurst:LEVel:ABSolute]?
```

## Response

```
<level>
```

## Parameter

<code>&lt;level&gt;</code>	Threshold value of level at which capture starts
Range	-60 to 50 dBm
Resolution	1 dB
Suffix code	None, value is returned in dBm units.

## Example of Use

```
To query the threshold value of the Wide IF Video trigger
level.
TRIG:WIF:LEV:ABS?
> 10
```

## 2.6 ACP/OBW/SEM/Spurious Emission Measurement Functions

Table 2.6-1 lists device messages for fetching the ACP/OBW/SEM/Spurious Emission measurement functions. The application to be used, the Signal Analyzer or Spectrum Analyzer, must be activated before using these device messages.

Refer to *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)* or *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)* for commands/queries to be used for control after these measurement functions have been fetched.

**Table 2.6-1 ACP/OBW/SEM/Spurious Emission Measurement Functions**

Function	Device Messages
Configure - ACP	:CONFigure[:SWEpt]:ACP
Configure - OBW	:CONFigure[:SWEpt]:OBWidth
Configure - SEM	:CONFigure[:SWEpt]:SEMAsk
Configure - Spurious Emission	:CONFigure[:SWEpt]:SPURious

**Note:**

FETCh:<measure>, INITiate:<measure>, READ:<measure>, and MEASure:<measure> cannot be used when this application is selected, except for Modulation measurement. The commands/queries can be used when Signal Analyzer or Spectrum Analyzer is selected after executing CONFigure:<measure>.

## :CONFigure[:SWEPT]:ACP

Configure - ACP

Function

This command selects the ACP measurement function.

Command

```
:CONFigure[:SWEPT]:ACP
```

Details

No measurement is made. This function cannot be executed during replay.

Example of Use

To select the ACP measurement function of Spectrum Analyzer.  
CONF:SWEPT:ACP

## :CONFigure[:SWEpt]:OBWidth

Configure - OBW

### Function

This command selects the OBW measurement function.

### Command

```
:CONFigure[:SWEpt]:OBWidth
```

### Details

No measurement is made. This function cannot be executed during replay.

### Example of Use

To select the OBW measurement function of Spectrum Analyzer.

```
CONF:SWEp:OBW
```

## :CONFigure[:SWEpt]:SEMAsk

Configure - SEM

### Function

This command selects the SEM measurement function.

### Command

```
:CONFigure[:SWEpt]:SEMAsk
```

### Details

No measurement is made. This function cannot be executed during replay.

### Example of Use

To select the SEM measurement function of Spectrum Analyzer.

```
CONF:SEM
```

## :CONFigure[:SWEpt]:SPURious

Configure - Spurious Emission

### Function

This command sets the Spurious Emission measurement to On.

### Command

```
:CONFigure[:SWEpt]:SPURious
```

### Details

No measurement is made.

When Spurious Emission measurement is set to On, the active trace is set to A. This function cannot be executed during replay.

### Example of Use

```
To set Spurious measurement to On.  
CONF:SPUR
```

## 2.7 Modulation Measurement Function

This section describes device messages for Modulation measurement.

Table 2.7-1 lists device messages for executing Modulation measurement and querying the result.

**Table 2.7-1 Device Messages for Modulation Measurement Functions**

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

Tables 2.7-2 and 2.7-3 list the responses to parameter [n] of the device messages in Table 2.7-1.

**Table 2.7-2 Responses for the Measurement Results (When the Selected Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p)**

n	Result Mode	Response
1 or omitted	A/B	Returns the measurement results with comma separated value in the following order. 1 Frequency Error[Hz] (Average) 2 Frequency Error[Hz] (Max) 3 Frequency Error[ppm] (Average) 4 Frequency Error[ppm] (Max) 5 Symbol Clock Error[ppm] (Average) 6 Symbol Clock Error[ppm] (Max) 7 Transmit Power(Average) 8 Transmit Power (Max) 9 EVM(rms) (Average) 10 EVM(rms) (Max) 11 EVM(peak) (Average) 12 EVM(peak) (Max) 13 Center Frequency Leakage (Average) 14 Center Frequency Leakage (Max) 15 Time Offset[ns] (Average) 16 Time Offset[ns] (Max) 17 Data EVM (Average) 18 Data EVM (Max) 19 Pilot EVM (Average) 20 Pilot EVM (Max) 21 Quadrature Error (Average) 22 Quadrature Error (Max) 23 IQ Gain Imbalance (Average) 24 IQ Gain Imbalance (Max)

**Table 2.7-2 Responses for the Measurement Results (When the Selected Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p) (Cont'd)**

n	Result Mode	Response
2	A/B	<p>1 Symbol#0                  2 Subcarrier#-N Constellation I                  3 Subcarrier#-N Constellation Q                  4 Subcarrier#-N Modulation                  5 Subcarrier#-(N-1) Constellation I                  6 Subcarrier#-(N-1) Constellation Q                  7 Subcarrier#-(N-1) Modulation                  ...                  ((Nx2+1) × 3-1) Subcarrier#N-1 Constellation I                  ((Nx2+1) × 3) Subcarrier#N-1 Constellation Q                  ((Nx2+1) × 3+1) Subcarrier#N-1 Modulation                  ((Nx2+1) × 3+2) Symbol#1                  ((Nx2+1) × 3+3) Subcarrier#-N Constellation I                  ((Nx2+1) × 3+4) Subcarrier#-N Constellation Q                  ((Nx2+1) × 3+5) Subcarrier#N-1 Modulation                  ...                  ((Nx2+1) × 3+1) × 2-2 Subcarrier#N-1 Constellation I                  ((Nx2+1) × 3+1) × 2-1 Subcarrier#N-1 Constellation Q                  ((Nx2+1) × 3+1) × 2 Subcarrier#N-1 Modulation                  ((Nx2+1) × 3+1) × 2+1 Subcarrier#N-1 Constellation I                  ((Nx2+1) × 3+1) × 2+2 Subcarrier#N-1 Constellation Q                  ((Nx2+1) × 3+1) × 2+3 Subcarrier#N-1 Modulation                  ...                  ((Nx2+1) × 3+1) × M-2 Subcarrier#N-1 Constellation I                  ((Nx2+1) × 3+1) × M-1 Subcarrier#N-1 Constellation Q                  ((Nx2+1) × 3+1) × M Subcarrier#N-1 Modulation</p> <p>*: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number". M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.</p>
3	A/B	<p>1 EVM vs Subcarrier View                  2 Subcarrier#-N EVM vs Subcarrier (rms)                  3 Subcarrier#-(N-1) EVM vs Subcarrier (rms)                  ...                  Nx2+1 Subcarrier#N-1 EVM vs Subcarrier (rms)                  Nx2+2 Subcarrier#N EVM vs Subcarrier (rms)</p> <p>*: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number".</p>



**Table 2.7-2 Responses for the Measurement Results (When the Selected Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p) (Cont'd)**

n	Result Mode	Response
4	A/B	1 EVM vs Subcarrier View 2 Subcarrier#-N EVM vs Subcarrier (Peak) 3 Subcarrier#-(N-1) EVM vs Subcarrier (Peak) ... Nx2+1 Subcarrier#N-1 EVM vs Subcarrier (Peak) Nx2+2 Subcarrier#N EVM vs Subcarrier (Peak)  *: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number".
5	A/B	1 Symbol#0 EVM vs Symbol (rms) 2 Symbol#1 EVM vs Symbol (rms) ... M-1 Symbol#M-2 EVM vs Symbol (rms) M Symbol#M-1 EVM vs Symbol (rms) *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.
6	A/B	1 Symbol#0 EVM vs Symbol (Peak) 2 Symbol#1 EVM vs Symbol (Peak) ... M-1 Symbol#M-2 EVM vs Symbol (Peak) M Symbol#M-1 EVM vs Symbol (Peak) *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.
7	A/B	1 Subcarrier#-N Spectral Flatness Amplitude 2 Subcarrier#-(N-1) Spectral Flatness Amplitude ... N×2 Subcarrier#N-1 Spectral Flatness Amplitude N×2+1 Subcarrier#N Spectral Flatness Amplitude *: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number".

**Table 2.7-2 Responses for the Measurement Results (When the Selected Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p) (Cont'd)**

n	Result Mode	Response
8	A/B	1 Subcarrier#-N Spectral Flatness Phase 2 Subcarrier#-(N-1) Spectral Flatness Phase ... N×2 Subcarrier#N-1 Spectral Flatness Phase N×2+1 Subcarrier#N Spectral Flatness Phase  *: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number".
9	A/B	1 Subcarrier#-N Spectral Flatness Group Delay 2 Subcarrier#-(N-1) Spectral Flatness Group Delay ... N×2 Subcarrier#N-1 Spectral Flatness Group Delay N×2+1 Subcarrier#N Spectral Flatness Group Delay  *: The value of N is determined by the range of Subcarrier numbers displayed in Constellation. For details on the range of Subcarrier numbers, refer to Section 2.7.13, "Marker Position Number".
10	A/B	1 Data Rate 2 Modulation 3 MCS Index 4 Stream ID 5 Length 6 GI 7 Preamble

**Note:**

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)*.

**Table 2.7-3 Responses for the Measurement Results (When the Selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK))**

n	Result Mode	Response
1 or omitted	A/B	<p>Returns the measurement results with comma separated value in the following order.</p> <ol style="list-style-type: none"> <li>1 Frequency Error[Hz] (Average)</li> <li>2 Frequency Error[Hz] (Max)</li> <li>3 Frequency Error[ppm] (Average)</li> <li>4 Frequency Error[ppm] (Max)</li> <li>5 Chip Clock Error (Average)</li> <li>6 Chip Clock Error (Max)</li> <li>7 Transmit Power (Average)</li> <li>8 Transmit Power (Max)</li> <li>9 EVM(rms) (Average)</li> <li>10 EVM(rms) (Max)</li> <li>11 EVM(peak) (Average)</li> <li>12 EVM(peak) (Max)</li> <li>13 IQ Origin Offset (Average)</li> <li>14 IQ Origin Offset (Max)</li> <li>15 Time Offset (Average)</li> <li>16 Time Offset (Max)</li> <li>17 Phase Error (Average)</li> <li>18 Phase Error (Max)</li> <li>19 Magnitude Error (Average)</li> <li>20 Magnitude Error (Max)</li> </ol>

**Table 2.7-3 Responses for the Measurement Results (When the Selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)) (Cont'd)**

n	Result Mode	Response
2	A/B	1 Chip#0 Constellation I 2 Chip#0 Constellation Q 3 Chip#0 Modulation 4 Chip#1 Constellation I 5 Chip#1 Constellation Q 6 Chip#1 Modulation ... M×3-2 Chip#M-1 Constellation I M×3-1 Chip#M-1 Constellation Q M×3 Chip#M-1 Modulation *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.
3	A/B	1 Chip#0 EVM vs Chip (rms) 2 Chip#1 EVM vs Chip (rms) ... M-1 Chip#M-2 EVM vs Chip (rms) M Chip #M-1 EVM vs Chip (rms) *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.
4	A/B	1 Chip#0 EVM vs Chip (Peak) 2 Chip#1 EVM vs Chip (Peak) ... M-1 Chip#M-2 EVM vs Chip (Peak) M Chip #M-1 EVM vs Chip (Peak) *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.
5	A/B	1 Chip#0 Phase Error vs Chip 2 Chip#1 Phase Error vs Chip ... M-1 Chip#M-2 Phase Error vs Chip M Chip #M-1 Phase Error vs Chip *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length.

**Table 2.7-3 Responses for the Measurement Results (When the Selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)) (Cont'd)**

n	Result Mode	Response
6	A/B	1 Chip#0.0 Eye Diagram I 2 Chip#0.0 Eye Diagram Q 3 Chip#0.1 Eye Diagram I 4 Chip#0.1 Eye Diagram Q ... $(M \times 10 - 1) \times 2 - 1$ Chip#M-2 Eye Diagram I $(M \times 10 - 1) \times 2$ Chip#M-2 Eye Diagram Q $M \times 10 \times 2 - 1$ Chip#M-1 Eye Diagram I $M \times 10 \times 2$ Chip#M-1 Eye Diagram Q *: M will be the value set in Analysis Length. However, if Auto is selected for Analysis Length Setup, it will be set to the auto-detected value for Analysis Length. The maximum displayed point of the Eye Diagram screen is 1,000, but the data up to M chip is output when querying the result.
7	A/B	1 Data Rate 2 Modulation 3 Length 4 Preamble

**Note:**

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)*.

Table 2.7-4 lists device messages on Parameter Setting for Modulation Measurement

**Table 2.7-4 Device Messages for Setting Parameters for Modulation Measurement (Continued)**

Parameter	Device Messages
Storage Mode	[ :SENSE]:EVM:AVERAge[:STATE] OFF ON AMAXimum 0 1 2
	[ :SENSE]:EVM:AVERAge[:STATE]?
Storage Count	[ :SENSE]:EVM:AVERAge:COUNT <integer>
	[ :SENSE]:EVM:AVERAge:COUNT?
Scale EVM Unit	:DISPlay:EVM[:VIEW]:WINDow2 3 5:TRACe:Y[:SCALE]:SPACing LINear LOGarithmic PERCent DB
	:DISPlay:EVM[:VIEW]:WINDow2 3 5:TRACe:Y[:SCALE]:SPACing?
EVM Scale	:DISPlay:EVM[:VIEW]:WINDow2 3 5:TRACe:Y[:SCALE]:RLEVel <integer>
	:DISPlay:EVM[:VIEW]:WINDow2 3 5:TRACe:Y[:SCALE]:RLEVel?
Flatness Scale	:DISPlay:EVM[:VIEW]:WINDow4:TRACe:Y[:SCALE]:RLEVel <integer>
	:DISPlay:EVM[:VIEW]:WINDow4:TRACe:Y[:SCALE]:RLEVel?
Phase Error vs Chip Scale	:DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALE]:RLEVel <integer>
	:DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALE]:RLEVel?
Trace Mode	:DISPlay:EVM[:VIEW]:SELEct EVSubcarrier EVSymbol FLATness EVCH  PECHip EYEDiagram SUMMary
	:DISPlay:EVM[:VIEW]:SELEct?
Spectral Flatness Type	:CALCulate:EVM:WINDow4:TYPE AMPLitude PHASe GDELay
	:CALCulate:EVM:WINDow4:TYPE?
Graph View	:CALCulate:EVM:WINDow2 3 6:GVIEW AVERAge AMAXimum
	:CALCulate:EVM:WINDow2 3 6:GVIEW?
EVM vs Subcarrier View	:CALCulate:EVM:WINDow2:MODE EACH AVERAge
	:CALCulate:EVM:WINDow2:MODE?
Constellation	:DISPlay:EVM[:VIEW]:WINDow[1]:RANGE SYMBol COMPOSITE
	:DISPlay:EVM[:VIEW]:WINDow[1]:RANGE?
Constellation View Select	:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier TOTal DATA PILOt 1SUBcarrier PAIR
	:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier?
Constellation Zoom	:DISPlay:TRACe:ZOOM

Table 2.7-5 lists the device messages for setting the marker and reading out the value at the marker position for Modulation measurement.

**Table 2.7-5 Device Messages Related to Marker for Modulation Measurement**

Parameter	Device Messages
Marker – On/Off	:CALCulate:EVM:MARKer[:STATe] OFF ON 0 1
	:CALCulate:EVM:MARKer[:STATe]?
Active Trace	:CALCulate:EVM:MARKer:ACTive CONSTellation BOTTom
	:CALCulate:EVM:MARKer:ACTive?
Marker	:CALCulate:EVM:MARKer:SUBCarrier <integer>
	:CALCulate:EVM:MARKer:SUBCarrier?
Marker Symbol Number	:CALCulate:EVM:MARKer:SYMBOL <integer>
	:CALCulate:EVM:MARKer:SYMBOL?
Marker X Axis Value Query	:CALCulate:EVM:MARKer:X?
Marker Y Axis Value (RMS)Query	:CALCulate:EVM:MARKer:Y[:RMS]?
Marker Y Axis Value Query (I) – Eye Diagram	:CALCulate:EVM:MARKer:I:Y?
Marker Y Axis Value Query (Q) – Eye Diagram	:CALCulate:EVM:MARKer:Q:Y?
Marker Y Axis Value (Peak) Query	:calculate:evm:marker:y:peak?
Marker EVM Value (RMS) Query	:CALCulate:EVM:MARKer:EVM[:RMS]?
Marker EVM Value (Peak) Query	:CALCulate:EVM:MARKer:EVM:PEAK?
Peak Search	:CALCulate:MARKer:MAXimum
Next Peak Search	:CALCulate:MARKer:MAXimum:NEXT
Dip Search	:CALCulate:MARKer:MINimum
Next Dip Search	:CALCulate:MARKer:MINimum:NEXT

## 2.7.1 Measure

### :CONFigure:EVM

Configure

Function

This command selects the Modulation measurement function.

Command

```
:CONFigure:EVM
```

Details

No measurement is made.

Example of Use

To select the Modulation measurement function.

```
CONF:EVM
```

### :INITiate:EVM

Initiate

Function

This command executes the Modulation measurement function.

Command

```
:INITiate:EVM
```

Example of Use

To execute the Modulation measurement.

```
INIT:EVM
```



---

**:FETCh:EVM[n]?**

Fetch

Function

This command queries the result of the Modulation measurement.

Query

```
:FETCh:EVM[n]?
```

Response

Refer to Table 2.7-2.

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.

The unit of the read EVM value depends on the setting of EVM Unit.

Example of Use

To query the result of the Modulation measurement.

```
FETC:EVM?
```

```
> 5.20, 1.03, 1,0.53, 38, 3, 2.34,...
```

### :READ:EVM[n]?

Read

Function

This command performs Modulation measurement once (single measurement) with the current settings, and then queries the measured result.

Query

:READ:EVM[n] ?

Response

Refer to Table 2.7-2.

Example of Use

To perform single Modulation measurement and query the measured result.

READ:EVM?

Related command

This command has the same function as the following command.

:MEASure:EVM[n] ?

### :MEASure:EVM[n]?

Measure

Function

This command performs Modulation measurement once (single measurement) with the current settings, and then queries the measured result.

Query

:MEASure:EVM[n] ?

Response

Refer to Table 2.7-2.

Example of Use

To perform single Modulation measurement and query the measured result.

MEAS:EVM?

Related command

This command has the same function as the following command.

READ:EVM[n] ?

## 2.7.2 Storage Mode

`[[:SENSE]:EVM:AVERage[:STATE] OFF|ON|AMAXimum|0|1|2`

Storage Mode

Function

This command sets the storage mode.

Command

`[[:SENSE]:EVM:AVERage[:STATE] mode`

Parameter

<code>&lt;mode&gt;</code>	Storage Mode
<code>OFF 0</code>	Off (Default)
<code>ON 1</code>	Average
<code>AMAXimum 2</code>	Average & Max

Details

This command is not available when the Replay function is executed.

Example of Use

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

## [ :SENSe ] :EVM :AVERage [ :STATe ] ?

Storage Mode Query

Function

This command queries the setting of the storage mode.

Query

```
[ :SENSe ] :EVM :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.  
EVM:AVER?  
> 1
```

### 2.7.3 Storage Count

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

Storage Count

Function

This command sets the storage count.

Command

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

Parameter

<code>&lt;integer&gt;</code>	Storage Count
Range	2 to 9999
Resolution	1
Default	10

Details

This command is not available when the Replay function is executed.

Example of Use

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

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

Storage Count Query

Function

This command queries the storage count.

Query

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

Response

`<integer>`

Parameter

<code>&lt;integer&gt;</code>	Storage Count
Range	2 to 9999
Resolution	1

Example of Use

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

### 2.7.4 Scale – EVM Unit

`:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:SPACing  
LINear|LOGarithmic|PERCent|DB`

Scale EVM Unit

Function

This command sets the unit for EVM of measurement results.

Command

```
:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:SPACing  
<mode>
```

Parameter

<mode>	Scale mode
LINear	% scale
LOGarithmic	dB scale
PERCent	% scale (Default)
DB	dB scale

Example of Use

To set the unit of EVM to dB scale.  
`DISP:EVM:WIND2:TRAC:Y:SPAC DB`

`:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:SPACing?`

Scale EVM Unit Query

Function

This command queries the scale unit for EVM.

Query

```
:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:SPACing?
```

Response

```
<mode>
```

Parameter

<mode>	Scale mode
PERC	% scale
DB	dB scale

Example of Use

To query the unit of EVM.  
`DISP:EVM:WIND2:TRAC:Y:SPAC?`  
> DB

### 2.7.5 Scale – EVM

`:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:RLEVel <integer>`

EVM Scale

Function

This command sets the vertical scale on the EVM vs Subcarrier, EVM vs Symbol, or EVM vs Chip graph. The unit depends on the setting of EVM Unit.

Command

```
:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:RLEVel
<integer>
```

Parameter

Range of vertical axis scale when EVM Unit is set to %.

Range	0.1 to 100.0
Default	1.0
Resolution	0.1

Range of vertical scale when EVM Unit is set to dB.

Range	-60 to 0
Default	-40
Resolution	1

Details

This setting is not available in the following case(s).

- When Trace Mode is set to Eye Diagram

Example of Use

To set the vertical axis scale of the result graph to 10%.

```
DISP:EVM:WIND2:TRAC:Y:RLEV 10
```

## :DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:RLEVel?

Scale EVM Scale Query

### Function

This command queries the vertical scale on the EVM vs Subcarrier, EVM vs Symbol, or EVM vs Chip graph. The unit of the readout value depends on the setting of EVM Unit.

### Query

```
:DISPlay:EVM[:VIEW]:WINDow2|3|5:TRACe:Y[:SCALe]:RLEVel?
```

### Response

```
<integer>
```

### Parameter

Range of vertical axis scale when EVM Unit is set to %.

Range	0.1 to 100.0
-------	--------------

Range of vertical axis scale when EVM Unit is set to dB.

Range	-60 to 0
-------	----------

### Example of Use

To query the vertical axis scale of the result graph (when EVM Unit is %).

```
DISP:EVM:WIND2:TRAC:Y:RLEV?
```

```
> 10.0
```



## 2.7.6 Scale – Flatness

`:DISPlay:EVM[:VIEW]:WINDow4:TRACe:Y[:SCALe]:RLEVel <real>`

Flatness Scale

Function

This command sets the vertical scale of the Flatness graph. The unit depends on the setting of Flatness Type.

Command

`:DISPlay:EVM:WINDow4:TRACe:Y[:SCALe]:RLEVel <real>`

Parameter

Range of vertical axis scale when Flatness Type = Amplitude

Range	1.0 dB to 100.0 dB
Default	10.0 dB
Resolution	0.1 dB

Range of vertical axis scale when Flatness Type = Phase

Range	1.0 degree to 180 degree
Default	60 degree
Resolution	0.1 degree

Range of vertical axis scale when Flatness Type = Group Delay

Range	1.0 ns to 1.0 $\mu$ s
Default	50.0 ns
Resolution	0.1 ns

Details

This setting is not available in the following case(s).

- When Trace Mode is set to Eye Diagram

Example of Use

To set the vertical axis scale of the result graph to 10 dB.

`DISP:EVM:WIND4:TRAC:Y:RLEV 10`

## :DISPlay:EVM[:VIEW]:WINDow4:TRACe:Y[:SCALe]:RLEVel?

Flatness Scale Query

### Function

This command queries the vertical scale of the Flatness graph. The unit of the readout value depends on the setting of the Flatness Type.

### Query

```
:DISPlay:EVM[:VIEW]:WINDow4:TRACe:Y[:SCALe]:RLEVel?
```

### Response

<real>

### Parameter

Range of vertical axis scale when Flatness Type = Amplitude

Range	1.0 dB to 100.0 dB
Resolution	0.1 dB

Range of vertical axis scale when Flatness Type = Phase

Range	1.0 degree to 180 degree
Resolution	0.1 degree

Range of vertical axis scale when Flatness Type = Group Delay

Range	1.0 ns to 1.0 $\mu$ s
Resolution	0.1 ns

### Example of Use

To query the vertical axis scale of the result graph.

```
DISP:EVM:WIND4:TRAC:Y:RLEV?  
> 10.0
```

`:DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALe]:RLEVel <integer>`

Phase Error vs Chip Scale

#### Function

This command sets the vertical scale of the Phase Error vs Chip graph.

#### Command

```
:DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALe]:RLEVel
<integer>
```

#### Parameter

Range	1.0 degree to 180.0 degree
Default	60.0 degree
Resolution	0.1 degree

#### Details

This setting is not available in the following case(s).

- When Trace Mode is set to Eye Diagram

#### Example of Use

To set the vertical axis scale of the result graph to 10 dB.

```
DISP:EVM:WIND6:TRAC:Y:RLEV 10
```

## :DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALe]:RLEVel?

Phase Error vs Chip Query

### Function

This command queries the vertical scale of the Phase Error vs Chip graph.

### Query

:DISPlay:EVM[:VIEW]:WINDow6:TRACe:Y[:SCALe]:RLEVel?

### Response

<integer>

### Parameter

Range	1.0 degree to 180.0 degree
Resolution	0.1 degree

### Example of Use

To query the vertical axis scale of the result graph.

```
DISP:EVM:WIND6:TRAC:Y:RLEV?
```

```
> 10.0
```

### 2.7.7 Trace Mode

:DISPlay:EVM[:VIEW]:SElect EVSubcarrier|EVSYmbol|FLATness|EVCHip|PECHip|EYEDiagram|SUMMary

Trace Mode

Function

This command sets the result type to be displayed on the graph window.

Command

```
:DISPlay:EVM[:VIEW]:SElect <mode>
```

Parameter

<mode>	Display result
EVSubcarrier	Displays EVM vs Subcarrier
EVSYmbol	Displays EVM vs Symbol.
FLATness	Displays Spectral Flatness.
EVCHip	Displays EVM vs Chip.
PECHip	Displays Phase Error vs Chip.
EYEDiagram	Displays Eye Diagram.
SUMMary	Displays Summary.
Default	EVSubcarrier (when the selected Standard is: 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, 802.11p, or 802.11ac)
	EVChip (when the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK))

Details

EVM vs Chip, Phase Error vs Chip, and Eye Diagram can be selected only when the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK).

Constellation is not displayed when Trace Mode is set to Summary.

Example of Use

To display Spectral Flatness in the graph window.

```
DISP:EVM:SEL FLAT
```

## :DISPlay:EVM[:VIEW]:SElect?

Trace Mode Query

### Function

This command queries the result type to be displayed on the graph window.

### Command

```
:DISPlay:EVM[:VIEW]:SElect?
```

### Response

```
<mode>
```

### Parameter

<mode>	Display result
EVS	Displays EVM vs Subcarrier
EVSY	Displays EVM vs Symbol.
FLAT	Displays Spectral Flatness.
EVCH	Displays EVM vs Chip.
PECH	Displays Phase Error vs Chip.
EYED	Displays Eye Diagram.
SUMM	Displays Summary.

### Example of Use

To query the result type displayed on the graph window.

```
DISP:EVM:SEL?
```

```
> FLAT
```

**:CALCulate:EVM:WINDow4:TYPE AMPLitude|PHASe|GDELay**

Spectral Flatness Type

## Function

This command sets the display type for the spectral flatness graph.

## Command

```
:CALCulate:EVM:WINDow4:TYPE <mode>
```

## Parameter

<mode>	Display type of spectral flatness graph
AMPLitude	Displays the amplitude characteristics for each subcarrier. (Default)
PHASe	Displays the phase characteristics for each subcarrier.
GDELay	Displays the group delay characteristics for each subcarrier.

## Example of Use

To set display type for the spectral flatness graph.

```
CALC:EVM:WIND4:TYPE AMPL
```

**:CALCulate:EVM:WINDow4:TYPE?**

Spectral Flatness Type Query

## Function

This command queries the display type of the spectral flatness graph.

## Query

```
:CALCulate:EVM:WINDow4:TYPE?
```

## Response

```
<mode>
```

## Parameter

<mode>	Display type of spectral flatness graph
AMPL	Displays the amplitude characteristics for each subcarrier.
PHAS	Displays the phase characteristics for each subcarrier.
GDEL	Displays the group delay characteristics for each subcarrier.

## Example of Use

To query the display type of the spectral flatness graph.

```
CALC:EVM:WIND4:TYPE?
> AMPL
```

## :CALCulate:EVM:WINDow2|3|6:GVIEW AVERage|AMAXimum

Graph View

Function

This command sets the display type for the EVM vs Subcarrier graph.

Command

```
:CALCulate:EVM:WINDow2|3|6:GVIEW <mode>
```

Parameter

<mode>	Display type of the graph
AVERage	Displays Average line only (Default)
AMAXimum	Displays both Average and Max lines

Details

This setting is available only when Storage is set to Ave&Max.

Example of Use

To display only Average line of EVM vs Subcarrier.  
CALC:EVM:WIND2:GVI AVER

## :CALCulate:EVM:WINDow2|3|6:GVIEW?

Graph View Query

Function

This command queries the display type of the EVM vs Subcarrier graph.

Query

```
:CALCulate:EVM:WINDow2|3|6:GVIEW?
```

Response

```
<mode>
```

Parameter

<mode>	Display type of the graph
AVER	Displays Average line only
AMAX	Displays both Average and Max lines

Example of Use

To query the display type of the EVM vs Subcarrier graph.  
CALC:EVM:WIND2:GVI?  
> AVER



### 2.7.8 Graph View Setting

#### :CALCulate:EVM:WINDow2:MODE EACH|AVERAge

EVM vs Subcarrier View

##### Function

This command sets the display type for the EVM vs Subcarrier graph.

##### Command

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

##### Parameter

<mode>	Display type of the graph
EACH	Displays EVM vs Subcarrier for each symbol
AVERAge	Displays EVM vs Subcarrier calculated by averaging all symbols (Default)

##### Example of Use

Displays EVM vs Subcarrier for each symbol  
 CALC:EVM:WIND2:MODE EACH

#### :CALCulate:EVM:WINDow2:MODE?

EVM vs Subcarrier View Query

##### Function

This command queries the display type of the EVM vs Subcarrier graph.

##### Query

```
:CALCulate:EVM:WINDow2:MODE?
```

##### Response

```
<mode>
```

##### Parameter

<mode>	Display type of the graph
EACH	Displays EVM vs Subcarrier for each symbol
AVER	Displays EVM vs Subcarrier calculated by averaging all symbols

##### Example of Use

To query the display type of the EVM vs Subcarrier graph.  
 CALC:EVM:WIND2:MODE?  
 > EACH

### 2.7.9 Constellation Symbol View

`:DISPlay:EVM[:VIEW]:WINDow[1]:RANGe SYMBol|COMPOSITE`

Constellation Symbol View

Function

This command sets the range of symbols to be displayed in a constellation.

Command

`:DISPlay:EVM[:VIEW]:WINDow[1]:RANGe <mode>`

Parameter

<code>&lt;mode&gt;</code>	Range of symbols to be displayed in a constellation
<code>SYMBol</code>	Symbol specified for Symbol Number
<code>COMPOSITE</code>	All symbols to be analyzed, determined by Starting Subframe Number and Measurement Interval (Default)

Example of Use

To display all symbols in a constellation.

`DISP:EVM:WIND:RANG COMP`

**:DISPlay:EVM[:VIEW]:WINDow[1]:RANGe?**

Constellation Symbol View Query

## Function

This command queries the range of symbols to be displayed in a constellation.

## Query

```
:DISPlay:EVM[:VIEW]:WINDow[1]:RANGe?
```

## Response

```
<mode>
```

## Parameter

<mode>	Range of symbols to be displayed in a constellation
SYMB	Symbol specified for Symbol Number
COMP	All symbols to be analyzed, determined by Starting Subframe Number and Measurement Interval

## Example of Use

To query the range of symbols to be displayed in a constellation.

```
DISP:EVM:WIND:RANG?
```

```
> COMP
```

### 2.7.10 Constellation View Select

:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier

TOTal|DATA|PILOt|1SUBcarrier|PAIR

Constellation View Select

#### Function

This command specifies the display mode of the Constellation screen.

#### Command

```
:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier <mode>
```

#### Parameter

<mode>	Range of symbols to be displayed in a constellation
TOTAL	Displays all subcarriers (Default)
DATA	Displays data subcarriers only
PILOt	Displays pilot subcarriers only
1SUBcarrier	Display subcarriers selected by the marker only
PAIR	Display subcarriers at the both ends only

#### Details

This setting is not available in the following case(s).

When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK)

#### Example of Use

To display all symbols in a constellation.

```
DISP:EVM:WIND:SUBC TOT
```

**:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier?**

Constellation View Select Query

## Function

This command queries the display status of the Constellation screen.

## Query

`:DISPlay:EVM[:VIEW]:WINDow[1]:SUBCarrier?`

## Response

`<mode>`

## Parameter

`<mode>`

Range of symbols to be displayed in a constellation

TOT

Displays all subcarriers

DATA

Displays data subcarriers only

PIL

Displays pilot subcarriers only

1SUB

Display subcarriers selected by the marker only

PAIR

Display subcarriers at the both ends only

## Example of Use

To query the range of symbols to be displayed in a constellation.

`DISP:EVM:WIND:SUBC?``> TOT`

### 2.7.11 Zoom In

#### :DISPlay:TRACe:ZOOM

Constellation Zoom

Function

This command zooms into the Constellation screen.

Command

:DISPlay:TRACe:ZOOM

Details

When another screen is selected in Trace Mode, this setting is automatically set to Off.

This setting is not available when Trace Mode is set to Summary.

Example of Use

To zoom in to the Constellation screen.  
DISP:TRAC:ZOOM

**2.7.12 Marker – On/Off(Modulation Analysis)****:CALCulate:EVM:MARKer[:STATe] OFF|ON|0|1**

Marker – On/Off

## Function

This command sets the marker display on/off.

## Command

`:CALCulate:EVM:MARKer[:STATe] <switch>`

## Parameter

<code>&lt;switch&gt;</code>	Marker
0 OFF	Off
1 ON	On (Default)

## Details

This setting is not available in the following case(s).

- When Trace Mode is set to Summary

## Example of Use

To display the marker.  
`CALC:EVM:MARK 1`

## :CALCulate:EVM:MARKer[:STATe]?

Marker – On/Off Query

### Function

This command queries the on/off settings of the Marker.

### Query

```
:CALCulate:EVM:MARKer[:STATe]?
```

### Response

```
<switch>
```

### Parameter

<switch>	Marker
0	Off
1	On

### Example of Use

To query the Marker settings.

```
CALC:EVM:MARK?  
> 1
```



### 2.7.13 Active Trace

#### :CALCulate:EVM:MARKer:ACTive CONSTellation|BOTTom

Active Trace

Function

For the marker result query command :CALCulate: EVM: MARKer: Y[:RMS]?, this command sets the type of marker results to obtain.

Command

```
:CALCulate:EVM:MARKer:ACTive CONSTellation|BOTTom
```

Parameter

<mode>	Marker result type to obtain
CONSTellation	Coordinate Q of the constellation
BOTTom	Marker result for the displayed graph (default)

Example of Use

To set the target graph of the marker to be queried to the Constellation.  
CALC:EVM:MARK:ACT CONS

#### :CALCulate:EVM:MARKer:ACTive?

Active Trace Query

Function

This command queries the Marker result type to obtain.

Query

```
:CALCulate:EVM:MARKer:ACTive?
```

Response

```
<mode>
```

Parameter

<mode>	Marker result type to obtain
CONS	Coordinate Q of the constellation
BOTT	Marker result for the displayed graph

Example of Use

To query the Marker result type to obtain.  
CALC:EVM:MARK:ACT?  
> CONS

### 2.7.14 Marker Position Number

`:CALCulate:EVM:MARKer:SUBCarrier <integer>`

Marker Subcarrier Number

**Function**

This command sets the position of the marker on the Constellation or on the graph window, in subcarrier number.

**Command**

`:CALCulate:EVM:MARKer:SUBCarrier <integer>`

**Parameter**

<code>&lt;integer&gt;</code>	Subcarrier number
When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j, or 802.11p:	
Range	-26 to 26
Resolution	1
Default	-26
When Standard is 802.11n:	
Range	-26 to 26 (Channel Bandwidth=20 MHz, PPDU Format = Non-HT) -28 to 28 (Channel Bandwidth=20 MHz, PPDU Format ≠ Non-HT) -58 to 58 (Channel Bandwidth=40 MHz, PPDU Format = Non-HT) -58 to 58 (Channel Bandwidth=40 MHz, PPDU Format ≠ Non-HT) -60 to 60 (Channel Bandwidth=40 MHz Upper, 40 MHz Lower)
Resolution	1
Default	-26
When Standard is 802.11ac:	
Range	-26 to 26 (Channel Bandwidth=20 MHz) -58 to 58 (Channel Bandwidth=40 MHz) -122 to 122 (Channel Bandwidth=80 MHz) -250 to 250 (Channel Bandwidth=160 MHz)
Resolution	1
Default	-26
Suffix code	None

**Example of Use**

---

To set the position of the marker to 10.

```
CALC:EVM:MARK:SUBC 10
```

## :CALCulate:EVM:MARKer:SUBCarrier?

Marker Subcarrier Number Query

### Function

This command queries the position of the marker on the Constellation or on the graph window, in subcarrier number.

### Command

```
:CALCulate:EVM:MARKer:SUBCarrier?
```

### Response

```
<integer>
```

### Parameter

```
<integer>          Subcarrier number
```

When Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11j, or 802.11p:

Range	-26 to 26
Resolution	1
Default	-26

When Standard is 802.11n:

Range	-26 to 26 (Channel Bandwidth=20 MHz, PPDU Format = Non-HT) -28 to 28 (Channel Bandwidth=20 MHz, PPDU Format ≠ Non-HT) -58 to 58 (Channel Bandwidth=40 MHz, PPDU Format = Non-HT) -58 to 58 (Channel Bandwidth=40 MHz, PPDU Format ≠ Non-HT) -60 to 60 (Channel Bandwidth=40 MHz Upper, 40 MHz Lower)
Resolution	1

When Standard is 802.11ac:

Range	-26 to 26 (Channel Bandwidth=20 MHz) -58 to 58 (Channel Bandwidth=40 MHz) -122 to 122 (Channel Bandwidth=80 MHz) -250 to 250 (Channel Bandwidth=160 MHz)
Resolution	1

### Example of Use

```
To query the marker position (subcarrier).  
CALC:EVM:MARK:SUBC?  
> 10
```

**:CALCulate:EVM:MARKer:SYMBOL <integer>**

Marker Symbol Number

## Function

This command sets the position of the marker on the Constellation or on the graph window, in symbol (chip) number.

## Command

```
:CALCulate:EVM:MARKer:SYMBOL <integer>
```

## Parameter

<integer>	Symbol (chip) number
Range	0 to Analysis Length - 1 (when Trace Mode is other than Eye Diagram) 0 to Analysis Length - 0.1 or 999.9, whichever smaller (when Trace Mode is Eye Diagram)
Resolution	1 (when Trace Mode is other than Eye Diagram) 0.1 (when Trace Mode is Eye Diagram)
Suffix code	None
Default	0

## Details

When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK), this command corresponds to Symbol Number.

When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK), this command corresponds to Chip Number.

When the graph window is set to Eye Diagram, this command corresponds to Eye Diagram Chip Number.

## Example of Use

To set the position of the marker to 10.

```
CALC:EVM:MARK:SYMB 10
```

## :CALCulate:EVM:MARKer:SYMBOL?

Marker Symbol Number Query

### Function

This command queries the position of the marker on the Constellation or on the graph window, in symbol (chip) number.

### Command

```
:CALCulate:EVM:MARKer:SYMBOL?
```

### Response

```
<integer>
```

### Parameter

<integer>	Symbol (chip) number
Range	0 to Analysis Length - 1 (when Trace Mode is other than Eye Diagram) 0 to Analysis Length - 0.1 or 999.0, whichever smaller (when Trace Mode is Eye Diagram)
Resolution	1 (when Trace Mode is other than Eye Diagram) 0.1 (when Trace Mode is Eye Diagram)

### Details

When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK), this command corresponds to Symbol Number.

When the selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK), this command corresponds to Chip Number.

When the graph window is set to Eye Diagram, this command corresponds to Eye Diagram Chip Number.

### Example of Use

To query the marker position.

```
CALC:EVM:MARK:SYMB?  
> 10
```

## 2.7.15 Marker Value

### :CALCulate:EVM:MARKer:X?

Marker X Axis Value Query

#### Function

This command queries the X-coordinate value at the marker position on the Constellation.

#### Query

```
:CALCulate:EVM:MARKer:X?
```

#### Response

```
<real>
```

#### Parameter

```
<real>          X-coordinate value at the marker on the  
Constellation
```

#### Details

This command is not available when Trace Mode is set to Summary. -999.0 is returned when no measurement is made or an error occurs.

#### Example of Use

```
To query the X-coordinate value at the marker on the Constellation.  
CALC:EVM:MARK:X?  
> 0.12345
```

**:CALCulate:EVM:MARKer:Y[:RMS]?**

Marker Y Axis Value (RMS)Query

Function

This command queries the RMS value on the Y-coordinate at the marker on the target graph.

Query

:CALCulate:EVM:MARKer:Y[:RMS]?

Response

<real>

Parameter

<real>                      RMS value on Y coordinate at maker on target graph

When Active Trace is set to Constellation:

Constellation                      No unit

When Active Trace is graph window and Trace Mode is EVM vs Subcarrier:

When EVM Unit is set to %:                      Unit: %

When EVM Unit is set to dB:                      Unit: dB

When Active Trace is graph window and Trace Mode is EVM vs Symbol:

When EVM Unit is set to %:                      Unit: %

When EVM Unit is set to dB:                      Unit: dB

When Active Trace is graph window and Trace Mode is EVM vs Chip:

When EVM Unit is set to %:                      Unit: %

When EVM Unit is set to dB:                      Unit: dB

When Active Trace is graph window and Trace Mode is Spectral Flatness

Amplitude                      Unit: dB

Phase                      Unit: deg

Group Delay                      Unit: ns

When Active Trace is graph window and Trace Mode is Phase Error vs Chip:

Phase Error                      Unit: deg



### Details

–999.0 is returned when Trace Mode is set to Summary.

–999.0 is returned when no measurement is made or an error occurs.

Use the following command to query the Constellation Q coordinates and the marker value at the bottom of the screen.

```
:CALCulate:EVM:MARKer:ACTive CONSTellation|BOTTom
```

### Example of Use

To query RMS value of Y coordinate at marker position.

```
CALC:EVM:MARK:Y?
```

```
> –20.00
```

## :CALCulate:EVM:MARKer:I:Y?

Marker Y Axis Value Query (I) – Eye Diagram

### Function

This command queries the value of the Y coordinate of the I phase at the Eye Diagram marker position.

### Query

```
:CALCulate:EVM:MARKer:I:Y?
```

### Response

```
<real>
```

### Parameter

```
<real>      Value of Y coordinate of I phase at Eye Diagram marker  
              position
```

### Details

-999.0 is returned when no measurement is made or an error occurs.  
This function is available when Trace Mode is Eye Diagram.

### Example of Use

```
To query RMS value of Y coordinate at marker position.  
CALC:EVM:MARK:I:Y?  
> -0.68638
```

## :CALCulate:EVM:MARKer:Q:Y?

Marker Y Axis Value Query (Q) – Eye Diagram

### Function

This command queries the value of the Y coordinate of the Q phase at the Eye Diagram marker position.

### Query

```
:CALCulate:EVM:MARKer:Q:Y?
```

### Response

```
<real>
```

### Parameter

```
<real>      Value of Y coordinate of Q phase at Eye Diagram marker  
              position
```

### Details

-999.0 is returned when no measurement is made or an error occurs.  
This function is available when Trace Mode is Eye Diagram.

## Example of Use

```
To query RMS value of Y coordinate at marker position.
CALC:EVM:MARK:QI:Y?
> -0.68638
```

## :CALCulate:EVM:MARKer:Y:PEAK?

Marker Y Axis Value (Peak) Query

## Function

This command queries the Peak value on the Y-coordinate at the marker on the graph window.

## Query

```
:CALCulate:EVM:MARKer:Y:PEAK?
```

## Response

```
<real>
```

## Parameter

```
<real>          Peak value on Y coordinate at maker on target
graph
    When EVM Unit is set to %:      Unit:%
    When EVM Unit is set to dB:    Unit: dB
```

## Details

-999.0 is returned if Trace Mode is not EVM vs Subcarrier, EVM vs Symbol or EVM vs Chip.  
-999.0 is returned when no measurement is made or an error occurs.

## Example of Use

```
To query Peak value of Y coordinate at marker position.
CALC:EVM:MARK:Y:PEAK?
> 3.75
```

## :CALCulate:EVM:MARKer:EVM[:RMS]?

Marker EVM Value (RMS) Query

### Function

This command queries the RMS value of EVM at the marker position on the target graph.

### Query

:CALCulate:EVM:MARKer:EVM[:RMS]?

### Response

<real>

### Parameter

<real>      RMS value at marker on target graph.

When EVM Unit is set to %:      Unit: %

When EVM Unit is set to dB:      Unit: dB

### Details

-999.0 is returned if Trace Mode is not EVM vs Subcarrier, EVM vs Symbol or EVM vs Chip.

-999.0 is returned when no measurement is made or an error occurs.

### Example of Use

To query RMS value of EVM at marker position.

```
CALC:EVM:MARK:EVM?
```

```
> 1.03
```

**:CALCulate:EVM:MARKer:EVM:PEAK?**

Marker EVM Value (Peak) Query

## Function

This command queries the Peak value of EVM at the marker position in the graph window.

## Query

```
:CALCulate:EVM:MARKer:EVM:PEAK?
```

## Response

```
<real>
```

## Parameter

```
<real>      Peak value of EVM at the marker position on the target
              graph
```

```
              When EVM Unit is set to %:      Unit:%
```

```
              When EVM Unit is set to dB:     Unit: dB
```

## Details

-999.0 is returned if Trace Mode is not EVM vs Subcarrier, EVM vs Symbol or EVM vs Chip.

-999.0 is returned when no measurement is made or an error occurs.

## Example of Use

To query Peak value of EVM at marker position.

```
CALC:EVM:MARK:EVM:PEAK?
```

```
> 3.75
```

## 2.7.16 Peak Search

### :CALCulate:MARKer:MAXimum

Peak Search

Function

This command searches for the maximum level point of the active trace and moves the marker point to that point.

Command

:CALCulate:MARKer:MAXimum

Details

This function is available on the following traces:

- EVM vs Subcarrier
- EVM vs Symbol
- Spectral flatness
- EVM vs Chip
- Phase Error vs Chip

When reading out a marker value after executing this command, use the \*WAI command and execute synchronization control.

Note that synchronization control during the Continuous mode is not supported.

Example of Use

To move the marker to the maximum level point and query the marker value.

```
CALC:MARK:MAX
```

```
*WAI
```

```
CALC:EVM:MARK:SUBC?
```

---

## :CALCulate:MARKer:MAXimum:NEXT

Next Peak Search

### Function

This command searches for the feature point on the active trace and moves the marker point to the peak point with a level lower than the current marker level.

### Command

```
:CALCulate:MARKer:MAXimum:NEXT
```

### Details

This function is available on the following traces:

- EVM vs Subcarrier
- EVM vs Symbol
- Spectral flatness
- EVM vs Chip
- Phase Error vs Chip

When reading out a marker value after executing this command, use the \*WAI command and execute synchronization control.

Note that synchronization control during the Continuous mode is not supported.

### Example of Use

To move the marker to the next peak point and query the marker value.

```
CALC:MARK:MAX:NEXT
```

```
*WAI
```

```
CALC:EVM:MARK:SUBC?
```

## :CALCulate:MARKer:MINimum

Dip Search

Function

This command searches for the minimum level point of the active trace and moves the marker point to that point.

Command

:CALCulate:MARKer:MINimum

Details

This function can be set when the following trace is active.

- EVM vs Subcarrier
- EVM vs Symbol
- Spectral flatness
- EVM vs Chip
- Phase Error vs Chip

When reading out a marker value after executing this command, use the \*WAI command and execute synchronization control.

Note that synchronization control during the Continuous mode is not supported.

Example of Use

To move the marker to the minimum level point and query the marker value.

```
CALC:MARK:MIN
```

```
*WAI
```

```
CALC:EVM:MARK:SUBC?
```



---

## :CALCulate:MARKer:MINimum:NEXT

Next Dip Search

### Function

This command searches for the feature point on the active trace and moves the marker point to the minimum point with a level larger than the current marker level.

### Command

```
:CALCulate:MARKer:MINimum:NEXT
```

### Details

This function can be set when the following trace is active.

- EVM vs Subcarrier
- EVM vs Symbol
- Spectral flatness
- EVM vs Chip
- Phase Error vs Chip

When reading out a marker value after executing this command, use the \*WAI command and execute synchronization control.

Note that synchronization control during the Continuous mode is not supported.

### Example of Use

To move the marker to the next minimum peak point and query the marker value.

```
CALC:MARK:MIN:NEXT
```

```
*WAI
```

```
CALC:EVM:MARK:SUBC?
```

## 2.8 Power vs Time

Table 2.8-1 shows device messages for Power vs Time. Power vs Time is not available when Standard is 802.11ac.

**Table 2.8-1 Device Messages Related to Execution and Result Readout for Power vs Time Management**

Function	Device Messages
Configure	:CONFigure:PVTime
Initiate	:INITiate:PVTime
Fetch	:FETCh:PVTime [n] ?
Read	:READ:PVTime [n] ?
Measure	:MEASure:PVTime [n] ?

Table 2.8-2 and 2.8-3 list the responses to parameter [n] of the device messages in Table 2.8-1. "-999.0" is always returned when Result Mode is set to B.

**Table 2.8-2 Responses for the Measurement Results (When the Selected Standard is 802.11a, 802.11g (ERP-OFDM), 802.11g (DSSS-OFDM), 802.11n, 802.11j, or 802.11p)**

n	Result Mode	Response
1 or omitted	A/B	Returns the measurement results with comma separated value in the following order. 1 Transmit Power (Average) 2 Transmit Power (Max) 3 Power Flatness Max (Average) 4 Power Flatness Max (Max) 5 Carrier Off Power (Average) 6 Carrier Off Power (Max) 7 On/Off Ratio (Average) 8 On/Off Ratio (Max) 9 Peak PSD (Average) 10 Peak PSD (Max)
2	A/B	1 Power at -20.0 $\mu$ s (in dBm) 2 Power at -19.9 $\mu$ s (in dBm) 3 Power at -19.8 $\mu$ s (in dBm) ... N Power at Analysis Length + 20.0 $\mu$ s (in dBm) * Power is returned in the range of -20.0 $\mu$ s to (Analysis Length + 20.0 $\mu$ s) (in steps of 0.1 $\mu$ s). However, when Preamble Search or Ramp-down Detection is set to ON, Power is returned in the range of -20.0 $\mu$ s to ((auto-detected burst length) + 20.0 $\mu$ s).

**Table 2.8-3 Responses for the Measurement Results (When the Selected Standard is 802.11b or 802.11g (ERP-DSSS/CCK))**

n	Result Mode	Response
1 or omitted	A/B	<p>Returns the measurement results with comma separated value in the following order.</p> <ul style="list-style-type: none"> <li>1 Transmit Power (Average)</li> <li>2 Transmit Power (Max)</li> <li>3 Power Flatness Max (Average)</li> <li>4 Power Flatness Max (Max)</li> <li>5 Carrier Off Power (Average)</li> <li>6 Carrier Off Power (Max)</li> <li>7 On/Off Ratio (Average)</li> <li>8 On/Off Ratio (Max)</li> <li>9 Peak PSD (Average)</li> <li>10 Peak PSD (Max)</li> <li>11 Power-on Ramp (Average)</li> <li>12 Power-on Ramp (Max)</li> <li>13 Power-down Ramp (Average)</li> <li>14 Power-down Ramp (Max)</li> </ul>
2	A/B	<ul style="list-style-type: none"> <li>1 Power at <math>-20.0 \mu\text{s}</math> (in dBm)</li> <li>2 Power at <math>-19.9 \mu\text{s}</math> (in dBm)</li> <li>3 Power at <math>-19.8 \mu\text{s}</math> (in dBm)</li> <li>...</li> <li>N Power at Analysis Length <math>+20.0 \mu\text{s}</math> (in dBm)</li> </ul> <p>* Power is returned in the range of <math>-20.0 \mu\text{s}</math> to (Analysis Length + <math>20.0 \mu\text{s}</math>) (in steps of <math>0.1 \mu\text{s}</math>). However, when Preamble Search or Ramp-down Detection is set to ON, Power is returned in the range of <math>-20.0 \mu\text{s}</math> to ((auto-detected burst length) + <math>20.0 \mu\text{s}</math>).</p>

Table 2.8-4 lists device messages for parameter settings for Power vs Time.

**Table 2.8-4 Device Messages Related to Parameter Settings for Power vs Time Measurement**

Parameter	Device Messages
Trace Mode	:DISPlay:PVTime[:VIEW][:SElect] BURSt TRANSient
	:DISPlay:PVTime[:VIEW][:SElect]?
Analysis Length - Power vs Time	[:SENSe]:PVTime:TIME:LENGth <time>
	[:SENSe]:PVTime:TIME:LENGth?
Preamble Search	[:SENSe]:PVTime:TIME:PSEarch OFF ON 0 1
	[:SENSe]:PVTime:TIME:PSEarch?
Ramp Down Detection	[:SENSe]:PVTime:TIME:RDDetection OFF ON 0 1
	[:SENSe]:PVTime:TIME:RDDetection?
Detection Levell	[:SENSe]:PVTime:DETEctor:THReshold <integer>
	[:SENSe]:PVTime:DETEctor:THReshold?
Detection Offset	[:SENSe]:PVTime:DETEctor:OFFSet <time>
	[:SENSe]:PVTime:DETEctor:OFFSet?
Display Reference Level	:DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence MAX AVERAge
	:DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence?
Transient Time Scale	:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALE]:TIME <integer>
	:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALE]:TIME?
Transient Ref. Power	:DISPlay:PVTime[:VIEW]:WINDow9:TRACe:REFerence TOTAL RAMP
	:DISPlay:PVTime[:VIEW]:WINDow9:TRACe:REFerence?
Marker – On/Off - Power vs Time	:CALCulate:PVTime:MARKer[:STATE] OFF ON 0 1
	:CALCulate:PVTime:MARKer[:STATE]?
Marker	:CALCulate:PVTime:MARKer:TIME <TIME>
	:CALCulate:PVTime:MARKer:TIME?
Bottom Graph Marker Value	:CALCulate:PVTime:WINDow2:MARKer:POWER:ABSolute[1]?
Active Trace	:CALCulate:PVTime:MARKer:ACTive RISE FALL
	:CALCulate:PVTime:MARKer:ACTive?
Smoothing	:CALCulate:SMOothing[:STATE] OFF ON 0 1
	:CALCulate:SMOothing[:STATE]?

## 2.8.1 Measure

### :CONFigure:PVTime

Configure

Function

This command selects Power vs Time.

Command

```
:CONFigure:PVTime
```

Detail

No measurement is made.

This setting is not available in the following case.

- When Standard is 802.11ac.

Example of Use

To select Power vs Time.

```
CONF:PVT
```

### :INITiate:PVTime

Initiate

Function

This command executes Power vs Time.

Command

```
:INITiate:PVTime
```

Detail

This setting is not available in the following case.

- When Standard is 802.11ac.

Example of Use

To execute Power vs Time.

```
INIT:PVT
```

### :FETCh:PVTime[n]?

Fetch

Function

This command queries the result of the Power vs Time measurement.

Query

`:FETCh:PVTime [n]?`

**Response**

Refer to Table 2.8-2.

**Example of Use**

To query the result of the Power vs Time measurement.  
`FETC: PVT?`

**:READ:PVTime[n]?**

Read

Function

This command performs Power vs Time measurement once (single measurement) using the current settings, and then queries the measurement result.

Query

```
:READ:PVTime [n] ?
```

Detail

This setting is not available in the following case.

- When Standard is 802.11ac.

Response

Refer to Table 2.8-2.

Example of Use

To execute Power vs Time and query the measurement result.

```
READ:PVT?
```

Related command

This command has the same function as the following command.

```
:MEASure:PVTime [n] ?
```

**:MEASure:PVTime[n]?**

Measure

Function

This command performs Power vs Time measurement once (single measurement) using the current settings, and then queries the measurement result.

Query

```
:MEASure:PVTime [n] ?
```

Detail

This setting is not available in the following case.

- When Standard is 802.11ac.

Response

Refer to Table 2.8-2.

**Example of Use**

To execute Power vs Time and query the measurement result.  
MEAS:PVT?

**Related command**

This command has the same function as the following command.  
:READ:PVTime [n] ?



## 2.8.2 Trace Mode

`:DISPlay:PVTime[:VIEW][:SElect] BURSt|TRANsient`

Trace Mode

Function

Sets the main trace type.

Command

`:DISPlay:PVTime[:VIEW][:SElect] <trace>`

Parameter

<code>&lt;trace&gt;</code>	Trace
<code>BURSt</code>	Displays waveform data for a single burst (Default)
<code>TRANsient</code>	Displays waveform, zooming in to the rising and falling edges of the burst.

Details

When Measuring Object is set to Continuous and Standard is 802.11ac, TRANsient is not available.

Example of Use

To display waveform data for a single burst.  
`DISP:PVT BURS`

## :DISPlay:PVTime[:VIEW][:SElect]?

Trace Mode Query

### Function

This command queries the main trace type.

### Command

```
DISPlay:PVTime[:VIEW][:SElect]?
```

### Response

```
<trace>
```

### Parameter

```
<trace>
```

Trace type

```
    BURS
```

Displays waveform data for a single burst.

```
    TRAN
```

Displays waveform, zooming in to the rising and falling edges of the burst.

### Example of Use

To query the main trace.

```
DISP:PVT?
```

```
> BURS
```

### 2.8.3 Analysis Length

`[[:SENSe]:PVTime:TIME:LENGth <time>`

Analysis Length - Power vs Time

#### Function

This command sets the measurement range for Power vs Time measurement.

#### Command

`[[:SENSe]:PVTime:TIME:LENGth <time>`

#### Parameter

<code>&lt;time&gt;</code>	Analysis Length
Range	0.02 ms to 50 ms or Burst Interval, whichever smaller.
Resolution	0.1 $\mu$ s
Default	1000 $\mu$ s
Suffix code	NS, US, MS, S
	S is used when the suffix code is omitted.

#### Details

This setting is not available in the following case(s).

- Ramp-down Detection is set to On
- Preamble Search is set to On

#### Example of Use

To set the analysis length of Power vs Time to 1 ms.  
`PVT:TIME:LENG 1MS`

## [ :SENSE]:PVTime:TIME:LENGth?

Analysis Length - Power vs Time Query

### Function

This command queries the analysis length of Power vs Time measurement.

### Query

```
[ :SENSE]:PVTime:TIME:LENGth?
```

### Response

```
<time>
```

### Parameter

<time>	Analysis length
Range	0.02 ms to 50 ms or Burst Interval, whichever smaller.
Resolution	0.1 $\mu$ s
	Value is returned in s units.

### Example of Use

To query the analysis length setting of Power vs Time measurement.

```
PVT:TIME:LENG?  
> 0.0010000
```

## 2.8.4 Preamble Search

`[[:SENSe]:PVTime:TIME:PSEarch OFF|ON|0|1`

Preamble Search

Function

This command sets the Preamble Search for Power vs Time measurement. When set to On, Burst Search is performed during Preamble Search. When set to Off, Burst Search is performed from the envelope of the signal.

Command

`[[:SENSe]:PVTime:TIME:PSEarch <switch>`

Parameter

<code>&lt;switch&gt;</code>	Preamble Search
<code>OFF 0</code>	Off
<code>ON 1</code>	Preamble Search (Default)

Details

This command is not available when Measuring Object is Continuous.

Example of Use

To set Preamble Search to ON.  
`PVT:TIME:PSE ON`

`[[:SENSe]:PVTime:TIME:PSEarch?`

Preamble Search Query

Function

This command queries the setting of Preamble Search.

Query

`[[:SENSe]:PVTime:TIME:PSEarch?`

Response

`<switch>`

Parameter

<code>&lt;switch&gt;</code>	Preamble Search
<code>0</code>	Off
<code>1</code>	Preamble Search

Example of Use

To query the setting of Preamble Search.  
`PVT:TIME:PSE?`  
`> 1`

## 2.8.5 Ramp Down Detection

`[[:SENSE]:PVTime:TIME:RDDetection OFF|ON|0|1`

Ramp Down Detection

### Function

This command sets On/Off for the function that detects the falling edge of the burst and automatically sets an appropriate analysis length (number of symbols or chips). When set to Off, analysis length is specified according to the set value of Analysis Length.

### Command

`[[:SENSE]:PVTime:TIME:RDDetection <switch>`

### Parameter

<code>&lt;switch&gt;</code>	Ramp Down Detection
<code>OFF 0</code>	Off
<code>ON 1</code>	Ramp Down Detection (Default)

### Details

This command is not available when Measuring Object is Continuous.

### Example of Use

To set Ramp Down Detection to On.  
`PVT:TIME:RDD 1`

`[[:SENSE]:PVTime:TIME:RDDetection?`

Ramp Down Detection Query

### Function

This command queries the Ramp Down Detection settings.

### Query

`[[:SENSE]:PVTime:TIME:RDDetection?`

### Response

`<switch>`

### Parameter

<code>&lt;switch&gt;</code>	Ramp Down Detection
<code>0</code>	Off
<code>1</code>	Ramp Down Detection

### Example of Use

To query the Ramp Down Detection settings.  
`PVT:TIME:RDD?`  
`> 1`

## 2.8.6 Detection Level

`[[:SENSe]:PVTime:DETEctor:THReshold <integer>`

Detection Level

Function

This command sets the threshold level to detect the rising and falling edges of burst signals.

Command

`[[:SENSe]:PVTime:DETEctor:THReshold <integer>`

Parameter

<code>&lt;integer&gt;</code>	Detection Level
Range	-20 to 0
Resolution	1
Default	0

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When Preamble Search is set to On and Ramp-down Detection is set to Off

Example of Use

To set the threshold to -10.

`PVT:DET:THR -10`

## [[:SENSe]:PVTime:DETEctor:THReshold?

Detection Level Query

### Function

This command queries the threshold level to detect the rising and falling edges of burst signals.

### Query

```
[[:SENSe]:PVTime:DETEctor:THReshold?
```

### Response

```
<integer>
```

### Parameter

<integer>	Ramp Down Detection
Range	-20 to 0
Resolution	1

### Example of Use

To query the threshold setting.

```
PVT:DET:THR?  
> -10
```



## 2.8.7 Detection Offset

`[[:SENSE]:PVTime:DETECTOR:OFFSet <time>`

Detection Offset

Function

This command sets the offset in the time direction for detected burst signals.

Command

`[[:SENSE]:PVTime:DETECTOR:OFFSet <time>`

Parameter

<code>&lt;time&gt;</code>	Detection Offset
Range	-2.0 to 2.0 $\mu$ s
Resolution	0.1 $\mu$ s
Default	0
Suffix code	NS, US, MS, S

Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When Preamble Search is set to On and Ramp-down Detection is set to Off

Example of Use

To set the offset to 0 sec.  
`PVT:DET:OFFS 0`

## [[:SENSe]:PVTime:DETEctor:OFFSet?

Detection Offset Query

### Function

This command queries the offset in the time direction for detected burst signals.

### Query

```
[[:SENSe]:PVTime:DETEctor:OFFSet?
```

### Response

```
<time>
```

### Parameter

<time>	Detection Offset
Range	-2.0 to 2.0
Resolution	0.1

### Example of Use

```
To query the offset setting.  
PVT:DET:OFFS?  
> 0.0000000
```

### 2.8.8 Display Reference Level

`:DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence MAX|AVERage`

Display Reference Level

Function

This command sets the reference value for displaying the waveform.

Command

`:DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence <mode>`

Parameter

<code>&lt;mode&gt;</code>	Range of symbols to be displayed in a constellation
<code>MAX</code>	Uses the maximum instantaneous power as the reference value for displaying the waveform.
<code>AVERage</code>	Uses the average power as the reference value for displaying the waveform (Default).

Example of Use

To set the reference value for displaying the waveform to the maximum instantaneous power.

`DISP:PVT:WIND:REF MAX`

## :DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence?

Display Reference Level Query

### Function

This command queries the reference value for displaying the waveform.

### Query

```
:DISPlay:PVTime[:VIEW]:WINDow[1]:REFerence?
```

### Response

```
<mode>
```

### Parameter

```
<mode>
```

Range of symbols to be displayed in a constellation

```
MAX
```

Uses the maximum instantaneous power as the reference value for displaying the waveform.

```
AVER
```

Uses the average power as the reference value for displaying the waveform

### Example of Use

To query the reference value for displaying the waveform.

```
DISP:PVT:WIND:REF?
```

```
> MAX
```

## 2.8.9 Transient Time Scale

`:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALE]:TIME <integer>`

Transient Time Scale

### Function

This command sets the display range for the horizontal axis, when the rising and falling edges of burst signals are displayed on the Transient screen.

### Command

```
:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALE]:TIME
<integer>
```

### Parameter

<code>&lt;integer&gt;</code>	Transmit Time Scale
Range	8.0 to 40.0 $\mu$ s
Resolution	0.2 $\mu$ s
Default	8.0
Suffix code	NS, US, MS, S

### Details

This setting is not available in the following case(s).

- When Measuring Object is set to Continuous
- When Trace Mode is set to Burst

### Example of Use

To set the display range to 10  $\mu$ s.

```
DISP:PVT:WIND2:TRAC:X:TIME 10US
```

## :DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALe]:TIME?

Transient Time Scale Query

### Function

This command queries the display range for the horizontal axis, when the rising and falling edges of burst signals are displayed.

### Query

```
:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:X[:SCALe]:TIME?
```

### Response

```
<integer>
```

### Parameter

<integer>	Transmit Time Scale
Range	8.0 to 40.0 $\mu$ s
Resolution	0.2 $\mu$ s

### Example of Use

To query the display setting of the horizontal axis.

```
DISP:PVT:WIND2:TRAC:X:TIME?  
> 0.0000100
```

## 2.8.10 Transient Ref. Power

`:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:REFerence TOTal|RAMP`

Transient Ref. Power

### Function

This command sets the transmission power reference value, when the rising and falling edges of burst signals are displayed on the Transient screen.

### Command

`:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:REFerence <mode>`

### Parameter

<mode>	Transmit Ref. Power Mode
TOTal	Uses the transmission power for the entire burst as the reference value.
RAMP	Uses the transmission power within the rising and falling waveform display range as the reference value (Default).

### Details

This setting is not available in the following case(s).

- When the selected Standard is other than 802.11b or 802.11g (ERP-DSSS/CCK)
- When Measuring Object is set to Continuous
- When Trace Mode is set to Burst

### Example of Use

To set the transmission power within the rising and falling waveform display range as the reference value.

`DISP:PVT:WIND2:TRAC:REF RAMP`

## :DISPlay:PVTime[:VIEW]:WINDow2:TRACe:REFerence?

Transient Ref. Power Query

### Function

This command queries the transmission power reference value.

### Query

```
:DISPlay:PVTime[:VIEW]:WINDow2:TRACe:REFerence?
```

### Response

```
<mode>
```

### Parameter

<mode>	<b>Transmit Ref. Power Mode</b>
TOT	Uses the transmission power for the entire burst as the reference value.
RAMP	Uses the transmission power within the rising and falling waveform display range as the reference value.

### Example of Use

To query the vertical axis scale of the result graph.

```
DISP:PVTime:WIND2:TRAC:REF?  
> RAMP
```



### 2.8.11 Marker – On/Off(Power vs Time)

**:CALCulate:PVTime:MARKer[:STATe] OFF|ON|0|1**

Marker – On/Off - Power vs Time

**Function**

This command sets the marker on/off.

**Command**

**:CALCulate:PVTime:MARKer[:STATe] <switch>**

**Parameter**

<switch>	Marker
0 OFF	Off
1 ON	On (Default)

**Example of Use**

To display the marker.  
CALC:PVT:MARK 1

**:CALCulate:PVTime:MARKer[:STATe]?**

Marker – On/Off Query - Power vs Time

**Function**

This command queries the on/off settings of the Marker.

**Query**

**:CALCulate:PVTime:MARKer[:STATe]?**

**Response**

<switch>

**Parameter**

<switch>	Marker
0	Off
1	On

**Example of Use**

To query the Marker settings.  
CALC:PVT:MARK?  
> 1

## 2.8.12 Marker Position Number

`:CALCulate:PVTTime:MARKer:TIME <time>`

Marker Time

Function

This command sets the position of the marker on the graph window by time unit.

Command

`:CALCulate:PVTTime:MARKer:TIME <time>`

Parameter

<code>&lt;time&gt;</code>	Set time
Range	-20 to AnalysisLength + 20 $\mu$ s
Resolution	0.1
Suffix code	NS, US, MS, S
Default	0

Example of Use

To set the position of the marker to 10.  
`CALC:PVT:MARK:TIME 10US`

---

**:CALCulate:PVTTime:MARKer:TIME?**

Marker Time Query

## Function

This command queries the position of the marker on the graph window by time unit.

## Command

```
:CALCulate:PVTTime:MARKer:TIME?
```

## Response

```
<time>
```

## Parameter

<time>	Set time
Range	-20 to AnalysisLength+ 20 $\mu$ s
Resolution	0.1

## Example of Use

To query the marker position (set time).  
CALC:PVT:MARK:TIME?  
> 0.0000100

### 2.8.13 Bottom Graph Marker Value

`:CALCulate:PVTTime:WINDow2:MARKer:POWer:ABSolute[1]?`

Bottom Graph Marker Power

Function

This command queries the Power value of the Bottom Graph Marker position in dBm units.

Query

`:CALCulate:PVTTime:WINDow2:MARKer:POWer:ABSolute[1]?`

Response

`<power>`

Parameter

`<power>`

Resolution	0.01
Unit	dBm

Example of Use

To query the Power value of the Bottom Graph Marker position.

`CALC:PVT:WIND2:MARK:POW:ABS?`

`> -78.45`

## 2.8.14 Active Trace

`:CALCulate:PVTime:MARKer:ACTive RISE|FALL`

Active Trace

Function

When Trace Mode is set to Transient, this command sets whether to use the trace that contains the rising edge or the trace that contains the falling edge as the active trace to be displayed in the graph window.

Command

`:CALCulate:PVTime:MARKer:ACTive <mode>`

Parameter

<mode>	Active trace
RISE	Trace that contains the rising edge (Default)
FALL	Trace that contains the falling edge

Example of Use

To set the active trace to the one that contains the rising edge.  
`CALC:PVT:MARK:ACT RISE`

## :CALCulate:PVTTime:MARKer:ACTive?

Active Trace Query

### Function

When Trace Mode is set to Transient, this command queries whether to use the trace that contains the rising edge or the trace that contains the falling edge as the active trace to be displayed in the graph window.

### Command

```
:CALCulate:PVTTime:MARKer:ACTive?
```

### Response

```
<mode>
```

### Parameter

<mode>	Active trace
RISE	Trace that contains the rising edge
FALL	Trace that contains the falling edge

### Example of Use

```
To query the active trace.  
CALC:PVT:MARK:ACT?  
> RISE
```

## 2.8.15 Smoothing

**:CALCulate:SMOothing[:STATe] OFF|ON|0|1**

Smoothing

Function

This command enables/disables smoothing for the trace.

Command

```
:CALCulate:SMOothing[:STATe] <switch>
```

Parameter

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

Example of Use

To enable smoothing for the trace.  
 CALC:SMO ON

**:CALCulate:SMOothing[:STATe]?**

Smoothing Query

Function

This command queries Smoothing On/Off status of the trace.

Query

```
:CALCulate:SMOothing[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Smoothing On/Off
1	On
0	Off

Example of Use

To query the Smoothing On/Off status.  
 CALC:SMO?  
 > 1

## 2.9 Measurement Result Saving Function

Table 2.9-1 lists device messages for saving measurement results.

**Table 2.9-1 Measurement Result Saving Function**

Function	Device Messages
Save All Results Data	: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>&lt;filename&gt;</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:  <code>\ / : * ? " ' &lt; &gt;  </code></p> <p>When omitted, the file is automatically named in the following format: “WLAN date_sequential number.xml”  WLAN20080617_00.xml</p>
<code>&lt;device&gt;</code>	<p>Drive name</p> <p>D,E,F,...</p> <p>D 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\WLAN`

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
```

## 2.10 Replay Function

Table 2.10-1 lists the device messages for the Replay function.

**Table 2.10-1 Device message for setting Replay function**

Function	Device Messages
Stop Replay	:MMEMory:LOAD:IQData:STOP
Execute Replay	:MMEMory:LOAD:IQData <filename>, <device>, <application>
Replay File Information Query	:MMEMory:LOAD:IQData:INFormation?
Replay Execute Query	:MMEMory:LOAD:IQData:INFormation:STATE?
Replay Filename Query	:MMEMory:LOAD:IQData:INFormation:FILE?
Replay Device Query	:MMEMory:LOAD:IQData:INFormation:DEVICE?
Replay Application Query	:MMEMory:LOAD:IQData:INFormation:APPLication?
Replay Level Over Query	:MMEMory:LOAD:IQData:INFormation:CONDition?
Replay Error Icon Query	:MMEMory:LOAD:IQData:INFormation:ERRor?
Replay Correction Query	:MMEMory:LOAD:IQData:INFormation:CORRection?
Replay External Reference Query	:MMEMory:LOAD:IQData:INFormation:ROSCillator?

## :MMEMory:LOAD:IQData:STOP

Stop Replay

Function

This command stops the Replay function.

Command

```
:MMEMory:LOAD:IQData:STOP
```

Details

This command is available only when the Replay function is executed.

Example of Use

To stop the Replay function.

```
MMEM:LOAD:IQD:STOP
```

## :MMEMory:LOAD:IQData <filename>,<device>,<application>

Execute Replay

Function

This command executes the Replay function. Set a file, a drive, and an application to select the target IQ data.

Command

```
:MMEMory:LOAD:IQData <filename>,<device>,<application>
```

Parameter

<filename>	Target file name Character string within 32 characters enclosed by double quotes ( " ") or single quotes ( ' ') (excluding extension) The following characters cannot be used: \ / : * ? " " \ ' < >
<device>	Drive name D, E, F, ...
<application>	Application to load IQ data file WLAN WLAN (802. 11) Measurement Software

Example of Use

To load the IQ data file named TEST in drive D and to execute the Replay function.

```
MMEM:LOAD:IQD "TEST",D,WLAN
```

**:MMEMory:LOAD:IQData:INFormation?**

Replay File Information Query

## Function

This command queries the information of the file for which the Replay function is executed.

## Query

```
:MMEMory:LOAD:IQData:INFormation?
```

## Response

```
<filename>,<time_length>
```

## Parameter

```
<filename>
```

File name

Character string within 32 characters (excluding extension)

\*\*\* is returned when the Replay function is not executed.

```
<time_length>
```

Time length of analyzable IQ data

Resolution

0.1 ms

No suffix code. Value is returned in s units.

-999999999999 is returned when the Replay function is not executed.

## Example of Use

To query the information of the file for which the Replay function is executed.

```
MMEM:LOAD:IQD:INF?
```

```
> TEST,0.02
```

## :MMEMory:LOAD:IQData:INFormation:STATe?

Replay Execute Query

### Function

This command queries whether the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:STATe?
```

### Response

```
<switch>
```

### Parameter

<switch>	Replay On/Off
1	Replay function is being executed.
0	Off

### Example of Use

To query whether the Replay function is executed.

```
MMEM:LOAD:IQD:INF:STAT?  
> 1
```

## :MMEMory:LOAD:IQData:INFormation:FILE?

Replay Filename Query

### Function

This command queries the name of the file for which the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:FILE?
```

### Response

```
<filename>
```

### Parameter

<filename>	File name
	Character string within 32 characters (excluding extension)
	*** is returned when the Replay function is not executed.

### Example of Use

To query the name of the file for which the Replay function is executed.

```
MMEM:LOAD:IQD:INF:FILE?  
> TEST
```

**:MMEMory:LOAD:IQData:INFormation:DEVIce?**

Replay Device Query

## Function

This command queries the name of the drive for which the Replay function is executed.

## Query

```
:MMEMory:LOAD:IQData:INFormation:DEVIce?
```

## Response

```
<device>
```

## Parameter

```
<device>
```

Drive name

D, E, F, . . .

\*\*\* is returned when the Replay function is not executed.

## Example of Use

To query the name of the drive for which the Replay function is executed.

```
MMEM:LOAD:IQD:INF:DEV?
```

```
> D
```

**:MMEMory:LOAD:IQData:INFormation:APPLIcation?**

Replay Application Query

## Function

This command queries the name of the application for which the Replay function is executed.

## Query

```
:MMEMory:LOAD:IQData:INFormation:APPLIcation?
```

## Response

```
<application>
```

## Parameter

```
<application>
```

```
WLAN
```

Application to load IQ data file

WLAN (802. 11) Measurement Software

\*\*\* is returned when the Replay function is not executed.

## Example of Use

To query the name of the application for which the Replay function is executed.

```
MMEM:LOAD:IQD:INF:APPL?
```

```
> WLAN
```

## :MMEMory:LOAD:IQData:INFormation:CONDition?

Replay Level Over Query

### Function

This command queries whether Level Over is displayed while the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:CONDition?
```

### Response

```
<switch>
```

```
1 Level Over is displayed
```

```
0 Normal
```

-999. 0 is returned when the Replay function is not executed.

### Example of Use

To query whether Level Over is displayed while the Replay function is executed.

```
MMEM:LOAD:IQD:INF:COND?
```

```
> 0
```



## :MMEMory:LOAD:IQData:INFormation:ERRor?

Replay Error Icon Query

### Function

This command queries whether the Replay Error Info. icon is displayed while the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:ERRor?
```

### Response

```
<switch>
  1      Replay Error Info. icon is displayed.
  0      Normal
         -999. 0 is returned when the Replay function is
         not executed.
```

### Details

The Replay Error Info. icon is displayed if the loaded xml file contains error information.

### Example of Use

To query whether the Replay Error Info. icon is displayed while the Replay function is executed.

```
MMEM:LOAD:IQD:INF:ERR?
```

```
> 0
```

## :MMEMory:LOAD:IQData:INFormation:CORRection?

Replay Correction Query

### Function

This command queries the Correction value while the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:CORRection?
```

### Response

```
<real>
```

### Parameter

<real>	Correction level
Range	-100 to 100 dB
	0.000 is returned when Correction is Off.
	-999. 0 is returned when the Replay function is not executed.

### Example of Use

To query the Correction value while the Replay function is executed.  
MMEM:LOAD:IQD:INF:CORR?

## :MMEMory:LOAD:IQData:INFormation:ROSCillator?

Replay External Reference Query

### Function

This command queries the frequency reference signal source when the Replay function is executed.

### Query

```
:MMEMory:LOAD:IQData:INFormation:ROSCillator?
```

### Response

```
<source>
```

### Parameter

<source>	Frequency reference signal source
INT	Internal reference signal source
INTU	Internal reference signal source (Unlock state)
EXT	External reference signal source
EXTU	Internal reference signal source (Unlock state)

\*\*\* is returned when the Replay function is not executed.

Example of Use

To query the frequency reference signal source when the Replay function is executed.

MMEM:LOAD:IQD:INF:ROSC?

## 2.11 Reading IQproducer Parameter File

This section explains the device message that pertains to reading parameter files.

The device message about reading IQproducer parameter file is as Table 2.11-1.

Table 2.11-1 Reading IQproducer Parameter File

Function	Device Message
Recall IQproducer Parameter File	:MMEMory:LOAD:IQPRoducer <filename>[,<device>]

**:MMEMory:LOAD:IQPRoducer <filename>[,<device>]**

Recall IQproducer Parameter File

Function

Reading IQproducer Parameter File

Command

:MMEMory:LOAD:IQPRoducer <filename>[,<device>]

Parameter

<filename> Target file name  
Character string within 32 characters enclosed  
by double quotes ( " ") or single quotes ( ' ' )

The following characters cannot be used:  
 \ / : \* ? " ' < > |

<device> Drive name  
D,E,F,...  
D when omitted.

Detail

Reads the IQproducer parameter file saved in the folder below.

[Drive name]:\Anritsu Corporation\Signal Analyzer\User  
Data\IQproducer\WLAN

Example of Use

Reading IQproducer Parameter File called "TEST"  
MMEM:LOAD:IQPR "TEST",D

## Chapter 3 SCPI Status Register

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

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	: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
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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: $2^2 = 4$	Signal Abnormal
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 65535

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.

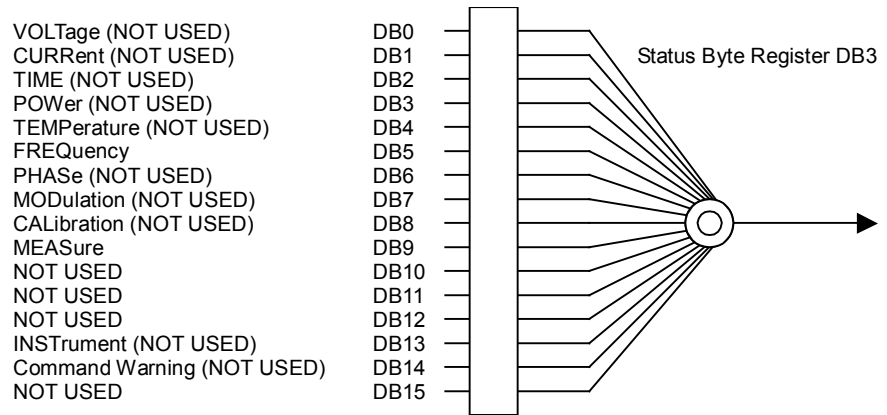


Figure 3.2-1 QUESTIONABLE Status Register

Table 3.2-1 Bit Definition of QUESTIONABLE Status Register

Bit	Definition
DB5	Reference Clock Unlock
DB9	QUESTIONABLE Measure Register Summary

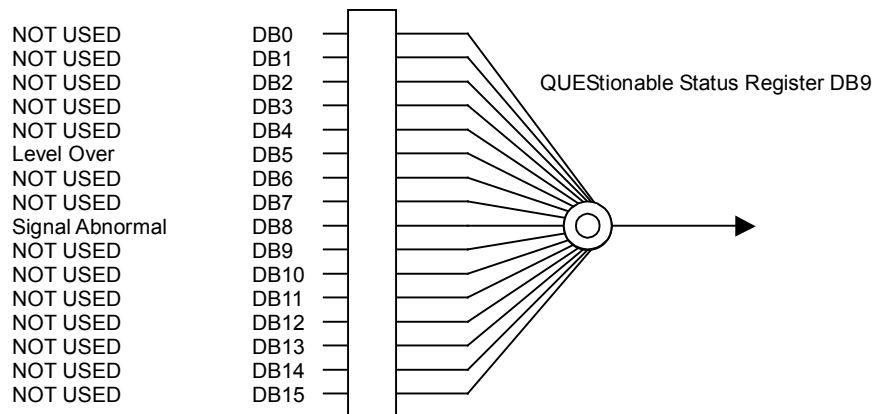


Figure 3.2-2 QUESTIONABLE Measure Register

Table 3.2-2 Bit Definition of QUESTIONABLE Measure Register

Bit	Definition
DB5	Level Over
DB8	Signal Abnormal

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>&lt;integer&gt;</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>&lt;integer&gt;</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>&lt;integer&gt;</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>&lt;integer&gt;</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.

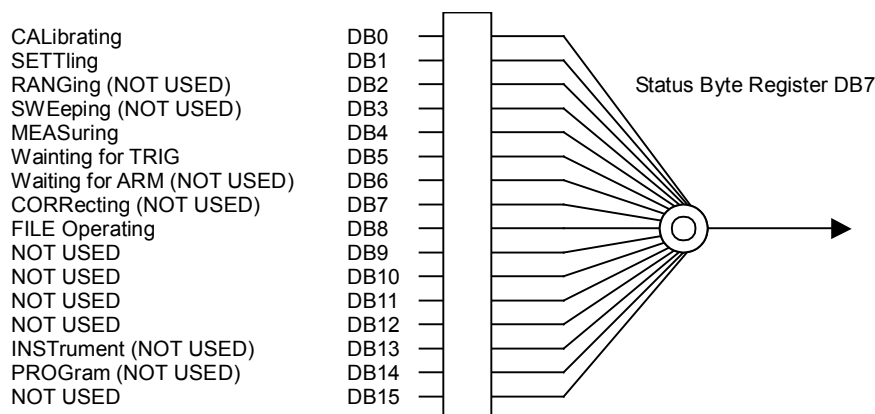


Figure 3.3-1 OPERATION Status Register

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>&lt;integer&gt;</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>&lt;integer&gt;</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
```

