MX283027A-001
WLAN Test Software
Operation Manual
Remote Control

Fourth 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 MS2830A Signal Analyzer Operation Manual (Mainframe Operation) and MX283027A-001 WLAN Test 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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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

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

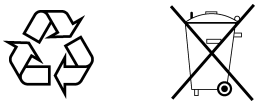
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

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.

MX283027A-001
WLAN Test Software
Operation Manual Remote Control

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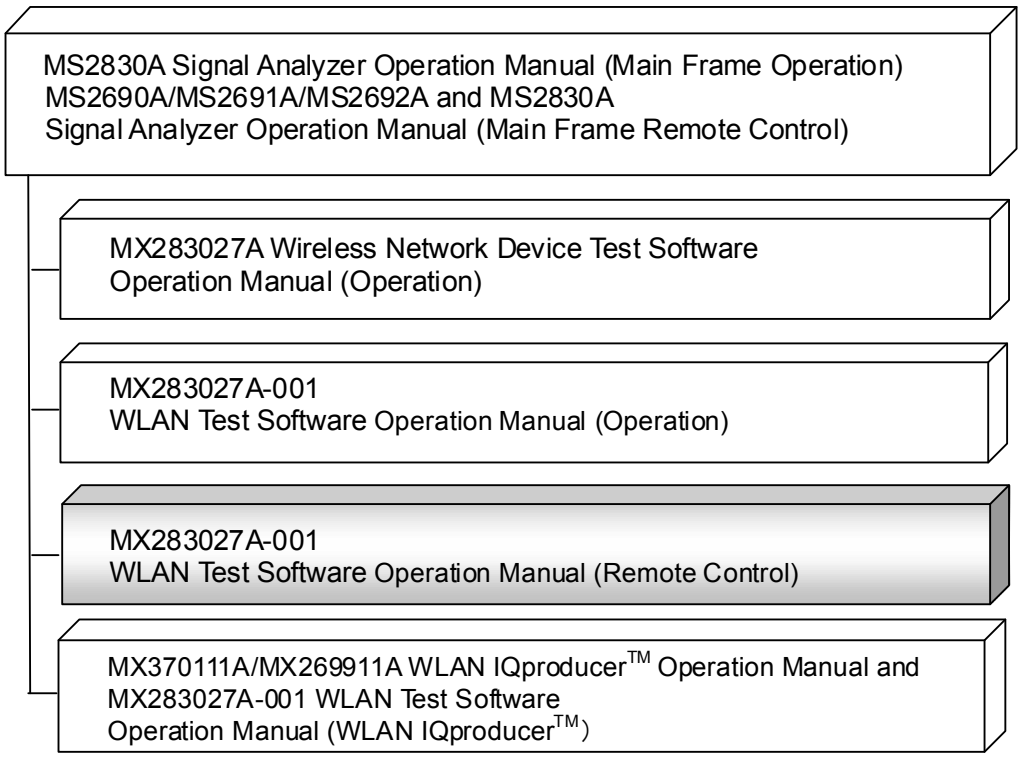
About This Manual

■Composition of Operation Manuals

The operation manuals for MX283027A-001 WLAN Test 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.

- MX283027A Wireless Network Device Test Software Operation Manual (Operation)

This manual describes basic operating methods and functions of the MX283027A Wireless Network Device Test Software.

- MX283027A-001 WLAN Test Software Operation Manual (Operation)
- MX283027A-001 WLAN Test Software Operation Manual (Remote Control) <This document>

This manual describes remote control of the MX283027A Wireless Network Device Test Software.

- MX370111A/MX269911A WLAN IQproducer™ Operation Manual and MX283027A-001 WLAN Test Software Operation Manual（WLAN IQproducer™）

This manual describes basic operating methods and functions of the WLAN IQproducer.

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Table of Contents

IV.

Chapter 1 Outline

This chapter outlines the remote control operation of the MX283027A-001 WLAN Test Software (hereinafter referred to as “this application”).

1.1 Outline

This application can be controlled from an external controller (PC) by remote control commands using the MS2830A Signal Analyzer. The remote control commands are defined by the SCPI format.

1.1.1 Interface

The MS2830A supports GPIB, Ethernet and USB as remote control interfaces. Only one of these can be used at once.

The interface to be used is determined automatically according to the communication start command received from the external controller (PC) while the MS2830A is in Local status. This instrument enters the remote state after the interface has been determined. At remote-interface operation, the front panel Remote lamp lights; the lamp is off at local-interface operation. Refer to *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. The MX283027A-001 measures an input signal by using the resource of RF Input. Thus, the MX283027A-001 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, the MX283027A-001 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 by using this application.

Figure 1.2-1 shows the flow of the basic control process. 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.

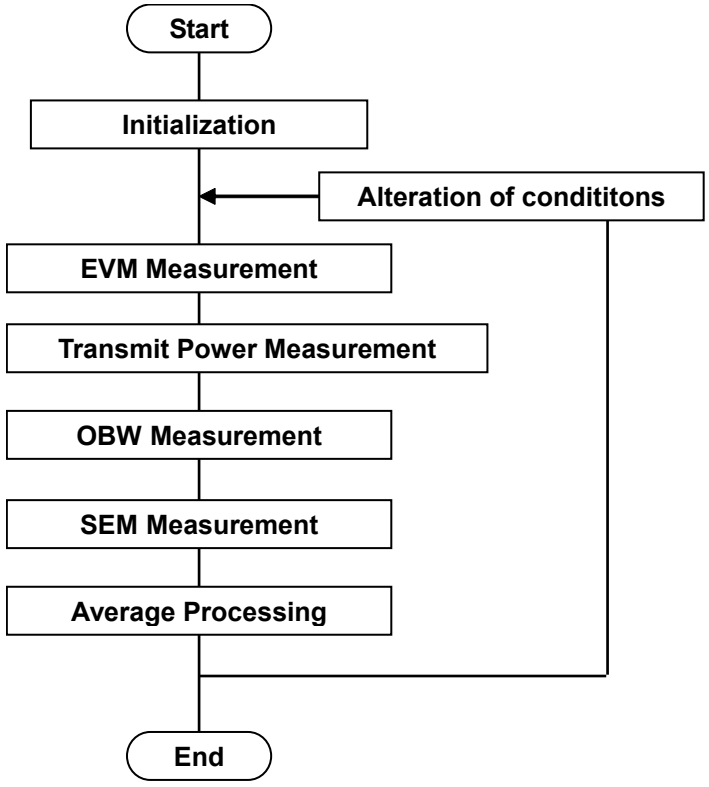

Figure 1.2-1 Flow of basic test

(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) Set the common parameters for the Batch measurement functions that are executed by using this application. This includes such as the trigger, modulation mode, and bandwidth.

1.2.3 Setting of batch measurement-common parameters

(4) Batch measurement

Execute in order the measurement functions executed with the MX283027A-001. 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 Batch measurement

1.2.1 Initialization

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

(1) 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. The Signal Analyzer and Spectrum Analyzer applications should be loaded, too.

(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.

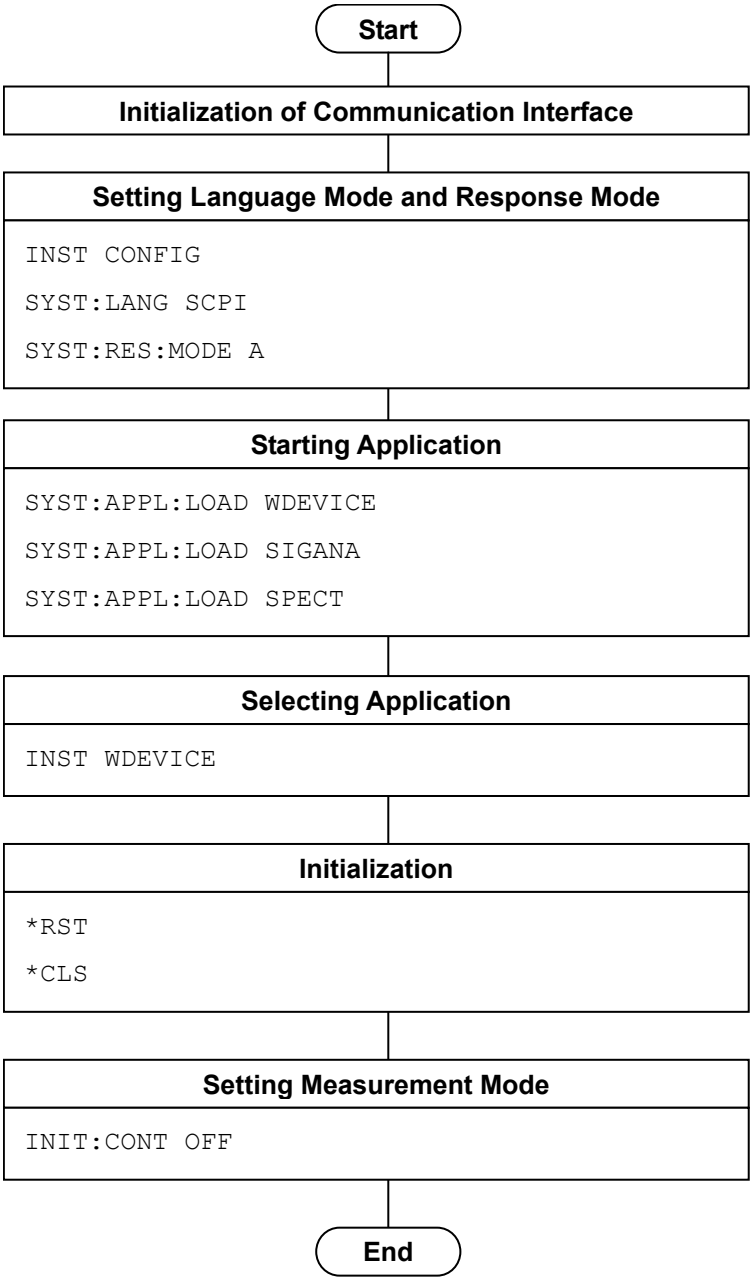

Figure 1.2.1-1 Initialization flow and command example

1.2.2 Setting of basic parameters

Set the common parameters (carrier frequency, input level, etc.) using the application/Signal Analyzer/Spectrum Analyzer. The basic parameters include the following:

(1) Carrier Frequency

(2) Input Level (Reference Level･Attenuator)

(3) Level Offset

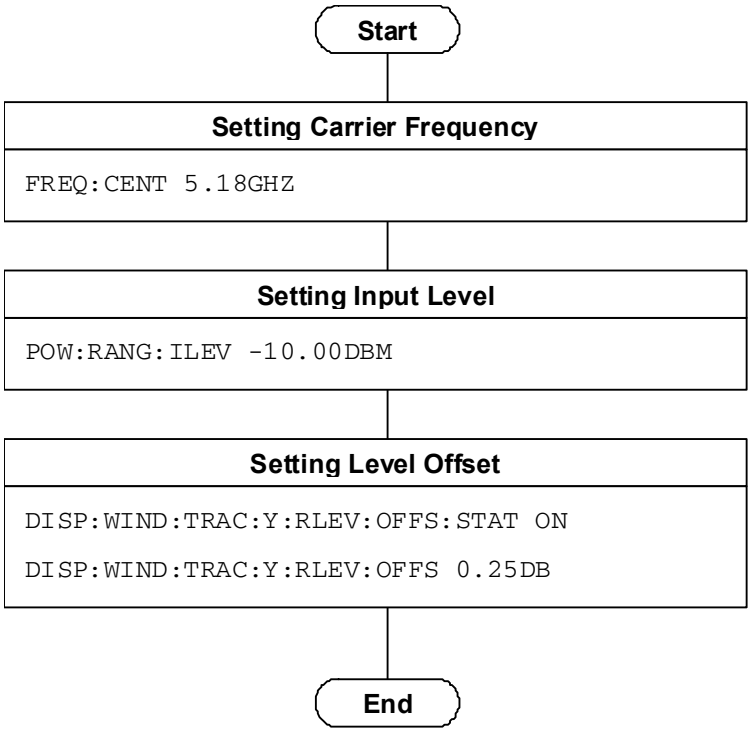

Figure 1.2.2-1 Flow of basic parameter setting and command example

1.2.3 Setting of batch measurement-common parameters

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

(1) Trigger
  (a) Trigger Switch
  (b) Trigger Source
  (c) Trigger Slope
  (d) Trigger Delay
(2) WLAN Standard
(3) Modulation
  (4) Preamble
(5) Burst Interval

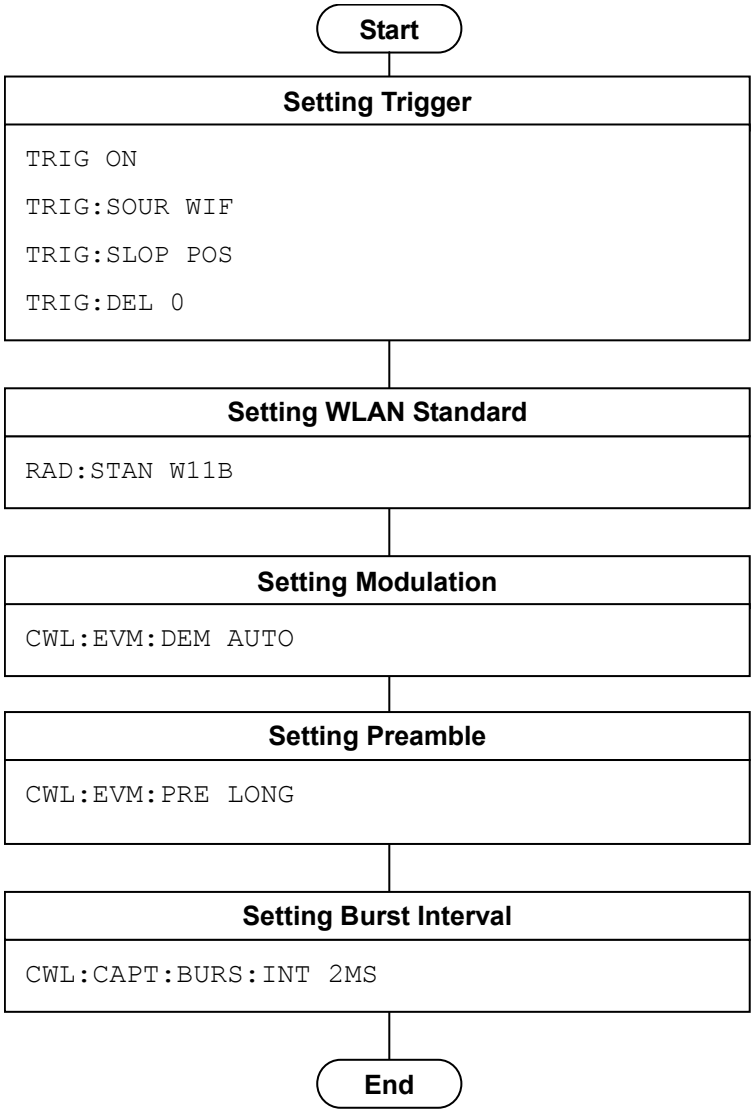

Figure 1.2.3-1 Flow of common settings for batch measurement and command example

1.2.4 Batch measurement

The Batch measurement is executed in the following order:

(1) Selecting the measurement function.

(2) Setting the measurement parameters
The following parameters are used only for the EVM measurement.

(a) EVM Measurement

(b) Storage Mode

(c) Storage Count

(d) Analysis Length Setup

(e) EVM Calculation Method

(f) Reference Filter

(d) Analysis Length Setup

(e) EVM Calculation Method

(f) Reference Filter

(g) Alpha/BT

(h) EVM Peak Limits

(3) Executing measurement and querying the result

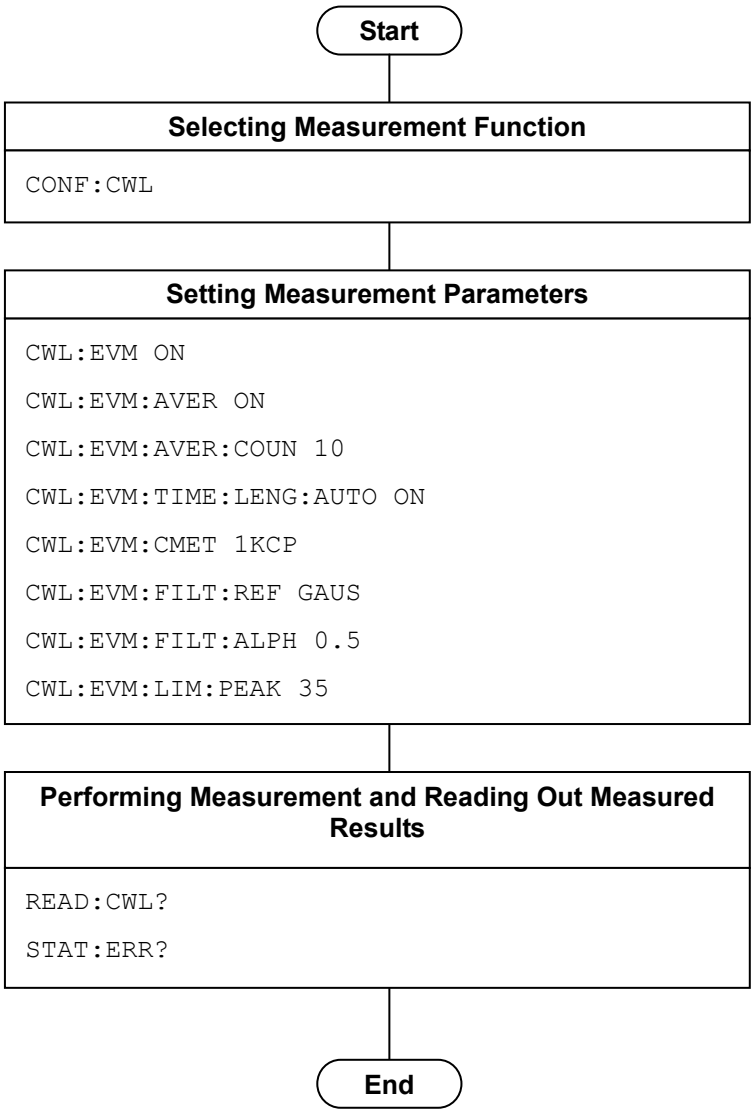

Figure 1.2.4-1 Flow of modulation measurement and command example

1.3 How to use the Native Mode

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

The Native mode processes commands that are in this instrument’s own definition type. Unless otherwise specified, the character string of a command header is fixed. If application commands are defined only by the SCPI mode, character strings converted according to the conversion rules are the commands in the Native mode. For programming, you cannot use the grammar of 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 `SYST:LANG NAT`.

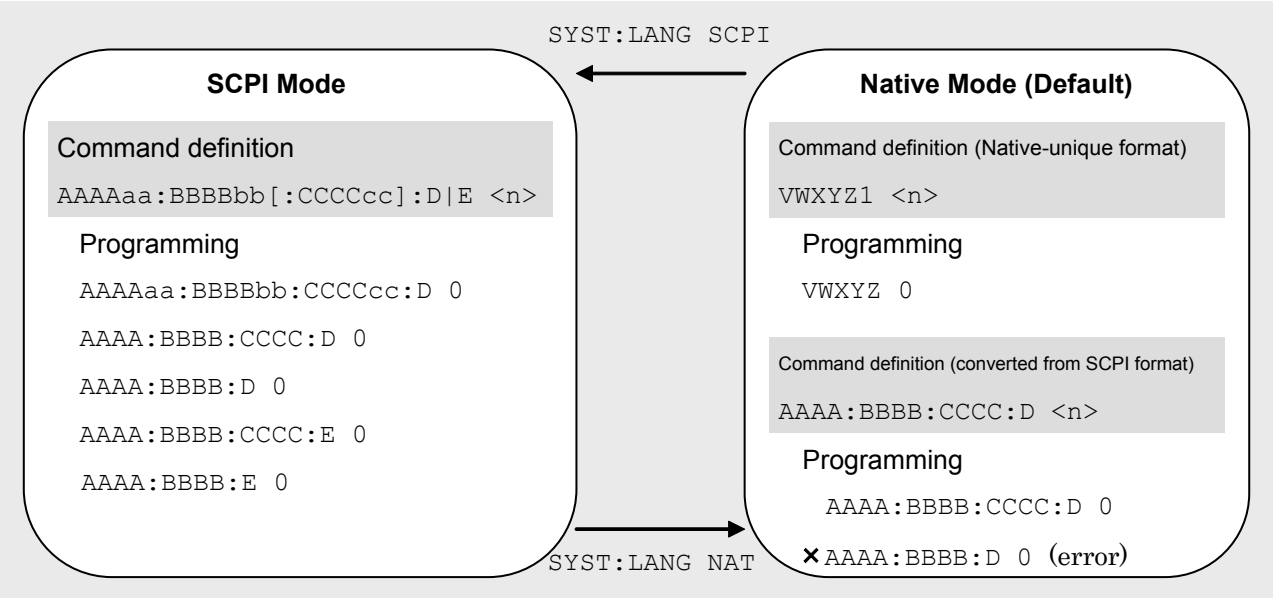

Figure 1.3-1 SCPI and native modes

The MX MX283027A-001 is only defined by the SCPI mode commands. You need to follow the conversion rules below in order to control the MX283027A-001 by using the Native mode.

Conversion rule

1. Move the numeric parameters in the SCPI mode program header to the head of the arguments. Omit parameters that represent only one type of value and can be omitted. Leave parameters that represent only one type of value but cannot be omitted.
2. Use the first node if multiple ones can be selected.
3. Delete layers that can be deleted.
4. Alter all the long forms into the short ones.
5. Omit the colon (":") at the head of the command.

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 layers that can be deleted.

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

[3] Alter all the long forms into the short ones.

```
:CALCulate:MARKer:CENTer <integer>
↓
:CALC:MARK:CENT <integer>
```

[4] Omit the colon (":") at the head of the command.

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

Example 2

`[:SENSe]:BPOWer|:TXPower[:STATe]?`

into a Native mode.

1. Use the first node if multiple ones can be selected.

   `[:SENSe]`**`:BPOWer|:TXPower`**`[:STATe]?`

   ↓

   `[:SENSe]`**`:BPOWer`**`[:STATe]?`

2. Delete layers that can be deleted.

   `[:SENSe]``:BPOWer`**`[:STATe]`**`?`

   ↓

   `:BPOWer?`

3. Alter all long forms into short forms.

   `:BPOWer?`

   ↓

   `:BPOW?`

4. Omit the colon (":") at the head of the command.

   `:BPOW?`

   ↓

   `BPOW?`

1.4 Setting Numeric Program Data

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

(1) `DEFault`

After DEFault has been set to numeric program data, the target parameter is set to the default value.

(2) `MINimum`

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

(3) `MAXimum`

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

In the MX283027A-001, DEFault, MINimum, and MAXimum can be used for the following parameters.

`<freq>`

`<real>`

`<rel_power>`

`<integer>`

`<time>`

Chapter 2 SCPI Device Message Details

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

2.1 Selecting Application

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

Table 2.1-1 Device Messages for Selecting Application

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

2.1.1 Launching application

:SYSTem:APPLication:LOAD WDEVICE

Load Application

Function

This command loads this application.

Command

```
:SYSTem:APPLication:LOAD WDEVICE
```

Details

This function loads an installed application and registers it to the Application Switch menu. Use this function after specifying `Config` for the application to be controlled.

Example of Use

To load this application.

```
SYST:APPL:LOAD WDEVICE
```

:SYSTem:APPLication:UNLoad WDEVICE

Unload Application

Function

This command exits this application.

Command

```
:SYSTem:APPLication:UNLoad WDEVICE
```

Details

This function exits an activated application and deletes it from the Application Switch menu. Use this function after specifying Config for the application to be controlled.

Example of Use

To exit this application.

```
SYST:APPL:UNL WDEVICE
```

2.1.2 Selecting application

:INSTrument[:SELect] WDEVICE|CONFIG

Application Switch

Function

This command selects the controlled application.

Command

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

Parameter

<apl_name>	Application
WDEVICE	This application
CONFIG	Config

Example of Use

To switch the control target to this application.

```
INST WDEVICE
```

:INSTrument[:SELect]?

Application Switch Query

Function

This command queries the controlled application.

Query

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

Response

```
<apl_name>
```

Parameter

<apl_name>	Application
WDEVICE	This application
SIGANA	Signal Analyzer
SPECT	Spectrum Analyzer
CONFIG	Config

Details

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

Example of Use

To query the controlled application.

```
INST?
> WDEVICE
```

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

Application Switch And Window Status

Function

This command selects the control target application and specifies the window status.

Command

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

Parameter

<apl_name>	Application
WDEVICE	This application
CONFIG	Config
<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 WDEVICE,ACT
```

:INSTrument:SYSTem? WDEVICE

Application Switch And Window Status Query

Function

This command queries the status of the specified application.

Query

```
:INSTrument:SYSTem? <apl_name>
```

Response

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

Parameter

<apl_name>	Application
WDEVICE	This application
CONFIG	Config
<status>	Application status
CURR	Executed and targeted for control
RUN	Executed but not targeted for control
IDLE	Loaded but not executed
UNL	Not loaded
<window>	Window status
ACT	Active
INAC	Inactive
MIN	Minimized
NON	Window not displayed

Example of Use

To query the status of this application.

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

2.1.3 Initialization

:INSTrument:DEFault

Preset Current Application

Function

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

Command

```
:INSTrument:DEFault
```

Example of Use

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

```
INST:DEF
```

:SYSTem:PRESet

Preset Current Application

Function

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

Refer to `:INSTrument:DEFault`.

Example of Use

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

```
SYST:PRES
```

2.2 Setting Basic Parameters

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

Table 2.2-1 Device Messages for Setting Basic Parameters

Parameter	Device Message
Carrier Frequency	[:SENSe]:FREQuency:CENTer <freq>
	[:SENSe]:FREQuency:CENTer?
Channel Number	[:SENSe]:CWLan:CHANnel <integer>
	[:SENSe]:CWLan:CHANnel?
Input Level	[:SENSe]:POWer[:RF]:RANGe:ILEVel <real>
	[:SENSe]:POWer[:RF]:RANGe:ILEVel?
Level Offset	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet <rel_power>
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet?
Level Offset State	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe OFF|ON|0|1
	:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:STATe?

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

<freq>		Carrier frequency
	Range	100 MHz to 3.6 GHz (MS2830A-040) 100 MHz to 6 GHz (MS2830A-041) 100 MHz to 13.5 GHz (MS2830A-043)
	Resolution	1 Hz
	Suffix code	HZ,KHZ,KZ,MHZ,MZ,GHZ,GZ Hz is used when omitted.
	Default	2.412 GHz

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 3.6 GHz (MS2830A-040) 100 MHz to 6 GHz (MS2830A-041) 100 MHz to 13.5 GHz (MS2830A-043)
	Resolution	1 Hz Value is returned in Hz units.

Example of Use

To query the carrier frequency.

```
FREQ:CENT?
> 5000000000
```

[:SENSe]:CWLan:CHANnel <integer>

Channel Number

Function

This command sets the channel center frequency by channel number.

Command

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

Parameter

<integer>		Channel Number(s)
	Range	1 to 14, 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165
	Default	1

Example of Use

To set channel number to 1.

```
CWL:CHAN 1
```

[:SENSe]:CWLan:CHANnel?

Channel Number Query

Function

This command queries the channel number setting.

Query

```
[:SENSe]:CWLan:CHANnel?
```

Response

```
<integer>
```

Parameter

`<integer>`		Channel Number(s)
	Range	1 to 14, 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165

Example of Use

To query the channel number setting.

```
CWL:CHAN?
> 1
```

2.2.2 Input Level

[:SENSe]:POWer[:RF]:RANGe:ILEVel <real>

Input Level

Function

This command sets the input level of RF signals.

Command

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

Parameter

<real>		Input level
Range		(–60.00+Level Offset) to (30.00+Level Offset) dBm
Resolution		0.01 dB
Unit		1 dBm
Suffix code	DBM	dBm is used when omitted.
Default		–10.00 dBm

Example of Use

To set the input level to 0 dBm.

```
POW:RANG:ILEV 0
```

[:SENSe]:POWer[:RF]:RANGe:ILEVel?

Input Level Query

Function

This command queries the input level of RF signals.

Query

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

Response

```
<real>
```

Parameter

`<real>`		Input level
	Range	(–60.00+Level Offset) to (30.00+Level Offset) dBm
	Resolution	0.01 dB Value is returned in dBm units.

Example of Use

To query the input level.

```
POW:RANG:ILEV?
> -15.00
```

2.2.3 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

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

Example of Use

To set the 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

<rel_power>	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
```

2.2.4 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
```

2.3 Setting System Parameters

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

Table 2.3-1 Device Messages for Setting System Parameters

Parameter	Device Message
WLAN Standard	[:SENSe]:RADio:STANdard W11A|W11B|WGOFdm|WGDSss|W11N
	[:SENSe]:RADio:STANdard?
Data Rate	[:SENSe]:CWLan:EVM:DRATe AUTO|6MBPs|9MBPs|12MBps|18MBps|24MBps|36MBps|48MBps|54MBps
	[:SENSe]:CWLan:EVM:DRATe?
Modulation	[:SENSe]:CWLan:EVM:DEMod AUTO|DSSS1|DSSS2|CC55|CC11
	[:SENSe]:CWLan:EVM:DEMod?
Preamble	[:SENSe]:CWLan:EVM:PREamble AUTO |LONG |SHORt
	[:SENSe]:CWLan:EVM:PREamble?
PPDU Format	[:SENSe]:CWLan:EVM:PFORmat MIXed|GREenfield
	[:SENSe]:CWLan:EVM:PFORmat?
Channel Bandwidth	[:SENSe]:CWLan:EVM:CBANdwidth 20|40|40UPper|40LOwer
	[:SENSe]:CWLan:EVM:CBANdwidth?
Burst Interval	[:SENSe]:CWLan:CAPTure:BURSt:INTerval <time>
	[:SENSe]:CWLan:CAPTure:BURSt:INTerval?
Burst Threshold	[:SENSe]:CWLan:CAPTure:BURSt:THReshold <real>
	[:SENSe]:CWLan:CAPTure:BURSt:THReshold?
Load Standard Parameter	[:SENSe]:CWLan:RADio:STANdard:LOAD <function>,[,<pattern>]
	[:SENSe]:CWLan:RADio:STANdard:LOAD? <function>

2.3.1 WLAN Standard

[:SENSe]:RADio:STANdard W11A|W11B|WGOFdm|WGDSss|W11N

WLAN Standard

Function

This command sets the standard of measured signal.

Command

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

Parameter

<mode>	Standard of measured signal
W11A	Analyze as 802.11a signal (default)
W11B	Analyze as 802.11b signal
WGOFdm	Analyze as 802.11g OFDM signal
WGDSss	Analyze as 802.11g DSSS signal
W11N	Analyze as 802.11n signal

Example of Use

To set the standard of measured signal to 802.11a

```
RAD:STAN W11A
```

[:SENSe]:RADio:STANdard?

WLAN Standard Query

Function

This command queries the standard of measured signal.

Query

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

Response

```
<mode>
```

Parameter

<mode>	Standard of measured signal
W11A	Analyse as 802.11a signal (default)
W11B	Analyze as 802.11b signal
WGOF	Analyze as 802.11g OFDM signal
WGDS	Analyze as 802.11g DSSS signal
W11N	Analyze as 802.11n signal

Example of Use

To query the band of the measured signal.

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

2.3.2 Data Rate

[:SENSe]:CWLan:EVM:DRATe
AUTO|6MBPs|9MBPs|12MBps|18MBps|24MBps|36MBps|48MBps|54MBps

Data Rate

Function

This command sets the modulation mode of measured signal.

Command

```
[:SENSe]:CWLan:EVM:DRATe <mode>
```

Parameter

<mode>	Modulation mode of measured signal
AUTO	Auto-detects the modulation mode (default)
6MBPs	Sets BPSK 6Mbps modulation mode for analysis.
9MBPs	Sets BPSK 9Mbps modulation mode for analysis.
12MBPs	Sets QPSK 12Mbps modulation mode for analysis.
18MBPs	Sets QPSK 18Mbps modulation mode for analysis.
24MBPs	Sets 16QAM 24Mbps modulation mode for analysis.
36MBPs	Sets 16QAM 36Mbps modulation mode for analysis.
48MBPs	Sets 64QAM 48Mbps modulation mode for analysis.
54MBPs	Sets 64QAM 54Mbps modulation mode for analysis.

Details

This command is not available when 802.11a or 802.11g OFDM is NOT selected.

Example of Use

To set Data Rate to AUTO.

```
CWL:EVM:DRATe AUTO
```

[:SENSe]:CWLan:EVM:DRATe?

Data Rate Query

Function

This command queries the modulation mode of measured signal.

Query

```
[:SENSe]:CWLan:EVM:DRATe?
```

Response

```
<mode>
```

Parameter

`<mode>`	Modulation mode of measured signal
`AUTO`	Auto-detects the modulation mode (default)
`6MBP`	Sets BPSK 6Mbps modulation mode for analysis.
`9MBP`	Sets BPSK 9Mbps modulation mode for analysis.
`12MB`	Sets QPSK 12Mbps modulation mode for analysis.
`18MB`	Sets QPSK 18Mbps modulation mode for analysis.
`24MB`	Sets 16QAM 24Mbps modulation mode for analysis.
`36MB`	Sets 16QAM 36Mbps modulation mode for analysis.
`48MB`	Sets 64QAM 48Mbps modulation mode for analysis.
`54MB`	Sets 64QAM 54Mbps modulation mode for analysis.

Example of Use

To query the data rate of measured signal

```
CWL:EVM:DRATe?
> AUTO
```

2.3.3 Modulation

[:SENSe]:CWLan:EVM:DEMod AUTO|DSSS1|DSSS2|CC55|CC11

Modulation

Function

This command sets the modulation mode of measured signal.

Command

```
[:SENSe]:CWLan:EVM:DEMod <mode>
```

Parameter

<mode>	Modulation mode of measured signal
AUTO	Auto-detects the modulation mode (default)
DSSS1	Sets DSSS 1Mbps modulation mode for analysis.
DSSS2	Sets DSSS 2Mbps modulation mode for analysis.
CC55	Sets CCK 5.5Mbps modulation mode for analysis.
CC11	Sets CCK 11Mbps modulation mode for analysis.

Details

This command is not available when 802.11b or 802.11g DSSS is NOT selected.

Example of Use

To set the modulate mode to AUTO.

```
CWL:EVM:DEM AUTO
```

[:SENSe]:CWLan:EVM:DEMod?

Modulation Query

Function

This command queries the modulation mode of measured signal.

Query

```
[:SENSe]:CWLan:EVM:DEMod?
```

Response

```
<mode>
```

Parameter

<mode>	Modulation mode of measured signal
AUTO	Auto-detects the modulation mode
DSSS1	Sets DSSS 1Mbps modulation mode for analysis.
DSSS2	Sets DSSS 2Mbps modulation mode for analysis.
CC55	Sets CCK 5.5Mbps modulation mode for analysis.
CC11	Sets CCK 11Mbps modulation mode for analysis.

Example of Use

To query the modulation mode of measured signal

```
CWL:EVM:DEM?
> AUTO
```

2.3.4 Preamble

[:SENSe]:CWLan:EVM:PREamble AUTO| LONG |SHORt

Preamble

Function

This command sets the frame format for 802.11b and 802.11g DSSS.

Command

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

Parameter

<mode>	Channel for analysis
AUTO	Auto-detects the frame format for analysis(Default)
LONG	Analyze as long frame format
SHORt	Analyze as short frame format

Example of Use

To set the frame format to long frame format

```
CWL:EVM:PRE LONG
```

[:SENSe]:CWLan:EVM:PREamble?

Preamble Query

Function

This command queries the frame format for 802.11b and 802.11g DSSS.

Query

```
[:SENSe]:CWLan:EVM:PREamble?
```

Response

```
<mode>
```

Parameter

<mode>	Channel for analysis
AUTO	Auto-detects the frame format for analysis
LONG	Analyze as long frame format
SHOR	Analyze as short frame format

Example of Use

To query the frame format

```
CWLan:EVM:PRE?
> LONG
```

2.3.5 PPDU Format

[:SENSe]:CWLan:EVM:PFORmat MIXed|GREenfield

PPDU Format

Function

This command sets the PPDU format for 802.11n.

Command

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

Parameter

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

Example of Use

To set the PPDU format to HT-Mixed

```
CWL:EVM:PFOR MIX
```

[:SENSe]:CWLan:EVM:PFORmat?

PPDU Format Query

Function

This command queries the PPDU format for 802.11n.

Query

```
[:SENSe]:CWLan:EVM:PFORmat?
```

Response

```
<mode>
```

Parameter

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

Example of Use

To query the PPDU format

```
CWL:EVM:PFOR?
> MIX
```


2.3.6 Channel Bandwidth

[:SENSe]:CWLan:EVM:CBANdwidth 20|40|40UPper|40Lower

Channel Bandwidth

Function

This command sets the Channel Bandwidth for 802.11n.

Command

```
[:SENSe]:CWLan:EVM:CBANdwidth <mode>
```

Parameter

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

Example of Use

To set Channel Bandwidth to 20 MHz

```
CWL:EVM:CBAN 20
```

[:SENSe]:CWLan:EVM:CBANdwidth?

Channel Bandwidth Query

Function

This command queries the Channel Bandwidth for 802.11n.

Query

```
[:SENSe]:CWLan:EVM:CBANdwidth?
```

Response

```
<mode>
```

Parameter

<mode>	Channel Bandwidth
20	Analyze as 20 MHz (Default)
40	Analyze as 40 MHz
40UP	Analyze as 40 MHz Upper
40L	Analyze as 40 MHz Lower

Example of Use

To query the Channel Bandwidth setting

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

[:SENSe]:CWLan:CAPTure:BURSt:INTerval <time>

Burst Interval

Function

This command sets Burst Interval.

Command

```
[:SENSe]:CWLan:CAPTure:BURSt:INTerval <time>
```

Parameter

`<time>` Burst Interval

Range The maximum value can be obtained by using the following procedure:

1) Calculate S_{MAX}, which is the maximum value among EVM Storage Count, Transmit Power Storage Count, Occupied Bandwidth Storage Count, and Transmit Spectrum Mask Storage Count.
2) Divide 2000 by S_{MAX}, and round down the result to the first decimal place.
3) If the obtained result is 100 or greater, the maximum value is regarded as 100 ms.
   If the obtained result is less than 100, the value is the maximum (unit: ms).

Minimum value

The minimum value is the largest value among the following values. However, the upper limit is 0.2 ms.

"Analysis Length of Transmit Power"

"Analysis Length of Occupied Bandwidth"

"Analysis Length of Transmit Spectrum Mask"

"Sum of Analysis Offset and Analysis Length of EVM"

The calculation formula for obtaining the sum of Analysis Offset and Analysis Length of EVM differs depending on the WLAN communication standard.

Standard	Calculation formula
802.11b or 802.11g DSSS	0.196 ms + (Analysis Offset + Analysis Length)/11000
802.11a or 802.11g OFDM	0.020 ms + 0.004 × (Analysis Offset+ Analysis Length)
802.11n	0.0.036 ms + 0.004 × (Analysis Offset+ Analysis Length)

Resolution	0.1 ms
Suffix code	`NS, US, MS, S` S is used when the suffix code is omitted.
Default	10 ms

Example of Use

To set the Burst Interval to 5 ms.

```
CWL:CAPT:BURS:INT 5MS
```

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

Burst Interval Query

Function

This command queries Burst Interval.

Query

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

Response

```
<time>
```

Parameter

Refer to `[:SENSe]:CWLan:CAPTure:BURSt:INTerval <time>`

Resolution	0.1 ms
	Value is returned in s units.

Example of Use

To query Burst Interval

```
CWL:CAPT:BURS:INT?
> 0.0050
```

[:SENSe]:CWLan:CAPTure:BURSt:THReshold <integer>

Burst Threshold

Function

This command sets Burst Threshold level for burst detection.

Command

```
[:SENSe]:CWLan:CAPTure:BURSt:THReshold <integer>
```

Parameter

`<interger>`	Burst Threshold level for burst detection
Range	0 to 60 dB
Resolution	1 dB
Default	30 dB

Example of Use

To set the threshold level to 30 dB

```
CWL:CAPT:BURS:THR 30
```

[:SENSe]:CWLan:CAPTure:BURSt:THReshold?

Burst Threshold Query

Function

This command queries Burst Threshold level for burst detection.

Query

```
[:SENSe]:CWLan:CAPTure:BURSt:THReshold?
```

Response

```
<integer>
```

Parameter

<integer>	Burst Threshold level for burst detection
Range	0 to 60 dB
Resolution	1 dB

Example of Use

To query Burst Threshold level for burst detection

```
CWL:CAPT:BURS:THR?
> 30
```

[:SENSe]:CWLan:RADio:STANdard:LOAD <function>[,<pattern>]

Load Standard Parameter

Function

This command sets the measurement parameters to the values pre-defined according to the standard.

Command

```
[:SENSe]:CWLan:RADio:STANdard:LOAD
<function>,[,<pattern>]
```

Parameter

<function>	Measurement function
EVM	EVM measurement
OBW	OBW Measurement
SEM	Transmit Spectrum Mask Measurement

EVM measurement

<pattern>	Parameter to set
6MBPs	IEEE802.11a, IEEE802.1 1g OFDM, 6Mbps
9MBPS	IEEE802.11a, IEEE802.11g OFDM, 9Mbps
12MBPS	IEEE802.11a, IEEE802.11g OFDM, 12Mbps
18MBPS	IEEE802.11a, IEEE802.11g OFDM, 18Mbps
24MBPS	IEEE802.11a, IEEE802.11g OFDM, 24Mbps
36MBPS	IEEE802.11a, IEEE802.11g OFDM, 36Mbps
48MBPS	IEEE802.11a, IEEE802.11g OFDM, 48Mbps
54MBPS	IEEE802.11a, IEEE802.11g OFDM, 54Mbps
DSSS	IEEE802.11b, IEEE802.11g DSSS
BP12	IEEE802.11n BPSK Coding Rate 1/2
QP12	IEEE802.11n QPSK Coding Rate 1/2
QP34	IEEE802.11n QPSK Coding Rate 3/4
1Q12	IEEE802.11n 16QAM Coding Rate 1/2
1Q34	IEEE802.11n 16QAM Coding Rate 3/4
6Q23	IEEE802.11n 64QAM Coding Rate 2/3
6Q34	IEEE802.11n 64QAM Coding Rate 3/4
6Q56	IEEE802.11n 64QAM Coding Rate 5/6
When omitted	IEEE802.11a, IEEE802.11g OFDM , 6Mbps

OBW Measurement

<pattern>	Parameter to set
T52INDOOR	TELEC 5.2GHz Indoor 20MHz
T56INDOOR	TELEC 5.6GHz Indoor 20MHz
T56OUTDOOR	TELEC 5.6GHz Outdoor 20MHz
T24DSSS	TELEC 2.4GHz DSSS
T24OFDM	TELEC 2.4GHz OFDM 20MHz
TI40MHZ	TELEC Indoor OFDM 40MHz
TO40MHZ	TELEC Outdoor OFDM 40MHz
When omitted	TELEC 5.2GHz Indoor 20MHz

Transmit Spectrum Mask Measurement

<pattern>	Parameter to set
O20MHZ	IEEE802.11 OFDM 20MHz
O40MHZ	IEEE802.11 OFDM 40MHz
DSSS	IEEE802.11 DSSS
When omitted	IEEE802.11 OFDM 20MHz

Example of Use

To set the EVM measurement setting to IEEE802.11a, IEEE802.11g OFDM , 6Mbps

```
CWL:RAD:STAN:LOAD EVM,6MBPS
```

[:SENSe]:CWLan:RADio:STANdard:LOAD?

Load Standard Parameter Query

Function

This command queries the loaded Standard Parameter.

Query

```
[:SENSe]:CWLan:RADio:STANdard:LOAD? <function>
```

Response

```
<pattern>
```

Parameter

```
<pattern>
```

Refer to `[:SENSe]:CWLan:RADio:STANdard:LOAD <function>,[,<pattern>]`

Example of Use

To query the loaded Standard Parameter

```
CWL:RAD:STAN:LOAD? EVM
> 6MBP
```

2.4 Utility Function

Table 2.4-1 lists the device messages for the utility function of the measurement target.

Table 2.4-1 Device Messages for Utility Function

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

2.4.1 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

<switch>	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 for performing operations common to the measurement functions.

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

Function	Device Message
Continuous Measurement	:INITiate:CONTinuous OFF|ON|0|1
	:INITiate:CONTinuous?
	:INITiate:MODE:CONTinuous
Single Measurement	:INITiate:MODE:SINGle
Initiate	:INITiate[:IMMediate]
Configure	:CONFigure?
Trigger Switch	:TRIGger[:SEQuence][:STATe] ON|OFF|1|0
	:TRIGger[:SEQuence][:STATe]?
Trigger Source	:TRIGger[:SEQuence]:SOURce EXTernal[1]|IMMediate|WIF|RFBurst|SG
	:TRIGger[:SEQuence]:SOURce?
Trigger Slope	:TRIGger[:SEQuence]:SLOPe POSitive|NEGative
	:TRIGger[:SEQuence]:SLOPe?
Wide IF Trigger Level	:TRIGger[:SEQuence]:WIF|:RFBurst:LEVel:ABSolute <ampl>
	:TRIGger[:SEQuence]:WIF|:RFBurst:LEVel:ABSolute?
Trigger Delay	:TRIGger[:SEQuence]:DELay <time>
	:TRIGger[:SEQuence]:DELay?

Note

The trigger settings are separately retained for each application, and are commonly applied to the measurement functions within the application. In other words, if the trigger is set by the signal analyzer, the same trigger setting is applied to all the measurement functions of the signal analyzer. The same applies to the spectrum analyzer.

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 mode (Default)
1|ON	Continuous measurement mode

Details

When ON is set, continuous measurement starts. When set to Off, the Single measurement mode is set but measurement does not start at that time.

Example of Use

To make a continuous measurement.

```
INIT:CONT ON
```

:INITiate:CONTinuous?

Continuous Measurement Query

Function

This command queries the measurement mode.

Query

```
:INITiate:CONTinuous?
```

Response

```
<switch>
```

Parameter

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

Example of Use

To query the measurement mode.

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

:INITiate:MODE:CONTinuous

Continuous Measurement

Function

This command starts continuous measurement.

Command

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

Example of Use

To start continuous measurement.

```
INIT:MODE:CONT
```

:INITiate:MODE:SINGle

Single Measurement

Function

This command starts single measurement.

Command

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

Example of Use

To start a single measurement.

```
INIT:MODE:SING
```

:INITiate[:IMMediate]

Initiate

Function

Measurement starts with the current measurement mode.

Command

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

Example of Use

To start the measurement in the current measurement mode.

```
INIT
```

:CONFigure?

Configure Query

Function

This command queries the name of the current measurement mode.

Query

```
:CONFigure?
```

Response

```
<mode>
```

Parameter

<mode>	Measurement function
CWL	This application

Example of Use

To query the current measurement function.

```
CONF?
> CWL
```

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

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

Example of Use

To set the trigger wait state to On.

```
TRIG ON
```

:TRIGger[:SEQuence][:STATe]?

Trigger Switch Query

Function

This command queries the trigger wait state On/Off.

Query

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

Response

```
<switch>
```

Parameter

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

Example of Use

To query the trigger wait state setting.

```
TRIG?
> 0
```

2.5.3 Trigger Source

:TRIGger[:SEQuence]:SOURce EXTernal[1]|IMMediate|WIF|RFBurst|SG

Trigger Source

Function

This command selects the trigger signal source.

Command

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

Parameter

<mode>	Trigger signal source
EXTernal[1]	External input
IMMediate	Free run
WIF|RFBurst	Wideband IF detection (Wide IF Video) (default)
SG	SG Marker

Details

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

Example of Use

To set the trigger signal source to External input.

```
TRIG:SOUR EXT
```

:TRIGger[:SEQuence]:SOURce?

Trigger Source Query

Function

This command queries the trigger signal source.

Query

```
:TRIGger[:SEQuence]:SOURce?
```

Response

```
<mode>
```

Parameter

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

Details

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

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
```

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

Wide IF Trigger Level

Function

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

Command

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

Parameter

`<ampl>` Threshold value of the level at which trigger sweep starts

Range	–60 to 50 dBm
Resolution	1 dBm
Default	–20 dBm

Example of Use

To set the threshold value of the level at which trigger sweep starts 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 trigger sweep starts in the Wide IF Video trigger.

Query

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

Response

```
<level>
```

Parameter

`<level>` Threshold value of the level at which trigger sweep 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 level at which trigger sweep starts

```
TRIG:WIF:LEV:ABS?
> 10
```

:TRIGger[:SEQuence]:DELay <time>

Trigger Delay

Function

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

Command

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

Parameter

`<time>` Delay time from generation of trigger to start of capture

Range	–2 to 2 s
Resolution	20 nano seconds
Suffix code	NS, US, MS, S S is used when the suffix code is omitted.
Default	0 s

Example of Use

To set the trigger delay time to 20 ms.

```
TRIG:DEL 20MS
```

:TRIGger[:SEQuence]:DELay?

Trigger Delay Query

Function

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

Query

```
:TRIGger[:SEQuence]:DELay?
```

Response

```
<time>
```

Parameter

`<time>` Delay time from generation of trigger to start of capture

Range	–2 to +2 s
Resolution	20 nanoseconds
	Value is returned in s units.

Example of Use

To query the trigger delay time.

```
TRIG:DEL?
> 0.02000000
```

2.6 Measurement Function

This section explains the device messages that pertains to measurement function.

Table 2.6-1 lists device messages to execute measurement and to query the result.

Table 2.6-1 Device Messages for Measurement Functions

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

Table 2.6-2 lists the responses to parameter [n] of the device messages in Table 2.6-1.

Table 2.6-2 Responses to Measurement Results

n	Result Mode	Response
1 or omitted	A/B	Responses are returned with comma-separated value formats in the following order: 1 Transmit Power (average) (dBm) 2 Transmit Power (max) (dBm) 3 Pass/Fail flag of Transmit Power (average) 4 Pass/Fail flag of Transmit Power (max) 5 Peak PSD (average) (dBm/MHz) 6 Peak PSD (max) (dBm/MHz) 7 Pass/Fail flag of Peak PSD (average) 8 Pass/Fail flag of Peak PSD (max) 9 Power-on Ramp Time (average) (µs) 10 Power-on Ramp Time (max) (µs) 11 Power-down Ramp Time (average) (µs) 12 Power-down Ramp Time (max) (µs) 13 Pass/Fail flag of overall Ramp (average) 14 Pass/Fail flag of overall Ramp (max) 15 Pass/Fail flag of Power-on Ramp (average) 16 Pass/Fail flag of Power-on Ramp (max) 17 Pass/Fail flag of Power-down Ramp (average) 18 Pass/Fail flag of Power-down Ramp (max) 19 Count of Transmit Power Measurements

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
1 or omitted	A/B	20 Peak PSD (RBW) of the reference channel (dBm) 21 Minimum margin level on the negative offset 1 (dBm) 22 Minimum margin from limit line on the negative offset 1 (dB) 23 Minimum margin offset frequency from the center frequency in the negative offset 1 (Hz) 24 Pass/Fail flag on the negative offset 1 (1/fail, 0/pass) 25 Minimum margin level on the positive offset 1 (dBm) 26 Minimum margin from limit line on the positive offset 1 (dB) 27 Minimum margin offset frequency from the center frequency in the positive offset 1 (Hz) 28 Pass/Fail flag on the positive offset 1 (1/fail, 0/pass) 29 Minimum margin level on the negative offset 2 (dBm) 30 Minimum margin from limit line on the negative offset 2 (dB) 31 Minimum margin offset frequency from the center frequency in the negative offset 2 (Hz) 32 Pass/Fail flag on the negative offset 2 (1/fail, 0/pass) 33 Minimum margin level on the positive offset 2 (dBm) 34 Minimum margin from limit line on the positive offset 2 (dB) 35 Minimum margin offset frequency from the center frequency in the positive offset 2 (Hz) 36 Pass/Fail flag on the positive offset 2 (1/fail, 0/pass)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
1 or omitted	A/B	37 Minimum margin level on the negative offset 3 (dBm) 38 Minimum margin from limit line on the negative offset 3 (dB) 39 Minimum margin offset frequency from the center frequency in the negative offset 3 (Hz) 40 Pass/Fail flag on the negative offset 3 (1/fail, 0/pass) 41 Minimum margin level on the positive offset 3 (dBm) 42 Minimum margin from limit line on the positive offset 3 (dB) 43 Minimum margin offset frequency from the center frequency in the positive offset 3 (Hz) 44 Pass/Fail flag on the positive offset 3 (1/fail, 0/pass) 45 Minimum margin level on the negative offset 4 (dBm) 46 Minimum margin from limit line on the negative offset 4 (dB) 47 Minimum margin offset frequency from the center frequency in the negative offset 4 (Hz) 48 Pass/Fail flag on the negative offset 4 (1/fail, 0/pass) 49 Minimum margin level on the positive offset 4 (dBm)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
1 or omitted	A/B	50 Minimum margin from limit line on the positive offset 4 (dB) 51 Minimum margin offset frequency from the center frequency in the positive offset 4 (Hz) 52 Pass/Fail flag on the positive offset 4 (1/fail, 0/pass) 53 Pass/Fail flag on overall offset (1/fail, 0/pass) 54 Count of Transmit Spectrum Mask Measurements 55 EVM rms (average) (%) 56 EVM rms (max) (%) 57 EVM peak (max) (%) 58 EVM rms (average) (dB) 59 EVM rms (max) (dB) 60 EVM peak (max) (dB) 61 Pass/Fail flag of EVM rms (average) 62 Pass/Fail flag of EVM rms (max) 63 Pass/Fail flag of EVM peak (max) 64 Frequency Error (average) (Hz) 65 Frequency Error (max) (Hz) 66 Frequency Error (average) (ppm) 67 Frequency Error (max) (ppm) 68 Pass/Fail flag of Frequency Error (average) 69 Pass/Fail flag of Frequency Error (max) 70 Center Frequency Leakage (average) (dB) 71 Center Frequency Leakage (max) (dB) 72 Pass/Fail flag of Center Frequency Leakage (average) 73 Pass/Fail flag of Center Frequency Leakage (max) 74 IQ Offset (average) (dB) 75 IQ Offset (max) (dB)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
1 or omitted	A/B	76 Pass/Fail flag of IQ Offset (average) 77 Pass/Fail flag of IQ Offset (max) 78 Pass/Fail flag of Spectrum Flatness 79 IQ Gain Imbalance (average) (dB) 80 IQ Gain Imbalance (max) (dB) 81 Quadrature Error (average) (deg.) 82 Quadrature Error (max) (deg.) 83 Symbol Clock Error (average) 84 Symbol Clock Error (max) 85 Pass/Fail flag of Symbol Clock Error (average) 86 Pass/Fail flag of Symbol Clock Error (max) 87 Chip Clock Error (average) 88 Chip Clock Error (max) 89 Pass/Fail flag of Chip Clock Error (average) 90 Pass/Fail flag of Chip Clock Error (max) 91 Count of Modulation Accuracy Measurements 92 Occupied Bandwidth (average)(Hz) 93 Occupied Bandwidth (max)(Hz) 94 Pass/Fail flag of Occupied Bandwidth (average) 95 Pass/Fail flag of Occupied Bandwidth (max) 96 Count of Occupied Bandwidth Measurements

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
2	A/B	1 Transmit Power (average) (dBm) 2 Transmit Power (max) (dBm) 3 Pass/Fail flag of Transmit Power (average) 4 Pass/Fail flag of Transmit Power (max) 5 Peak PSD (average) (dBm/MHz) 6 Peak PSD (max) (dBm/MHz) 7 Pass/Fail flag of Peak PSD (average) 8 Pass/Fail flag of Peak PSD (max) 9 Power-on Ramp Time (average) (μs) 10 Power-on Ramp Time (max) (μs) 11 Power-down Ramp Time (average) (μs) 12 Power-down Ramp Time (max) (μs) 13 Pass/Fail flag of overall Ramp (average) 14 Pass/Fail flag of overall Ramp (max) 15 Pass/Fail flag of Power-on Ramp (average) 16 Pass/Fail flag of Power-on Ramp (max) 17 Pass/Fail flag of Power-down Ramp (average) 18 Pass/Fail flag of Power-down Ramp (max) 19 Count of Transmit Power Measurements

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
3	A/B	1 Peak PSD (RBW) of the reference channel (dBm) 2 Minimum margin level on the negative offset 1 (dBm) 3 Minimum margin from limit line on the negative offset 1 (dB) 4 Minimum margin offset frequency from the center frequency in the negative offset 1 (Hz) 5 Pass/Fail flag on the negative offset 1 (1/fail, 0/pass) 6 Minimum margin level on the positive offset 1 (dBm) 7 Minimum margin from limit line on the positive offset 1 (dB) 8 Minimum margin offset frequency from the center frequency in the positive offset 1 (Hz) 9 Pass/Fail flag on the positive offset 1 (1/fail, 0/pass) 10 Minimum margin level on the negative offset 2 (dBm) 11 Minimum margin from limit line on the negative offset 2 (dB) 12 Minimum margin offset frequency from the center frequency in the negative offset 2 (Hz) 13 Pass/Fail flag on the negative offset 2 (1/fail, 0/pass) 14 Minimum margin level on the positive offset 2 (dBm) 15 Minimum margin from limit line on the positive offset 2 (dB) 16 Minimum margin offset frequency from the center frequency in the positive offset 2 (Hz) 17 Pass/Fail flag on the positive offset 2 (1/fail, 0/pass) 18 Minimum margin level on the negative offset 3 (dBm) 19 Minimum margin from limit line on the negative offset 3 (dB)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
3	A/B	20 Minimum margin offset frequency from the center frequency in the negative offset 3 (Hz) 21 Pass/Fail flag on the negative offset 3 (1/fail, 0/pass) 22 Minimum margin level on the positive offset 3 (dBm) 23 Minimum margin from limit line on the positive offset 3 (dB) 24 Minimum margin offset frequency from the center frequency in the positive offset 3 (Hz) 25 Pass/Fail flag on the positive offset 3 (1/fail, 0/pass) 26 Minimum margin level on the negative offset 4 (dBm) 27 Minimum margin from limit line on the negative offset 4 (dB) 28 Minimum margin offset frequency from the center frequency in the negative offset 4 (Hz) 29 Pass/Fail flag on the negative offset 4 (1/fail, 0/pass) 30 Minimum margin level on the positive offset 4 (dBm) 31 Minimum margin from limit line on the positive offset 4 (dB) 32 Minimum margin offset frequency from the center frequency in the positive offset 4 (Hz) 33 Pass/Fail flag on the positive offset 4 (1/fail, 0/pass) 34 Pass/Fail flag on overall offset (1/fail, 0/pass) 35 Count of Transmit Spectrum Mask Measurements

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
3	A/B	36. Absolute power spectral density for negative offset 1 start frequency (dBm) 37. Absolute power spectral density for positive offset 1 start frequency (dBm) 38. Absolute power spectral density for negative offset 2 start frequency (dBm) 39. Absolute power spectral density for positive offset 2 start frequency (dBm) 40. Absolute power spectral density for negative offset 3 start frequency (dBm) 41. Absolute power spectral density for positive offset 3 start frequency (dBm) 42. Absolute power spectral density for negative offset 4 start frequency (dBm) 43. Absolute power spectral density for positive offset 4 start frequency (dBm) 44. Absolute power spectral density for negative offset 4 end frequency (dBm) 45. Absolute power spectral density for positive offset 4 end frequency (dBm)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
4	A/B	1 EVM rms (average) (%) 2 EVM rms (max) (%) 3 EVM peak (max) (%) 4 EVM rms (average) (dB) 5 EVM rms (max) (dB) 6 EVM peak (max) (dB) 7 Pass/Fail flag of EVM rms (average) 8 Pass/Fail flag of EVM rms (max) 9 Pass/Fail flag of EVM peak (max) 10 Frequency Error (average) (Hz) 11 Frequency Error (max) (Hz) 12 Frequency Error (average) (ppm) 13 Frequency Error (max) (ppm) 14 Pass/Fail flag of Frequency Error (average) 15 Pass/Fail flag of Frequency Error (max) 16 Center Frequency Leakage (average) (dB) 17 Center Frequency Leakage (max) (dB) 18 Pass/Fail flag of Center Frequency Leakage (average) 19 Pass/Fail flag of Center Frequency Leakage (max)

Table 2.6-2 Responses to Measurement Results (Continued)

n	Result Mode	Response
4	A/B	20 IQ Offset (average) (dB) 21 IQ Offset (max) (dB) 22 Pass/Fail flag of IQ Offset (average) 23 Pass/Fail flag of IQ Offset (max) 24 Pass/Fail flag of Spectrum Flatness 25 IQ Gain Imbalance (average) (dB) 26 IQ Gain Imbalance (Max) (dB) 27 Quadrature Error (average) (deg.) 28 Quadrature Error (max) (deg.) 29 Symbol Clock Error (average) 30 Symbol Clock Error (max) 31 Pass/Fail flag of Symbol Clock Error (average) 32 Pass/Fail flag of Symbol Clock Error (max) 33 Chip Clock Error (average) 34 Chip Clock Error (max) 35 Pass/Fail flag of Chip Clock Error (average) 36 Pass/Fail flag of Chip Clock Error (max) 37 Count of Modulation Accuracy Measurements
5	A/B	1 Occupied Bandwidth (average)(Hz) 2 Occupied Bandwidth (max)(Hz) 3 Pass/Fail flag of Occupied Bandwidth (average) 4 Pass/Fail flag of Occupied Bandwidth (max) 5 Count of Occupied Bandwidth Measurements

Table 2.6-3 Device Messages for Setting EVM Parameters for This Application

Parameter	Device Message
EVM Measurement	[:SENSe]:CWLan:EVM[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:EVM[:STATe]?
Storage Mode	[:SENSe]:CWLan:EVM:AVERage[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:EVM:AVERage[:STATe]?
Storage Count	[:SENSe]:CWLan:EVM:AVERage:COUNt <integer>
	[:SENSe]:CWLan:EVM:AVERage:COUNt?
Analysis Length Setup	[:SENSe]:CWLan:EVM:TIME:LENGth[:STATe]:AUTO OFF|ON|0|1
	[:SENSe]:CWLan:EVM:TIME:LENGth[:STATe]:AUTO?
Analysis Length	[:SENSe]:CWLan:EVM:TIME:LENGth <integer>
	[:SENSe]:CWLan:EVM:TIME:LENGth?
Analysis Offset	[:SENSe]:CWLan:EVM:TIME:OFFSet <integer>
	[:SENSe]:CWLan:EVM:TIME:OFFSet?
EVM Calculation Method	[:SENSe]:CWLan:EVM:CMEThod PSDU|1KCPreamble|1K99
	[:SENSe]:CWLan:EVM:CMEThod?
Channel Estimation	[:SENSe]:CWLan:EVM:EQUalizer:TRAining SEQ|SDATa
	[:SENSe]:CWLan:EVM:EQUalizer:TRAining?
Tracking	[:SENSe]:CWLan:EVM:TRACk:AMP OFF|ON|0|1
	[:SENSe]:CWLan:EVM:TRACk:AMP?
	[:SENSe]:CWLan:EVM:TRACk:PHASe OFF|ON|0|1
	[:SENSe]:CWLan:EVM:TRACk:PHASe?
Symbol Timing Adjust	[:SENSe]:CWLan:EVM:TADJust <integer>
	[:SENSe]:CWLan:EVM:TADJust?
Filter	[:SENSe]:CWLan:EVM:FILTer:REFerence NONe | GAUSsian |RCOSine
	[:SENSe]:CWLan:EVM:FILTer:REFerence?
	[:SENSe]:CWLan:EVM:FILTer:ALPHa <real>
	[:SENSe]:CWLan:EVM:FILTer:ALPHa?

Table 2.6-3 Device Messages for Setting EVM Parameters for This Application (Continued)

Parameter	Device Message
Limits	[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA <real>
	[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA?
	[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK <real>
	[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK?
	[:SENSe]:CWLan:EVM:LIMit:FERRor <real>
	[:SENSe]:CWLan:EVM:LIMit:FERRor?
	[:SENSe]:CWLan:EVM:LIMit:CFLeakage <real>
	[:SENSe]:CWLan:EVM:LIMit:CFLeakage?
	[:SENSe]:CWLan:EVM:LIMit:IQOFfset <real>
	[:SENSe]:CWLan:EVM:LIMit:IQOFfset?

Table 2.6-4 lists the device messages for setting the Transmit Power Level parameters for this application.

Table 2.6-4 Device Messages for Setting Transmit Power Parameters for This Application

Parameter	Device Message
Transmit Power Measurement	[:SENSe]:CWLan:TXPower[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:TXPower[:STATe]?
Storage Mode	[:SENSe]:CWLan:TXPower:AVERage[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:TXPower:AVERage[:STATe]?
Storage Count	[:SENSe]:CWLan:TXPower:AVERage:COUNt <integer>
	[:SENSe]:CWLan:TXPower:AVERage:COUNt?
Analysis Length	[:SENSe]:CWLan:TXPower:TIME:LENGth <time>
	[:SENSe]:CWLan:TXPower:TIME:LENGth?
Preamble Search	[:SENSe]:CWLan:TXPower:TIME:PSEarch OFF|ON|0|1
	[:SENSe]:CWLan:TXPower:TIME:PSEarch?
Ramp Down Detection	[:SENSe]:CWLan:TXPower:TIME:RDDetection OFF|ON|0|1
	[:SENSe]:CWLan:TXPower:TIME:RDDetection?
Detection Offset	[:SENSe]:CWLan:TXPower:TIME:DOFFset <time>
	[:SENSe]:CWLan:TXPower:TIME:DOFFset?
Transmit Power Level Limit	[:SENSe]:CWLan:TXPower:LIMit:TPOWer <ampl>
	[:SENSe]:CWLan:TXPower:LIMit:TPOWer?
Peak PSD Limits	[:SENSe]:CWLan:TXPower:LIMit:PSDensity <ampl>
	[:SENSe]:CWLan:TXPower:LIMit:PSDensity?
Max Ramp Up Time	[:SENSe]:CWLan:PVTime:LIMit:URTime <time>
	[:SENSe]:CWLan:PVTime:LIMit:URTime?
Max Ramp Down Time	[:SENSe]:CWLan:PVTime:LIMit:DRTime <time>
	[:SENSe]:CWLan:PVTime:LIMit:DRTime?

Table 2.6-5 lists the device messages for setting the Occupied Bandwidth parameters for this application.

Table 2.6-5 Device Messages for Setting Occupied Bandwidth Parameters for This Application

Parameter	Device Message
Occupied Bandwidth Measurement	[:SENSe]:CWLan:OBWidth[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:OBWidth[:STATe]?
Storage Mode	[:SENSe]:CWLan:OBWidth:STORage:MODE OFF|AVERage|MAXHold
	[:SENSe]:CWLan:OBWidth:STORage:MODE?
Storage Count	[:SENSe]:CWLan:OBWidth:AVERage:COUNt <integer>
	[:SENSe]:CWLan:OBWidth:AVERage:COUNt?
Preamble Search	[:SENSe]:CWLan:OBWidth:TIME:PSEarch OFF|ON|0|1
	[:SENSe]:CWLan:OBWidth:TIME:PSEarch?
Analysis Length Setup	[:SENSe]:CWLan:OBWidth:TIME:LENGth[:STATe]:AUTO OFF|ON|0|1
	[:SENSe]:CWLan:OBWidth:TIME:LENGth[:STATe]:AUTO?
Analysis Length	[:SENSe]:CWLan:OBWidth:TIME:LENGth <time>
	[:SENSe]:CWLan:OBWidth:TIME:LENGth?
Analysis Offset	[:SENSe]:CWLan:OBWidth:TIME:OFFSet <time>
	[:SENSe]:CWLan:OBWidth:TIME:OFFSet?
Resolution Bandwidth	[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution] 30|100|300
	[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution]?
Detection	[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion] POSitive|RMS
	[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion]?
Occupied Bandwidth Percent	[:SENSe]:CWLan:OBWidth:PERCent 99|90
	[:SENSe]:CWLan:OBWidth:PERCent?
Limits	[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA <bandwidth>
	[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA?

Table 2.6-6 lists the device messages for setting the Transmit Spectrum Mask parameters for this application.

Table 2.6-6 Device Messages for Setting Transmit Spectrum Mask Parameters for This Application

Parameter	Device Message
Transmit Spectrum Mask Measurement	[:SENSe]:CWLan:TOSPectrum[:STATe] OFF|ON|0|1
	[:SENSe]:CWLan:TOSPectrum[:STATe]?
Storage Mode	[:SENSe]:CWLan:TOSPectrum:STORage:MODE OFF|AVERage|MAXHold
	[:SENSe]:CWLan:TOSPectrum:STORage:MODE?
Storage Count	[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt <integer>
	[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt?
Preamble Search	[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch OFF|ON|0|1
	[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch?
Analysis Length Setup	[:SENSe]:CWLan:TOSPectrum:TIME:LENGth[:STATe]:AUTO OFF|ON|0|1
	[:SENSe]:CWLan:TOSPectrum:TIME:LENGth[:STATe]:AUTO?
Analysis Length	[:SENSe]:CWLan:TOSPectrum:TIME:LENGth <time>
	[:SENSe]:CWLan:TOSPectrum:TIME:LENGth?
Analysis Offset	[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet <time>
	[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet?
Detection	[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion] POSitive| RMS
	[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion]?
Limit Level	:CALCulate:CWLan:TOSPectrum:LIMit:DATA <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>, <rel_ampl>,<rel_ampl>,<rel_ampl>,<rel_ampl>
	:CALCulate:CWLan:TOSPectrum:LIMit:DATA?

2.6.1 Measure

:CONFigure:CWLan

Batch Measurement

Function

This command selects this application.

Command

```
:CONFigure:CWL
```

Details

No measurement is made.

Example of Use

To select this application.

```
CONF:CWL
```

:INITiate:CWLan

Batch Measurement

Function

This command executes this application.

Command

```
:INITiate:CWL
```

Example of Use

To execute this application.

```
INIT:CWL
```

:FETCh:CWLan[n]?

Batch Measurement Query

Function

This command queries the result of this application.

Query

```
:FETCh:CWL[n]?
```

Response

See Table 2.6-2.

Details

–999.0 is returned when no measurement is made or an error occurs.
999999999999 is returned in case of Frequency Error and EVM[dB].
The unit of the fetched EVM value depends on the setting of EVM Unit.

Example of Use

To query the measurement results.

```
FETC:CWL?
> 5.20,  1.03,  1, 0.53,  38,  3,  2.34, …
```

:READ:CWLan[n]?

Modulation Query

Function

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

Query

```
:READ:CWL[n]?
```

Response

See Table 2.6-2.

Example of Use

To perform single Modulation measurement and query the measured result.

```
READ:CWL?
```

Related command

This command has the same function as the following command.

```
:MEASure:CWL[n]?
```

:MEASure:CWLan[n]?

Modulation Query

Function

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

Query

```
:MEASure:CWL[n]?
```

Response

See Table 2.6-2.

Example of Use

To execute this application and query the measured result.

```
MEAS:CWL?
```

Related command

This command has the same function as the following command.

```
READ:CWL[n]?
```

2.6.2 EVM Measurement

[:SENSe]:CWLan:EVM[:STATe] OFF|ON|0|1

EVM Measurement

Function

This command sets the EVM measurement to On/Off.

Command

```
[:SENSe]:CWLan:EVM[:STATe] <switch>
```

Parameter

<switch>	EVM measurement On/Off
OFF|0	Off (Default)
ON|1	On

Example of Use

To set the EVM measurement to On.

```
CWL:EVM 1
```

[:SENSe]:CWLan:EVM[:STATe]?

EVM Measurement Query

Function

This command queries the On/Off setting of EVM measurement.

Query

```
[:SENSe]:CWLan:EVM[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	EVM measurement On/Off
0	Off
1	On

Example of Use

To query the EVM measurement On/Off status

```
CWL:EVM?
> 1
```

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

EVM Storage Mode

Function

This command sets the storage mode of EVM measurement.

Command

```
[:SENSe]:CWLan:EVM:AVERage[:STATe] OFF|ON|0|1 <mode>
```

Parameter

<mode>	Storage Mode
OFF|0	Off (Default)
ON|1	average

Example of Use

To set the storage mode to Average.

```
CWL:EVM:AVER ON
```

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

Storage Mode Query

Function

This command queries the setting of the storage mode.

Query

```
[:SENSe]:CWLan:EVM:AVERage[:STATe]?
```

Response

```
<mode>
```

Parameter

<mode>	Storage Mode
0	Off
1	average

Example of Use

To query the setting of the storage mode.

```
CWL:EVM:AVER?
> 1
```

[:SENSe]:CWLan:EVM:AVERage:COUNt <integer>

Storage Count

Function

This command sets the storage count of EVM measurement.

Command

```
[:SENSe]:CWLan:EVM:AVERage:COUNt <integer>
```

Parameter

`<integer>`		Storage Count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1
	Default	2

Example of Use

To set the storage count to 10.

```
CWL:EVM:AVER:COUN 10
```

[:SENSe]:CWLan:EVM:AVERage:COUNt?

Storage Count Query

Function

This command queries the storage count of EVM measurement.

Query

```
[:SENSe]:CWLan:EVM:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

`<integer>`		Storage Count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1

Example of Use

To query the storage count.

```
CWL:EVM:AVER:COUN?
> 10
```

[:SENSe]:CWLan: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]:CWLan:EVM:TIME:LENGth[:STATe]:AUTO <switch>
```

Parameter

<switch>	On/Off setting of Analysis Length Setup
OFF|0	Manual setting
ON|1	Auto setting (Default)

Example of Use

To enable the automatic setting of the analysis length.

```
CWL:EVM:TIME:LENG:AUTO ON
```

[:SENSe]:CWLan: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]:CWLan:EVM:TIME:LENGth[:STATe]:AUTO?
```

Response

```
<switch>
```

Parameter

<switch>	Analysis Length Setup
0	Manual setting
1	Automatic setting

Example of Use

To query the setting of Analysis Length Setup.

```
CWL:EVM:TIME:LENG:AUTO?
> 1
```

[:SENSe]:CWLan:EVM:TIME:LENGth <integer>

Analysis Length

Function

This command sets the analysis time length of EVM measurement.

Command

```
[:SENSe]:CWLan:EVM:TIME:LENGth <integer>
```

Parameter

When WLAN Standard is 802.11a, 802.11g OFDM, or 802.11n:

<integer> Number of symbols to analyze

Range	1 to 250−Analysis Offset or (Burst Interval − Interval − 0.020)×250−Analysis Offset, whichever smaller
Resolution	1
Default	10

When WLAN Standard is 802.11b or 802.11g DSSS, and when EVM Calculation Method is PSDU EVM:

<integer> Number of chips to be analyzed

Range	1 to 45056–Analysis Offset or (Burst Interval – Interval – 0.192)×11000–Analysis Offset, whichever smaller
Resolution	1
Default	1000

When WLAN Standard is 802.11b or 802.11g DSSS, and when EVM Calculation Method is 1KCP or 1K99:

<integer> Number of chips to be analyzed

Range	Cannot be set

When WLAN Standard is 802.11n:

<integer> Number of symbols to analyze

Range	1 to 1370–Analysis Offset or (Burst Interval – Interval – 0.036)×250–Analysis Offset, whichever smaller
Resolution	1
Default	10

Example of Use

To set the EVM analysis time length to 10.

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

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

Analysis Length Query

Function

This command queries the analysis time length of EVM measurement.

Query

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

Response

```
<integer>
```

Parameter

Refer to `[:SENSe]:CWLan:EVM:TIME:LENGth <integer>`

Example of Use

To query the analysis time length of EVM measurement.

```
CWL:EVM:TIME:LENG?
> 10
```

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

Analysis Offset

Function

This command sets the offset of the EVM analysis range.

Command

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

Parameter

When WLAN Standard is 802.11a or 802.11g OFDM:

`<integer>` Number of symbols to analyze

Range	0 to 249 or (Burst Interval – 0.020)×250, (whichever smaller) –1
Resolution	1
Default	0

When WLAN Standard is 802.11b or 802.11g DSSS, and when EVM Calculation Method is PSDU EVM:

`<integer>` Number of chips analyze

Range	0 to 45055 or (Burst Interval – 0.192)×11000, (whichever smaller) –1
Resolution	1
Default	20

When WLAN Standard is 802.11b or 802.11g DSSS, and when EVM Calculation Method is 1KCP or 1K99:

`<integer>` Number of chips analyze

Range	0 to 1111 (when Preamble is Auto or Long) 55 (when Preamble is Short)
Resolution	1
Default	20

When WLAN Standard is 802.11n:

`<integer>` Number of symbols to analyze

Range	0 to 1369 or (Burst Interval – 0.036)×250, (whichever smaller) –1
Resolution	1
Default	0

Example of Use

To set the offset of the EVM analysis range to ten symbols.

```
CWL:EVM:TIME:OFFS 10
```

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

Analysis Offset Query

Function

This command queries the offset of the EVM analysis range.

Query

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

Response

```
<integer>
```

Parameter

Refer to `[:SENSe]:CWLan:EVM:TIME:OFFSet <integer>`

Example of Use

To query the offset of the EVM analysis range.

```
CWL:EVM:TIME:OFFS?
> 10
```

[:SENSe]:CWLan:EVM:CMEThod PSDU|1KCPreamble|1K99

EVM Calculation Method

Function

This command sets the EVM calculation method.

Command

```
[:SENSe]:CWLan:EVM:CMEThod PSDU|1KCPreamble <mode>
```

Parameter

<mode>		EVM calculation method
	PSDU	EVM calculation is executed for the PSDU following the preamble. (Default)
	1KCPreamble	EVM calculation is executed for 1,000 chips of the preamble. EVM is measured according to IEEE std 802.11-2007.
	1K99	EVM calculation is executed for 1,000 chips of the preamble. EVM is measured according to IEEE std 802.11-1999.

Details

This function is available when 802.11b or 802.11g DSSS is selected for WLAN Standard.

Example of Use

To set the EVM calculation method to PSDU.

```
CWL:EVM:CMET PSDU
```

[:SENSe]:CWLan:EVM:CMEThod?

EVM Calculation Method Query

Function

This command queries the EVM calculation method.

Query

```
[:SENSe]:CWLan:EVM:CMEThod?
```

Response

```
<mode>
```

Parameter

`<mode>`	Modulation mode of measured signal
`PSDU`	EVM calculation is executed for the PSDU following the preamble.
`1KCPreamble`	EVM calculation is executed for 1,000 chips of the preamble. EVM is measured according to IEEE std 802.11-2007.
`1K99`	EVM calculation is executed for 1,000 chips of the preamble. EVM is measured according to IEEE std 802.11-1999.

Details

This function is available when 802.11b or 802.11g DSSS is selected for WLAN Standard.

Example of Use

To query the EVM calculation method.

```
CWL:EVM:CMET?
> PSDU
```

[:SENSe]:CWLan:EVM:EQUalizer:TRAining SEQ|SDATa

Channel Estimation

Function

This command sets the target of channel estimation.

Command

```
[:SENSe]:CWLan:EVM:EQUalizer:TRAining <mode>
```

Parameter

<mode>	Channel for analysis
SEQ	The long training sequence is the target. (Default)
SDATa	All packets are targets.

Example of Use

To set the target of channel estimation to long training.

```
CWL:EVM:EQU:TRA SEQ
```

[:SENSe]:CWLan:EVM:EQUalizer:TRAining?

Channel Estimation Query

Function

This command queries the target of channel estimation.

Query

```
[:SENSe]:CWLan:EVM:EQUalizer:TRAining?
```

Response

```
<mode>
```

Parameter

<mode>	Channel for analysis
SEQ	The long training sequence is the target.
SDAT	All packets are targets.

Example of Use

To query the modulation mode of measured signal

```
CWL:EVM:EQU:TRA?
> SEQ
```

[:SENSe]:CWLan:EVM:TRACk:AMP OFF|ON|0|1

Amplitude Tracking

Function

This command enables or disables the amplitude tracking function.

Command

```
[:SENSe]:CWLan:EVM:TRACk:AMP <switch>
```

Parameter

<switch>		Enables or disables the amplitude tracking function
	OFF|0	Disables
	ON|1	Enables (Default)

Example of Use

To enable the amplitude tracking function.

```
CWL:EVM:TRAC:AMP ON
```

[:SENSe]:CWLan:EVM:TRACk:AMP?

Amplitude Tracking Query

Function

This command queries whether the amplitude tracking function is enabled.

Query

```
[:SENSe]:CWLan:EVM:TRACk:AMP?
```

Response

```
<Switch>
```

Parameter

<switch>		Enables or disables the amplitude tracking function
	0	Disabled
	1	Enabled

Example of Use

To query whether the amplitude tracking function is enabled.

```
CWL:EVM:TRAC:AMP?
> 1
```

[:SENSe]:CWLan:EVM:TRACk:PHASe OFF|ON|0|1

Phase Tracking

Function

This command enables or disables the phase tracking function.

Command

```
[:SENSe]:CWLan:EVM:TRACk:PHASe <switch>
```

Parameter

<mode>	Enables or disables the phase tracking function
OFF|0	Disables
ON|1	Enables (Default)

Example of Use

To enable the phase tracking function.

```
CWL:EVM:TRAC:PHAS ON
```

[:SENSe]:CWLan:EVM:TRACk:**PHASe**?

Phase Tracking Query

Function

This command queries whether the phase tracking function is enabled.

Query

```
[:SENSe]:CWLan:EVM:TRACk:PHASe?
```

Response

```
<Switch>
```

Parameter

<switch>	Enables or disables the phase tracking function
0	Disabled
1	Enabled

Example of Use

To query whether the phase tracking function is enabled.

```
CWL:EVM:TRAC:PHAS?
> 1
```

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

Symbol Timing Adjustment

Function

This command sets the timing of the FFT window during EVM measurement. When `1KCP` or `1K99` is specified, the measurement start position is based on the start of a burst signal, and the analysis length is fixed to 1,000 chips. If `PSDU` is specified, the measurement start position is based on the start of the PSDU. This function is applied when 802.11b or 802.11g DSSS is selected.

Command

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

Parameter

`<integer>`	Offset value from the center of the guard interval
Range	−16 to 16
Resolution	1
Default	0

Example of Use

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

```
CWL:EVM:TADJ 0
```

[:SENSe]:CWLan:EVM:TADJust?

Symbol Timing Adjustment Query

Function

This command queries the timing of the FFT window during EVM measurement.

Query

```
[:SENSe]:CWLan:EVM:TADJust?
```

Response

```
<integer>
```

Parameter

`<integer>`	Offset value 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.

```
:CWL:EVM:TADJ?
> 0
```

[:SENSe]:CWLan:EVM:FILTer:REFerence NONE | GAUSsian |RCOSine

Filter Type

Function

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

Command

```
[:SENSe]:CWLan:EVM:FILTer:REFerence <mode>
```

Parameter

<mode>	Filter type
NONE	No filter (Default)
GAUSsian	Gauss filter
RCOSine	Root Nyquist filter

Example of Use

To set filter type to Gaussian.

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

[:SENSe]:CWLan:EVM:FILTer:REFerence?

Filter Type Query

Function

This command queries the filter used for EVM calculation.

Query

```
[:SENSe]:CWLan:EVM:FILTer:REFerence?
```

Response

```
<mode>
```

Parameter

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

Example of Use

To query the file type.

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

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

Alpha/BT

Function

This command sets the alpha value of the square-route Nyquist filter or the BT product of the Gauss filter.

Command

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

Parameter

<real>	Alpha value or BT product
Range	0.3 to 1.0
Resolution	0.1
Default	0.5

Example of Use

To set the BT product to 0.5.

```
CWL:EVM:FILT:ALPH 0.5
```

[:SENSe]:CWLan:EVM:FILTer:**ALPHa**?

Alpha/BT Query

Function

This command queries the alpha value or BT product.

Query

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

Response

```
<real>
```

Parameter

<real>	Alpha value or BT product
Range	0.3 to 1.0
Resolution	0.1

Example of Use

To query the alpha value.

```
CWL:EVM:FILT:ALPH?
> 0.5
```

[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA <real>

EVM(rms) Limits

Function

This commands sets the EVM (rms) limit.

Command

```
[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA <real>
```

Parameter

<real>		EVM (rms) limit
	Range	0.1 to 60.0
	Resolution	0.1
	Default	5.6

Example of Use

To set the EVM (rms) limit to 5%.

```
CWL:EVM:LIM:DATA 5
```

[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA?

EVM(rms) Limits Query

Function

This commands queries the EVM (rms) limit.

Query

```
[:SENSe]:CWLan:EVM:LIMit[:UPPer]:DATA?
```

Response

```
<real>
```

Parameter

<real>		EVM (rms) limit
	Range	0.1 to 60.0
	Resolution	0.1

Example of Use

To query the EVM (rms) limit

```
CWL:EVM:LIM:DATA?
> 5.6
```

[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK <real>

EVM(peak) Limits

Function

This commands sets the EVM (peak) limit.

Command

```
[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK <real>
```

Parameter

<real>	EVM (peak) limit
Range	0.1 to 1000.0
Resolution	0.1
Default	1000.0

Example of Use

To set the EVM (peak) limit to 35%.

```
CWL:EVM:LIM:PEAK 35
```

[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK?

EVM(peak) Limits Query

Function

This commands queries the EVM (peak) limit.

Query

```
[:SENSe]:CWLan:EVM:LIMit[:UPPer]:PEAK?
```

Response

```
<real>
```

Parameter

<real>	EVM (peak) limit
Range	0.1 to 1000.0
Resolution	0.1

Example of Use

To query the EVM (peak) limit

```
CWL:EVM:LIM:PEAK?
> 35.0
```

[:SENSe]:CWLan:EVM:LIMit:FERRor <real>

Frequency Error Limits

Function

This commands sets the Frequency Error limit.

Command

```
[:SENSe]:CWLan:EVM:LIMit:FERRor <real>
```

Parameter

<real>		Frequency Error limit
	Range	0.1 to 30.0
	Resolution	0.1
	Default	20.0

Example of Use

To set the Frequency Error limit to 20 ppm.

```
CWL:EVM:LIM:FERR 20
```

[:SENSe]:CWLan:EVM:LIMit:FERRor?

Frequency Error Limits Query

Function

This commands queries the Frequency Error limit.

Query

```
[:SENSe]:CWLan:EVM:LIMit:FERRor?
```

Response

```
<real>
```

Parameter

<real>		Frequency Error limit
	Range	0.1 to 30.0
	Resolution	0.1

Example of Use

To query the Frequency Error limit.

```
CWL:EVM:LIM:FERR?
> 20.0
```

[:SENSe]:CWLan:EVM:LIMit:CFLeakage <real>

Transmitter Center Frequency Leakage Limits

Function

This commands sets the Transmitter Center Frequency Leakage limit.

Command

```
[:SENSe]:CWLan:EVM:LIMit:CFLeakage <real>
```

Parameter

`<real>`		Transmitter Center Frequency Leakage limit
	Range	–60.0 to 0.0
	Resolution	0.1
	Default	–15.0
	Suffix code	`DBM`
		dBm is used when omitted.

Example of Use

To set the Transmitter Center Frequency Leakage limit to –15 dB.

```
CWL:EVM:LIM:CFL -15
```

[:SENSe]:CWLan:EVM:LIMit:CFLeakage?

Transmitter Center Frequency Leakage Limits Query

Function

This commands queries the Transmitter Center Frequency Leakage limit.

Query

```
[:SENSe]:CWLan:EVM:LIMit:CFLeakage?
```

Response

```
<real>
```

Parameter

`<real>`		Transmitter Center Frequency Leakage limit
	Range	–60.0 to 0.0
	Resolution	0.1

Example of Use

To query the Transmitter Center Frequency Leakage limit

```
CWL:EVM:LIM:CFL?
> -15.0
```

[:SENSe]:CWLan:EVM:LIMit:IQOFfset <real>

IQ Offset Limits

Function

This commands sets the IQ Offset limit.

Command

```
[:SENSe]:CWLan:EVM:LIMit:IQOFfset <real>
```

Parameter

<real>	IQ Offset limit
Range	–60.0 to 0.0
Resolution	0.1
Default	–15.0
Suffix code	DBM
	dBm is used when omitted.

Example of Use

To set the IQ Offset limit to – 15dB.

```
CWL:EVM:LIM:IQOF -15
```

[:SENSe]:CWLan:EVM:LIMit:**IQOFfset**?

IQ Offset Limits Query

Function

This commands queries the IQ Offset limit.

Query

```
[:SENSe]:CWLan:EVM:LIMit:IQOFfset?
```

Response

```
<real>
```

Parameter

<real>	IQ Offset limit
Range	–60.0 to 0.0
Resolution	0.1

Example of Use

To query the IQ Offset limit

```
CWL:EVM:LIM:IQOF?
> -15.0
```

2.6.3 Transmit Power Measurement

[:SENSe]:CWLan:TXPower[:STATe] OFF|ON|0|1

Transmit Power Measurement

Function

This command enables/disables the Transmit Power Measurement.

Command

```
[:SENSe]:CWLan:TXPower[:STATe] OFF|ON|0|1
```

Parameter

<switch>	Transmit Power Measurement On/Off
OFF|0	Off (Default)
ON|1	On

Example of Use

To enable Transmit Power Measurement.

```
CWLan:TXP 1
```

[:SENSe]:CWLan:TXPower[:STATe]?

Transmit Power Measurement Query

Function

This command queries the Transmit Power Measurement On/Off status.

Query

```
[:SENSe]:CWLan:TXPower[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Transmit Power Measurement On/Off
0	Off
1	On

Example of Use

To query the Transmit Power Measurement On/Off status.

```
CWL:TXP?
> 1
```

[:SENSe]:CWLan:**TXPower**:AVERage[:STATe] OFF|ON|0|1

Tx Power Storage Mode

Function

This command sets the storage mode of Tx Power measurement.

Command

```
[:SENSe]:CWLan:TXPower:AVERage[:STATe] OFF|ON|0|1 <mode>
```

Parameter

<mode>	Storage Mode
OFF|0	Off (Default)
ON|1	average

Example of Use

To set the storage mode to Average.

```
CWL:TXP:AVER ON
```

[:SENSe]:CWLan:TXPower:AVERage[:STATe]?

Storage Mode Query

Function

This command queries the setting of the storage mode.

Query

```
[:SENSe]:CWLan:TXPower:AVERage[:STATe]?
```

Response

```
<mode>
```

Parameter

<mode>	Storage Mode
0	Off
1	average

Example of Use

To query the setting of the storage mode.

```
CWL:TXP:AVER?
> 1
```

[:SENSe]:CWLan:**TXPower**:AVERage:COUNt <integer>

Storage Count

Function

This command sets the averaging storage count of Tx Power measurement.

Command

```
[:SENSe]:CWLan:TXPower:AVERage:COUNt <integer>
```

Parameter

<integer>		Storage Count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1
	Default	2

Example of Use

To set the storage count to 10.

```
CWL:TXP:AVER:COUN 10
```

[:SENSe]:CWLan:TXPower:AVERage:COUNt?

Storage Count Query

Function

This command queries the averaging storage count of Tx Power measurement.

Query

```
[:SENSe]:CWLan:TXPower:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>		Storage Count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1

Example of Use

To query the storage count.

```
CWL:TXP:AVER:COUN?
> 10
```

[:SENSe]:CWLan:TXPower:TIME:LENGth <time>

Analysis Length

Function

This command sets the analysis time length of Tx Power measurement.

Command

```
[:SENSe]:CWLan:TXPower:TIME:LENGth <time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs, or Burst Interval, whichever smaller.
	Resolution	0.1 µs
	Suffix code	NS, US, MS, S S is used when the suffix code is omitted.
	Default	1 ms

Example of Use

To set the analysis time length of Tx Power measurement to1 ms.

```
CWL:TXP:TIME:LENG 1MS
```

[:SENSe]:CWLan:TXPower:TIME:LENGth?

Analysis Length Query

Function

This command queries the analysis time length of Tx Power measurement.

Query

```
[:SENSe]:CWLan:TXPower:TIME:LENGth?
```

Response

```
<time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs or Burst Interval, whichever smaller.
	Resolution	0.1 µs Value is returned in s units.

Example of Use

To query the analysis time length of Tx Power measurement.

```
CWL:TXP:TIME:LENG?
> 0.0010000
```

[:SENSe]:CWLan:TXPower:TIME:PSEarch OFF|ON|0|1

Preamble Search

Function

This command sets whether to detect the rising of a burst signal according to the preamble information or by the level change. If `Off` is specified, the rising of a burst signal is detected by the level change.

Command

```
[:SENSe]:CWLan:TXPower:TIME:PSEarch <mode>
```

Parameter

`<mode>`	Preamble Search
`OFF|0`	Off
`ON|1`	Preamble Search (Default)

Example of Use

To set Preamble Search to On.

```
CWL:TXP:TIME:PSE ON
```

[:SENSe]:CWLan:TXPower:TIME:PSEarch?

Preamble Search Query

Function

This command queries Preamble Search setting.

Query

```
[:SENSe]:CWLan:TXPower:TIME:PSEarch?
```

Response

```
<mode>
```

Parameter

`<mode>`	Preamble Search
`0`	Off
`1`	Preamble Search On

Example of Use

To query Preamble Search setting.

```
CWL:TXP:TIME:PSE?
> 1
```

[:SENSe]:CWLan:TXPower:TIME:RDDetection OFF|ON|0|1

Ramp Down Detection

Function

This command enables or disables the function that automatically sets the appropriate analysis length (symbols and number of chips) upon detection of the falling of a burst signal. If `Off` is specified, the analysis length is set according to the specified analysis length.

Command

```
[:SENSe]:CWLan:TXPower:TIME:RDDetection <mode>
```

Parameter

`<mode>`	Ramp Down Detection
`OFF|0`	Off
`ON|1`	Ramp Down Detection (Default)

Example of Use

To set Ramp Down Detection to On.

```
CWL:TXP:TIME:RDD 1
```

[:SENSe]:CWLan:TXPower:TIME:RDDetection?

Ramp Down Detection Query

Function

This command queries the Ramp Down Detection setting.

Query

```
[:SENSe]:CWLan:TXPower:TIME:RDDetection?
```

Response

```
<mode>
```

Parameter

`<mode>`	Ramp Down Detection
`0`	Off
`1`	Ramp Down Detection

Example of Use

To query the Ramp Down Detection setting.

```
CWL:TXP:TIME:RDD?
> 1
```

[:SENSe]:CWLan:TXPower:TIME:DOFFset <time>

Detection Offset

Function

This function aligns the position of the detected burst signal in the time direction.

Command

```
[:SENSe]:CWLan:TXPower:TIME:DOFFset <time>
```

Parameter

<time>		Offset from the burst signal detected position to the analysis start position in the time direction.
	Range	−2.0 to 2.0 µs
	Resolution	0.1 µs
	Default	0.0
		Specify the offset in seconds.

Example of Use

To set Detection Offset to 0.1 µs.

```
CWLan:TXP:TIME:DOFF 0.000001
```

[:SENSe]:CWLan:TXPower:TIME:**DOFFset**?

Detection Offset Query

Function

This command queries the Detection Offset value.

Query

```
[:SENSe]:CWLan:TXPower:TIME:DOFFset?
```

Response

```
<time>
```

Parameter

<time>		Detection Offset
	Range	−2.0 to 2.0 µs
	Resolution	0.1 µs
		Value is returned in s units.

Example of Use

To query the Detection Offset value.

```
CWL:TXP:TIME:DOFF?
> 0.0000010
```

[:SENSe]:CWLan:TXPower:LIMit:TPOWer <ampl>

Transmit Power Level Limit

Function

This command sets the Transmit Power Level limit.

Command

```
[:SENSe]:CWLan:TXPower:LIMit:TPOWer <ampl>
```

Parameter

<ampl>		Transmit Power Level limit
	Range	−40.0 to +30.0
	Resolution	0.1
	Default	23.0

Example of Use

To set the Transmit Power Level limit to +23 dBm.

```
CWL:TXP:LIM:TPOW 23
```

[:SENSe]:CWLan:TXPower:LIMit:**TPOWer**?

Transmit Power Level Limit Query

Function

This command queries the Transmit Power Level limit.

Query

```
[:SENSe]:CWLan:TXPower:LIMit:TPOWer?
```

Response

```
<ampl>
```

Parameter

<ampl>		Transmit Power Level limit
	Range	−40.0 to +30.0
	Resolution	0.1

Example of Use

To query the Transmit Power Level limit.

```
CWL:TXP:LIM:TPOW?
> 23.0
```

[:SENSe]:CWLan:TXPower:LIMit:PSDensity <ampl>

Peak PSD Limits

Function

This commands sets the Peak PSD limit.

Command

```
[:SENSe]:CWLan:TXPower:LIMit:PSDensity <ampl>
```

Parameter

<ampl>		Peak PSD limit
	Range	−56.0 to +14.0
	Resolution	0.1
	Default	11.0

Example of Use

To set the Peak PSD limit to +11 dBm/MHz.

```
CWL:TXP:LIM:PSD 11
```

[:SENSe]:CWLan:**TXPower**:LIMit:PSDensity?

Peak PSD Limit Query

Function

This commands queries the Peak PSD limit.

Query

```
[:SENSe]:CWLan:TXPower:LIMit:PSDensity?
```

Response

```
<ampl>
```

Parameter

<ampl>		Peak PSD limit
	Range	−56.0 to +14.0
	Resolution	0.1

Example of Use

To query the Peak PSD limit.

```
CWL:TXP:LIM:PSD?
> 11.0
```

[:SENSe]:CWLan:PVTime:LIMit:URTime <time>

Max Ramp Up Time

Function

This command sets the limit of Power-on Ramp Time. This function is applied when 802.11b or 802.11g DSSS is selected.

Command

```
[:SENSe]:CWLan:PVTime:LIMit:URTime <time>
```

Parameter

<time>		Limit of Power-on Ramp Time
	Range	0.1 to 10.0 µs
	Resolution	0.1 µs
	Default	2.0 µs
	Suffix code	NS, US, MS, S
		S is used when the suffix code is omitted.

Example of Use

To set the limit of Power-on Ramp Time to 2.0 µs.

```
CWL:PVT:LIM:URT 2US
```

[:SENSe]:CWLan:PVTime:LIMit:URTime?

Max Ramp Up Time Query

Function

This command queries the limit of Power-on Ramp Time.

Query

```
[:SENSe]:CWLan:PVTime:LIMit:URTime?
```

Response

```
<time>
```

Parameter

<ampl>		Limit of Power-on Ramp Time
	Range	0.1 to 10.0 µs
	Resolution	0.1 µs
		Value is returned in s units.

Example of Use

To query the Limit of Power-on Ramp Time.

```
CWL:PVT:LIM:URT?
> 0.0000020
```

[:SENSe]:CWLan:PVTime:LIMit:DRTime <time>

Max Ramp Down Time

Function

This command sets the limit of Power-down Ramp Time. This function is applied when 802.802.11b or 802.11g DSSS is selected.

Command

```
[:SENSe]:CWLan:PVTime:LIMit:DRTime <time>
```

Parameter

<time>		Limit of Power-down Ramp Time
	Range	0.1 to 10.0 µs
	Resolution	0.1 µs
	Default	2.0 µs
	Suffix code	NS, US, MS, S
		S is used when the suffix code is omitted.

Example of Use

To set the limit of Power-down Ramp Time to 2.0 µs.

```
CWL:PVT:LIM:DRT 2US
```

[:SENSe]:CWLan:PVTime:LIMit:DRTime?

Max Ramp DownTime Query

Function

This command queries the limit of Power-down Ramp Time.

Query

```
[:SENSe]:CWLan:PVTime:LIMit:DRTime?
```

Response

```
<time>
```

Parameter

<ampl>		Limit of Power-down Ramp Time
	Range	0.1 to 10.0 µs
	Resolution	0.1 µs
		Value is returned in s units.

Example of Use

To query the Limit of Power-down Ramp Time.

```
CWL:PVT:LIM:DRT?
> 0.0000020
```

2.6.4 Occupied Bandwidth Measurement

[:SENSe]:CWLan:OBWidth[:STATe] OFF|ON|0|1

Occupied Bandwidth Measurement

Function

This command sets the OBW measurement to On/Off.

Command

```
[:SENSe]:CWLan:OBWidth[:STATe] <switch>
```

Parameter

<switch>	OBW measurement On/Off
OFF|0	Off (Default)
ON|1	On

Example of Use

To set the OBW measurement to On.

```
CWL:OBW 1
```

[:SENSe]:CWLan:OBWidth[:STATe]?

Occupied Bandwidth Measurement Query

Function

This command queries the On/Off setting of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	OBW measurement On/Off
0	Off
1	On

Example of Use

To query the OBW measurement On/Off status

```
CWL:OBW?
> 1
```

[:SENSe]:CWLan:OBWidth:STORage:MODE OFF|AVERage|MAXHold

Occupied Bandwidth Storage Mode

Function

This command sets the storage mode of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:STORage:MODE <mode>
```

Parameter

<mode>	Storage Mode
OFF	Off (Default)
AVERage	The average value is measured.
MAXHold	The maximum value is held.

Example of Use

To set the storage mode to Average.

```
CWL:OBW:STOR:MODE AVER
```

[:SENSe]:CWLan:OBWidth:STORage:MODE?

Storage Mode Query

Function

This command queries the storage mode of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:STORage:MODE?
```

Response

```
<mode>
```

Parameter

<mode>	Storage Mode
OFF	Off
AVER	The average value is measured.
MAXH	The maximum value is held.

Example of Use

To query the setting of the storage mode.

```
CWL:OBW:STOR:MODE?
> AVER
```

[:SENSe]:CWLan:OBWidth:AVERage:COUNt <integer>

Storage Count

Function

This command sets the storage count of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:AVERage:COUNt <integer>
```

Parameter

<integer>		Storage count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1
	Default	10

Example of Use

To set the storage count to 10.

```
CWL:OBW:AVER:COUN 10
```

[:SENSe]:CWLan:OBWidth:AVERage:COUNt?

Storage Count Query

Function

This command queries the storage count of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>		Storage count
	Range	2 to 200, or 2s/Burst Interval, whichever smaller.
	Resolution	1

Example of Use

To query the storage count of OBW measurement.

```
CWL:OBW:AVER:COUN?
> 10
```

[:SENSe]:CWLan:OBWidth:TIME:PSEarch OFF|ON|0|1

OBW Preamble Search

Function

This command sets Preamble Search for OBW measurement. If `On` is specified, a burst signal is detected by using a preamble search. If `Off` is specified, it is detected by the signal envelope.

Command

```
[:SENSe]:CWLan:OBWidth:TIME:PSEarch <mode>
```

Parameter

`<mode>`	Preamble Search
`OFF|0`	Off
`ON|1`	Preamble Search (Default)

Example of Use

To set the storage mode to Average.

```
CWL:OBW:TIME:PSE ON
```

[:SENSe]:CWLan:OBWidth:TIME:PSEarch?

Preamble Search Query

Function

This command queries Preamble Search setting.

Query

```
[:SENSe]:CWLan:OBWidth:TIME:PSEarch?
```

Response

```
<mode>
```

Parameter

`<mode>`	Preamble Search
`0`	Off
`1`	On

Example of Use

To query Preamble Search setting.

```
CWL:OBW:TIME:PSE?
> 1
```

[:SENSe]:CWLan:OBWidth: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]:CWLan:OBWidth:TIME:LENGth[:STATe]:AUTO <switch>
```

Parameter

<switch>	On/Off setting of Analysis Length Setup
OFF|0	Manual setting
ON|1	Automatic setting (Default)

Example of Use

To enable the automatic setting of the analysis length.

```
CWL:OBW:TIME:LENG:AUTO ON
```

[:SENSe]:CWLan:OBWidth:TIME:LENGth[:STATe]:AUTO?

Analysis Length Setup Query

Function

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

Query

```
[:SENSe]:CWLan:OBWidth:TIME:LENGth[:STATe]:AUTO?
```

Response

```
<switch>
```

Parameter

<switch>	Analysis Length Setup
0	Manual setting
1	Automatic setting

Example of Use

To query the settings of Analysis Length Setup.

```
CWL:OBW:TIME:LENG:AUTO?
> 1
```

[:SENSe]:CWLan:OBWidth:TIME:LENGth <time>

Analysis Length

Function

This command sets the analysis time length of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:TIME:LENGth <time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs, or Burst Interval, whichever smaller.
	Resolution	0.1 µs
	Default	1000 µs
	Suffix code	NS, US, MS, S S is used when the suffix code is omitted.

Example of Use

To set the analysis time length of OBW measurement to 1.

```
CWL:OBW:TIME:LENG 1MS
```

[:SENSe]:CWLan:OBWidth:TIME:LENGth?

Analysis Length Query

Function

This command queries the analysis time length of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:TIME:LENGth?
```

Response

```
<time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs, or Burst Interval, whichever smaller.
	Resolution	0.1 µs Value is returned in s units.

Example of Use

To query the analysis time length of OBW measurement

```
CWL:OBW:TIME:LENG?
> 0.0010000
```

[:SENSe]:CWLan:OBWidth:TIME:OFFSet <time>

Analysis Offset

Function

This command sets the Analysis Offset of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:TIME:OFFSet <time>
```

Parameter

<time>		Analysis Offset
	Range	−1000.0 to 1000.0 µs
	Resolution	0.1 µs
	Default	0.0 µs
	Suffix code	NS, US, MS, S
		S is used when the suffix code is omitted.

Example of Use

To set the Analysis Offset of OBW measurement to 0 ms.

```
CWL:OBW:TIME:OFFS 0
```

[:SENSe]:CWLan:OBWidth:TIME:OFFSet?

Analysis Offset Query

Function

This command queries the Analysis Offset of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:TIME:OFFSet?
```

Response

```
<time>
```

Parameter

<time>		Analysis Offset
	Range	−1000.0 to 1000.0 µs
	Resolution	0.1 µs
		Value is returned in s units.

Example of Use

To query the Analysis Offset of OBW measurement

```
CWL:OBW:TIME:OFFS?
> 0.0010000
```

[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution] 30|100|300

Resolution Bandwidth

Function

This command sets the Resolution Bandwidth of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution] <freq>
```

Parameter

<freq>	Resolution bandwidth (RBW)
30	30 kHz (Default)
100	100 kHz
300	300 kHz

Example of Use

To set the resolution bandwidth to 30 kHz

```
CWL:OBW:BWID 30
```

[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution]?

Resolution Bandwidth Query

Function

This command queries the Resolution Bandwidth of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:BWIDth[:RESolution]?
```

Response

```
<freq>
```

Parameter

<real>	Resolution bandwidth (RBW)
30	30 kHz
100	100 kHz
300	300 kHz

Example of Use

To query the Resolution Bandwidth of OBW measurement.

```
CWL:OBW:BWID?
> 30
```

[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion] POSitive| RMS

Detection

Function

This command sets the detection mode of OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion] <mode>
```

Parameter

<mode>		Detection mode
	POSitive	Positive peak detection (Default)
	RMS	RMS detection

Example of Use

To set the detection mode to positive peak detection.

```
CWL:OBW:DET POS
```

[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion]?

Detection Query

Function

This command queries the detection mode of OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:DETector[:FUNCtion]? <mode>
```

Response

```
<mode>
```

Parameter

<mode>		Detection mode
	POS	Positive peak detection
	RMS	RMS detection

Example of Use

To query the detection mode of OBW measurement.

```
CWL:OBW:DET?
> POS
```

[:SENSe]:CWLan:OBWidth:PERCent 99|90

Occupied Bandwidth Percent

Function

This command sets the occupancy rate in OBW measurement.

Command

```
[:SENSe]:CWLan:OBWidth:PERCent <ratio>
```

Parameter

<ratio>	Occupancy rate
99	99% (Default)
90	90%

Example of Use

To set the occupancy rate to 90%.

```
CWL:OBW:PERC 90
```

[:SENSe]:CWLan:OBWidth:PERCent?

Occupied Bandwidth Percent Query

Function

This command queries the occupancy rate in OBW measurement.

Query

```
[:SENSe]:CWLan:OBWidth:PERCent?
```

Response

```
<ratio>
```

Parameter

<ratio>	Occupancy rate
99	99%
90	90%

Example of Use

To query the occupancy rate.

```
CWL:OBW:PERC?
> 99
```

[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA <bandwidth>

OBW Limits

Function

This command sets the OBW limit.

Command

```
[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA <bandwidth>
```

Parameter

<bandwidth>	OBW limit
Range	10.0 to 50.0 MHz
Resolution	1 Hz
Default	19.0 MHz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
	Hz is used when omitted.

Example of Use

To set the OBW limit to 19 MHz.

```
CWL:OBW:LIM:DATA 19MZ
```

[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA?

OBW Limits Query

Function

This command queries the OBW limit.

Query

```
[:SENSe]:CWLan:OBWidth:LIMit[:UPPer]:DATA?
```

Response

```
<bandwidth>
```

Parameter

< bandwidth >	OBW limit
Range	10.0 to 50.0MHZ
Resolution	1 Hz

Example of Use

To query the OBW limit.

```
CWL:OBW:LIM:DATA?
> 19000000
```

2.6.5 Transmit Spectrum Mask Measurement

[:SENSe]:CWLan:TOSPectrum[:STATe] OFF|ON|0|1

Transmit Spectrum Mask Measurement

Function

This command enables/disables the Transmit Spectrum Mask measurement.

Command

```
[:SENSe]:CWLan:TOSPectrum[:STATe] <switch>
```

Parameter

<switch>	Transmit Spectrum Mask measurement On/Off
OFF|0	Off (Default)
ON|1	On

Example of Use

To enable Transmit Spectrum Mask measurement

```
CWL:TOSP 1
```

[:SENSe]:CWLan:TOSPectrum[:STATe]?

Transmit Spectrum Mask Measurement Query

Function

This command queries the On/Off setting of the Transmit Spectrum Mask measurement.

Query

```
[:SENSe]:CWLan:TOSPectrum[:STATe]?
```

Response

```
<switch>
```

Parameter

<switch>	Transmit Spectrum Mask measurement On/Off
0	Off
1	On

Example of Use

To query the On/Off setting of the Transmit Spectrum Mask measurement.

```
CWL:TOSP?
> 1
```

[:SENSe]:CWLan:TOSPectrum:STORage:MODE OFF|AVERage|MAXHold

Transmit Spectrum Mask Storage Mode

Function

This command sets the Storage Mode of Transmit Spectrum Mask measurement.

Command

```
[:SENSe]:CWLan:TOSPectrum:STORage:MODE <mode>
```

Parameter

<mode>	Storage Mode
OFF	Off (Default)
AVERage	average
MAXHold	Maxhold

Example of Use

To set the storage mode to Average.

```
CWL:TOSP:STOR:MODE AVER
```

[:SENSe]:CWLan:TOSPectrum:STORage:MODE?

Storage Mode Query

Function

This command queries the setting of the storage mode.

Query

```
[:SENSe]:CWLan:TOSPectrum:STORage:MODE?
```

Response

```
<mode>
```

Parameter

<mode>	Storage Mode
OFF	Off
AVERage	average
MAXHold	Maxhold

Example of Use

To query the setting of the storage mode.

```
CWL:TOSP:STOR:MODE?
> OFF
```

[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt <integer>

Storage Count

Function

This command sets the Storage Count of Transmit Spectrum Mask.

Command

```
[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt <integer>
```

Parameter

<integer>		Storage Count
	Range	2 to 200, or 2s / Burst Interval, whichever smaller.
	Resolution	1
	Default	2

Example of Use

To set the storage count to 10.

```
CWL:TOSP:AVER:COUN 10
```

[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt?

Storage Count Query

Function

This command queries the Storage Count of Transmit Spectrum Mask.

Query

```
[:SENSe]:CWLan:TOSPectrum:AVERage:COUNt?
```

Response

```
<integer>
```

Parameter

<integer>		Storage Count
	Range	2 to 200, or 2s / Burst Interval, whichever smaller.
	Resolution	1

Example of Use

To query the storage count.

```
CWL:TOSP:AVER:COUN?
> 10
```

[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch OFF|ON|0|1

Preamble Search

Function

This command enables/disables Preamble Search.

Command

```
[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch <mode>
```

Parameter

<mode>	Preamble Search On/Off
OFF|0	Manual setting
ON|1	Preamble Search (Default)

Example of Use

To enable Preamble Search.

```
CWL:TOSP:TIME:PSE ON
```

[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch?

Preamble Search Query

Function

This command queries the On/Off setting of Preamble Search.

Query

```
[:SENSe]:CWLan:TOSPectrum:TIME:PSEarch?
```

Response

```
<switch>
```

Parameter

<switch>	Preamble Search
0	Manual setting
1	Preamble Search

Example of Use

To query the On/Off setting of Preamble Search.

```
CWL:TOSP:TIME:PSE?
> 1
```

[:SENSe]:CWLan:TOSPectrum: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]:CWLan:TOSPectrum:TIME:LENGth[:STATe]:AUTO
<switch>
```

Parameter

<switch>	Analysis Length Setup On/Off
OFF|0	Manual setting
ON|1	Auto setting (Default)

Example of Use

To enable the automatic setting of the analysis length.

```
CWL:TOSP:TIME:LENG:AUTO ON
```

[:SENSe]:CWLan:TOSPectrum:TIME:LENGth[:STATe]:AUTO?

Analysis Length Setup Query

Function

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

Query

```
[:SENSe]:CWLan:TOSPectrum:TIME:LENGth[:STATe]:AUTO?
```

Response

```
<switch>
```

Parameter

<switch>	Analysis Length Setup
0	Manual setting
1	Automatic setting

Example of Use

To query the settings of Analysis Length Setup.

```
CWL:TOSP:TIME:LENG:AUTO?
> 1
```

[:SENSe]:CWLan:TOSPectrum:TIME:LENGth <time>

Analysis Length

Function

This command sets the Analysis Length of Transmit Spectrum Mask.

Command

```
[:SENSe]:CWLan:TOSPectrum:TIME:LENGth <time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs, or Burst Interval, whichever smaller
	Resolution	0.1 µs
	Default	1000 µs
	Suffix code	NS, US, MS, S S is used when the suffix code is omitted.

Example of Use

To set the EVM analysis time length to 1 ms.

```
CWL:TOSP:TIME:LENG 1ms
```

[:SENSe]:CWLan:TOSPectrum:TIME:LENGth?

Analysis Length Query

Function

This command queries the Analysis Length of Transmit Spectrum Mask.

Query

```
[:SENSe]:CWLan:TOSPectrum:TIME:LENGth?
```

Response

```
<time>
```

Parameter

<time>		Analysis time length
	Range	100.0 to 7000.0 µs, or Burst Interval, whichever smaller
	Resolution	0.1 µs Value is returned in s units.

Example of Use

To query the Analysis Length of Transmit Spectrum Mask.

```
CWL:TOSP:TIME:LENG?
> 0.0010000
```

[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet <time>

Analysis Offset

Function

This command sets the Analysis Offset of Transmit Spectrum Mask measurement.

Command

```
[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet <time>
```

Parameter

<time>	Analysis Offset
Range	−1000.0 to 1000.0 µs
Resolution	0.1 µs
Default	0.0 µs
Suffix code	NS, US, MS, S
	S is used when the suffix code is omitted.

Example of Use

To set the Analysis Offset of Transmit Spectrum Mask to 0 ms.

```
CWL:TOSP:TIME:OFFS 0
```

[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet?

Analysis Offset Query

Function

This command queries the Analysis Offset of Transmit Spectrum Mask measurement.

Query

```
[:SENSe]:CWLan:TOSPectrum:TIME:OFFSet?
```

Response

```
<time>
```

Parameter

<time>	Analysis Offset
Range	−1000.0 to 1000.0 µs
Resolution	0.1 µs
	Value is returned in s units.

Example of Use

To query the Analysis Offset of the Transmit Spectrum Mask measurement.

```
CWL:TOSP:TIME:OFFS?
> 0.0001000
```

[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion] POSitive| RMS

Detection

Function

This command sets the detection mode of Transmit Spectrum Mask measurement.

Command

```
[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion] <mode>
```

Parameter

<mode>	Detection mode
POSitive	Positive peak detection
RMS	RMS detection (Default)

Example of Use

To set the detection mode to RMS.

```
CWL:TOSP:DET RMS
```

[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion]?

Detection Query

Function

This command queries the detection mode of Transmit Spectrum Mask measurement.

Query

```
[:SENSe]:CWLan:TOSPectrum:DETector[:FUNCtion]? <mode>
```

Response

```
<mode>
```

Parameter

<mode>	Detection mode
POS	Positive peak detection
RMS	RMS detection

Example of Use

To query the status of this application.

```
CWL:TOSP:DET?
> RMS
```

:CALCulate:CWLan:TOSPectrum:LIMit:DATA <rel_ampl_S1>,<rel_ampl_E1>,<rel_ampl_S2>,<rel_ampl_E2>,<rel_ampl_S3>,<rel_ampl_E3>,<rel_ampl_S4>,<rel_ampl_E4>

Transmit Spectrum Mask Limit Level

Function

This command sets the maximum relative levels of the start frequency and terminal frequency for Offset 1 to Offset 4 in Transmit Spectrum Mask measurement.

Command

```
:CALCulate:CWLan:TOSPectrum:LIMit:DATA
<rel_ampl_S1>,<rel_ampl_E1>,<rel_ampl_S2>,<rel_ampl_E2>,
<rel_ampl_S3>,<rel_ampl_E3>,<rel_ampl_S4>,<rel_ampl_E4>
```

Parameter

`<rel_ampl_Sn>` Maximum relative level of the start frequency for Offset n in Transmit Spectrum Mask measurement.

Range	−100 to 0 dB
Resolution	0.1 dB

`<rel_ampl_En>` Maximum relative level of the terminal frequency for Offset n in Transmit Spectrum Mask measurement.

Range	−100 to 0 dB
Resolution	0.1 dB
Suffix code	`DB` dB is used when omitted.

Details

When the WLAN communication standard is either 802.11a or 802.11g OFDM, the range of Offset 1, 2, 3, and 4 is 9 to 11 MHz, 11 to 20 MHz, 20 to 30 MHz, and 30 to 40 MHz, respectively, and VBW is 30 kHz.
When the WLAN communication standard is 802.11b or 802.11g DSSS, the range of Offset 1, 2, 3, and 4 is 11 to 22 MHz, 22 to 33 MHz, 33 to 33 MHz, and 33 to 33 MHz, respectively, and VBW is 100 kHz.
When the WLAN communication standard is 802.11n 20MHz, the range of Offset 1, 2, 3, and 4 is 9 to 11 MHz, 11 to 20 MHz, 20 to 30 MHz, and 30 to 40 MHz, respectively, and VBW is 30 kHz.
When the WLAN communication standard is 802.11n 40MHz, the range of Offset 1, 2, 3, and 4 is 19 to 21 MHz, 21 to 40 MHz, 40 to 60 MHz and 60 to 60 MHz, respectively, and VBW is 30 kHz.

Table 2.6.5-1 Transmit Spectrum Mask Measurement Parameters

WLAN Standard	Offset [MHz]				RBW [kHz]	VBW [kHz]
	1	2	3	4		
802.11a, 802.11g OFDM	9 to 11	11 to 20	20 to 30	30 to 40	100	30
802.11b, 802.11g DSSS	11 to 22	22 to 33	-	-	100	100
802.11n 20MHz	9 to 11	11 to 20	20 to 30	30 to 40	100	30
802.11n 40MHz	19 to 21	21 to 40	40 to 60	-	100	30

Example of Use

To set the maximum relative levels of the start frequency and terminal frequency for each offset.

```
CALC:CWL:TOSP:LIM:DATA 0,-20,-20,-28,-28,-40,-40,-40
```

CALCulate:CWLan:TOSPectrum:LIMit:DATA?

Transmit Spectrum Mask Limit Level Query

Function

This command queries the maximum relative levels of the start frequency and terminal frequency for Offset 1 to Offset 4 in Transmit Spectrum Mask measurement.

Query

```
CALCulate:CWLan:TOSPectrum:LIMit:DATA?
```

Response

```
<rel_ampl_S1>,<rel_ampl_E1>,<rel_ampl_S2>,<rel_ampl_E2>,
<rel_ampl_S3>,<rel_ampl_E3>,<rel_ampl_S4>,<rel_ampl_E4>
```

Parameter

`<rel_ampl_Sn>` Maximum relative level of the start frequency for Offset n in Transmit Spectrum Mask measurement.

Range	−100 to 0 dB
Resolution	0.1 dB

`<rel_ampl_En>` Maximum relative level of the terminal frequency for Offset n in Transmit Spectrum Mask measurement.

Range	−100 to 0 dB
Resolution	0.1 dB

Example of Use

To query the maximum relative levels of the start frequency and terminal frequency for each offset.

```
CALC:CWL:TOSP:LIM:DATA?
> 0.0,-20.0,-20.0,-28.0,-28.0,-40.0,-40.0,-40.0
```

Chapter 3 SCPI Device Message Details

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

3.1 Querying Measurement Status

:STATus:ERRor?

Measurement Status Query

Function

This command queries the measurement status.

Query

```
:STATus:ERRor?
```

Response

```
<status>
```

Parameter

`<status>` Measurement status

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

bit0 : 2^0 = 1	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 255

Details

0 is returned at normal termination.

Example of Use

To query the measurement status.

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

3.2 STATus:QUEStionable Register

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

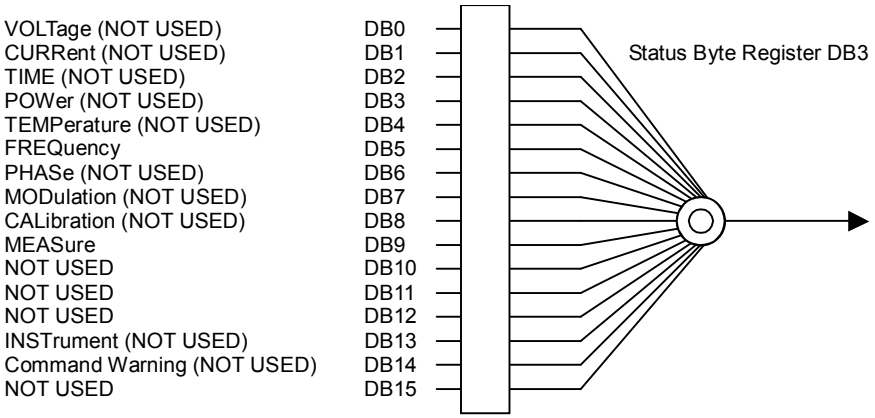

Figure 3.2-1 QUEStionable Status Register

Table 3.2-1 Bit Definition of QUEStionable Status Register

Bit	Definition
DB5	Reference Clock Unlock
DB9	QUEStionable Measure Register Summary

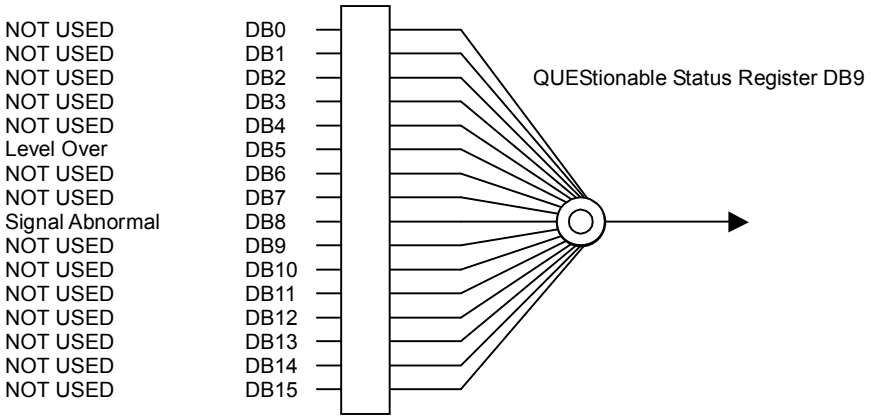

Figure 3.2-2 QUEStionable Measure Register

Table 3.2-2 Bit Definition of QUEStionable Measure Register

Bit	Definition
DB5	Level Over
DB8	Signal Abnormal

Table 3.2-3 lists 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 the event register of the QUEStionable Status Register.

Query

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

Response

```
<integer>
```

Parameter

`<integer>`		Bit sum of event register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:CONDition?

Questionable Status Register Condition

Function

This command queries the condition register of the QUEStionable Status Register.

Query

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

Response

```
<integer>
```

Parameter

`<integer>`		Bit sum of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

To query the condition register of the QUEStionable Status Register.

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

:STATus:QUEStionable:ENABle <integer>

Questionable Status Register Enable

Function

This command sets the event enable register of the QUEStionable status register.

Command

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

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:ENABle?

Questionable Status Register Enable Query

Function

This command queries the event enable register of the QUEStionable Status Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:NTRansition <integer>

Questionable Status Register Negative Transition

Function

This command sets the transition filter (negative transition) of the QUEStionable Status Register.

Command

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

Parameter

<integer>		Bit sum of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:NTRansition?

Questionable Status Register Negative Transition Query

Function

This command queries the transition filter (negative transition) of the QUEStionable Status Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:PTRansition <integer>

Questionable Status Register Positive Transition

Function

This command sets the transition filter (positive transition) of the QUEStionable Status Register.

Command

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

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:PTRansition?

Questionable Status Register Positive Transition Query

Function

This command queries the transition filter (positive transition) of the QUEStionable Status Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure[:EVENt]?

Questionable Measure Register Event

Function

This command queries the event register of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of event register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:CONDition?

Questionable Measure Register Condition

Function

This command queries the condition register of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:ENABle <integer>

Questionable Measure Register Enable

Function

This command sets the event enable register of the QUEStionable Measure Register.

Command

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

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:ENABle?

Questionable Measure Register Enable Query

Function

This command queries the event enable register of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:NTRansition <integer>

Questionable Measure Register Negative Transition

Function

This command sets the transition filter (negative transition) of the QUEStionable Measure Register.

Command

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

Parameter

<integer>		Bit sum of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:NTRansition?

Questionable Measure Register Negative Transition Query

Function

This command queries the transition filter (negative transition) of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of transition filter (negative transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:PTRansition <integer>

Questionable Measure Register Positive Transition

Function

This command sets the transition filter (positive transition) of the QUEStionable Measure Register.

Command

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

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:QUEStionable:MEASure:PTRansition?

Questionable Measure Register Positive Transition Query

Function

This command queries the transition filter (positive transition) of the QUEStionable Measure Register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

3.3 STATus:OPERation Register

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

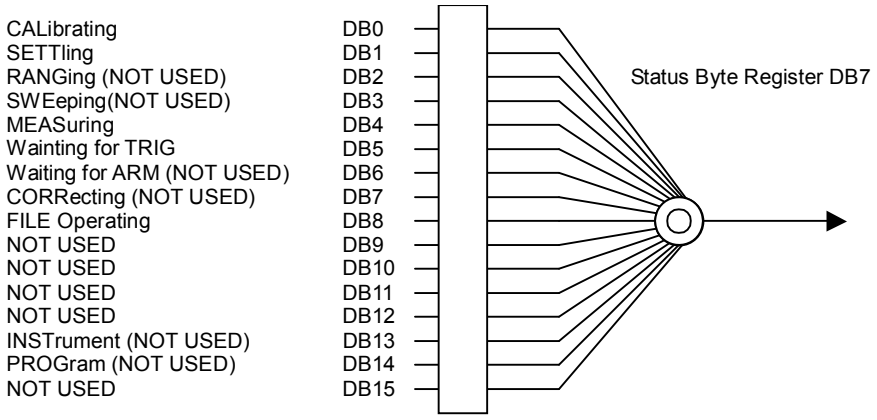

Figure 3.3-1 OPERation Status Register

Table 3.3-1 Definition for OPERation Status Register

Bit	Definition
DB0	Executing calibration
DB1	Warm Up message is being displayed.
DB4	Performing measurement (including trigger signal waiting status; always 1 during Continuous measurement)
DB5	Waiting for trigger signal
DB8	Operating on file

Table 3.3-2 lists 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 the content of the event enable register of the OPERation status register.

Query

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

Response

```
<integer>
```

Parameter

`<integer>`		Bit sum of event register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:CONDition?

Operation Status Register Condition

Function

This command queries the content of the condition register of the OPERation status register.

Query

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

Response

```
<integer>
```

Parameter

`<integer>`		Bit sum of condition register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:ENABle <integer>

Operation Status Register Enable

Function

This command sets the event enable register of the OPERation status register.

Command

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

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:ENABle?

Operation Status Register Enable Query

Function

This command queries the event enable register of the OPERation status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of event enable register
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:NTRansition <integer>

Operation Status Register Negative Transition

Function

This command sets the transition filter (negative transition) of the OPERation status register.

Command

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

Parameter

<integer>	Bit sum of transition filter (negative transition)
Resolution	1
Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:NTRansition?

Operation Status Register Negative Transition Query

Function

This command queries the transition filter (negative transition) of the OPERation status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>	Bit sum of transition filter (negative transition)
Resolution	1
Range	0 to 65535

Example of Use

This function queries the transition filter (negative transition) of the OPERation status register.

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

:STATus:OPERation:PTRansition <integer>

Operation Status Register Positive Transition

Function

This command sets the transition filter (positive transition) of the OPERation status register.

Command

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

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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

:STATus:OPERation:PTRansition?

Operation Status Register Positive Transition Query

Function

This command queries the transition filter (positive transition) of the OPERation status register.

Query

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

Response

```
<integer>
```

Parameter

<integer>		Bit sum of transition filter (positive transition)
	Resolution	1
	Range	0 to 65535

Example of Use

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

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