MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual Remote Control

11th Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation) and MS2690A/MS2691A/MS2692A Option 020 Vector Signal Generator Operation Manual (Operation). Please also refer to them 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.

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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

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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.

MS2690A/MS2691A/MS2692A
Signal Analyzer Option 020: Vector Signal Generator
Operation Manual Remote Control

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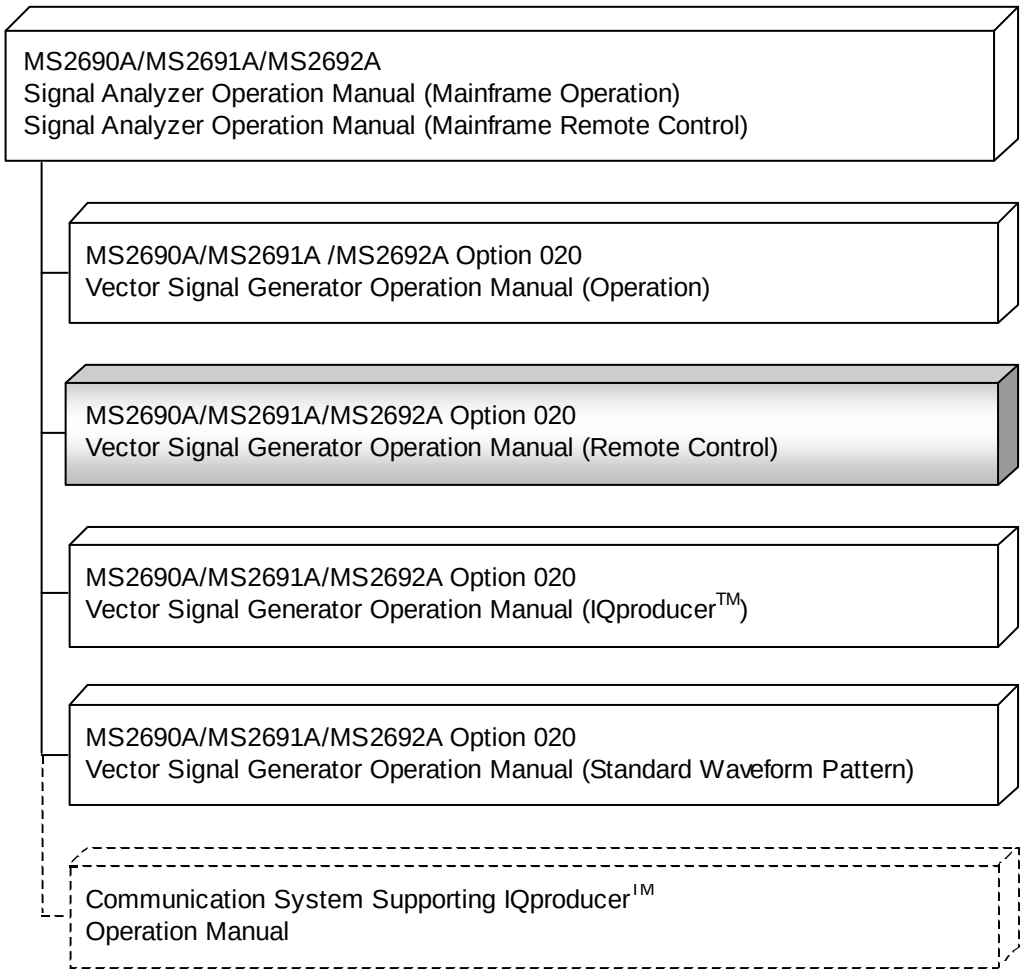
About This Manual

■ **Composition of Operation Manuals**

The operation manuals for the MS2690A/MS2691A/MS2692A Signal Analyzer 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.

- **Vector Signal Generator Operation Manual (Operation)**

This manual describes functions, operating methods, and so on of the vector signal generator (option).

- **Vector Signal Generator Operation Manual (Remote Control) (This manual)**

This manual describes remote control of the vector signal generator (option).

- **Vector Signal Generator Operation Manual (IQproducer™)**

This manual describes functions, operating methods, and so on of the IQproducer, which is application software used with the vector signal generator (option).

- **Vector Signal Generator Operation Manual (Standard Waveform Pattern)**

This manual describes details on the standard waveform pattern data used with the vector signal generator (option).

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IV.

Chapter 1 Overview

This section provides an overview of the remote control of the Spectrum Analyzer function (hereinafter, referred to as “this application”).

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1.1 Overview

Automatic measurement can be performed by using this instrument in connection with an external controller (PC). This instrument is standardly equipped with GPIB, Ethernet, and USB interfaces. You can also select a remote control command from the SCPI mode, which is a command format defined by the SCPI Consortium, and Native mode, which is our unique format.

See the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for how to switch the language mode.

You can use the Native mode by converting SCPI commands into Native ones. See the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for details.

Chapter 2 SCPI Device Message

This chapter describes detailed specifications on SCPI remote control commands for executing functions of this application, in alphabetical order. Refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for detailed specifications on IEEE488.2 common device messages and application common device messages.

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2.1 Frequency Settings

Table 2.1-1 shows device messages for frequency.

Table 2.1-1 Device messages for frequency

Function	Device Message
Frequency	[:SOURce]:FREQuency[:CW|:FIXed] <freq>
	[:SOURce]:FREQuency[:CW|:FIXed]?
Frequency Step Value	[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>
	[:SOURce]:FREQuency:STEP[:INCRement]?
Frequency Switching Speed Mode	[:SOURce]:FREQuency:SWSPeed NORMal|FAST
	[:SOURce]:FREQuency:SWSPeed?
RF Spectrum	[:SOURce]:DM:POLarity[:ALL] NORMal|INVert
	[:SOURce]:DM:POLarity[:ALL]?

[:SOURce]:FREQuency[:CW|:FIXed] <freq>

Frequency

Function

Sets the frequency.

Command

```
[:SOURce]:FREQuency[:CW|:FIXed] <freq>
```

Parameter

<freq>	Frequency
Range	125 MHz to 6 GHz
Resolution	0.01 Hz
Initial value	1 GHz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
When omitted	Hz

Example of Use

To set the frequency to 800 MHz.

```
FREQ 800MHZ
```

[:SOURce]:FREQuency[:CW|:FIXed]?

Frequency Query

Function

Queries the frequency.

Query

```
[:SOURce]:FREQuency[:CW|:FIXed]?
```

Response

```
<freq>
```

Parameter

<freq>	Frequency
Range	125 MHz to 6 GHz
Resolution	0.01 Hz
Initial value	1 GHz

Example of Use

To query the frequency.

```
FREQ?
> 800000000.00
```

[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>

Frequency - Step Value

Function

Sets the fluctuation width (step value) when the frequency is increased/decreased in step units.

Command

```
[:SOURce]:FREQuency:STEP[:INCRement] <numeric_value>
```

Parameter

<numeric_value>	Frequency step width
Range	0.01 Hz to 1 GHz
Resolution	0.01 Hz
Initial value	100 kHz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
When omitted	Hz

Example of Use

To set the frequency step width to 200 kHz.

```
FIS 200KHZ
```

[:SOURce]:FREQuency:STEP[:INCRement]?

Frequency - Step Value Query

Function

Queries the status of the fluctuation width when the frequency setting is increased/decreased in step units.

Query

```
[:SOURce]:FREQuency:STEP[:INCRement]?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Frequency step width
Range	0.01 Hz to 1 GHz
Resolution	0.01 Hz
Initial value	100 kHz

Example of Use

To query the frequency step width.

```
FREQ:STEP?
> 200000.00
```

[:SOURce]:FREQuency:SWSPeed NORMal|FAST

Frequency Switching Speed

Function

Selects the frequency switching speed.

Command

```
[:SOURce]:FREQuency:SWSPeed <mode>
```

Parameter

<mode>	Frequency switching speed
NORMal	Normal mode
FAST	Fast mode

Example of Use

To set the frequency switching speed to the fast mode.

```
FREQ:SWSP FAST
```

[:SOURce]:FREQuency:SWSPeed?

Frequency Switching Speed

Function

Queries the frequency switching speed.

Query

```
[:SOURce]:FREQuency:SWSPeed?
```

Response

```
<mode>
```

Parameter

`<mode>`	Frequency switching speed
`NORM`	Normal mode
`FAST`	Fast mode

Example of Use

To query the frequency switching speed.

```
FREQ:SWSP?
> FAST
```

[:SOURce]:DM:POLarity[:ALL] NORMal|INVert

RF Spectrum - Reverse/Normal

Function

Sets whether to invert spectrum of the output waveform (reverses I and Q).

Command

```
[:SOURce]:DM:POLarity[:ALL] <mode>
```

Parameter

`<mode>`	Whether to invert output waveform
`NORMal`	Normal: Do not invert (Command only)
`INVert`	Reverse: Invert (Command only)

Example of Use

To invert the output waveform.

```
DM:POL INV
```

[:SOURce]:DM:POLarity[:ALL]?

RF Spectrum - Reverse/Normal Query

Function

Queries the status of the spectrum invert (reverses I and Q) of the output waveform.

Query

```
[:SOURce]:DM:POLarity[:ALL]?
```

Response

```
<mode>
```

Parameter

<mode>	Whether to invert output waveform
NORM	Normal: Do not invert (Command only)
INV	Reverse: Invert (Command only)

Example of Use

To query the invert status of the output waveform.

```
DM:POL?
> INV
```

2.2 Level Settings

Table 2.2-1 shows device messages for setting levels.

Table 2.2-1 Device messages for levels

Function	Device Message
Output Level Unit	:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBU
	:DISPlay:ANNotation:AMPLitude:UNIT?
Volt Unit Display	:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage EMF|TERM
	:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?
RF Output	:OUTPut[:STATe] ON|OFF|1|0
	:OUTPut[:STATe]?
Unit Power	:UNIT:POWer DBM|DBUV|DBUVEMF
	:UNIT:POWer?
SG Level Auto Cal	[:SOURce]:POWer:ATTenuation:AUTO ON|OFF|1|0
	[:SOURce]:POWer:ATTenuation:AUTO?
SG Level Calibration	[:SOURce]:POWer:ALC:SEARch {ONCE}
Relative Level Value	[:SOURce]:POWer:REFerence:AMPLitude <numeric_value><unit>
	[:SOURce]:POWer:REFerence:AMPLitude?
Relative Level	[:SOURce]:POWer:REFerence:STATe ON|OFF|1|0
	[:SOURce]:POWer:REFerence:STATe?
Reference of Relative Level	[:SOURce]:POWer:REFerence?
Level Status List	[:SOURce]:POWer:SETTing?
Level Offset Value	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet <numeric_value><unit>
	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?
Level Offset	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe ON|OFF|1|0
	[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?
Output Level Step Value	[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement] <numeric_value><unit>
	[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?
Output Level	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value><unit>
	[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? <unit>

:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBU

Level Unit

Function

Sets the output level unit.

Command

```
:DISPlay:ANNotation:AMPLitude:UNIT <unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBU	dBμV

Example of Use

To set the level setting unit to dBm.

```
DISP:ANN:AMPL:UNIT DBM
```

:DISPlay:ANNotation:AMPLitude:UNIT?

Level Unit Query

Function

Queries the output level unit.

Query

```
:DISPlay:ANNotation:AMPLitude:UNIT?
```

Response

```
<unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBU	dBμV

Example of Use

To query the level setting unit.

```
DISP:ANN:AMPL:UNIT?
> DBM
```

:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage EMF|TERM

Volt Unit

Function

Sets the display system when the output level is set in voltage units.

Command

```
:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage <unit>
```

Parameter

<unit>	Voltage unit display system
EMF	Open voltage display
TERM	Termination voltage display

Example of Use

To display the voltage units using open voltage.

```
DISP:ANN:AMPL:UNIT:VOLT EMF
```

:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?

Volt Unit Query

Function

Queries the display system when the output level is set in voltage units.

Query

```
:DISPlay:ANNotation:AMPLitude:UNIT:VOLTage?
```

Response

```
<unit>
```

Parameter

<unit>	Voltage unit display system
EMF	Open voltage display
TERM	Termination voltage display

Example of Use

To query the voltage units.

```
DISP:ANN:AMPL:UNIT:VOLT?
> EMF
```

:OUTPut[:STATe] ON|OFF|1|0

RF Output - ON/OFF

Function

Sets RF output ON/OFF.

Command

```
:OUTPut[:STATe] <on_off>
```

Parameter

<on_off>	RF Output
ON|1	ON
OFF|0	OFF

Example of Use

To set the RF signal output to OFF.

```
OUTP OFF
```

:OUTPut[:STATe]?

RF Output - ON/OFF

Function

Queries ON/OFF status of RF output.

Query

```
:OUTPut[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	RF Output
1	ON
0	OFF

Example of Use

To query the output status of RF signal.

```
OUTP?
> 1
```

:UNIT:POWer DBM|DBUV|DBUVEMF

Unit Power

Function

Sets the output level unit.

Command

```
:UNIT:POWer <unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBUV	dBμV (terminal voltage display)
DBUVEMF	dBμV (open voltage display)

Example of Use

To set the level setting unit to dBμV (open voltage display).

```
UNIT:POW DBUVEMF
```

:UNIT:POWer?

Unit Power Query

Function

Queries the output level unit.

Query

```
:UNIT:POWer?
```

Response

```
<unit>
```

Parameter

<unit>	Output level unit
DBM	dBm
DBUV	dBμV (terminal voltage display)
DBUVEMF	dBμV (open voltage display)

Example of Use

To query the level setting unit.

```
UNIT:POW?
> DBM
```

[:SOURce]:POWer:ATTenuation:AUTO ON|OFF|1|0

SG Level Auto Cal

Function

Sets auto calibration function ON/OFF. The auto calibration function is enabled when Auto Cal is set to ON.

Command

```
[:SOURce]:POWer:ATTenuation:AUTO <on_off>
```

Parameter

<on_off>	Auto calibration function ON/OFF
ON|1	ON
OFF|0	OFF

Details

The auto calibration function can be set to OFF when all conditions shown below are fulfilled:

- Modulation is enabled (ON)
- RF Output is set to –5 dBm or less

Example of Use

To disable auto calibration function.

```
POW:ATT:AUTO OFF
```

[:SOURce]:POWer:ATTenuation:AUTO?

SG Level Auto Cal Query

Function

Queries the automatic calibration function ON/OFF status.

Query

```
[:SOURce]:POWer:ATTenuation:AUTO?
```

Response

```
<on_off>
```

Parameter

<on_off>	Auto calibration function ON/OFF
1	ON
0	OFF

Example of Use

To query the automatic calibration function ON/OFF status.

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

[:SOURce]:POWer:ALC:SEARch {ONCE}

SG Level Calibration

Function

Calibrates output level.

Command

```
[:SOURce]:POWer:ALC:SEARch {ONCE}
```

Example of Use

To calibrate output level.

```
POW:ALC:SEAR
```

[:SOURce]:POWer:REFerence:AMPLitude <numeric_value>

Relative Level

Function

Sets the screen display output level at relative output level display mode.

Command

```
[:SOURce]:POWer:REFerence:AMPLitude <numeric_value>
```

Parameter

<numeric_value>	Relative output level
Range	–200.00 to 200.00 dB

Example of Use

To set the relative output to +10.00 dB.

```
POW:REF:AMPL 10.00DB
```

[:SOURce]:POWer:REFerence:AMPLitude?

Relative Level

Function

Queries the screen display output level in the relative output level display mode.

Query

```
[:SOURce]:POWer:REFerence:AMPLitude?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Relative output level
Range	–200.00 to 200.00 dB
Resolution	0.01 dB

Example of Use

To query the relative output.

```
POW:REF:AMPL?
> -10.00
```

[:SOURce]:POWer:REFerence:STATe ON|OFF|1|0

Relative - On/Off

Function

Sets the relative output level display ON/OFF.

Command

```
[:SOURce]:POWer:REFerence:STATe <on_off>
```

Parameter

<on_off>	Relative output level display
ON|1	ON
OFF|0	OFF

Example of Use

To enable relative output level display.

```
POW:REF:STAT ON
```

[:SOURce]:POWer:REFerence:STATe?

Relative - On/Off Query

Function

Queries the relative output level display ON/OFF status.

Query

```
[:SOURce]:POWer:REFerence:STATe?
```

Response

```
<on_off>
```

Parameter

<on_off>	Relative output level display ON/OFF status
1	ON
0	OFF

Example of Use

To query the relative output level display ON/OFF status.

```
POW:REF:STAT?
> 1
```

[:SOURce]:POWer:REFerence?

Relative Level - Reference Level Query

Function

Queries the reference output level at relative output level display mode (Output level when the relative display mode is set to ON).

Query

```
[:SOURce]:POWer:REFerence?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Relative output reference level
Range	–190.00 to 60.00 dBm
Resolution	0.01 dB

Example of Use

To query the relative output reference level.

```
POW:REF?
> -5.00
```

[:SOURce]:POWer:SETTing?

Level Status List Query

Function

Queries the output level status.

Query

```
[:SOURce]:POWer:SETTing?
```

Response

```
<unit>,<offset>,<unleveled>,INT,<auto_cal>,<relative>,
NORM
```

Parameter

<unit>	Voltage display unit
EMF	Open voltage
TERM	Termination voltage
<offset>	Level offset
1	ON
0	OFF
<unleveled>	Output level accuracy status
NORM	Normal status
UNL	Outside level accuracy assurance
<auto_cal>	Auto Cal mode
1	Enabled
0	Disabled
<relative>	Relative output mode
1	ON
0	OFF

Example of Use

To query the output level status.

```
POW:SETT?
> EMF,0,NORM,INT,1,0,NORM
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet <numeric_value>

Level Offset - Level

Function

Sets the output level offset.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet
<numeric_value>
```

Parameter

<numeric_value>	Output level offset
Range	–100.00 to 100.00 dB
Resolution	0.01 dB
Initial value	0.00 dB

Example of Use

To set the output level offset to –15.00 dB.

```
POW:OFFS -15.00
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?

Level Offset - Level Query

Function

Queries the output level offset.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Output level offset
Range	–100.00 to 100.00 dB
Resolution	0.01 dB

Example of Use

To query the output level offset.

```
POW:OFFS?
> -5.00
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe ON|OFF|1|0

Level Offset - On/Off

Function

Sets the output level offset ON/OFF.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe <on_off>
```

Parameter

<on_off>	Output level offset
ON|1	ON
OFF|0	OFF

Example of Use

To enable the output level offset.

```
POW:OFFS:STAT ON
```

[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?

Level Offset - On/Off Query

Function

Queries the output level offset ON/OFF status.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe?
```

Response

```
<on_off>
```

Parameter

<on_off>	Output level offset ON/OFF status
1	ON
0	OFF

Example of Use

To query the output level offset ON/OFF status.

```
POW:OFFS:STAT?
> 1
```

[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement] <numeric_value>

Output Level - Set Value

Function

Sets the numerical value fluctuation width (step value) when the output level is increased/decreased in step units.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]
<numeric_value>
```

Parameter

<numeric_value>	Output level step width
Range	0.01 to 100.00 dB
Resolution	0.01 dB

Example of Use

To set the output level step width to 5.00 dB.

```
POW:STEP 5.00
```

[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?

Output Level - Set Value Query

Function

Queries the numerical value fluctuation width when the output level is increased/decreased in step units.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Output level step width
Range	0.01 to 100.00 dB
Resolution	0.01 dB

Example of Use

To query the step width of the output level.

```
POW:STEP?
> 0.10
```

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric_value>

Output Level

Function

Sets the output level.

Command

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]
<numeric_value>
```

Parameter

<numeric_value>	Output level
Range	–140.00 to 10.00 dBm (No offset)
	–33.01 to 116.99 dBμV (When TERM is set)
	–26.99 to 123.01 dBμV (When EMF is set)
Resolution	0.01 dBm or 0.01 dBμV
Initial value	–140.00 dBm
Suffix code	DBM, DBU

Example of Use

To set the output level to –30.00 dBm.

```
POW -30.00
```

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? <unit>

Output Level Query

Function

Queries the output level.

Query

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? <unit>
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	Output level
Range	–140.00 to 10.00 dBm (No offset)
	–33.01 to 116.99 dBμV (When TERM is set)
	–26.99 to 123.01 dBμV (When EMF is set)
Resolution	0.01 dBm or 0.01 dBμV
Response unit	dBm or dBμV (Based on settings value)
`<unit>`	Output level unit
`DBM`	dBm
`DBU`	dBμV
When omitted	dBm

Example of Use

To query the output level.

```
POW? DBM
> -30.00
```

2.3 Play/Select/Load Waveform Pattern

2.3.1 Playing/Selecting Waveform Pattern

Table 2.3.1-1 shows device messages for playing and selecting, as well as status queries on waveform pattern loaded to waveform memory.

Table 2.3.1-1 Device messages for playing/selecting waveform pattern

Function	Device Message
Delete Pattern file on Wave Memory	`:MEMory:DELete[:NAME] <package>,<pattern>`
Delete All Pattern files on Wave Memory (Clear Wave Memory)	`:MEMory:DELete:ALL`
List of Loaded Pattern Files	`:MEMory:WAVeform:NAME? <numeric_value>`
Number of loaded pattern files	`:MEMory:WAVeform:COUNt?`
Wave Memory Size	`:MEMory:FREE[:ALL]?`
Select Pattern file on Wave Memory	`[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>`
	`[:SOURce]:RADio:ARB:WAVeform?`
Waveform Restart	`[:SOURce]:RADio:ARB:WAVeform:RESTart`
ARB Status Query	`[:SOURce]:RADio:ARB:REGister[:STATus]?`

:MEMory:DELete[:NAME] <package>,<pattern>

Delete Pattern file on Waveform Memory

Function

Deletes the waveform pattern file in the waveform memory.

Command

```
:MEMory:DELete[:NAME] <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete the “TEST” pattern in the package “WCDMA” .

```
MEM:DEL "WCDMA","TEST""
```

:MEMory:DELete:ALL

Delete Pattern file on Waveform Memory

Function

Deletes all the waveform pattern files in the waveform memory.

Command

```
:MEMory:DELete:ALL
```

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete all the waveform pattern files in the waveform memory.

```
MEM:DEL:ALL
```

:MEMory:WAVeform:NAME? <numeric_value>

Loaded File Name in Waveform Memory Query

Function

Queries the waveform pattern filename loaded in the waveform memory.

Query

```
:MEMory:WAVeform:NAME? <numeric_value>
```

Response

```
<package>,<pattern>
```

Parameter

<numeric_value>	Random numbers allocated to waveform patterns
Range	0 to (Number of waveform patterns in the waveform memory – 1)
Resolution	1
<package>	Package name (Character string)
<pattern>	Pattern name (Character string)

Example of Use

To readout waveform pattern filenames in the waveform memory.

```
MEM:WAV:NAME? 2
> "WCDMA","TEST"
```

:MEMory:WAVeform:COUNt?

Number of Loaded Files Query

Function

Queries the number of waveform pattern files loaded in the waveform memory.

Query

```
:MEMory:WAVeform:COUNt?
```

Response

```
<n>
```

Parameter

<n>		Number of waveform pattern files loaded to waveform memory
	Range	0 to 1024
	Resolution	1

Example of Use

To readout the number of waveform pattern files in the waveform memory.

```
MEM:WAV:COUN?
> 2
```

:MEMory:FREE[:ALL]?

Waveform Memory Space Query

Function

Queries the waveform memory free space.

Query

```
:MEMory:FREE[:ALL]?
```

Response

```
<blank>,<consecutive_blank>,<total>
```

Parameter

<blank>	Free space (Byte units)
<consecutive_blank>	Contiguous free space (Byte units)
<total>	Total waveform memory size (Byte units)

Example of Use

To query the waveform memory free space.

```
MEM:FREE?
>
```

[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>

Select Waveform File

Function

Selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

Command

```
[:SOURce]:RADio:ARB:WAVeform <package>,<pattern>
```

Parameter

<package>	Package name (Character string)
NONE	Waveform pattern file not selected
<pattern>	Pattern name (Character string)
NONE	Waveform pattern file not selected

Example of Use

To select loading the “TEST” pattern in package “WCDMA”.

```
RAD:ARB:WAV "WCDMA","TEST"
```

[:SOURce]:RADio:ARB:WAVeform?

Select Waveform File Query

Function

Queries the waveform pattern file to be played.

Query

```
[:SOURce]:RADio:ARB:WAVeform?
```

Response

```
<package>,<pattern>
```

Parameter

<package>	Package name (character string)
NONE	Waveform pattern file not selected
<pattern>	Pattern name (character string)
NONEWaveform pattern file not selected	

Example of Use

To query the waveform pattern file to be loaded.

```
RAD:ARB:WAV?
> ”WCDMA”,”TEST”
```

[:SOURce]:RADio:ARB:WAVeform:RESTart

Waveform Restart

Function

Plays waveform pattern from the beginning.

Command

```
[:SOURce]:RADio:ARB:WAVeform:RESTart
```

Example of Use

To play waveform pattern from the beginning.

```
RAD:ARB:WAV:REST
```

[:SOURce]:RADio:ARB:REGister[:STATus]?

ARB Status Query

Function

Queries the ARB status.

Query

```
[:SOURce]:RADio:ARB:REGister[:STATus]?
```

Response

```
<status>
```

Parameter

`<status>` ARB status

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

The bit assignments are as follows:

bit0: $2^0 = 1$	(Not used)
bit1: $2^1 = 2$	(Not used)
bit2: $2^2 = 4$	The waveform pattern play status. (0: Stop, 1: Playing)
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: 215 = 32768	(Not used)

Example of Use

To query the ARB status.

```
RAD:ARB:REG?
> 4
```

2.3.2 Loading Waveform pattern

Table 2.3.2-1 shows device messages to load the waveform pattern in the hard disk into the waveform memory.

Table 2.3.2-1 Device messages for loading waveform pattern

Function	Device Message
Copy pattern file to Hard Disk Drive	`:MMEMory:COPY <device>,<package>`
Delete Pattern file on Hard Disk Drive	`:MMEMory:DELete[:NAME] <string>,<string>`
Load Pattern File / Query Load Status and Wave Memory	`:MMEMory:LOAD:WAVeform <string>,<string>`
	`:MMEMory:LOAD:WAVeform? <string>,<string>`
Cancel Loading	`:MMEMory:LOAD:WAVeform:ABORt`
Pattern File Version	`:MMEMory:WAVeform:VERSion? <string>,<string>`
Hard Disk Drive Size	`:MMEMory:WAVeform:FREE[:ALL]?`

:MMEMory:COPY <device>,<package>

Copy pattern file to Hard Disk Drive

Function

Copies the waveform pattern file from the specified drive to the internal hard disk drive. Specify a waveform pattern by a package name, which is the name of the folder that stores the waveform pattern file.

Command

```
:MMEMory:COPY <device>,<package>
```

Parameter

`<device>`	Copy source drive name (`D` to `Z`, `D` when omitted)
`<package>`	Copy source package name (character string)

Details

An error occurs when the specified drive or waveform pattern file cannot be found.

When the package name (`package`) is omitted, all the packages in the root folder of the specified drive will be copied.

Example of Use

To copy the waveform pattern in the package “WCDMA” of Drive D to the internal hard disk.

```
MMEM:COPY D,"WCDMA"
```

:MMEMory:DELete[:NAME] <package>,<pattern>

Delete Pattern file on Hard Disk Drive

Function

Deletes the waveform pattern file on the hard disk.

Command

```
:MMEMory:DELete[:NAME] <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)

Details

This command does not delete waveform patterns in the waveform memory.

Example of Use

To delete the "TEST" pattern in the package "WCDMA" .

```
DELFILEHDD "WCDMA","TEST"
```

:MMEMory:LOAD:WAVeform <package>,<pattern>

Load Pattern File/Check Status of Lading Pattern and Waveform Memory

Function

Starts loading the waveform pattern from the hard disk to the waveform memory.

Command

```
:MMEMory:LOAD:WAVeform <package>,<pattern>
```

Parameter

`<package>`	Package name (Character string)
`<pattern>`	Pattern name (Character string)

Details

If a waveform pattern is loaded when the same waveform pattern has already been loaded, the existing waveform pattern is overwritten.

Example of Use

To start loading "TEST" pattern in package "WCDMA".

```
MMEM:LOAD:WAV "WCDMA","TEST"
*OPC?                                   // Loaded when 1 is returned
```

:MMEMory:LOAD:WAVeform? <package>,<pattern>

Load Pattern File/Check Status of Lading Pattern and Waveform Memory Query

Function

Load results and current status for the specified waveform pattern are returned in response to the query.

Query

```
:MMEMory:LOAD:WAVeform? <package>,<pattern>
```

Response

```
<status>
```

Parameter

<package>	Package name (Character string)
<pattern>	Pattern name (Character string)
<status>	Status
0	Already loaded
1	Can be loaded
2	License required
3	No corresponding file
4	Insufficient waveform memory free space
5	Internal error
6	Version mismatch
7	Pattern file analysis error
8	Illegal pattern file (.wvi)
9	Exceeded number of loadable waveform pattern files
10	Exceeded number of loadable packages
11	Exceeded number of loadable waveform pattern files in 1 package

Example of Use

To start the current status of “TEST” pattern in packeage ”WCDMA”.

```
MMEM:LOAD:WAV? "WCDMA","TEST"
> 1
```

:MMEMory:LOAD:WAVeform:ABORt

Cancel Loading

Function

Cancels loading waveform patterns to waveform memory.

Command

```
:MMEMory:LOAD:WAVeform:ABORt
```

Example of Use

To cancel loading waveform pattern.

```
MMEM:LOAD:WAV:ABOR
```

:MMEMory:WAVeform:VERSion? <package>,<pattern>

File Version Query

Function

Queries the waveform pattern file version on the hard disk.

Query

```
:MMEMory:WAVeform:VERSion? <package>,<pattern>
```

Response

```
<version>
```

Parameter

<package>	Package name (Character string)
<pattern>	Pattern name (Character string)
<version>	Version number

Example of Use

To readout the “TEST” pattern version number of the package “WCDMA” .

```
MMEM:WAV:VERS? "WCDMA","TEST"
> 1.00
```

:MMEMory:WAVeform:FREE[:ALL]?

Hard Disk Drive Size Query

Function

Queries hard disk free space information.

Query

```
:MMEMory:WAVeform:FREE[:ALL]?
```

Response

```
<total>,<blank>
```

Parameter

<total>	Total hard disk size
Response unit	Bytes
<blank>	Hard disk free space
Response unit	Bytes

Example of Use

To query the hard disk size.

```
MMEM:WAV:FREE?
> 1234567890,123456789
```

2.4 Modulation and AWGN Settings

Table 2.4-1 shows device messages for setting modulation and AWGN.

Table 2.4-1 Device messages for setting modulation and AWGN

Function	Device Message
Modulation	`:OUTPut:MODulation[:STATe] ON|OFF|1|0`
	`:OUTPut:MODulation[:STATe]?`
AWGN	`[:SOURce]:RADio:ARB:NOISe[:STATe] ON|OFF|1|0`
	`[:SOURce]:RADio:ARB:NOISe[:STATe]?`
C/N Ratio	`[:SOURce]:RADio:ARB:NOISe:CN <numeric_value><unit>`
	`[:SOURce]:RADio:ARB:NOISe:CN?`
Target of C/N Setting	`[:SOURce]:RADio:ARB:NOISe:CN:TARGet CARRier|NOISe|CONStant`
	`[:SOURce]:RADio:ARB:NOISe:CN:TARGet?`
Carrier Power	`[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value><unit>`
	`[:SOURce]:RADio:ARB:NOISe:CPOWer?`
Sampling Clock	`[:SOURce]:RADio:ARB:SCLock:RATE?`

:OUTPut:MODulation[:STATe] ON|OFF|1|0

Modulation - On/Off

Function

Sets the modulation function ON/OFF.

Command

```
:OUTPut:MODulation[:STATe] <on_off>
```

Parameter

`<on_off>`	Modulation ON/OFF
`ON|1`	ON
`OFF|0`	OFF

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To set the modulation function to ON.

```
OUTP:MOD ON
```

:OUTPut:MODulation[:STATe]?

Modulation - On/Off Query

Function

Queries the modulation function ON/OFF status.

Query

```
:OUTPut:MODulation[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	Modulation function ON/OFF status
1	ON
0	OFF

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To query the modulation function ON/OFF status.

```
OUTP:MOD?
> 1
```

[:SOURce]:RADio:ARB:NOISe[:STATe] ON|OFF|1|0

AWGN

Function

Sets AWGN output ON/OFF.

Command

```
[:SOURce]:RADio:ARB:NOISe[:STATe] <on_off>
```

Parameter

<on_off>	AWGN output ON/OFF
ON|1	ON
OFF|0	OFF

Details

Outputs a signal with AWGN added when AWGN is ON.
The AWGN output function can be set to ON or OFF only when a waveform pattern file is selected and the modulation is enabled (ON).

The AWGN output function is automatically set to OFF when a waveform pattern is changed.

Example of Use

To add AWGN to output signal.

```
RAD:ARB:NOIS ON
```

[:SOURce]:RADio:ARB:NOISe[:STATe]?

AWGN Query

Function

Queries the AWGN output ON/OFF status.

Query

```
[:SOURce]:RADio:ARB:NOISe[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	AWGN output ON/OFF status
1	ON
0	OFF

Example of Use

To query the ON/OFF status of the AWGN output signal.

```
RAD:ARB:NOIS?
> 1
```

[:SOURce]:RADio:ARB:NOISe:CN <numeric_value>

Power Ratio

Function

Sets the output ratio of AWGN to carrier (C/N) when AWGN is ON.

Command

```
[:SOURce]:RADio:ARB:NOISe:CN <numeric_value>
```

Parameter

<numeric_value>	C/N
Range	–40 to +40 dB
Resolution	0.01
Initial value	–40.00

Details

The setting range may be narrowed if the RF output level is close to the upper or lower limit.

Example of Use

To set the C/N to 3 dB.

```
RAD:ARB:NOIS:CN 3DB
```

[:SOURce]:RADio:ARB:NOISe:CN?

Power Ratio Query

Function

Queries the output ratio (C/N) of carrier and AWGN when AWGN is set to On.

Query

```
[:SOURce]:RADio:ARB:NOISe:CN?
```

Response

```
<numeric_value>
```

Parameter

`<numeric_value>`	C/N
Range	–40 to +40 dB
Resolution	0.01
Initial value	–40.00

Example of Use

To query C/N.

```
RAD:ARB:NOIS:CN?
> -3.00
```

[:SOURce]:RADio:ARB:NOISe:CN:TARGet CARRier|NOISe|CONStant

Target of C/N Setting

Function

Sets the parameters to be changed when C/N is set.

Command

```
[:SOURce]:RADio:ARB:NOISe:CN:TARGet <target>
```

Parameter

`<target>`	Parameter to be changed when C/N is set
`CARRier`	Carrier signal
`NOISe`	NOISE
`CONStant`	Fixed output level (Carrier + AWGN)

Example of Use

To set the parameter to be changed when C/N is set to NOISE.

```
RAD:ARB:NOIS:CN:TARG NOIS
```

[:SOURce]:RADio:ARB:NOISe:CN:TARGet?

Target of C/N Setting Query

Function

Queries the parameter to be changed when C/N is set.

Query

```
[:SOURce]:RADio:ARB:NOISe:CN:TARGet?
```

Response

```
<target>
```

Parameter

<target>	Parameter to be changed when C/N is set
CARR	Carrier signal
NOIS	NOISE
CONS	Fixed output level (Carrier + AWGN)

Example of Use

To query the parameter to be changed when C/N is set.

```
RAD:ARB:NOIS:CN:TARG?
> CARR
```

[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value>

Carrier Power

Function

Sets the carrier signal level when AWGN is ON.

Command

```
[:SOURce]:RADio:ARB:NOISe:CPOWer <numeric_value>
```

Parameter

<numeric_value>	Carrier signal level when AWGN is ON.
Range	
Resolution	0.01 dB
Suffix Code	DBM,DM

Example of Use

To set the carrier signal level when AWGN is ON to –55.0 dBm.

```
RAD:ARB:NOIS:CPOW -55.0
```

[:SOURce]:RADio:ARB:NOISe:CPOWer?

Carrier Power Query

Function

Queries the carrier signal level when AWGN is set to On.

Query

```
[:SOURce]:RADio:ARB:NOISe:CPOWer?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Carrier signal level when AWGN is ON.
Range	
Resolution	0.01 dB

Example of Use

To query the carrier signal level when AWGN is set to On.

```
RAD:ARB:NOIS:CPOW?
> -10.00
```

[:SOURce]:RADio:ARB:SCLock:RATE?

Sampling Clock Query

Function

Queries the baseband signal sampling clock.

Query

```
[:SOURce]:RADio:ARB:SCLock:RATE?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Sampling clock
Range	0.02 to 160 MHz
Resolution	0.001 Hz

Example of Use

To query the sampling clock.

```
RAD:ARB:SCL:RATE?
> 80000000.000
```

2.5 External In/Output Settings

2.5.1 External input signal settings

Table 2.5.1-1 shows device messages for setting external in/output signals.

Table 2.5.1-1 Device messages for setting external input signals

Function	Device Message
Pulse Modulation Source	[:SOURce]:RADio:ARB:PULM:SOURce INTernal|EXTernal|OFF
	[:SOURce]:RADio:ARB:PULM:SOURce?
External Trigger Mode	[:SOURce]:RADio:ARB:TRIGger:TYPE STARt|FRAMe
	[:SOURce]:RADio:ARB:TRIGger:TYPE?
External Trigger	[:SOURce]:RADio:ARB:TRIGger[:STATe] ON|OFF|0|1
	[:SOURce]:RADio:ARB:TRIGger[:STATe]?
External Trigger Source	[:SOURce]:RADio:ARB:TRIGger:SOURce EXTernal|APPSync|BBIF
	[:SOURce]:RADio:ARB:TRIGger:SOURce?
External Trigger Delay	[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>
	[:SOURce]:RADio:ARB:TRIGger:DELay?
External Trigger Delay Time	[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?
External Trigger Edge	[:SOURce]:RADio:ARB:TRIGger:SLOPe POSitive|NEGative
	[:SOURce]:RADio:ARB:TRIGger:SLOPe?
Baseband Reference Clock Source	[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] INTernal|TTL|AC
	[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?
Baseband Reference Clock	[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision SIXTeenth|EIGHth|QUARter|HALF|1|2|4|8|16
	[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?

[:SOURce]:RADio:ARB:PULM:SOURce INTernal|EXTernal|OFF

Pulse Modulation Source

Function

Sets the pulse modulation signal source.

Command

```
[:SOURce]:RADio:ARB:PULM:SOURce <source>
```

Parameter

<source>	Pulse modulation signal source
INTernal	Internal signal
EXTernal	External input signal
OFF	No pulse modulation

Example of Use

To set the pulse modulation signal source to internal signal.

```
RAD:ARB:PULM:SOUR INT
```

[:SOURce]:RADio:ARB:PULM:SOURce?

Pulse Modulation Source

Function

Queries the pulse modulation signal source.

Query

```
[:SOURce]:RADio:ARB:PULM:SOURce?
```

Response

```
<source>
```

Parameter

<source>	Pulse modulation signal source
INT	Internal signal
EXT	External input signal
OFF	No pulse modulation

Example of Use

To query the status of the pulse modulation signal source.

```
RAD:ARB:PULM:SOUR?
> INT
```

[:SOURce]:RADio:ARB:TRIGger:TYPE STARt|FRAMe

External Trigger - Mode

Function

Sets the external trigger operation mode.

Command

```
[:SOURce]:RADio:ARB:TRIGger:TYPE <mode>
```

Parameter

<mode>	External trigger operation mode
STARt	Start trigger
FRAMe	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
RAD:ARB:TRIG:TYPE START
```

[:SOURce]:RADio:ARB:TRIGger:TYPE?

External Trigger - Mode Query

Function

Queries the external trigger operation mode.

Query

```
[:SOURce]:RADio:ARB:TRIGger:TYPE?
```

Response

```
<mode>
```

Parameter

<mode>	External trigger operation mode
STAR	Start trigger
FRAM	Frame trigger

Example of Use

To query the external trigger operation mode.

```
RAD:ARB:TRIG:TYPE?
> STAR
```

[:SOURce]:RADio:ARB:TRIGger[:STATe] ON|OFF|0|1

External Trigger - On/Off

Function

Sets the external trigger ON/OFF.

Command

```
[:SOURce]:RADio:ARB:TRIGger[:STATe] <on_off>
```

Parameter

<on_off>	ON/OFF of external trigger
ON|1	ON
OFF|0	OFF

Example of Use

To enable the external trigger.

```
RAD:ARB:TRIG ON
```

[:SOURce]:RADio:ARB:TRIGger[:STATe]?

External Trigger - On/Off Query

Function

Queries the external trigger ON/OFF status.

Query

```
[:SOURce]:RADio:ARB:TRIGger[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	External trigger ON/OFF status
1	ON
0	OFF

Example of Use

To query the external trigger ON/OFF status.

```
RAD:ARB:TRIG?
> 0
```

[:SOURce]:RADio:ARB:TRIGger:SOURce EXTernal|APPSync|BBIF

Start Trigger Delay Source

Function

Sets the signal source of the external trigger.

Command

```
[:SOURce]:RADio:ARB:TRIGger:SOURce <source>
```

Parameter

<source>	Signal source of external trigger
EXTernal	External input signal
APPSync	Application sync trigger
BBIF	Baseband Interface

Details

APPsync support the options.
BBIF cannot be selected only when the Option 040 Baseband Interface Unit is not installed or the software package is Ver.6.00.00 or later.

Example of Use

To set the signal source of the external trigger to the external input signal.

```
RAD:ARB:TRIG:SOUR EXT
```

[:SOURce]:RADio:ARB:TRIGger:SOURce?

Start Trigger Delay Source Query

Function

Queries the signal source of the external trigger.

Query

```
[:SOURce]:RADio:ARB:TRIGger:SOURce?
```

Response

```
<source>
```

Parameter

<source>	Signal source of external trigger
EXT	External input signal
APPS	Application sync trigger
BBIF	Baseband Interface

Details

APPsync support the options.
BBIF cannot be selected only when the Option 040 Baseband Interface Unit is not installed or the software package is Ver.6.00.00 or later.

Example of Use

To query the status of the external trigger.

```
RAD:ARB:TRIG:SOUR?
> EXT
```

[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>

Start Trigger Delay

Function

Sets the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Command

```
[:SOURce]:RADio:ARB:TRIGger:DELay <numeric_value>
```

Parameter

<numeric_value>	Start trigger delay time
Range	Varies depending on the selected waveform pattern.
Resolution	Varies depending on the selected waveform pattern.
Initial value	0
Response unit	None (Symbol or chip)

Example of Use

To set the start trigger delay time to 30 chips.

```
RAD:ARB:TRIG:DEL 30
```

[:SOURce]:RADio:ARB:TRIGger:DELay?

Start Trigger Delay Query

Function

Queries the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Query

```
[:SOURce]:RADio:ARB:TRIGger:DELay?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Start trigger delay time
Range	Varies depending on the selected waveform pattern.
Resolution	Varies depending on the selected waveform pattern.
Initial value	0
Response unit	None (Symbol or chip)

Example of Use

To query the status of the external trigger.

```
RAD:ARB:TRIG:DEL?
> 30
```

[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?

Start Trigger Delay Time Query

Function

Queries a value computed by converting the output timing of RF signals into time.

Query

```
[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?
```

Response

```
<numeric_value>
```

Parameter

<numeric_value>	Start trigger delay time
Response unit	s

Example of Use

To query the output timing of the external trigger.

```
RAD:ARB:TRIG:DEL:TIME?
```

[:SOURce]:RADio:ARB:TRIGger:SLOPe POSitive|NEGative

External Trigger Edge

Function

Sets the polarity of the external trigger input.

Command

```
[:SOURce]:RADio:ARB:TRIGger:SLOPe <edge>
```

Parameter

<edge>	External trigger polarity
POSitive	Positive
NEGative	Negative

Example of Use

To set the polarity of the external trigger to Negative.

```
RAD:ARB:TRIG:SLOP NEG
```

[:SOURce]:RADio:ARB:TRIGger:SLOPe?

External Trigger Edge Query

Function

Queries the polarity of the external trigger input.

Query

```
[:SOURce]:RADio:ARB:TRIGger:SLOPe?
```

Response

```
<edge>
```

Parameter

<edge>	External trigger polarity
POS	Positive
NEG	Negative

Example of Use

To query the polarity of the external trigger.

```
RAD:ARB:TRIG:SLOP?
> POS
```

[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] INTernal|TTL|AC

Baseband Reference Clock Source

Function

Sets baseband signal reference clock.

Command

```
[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] <source>
```

Parameter

<source>	Baseband signal reference clock
INT	Internal signal (Initial value)
TTL	External input signal (TTL level)
AC	External input signal (AC coupling)

Example of Use

To set the baseband signal reference clock to external input signal (TTL level).

```
RAD:ARB:CLOC:REF TTL
```

[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?

Baseband Reference Clock Source Query

Function

Queries the reference clock of the baseband signal.

Query

```
[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?
```

Response

```
<source>
```

Parameter

<source>	Baseband signal reference clock
INT	Internal signal (Initial value)
TTL	External input signal (TTL level)
AC	External input signal (AC coupling)

Example of Use

To query the reference clock of the baseband signal.

```
RAD:ARB:CLOC:REF?
> INT
```

[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision SIXTeenth|EIGHth|QUARter|HALF|1|2|4|8|16

Baseband Reference Clock

Function

Sets the baseband signal reference clock frequency in magnification ratio based on the sampling clock.

Command

```
[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision <clock>
```

Parameter

`<clock>`	Baseband signal reference clock
`SIXTeenth`	Sampling clock ×1/16
`EIGHth`	Sampling clock ×1/8
`QUARter`	Sampling clock ×1/4
`HALF`	Sampling clock ×1/2
`1`	Sampling clock ×1
`2`	Sampling clock ×2
`4`	Sampling clock ×4
`8`	Sampling clock ×8
`16`	Sampling clock ×16

The setting range is as shown in the following table.

Baseband reference clock setting range

Sampling Clock [MHz]	Baseband reference clock settings								
	16	8	4	2	1	1/2	1/4	1/8	1/16
0.02 ≤ f ≤ 0.024414062	✓	✓	✓	✓	✓				
0.024414062 < f ≤ 0.048828125	✓	✓	✓	✓	✓	✓			
0.048828125 < f ≤ 0.09765625	✓	✓	✓	✓	✓	✓	✓		
0.09765625 < f ≤ 0.1953125	✓	✓	✓	✓	✓	✓	✓	✓	
0.1953125 < f ≤ 2.5	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5 < f ≤ 5		✓	✓	✓	✓	✓	✓	✓	✓
5 < f ≤ 10			✓	✓	✓	✓	✓	✓	✓
10 < f ≤ 20				✓	✓	✓	✓	✓	✓
20 < f ≤ 40					✓	✓	✓	✓	✓
40 < f ≤ 80						✓	✓	✓	✓
80 < f ≤ 160							✓	✓	✓

Example of Use

To set the baseband signal reference lock frequency to sampling clock ×2.

```
RAD:ARB:CLOC:REF:DIV 2
```

[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?

Baseband Reference Clock Query

Function

Queries the reference clock frequency of the baseband signal.

Query

```
[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?
```

Response

```
<clock>
```

Parameter

<clock>	Baseband signal reference clock
SIXT	Sampling clock ×1/16
EIGH	Sampling clock ×1/8
QUAR	Sampling clock ×1/4
HALF	Sampling clock ×1/2
1	Sampling clock ×1
2	Sampling clock ×2
4	Sampling clock ×4
8	Sampling clock ×8
16	Sampling clock ×16

Example of Use

To query the reference clock frequency of the baseband signal.

```
RAD:ARB:CLOC:REF:DIV?
> 1
```

2.5.2 External output signal settings

Table 2.5.2-1 shows device messages for setting external output signals.

Table 2.5.2-1 Device messages for setting external output signals

Function	Device Message
Marker Polarity	[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity POSitive|NEGative
	[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity?
Marker Edit	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe] ON|OFF|1|0|PATSync
	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe]?
Marker Pulse Cycle Value	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe <numeric_value>
	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe?
Marker Pulse Start Offset Value	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet <numeric_value>
	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet?
Marker Pulse Width Value	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh <numeric_value>
	[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh?

[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity POSitive|NEGative

Marker Polarity

Function

Sets the polarity of the external output marker signal.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:POLarity <polarity>
```

Parameter

<n> Marker type
- 1 Marker 1
- 2 Marker 2
- 3 Marker 3

<polarity> Polarity
- POSitive Positive (Positive polarity)
- NEGative Negative (Negative polarity)

Example of Use

To set the polarity of Marker 1 to negative.

```
RAD:ARB:MARK1:POL NEG
```

[:SOURce]:RADio:ARB:MARKer1|2|3:POLarity?

Marker Polarity Query

Function

Queries the polarity of the external output marker signal.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:POLarity?
```

Response

```
<polarity>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<polarity>	Polarity
POS	Positive (Positive polarity)
NEG	Negative (Negative polarity)

Example of Use

To query the polarity of the external output marker signal.

```
RAD:ARB:MARK1:POL?
> POS
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe] ON|OFF|1|0|PATSync

Marker Edit

Function

Specifies the user setting mode for the external output marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STSTe] <mode>
```

Parameter

`<n>`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`<mode>`	User setting mode
`ON|1`	Outputs the user setting marker.
`OFF|0`	Outputs the marker previously recorded in the waveform pattern.
`PATSync`	Outputs the marker at the start of the waveform pattern.

Example of Use

To set Marker 1 to the user setting marker.

```
RAD:ARB:MARK1:EDIT ON
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT[:STSTe]?

Marker Edit Query

Function

Queries the user setting mode for the external output marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STSTe]?
```

Response

```
<mode>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<mode>	User setting mode
1	Outputs the user setting marker.
0	Outputs the marker previously recorded in the waveform pattern.
PATS	Outputs the marker at the start of the waveform pattern.

Example of Use

To query the setting mode for the external output marker of Marker 1.

```
RAD:ARB:MARK1:EDIT?
> 1
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe <numeric_value>

Marker Edit Mode Cycle Value

Function

Sets the output pulse cycle when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:CYCLe <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Output pulse cycle

Example of Use

To set Marker 1 to the user setting marker and set the output pulse cycle to 200.

```
RAD:ARB:MARK1:EDIT:CYCL 200
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe?

Marker Edit Mode Cycle Value Query

Function

Queries the output pulse cycle when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STSTe]?
```

Response

```
<numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Output pulse cycle

Example of Use

To query the output pulse cycle of Marker 1.

```
RAD:ARB:MARK1:EDIT?
> 200.00
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet <numeric_value>

Marker Edit Mode Start Offset Value

Function

Sets the output pulse starting offset when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:OFFSet <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Starting offset value

Example of Use

To set Marker 1 to the user setting marker and set the output pulse starting offset to 100.

```
RAD:ARB:MARK1:EDIT:OFFS 100
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:OFFSet?

Marker Edit Mode Start Offset Value Query

Function

Queries the output pulse starting offset when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:OFFSet?
```

Response

```
<numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Starting offset value

Example of Use

To query the start offset value of Marker 1.

```
RAD:ARB:MARK1:EDIT:OFFS?
> 100.00
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh <numeric_value>

Marker Edit Mode Width Value

Function

Sets the output pulse width when the external output marker is set to the user setting marker.

Command

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:WIDTh <numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Pulse width

Example of Use

To set Marker 1 to the user setting marker and set the output pulse width to 50.

```
RAD:ARB:MARK1:EDIT:WIDT 50
```

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh?

Marker Edit Mode Width Value Query

Function

Queries the output pulse width when the external output marker is set to the user setting marker.

Query

```
[:SOURce]:RADio:ARB:MARKer[n]:EDIT:WIDTh?
```

Response

```
<numeric_value>
```

Parameter

<n>	Marker type
1	Marker 1
2	Marker 2
3	Marker 3
<numeric_value>	Pulse width

Example of Use

To query the pulse width of Marker 1.

```
RAD:ARB:MARK1:EDIT:WIDT?
> 50.00
```

2.5.3 Trigger to output into SG marker of SA/SPA settings

Table 2.5.3-1 shows device messages for setting trigger to output to the SG marker of SA/SPA.

Table 2.5.3-1 Device messages for setting trigger to output into SG marker of SA/SPA.

Function	Device Message
SA Trigger Out	`:ROUTe:SATRigger[:OUTPut] MARKer1|2|3|PATSync`
	`:ROUTe:SATRigger[:OUTPut]?`

:ROUTe:SATRigger[:OUTPut] MARKer1|2|3|PATSync

SA Trigger Out

Function

Selects the type of the trigger to be output to the SG marker of SA/SPA.

Command

```
:ROUTe:SATRigger[:OUTPut] <triggertoSA>
```

Parameter

`<triggertoSA>`	Output trigger
`MARKer1`	Marker 1
`MARKer2`	Marker 2
`MARKer3`	Marker 3
`PATSync`	A marker synchronized with the top of pattern

Example of Use

To select Marker 1 for the type of the trigger to be output to the SG marker of SA/SPA.

```
ROUT:SATR MARK1
```

:ROUTe:SATRigger[:OUTPut]?

SA Trigger Out Query

Function

Queries the type of the trigger to be output to the SG marker of SA/SPA.

Query

```
:ROUTe:SATRigger[:OUTPut]?
```

Response

```
<triggertoSA>
```

Parameter

<triggertoSA>	Output trigger
MARK1	Marker 1
MARK2	Marker 2
MARK3	Marker 3
PATS	A marker synchronized with the top of pattern

Example of Use

To query the type of the trigger to be output to the SG marker of SA/SPA.

```
ROUT:SATR?
> MARK1
```

2.6 BER Settings

Table 2.6-1 shows device messages for setting functions for BER.

Table 2.6-1 Device messages for setting BER

Function	Device Message
Bit Error Rate Query	:CALCurate:BERT[:BASeband]:BER? EP|ER
Received Bit Query	:CALCurate:BERT[:BASeband]:DATA:COUNt?
Result and Status Query	:DATA:DATA? ER|EP
Error Bit Query	:DATA:DATA:BEC?
Count Clear	:DATA:COUNt:CLEar
Start Measurement by Continuous Mode	:INITiate:MODE:CONTinuous
Start Measurement by Endless Mode	:INITiate:MODE:ENDLess
Start Measurement by Single Mode	:INITiate:MODE:SINGle
Enable Polarity	:INPut:BERT[:BASeband]:CGATe:POLarity POSitive|NEGative
	:INPut:BERT[:BASeband]:CGATe:POLarity?
	:INPut:BERT[:BASeband]:CGATe[:STATe] ON|OFF|1|0
	:INPut:BERT[:BASeband]:CGATe[:STATe]?
Clock Polarity	:INPut:BERT[:BASeband]:CLOCk:POLarity POSitive|NEGative
	:INPut:BERT[:BASeband]:CLOCk:POLarity?
Data Polarity	:INPut:BERT[:BASeband]:DATA:POLarity POSitive|NEGative
	:INPut:BERT[:BASeband]:DATA:POLarity?
Display BER User Pattern File List Query	:MMEMory:LIST:PATTern?
Drive to load User Pattern	:MMEMory:MSIS <drive>
	:MMEMory:MSIS?
Load User Pattern	:MMEMory:LOAD:PATTern <pattern>
Measurement Status Query	:STATus:BERT:MEASure?
Data Pattern Type	[:SENSe]:BERT[:BASeband]:PRBS[:DATA] PN9|PN11|PN15|PN20|PN23|ALL0|ALL1|ALT|FPN9|FPN11|FPN15|FPN20|FPN23|USER
	[:SENSe]:BERT[:BASeband]:PRBS[:DATA]?
Sync Loss Threshold	[:SENSe]:BERT[:BASeband]:RSYNc:THReshold<numeric_value>,500|5000|50000
	[:SENSe]:BERT[:BASeband]:RSYNc:THReshold?
Auto Re-sync	[:SENSe]:BERT[:BASeband]:RSYNc[:STATe] ON|OFF|1|0
	[:SENSe]:BERT[:BASeband]:RSYNc[:STATe]?

Table 2.6-1 Device messages for setting BER (Cont'd)

Function	Device Message
BER – On/Off	[:SENSe]:BERT[:BASeband]:STATe ON|OFF|1|0
	[:SENSe]:BERT[:BASeband]:STATe?
Measurement Error Bit	[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT <bit>
	[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT?
Count Mode	[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect] EBIT|NONE
	[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect]?
Measurement Bit	[:SENSe]:BERT[:BASeband]:TBITs <bit>
	[:SENSe]:BERT[:BASeband]:TBITs?
Measurement Mode	[:SENSe]:BERT[:BASeband]:MODE SINGle|CONTinuous|ENDLelss
	[:SENSe]:BERT[:BASeband]:MODE?
PN Fix Pattern Length	[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth <bit>
	[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth?
PN Fix Pattern Initial Value	[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial <n>
	[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial?
Length for Sync on User Pattern	[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth <bit>
	[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth?
Sync Loss Count Query	[:SENSe]:BERT[:BASeband]:SYNLoss:COUNt?
Count Action at Sync Loss	[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion CLEar|KEEP
	[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion?
Sync Start Position on User Pattern	[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt <bit>
	[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt?
User Pattern File Name Query	[:SENSe]:BERT[:BASeband]:PRBS:USER:PATTern?
User Pattern Length Query	[:SENSe]:BERT[:BASeband]:PRBS:USER:LENGth?
Start Measurement	:INITiate[:IMMediate]
Stop Measurement	:ABORt

:CALCurate:BERT[:BASeband]:BER? EP|ER

Bit Error Rate Query

Function

Queries the bit error rate of BER measurement.

Query

```
:CALCurate:BERT[:BASeband]:BER? <format>
```

Response

```
<bit>
```

Parameter

<format>	Response format
EP	Returns the bit error rate as a percentage.
ER	Returns the bit error rate as an exponent.
<bit>	Bit error rate
EP	0.000 to 100.000 %
ER	0.000E+00 to 1.000E+02

Example of Use

To query the bit error rate in BER measurement as a percentage.

```
CALC:BERT:BER? EP
> 5.000
```

:CALCurate:BERT[:BASeband]:DATA:COUNt?

Received Bit Query

Function

Queries the reception bit count value of BER measurement.

Query

```
:CALCurate:BERT[:BASeband]:DATA:COUNt?
```

Response

```
<bit>
```

Parameter

<bit>	Number of count bits
Range	0 to $(256^8 - 1)$

Example of Use

To query the reception bit count value of BER measurement.

```
CALC:BERT:DATA:COUN?
> 12356789
```

:DATA:DATA? ER|EP

Result and Status Query

Function

Queries the bit error rate and status information of BER measurement.

Query

```
:DATA:DATA? <format>
```

Response

```
<per>,<countbit>,<errorbit>,<status>,<error>
```
(when `format` is `EP`)

```
<exp>,<countbit>,<errorbit>,<status>,<error>
```
(when `format` is `ER`)

Parameter

`<per>`	Bit error rate (percentage)
Range	0.000 to 100.000 %
`<exp>`	Bit error rate (exponent format)
Range	0.000E+00 to 1.000E+02
`<countbit>`	Number of count bits
`<errorbit>`	Number of error bits
`<status>`	Measurement status
`<error>`	Error status
`<format>`	Response format
`EP`	Returns the bit error rate in percentage
`ER`	Returns the bit error rate in exponent format

Example of Use

To query the bit error rate in percentage.

```
DATA:DATA? EP
```

:DATA:DATA:BEC?

Error Bit Query

Function

Queries the number of error bits of BER measurement.

Query

```
:DATA:DATA:BEC?
```

Response

```
<bit>
```

Parameter

<bit>	Number of error bits
Range	0 to 2^{32} bit

Example of Use

To query the number of error bits.

```
DATA:DATA:BEC?
```

:DATA:COUNt:CLEar

Count Clear

Function

Resets the BER measurement bit count to 0.

Command

```
:DATA:COUNt:CLEar
```

Details

This command is valid only when the measurement mode is Single or Endless.

Example of Use

To reset the bit count to 0.

```
DATA:COUN:CLE
```

:INITIate:MODE:CONTinuous

Start Measurement by Continuous Mode

Function

Starts the BER measurement in Continuous mode.

Command

```
:INITIate:MODE:CONTinuous
```

Example of Use

To start the BER measurement in Continuous mode.

```
INIT:MODE:CONT
```

:INITiate:MODE:ENDLess

Start Measurement by Endless Mode

Function

Starts the BER measurement in Endless mode.

Command

```
:INITiate:MODE:ENDLess
```

Example of Use

To start the BER measurement in Endless mode.

```
INIT:MODE:ENDL
```

:INITiate:MODE:SINGle

Start Measurement by Single Mode

Function

Starts the BER measurement in Single mode.

Command

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

Example of Use

To start the BER measurement in Single mode.

```
INIT:MODE:SING
```

:INPut:BERT[:BASeband]:CGATe:POLarity POSitive|NEGative|DISable

Enable Polarity

Function

Sets or disables the polarity of the Enable signal for BER measurement.

Command

```
:INPut:BERT[:BASeband]:CGATe:POLarity <polarity>
```

Parameter

<polarity>	Enable signal polarity
POSitive	Positive logic (high active)
NEGative	Negative logic (low active)
DISable	Disables the signal polarity

Example of Use

To set the Enable signal polarity to positive.

```
INP:BERT:CGAT:POL POS
```

:INPut:BERT[:BASeband]:CGATe:POLarity?

Enable Polarity Query

Function

Queries the polarity of the Enable signal for BER measurement.

Query

```
:INPut:BERT[:BASeband]:CGATe:POLarity?
```

Response

```
<polarity>
```

Parameter

<polarity>	Enable signal polarity
POS	Positive logic (active high)
NEG	Negative logic (active low)
DIS	Disables the signal polarity

Example of Use

To query the polarity of the Enable signal.

```
INP:BERT:CGAT:POL?
> POS
```

:INPut:BERT[:BASeband]:CGATe[:STATe] ON|OFF|1|0

Enable Polarity – On/Off

Function

Enables/disables the Enable signals of BER measurement.

Command

```
:INPut:BERT[:BASeband]:CGATe[:STATe] <on_off>
```

Parameter

`<on_off>`	Enables/disables Enable signal
`ON|1`	Enabled
`OFF|0`	Disabled

Example of Use

To enable the Enable signal.

```
INP:BERT:CGAT ON
```

:INPut:BERT[:BASeband]:CGATe[:STATe]?

Enable Polarity – On/Off Query

Function

Queries whether the Enable signal is enabled or disabled for BER measurement.

Query

```
:INPut:BERT[:BASeband]:CGATe[:STATe]?
```

Response

```
<on_off>
```

Parameter

`<on_off>`	Enable signal status
`1`	Enabled
`0`	Disabled

Example of Use

To query whether the Enable signal is enabled.

```
INP:BERT:CGAT?
> 1
```

:INPut:BERT[:BASeband]:CLOCk:POLarity POSitive|NEGative

Clock Polarity

Function

Sets the polarity of the clock signal for BER measurement.

Command

```
:INPut:BERT[:BASeband]:CLOCk:POLarity <polarity>
```

Parameter

<polarity>	Clock signal polarity
POSitive	Data is detected at the rising edge.
NEGative	Data is detected at the falling edge.

Example of Use

To set the clock signal polarity to Positive.

```
INP:BERT:CLOC:POL POS
```

:INPut:BERT[:BASeband]:CLOCk:POLarity?

Clock Polarity Query

Function

Queries the polarity of the clock signal of BER measurement.

Query

```
:INPut:BERT[:BASeband]:CLOCk:POLarity?
```

Response

```
<polarity>
```

Parameter

<polarity>	Clock signal polarity
POS	Data is detected at the rising edge.
NEG	Data is detected at the falling edge.

Example of Use

To query the polarity of the clock signal.

```
INP:BERT:CLOC:POL?
> POS
```

:INPut:BERT[:BASeband]:DATA:POLarity POSitive|NEGative

Data Polarity

Function

Sets the logic (positive or negative) of the Data signal for BER measurement.

Command

```
:INPut:BERT[:BASeband]:DATA:POLarity <polarity>
```

Parameter

<polarity>	Data signal logic
POSitive	Positive logic
NEGative	Negative logic

Example of Use

To set the Data signal logic to positive.

```
INP:BERT:DATA:POL POS
```

:INPut:BERT[:BASeband]:DATA:POLarity?

Data Polarity Query

Function

Queries the logic (positive or negative) of the data signal for BER measurement.

Query

```
:INPut:BERT[:BASeband]:DATA:POLarity?
```

Response

```
<polarity>
```

Parameter

<polarity>	Data signal logic
POS	Positive logic
NEG	Negative logic

Example of Use

To query the logic (positive or negative) of the data signal.

```
INP:BERT:DATA:POL?
> POS
```

:MMEMory:LIST:PATTern?

Display BER User Pattern File List Query

Function

Queries the list of the user pattern files for BER measurement.

Query

```
:MMEMory:LIST:PATTern?
```

Response

```
<s1>,<s2>,<s3>.............,<s99>,<s100>
```

Parameter

<s1>,.....,<s100>	Existing user pattern file names (up to 100) Within 32 characters

Details

Returns ***, if there is no user pattern file.
The file lists of response messages are in alphabetical order.

Example of Use

To query the list of the user pattern files for BER measurement.

```
MMEM:LIST:PATT?
> TEST1,TEST2,TEST3
```

:MMEMory:MSIS <drive>

Drive to load User Pattern

Function

Sets the name of the drive to load the user-defined pattern file for BER measurement.

Command

```
:MMEMory:MSIS <drive>
```

Parameter

<drive>	Load source drive name

Example of Use

To load the user-defined pattern from drive D.

```
MMEM:MSIS D
```

:MMEMory:MSIS?

Drive to load User Pattern Query

Function

Queries the drive name loading the user-defined pattern file for BER measurement.

Query

```
:MMEMory:MSIS?
```

Response

```
<drive>
```

Parameter

`<drive>`	Load source drive name

Example of Use

To query the load source drive of the user-defined pattern.

```
MMEM:MSIS?
> D
```

:MMEMory:LOAD:PATTern <pattern>

Load User Pattern

Function

Loads the user-defined pattern for BER measurement from a file.

Command

```
:MMEMory:LOAD:PATTern <pattern>
```

Parameter

`<pattern>`	User-defined pattern to be loaded Specify a character string within 32 characters, obtained by removing an extension (bpn) from the target user defied pattern file name.

Details

Only files with extension “bpn” can be loaded.

An error is returned if the specified user-defined pattern file does not exist.

Example of Use

To load the user-defined pattern file “USERPATTERN.bpn” .

```
MMEM:LOAD:PATT "USERPATTERN"
```

:STATus:BERT:MEASure?

BER Measurement Status Query

Function

Queries the measurement status for BER measurement.

Query

```
:STATus:BERT:MEASure?
```

Response

```
<status>
```

Parameter

<status>	Measurement Status
0	During halt
1	During measurement
2	Synchronization is being built up.
3	Stopped due to the occurrence of measurement error.
4	Stopped because SyncLoss count exceeded the maximum.
5	Stopped because count bit exceeded the maximum.

Details

The error contents can be obtained by using :STATus:ERRor? when a measurement error occurs.

Example of Use

To query the current measurement status.

```
STAT:BERT:MEAS?
> 0
```

[:SENSe]:BERT[:BASeband]:PRBS[:DATA] PN9|PN11|PN15|PN20|PN23|ALL0|ALL1|ALT|FPN9|FPN11|FPN15|FPN20|FPN23|USER

Data Pattern Type

Function

Sets the data pattern type for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:PRBS[:DATA] <pattern>
```

Parameter

`<pattern>`	Data pattern type
`PN9`	PN9
`PN11`	PN11
`PN15`	PN15
`PN20`	PN20
`PN23`	PN23
`ALL0`	All 0 (00...0)
`ALL1`	All 1 (11...1)
`ALT`	Repetition of “01” patterns (0,1,0,1,...)
`FPN9`	PN9 Fix
`FPN11`	PN11 Fix
`FPN15`	PN15 Fix
`FPN20`	PN20 Fix
`FPN23`	PN23 Fix
`USER`	User-defined pattern

Example of Use

To set the data pattern type to PN9.

```
BERT:PRBS PN9
```

[:SENSe]:BERT[:BASeband]:PRBS[:DATA]?

Data Pattern Type Query

Function

Queries the data pattern type for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS[:DATA]?
```

Response

```
<pattern>
```

Parameter

<pattern>	Data pattern type
PN9	PN9
PN11	PN11
PN15	PN15
PN20	PN20
PN23	PN23
ALL0	All 0 (00...0)
ALL1	All 1 (11...1)
ALT	Repetition of “01” patterns (0,1,0,1,...)
FPN9	PN9 Fix
FPN11	PN11 Fix
FPN15	PN15 Fix
FPN20	PN20 Fix
FPN23	PN23 Fix
USER	User-defined pattern

Example of Use

To query the data pattern type.

```
BERT:PRBS?
> PN9
```

[:SENSe]:BERT[:BASeband]:RSYNc:THReshold <n>, 500|5000|50000

Sync Loss Threshold

Function

Sets the Sync Loss judgment condition for the BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:RSYNc:THReshold <n>,<a>
```

Parameter

<n>		Numerator of Sync Loss threshold
	Range	1 to (a/2) bits
[a]		Dominator of Sync Loss threshold
	500	500 bits
	5000	5000 bits
	50000	50000 bits

Details

During BER measurement, if *n* bits out of continuous *a* bits are detected as error bits, it is judged as Sync Loss.

This command is valid only when auto resynchronization is disabled.

Example of Use

To set the Sync Loss threshold to 123/500 bits.

```
BERT:RSYN:THR 123,500
```

[:SENSe]:BERT[:BASeband]:RSYNc:THReshold?

Sync Loss Threshold Query

Function

Queries the Sync Loss judgment condition for the BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:RSYNc:THReshold?
```

Response

```
<n>,<a>
```

Parameter

<n>		Numerator of Sync Loss threshold
	Range	1 to (a/2) bits
[a]		Dominator of Sync Loss threshold
	500	500 bits
	5000	5000 bits
	50000	50000 bits

Example of Use

To query the Sync Loss judgment condition.

```
BERT:RSYN:THR?
> 123,500
```

[:SENSe]:BERT[:BASeband]:RSYNc[:STATe] ON|OFF|1|0

Auto Re-sync

Function

Enables (ON) or disables (OFF) the automatic resynchronization for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:RSYNc[:STATe] <on_off>
```

Parameter

<on_off>		Automatic resynchronization ON/OFF
	ON|1	Enables automatic resynchronization
	OFF|0	Disables automatic resynchronization

Example of Use

To enable the automatic resynchronization.

```
BERT:RSYN ON
```

[:SENSe]:BERT[:BASeband]:RSYNc[:STATe]?

Auto Re-sync Query

Function

Queries the ON/OFF status of the automatic resynchronization for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:RSYNc[:STATe]?
```

Response

```
<on_off>
```

Parameter

<on_off>	Automatic resynchronization ON/OFF status
1	Automatic resynchronization is enabled.
0	Automatic resynchronization is disabled.

Example of Use

To query the ON/OFF status of the automatic resynchronization.

```
BERT:RSYN?
> 1
```

[:SENSe]:BERT[:BASeband]:STATe ON|OFF|1|0

BER- On/Off

Function

Starts or stops BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:STATe <on_off>
```

Parameter

<on_off>	Start/stop of BER measurement
ON|1	Start
OFF|0	Stop

Example of Use

To start BER measurement.

```
BERT:STAT ON
```

[:SENSe]:BERT[:BASeband]:STATe?

BER- On/Off Query

Function

Queries the measurement status of BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:STATe?
```

Response

```
<on_off>
```

Parameter

<on_off>	BER measurement status
1	During measurement
0	During halt

Example of Use

To query the measurement status of BER measurement.

```
BERT:STAT?
> 1
```

[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT <bit>

Measurement Error Bit

Function

Sets the number of measurement error bits for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT <bit>
```

Parameter

<bit>	Number of measurement error bits
Range	1 to 2 Gbits
	1 to 2147 Mbits
	1 to 2147483 Kbits
	1 to 2147483647 bits
Suffix Code	GBIT,MBIT,KBIT,BIT
	BIT is applied when omitted.

Example of Use

To set the number of measurement error bits to 4,095 bits.

```
BERT:STOP:CRIT:EBIT 4095
```

[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT?

Measurement Error Bit Query

Function

Queries the number of measurement error bits for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:STOP:CRITeria:EBIT?
```

Response

```
<bit>
```

Parameter

<bit>		Number of measurement error bits
	Range	1 to 2 Gbits
		1 to 2147 Mbits
		1 to 2147483 Kbits
		1 to 2147483647 bits

Example of Use

To query the number of measurement error bits.

```
BERT:STOP:CRIT:EBIT?
> 4095
```

[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect] EBIT|NONE

Count Mode

Function

Sets the BER measurement end condition.

Command

```
[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect] <mode>
```

Parameter

<mode>	BER measurement end condition
EBIT	BER measurement ends when the specified number of error bits is reached.
NONE	BER measurement ends when the specified number of count bits is reached.

Example of Use

To end the BER measurement when the specified number of error bits is reached.

```
BERT:STOP:CRIT EBIT
```

[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect]?

Count Mode Query

Function

Queries the measurement end condition of BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:STOP:CRITeria[:SELect]?
```

Response

```
<mode>
```

Parameter

<mode>	BER measurement end condition
EBIT	BER measurement ends when the specified number of error bits is reached.
NONE	BER measurement ends when the specified number of count bits is reached.

Example of Use

To query the measurement end condition of BER measurement.

```
BERT:STOP:CRIT?
> EBIT
```

[:SENSe]:BERT[:BASeband]:TBITs <bit>

Measurement Bit

Function

Sets the number of measurement bits for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:TBITs <bit>
```

Parameter

<bit>	Number of measurement bits
Range	1 to 4 Gbits 1 to 4294 Mbits 1 to 4294967 Kbits 1000 to 4294967295 bits
Suffix Code	GBIT,MBIT,KBIT,BIT BIT is applied when omitted.

Example of Use

To set the number of measurement bits to 10,000 bits.

```
BERT:TBIT 10000
```

[:SENSe]:BERT[:BASeband]:TBITs?

Measurement Bit Query

Function

Queries the number of measurement bits for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:TBITs?
```

Response

```
<bit>
```

Parameter

<bit>	Number of measurement bits
Range	1 to 4 Gbits
	1 to 4294 Mbits
	1 to 4294967 Kbits
	1000 to 4294967295 bits

Example of Use

To query the number of the measurement bits.

```
BERT:TBIT?
> 10000
```

[:SENSe]:BERT[:BASeband]:MODE SINGle|CONTinuous|ENDLess

Measurement Mode

Function

Sets the BER measurement mode.

Command

```
[:SENSe]:BERT[:BASeband]:MODE <mode>
```

Parameter

mode	Measurement mode
SINGle	Single mode
CONTinuous	Continuous mode
ENDLess	Endless mode

Details

If set to the endless mode, the other settings will be changed as follows:

- Count Mode Data Bit
- Measurement Bit 4294967295 bits

Example of Use

To set the measurement mode to Single mode.

```
BERT:MODE SING
```

[:SENSe]:BERT[:BASeband]:MODE?

Measurement Mode Query

Function

Queries the measurement mode of BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:MODE?
```

Response

```
<mode>
```

Parameter

<mode>	Measurement mode
SING	Single mode
CONT	Continuous mode
ENDL	Endless mode

Example of Use

To query the measurement mode.

```
BERT:MODE?
> SING
```

[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth <bit>

PN Fix Pattern Length

Function

Sets the length of PN Fix pattern for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth <bit>
```

Parameter

<bit>	Bit length of PN Fix pattern
Range	96 to 134217728 bits
Suffix Code	None

Details

This command is valid only when Data Type is set to PN Fix.

Example of Use

To set the length of the PN Fix pattern to 1,024 bits.

```
BERT:PRBS:PNF:LENG 1024
```

[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth?

PN Fix Pattern Length Query

Function

Queries the length of PN Fix pattern for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:PNFix:LENGth?
```

Response

```
<bit>
```

Parameter

<bit>	Bit length of PN Fix pattern
Range	96 to 134217728 bits
Suffix Code	None

Example of Use

To query the length of PN Fix pattern.

```
BERT:PRBS:PNF:LENG?
> 1024
```

[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial <n>

PN Fix Pattern Initial Value

Function

Sets the initial value of PN Fix pattern in binary, for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial <n>
```

Parameter

<n>	PN Fix pattern initial value (binary)
Range	00…0 to 11…1 [9 bits] (for PN9 Fix)
	00…0 to 11…1 [15 bits] (for PN15 Fix)
	00…0 to 11…1 [20 bits] (for PN20 Fix)
	00…0 to 11…1 [23 bits] (for PN23 Fix)

Details

This command is valid only when Data Type is set to PN Fix.
Prefix "#B", a character string indicating binary, to the parameter.

Example of Use

To set the PN9 Fix initial value to 101,010,101.

```
BERT:PRBS:PNF:INIT #B101010101
```

[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial?

PN Fix Pattern Initial Value Query

Function

Queries the initial value of PN Fix pattern in binary, for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:PNFix:INITial?
```

Response

```
<n>
```

Parameter

<n>		PN Fix pattern initial value (binary)
	Range	00…0 to 11…1 [9 bits] (for PN9 Fix)
		00…0 to 11…1 [15 bits] (for PN15 Fix)
		00…0 to 11…1 [20 bits] (for PN20 Fix)
		00…0 to 11…1 [23 bits] (for PN23 Fix)

Example of Use

To query the initial value of PN9 Fix.

```
BERT:PRBS:PNF:INIT?
> 101010101
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth <bit>

Length for Sync on User Pattern

Function

Sets the length of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth <n>
```

Parameter

<bit>		Length of synchronization judgment bit string
	Range	8 to 1024 bits

Details

This command is valid only when Data Type is set to User Define.

Example of Use

To set the length of the synchronization judgment bit string in the user-defined pattern to 65 bits.

```
BERT:PRBS:USER:SYNC:LENG 65
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth?

Length for Sync on User Pattern Query

Function

Queries the length of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:LENGth?
```

Response

```
<bit>
```

Parameter

<bit>	Length of synchronization judgment bit string
Range	8 to 1024 bits

Example of Use

To query the length of the synchronization judgment bit string in the user-defined pattern.

```
BERT:PRBS:USER:SYNC:LENG?
> 65
```

[:SENSe]:BERT[:BASeband]:SYNLoss:COUNt?

Sync Loss Count Query

Function

Queries the number of Sync Loss (out of synchronization) errors having occurred during the BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:SYNLoss:COUNt?
```

Response

```
<count>
```

Parameter

<count>	Number of Sync Loss errors occurred
Range	0 to 65535

Example of Use

To query the number of Sync Loss errors.

```
BERT:SYNL:COUN?
> 500
```

[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion CLEar|KEEP

Count Action at Sync Loss

Function

Sets the action when Sync Loss occurs during BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion <a>
```

Parameter

<a>	Action when Sync Loss occurs
CLEar	Clears current count value
KEEP	Keeps current count value

Details

Selects whether to clear or keep the count value when Sync Loss occurs during measurement.
This command is valid only when auto resynchronization is enabled.

Example of Use

To clear the count value when Sync Loss occurs.

```
BERT:RSYN:COUN:ACT CLE
```

[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion?

Count Action at Sync Loss Query

Function

Queries the action when Sync Loss occurs during BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:RSYNc:COUNt:ACTion?
```

Response

```
<a>
```

Parameter

<a>	Action against Sync Loss
CLE	Clears current count value.
KEEP	Keeps current count value.

Example of Use

To query the action when Sync Loss occurs.

```
BERT:RSYN:COUN:ACT?
> CLE
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt <bit>

Sync Start Position on User Pattern

Function

Sets the start position of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Command

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt <bit>
```

Parameter

<bit>	Start position of synchronization judgment bit string
Range	1 to (Pattern Length) bits

Details

This command is valid only when Data Type is set to User Define.

Example of Use

To set the 31st bit from the start of the user-defined pattern as the start position of synchronization judgment bit string.

```
BERT:PRBS:USER:SYNC:STAR 31
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt?

Sync Start Position on User Pattern Query

Function

Queries the start position of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:SYNC:STARt?
```

Response

```
<bit>
```

Parameter

<bit>	Start position of synchronization judgment bit string
Range	1 to (Pattern Length) bits

Example of Use

To query the start position of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

```
BERT:PRBS:USER:SYNC:STAR?
> 31
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:PATTern?

User Pattern File Name Query

Function

Queries the user-defined pattern name for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:PATTern?
```

Response

```
<pattern>,<drive>
```

Parameter

<pattern>	Character string within 32 characters, obtained by removing the extension (bpn) from the loaded user-defined pattern file name.
<drive>	The name of the drive from which the user-defined pattern file is loaded

Details

*** is returned if a user-defined pattern is not loaded.

Example of Use

To query the user-defined pattern name.

```
BERT:PRBS:USER:PATT?
>
```

[:SENSe]:BERT[:BASeband]:PRBS:USER:LENGth?

User Pattern Length Query

Function

Queries the bit length of the user-defined pattern for BER measurement.

Query

```
[:SENSe]:BERT[:BASeband]:PRBS:USER:LENGth?
```

Response

```
<bit>
```

Parameter

<bit>	Bit length of user-defined pattern
Range	8 to 1024 bits

Example of Use

To query the bit length of the user-defined pattern.

```
BERT:PRBS:USER:LENG?
>
```

:INITiate[:IMMediate]

Start Measurement

Function

Starts the BER measurement.

Command

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

Example of Use

To start the BER measurement.

```
INIT
```

:ABORt

Stop Measurement

Function

Stops the BER measurement.

Command

```
:ABORt
```

Example of Use

To stop the BER measurement.

```
ABOR
```

2.7 Display Settings

Table 2.7-1 shows device messages for setting functions for displays.

Table 2.7-1 Device messages for setting functions for displays.

Function	Device Message
SG Window Position	`:DISPlay[:WINDow]:POSition TOP|BOTTom`
	`:DISPlay[:WINDow]:POSition?`

:DISPlay[:WINDow]:POSition TOP|BOTTom

SG Window Position

Function

Switches the display position of the Signal Generator screen.

Command

```
:DISPlay[:WINDow]:POSition <position>
```

Parameter

`<position>`	Display position
`TOP`	Upper
`BOTTom`	Lower

Example of Use

To display the Signal Generator screen at the lower portion.

```
DISP:POS BOTT
```

:DISPlay[:WINDow]:POSition?

SG Window Position Query

Function

Queries the display position of the Signal Generator screen.

Query

```
:DISPlay[:WINDow]:POSition?
```

Response

```
<position>
```

Parameter

<position>	Display position
TOP	Upper
BOTT	Lower

Example of Use

To query the display position of the Signal Generator screen.

```
DISP:POS?
> BOTT
```

2.8 Calibration Settings

Table 2.8-1 shows the device messages for setting the calibration functions.

Table 2.8-1 Device Messages for Calibration Settings

Function	Device Message
SG I/Q Cal SG I/Q External Cal	`:CALibration:SG:IQ NORMal|EXTernal`
SG IQ Calibration Restore Default	`:CALibration:SG:IQ:DEFault`
SG IQ Calibration Frequency	`:CALibration:SG:IQ:FREQuency? <freq>`
SG IQ Calibration Frequency List	`:CALibration:SG:IQ:LIST:FREQuency?`

:CALibration:SG:IQ NORMal|EXTernal

SG IQ Calibration / SG IQ External Calibration

Function

Calculates and sets calibrated values for deciding IQ gain balance, time difference (timing), and orthogonality optimal for the current setting of the signal generator.

Command

```
:CALibration:SG:IQ <mode>
```

Parameter

<mode>	Mode
NORMal	Calibrates the signal analyzer and signal generator without external connection.
EXTernal	Calibrates the signal analyzer and signal generator with external connection.

Details

The factory defaults are applied to the MS2691A/MS2691A/MS2692A. This function is used to get calibrated values more suitable for the environment concerning particular frequency points.
Perform the calibration at stable ambient temperature after warming up for at least 30 minutes.

Example of Use

Calibrates in the current settings of the signal generator.

```
CAL:SG:IQ NORM
*OPC?
```

:CALibration:SG:IQ:DEFault

SG IQ Calibration Restore Default

Function

Deletes the SG I/Q calibration values and restore the factory defaults.

Command

```
:CALibration:SG:IQ:DEFault
```

Example of Use

Deletes the SG I/Q calibration values and restore the factory defaults.

```
CAL:SG:IQ:DEF
```

:CALibration:SG:IQ:FREQuency? <freq>

SG IQ Calibration Frequency

Function

Queries if SG I/Q Cal or SG I/Q External Cal has been performed in the specified frequency or not.

Query

```
:CALibration:SG:IQ:FREQuency? <freq>
```

Response

```
<executed>
```

Parameter

<freq>	Calibrated frequency points
Range	125 MHz to 6 GHz
Resolution	0.01 Hz
Suffix code	HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ
	When omitted Hz
<executed>	Finds calibrated values or not.
0	None
1	Yes

Example of Use

Queries if SG I/Q Cal has been performed in the output frequency of 5 GHz.

```
CAL:SG:IQ:FREQ? 5GHZ
> 1
```

:CALibration:SG:IQ:LIST:FREQuency?

SG IQ Calibration Frequency List

Function

Queries the list of the frequency points where SG I/Q Cal and SG I/Q External Cal were already performed.

Query

```
:CALibration:SG:IQ:LIST:FREQuency?
```

Response

```
<freq_1>,<freq_2>,…,<freq_n>
```

Parameter

<freq_n>	Calibrated frequency points
Range	Maximum 100 points
Resolution	0.01 Hz
Suffix code	None, in Hz units
	999.0 is returned when no calibration has been performed yet.

Example of Use

Queries the list of the frequencies which calibration was already performed.

```
CAL:SG:IQ:LIST:FREQ?
> 5000000000.00,5600000000.00
```

2.9 Other Settings

Table 2.9-1 shows a device message for setting other functions.

Table 2.9-1 Device message for other settings

Function	Device Message
SG Status	`:STATus:ERRor?`

:STATus:ERRor?

SG Status Query

Function

Queries the abnormal status of SG when the target application is SG, and queries the measurement status of BER when the target application is BER.

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

When the target application is SG, the bit assignments are as follows:

bit0: $2^0 = 1$	Lock abnormal status during using the external reference signal source
bit1: $2^1 = 2$	ALC circuit is abnormal.
bit2: $2^2 = 4$	Outside level accuracy assurance
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: 211 = 2048 (Not used)
bit12: 2^{12} = 4096 (Not used)
bit13: 2^{13} = 8192 (Not used)
bit14: 2^{14} = 16384 (Not used)
bit15: 215 = 32768 (Not used)

When the target application is BER, the bit assignments are as follows:

bit0: 2^0 = 1 Sync Loss status
bit1: 2^1 = 2 Clock signal error
bit2: 2^2 = 4 Enable signal error
bit3: 2^3 = 8 (Not used)
bit4: 2^4 = 16 (Not used)
bit5: 2^5 = 32 (Not used)
bit6: 2^6 = 64 (Not used)
bit7: 2^7 = 128 (Not used)
bit8: 2^8 = 256 (Not used)
bit9: 2^9 = 512 (Not used)
bit10: 2^{10} = 1024 (Not used)
bit11: 2^{11} = 2048 (Not used)
bit12: 2^{12} = 4096 (Not used)
bit13: 2^{13} = 8192 (Not used)
bit14: 2^{14} = 16384 (Not used)
bit15: 2^{15} = 32768 (Not used)

Range 0 to 65535

Details

Returns 0 when both SG and BER operate normally.

Example of Use

To queries the current operation status.

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

Chapter 3 Native Device Message List

This chapter describes remote control commands for executing functions of this application using a list organized by functions. Refer to Chapter 4 "Device Message Details" for detailed specifications for each command. Refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for detailed specifications on IEEE488.2 common device messages and application common device messages.

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3.1 IEEE488.2 Common Device Messages

IEEE488.2 common device messages available in this application are shown in Table 3.1-1.

Table 3.1-1 IEEE488.2 common device messages

Function	Command	Query	Response	Remarks
Identification	---	*IDN?	ANRITSU, model, serial, version	model: Main unit model name serial: Main unit serial number version: Software package version
Operation Complete	*OPC	*OPC?	1	
Preset (All Application)	*RST	---	---	
Self Test	---	*TST?	result	Result: Self test results = 0 | 1
Wait to Continue	*WAI	---	---	
Clear Status	*CLS	---	---	
Service Request Enable Register	*SRE byte	*SRE?	Byte	byte = bit7: EESB7 bit6: Not used bit5: ESB bit4: MAV bit3: EESB3 bit2: EESB2 bit1: EESB1 (ERROR Event) bit0: EESB0 (END Event)
Status Byte Register	---	*STB?	Byte	byte = bit7: EESB7 bit6: MSS/RQS bit5: ESB bit4: MAV bit3: EESB3 bit2: EESB2 bit1: EESB1 (ERROR Event) bit0: EESB0 (END Event)

Table 3.1-1 IEEE488.2 common device messages (Cont'd)

Function	Command	Query	Response	Remarks
Standard Event Status Enable Register	`*ESE byte`	`*ESE?`	`Byte`	`byte` = `bit7`: Power on `bit6`: User request `bit5`: Command error `bit4`: Execution error `bit3`: Device error `bit2`: Query error `bit1`: Not used `bit0`: Operation complete
Standard Event Status Register	`---`	`*ESR?`	`Byte`	

3.2 Application Common Device Messages

Application common device messages available in this application are shown in Table 3.2-1.

Table 3.2-1 Application common device messages

Function	Command	Query	Response	Remarks
Application Switch	SYS apl, window	SYS? apl	status, window	apl: Application name = SG | BER window: Window status = ACT | INACT | MIN | NON status: Application execution status = CURRENT | IDLE | RUN | UNLOAD
Preset (All Applications)	*RST	---	---	
Preset (Active Application Only)	PRE	---	---	
	INI	---	---	
System Restart	REBOOT	---	---	
LCD Power	DISPLAY on_off	DISPLAY?	on_off	
Error Display Mode	REMDISP mode	REMDISP?	Mode	mode: Display mode = NORMAL | REMAIN | REMAIN_LAST
Save Parameter	SVPRM	---	---	fname: Filename dev: Drive name = D | E | …
	SVPRM fname, dev	---	---	
Recall Parameter	RCPRM fname, dev	---	---	fname: Filename dev: Drive name = D | E | … apl: Target application = ALL | CURR
	RCPRM fname, dev,apl	---	---	
Hard Copy	PRINT	---	---	fname: Filename dev: Drive name = D | E | …
	PRINT fname, dev	---	---	

Table 3.2-1 Application common device messages (Cont'd)

Function	Command	Query	Response	Remarks
Hard Copy Mode	PMOD format	PMOD?	format	format: Specifies file format = BMP | PNG
	PMOD	PMOD?	BMP	
END Event Status Enable Register (Signal Generator function)	ESE0 n	ESE0?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Waveform pattern copied bit4: Waveform pattern loaded bit3: Not used bit2: Not used bit1: Not used bit0: Not used
END Event Status Register (Signal Generator function)	---	ESR0?	byte	
ERROR Event Status Enable Register (Signal Generator function)	ESE1 n	ESE1?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Waveform pattern copy error bit4: Waveform pattern load error bit3: Not used bit2: Not used bit1: Not used bit0: Not used
ERROR Event Status Register (Signal Generator function)	---	ESR1?	byte	

Table 3.2-1 Application common device messages (Cont'd)

Function	Command	Query	Response	Remarks
Extended END Event Status Enable Register (Signal Generator/BER function)	ESE0 n	ESE0?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Not used bit4: Not used bit3: Not used bit2: Not used bit1: BER bit0: Signal Generator
Extended END Event Status Register (Signal Generator/BER function)	---	ESR0?	byte	
Extended ERROR Event Status Enable Register (Signal Generator/BER function)	ESE1 n	ESE1?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Not used bit4: Not used bit3: Not used bit2: Not used bit1: BER bit0: Signal Generator
Extended ERROR Event Status Register (Signal Generator/BER function)	---	ESR1?	byte	

Table 3.2-1 Application common device messages (Cont'd)

Function	Command	Query	Response	Remarks
END Event Status Enable Register (Signal Generator function)	ESEEND n	ESEEND?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Completion of waveform pattern copy bit4: Completion of Waveform pattern loading bit3: Not used bit2: Not used bit1: Not used bit0: Not used
END Event Status Register (Signal Generator function)	---	ESREND?	byte	
ERROR Event Status Enable Register (Signal Generator function)	ESEERR n	ESEERR?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Waveform pattern copy error bit4: Waveform pattern load error bit3: Not used bit2: Not used bit1: Not used bit0: Not used
ERROR Event Status Register (Signal Generator function)	---	ESRERR?	byte	

Table 3.2-1 Application common device messages (Cont'd)

Function	Command	Query	Response	Remarks
END Event Status Enable Register (BER Measurement function)	ESEEND n	ESEEND?	byte	byte = Status bit bit7: Measurement stop bit6: Not used bit5: Not used bit4: Not used bit3: Not used bit2: Not used bit1: Measurement interruption bit0: Measurement completion
END Event Status Register (BER Measurement function)	---	ESREND?	byte	
ERROR Event Status Enable Register (BER Measurement function)	ESEERR n	ESEERR?	byte	byte = Status bit bit7: Not used bit6: Not used bit5: Not used bit4: Not used bit3: Bit count overflow bit2: Syncloss count overflow bit1: Measurement stop with synchronization incompletion bit0: Measurement start failure
ERROR Event Status Register (BER Measurement function)	---	ESRERR?	byte	

3.3 Frequency Settings

Device messages for setting frequencies are shown in Table 3.3-1.

Table 3.3-1 Frequency setting messages

Function	Command	Query	Response	Remarks
Frequency	`FREQ freq`	`FREQ?`	`freq`	
Frequency Step Value	`FIS freq`	`FIS?`	`freq`	
Frequency Step Up/Down	`FRS up_down`	`---`	`---`	
RF Spectrum	`SPREV mode`	`SPREV?`	`mode`	`mode`: Invert output waveform = `ON | OFF`
Frequency Switching Speed Mode	`FREQSWSPEED mode`	`FREQSWSPEED?`	`mode`	`mode`: Frequency switching speed = `NORMAL | FAST`

3.4 Level Settings

Device messages for setting levels are shown in Table 3.4-1.

Table 3.4-1 Level setting messages

Function	Command	Query	Response	Remarks
RF Output	LVL on_off	LVL?	on_off	
Output Level	OLVL level	OLVL? unit	level	unit: Units = DBM | DBU
Output Level Step Value	OIS level	OIS?	level	
Output Level Step	OLS up_down	---	---	up_down: Up/Down = UP | DOWN | DN
Output Level Unit	OLU unit	OLU?	---	unit: Units = DBM | DBU
Volt Unit Display	VDSPL unit	VDSPL?	unit	unit: Voltage unit display system = EMF | TERM
Level Offset	OOF on_off	OOF?	on_off	
Level Offset Value	OOS level	OOS?	level	
Relative Level	ORL on_off	ORL?	on_off	
Relative Level Value	ORLV level	ORLV?	level	
Reference of Relative Level	---	ORLR?	level	
SG Level Auto Cal	CALMOD on_off	CALMOD?	on_off	
SG Level Calibration	LVLCAL	---	---	
ALC Status	---	ALCSTT?	status	status: ALC status = NORMAL | ALCALARM
Unleveled Status	--	LVLACCSTT?	unleveled	unleveled: Output level accuracy status = NORMAL | UNLEVELED

Table 3.4-1 Level setting messages (Cont'd)

Function	Command	Query	Response	Remarks
Level Status List	---	LVLSTTLST?	unit, offset, unleveled, INTALC, auto_cal, relative, NORMAL	unit: Voltage unit display = EMF | TERM offset: Level offset = OFFSETON | OFFSETOFF unleveled: Output level accuracy status = NORMAL | UNLEVELED auto_cal: Auto Cal mode = CALON | CALOFF relative: Relative output mode = RELON | RELOFF

3.5 Play/Select/Load Waveform Pattern

3.5.1 Playing/selecting waveform pattern

Device messages for playing, selecting and status queries on waveform patterns loaded to waveform memory are shown in Table 3.5.1-1.

Table 3.5.1-1 Waveform pattern playing/selecting messages

Function	Command	Query	Response	Remarks
Waveform Restart	DLRES	---	---	
Waveform Status	---	PATRUNSTT?	status	status: Play status = STOP | PLAY
Select Pattern file on Wave Memory	LOADEDFILESEL package, pattern	LOADEDFILESEL?	package, pattern	package: Package name pattern: Pattern name
	PAT package, pattern	PAT?	package, pattern	
Delete Pattern file on Wave Memory	DELFILEWM package, pattern	---	---	package: Package name pattern: Pattern name
	DELPATWM package, pattern	---	---	
Delete All Pattern files on Wave Memory (Clear Wave Memory)	DELFILEWM ALL	---	---	
Number of loaded pattern files	---	LOADEDFILENUM?	number	number: Number of waveform patterns
	---	PATNUM?	number	
List of Loaded Pattern Files	---	LOADEDFILENAME? number	package, pattern	number: Waveform pattern number package: Package name pattern: Pattern name
	---	PATNAME? number	package, pattern	
Wave Memory Size	---	WMSPC?	blank1, blank2, total	blank1: Memory free space (byte) blank2: Contiguous memory free space (byte) total: Total memory size

3.5.2 Loading waveform pattern

Device messages for loading waveform patterns in the hard disk to waveform memory are shown in Table 3.5.2-1.

Table 3.5.2-1 Waveform pattern loading messages

Function	Command	Query	Response	Remarks
Load Pattern File / Query Load Status and Wave Memory	`LDFILE package, pattern`	`LDFILE? package, pattern`	`status`	`package`: Package name `pattern`: Pattern name `status`: Load status
	`LDPAT package, pattern`	`LDPAT? package, pattern`		
Cancel Loading	`LDCANCEL`	---	---	
Pattern File Version	---	`FILEVER? package, pattern`	`version`	`package`: Package name `pattern`: Pattern name `version`: Version number
Hard Disk Drive Size	---	`HDDSPC?`	`total, blank`	`total`: Total hard disk size `blank`: Hard disk free space
Copy pattern file to Hard Disk Drive	`CPYPATTOHDD drive,package`	---	---	`drive`: Copy source drive name `package`: Package name
Delete Pattern file on Hard Disk Drive	`DELFILEHDD package, pattern`	---	---	`package`: Package name `pattern`: Pattern name
	`DELPATHDD package, pattern`	---	---	

3.6 Modulation and AWGN Settings

Device messages for setting modulation and AWGN are shown in Table 3.6-1.

Table 3.6-1 Modulation and AWGN setting messages

Function	Command	Query	Response	Remarks
Modulation	`MOD on_off`	`MOD?`	`on_off`	
Sampling Clock	---	`SAMPLINGCLK?`	`freq`	
AWGN	`AWGN on_off`	`AWGN?`	`on_off`	
C/N Ratio	`PATWMPOWRATIO level`	`PATWMPOWRATIO?`	`level`	
Target of C/N Setting	`POWRATIOTARGET target`	`POWERRATIOTARGET?`	`target`	`target`: Target to change = `CARRIER | NOISE | CONSTANT`
Carrier Power	`CARRIERPOW level`	`CARRIERPOW?`	`level`	

3.7 External I/O Settings

Device messages for external I/O settings are shown in Tables 3.7.1-1 through 3.7.3-1.

3.7.1 External input signal settings

Table 3.7.1-1 External input signal setting messages

Function	Command	Query	Response	Remarks
External Trigger	SFTRG on_off	SFTRG?	on_off	
External Trigger Source	STDLYSRC source	STDLYSRC?	source	source: Signal source = EXTTRG | APPSYNCTRG |BBIF
External Trigger Mode	SFTRGMODE mode	SFTRGMODE?	mode	mode: Operation mode = START | FRAME
	STGS mode	STGS?	mode	mode: Operation mode = INT | EXTSTA | EXTFRM
External Trigger Delay	STDLYSYM delay	STDLYSYM?	delay	delay: Delay time = (Number of symbols or chips)
External Trigger Edge	EIST edge	EIST?	edge	edge: Polarity = RISE | FALL
Baseband Reference Clock Source	REFCLKSRC source	REFCLKSRC?	source INT	source: Clock source = INT | EXT_TTL | EXT_AC
Baseband Reference Clock	REFCLKVAL clock	REFCLKVAL?	clock	clock: Reference clock = SIXTEENTH | EIGHTH | QUARTER | HALF | 1 | 2 | 4 | 8 | 16
Baseband Reference Clock Condition	---	BBREFCOND?	status	status: Lock status = NORMAL | CHKEXT
Pulse Modulation Source	PMO source	PMO?	source	source: Signal source = INT | EXT | OFF

3.7.2 External output signal settings

Table 3.7.2-1 External output signal setting messages

Function	Command	Query	Response	Remarks
Marker Edit	MARKEREDIT marker,mode	MARKEREDIT? marker	mode	marker: Marker type = 1 | 2 | 3 mode: Marker mode = OFF | ON | PATSYNC
Marker Polarity	MARKERPOL marker,polarity	MARKERPOL? marker	polarity	marker: Marker type = 1 | 2 | 3 polarity: Polarity = POSITIVE | NEGATIVE
Marker Pulse Start Offset Value	MARKEREDITOFFSET marker, offset	MARKEREDITOFFSET? marker	offset	marker: Marker type = 1 | 2 | 3 offset: Pulse starting offset time
Marker Pulse Width Value	MARKEREDITWIDTH marker, width	MARKEREDITWIDTH? marker	width	marker: Marker type = 1 | 2 | 3 width: Pulse width
Marker Pulse Cycle Value	MARKEREDITCYCLE marker, cycle	MARKEREDITCYCLE? marker	cycle	marker: Marker type = 1 | 2 | 3 cycle: Pulse cycle

3.7.3 Setting trigger output to SG marker of SA/SPA

Table 3.7.3-1 Message for setting trigger output to SG marker of SA/SPA

Function	Command	Query	Response	Remarks
SA Trigger Out	SATRGOUT triggertoSA	SATRGOUT?	triggertoSA	triggertoSA: Trigger selection = MARKER1 | MARKER2 | MARKER3 | PATSYNC

3.8 BER Measurement Settings

Device messages for setting the bit error rate (BER) measurement function are shown in Table 3.8-1.

Table 3.8-1 BER measurement setting messages

Function	Command	Query	Response	Remarks
Measurement Mode	MODE mode	MODE?	mode	mode: Measurement mode = SINGLE | CONTINUOUS | ENDLESS
Start Measurement	START	---	---	
Stop Measurement	STOP	---	---	
Start Measurement by Single Mode	SNGLS	---	---	
Start Measurement by Continuous Mode	CONTS	---	---	
Start Measurement by Endless Mode	ENDLS	---	---	
Count Clear	COUNTCLR	---	---	
Count Mode	COUNTMODE mode	COUNTMODE?	mode	mode: Measurement end condition = DATABIT | ERRORBIT
Measurement Bit	BERBIT bit	BERBIT?	bit	bit: Number of measurement bits
Measurement Error Bit	ERRORBIT bit	ERRORBIT?	bit	bit: Number of measurement error bits
Data Polarity	Data polarity	DATA?	polarity	polarity: Polarity = POS | NEG
Clock Polarity	CLK polarity	CLK?	polarity	polarity: Polarity = RISE | FALL
Enable Polarity	ENBL polarity	ENBL?	polarity	polarity: Polarity = HIGH | LOW | DISABLE

Table 3.8-1 BER measurement setting messages (Cont'd)

Function	Command	Query	Response	Remarks
Data Pattern Type	TYPE pattern	TYPE?	pattern	pattern: Data pattern type = PN9 | PN11 | PN15 | PN20 | PN23 | ALL0 | ALL1 | ALT | PN9FIX | PN11FIX | PN15FIX | PN20FIX | PN23FIX | USER
PN Fix Pattern Initial Value	PNINITIAL n	PNINITIAL?	n	
PN Fix Pattern Length	PNFIXLENG bit	PNFIXLENG?	bit	
Sync Start Position on User Pattern	SYNCSTARTPOS bit	SYNCSTARTPOS?	bit	
Length for Sync on User Pattern	SYNCLENG bit	SYNCLENG?	bit	
Drive to load User Pattern	LOADMEDIA drive	LOADMEDIA?	drive	drive: Drive letter
User Pattern File List	---	USERPATLST?	s1,s2,s3,...,s100	s*: Pattern file name
Load User Pattern	LOADUSERPAT pattern	---	---	pattern: Pattern file name
User Pattern File Name Query	---	USERPAT?	pattern,drive	Pattern: Pattern file name drive: Drive
User Pattern Length Query	---	USERPATLENG?	bit	
Auto Re-sync	AUTORESYNC on_off	AUTORESYNC?	on_off	
Sync Loss Threshold	SYNCLOSSTHLD n,a	SYNCLOSSTHLD?	n,a	n: Numerator of threshold (bit) a: Denominator of threshold (bit) = 500 | 5000 | 50000
Count Action at Sync Loss	SYNCLOSSACT action	SYNCLOSSACT0?	action	action: Action at Sync Loss = COUNT_CLEAR | COUNT_KEEP

Table 3.8-1 BER measurement setting messages (Cont'd)

Function	Command	Query	Response	Remarks
Result and Status Query	---	RESULT? EP	per,countbit,errorbit,status,error	per: Error rate (%) exp: Error rate (exponent) countbit: Number of count bits errorbit: Number of error bits syncloss: Number of generated Sync Loss status: Measurement status error: Error status
		RESULT? ER	exp,countbit,errorbit,status,error	
		RESULT? EP_WSYNCLOSS	per,countbit,errorbit,syncloss,status,error	
		RESULT? ER_WSYNCLOSS	exp,countbit,errorbit,syncloss,status,error	
Error Rate Query	---	BER? EP	per	per: Error rate (%) exp: Error rate (exponent)
		BER? ER	exp	
Count Bit Query	---	RCVBIT?	bit	bit: Number of count bits
Error Bit Query	---	BITERR?	bit	bit: Number of error bits
Sync Loss Count Query	---	SYNCLOSS?	count	Count: Number of generated Sync Loss
Status Query	---	STATUS?	status	status: Measurement status = EXEC | SYNCHRONIZING | STOP | ERROR
Stop Status Query	---	STOPSTATUS?	status	status: Measurement stop status = EXEC | SYNCHRONIZING | STOP_NORMAL | STOP_OVERFLOW_DATACOUNT | STOP_OVERFLOW_SYNCLOSS | STOP_ABNORMAL_COUNT
Error Query	---	MEASERROR?	status	status: Error information = NONE | SYNCLOSS | CLOCKERROR | ENABLEERROR

3.9 Display Settings

Device messages for display settings are shown in Table 3.9-1.

Table 3.9-1 Display setting messages

Function	Command	Query	Response	Remarks
SG Window Position	`SGWINDOWPOS position`	`SGWINDOWPOS?`	`position`	`position`: Window position `= TOP | BOTTOM`

Chapter 4 Native Device Message Details

This chapter describes detailed specifications on remote control commands for executing functions of this application, in alphabetical order. Refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Remote Control) for detailed specifications on IEEE488.2 common device messages and application common device messages.

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ALCSTT?

ALC Status Query

Function

Queries the output level alarm information.

Query

```
ALCSTT?
```

Response

```
status
```

Parameter

`status`	Level alarm status
`NORMAL`	Normal status
`ALCALARM`	ALC circuit abnormality

Example of Use

To query level alarm status.

```
ALCSTT?
```

AUTORESYNC/AUTORESYNC?

Auto Re-sync

Function

Enables (ON) or disables (OFF) the automatic resynchronization for BER measurement.

Command

```
AUTORESYNC on_off
```

Query

```
AUTORESYNC?
```

Response

```
on_off
```

Parameter

on_off	Automatic resynchronization ON/OFF
ON	Enables automatic resynchronization
OFF	Disables automatic resynchronization

Example of Use

To enable the automatic resynchronization.

```
AUTORESYNC ON
```

AWGN/AWGN?

AWGN

Function

Sets AWGN output ON/OFF.

Command

```
AWGN on_off
```

Query

```
AWGN?
```

Response

```
on_off
```

Parameter

`on_off`	AWGN output ON/OFF
`ON`	ON
`OFF`	OFF

Details

Outputs a signal with AWGN added when AWGN is ON.
The AWGN output function can be set to ON or OFF only when a waveform pattern file is selected and the modulation is enabled (ON).

The AWGN output function is automatically set to OFF when a waveform pattern is changed.

Example of Use

To add AWGN to output signal.

```
AWGN ON
```

BBREFCOND?

Baseband Reference Clock Condition

Function

Queries the lock status of the baseband reference clock.

Query

```
BBREFCOND?
```

Response

```
status
```

Parameter

status	Lock status of reference clock
NORMAL	Normal status
CHKEXT	Lock abnormal status when an external reference signal source is used.

Example of Use

To query the lock status of the baseband reference clock.

```
BBREFCOND?
```

BER?

Bit Error Rate Query

Function

This command returns the bit error rate of the BER measurement function.

Query

```
BER? a
```

Response

p

Where a is EP (in percentage)

e

Where a is ER (in exponents)

Parameter

a	Bit error rate format
EP	The bit rate is returned in percentage.
ER	The bit rate is returned in exponent format.

p

Range	0.000 to 100.000 %

e

Range	0.00E+00 to 1.00E+02

Example of Use

To query the bit error rate of the BER measurement function in percentage.

```
BER? EP
```

BERBIT/BERBIT?

Measurement Bit

Function

Sets the number of measurement bits for BER measurement.

Command

```
BERBIT bit
```

Query

```
BERBIT?
```

Response

`bit`

Integer in bit units, unitless

Parameter

`bit`

Number of measurement bits

Range	1 to 4 Gbits 1 to 4294 Mbits 1 to 4294967 Kbits 1000 to 4294967295 bits
Suffix Code	`GBIT,MBIT,KBIT,BIT` `BIT` is applied when omitted.

Example of Use

To set the number of measurement bits to 10,000 bits.

```
BERBIT 10000BIT
```

BITERR?

Error Bit Query

Function

Queries the number of error bits in the BER measurement.

Query

```
BITERR?
```

Response

`bit`		Number of error bits
	Range	0 to 2^{32} bits

Example of Use

To query the number of error bits.

```
BITERR?
```

CALMOD/CALMOD?

SG Level Auto Cal

Function

Sets auto calibration function ON/OFF. The auto calibration function is enabled when Auto Cal is ON.

Command

```
CALMOD on_off
```

Query

```
CALMOD?
```

Response

```
on_off
```

Parameter

on_off	Auto calibration function ON/OFF
ON	ON
OFF	OFF

Details

The auto calibration function can be set to OFF when all conditions shown below are fulfilled:

- A waveform pattern is selected
- Modulation is enabled (ON)
- RF Output is set to –5 dBm or less

Example of Use

To disable auto calibration function.

```
CALMOD OFF
```

Related Commands

AWGN	Sets AWGN ON/OFF
MOD	Sets modulation
LOADEDFILESEL	Selects waveform pattern

CARRIERPOW/CARRIERPOW?

Carrier Power

Function

Sets the carrier signal level when AWGN is ON.

Command

```
CARRIERPOW level
```

Query

```
CARRIERPOW?
```

Response

```
level
```

Parameter

`level` Carrier signal level when AWGN is ON.

Range	
Resolution	0.01 dB
Suffix Code	`DBM`

Example of Use

To set the carrier signal level when AWGN is ON to –55.0 dBm.

```
AWGN ON
CARRIERPOW -55.0DBM
```

Related Commands

`AWGN` Set AWGN ON/OFF.

CLK/CLK?

Clock Polarity

Function

Sets the polarity of the clock signal for BER measurement.

Command

```
CLK polarity
```

Query

```
CLK?
```

Response

```
polarity
```

Parameter

`polarity`	Clock signal polarity
`RISE`	Data is detected at the rising edge
`FALL`	Data is detected at the falling edge

Example of Use

To set the clock signal polarity to RISE.

```
CLK RISE
```

CONTS

Start Measurement by Continuous Mode

Function

Starts the BER measurement in Continuous mode.

Command

```
CONTS
```

Example of Use

To start the BER measurement in Continuous mode.

```
CONTS
```

COUNTCLR

Count Clear

Function

Resets the BER measurement bit count to 0.

Command

```
COUNTCLR
```

Details

This command is valid only when the measurement mode is Single or Endless.

Example of Use

To reset the bit count to 0.

```
CONTCLR
```

COUNTMODE/COUNTMODE?

Count Mode

Function

Sets the BER measurement end condition.

Command

```
COUNTMODE mode
```

Query

```
COUNTMODE?
```

Response

```
mode
```

Parameter

`mode`	BER measurement end condition
`DATABIT`	BER measurement ends when the specified number of count bits is reached.
`ERRORBIT`	BER measurement ends when the specified number of error bits is reached.

Example of Use

To end the BER measurement when the specified number of count bits is reached.

```
COUNTMODE DATABIT
```

CPYPATTOHDD

Copy Pattern File to Hard Disk Drive

Function

Copies the waveform pattern file from the specified drive to the internal hard disk drive. Specify a waveform pattern by a package name, which is the name of the folder that stores the waveform pattern file.

Command

```
CPYPATTOHDD drive,package
```

Parameter

`drive`	Copy source drive name (`D` to `Z`, `D` when omitted)
`package`	Copy source package name (character string)

Details

An error occurs when the specified drive or waveform pattern file cannot be found.

When the package name (`package`) is omitted, all the packages in the root folder of the specified drive will be copied.

Example of Use

To copy the waveform pattern in the package "WCDMA" of Drive D to the internal hard disk.

```
CPYPATTOHDD D,"WCDMA"
```

DATA/DATA?

Data Polarity

Function

Sets the logic (positive or negative) of the Data signal for BER measurement.

Command

```
DATA polarity
```

Query

```
DATA?
```

Response

```
polarity
```

Parameter

`polarity`	Data signal logic
`POS`	Positive logic
`NEG`	Negative logic

Example of Use

To set the Data signal logic to positive.

```
DATA POS
```

DELFILEHDD

Delete Pattern File on Hard Disk Drive

Function

Deletes the waveform pattern file on the hard disk.

Command

```
DELFILEHDD package,pattern
```

Parameter

`package`	Package name (Character string)
`pattern`	Pattern name (Character string)

Details

This command does not delete waveform patterns in the waveform memory.

Example of Use

To delete the “TEST” pattern in the package “WCDMA”.

```
DELFILEHDD "WCDMA","TEST"
```

Related Commands

`DELPATHDD`	Same function as `DELFILEHDD`

DELFILEWM

Delete Pattern file on Waveform Memory

Function

Deletes the waveform pattern file in the waveform memory.

Command

```
DELFILEWM package,pattern
DELFILEWM ALL
```

Parameter

`package`	Package name (Character string)
`ALL`	Deletes all waveform patterns
`pattern`	Pattern name (Character string)

Details

This command does not delete waveform patterns on the hard disk.

Example of Use

To delete the “TEST” pattern in the package “WCDMA”.

```
DELFILEWM "WCDMA","TEST"
```

Related Commands

`DELPATWM`	Same function as `DELFILEWM`

DELPATHDD

Delete Pattern File on Hard Disk Drive

Function

Deletes the waveform pattern file on the hard disk.

The function is the same as that of DELFILEHDD. Refer to the descriptions of DELFILEHDD for details.

DELPATWM

Delete Pattern File on Waveform Memory

Function

Deletes the waveform pattern file in the waveform memory.

The function is the same as that of DELFILEWM. Refer to the descriptions of DELFILEWM for details.

DLRES

Waveform Restart

Function

Plays waveform pattern from the beginning.

Command

```
DLRES
```

Example of Use

To play waveform pattern from the beginning.

```
DLRES
```

EIST/EIST?

External Trigger Edge

Function

Sets the external trigger input polarity.

Command

```
EIST edge
```

Query

```
EIST?
```

Response

```
edge
```

Parameter

`edge`	External trigger polarity
`RISE`	Rise
`FALL`	Fall

Example of Use

To set the external trigger polarity to Fall.

```
EIST FALL
```

Related Commands

`SFTRG`	Sets external trigger ON/OFF.

ENBL/ENBL?

Enable Polarity

Function

Sets or disables the polarity of the Enable signal for BER measurement.

Command

```
ENBL polarity
```

Query

```
ENBL?
```

Response

```
polarity
```

Parameter

`polarity`	Enable signal polarity
`HIGH`	Positive logic (high active)
`LOW`	Negative logic (low active)
`DISABLE`	Disables the signal polarity

Example of Use

To set the Enable signal polarity to positive.

```
ENBL HIGH
```

ENDLS

Start Measurement by Endless Mode

Function

Starts the BER measurement in Endless mode.

Command

```
ENDLS
```

Example of Use

To start the BER measurement in Endless mode.

```
ENDLS
```

ERRORBIT/ERRORBIT?

Measurement Error Bit

Function

Sets the number of measurement error bits for BER measurement.

Command

`ERRORBIT bit`

Query

`ERRORBIT?`

Response

`bit`

Integer in bit units, unitless

Parameter

`bit`		Number of measurement bits
	Range	1 to 2 Gbits
		1 to 2147 Mbits
		1 to 2147483 Kbits
		1 to 2147483647 bits
	Suffix Code	`GBIT,MBIT,KBIT,BIT`
		`BIT` is applied when omitted.

Example of Use

To set the number of measurement error bits to 4,095 bits.

```
ERRORBIT 4095
```

ESE0/ESE0?

Extended End Event Status Enable Register

Function

Sets the extended end event status enable register. When an end event occurs in the specified application, the end summary bit (ESB) value of the corresponding status byte register is set to 1 (true).

Command

```
ESE0 n
```

Query

```
ESE0?
```

Response

```
n
```

Parameter

`n` Extended end event status enable register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	BER measurement function
bit0 = 2^0 = 1	Bit 0:	Signal Generator function

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended end event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable an end event for the Signal Generator function.

```
ESE0 1
```

Related Commands

`ESR0?` Queries the extended end event status register.

ESE1/ESE1?

Extended Error Event Status Enable Register

Function

Sets the extended error event status enable register. When an error event occurs in the specified application, the error summary bit (ESB) value in the corresponding status byte register is set to 1 (true).

Command

```
ESE1 n
```

Query

```
ESE1?
```

Response

```
n
```

Parameter

`n` Extended error event status enable register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	BER measurement function
bit0 = 2^0 = 1	Bit 0:	Signal Generator function

Details

Set the sum of the values for bits to be enabled to the parameter, from the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended error event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable an error event for the Signal Generator function.

```
ESE1 1
```

Related Commands

`ESR1?`	Queries the extended error event status register.

ESEEND/ESEEND?

End Event Status Enable Register

Function

Sets the end event status enable register that can be used for the Signal Generator and BER functions. When a specified end event occurs, the end summary bit (ESB) value corresponding to the event is set to 1 (true).

This command can be used for the currently active function.

Command

```
ESEEND n
```

Query

```
ESEEND?
```

Response

```
n
```

Parameter

`n` End event status enable register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Completion of waveform pattern copy
bit4 = 2^4 = 16	Bit 4:	Completion of waveform pattern loading to waveform memory
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Not used
bit0 = 2^0 = 1	Bit 0:	Not used

BER measurement function

bit7 = 2^7 = 128	Bit 7:	Measurement stop by the STOP or START command
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Measurement stop due to parameter change
bit0 = 2^0 = 1	Bit 0:	Measurement completion

Details

Set the sum of the values for bits to be enabled to the parameter, from the values $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, and $2^7 = 128$, corresponding to the end event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable the waveform pattern loading completion event.

```
SYS SG
ESEEND 16
```

Related Commands

`ESREND?`	Queries the end event status register.

ESEERR/ESEERR?

Error Event Status Enable Register

Function

Sets the error event status enable register that can be used for the Signal Generator and BER functions. When a specified error event occurs, the error summary bit (ESB) value corresponding to the event is set to 1 (true).

This command can be used for the currently active function.

Command

```
ESEERR n
```

Query

```
ESEERR?
```

Response

```
n
```

Parameter

n Error event status enable register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Waveform pattern copy error
bit4 = 2^4 = 16	Bit 4:	Waveform pattern loading to waveform memory error
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Not used
bit0 = 2^0 = 1	Bit 0:	Not used

BER measurement function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Bit count overflow
bit2 = 2^2 = 4	Bit 2:	Syncloss count overflow
bit1 = 2^1 = 2	Bit 1:	Measurement stop with synchronization incompletion
bit0 = 2^0 = 1	Bit 0:	Measurement start failure

Details

Set the sum of the values for bits to be enabled to the parameter, from the values $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, and $2^7 = 128$, corresponding to the error event status enable register bits 0, 1, 2, 3, 4, 5, 6, and 7.

Example of Use

To enable the waveform pattern loading error event.

```
SYS SG
ESEERR 16
```

Related Commands

`ESEERR?`	Queries the error event status register.

ESR0?

Extended End Event Status Register Query

Function

Queries the extended end event status.

Query

```
ESR0?
```

Response

```
n
```

Parameter

`n` Extended end event status register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	BER measurement function
bit0 = 2^0 = 1	Bit 0:	Signal Generator function

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended end event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the extended end event status register value is cleared.

Example of Use

To readout the extended end event status register.

```
ESR0?
```

Related Commands

`ESE0`	Sets the extended end event status enable register.

ESR1?

Extended Error Event Status Register Query

Function

Queries the extended error event status.

Query

```
ESR1?
```

Response

```
n
```

Parameter

n Extended error event status register

Value = bit0 + bit1 + ... + bit7

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	BER measurement function
bit0 = 2^0 = 1	Bit 0:	Signal Generator function

Details

The response is the sum of the values 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16, 2^5 = 32, 2^6 = 64, and 2^7 = 128, corresponding to the extended error event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the extended error event status register value is cleared.

Example of Use

To readout the extended error event status register.

```
ESR1?
```

Related Commands

ESE1	Sets the extended error event status enable register.

ESREND?

Event Status Register Query

Function

Queries the end event status that is used for the Signal Generator and BER functions.

This command can be used for the currently active function.

Query

```
ESREND?
```

Response

```
n
```

Parameter

n End event status register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Completion of waveform pattern copy
bit4 = 2^4 = 16	Bit 4:	Completion of waveform pattern loading to waveform memory
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Not used
bit0 = 2^0 = 1	Bit 0:	Not used

BER measurement function

bit7 = 2^7 = 128	Bit 7:	Measurement stop by the STOP or START command
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Measurement stop due to parameter change
bit0 = 2^0 = 1	Bit 0:	Measurement completion

Details

The response is the sum of the values $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, and $2^7 = 128$, corresponding to the end event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the end event status register value is cleared.

Example of Use

To readout the end event status register for the Signal Generator function.

```
SYS SG
ESREND?
```

Related Commands

`ESEERR`	Sets the end event status enable register.

ESRERR?

Error Event Status Register Query

Function

Queries the error event status that is used for the Signal Generator and BER functions.

This command can be used for the currently active function.

Query

```
ESRERR?
```

Response

```
n
```

Parameter

n Error event status register

Value = bit0 + bit1 + ... + bit7

Signal Generator function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Waveform pattern copy error
bit4 = 2^4 = 16	Bit 4:	Waveform pattern loading to waveform memory error
bit3 = 2^3 = 8	Bit 3:	Not used
bit2 = 2^2 = 4	Bit 2:	Not used
bit1 = 2^1 = 2	Bit 1:	Not used
bit0 = 2^0 = 1	Bit 0:	Not used

BER measurement function

bit7 = 2^7 = 128	Bit 7:	Not used
bit6 = 2^6 = 64	Bit 6:	Not used
bit5 = 2^5 = 32	Bit 5:	Not used
bit4 = 2^4 = 16	Bit 4:	Not used
bit3 = 2^3 = 8	Bit 3:	Bit count overflow
bit2 = 2^2 = 4	Bit 2:	Syncloss count overflow
bit1 = 2^1 = 2	Bit 1:	Measurement stop with synchronization incompletion
bit0 = 2^0 = 1	Bit 0:	Measurement start failure

Details

The response is the sum of the values $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, and $2^7 = 128$, corresponding to the error event status register bits 0, 1, 2, 3, 4, 5, 6, and 7. When a response is read, the error event status register value is cleared.

Example of Use

To readout the error event status register for the Signal Generator function.

```
SYS SG
ESRERR?
```

Related Commands

`ESEERR`	Sets the error event status enable register.

FILEVER?

File Version Query

Function

Queries the waveform pattern file version on the hard disk.

Query

```
FILEVER? package,pattern
```

Response

```
version
```

Parameter

`package`	Package name (Character string)
`pattern`	Pattern name (Character string)
`version`	Version number

Example of Use

To readout the “TEST” pattern version number of the package “WCDMA”.

```
FILEVER? "WCDMA","TEST"
```

FIS/FIS?

Frequency - Step Value

Function

Sets the fluctuation width (step value) when the frequency is increased/decreased in step units.

Command

```
FIS freq
```

Query

```
FIS?
```

Response

```
freq
```

Parameter

`freq`	Frequency step width
Range	0.01 Hz to 1 GHz
Resolution	0.01 Hz
Initial value	100 kHz
Response unit	Hz
Suffix code	`HZ`, `KHZ`, `KZ`, `MHZ`, `MZ`, `GHZ`, `GZ`

Example of Use

To set the frequency step width to 200 kHz.

```
FIS 200KHZ
```

Related Commands

`FRS`	Sets the frequency by increasing or decreasing in specified steps.

FREQ/FREQ?

Frequency

Function

Sets the frequency.

Command

```
FREQ freq
```

Query

```
FREQ?
```

Response

```
Freq
```

Parameter

`freq`	Frequency
Range	125 MHz to 6 GHz
Resolution	0.01 Hz
Initial value	1 GHz
Response unit	Hz
Suffix code	`HZ`, `KHZ`, `KZ`, `MHZ`, `MZ`, `GHZ`, `GZ`

Example of Use

To set the frequency to 800 MHz.

```
FREQ 800MHZ
```

FREQSWSPEED/FREQSWSPEED?

Frequency Switching Speed

Function

Selects the frequency switching speed.

Command

```
FREQSWSPEED mode
```

Query

```
FREQSWSPEED?
```

Response

```
mode
```

Parameter

mode	Frequency switching speed
NORMAL	Normal mode
FAST	Fast mode

Example of Use

To set the frequency switching speed to the fast mode.

```
FREQSWSPEED FAST
```

FRS

Frequency Step Up/Down

Function

Raises/lowers the frequency in a set width (step value).

Command

```
FRS up_down
```

Parameter

`up_down`	Fluctuation direction of the frequency step width
`UP`	Raises the frequency
`DN`	Lowers the frequency
`DOWN`	Lowers the frequency

Example of Use

To raise the frequency twice in the 200 kHz width.

```
FIS 200KHZ
FRS UP
FRS UP
```

Related Commands

`FIS`	Sets the frequency step width.

HDDSPC?

Hard Disk Drive Size Query

Function

Queries hard disk free space information.

Query

```
HDDSPC?
```

Response

```
total,blank
```

Parameter

`total`	Total hard disk size
Response unit	Bytes
`blank`	Hard disk free space
Response unit	Bytes

Example of Use

To query the hard disk size.

```
HDDSPC?
```

INI

Preset

Function

Executes initialization.

Command

```
INI
```

Details

The application currently selected is the target.

Example of Use

To execute initialization.

```
INI
```

Related Commands

`PRE`	Same function as `INI`.
`*RST`	Initializes all applications.

LDCANCEL

Cancel Loading

Function

Cancels loading waveform patterns to waveform memory.

Command

```
LDCANCEL
```

Example of Use

To cancel loading waveform pattern.

```
LDCANCEL
```

LDFILE/LDFILE?

Load Pattern File/Check Status of Loading Pattern and Waveform Memory

Function

Starts loading the waveform pattern from the hard disk to the waveform memory. Load results and current status for the specified waveform pattern are returned in response to the query.

Command

```
LDFILE package,pattern
```

Query

```
LDFILE? package,pattern
```

Response

```
status
```

Parameter

`package`	Package name (Character string)	
`pattern`	Pattern name (Character string)	
`status`	Status	
	`EXIST`	Already loaded
	`ENABLE`	Can be loaded
	`NEED_LICENSE`	License required
	`NO_PATTERN_HDD`	No corresponding file
	`TOO_LARGE_SIZE`	Insufficient waveform memory free space
	`DISABLE_LOAD`	Internal error
	`INVALID_VERSION`	Version mismatch
	`FILE_ERROR`	Pattern file analysis error
	`WVI_FILE_ERROR`	Illegal pattern file (.wvi)
	`PATTERN_OVER_ON_WM`	Exceeded number of loadable waveform pattern files
	`PACKAGE_OVER_ON_WM`	Exceeded number of loadable packages
	`PATTERN_OVER_ON_PACKAGE`	Exceeded number of loadable waveform pattern files in 1 package

Details

If a waveform pattern is loaded when the same waveform pattern has already been loaded, the existing waveform pattern is overwritten.

Example of Use

To start loading “TEST” pattern in package “WCDMA”.

```
LDFILE "WCDMA","TEST"
*OPC?
```

Loaded when //1 is returned

Related Commands

`LDPAT` Same function as `LDFILE`

LDPAT/LDPAT?

Load Pattern File/Check Status of Loading Pattern and Waveform Memory

Function

Starts loading the waveform pattern from the hard disk to the waveform memory. Load results and current status for the specified waveform pattern are returned in response to the query.

The function is the same as that of `LDFILE`. Refer to the descriptions of `LDFILE` for details.

LOADEDFILENAME?

Loaded Filename in Waveform Memory

Function

Queries the waveform pattern filename loaded in the waveform memory.

Query

```
LOADEDFILENAME? n
```

Response

```
package,pattern
```

Parameter

`n`	Random numbers allocated to waveform patterns.
Range	0 to (Number of waveform patterns in the waveform memory – 1)
Resolution	1
`package`	Package name (Character string)
`pattern`	Pattern name (Character string)

Example of Use

To readout waveform pattern filenames in the waveform memory.

```
LOADEDFILENUM?              Response> 3
LOADEDFILENAME? 0
LOADEDFILENAME? 1
LOADEDFILENAME? 2
```

Related Commands

`LOADEDFILENUM?`	Queries the number of waveform pattern files in the waveform memory.

LOADEDFILENUM?

Number of Loaded Files Query

Function

Queries the number of waveform pattern files loaded in the waveform memory.

Query

```
LOADEDFILENUM?
```

Response

```
n
```

Parameter

`n`		Number of waveform pattern files loaded to waveform memory
	Range	0 to 1024
	Resolution	1

Example of Use

To readout the number of waveform pattern files in the waveform memory.

```
LOADEDFILENUM?
```

Related Commands

`PATNUM?`	Same function as `LOADEDFILENUM?`

LOADEDFILESEL/LOADEDFILESEL?

Select Waveform File

Function

Selects the waveform pattern file to be played from the waveform pattern files loaded to the waveform memory.

Command

```
LOADEDFILESEL package,pattern
```

Query

```
LOADEDFILESEL?
```

Response

```
package,pattern
```

Parameter

`package`	Package name (Character string)
`NONE`	Waveform pattern file not selected
`pattern`	Pattern name (Character string)
`NONE`	Waveform pattern file not selected

Example of Use

To select loading the “TEST” pattern in package “WCDMA”.

```
LOADEDFILESEL "WCDMA","TEST"
```

Related Commands

`PAT`	Same function as `LOADEDFILESEL`.

LOADMEDIA/LOADMEDIA?

Drive to load User Pattern

Function

Sets the name of the drive to load the user-defined pattern file for BER measurement.

Command

```
LOADMEDIA drive
```

Query

```
LOADMEDIA?
```

Response

```
drive
```

Parameter

`drive`	Load source drive name

Example of Use

To load the user-defined pattern from drive D.

```
LOADMEDIA D
```

LOADUSERPAT

Load User Pattern

Function

Loads the user-defined pattern for BER measurement from a file.

Command

```
LOADUSERPAT pattern
```

Parameter

`pattern`	User-defined pattern to be loaded Specify a character string within 32 characters, obtained by removing an extension (bpn) from the target user defied pattern file name.

Details

Only files with extension “bpn” can be loaded.

An error is returned if the specified user-defined pattern file does not exist.

Example of Use

To load the user-defined pattern file “USERPATTERN.bpn”.

```
LOADUSERPAT "USERPATTERN"
```

LVL/LVL?

RF Output - ON/OFF

Function

Sets RF output ON/OFF.

Command

```
LVL on_off
```

Query

```
LVL?
```

Response

```
on_off
```

Parameter

`on_off`	RF Output
`ON`	On
`OFF`	Off

Example of Use

To set the RF signal output to OFF.

```
LVL OFF
```

LVLACCSTT?

Level Accuracy Status Query

Function

Queries the output level accuracy status.

Query

```
LVLACCSTT?
```

Response

```
status
```

Parameter

status	Output level accuracy status
NORMAL	Normal status
UNLEVELED	Outside performance assurance status

Example of Use

To query the output level accuracy status.

```
LVLACCSTT?
```

LVLCAL

SG Level Calibration

Function

Calibrates output level.

Command

```
LVLCAL
```

Example of Use

To calibrate output level.

```
LVLCAL
```

LVLSTTLST?

Level Status List Query

Function

Queries the output level status.

Query

```
LVLSTTLST?
```

Response

```
unit,offset,unleveled,INTALC,auto_cal,relative,NORMAL
```

Parameter

`unit`	Voltage display unit
`EMF`	Open voltage
`TERM`	Termination voltage
`offset`	Level offset
`OFFSETON`	On
`OFFSETOFF`	Off
`unleveled`	Output level accuracy status
`NORMAL`	Normal status
`UNLEVELED`	Outside level accuracy assurance
`auto_cal`	Auto Cal mode
`CALON`	Enabled
`CALOFF`	Disabled
`relative`	Relative output mode
`RELON`	On
`RELOFF`	Off

Example of Use

To query the output level status.

```
LVLSTTLST?
```

MARKEREDIT/MARKEREDIT?

Marker Edit

Function

Specifies the user setting mode for the external output marker.

Command

```
MARKEREDIT n,mode
```

Query

```
MARKEREDIT? n
```

Response

```
mode
```

Parameter

`n`	Marker type
`1`	Marker 1
`2`	Marker 2
`3`	Marker 3
`mode`	User setting mode
`OFF`	Outputs the marker previously recorded in the waveform pattern.
`ON`	Outputs the user setting marker.
`PATSYNC`	Outputs the marker at the start of the waveform pattern.

Example of Use

To set Marker 1 to the user setting marker.

```
MARKEREDIT 1,ON
```

MARKEREDITCYCLE/MARKEREDITCYCLE?

Marker Edit Mode Cycle Value

Function

Sets the output pulse cycle when the external output marker is set to the user setting marker.

Command

```
MARKEREDITCYCLE n,cycle
```

Query

```
MARKEREDITCYCLE? n
```

Response

```
cycle
```

Parameter

n	Marker type
1	Marker1
2	Marker2
3	Marker3
cycle	Output pulse cycle

Example of Use

To set Marker 1 to the user setting marker and set the output pulse cycle to 200.

```
1: MARKEREDIT 1,ON
2: MARKEREDITCYCLE 1,200
```

MARKEREDITOFFSET/MARKEREDITOFFSET?

Marker Edit Mode Start Offset Value

Function

Sets the output pulse starting offset when the external output marker is set to the user setting marker.

Command

```
MARKEREDITOFFSET n,offset
```

Query

```
MARKEREDITOFFSET? n
```

Response

```
offset
```

Parameter

n	Marker type
1	Marker1
2	Marker2
3	Marker3
offset	Starting offset value

Example of Use

To set Marker 1 to the user setting marker and set the output pulse starting offset to 100.

```
1: MARKEREDIT 1,ON
2: MARKEREDITOFFSET 1,100
```

MARKEREDITWIDTH/MARKEREDITWIDTH?

Marker Edit Mode Width Value

Function

Sets the output pulse width when the external output marker is set to the user setting marker.

Command

```
MARKEREDITWIDTH n,width
```

Query

```
MARKEREDITWIDTH? n
```

Response

```
width
```

Parameter

n	Marker type
1	Marker1
2	Marker2
3	Marker3
width	Pulse width

Example of Use

To set Marker 1 to the user setting marker and set the output pulse width to 50.

```
1: MARKEREDIT 1,ON
2: MARKEREDITWIDTH 1,50
```

MARKERPOL/MARKERPOL?

Marker Polarity

Function

Sets the external output marker signal polarity.

Command

```
MARKERPOL n,polarity
```

Query

```
MARKERPOL? n
```

Response

```
polarity
```

Parameter

`n`	Marker type
`1`	Marker1
`2`	Marker2
`3`	Marker3
`polarity`	Polarity
`POS`	Positive (Positive polarity)
`NEG`	Negative (Negative polarity)

Example of Use

To set Marker 1 polarity to negative.

```
MARKERPOL 1,NEG
```

MEASERROR?

Error Query

Function

Queries BER measurement error status.

Query

```
MEASERROR?
```

Response

```
error
```

Parameter

`error`	Error status
`NONE`	No error
`SYNCLOSS`	Sync Loss status
`CLOCKERROR`	Clock signal error
`ENABLEERROR`	Enable signal error

Details

Error status query is executed in the following priority:
Enable signal error > Clock signal error > Sync Loss status

Example of Use

To query error status.

```
MEASERROR?
```

MOD/MOD?

Modulation - ON/OFF

Function

Sets the modulation function ON/OFF.

Command

```
MOD on_off
```

Query

```
MOD?
```

Response

```
on_off
```

Parameter

`on_off`	Modulation ON/OFF
`ON`	On
`OFF`	Off

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To set the modulation function to ON.

```
MOD ON
```

MODE/MODE?

Measurement Mode

Function

Selects the BER measurement mode.

Command

```
MODE mode
```

Query

```
MODE?
```

Response

```
mode
```

Parameter

`mode`	Measurement mode
`SINGLE`	Single mode
`CONTINUOUS`	Continuous mode
`ENDLESS`	Endless mode

Details

When the measurement mode is set to Endless mode, the BER measurement end condition is set to DATABIT and the number of measurement bits is set to 4294967295 bits.

Example of Use

To set the measurement mode to Single mode.

```
MODE SINGLE
```

OIS/OIS?

Output Level - Set Value

Function

Sets the numerical value fluctuation width (step value) when the output level is increased/decreased in step units.

Command

```
OIS level
```

Query

```
OIS?
```

Response

```
level
```

Parameter

`level`	Output level step width
Range	0.01 to 100.00 dB
Resolution	0.01 dB
Initial value	
Response unit	dB
Suffix code	`DB`

Example of Use

To set the output level step width to 5.00 dB.

```
OIS 5.00DB
```

Related Commands

`OLS`	Fluctuates the output level using a set width (step value).

OLS

Level Set Up/Down

Function

Fluctuates the output level using a set width (step value).

Command

```
OLS up_down
```

Parameter

up_down	Fluctuation direction of output level step width
UP	Raises the output level
DN	Lowers the output level
DOWN	Lowers the output level

Example of Use

To raise the output level twice using 2.00 dB width.

```
OIS 2.00DB
OLS UP
OLS UP
```

Related Commands

OIS	Sets the output level in step units.

OLU/OLU?

Level Unit

Function

Sets the output level unit.

Command

```
OLU unit
```

Query

```
OLU?
```

Response

```
unit
```

Parameter

`unit`	Output level unit
`DBM`	dBm
`DBU`	dBμV

Example of Use

To set the level setting unit to dBm.

```
OLU DBM
```

OLVL/OLVL?

Output Level

Function

Sets the output level.

Command

```
OLVL level
```

Query

```
OLVL? unit
```

Response

```
level
```

Parameter

`level`	Output level
Range	–140.00 to 10.00 dBm (No offset)
	–33.01 to 116.99 dBμV (When TERM is set)
	–26.99 to 123.01 dBμV (When EMF is set)
Resolution	0.01 dBm or 0.01 dBμV
Initial value	–140.00 dBm
Response unit	dBm or dBμV (Based on settings value)
Suffix code	`DBM, DBU`
`unit`	Output level unit(optional)
`DBM`	dBm
`DBU`	dBμV
When omitted	dBm

Example of Use

To set the output level to –30.00 dBm.

```
OLVL -30.00DBM
```

OOF/OOF?

Level Offset - ON/OFF

Function

Sets the output level offset ON/OFF.

Command

```
OOF on_off
```

Query

```
OOF?
```

Response

```
on_off
```

Parameter

`on_off`	Output level offset
`ON`	ON
`OFF`	OFF

Example of Use

To enable the output level offset.

```
OOF ON
```

OOS/OOS?

Level Offset - Level

Function

Sets the output level offset.

Command

```
OOS level
```

Query

```
OOS?
```

Response

```
level
```

Parameter

`level`	Output level offset
Range	–100.00 to 100.00 dB
Resolution	0.01 dB
Initial value	0.00 dB
Response unit	dB
Suffix code	`DB`

Example of Use

To set the output level offset to –15.00 dB.

```
OOS -15.00DB
```

ORL/ORL?

Relative - ON/OFF

Function

Sets the relative output level display ON/OFF.

Command

```
ORL on_off
```

Query

```
ORL?
```

Response

```
on_off
```

Parameter

`on_off`	Relative output level display
`ON`	ON
`OFF`	OFF

Example of Use

To enable relative output level display.

```
ORL ON
```

ORLR?

Relative Level - Reference Level

Function

Queries the reference output level at relative output level display mode (Output level when the relative display mode is set to ON).

Query

```
ORLR?
```

Response

```
level
```

Parameter

`level`	Relative output reference level
Range	–190.00 to 60.00 dBm
Resolution	0.01 dB
Response unit	dBm

Example of Use

To query the relative output reference level.

```
OLVL -75.00DBM
ORL ON
ORLR?                    Response> -75.00
```

ORLV/ORLV?

Relative Level

Function

Sets the screen display output level at relative output level display mode.

Command

```
ORLV level
```

Query

```
ORLV?
```

Response

```
level
```

Parameter

`level`	Relative output level
Range	–200.00 to 200.00 dB
Resolution	0.01 dB
Response unit	dB

Example of Use

To set the relative output to +10.00 dB with reference output level of –75.00 dBm.

```
OLVL -75.00DBM
ORL ON
ORLV 10.00DB
```

PAT

Select Waveform File

Function

Selects the waveform pattern file to be played from the waveform pattern files loaded to waveform memory.

The function is the same as that of `LOADEDFILESEL`. Refer to the descriptions of `LOADEDFILESEL` for details.

PATNAME?

Loaded Filename in Waveform Memory

Function

Queries the waveform pattern filename loaded in the waveform memory.

The function is the same as that of LOADEDFILENAME?. Refer to the descriptions of LOADEDFILENAME? for details.

PATNUM?

Number of Loaded Files

Function

Queries the number of waveform pattern files loaded in the waveform memory.

The function is the same as that of LOADEDFILENUM?. Refer to the descriptions of LOADEDFILENUM? for details.

PATRUNSTT?

Pattern Running Status Query

Function

Queries the waveform pattern play status.

Query

```
PATRUNSTT?
```

Response

```
status
```

Parameter

`status`	Waveform pattern play status
`STOP`	Stop
`PLAY`	Playing

Example of Use

To readout waveform pattern status.

```
PATRUNSTT?
```

PATWMPOWRATIO/PATWMPOWRATIO?

Power Ratio

Function

Sets the output ratio of AWGN to carrier (C/N) when AWGN is ON.

Command

```
PATWMPOWRATIO level
```

Query

```
PATWMPOWRATIO?
```

Response

```
level
```

Parameter

`level`	C/N
Range	–40 to +40 dB
Resolution	0.01
Initial value	–40.00
Response unit	dB
Suffix code	`DB`

Details

The setting range may be narrowed if the RF output level is close to the upper or lower limit.

Example of Use

To set the C/N to 3 dB.

```
PATWMPOWRATIO 3DB
```

PMO/PMO?

Pulse Modulation Source

Function

Sets the pulse modulation signal source.

Command

```
PMO source
```

Query

```
PMO?
```

Response

```
source
```

Parameter

`source`	Pulse modulation signal source
`INT`	Internal signal
`EXT`	External input signal
`OFF`	No pulse modulation

Example of Use

To set the pulse modulation signal source to internal signal.

```
PMO INT
```

PNFIXLENG/PNFIXLENG?

PN Fix Pattern Length

Function

Sets the length of PN Fix pattern for BER measurement.

Command

```
PNFIXLENG bit
```

Query

```
PNFIXLENG?
```

Response

```
bit
```

Integer in bit units, unitless

Parameter

`bit`	Bit length of PN Fix pattern
Range	96 to 134217728 bits
Suffix Code	None

Details

This command is valid only when Data Type is set to PN Fix.

Example of Use

To set the bit length of the PN Fix pattern to 1,024.

```
PNFIXLENG 1024
```

PNINITIAL/PNINITIAL?

PN Fix Pattern Initial Value

Function

Sets the initial value of PN Fix pattern in binary, for BER measurement.

Command

```
PNINITIAL n
```

Query

```
PNINITIAL?
```

Response

```
n
```

Parameter

n		PN Fix pattern initial value (binary)
	Range	00…0 to 11…1 [9 bits] (for PN9 Fix)
		00…0 to 11…1 [15 bits] (for PN15 Fix)
		00…0 to 11…1 [20 bits] (for PN20 Fix)
		00…0 to 11…1 [23 bits] (for PN23 Fix)

Details

This command is valid only when Data Type is set to PN Fix.

Prefix "#B", a character string indicating binary, to the parameter.

Example of Use

To set the PN9 Fix initial value to 101,010,101.

```
PNINITIAL #B101010101
```

POWRATIOTARGET/POWRATIOTARGET?

Target of C/N Setting

Function

Sets the parameters to be changed when C/N is set.

Command

```
POWRATIOTARGET target
```

Query

```
POWRATIOTARGET?
```

Response

```
target
```

Parameter

`target`	Parameter to be changed when C/N is set
`CARRIER`	Carrier signal
`NOISE`	NOISE
`CONSTANT`	Fixed output level (Carrier + AWGN)

Example of Use

To set the parameter to be changed when C/N is set to NOISE.

```
POWRATIOTARGET NOISE
```

PRE

Preset

Function

Executes initialization.

Command

`PRE`

Details

The application currently selected is the target.

Example of Use

To execute initialization.

`PRE`

Related Commands

`INI`	Same function as `PRE`.
`*RST`	Initializes all applications.

RCVBIT?

Received Bit Query

Function

This command returns the received bit count during BER measurement.

Query

```
RCVBIT?
```

Response

```
RCVBIT n
```

Parameter

n	Bit count
Range	0 to ($256^8 - 1$)

Example of Use

To query the received bit count.

```
RCVBIT?
```

REFCLKSRC/REFCLKSRC?

Baseband Reference Clock Source

Function

Sets baseband signal reference clock.

Command

```
REFCLKSRC source
```

Query

```
REFCLKSRC?
```

Response

```
source
```

Parameter

`source`	Baseband signal reference clock
`INT`	Internal signal (Initial value)
`EXT_TTL`	External input signal (TTL level)
`EXT_AC`	External input signal (AC coupling)

Example of Use

To set the baseband signal reference clock to external input signal (TTL level).

```
REFCLKSRC EXT_TTL
```

REFCLKVAL/REFCLKVAL?

Baseband Reference Clock

Function

Sets the baseband signal reference clock frequency in magnification ratio based on the sampling clock.

Command

```
REFCLKVAL clock
```

Query

```
REFCLKVAL?
```

Response

```
clock
```

Parameter

`clock`	Baseband signal reference clock
`SIXTEENTH`	Sampling clock ×1/16
`EIGHTH`	Sampling clock ×1/8
`QUARTER`	Sampling clock ×1/4
`HALF`	Sampling clock ×1/2
`1`	Sampling clock ×1
`2`	Sampling clock ×2
`4`	Sampling clock ×4
`8`	Sampling clock ×8
`16`	Sampling clock ×16

The setting range is as shown in the following table.

Baseband reference clock setting range

Sampling Clock [MHz]	Baseband reference clock settings								
	16	8	4	2	1	1/2	1/4	1/8	1/16
0.02 ≤ f ≤ 0.024414062	√	√	√	√	√				
0.024414062 < f ≤ 0.048828125	√	√	√	√	√	√			
0.048828125 < f ≤ 0.09765625	√	√	√	√	√	√	√		
0.09765625 < f ≤ 0.1953125	√	√	√	√	√	√	√	√	
0.1953125 < f ≤ 2.5	√	√	√	√	√	√	√	√	√
2.5 < f ≤ 5		√	√	√	√	√	√	√	√
5 < f ≤ 10			√	√	√	√	√	√	√
10 < f ≤ 20				√	√	√	√	√	√
20 < f ≤ 40					√	√	√	√	√
40 < f ≤ 80						√	√	√	√
80 < f ≤ 160							√	√	√

Example of Use

To set the baseband signal reference lock frequency to sampling clock ×2.

```
REFCLKVAL 2
```

RESULT?

Result and Status Query

Function

Queries the bit error rate and status information of BER measurement.

Query

```
RESULT? format
```

Response

```
per,countbit,errorbit,status,error          (when format is EP)
exp,countbit,errorbit,status,error          (when format is ER)
per,countbit,errorbit,syncloss,status,error
                                (when format is EP_WSYNCLOSS)
exp,countbit,errorbit,syncloss,status,error
                                (when format is ER_WSYNCLOSS)
```

per	Bit error rate (percentage)
Range	0.000 to 100.000 %
exp	Bit error rate (exponent format)
Range	0.000E+00 to 1.000E+02
countbit	Number of count bits
errorbit	Number of error bits
syncloss	Number of Sync Loss errors occurred during measurement
status	Measurement status
error	Error status

Parameter

format	Response format
EP	Returns the bit error rate in percentage
ER	Returns the bit error rate in exponent format
EP_WSYNCLOSS	Returns the bit error rate in percentage
ER_WSYNCLOSS	Returns the bit error rate in exponent format

Example of Use

To query the bit error rate in percentage.

```
RESULT? EP
```

SAMPLINGCLK?

Sampling Clock Query

Function

Queries the baseband signal sampling clock.

Query

```
SAMPLINGCLK?
```

Response

```
freq
```

Parameter

`freq`	Sampling clock
Range	0.02 to 160 MHz
Resolution	0.001 Hz
Response unit	Hz

Example of Use

To query the sampling clock.

```
SAMPLINGCLK?
```

SATRGOUT

SA Trigger Out

Function

Selects the type of trigger output to the SG marker of SA/SPA.

Command

```
SATRGOUT triggertoSA
```

Query

```
SATRGOUT?
```

Response

```
triggertoSA
```

MARKER1	Marker 1
MARKER2	Marker 2
MARKER3	Marker 3
PATSYNC	A marker synchronized with the top of pattern

Example of Use

To select Marker 1 for the type of trigger output to the SG marker of SA/SPA.

```
SATRGOUT MARKER1
```

SFTRG/SFTRG?

External Trigger - ON/OFF

Function

Sets the external trigger ON/OFF.

Command

```
SFTRG on_off
```

Query

```
SFTRG?
```

Response

```
on_off
```

Parameter

`on_off`	ON/OFF of external trigger
`ON`	ON
`OFF`	OFF

Example of Use

To enable the external trigger.

```
SFTRG ON
```

SFTRGMODE/SFTRGMODE?

External Trigger - Mode

Function

Sets the external trigger operation mode.

Command

```
SFTRGMODE mode
```

Query

```
SFTRGMODE?
```

Response

```
mode
```

Parameter

`mode`	External trigger operation mode
`START`	Start trigger
`FRAME`	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
SFTRG ON
SFTRGMODE START
```

SGWINDOWPOS/SGWINDOWPOS?

SG Window Position

Function

Switches the display position of the Signal Generator screen.

Command

```
SGWINDOWPOS position
```

Query

```
SGWINDOWPOS?
```

Response

```
position
```

Parameter

`position`	Display position
`TOP`	Upper
`BOTTOM`	Lower

Example of Use

To display the Signal Generator screen at the lower portion.

```
SGWINDOWPOS BOTTOM
```

SNGLS

Start Measurement by Single Mode

Function

Starts the BER measurement in Single mode.

Command

```
SNGLS
```

Example of Use

To start the BER measurement in Single mode.

```
SNGLS
```

SPREV/SPREV?

RF Spectrum - Reverse/Normal

Function

Sets whether to invert spectrum of the output waveform (reverses I and Q).

Command

```
SPREV mode
```

Query

```
SPREV?
```

Response

```
mode
```

Parameter

`mode`	Whether to invert output waveform
`ON`	Reverse: Invert
`REV`	Reverse: Invert (Command only)
`INV`	Reverse: Invert (Command only)
`OFF`	Normal: Do not invert (Initial value)
`NORMAL`	Normal: Do not invert (Command only)

Example of Use

To invert the output waveform.

```
SPREV ON
```

START

Start Measurement

Function

Starts the BER measurement.

Command

```
START
```

Example of Use

To start the BER measurement.

```
START
```

STATUS?

Status Query

Function

Queries the BER measurement status.

Query

```
STATUS?
```

Response

`status`	Measurement status
`EXEC`	During measurement
`SYNCHRONIZING`	Synchronization is established.
`STOP`	Measurement is stopped with no error.
`ERROR`	Measurement is stopped and an error has occurred.

Details

The error contents can be queried by using the `MEASERROR?` command.

Example of Use

To query the measurement status.

```
STATUS?
```

STDLYSRC/STDLYSRC?

Start Trigger Delay Source

Function

Sets the signal source of external trigger.

Command

```
STDLYSRC source
```

Query

```
STDLYSRC?
```

Response

```
source
```

Parameter

source	Signal source of external trigger
EXTTRG	External input signal
APPSYNCTRG	Application Sync Trigger
BBIF	Baseband Interface

Details

BBIF cannot be selected only when the Option 040 Baseband Interface Unit is not installed or the software package is Ver.6.00.00 or later.

Example of Use

To set the signal source of the external trigger to the external input signal.

```
STDLYSRC EXTTRG
```

STDLYSYM/STDLYSYM?

Start Trigger Delay

Function

Sets the RF signal output timing in symbol or chip rate units of each system (determined by the overrate).

Command

```
STDLYSYM t
```

Query

```
STDLYSYM?
```

Response

```
t
```

Parameter

t	Start trigger delay time
Range	Varies depending on the selected waveform pattern.
Resolution	Varies depending on the selected waveform pattern.
Initial value	0
Response unit	None (Symbol or chip)

Example of Use

To set the start trigger delay time to 30 chips.

```
STDLYSYM 30
```

STGS/STGS?

External Trigger - Mode

Function

Sets the external trigger operation mode.

Command

```
STGS mode
```

Query

```
STGS?
```

Response

```
mode
```

Parameter

mode	External trigger operation mode
INT	External trigger not used (Initial value)
EXTSTA	Start trigger
EXT	Start trigger (Command only)
EXTFRM	Frame trigger

Example of Use

To set the external trigger operation mode to start trigger.

```
STGS EXTSTA
```

STOP

Stop Measurement

Function

Stops the BER measurement.

Command

```
STOP
```

Example of Use

To stop the BER measurement.

```
STOP
```

STOPSTATUS?

Stop Status Query

Function

Queries the BER measurement stop status.

Query

```
STOPSTATUS?
```

Response

status	Measurement stop status
STOP_NORMAL	Measurement is stopped normally.
STOP_OVERFLOW_DATACOUNT	The number of count bits exceeds the upper limit.
STOP_OVERFLOW_SYNCLOSS	The number of Sync Loss errors exceeds the upper limit.
STOP_ABNORMAL_COUNT	Measurement is stopped due to abnormality.
EXEC	During measurement
SYNCHRONIZING	Synchronization is established.

Example of Use

To query the measurement stop status.

```
STOPSTATUS?
```

SYNCLENG/SYNCLENG?

Length for Sync on User Pattern

Function

Sets the length of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Command

```
SYNCLENG bit
```

Query

```
SYNCLENG?
```

Response

```
bit
```

Parameter

`bit`		Length of synchronization judgment bit string
	Range	8 to 1024 bits

Details

This command is valid only when Data Type is set to User Define.

Example of Use

To set the length of the synchronization judgment bit string in the user-defined pattern to 65 bits.

```
SYNCLENG 65
```

SYNCLOSS?

Sync Loss Count Query

Function

Queries the number of Sync Loss (out of synchronization) errors having occurred during the BER measurement.

Query

```
SYNCLOSS?
```

Response

`count`	Number of Sync Loss errors occurred
Range	0 to 65535

Example of Use

To query the number of Sync Loss errors.

```
SYNCLOSS?
```

SYNCLOSSACT/SYNCLOSSACT?

Count Action at Sync Loss

Function

Sets the action when Sync Loss occurs during BER measurement.

Command

```
SYNCLOSSACT a
```

Query

```
SYNCLOSSACT?
```

Response

```
a
```

Parameter

a	Action when Sync Loss occurs
COUNT_CLEAR	Clears current count value
COUNT_KEEP	Keeps current count value

Details

Selects whether to clear or keep the count value when Sync Loss occurs during measurement.

This command is valid only when auto resynchronization is enabled.

Example of Use

To clear the count value when Sync Loss occurs.

```
SYNCLOSSACT COUNT_CLEAR
```

SYNCLOSSTHLD/SYNCLOSSTHLD?

Sync Loss Threshold

Function

Sets the Sync Loss judgment condition for the BER measurement.

Command

```
SYNCLOSSTHLD n,a
```

Query

```
SYNCLOSSTHLD?
```

Response

```
n,a
```

Parameter

n		Numerator of Sync Loss threshold
	Range	1 to (a/2) bits
a		Dominator of Sync Loss threshold
	500	500 bits
	5000	5000 bits
	50000	50000 bits

Details

During BER measurement, if *n* bits out of continuous *a* bits are detected as error bits, it is judged as Sync Loss.

This command is valid only when auto resynchronization is disabled.

Example of Use

To set the Sync Loss threshold to 123/500 bits.

```
SYNCLOSSTHLD 123,500
```

SYNCSTARTPOS/SYNCSTARTPOS?

Sync Start Position on User Pattern

Function

Sets the start position of the partial bit string, which is used for synchronization judgment, in the user-defined pattern for BER measurement.

Command

```
SYNCSTARTPOS bit
```

Query

```
SYNCSTARTPOS?
```

Response

```
bit
```

Parameter

`bit`		Start position of synchronization judgment bit string
	Range	1 to (Pattern Length) bits

Details

This command is valid only when Data Type is set to User Define.

Example of Use

To set the 31st bit from the start of the user-defined pattern as the start position of synchronization judgment bit string.

```
SYNCSTARTPOS 31
```

SYS/SYS?

Application Switch Command/Application Status Query

Function

Sets the operation target (application) to the signal generator. The execution status of the specified application is returned for the query.

Command

```
SYS SG,window
```

Query

```
SYS? SG
```

Response

```
status,window
```

Parameter

`window`	Window status (optional)
`ACT`	Active (brought to front)
`INACT`	Inactive
`MIN`	Minimized
`NON`	No window displayed (response only)
When omitted	Same as `ACT`
`Status`	Application status
`CURRENT`	Operation target
`IDLE`	Loaded but not running
`RUN`	Running but not being operation target
`UNLOAD`	Unloaded

Example of Use

To switch the operation target to the signal generator.

```
SYS SG,ACT
```

TYPE/TYPE?

Data Pattern Type

Function

Sets the data pattern type for BER measurement.

Command

```
TYPE pattern
```

Query

```
TYPE?
```

Response

```
pattern
```

Parameter

`pattern`	Data pattern type
`PN9`	PN9
`PN11`	PN11
`PN15`	PN15
`PN20`	PN20
`PN23`	PN23
`ALL0`	All 0 (00…0)
`ALL1`	All 1 (11…1)
`ALT`	Repetition of “01” patterns (0101….)
`PN9FIX`	PN9 Fix
`PN11FIX`	PN11 Fix
`PN15FIX`	PN15 Fix
`PN20FIX`	PN20 Fix
`PN23FIX`	PN23 Fix
`USER`	User-defined pattern

Example of Use

To set the data pattern type to PN9.

```
TYPE PN9
```

USERPAT?

User Pattern File Name Query

Function

Queries the user-defined pattern name for BER measurement.

Query

```
USERPAT?
```

Response

```
pattern,drive
```

Parameter

`pattern`	Character string within 32 characters, obtained by removing the extension (bpn) from the loaded user-defined pattern file name.
`drive`	The name of the drive from which the user-defined pattern file is loaded

Details

`***` is returned if a user-defined pattern is not loaded.

Example of Use

To query the user-defined pattern name.

```
USERPAT?
```

USERPATLENG?

User Pattern Length Query

Function

Queries the bit length of the user-defined pattern for BER measurement.

Query

```
USERPATLENG?
```

Response

`bit`		Bit length of user-defined pattern
	Range	8 to 1024 bits

Example of Use

To query the bit length of the user-defined pattern.

```
USERPATLENG?
```

USERPATLST?

Display BER User Pattern File List Query

Function

This command returns the list of user-defined pattern files for BER measurement.

Query

```
USERPATLST?
```

Response

$USERPATLST\ S_1,S_2,S_3,\ldots,S_{99},S_{100}$

Parameter

S

Within 32 characters: User-defined pattern file name (up to 100)

Details

"***" is returned if there is no user-defined pattern.
The user-defined pattern files returned in a response message are listed in alphabetical order.

Example of Use

To query the list of user-defined pattern files for BER measurement.

```
USERPATLST?
```

VDSPL/VDSPL?

Volt Unit Display

Function

Sets the display system when the output level is set in voltage units.

Command

```
VDSPL unit
```

Query

```
VDSPL?
```

Response

```
unit
```

Parameter

`unit`	Voltage unit display system
`EMF`	Open voltage display
`TERM`	Termination voltage display

Example of Use

To display the voltage units using open voltage.

```
VDSPL EMF
```

WMSPC?

Waveform Memory Space Query

Function

Queries the waveform memory free space.

Query

```
WMSPC?
```

Response

```
blank,consecutive_blank,total
```

Parameter

`blank`	Free space (Byte units)
`consecutive_blank`	Continuous free space (Byte units)
`total`	Total waveform memory size (Byte units)

Example of Use

To query the waveform memory free space.

```
WMSPC?
```