For safety and warning information, please read this manual before attempting to use the equipment.

Additional safety and warning information is provided within the MS2830A Signal Analyzer Operation Manual (Mainframe Operation) and the MS2830A Signal Analyzer Vector Signal Generator Option Operation Manual (Operation). Please also refer to these documents before using the equipment.

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

Symbols used in manual

- **DANGER** ▼ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.
- **WARNING** ▼ This indicates a hazardous procedure that could result in serious injury or death if not performed properly.
- **CAUTION** ▼ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

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

- ![Prohibited Operation](image)
  - This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

- ![Obligatory Safety Precaution](image)
  - This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

- ![Warning or Caution](image)
  - This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

- ![Note](image)
  - This indicates a note. The contents are described in the box.

- ![Recycling](image)
  - These indicate that the marked part should be recycled.
Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.
About This Manual

■ Composition of Operation Manuals
The operation manuals for the MS2830A 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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## Chapter 4 Native Device Message Details

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Chapter 1  Overview

This chapter 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 and MS2830A 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 and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)” for details.
Chapter 2  SCPI Device Message

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

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2.1 Setting Frequency

Table 2.1-1 shows device messages for frequency.

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<th>Device Messages</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td></td>
<td>[:SOURce]:FREQuency[:CW</td>
</tr>
<tr>
<td>Frequency Step Value</td>
<td>[:SOURce]:FREQuency:STEP[:INCRement] &lt;numeric_value&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:FREQuency:STEP[:INCRement]?</td>
</tr>
<tr>
<td>RF Spectrum</td>
<td>[:SOURce]:DM:POLarity[:ALL] NORMAL</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:DM:POLarity[:ALL]?</td>
</tr>
</tbody>
</table>
2.1.1 Frequency

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

Frequency

Function

Sets frequency

Command

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

Parameter

<freq> Frequency

Range 250 kHz to 3.6 GHz (*)

250 kHz to 6 GHz (**)

Resolution 0.01 Hz

Default 1 GHz

Suffix code HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ

When omitted: Hz

(*) When option 020/120 is installed.

(**) When option 021/121 is installed.

Example of Use

To set the frequency to 800 MHz

FREQ 800MHZ
2.1 Setting Frequency

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

Function

This command queries the frequency.

Query

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

Response

<freq>

Parameter

<freq>  Frequency
Range     250 kHz to 3.6 GHz (*)
          250 kHz to 6 GHz (**)  
Resolution 0.01 Hz
Default    1 GHz

(*) When option 020/120 is installed.
(**) When option 021/121 is installed.

Example of Use

To query the frequency.
FREQ?
> 800000000.00
2.1.2 Frequency Step Value

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

Function

This command sets the amount the frequency to be incremented or decremented (frequency step width) when the frequency setting is stepped up or down.

Command

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

Parameter

<numeric_value> Frequency step width

Range 0.01 Hz to 1 GHz
Resolution 0.01 Hz
Default 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.

FREQ:STEP 200KHZ
2.1 Setting Frequency

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

Frequency - Step Value Query

Function

This command queries the amount the frequency to be incremented or
decremented (frequency step width) when the frequency setting is
stepped up or down.

Query

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

Response

<numerate_value>

Parameter

<numerate_value> Frequency step width
Range 0.01 Hz to 1 GHz
Resolution 0.01 Hz
Default 100 kHz

Example of Use

To query the frequency step width.
FREQ:STEP?
> 200000.00
2.1.3 RF Spectrum

[:SOURce]:DM:POLarity[:ALL] NORMal|INVert
RF Spectrum - Reverse/Normal

Function

This command 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
    INVert   Reverse: Invert

Example of Use

To invert the output waveform.
DM:POL INV

[:SOURce]:DM:POLarity[:ALL]?
RF Spectrum - Reverse/Normal Query

Function

This command 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
    NORMal   Normal: Do not invert
    INV     Reverse: Invert

Example of Use

To query the invert status of the output waveform.
DM:POL?
> INV
## 2.2 Setting Level

Table 2.2-1 shows device messages for setting level.

### Table 2.2-1 Device messages for level

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Level Unit</td>
<td>`:DISPlay:ANNotation:AMPLitude:UNIT DBM</td>
</tr>
<tr>
<td>RF Output</td>
<td>`:OUTPUT[:STATe] ON</td>
</tr>
<tr>
<td>Unit Power</td>
<td>`:UNIT:POWer DBM</td>
</tr>
<tr>
<td>SG Level Calibration</td>
<td><code>[:SOURce]:POWer:ALC:SEARch {ONCE}</code></td>
</tr>
<tr>
<td>Relative Level Value</td>
<td><code>[:SOURce]:POWer:REFerence:AMPLitude &lt;numeric_value&gt;</code>&lt;br&gt;<code>[:SOURce]:POWer:REFerence:AMPLitude?</code></td>
</tr>
<tr>
<td>Relative Level</td>
<td>`[:SOURce]:POWer:REFerence:STATe ON</td>
</tr>
<tr>
<td>Reference of Relative Level</td>
<td><code>[:SOURce]:POWer:REFerence?</code></td>
</tr>
<tr>
<td>Level Status List</td>
<td><code>[:SOURce]:POWer:SETTing?</code></td>
</tr>
<tr>
<td>Level Offset Value</td>
<td><code>[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet &lt;numeric_value&gt;</code>&lt;br&gt;<code>[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet?</code></td>
</tr>
<tr>
<td>Level Offset</td>
<td>`[:SOURce]:POWer[:LEVel][:IMMediate]:OFFSet:STATe ON</td>
</tr>
<tr>
<td>Output Level Step Value</td>
<td><code>[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement] &lt;numeric_value&gt;</code>&lt;br&gt;<code>[:SOURce]:POWer[:LEVel][:IMMediate]:STEP[:INCRement]?</code></td>
</tr>
<tr>
<td>Output Level</td>
<td><code>[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] &lt;numeric_value&gt;</code>&lt;br&gt;<code>[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? {&lt;unit&gt;}</code></td>
</tr>
</tbody>
</table>
2.2.1 Output Level Unit

:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBU

Level Unit

Function

This command sets the output level unit.

Command

:DISPlay:ANNotation:AMPLitude:UNIT <unit>

Parameter

<table>
<thead>
<tr>
<th>&lt;unit&gt;</th>
<th>Output level unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBM</td>
<td>dBm</td>
</tr>
<tr>
<td>DBU</td>
<td>dBμV</td>
</tr>
</tbody>
</table>

Example of Use

To set the level setting unit to dBm.

DISP:ANN:AMPL:UNIT DBM

:DISPlay:ANNotation:AMPLitude:UNIT?

Level Unit Query

Function

This command queries the output level unit.

Query

:DISPlay:ANNotation:AMPLitude:UNIT?

Response

<unit>

Parameter

<table>
<thead>
<tr>
<th>&lt;unit&gt;</th>
<th>Output level unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBM</td>
<td>dBm</td>
</tr>
<tr>
<td>DBU</td>
<td>dBμV</td>
</tr>
</tbody>
</table>

Example of Use

To query the level setting unit.

DISP:ANN:AMPL:UNIT?

> DBM
2.2.2 Volt Unit Display

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

Volt Unit

Function

This command sets the display method when the output level is set in voltage units.

Command

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

Parameter

<unit> Voltage unit display system
   EMF Open circuit 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

This command queries the display method 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 circuit voltage display
   TERM Termination voltage display

Example of Use

To query the voltage unit display system
DISP:ANN:AMPL:UNIT:VOLT?
> EMF
2.2.3 RF Output

:OUTPut[:STATe] ON|OFF|1|0
RF Output - On/Off

Function
This command turns RF output ON/OFF.

Command
:OUTPut[:STATe] <on_off>

Parameter

<table>
<thead>
<tr>
<th>&lt;on_off&gt;</th>
<th>RF output On/Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>1</td>
</tr>
<tr>
<td>OFF</td>
<td>0</td>
</tr>
</tbody>
</table>

Example of Use
To set the RF signal output to Off.
OUTP OFF

:OUTPut[:STATe]?
RF Output - On/Off Query

Function
This command queries the ON/OFF status of RF output.

Query
:OUTPut[:STATe]?

Response

<table>
<thead>
<tr>
<th>&lt;on_off&gt;</th>
</tr>
</thead>
</table>

Parameter

<table>
<thead>
<tr>
<th>&lt;on_off&gt;</th>
<th>RF output On/Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>1</td>
</tr>
<tr>
<td>OFF</td>
<td>0</td>
</tr>
</tbody>
</table>

Example of Use
To query the ON/OFF status of RF output.
OUTP?
> 1
2.2.4 Unit Power

:UNIT:POWer DBM|DBUV|DBUVEMF

Unit Power

Function

This command 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

This command 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
2.2.5 SG Level Calibration

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

SG Level Calibration

Function

This command calibrates the output level.

Command

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

Example of Use

To calibrate the output level.

POW:ALC:SEAR
2.2.6 Relative Level Value

[:SOURce]:POWer:REFe rence:AMPLitude <numeric_value>

Relative Level

Function

This command sets the screen display output level at relative output level display mode.

Command

[:SOURce]:POWer:REFe rence:AMPLitude <numeric_value>

Parameter

<numeric_value> Relative output level

Range
60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*)
42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*)
151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**) 
133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**) 

Resolution 0.01 dB

Response unit dB

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To set the relative output to +10.00 dB.

POW:REF:AMPL 10.00DB
[:SOURce]:POWer:REFerence:AMPLitude?

Relative Level Query

Function

This command queries the screen display output level at relative output level display mode.

Query

[:SOURce]:POWer:REFerence:AMPLitude?

Response

<numeric_value>

Parameter

<numeric_value> Relative output level

Range
60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*)
42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*)
151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**)
133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**)

Resolution 0.01 dB

Response unit dB

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To query the relative output level.

POW:REF:AMPL?

> 10.00
2.2 Setting Level

2.2.7 Relative Level

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

Relative - On/Off

Function

This command 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

This command queries the relative output level display ON/OFF status.

Query

[:SOURce]:POWer:REference:STATe?

Response

<on_off>

Parameter

<on_off> Relative output level display
  1 On
  0 Off

Example of Use

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

POW:REF:STAT?

> 1
2.2.8 Reference of Relative Level

[:SOURce]:POWer:REFerence?

Relative Level - Reference Level Query

Function

This command queries the relative output level in the relative output level display mode (the output level when relative output mode is on).

Query

[:SOURce]:POWer:REFerence?

Response

<numeric_value>

Parameter

<numeric_value> Reference level of relative output

Range

-40.00 dBm to +20.00 dBm (>25 MHz)(*)
-40.00 dBm to +2.00 dBm (≤25 MHz)(*)
-136.00 dBm to +15.00 dBm (>25 MHz)(**)
-136.00 dBm to –3.00 dBm (≤25 MHz)(**)

Resolution 0.01 dB

Response unit dBm

(*) When option 022/122 is NOT installed.

(**) When option 022/122 is installed.

Details

The range is based on an output level unit of dBm.

The range differs as follows according to the conditions:

When dBµV (Term) is set as the output level unit

Range + 106.99 dB

When dBµV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on:

Range + Offset Value

Example of Use

To query reference level of relative output

POW:REF?

> -5.00
2.2.9 Level Status List

[:SOURce]:POWer:SETTing?

Level Status List Query

Function

This command queries the output level status.

Query

[:SOURce]:POWer:SETTing?

Response

[unit],<offset>,<unleveled>,INT,0,<relative>,NORM

Parameter

[unit]

Voltage unit display

EMF Open circuit voltage
TERM Termination voltage

[offset]

Level offset

1 On
0 Off

[unleveled]

Output level accuracy status

NORM Normal state
UNL Outside level accuracy assurance

INT Fixed value

Fixed value[relative]

Relative output mode

1 On
0 Off

Example of Use

To query the output level status.

POW:SETT?

> EMF,0,NORM,1,0
2.2.10 Level Offset Value

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

Level Offset - Level

Function

This command sets the output level offset value

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
Default 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

This 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?
> $-5.00$
### 2.2.11 Level Offset

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

**Level Offset - On/Off**

**Function**

This command sets the output level offset ON/OFF.

**Command**

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

**Parameter**

- `<on_off>`
  - Output level offset On/Off
  - 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**

This command 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
  - 1: On
  - 0: Off

**Example of Use**

To query the output level offset ON/OFF status.

```
POW:OFFS:STAT?
```

>` 1`
2.2.12 Output Level Step Value

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

Output Level - Set Value

Function

This command 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

This command queries the numerical value fluctuation width (step value) 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
2.2.13 Output Level

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

Output Level

Function

This command sets the output level.

Command

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

Parameter

<table>
<thead>
<tr>
<th>&lt;numeric_value&gt;</th>
<th>Output Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td></td>
</tr>
<tr>
<td>~40.00 dBm to +20.00 dBm (&gt;25 MHz)(*)</td>
<td></td>
</tr>
<tr>
<td>~40.00 dBm to +2.00 dBm (≤25 MHz)(*)</td>
<td></td>
</tr>
<tr>
<td>~136.00 dBm to +15.00 dBm (&gt;25 MHz) (**)</td>
<td></td>
</tr>
<tr>
<td>~136.00 dBm to −3.00 dBm (≤25 MHz) (**)</td>
<td></td>
</tr>
</tbody>
</table>

Resolution 0.01 dB

Default ~40.00 dBm (*)

~136.00 dBm (**)  

Suffix code DBM, DBU  

When omitted: DBM

(*) When option 022/122 is NOT installed.  

(**) Details of when option 022/122 is installed.

The range is based on an output level unit of dBm.

The set range differs as follows according to the setting conditions:

When dBμV (Term) is set as the output level unit  

Range + 106.99 dB

When dBμV (EMF) is set as the output level unit  

Range + 113.01 dB

When Offset is on:  

Range + Offset Value

Example of Use

To set the output level to −30.00 dBm  

POW _30.00
Chapter 2  SCPI Device Message

[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]? {<unit>}
Output Level Query

Function
This command queries the output level.

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

Response
<numeric_value>

Parameter
<numeric_value>  Output Level
Range
-40.00 dBm to +20.00 dBm (>25 MHz)(*)
-40.00 dBm to +2.00 dBm (≤25 MHz)(*)
-136.00 dBm to +15.00 dBm (>25 MHz) (**)
-136.00 dBm to -3.00 dBm (≤25 MHz) (**)
Resolution  0.01 dB
Response unit  dBm or dBμV (according to the set value)

(*)  When option 022/122 is NOT installed.
(**) When option 022/122 is installed.

<unit>  Output level unit
DBM  dBm
DBU  dBμV
When omitted:  dBm

Details
The range is based on an output level unit of dBm.
The range differs as follows according to the conditions:
When dBμV (Term) is specified as the output level unit
Range + 106.99 dB
When dBμV (EMF) is specified as the output level unit
Range + 113.01 dB
When Offset is on:  Range + Offset Value
Example of Use

To query the output level in dBm.

POW? DBM
> -30.00
2.3 Controlling Waveform Patterns in Waveform Memory

Table 2.3-1 shows the device messages for controlling waveform patterns loaded into the waveform memory.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete Pattern file on Wave Memory</td>
<td>:MEMory:DELe[ete[:NAME] &lt;package&gt;,&lt;pattern&gt;</td>
</tr>
<tr>
<td>Delete All Pattern files on Wave Memory (Clear Wave Memory)</td>
<td>:MEMory:DELe[ete:ALL</td>
</tr>
<tr>
<td>List of Loaded Pattern Files</td>
<td>:MEMory:WAVeform:NAME? &lt;numeric_value&gt;</td>
</tr>
<tr>
<td>Number of loaded pattern files</td>
<td>:MEMory:WA Veform:COUNT?</td>
</tr>
<tr>
<td>Wave Memory Size</td>
<td>:MEMory:FREE[:ALL]?</td>
</tr>
<tr>
<td>Select Pattern file on Wave Memory</td>
<td>[:SOURce]:RADio:ARB:WA Veform &lt;package&gt;,&lt;pattern&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:WA Veform?</td>
</tr>
<tr>
<td>Waveform Restart</td>
<td>[:SOURce]:RADio:ARB:WA Veform:RESTart</td>
</tr>
<tr>
<td>ARB Status Query</td>
<td>[:SOURce]:RADio:ARB:REGister[:STATus]?</td>
</tr>
</tbody>
</table>
2.3 Controlling Waveform Patterns in Waveform Memory

2.3.1 Delete Pattern file on Wave Memory

:MEMory:DELeTe[:NAME] <package>,<pattern>
Delete Pattern file on Wave Memory

Function

This command 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"
2.3.2 Delete All Pattern files on Wave Memory

:MEMory:DELe:ALL
Delete Pattern file on Waveform Memory

Function

This command deletes all waveform pattern files in the waveform memory.

Command

:MEMory:DELe:ALL

Details

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

Example of Use

To delete all waveform pattern files in the waveform memory.
MEM:DELI:ALL
2.3 Controlling Waveform Patterns in Waveform Memory

2.3.3 List of Loaded Pattern Files

:MEM:WAV:NAME? <numeric_value>

Loaded File Name in Waveform Memory Query

Function

This command queries the waveform pattern filename loaded in the waveform memory.

Query

:MEM:WAV: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 query the waveform pattern filename loaded in the waveform memory.

MEM:WAV:NAME? 2

> "WCDMA","TEST"
2.3.4 Number of loaded pattern files

:MEMory:WAVEform:COUNt?

Number of Loaded Files Query

Function

This command 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 4096
Resolution 1

Example of Use

To query the number of waveform pattern files loaded in the waveform memory.
MEM:WAV:COUN?
> 2
2.3.5 Wave Memory Size

:MEMory:FREE[:ALL]?
Waveform Memory Space Query

Function

This command queries the waveform memory free space.

Query

:MEMory:FREE[:ALL]?

Response

<blank>,<consecutive_blank>,<total>

Parameter

<blank> Free space (in byte)
<consecutive_blank> Contiguous free space (in byte)
<total> Total waveform memory size (in byte)

Example of Use

To query the waveform memory free space.
MEM:FREE?
### 2.3.6 Select Pattern file on Wave Memory

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

Select Waveform File

**Function**

This 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 the "TEST" pattern in the package "WCDMA".

RAD:ARB:WAV "WCDMA", "TEST"
2.3 Controlling Waveform Patterns in Waveform Memory

[:SOURce]:RADio:ARB:WAVeform?
Select Waveform File Query

Function
This command queries the waveform pattern file to be played.

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

Response
<package>,<pattern>

Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;package&gt;</td>
<td>Package name (Character string)</td>
</tr>
<tr>
<td>NONE</td>
<td>Waveform pattern file not selected</td>
</tr>
<tr>
<td>&lt;pattern&gt;</td>
<td>Pattern name (Character string)</td>
</tr>
<tr>
<td>NONE</td>
<td>Waveform pattern file not selected</td>
</tr>
</tbody>
</table>

Example of Use
To query the waveform pattern file to be played.
RAD:ARB:WAV?
> "WCDMA", "TEST"
2.3.7  Waveform Restart
[:SOURce]:RADio:ARB:WAVeform:RESTart

Waveform Restart

Function

This command 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
2.3 Controlling Waveform Patterns in Waveform Memory

2.3.8 ARB Status Query

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

ARB Status Query

Function

This command queries the waveform memory status.

Query

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

Response

<status>

Parameter

<status>

Waveform memory 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 : $2^2 = 4$ Waveform pattern playback status:
  - (0: Paused, 1: Play)
- 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

Example of Use

To query the waveform memory status.
RAD:ARB:REG?
> 4
# 2.4 Controlling Waveform Patterns in HDD

Table 2.4-1 shows the device messages for controlling waveform patterns in the hard disk.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy pattern file to Hard Disk Drive</td>
<td>:MMEMory:COPY &lt;device&gt;[,&lt;package&gt;]</td>
</tr>
<tr>
<td>Delete Pattern file on Hard Disk Drive</td>
<td>:MMEMory:DELete[:NAME] &lt;package&gt;,&lt;pattern&gt;</td>
</tr>
<tr>
<td>Load Pattern File / Query Load Status and Wave Memory</td>
<td>:MMEMory:LOAD:WAVEform &lt;package&gt;,&lt;pattern&gt;</td>
</tr>
<tr>
<td>Load Pattern File / Query Load Status and Wave Memory</td>
<td>:MMEMory:LOAD:WAVEform? &lt;package&gt;,&lt;pattern&gt;</td>
</tr>
<tr>
<td>Cancel Loading</td>
<td>:MMEMory:LOAD:WAVEform:ABORT</td>
</tr>
<tr>
<td>Hard Disk Drive Size</td>
<td>:MMEMory:WAVEform:FREE[:ALL]?</td>
</tr>
</tbody>
</table>
2.4 Controlling Waveform Patterns in HDD

2.4.1 Copy pattern file to Hard Disk Drive

:MMEMory:COPY <device>[,<package>]
Copy pattern file to Hard Disk Drive

Function

This command 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 (A, B, D to Z, D when omitted)
<package> Copy source package name (character string) or, ROOT

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.

When ROOT is specified for <package>, all the patterns 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"
2.4.2 Delete Pattern file on Hard Disk Drive

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

Delete Pattern file on Hard Disk Drive

Function

This command 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".

MMEM:DEL "WCDMA","TEST"
2.4 Controlling Waveform Patterns in HDD

2.4.3 Load Pattern File / Query Load Status and Wave Memory

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

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

Function

This command 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
Chapter 2  SCPI Device Message

:MMEMory:LOAD:WAVeform? <package>,<pattern>
Load Pattern File/Check Status of Loading Pattern and Waveform Memory Query

Function

Loaded 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 package "WCDMA".
MMEM:LOAD:WAV? "WCDMA","TEST"
> 1  // Can be loaded
2.4 Controlling Waveform Patterns in HDD

2.4.4 Cancel Loading

:MMEMory:LOAD:WAVeform:ABORt

Cancel Loading

Function

This command cancels loading waveform patterns to waveform memory.

Command

:MMEMory:LOAD:WAVeform:ABORt

Example of Use

To cancel loading waveform patterns to waveform memory.

MMEM:LOAD:WAV:ABOR
2.4.5 Pattern File Version

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

File Version Query

Function

This command 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 query the "TEST" pattern version number of the package "WCDMA".

MMEM:WAV:VERS? "WCDMA", "TEST"

> 1.00
2.4.6 Hard Disk Drive Size

:MMEMory:WAVeform:FREE[:ALL]?

Hard Disk Drive Size Query

Function

This command queries hard disk free space information.

Query

:MMEMory:WAVeform:FREE[:ALL]?

Response

<total>,<blank>

Parameter

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

Example of Use

To query the hard disk size.

MMEM:WAV:FREE?

> 1234567890,123456789
### 2.5 Modulation and AWGN Settings

Table 2.5-1 shows device messages for setting modulation and AWGN.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulation</td>
<td>:OUTPut:MODulation[:STATe] ON</td>
</tr>
<tr>
<td></td>
<td>:OUTPut:MODulation[:STATe]?</td>
</tr>
<tr>
<td>AWGN</td>
<td>[:SOURce]:RADIO:ARB:NOISe[:STATe] ON</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:NOISe[:STATe]?</td>
</tr>
<tr>
<td>C/N Ratio</td>
<td>[:SOURce]:RADIO:ARB:NOISe:CN &lt;numeric_value&gt;&lt;unit&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:NOISe:CN?</td>
</tr>
<tr>
<td>Target of C/N Setting</td>
<td>[:SOURce]:RADIO:ARB:NOISe:CN:TARGet CARRier</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:NOISe:CN:TARGet?</td>
</tr>
<tr>
<td>Carrier Power</td>
<td>[:SOURce]:RADIO:ARB:NOISe:CPower &lt;numeric_value&gt;&lt;unit&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:NOISe:CPower?</td>
</tr>
<tr>
<td>Sampling Clock</td>
<td>[:SOURce]:RADIO:ARB:SClock:RATE?</td>
</tr>
</tbody>
</table>
2.5 Modulation and AWGN Settings

2.5.1 Modulation

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

Modulation - On/Off

Function

This command 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

This command queries the modulation ON/OFF status.

Query

:OUTPut:MODulation[:STATe]?

Response

<on_off>

Parameter

<on_off> Modulation ON/OFF
1 On
0 Off

Details

Fixed to OFF when no waveform pattern file is selected.

Example of Use

To query the modulation ON/OFF status.

OUTP:MOD?

> 1
2.5.2 AWGN

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

AWGN

Function

This command turns 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

This command queries the AWGN output ON/OFF status.

Query

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

Response

<on_off>

Parameter

<on_off>  AWGN output On/Off
         1    On
         0    Off

Example of Use

To query the ON/OFF status of the AWGN output signal.
RAD:ARB:NOIS?
> 1
### 2.5.3 C/N Ratio

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

**Power Ratio**

**Function**

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

**Command**

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

**Parameter**

<table>
<thead>
<tr>
<th>&lt;numeric_value&gt;</th>
<th>C/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>–40 to +40 dB</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01</td>
</tr>
<tr>
<td>Default</td>
<td>–40.00</td>
</tr>
</tbody>
</table>

**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

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

Query

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

Response

<numeric_value>

Parameter

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

Example of Use

To query C/N.
RAD:ARB:NOIS:CN?
> –3.00
2.5.4 Target of C/N Setting

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

Target of C/N Setting

Function

This command 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 AWGN as the parameter to be changed when C/N is set.
RAD:ARB:NOIS:CN:TARG NOIS

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

Target of C/N Setting Query

Function

This command queries the parameters 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 parameters to be changed when C/N is set.
RAD:ARB:NOIS:CN:TARG?
> NOIS
2.5.5 Carrier Power

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

Carrier Power

Function

This command 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 DB

Example of Use

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

RAD:ARB:NOIS:CPOW –55

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

Carrier Power Query

Function

This command queries the carrier signal level when AWGN is 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 ON.

RAD:ARB:NOIS:CPOW?

> –10.00
2.5.5 Sampling Clock

[:SOURce]:RADio:ARB:SCLock:RATE?
Sampling Clock Query

Function

This command 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
2.6 External In/Output Settings

Table 2.6-1 shows device messages for setting external in/output signals.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Modulation Source</td>
<td>[:SOURce]:RADio:ARB:PULM:SOURce INTernal</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:PULM:SOURce?</td>
</tr>
<tr>
<td>External Trigger Mode</td>
<td>[:SOURce]:RADio:ARB:TRIGger:TYPE START</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger:TYPE?</td>
</tr>
<tr>
<td>External Trigger</td>
<td>[:SOURce]:RADio:ARB:TRIGger[:STATe] ON</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger[:STATe]?</td>
</tr>
<tr>
<td>External Trigger Source</td>
<td>[:SOURce]:RADio:ARB:TRIGger:SOURce EXTERNAL</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger:SOURce?</td>
</tr>
<tr>
<td>External Trigger Delay</td>
<td>[:SOURce]:RADio:ARB:TRIGger:DELay &lt;numeric_value&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger:DELay?</td>
</tr>
<tr>
<td>External Trigger Delay Time</td>
<td>[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?</td>
</tr>
<tr>
<td>External Trigger Edge</td>
<td>[:SOURce]:RADio:ARB:TRIGger:SLOPe POSITIVE</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger:SLOPe?</td>
</tr>
<tr>
<td>Baseband Reference Clock Source</td>
<td>[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce] INTernal</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:CLOCk:REFerence[:SOURce]?</td>
</tr>
<tr>
<td>Baseband Reference Clock</td>
<td>[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision SIXTeenth</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:CLOCk:REFerence:DIVision?</td>
</tr>
<tr>
<td>Frame Count</td>
<td>[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt &lt;integer&gt;</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADio:ARB:TRIGger:FRAMe:COUNt?</td>
</tr>
<tr>
<td>Remote Command Trigger</td>
<td>[:SOURce]:RADio:ARB:TRIGger:GENERate</td>
</tr>
</tbody>
</table>
2.6 External In/Output Settings

2.6.1 Pulse Modulation Source

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

Pulse Modulation Source

Function
This command sets the pulse modulation signal source.

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

Parameter
<source>
- Internal signal
- External input signal
- 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 Query

Function
This command queries the pulse modulation signal source.

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

Response
<source>

Parameter
<source>
- Internal signal
- External input signal
- No pulse modulation

Example of Use
To query the status of the pulse modulation signal source.
RAD:ARB:PULM:SOUR?
> INT
2.6.2 External Trigger Mode

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

External Trigger - Mode

Function

This command 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

This command 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
2.6 External In/Output Settings

2.6.3 External Trigger

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

External Trigger - On/Off

Function

This command sets the external trigger ON/OFF.

Command

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

Parameter

<on_off> External trigger On/Off
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

This command queries the external trigger ON/OFF status.

Query

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

Response

<on_off>

Parameter

<on_off> External trigger On/Off
1 On
0 Off

Example of Use

To query the external trigger ON/OFF status.
RAD:ARB:TRIG?
> 0
2.6.4 External Trigger Source
[:SOURce]:RADio:ARB:TRIGger:SOURce EXTernal|KEY|BUS

Start Trigger Delay Source

Function

This command sets the signal source of the external trigger.

Command

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

Parameter

<table>
<thead>
<tr>
<th>&lt;source&gt;</th>
<th>External trigger signal source</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXternal</td>
<td>External input signal</td>
</tr>
<tr>
<td>KEY</td>
<td>Trigger key input</td>
</tr>
<tr>
<td>BUS</td>
<td>Remote Command</td>
</tr>
</tbody>
</table>

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

This command queries the signal source of the external trigger.

Query

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

Response

<source>

Parameter

<table>
<thead>
<tr>
<th>&lt;source&gt;</th>
<th>External trigger signal source</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT</td>
<td>External input signal</td>
</tr>
<tr>
<td>KEY</td>
<td>Trigger key input</td>
</tr>
<tr>
<td>BUS</td>
<td>Remote Command</td>
</tr>
</tbody>
</table>

Example of Use

To query the external trigger ON/OFF status.
RAD:ARB:TRIG:SOUR?
> EXT
2.6.5 External Trigger Delay

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

Start Trigger Delay

Function

This command 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.

Default 0

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

This command 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.

Default 0

Unit None (Symbol or chip)

Example of Use

To query the external trigger ON/OFF status.
RAD:ARB:TRIG:DEL?
> 30
2.6.6  External Trigger Delay Time
[:SOURce]:RADio:ARB:TRIGger:DELay:TIME?
Start Trigger Delay Time Query

Function

This command 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
Unit  s

Example of Use

To query the output timing of the external trigger.
RAD:ARB:TRIG:DEL:TIME?
> 6.50E-8
2.6.7 External Trigger Edge

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

External Trigger Edge

Function

This command sets the polarity of the external trigger input.

Command

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

Parameter

<edge>

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

This command queries the polarity of the external trigger input.

Query

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

Response

<edge>

Parameter

<edge>

POS Positive
NEG Negative

Example of Use

To query the polarity of the external trigger input.
RAD:ARB:TRIG:SLOP?
> POS
2.6.8 Baseband Reference Clock Source

[:SOURce]:RADio:ARB:CLEck:REFerence[:SOURce] INTernal|EXTer nal

Baseband Reference Clock Source

Function
This command sets baseband signal reference clock.

Command
[:SOURce]:RADio:ARB:CLEck:REFerence[:SOURce] <source>

Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;source&gt;</td>
<td>Baseband signal reference clock</td>
</tr>
<tr>
<td>INT</td>
<td>Internal signal (Default)</td>
</tr>
<tr>
<td>EXT</td>
<td>External input signal</td>
</tr>
</tbody>
</table>

Example of Use
To set the baseband signal reference clock to external input signal.
RAD:ARB:CLEck:REF EXT

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

Baseband Reference Clock Source Query

Function
This command queries baseband signal reference clock.

Query
[:SOURce]:RADio:ARB:CLEck:REFerence[:SOURce]?

Response

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;source&gt;</td>
<td>Baseband signal reference clock</td>
</tr>
<tr>
<td>INT</td>
<td>Internal signal (Default)</td>
</tr>
<tr>
<td>EXT</td>
<td>External input signal</td>
</tr>
</tbody>
</table>

Example of Use
To query baseband signal reference clock.
RAD:ARB:CLEck:REF?
> INT
2.6.9 Baseband Reference Clock

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

Baseband Reference Clock

Function

This command sets the baseband signal reference clock frequency in
magnification ratio based on the sampling clock.

Command

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

Parameter

<table>
<thead>
<tr>
<th>&lt;clock&gt;</th>
<th>Baseband signal reference clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIXTeenth</td>
<td>Sampling Clock × 1/16</td>
</tr>
<tr>
<td>EIGHth</td>
<td>Sampling Clock × 1/8</td>
</tr>
<tr>
<td>QUARter</td>
<td>Sampling Clock × 1/4</td>
</tr>
<tr>
<td>HALF</td>
<td>Sampling Clock × 1/2</td>
</tr>
<tr>
<td>1</td>
<td>Sampling Clock × 1</td>
</tr>
<tr>
<td>2</td>
<td>Sampling Clock × 2</td>
</tr>
<tr>
<td>4</td>
<td>Sampling Clock × 4</td>
</tr>
<tr>
<td>8</td>
<td>Sampling Clock × 8</td>
</tr>
<tr>
<td>16</td>
<td>Sampling Clock × 16</td>
</tr>
</tbody>
</table>

The setting range is as shown in the following table.

<table>
<thead>
<tr>
<th>Sampling Clock [MHz]</th>
<th>Baseband Reference Clock Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02≤f&lt;0.024414062</td>
<td>✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>0.024414062≤f&lt;0.048828125</td>
<td>✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>0.048828125≤f&lt;0.09765625</td>
<td>✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>0.09765625≤f&lt;0.1953125</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>0.1953125≤f&lt;2.5</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>2.5≤f&lt;5</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>5≤f&lt;10</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>10≤f&lt;20</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>20≤f&lt;40</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>40≤f&lt;80</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
<tr>
<td>80≤f&lt;160</td>
<td>✓      ✓      ✓      ✓      ✓      ✓      ✓      ✓</td>
</tr>
</tbody>
</table>

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

This command 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
2.6.10 Frame Count

[:SOURce]:RADio:ARB:TRIGger:FRAME:COUNt <integer>

Frame Count

Function

This command sets the Frame Count from the Signal Generator option.

Command

[:SOURce]:RADio:ARB:TRIGger:FRAME:COUNt <integer>

Parameter

<integer>,n

Specifying the output frame count
Range 1 to 32767
Resolution 1
Default 1

Example of Use

To set the output frame count to 10.
RAD:ARB:TRIG:FRAM:COUN 10

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

Frame Count Query

Function

This command queries the Frame Count from the Signal Generator option.

Query

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

Response

<integer>,n

Parameter

<integer>

Number of output frames
Range 1 to 32767
Resolution 1

Example of Use

To query the Frame Count from the Signal Generator option.
RAD:ARB:TRIG:FRAM:COUN?
> 10
2.6.11 Remote Command Trigger

[:SOURce]:RADio:ARB:TRIGger:GENerate

Remote Command Trigger

Function

This command triggers the output of waveform pattern. This becomes available when Trigger Source is BUS.

Command

[:SOURce]:RADio:ARB:TRIGger:GENerate

Example of Use

To trigger the output of waveform pattern.

RAD:ARB:TRIG:GEN
## 2.7 External output signal settings

Table 2.7-1 shows device messages for setting external output signals.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker Polarity</td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td>Marker Edit</td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td>Marker Pulse Cycle Value</td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td>Marker Pulse Start Offset Value</td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td>Marker Pulse Width Value</td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
<tr>
<td></td>
<td>[:SOURce]:RADIO:ARB:MARKer1</td>
</tr>
</tbody>
</table>
2.7 External output signal settings

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

Marker Polarity

Function

This command 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

This command 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 Marker 1.
RAD:ARB:MARK1:POL?
> POS
2.7.2 Marker Edit

This command specifies the user setting mode for the external output marker.

Command:

[:SOURce]:RADio:ARB:MARKer[n]:EDIT[:STATe] <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.

Details:

OFF|0 can be set only when a waveform with a resolution of 14 bit IQ data is selected. When a waveform with a resolution of 15 or 16 bits is selected, the following restriction applies:

15-bit resolution: Markers 2 and 3 cannot be set to OFF|0.
16-bit resolution: Markers 1 and 3 cannot be set to OFF|0.

Example of Use:

To set the Marker 1 to user setting mode.

RAD:ARB:MARK1:EDIT ON
Marker Edit Query

This command 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
2.7 External output signal settings

2.7.3 Marker Pulse Cycle Value

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

Marker Edit Mode Cycle Value

Function

This command 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 the output pulse cycle of Marker 1 to 200.

RAD:ARB:MARK1:EDIT:CYCL 200
[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:CYCLe?

Marker Edit Mode Cycle Value Query

Function

This command queries the output pulse cycle when the external output marker is set to the user setting marker.

Query

[:SOURce]:RADio:ARB:MARKer[n]:EDIT:CYCLe?

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:CYCL?

> 200.00
2.7.4 Marker Pulse Start Offset Value

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

Marker Edit Mode Start Offset Value

Function

This command 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 the starting offset of marker 1 to 100.

RAD:ARB:MARK1:EDIT:OFFS 100
Marker Edit Mode Start Offset Value Query

Function

This command 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>  
1  Marker 1
2  Marker 2
3  Marker 3
<numeric_value>  Starting offset value

Example of Use

To query the starting offset value of Marker 1.
RAD:ARB:MARK1:EDIT:OFFS?
> 100.00
2.7 External output signal settings

2.7.5 Marker Pulse Width Value

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

Marker Edit Mode Width Value

Function

This command 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 the pulse width of marker 1 to 50.
RAD:ARB:MARK1:EDIT:WIDT 50
Chapter 2  SCPI Device Message

[:SOURce]:RADio:ARB:MARKer1|2|3:EDIT:WIDTh?
Marker Edit Mode Width Value Query

Function
This command 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

<numERIC_value>  Pulse width

Example of Use
To query the pulse width of marker 1.
RAD:ARB:MARK1:EDIT:WIDT?
> 50.00
2.8 Setting Trigger to Be Output to SG Marker of SA/SPA

Table 2.8-1 shows the device messages for setting the trigger to be output to the SG marker of SA/SPA.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA Trigger Out</td>
<td>:ROUTe:SATRigger[:OUTPut] MARKer1</td>
</tr>
</tbody>
</table>
|           | :ROUTe:SATRigger[:OUTPut]?

2.8.1 SA Trigger Out

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

SA Trigger Out

Function

This command 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 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

This command 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
2.9 Display Settings

Table 2.9-1 shows the device messages for setting the display function.

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG Window Position</td>
<td>:DISPlay[:WINDow]:POSition TOP</td>
</tr>
<tr>
<td></td>
<td>:DISPlay[:WINDow]:POSition?</td>
</tr>
</tbody>
</table>

2.9.1 SG Window Position

:DISPlay[:WINDow]:POSition TOP|BOTTom

SG Window Position

Function

This command switches the display position of the Signal Generator screen.

Command

:DISPlay[:WINDow]:POSition <position>

Parameter

<table>
<thead>
<tr>
<th>&lt;position&gt;</th>
<th>Display position</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP</td>
<td>Top</td>
</tr>
<tr>
<td>BOTTom</td>
<td>Bottom</td>
</tr>
</tbody>
</table>

Example of Use

To display the Signal Generator screen at the lower portion.

DISP:POS BOTT
:DISPlay[:WINDow]:POSition?

SG Window Position Query

Function

This command queries the display position of the Signal Generator screen.

Query

:DISPlay[:WINDow]:POSition?

Response

<position>

Parameter

<position>  Display position
  TOP     Top
  BOTT    Bottom

Example of Use

To query the display position of the Signal Generator screen.
DISP:POS?
> BOTT
2.10 Other Settings

Table 2.10-1 shows the device messages for setting other functions.

Table 2.10-1  Device Messages for Other Settings

<table>
<thead>
<tr>
<th>Function</th>
<th>Device Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG Status</td>
<td>:STATus:ERRor?</td>
</tr>
</tbody>
</table>

### 2.10.1 SG Status

:STATus:ERRor?

**SG Status Query**

**Function**

This command queries the SG operating status (normal/malfunction) when the application to be operated is SG.

**Query**

:STATus:ERRor?

**Response**

<status>

**Parameter**

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

The bit assignments are as follows:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit0</td>
<td>2^0</td>
<td>= 1 Lock malfunction occurred while external reference signal source was being used</td>
</tr>
<tr>
<td>bit1</td>
<td>2^1</td>
<td>= 2 ALC circuit is abnormal.</td>
</tr>
<tr>
<td>bit2</td>
<td>2^2</td>
<td>= 4 Outside level accuracy assurance</td>
</tr>
<tr>
<td>bit3</td>
<td>2^3</td>
<td>= 8 (Not used)</td>
</tr>
<tr>
<td>bit4</td>
<td>2^4</td>
<td>= 16 (Not used)</td>
</tr>
<tr>
<td>bit5</td>
<td>2^5</td>
<td>= 32 (Not used)</td>
</tr>
<tr>
<td>bit6</td>
<td>2^6</td>
<td>= 64 (Not used)</td>
</tr>
<tr>
<td>bit7</td>
<td>2^7</td>
<td>= 128 (Not used)</td>
</tr>
<tr>
<td>bit8</td>
<td>2^8</td>
<td>= 256 (Not used)</td>
</tr>
<tr>
<td>bit9</td>
<td>2^9</td>
<td>= 512 (Not used)</td>
</tr>
<tr>
<td>bit10</td>
<td>2^10</td>
<td>= 1024 (Not used)</td>
</tr>
<tr>
<td>bit11</td>
<td>2^11</td>
<td>= 2048 (Not used)</td>
</tr>
</tbody>
</table>
bit12 : $2^{12} = 4096$  (Not used)
bit13 : $2^{13} = 8192$  (Not used)
bit14 : $2^{14} = 16384$  (Not used)
bit15 : $2^{15} = 32768$  (Not used)

Range 0 to 65535

Details

0 is returned if the operation is normal.

Example of Use

To query the current operation status.

```
STAT:ERR?
> 0
```
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 or MS2830A 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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3.4 Level Settings ..................................................... 3-8
3.5 Controlling Waveform Patterns in Waveform
   Memory .................................................................... 3-10
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3.9 External Output Signal Settings ............................ 3-16
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    SA/SPA ................................................................... 3-17
3.11 Display Settings .................................................. 3-18
### 3.1 IEEE488.2 Common Device Messages

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification</td>
<td>---</td>
<td>*IDN?</td>
<td>ANRITSU, model, serial, version</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>model: Main unit model name</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>serial: Main unit serial number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>version: Software package version</td>
</tr>
<tr>
<td>Operation Complete</td>
<td>*OPC</td>
<td>*OPC?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Preset (All Application)</td>
<td>*RST</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Self Test</td>
<td>---</td>
<td>*TST?</td>
<td>result</td>
<td>Result: Self test results</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= 0</td>
</tr>
<tr>
<td>Wait to Continue</td>
<td>*WAI</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Clear Status</td>
<td>*CLS</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Service Request Enable Register</td>
<td>*SRE byte</td>
<td>*SRE?</td>
<td>byte</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>byte =</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit7: EESB7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit6: Not used</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit5: ESB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit4: MAV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit3: EESB3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit2: EESB2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit1: EESB1 (ERROR Event)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bit0: EESB0 (END Event)</td>
</tr>
<tr>
<td>Function</td>
<td>Command</td>
<td>Query</td>
<td>Response</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------</td>
<td>-------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 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)                                                  |
| Standard Event Status Enable Register | *ESE byte | *ESE? | byte     | byte = bit7: Power on
| Standard Event Status Register | ---     | *ESR? | byte     | bit6: User request
|                          |         |       |          | bit5: Command error
|                          |         |       |          | bit4: Execution error
|                          |         |       |          | bit3: Device error
|                          |         |       |          | bit2: Query error
|                          |         |       |          | bit1: Not used
|                          |         |       |          | bit0: Operation complete                                                 |
### 3.2 Application Common Device Messages

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Switch</td>
<td>SYS apl, window</td>
<td>SYS? apl</td>
<td>status, window</td>
<td>apl: Application name = SG, window: Window status = ACT</td>
</tr>
<tr>
<td>Preset (All Application)</td>
<td>*RST</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Preset (Active Application only)</td>
<td>PRE</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>System Restart</td>
<td>REBOOT</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>LCD Power</td>
<td>DISPLAY on_off</td>
<td>DISPLAY? on_off</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Error Display Mode</td>
<td>REMDISP mode</td>
<td>REMDISP?</td>
<td>mode</td>
<td>mode: Display mode = NORMAL</td>
</tr>
<tr>
<td>Save Parameter</td>
<td>SVPRM</td>
<td>---</td>
<td>---</td>
<td>fname: Filename</td>
</tr>
<tr>
<td></td>
<td>SVPRM fname, dev</td>
<td>---</td>
<td>---</td>
<td>dev Drive name = D</td>
</tr>
<tr>
<td>Recall Parameter</td>
<td>RCPRM fname, dev</td>
<td>---</td>
<td>---</td>
<td>fname: Filename</td>
</tr>
<tr>
<td></td>
<td>RCPRM fname, dev, apl</td>
<td>---</td>
<td>---</td>
<td>dev Drive name = D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>apl: Target application = ALL</td>
</tr>
<tr>
<td>Function</td>
<td>Command</td>
<td>Query</td>
<td>Response</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>----------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Hard Copy</td>
<td>PRINT</td>
<td>---</td>
<td>---</td>
<td>fns: Filename</td>
</tr>
<tr>
<td></td>
<td>PRINT fname, dev</td>
<td>---</td>
<td>---</td>
<td>dev Drive name = D</td>
</tr>
<tr>
<td>Hard Copy Mode</td>
<td>PMOD format</td>
<td>PMOD?</td>
<td>format</td>
<td>format: Specifies file format</td>
</tr>
<tr>
<td></td>
<td>PMOD</td>
<td>PMOD?</td>
<td>BMP</td>
<td>= BMP</td>
</tr>
<tr>
<td>Extended End Event Status Enable Register</td>
<td>ESE0 n</td>
<td>ESE0?</td>
<td>byte</td>
<td>byte = Status bit bi0 = Not used</td>
</tr>
<tr>
<td>Extended End Event Status Register</td>
<td>---</td>
<td>ESR0?</td>
<td>byte</td>
<td></td>
</tr>
<tr>
<td>Extended Error Event Status Enable Register</td>
<td>ESE1 n</td>
<td>ESE1?</td>
<td>byte</td>
<td>byte = Status bit bi0 = Not used</td>
</tr>
<tr>
<td>Extended Error Event Status Register</td>
<td>---</td>
<td>ESR1?</td>
<td>byte</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Command</td>
<td>Query</td>
<td>Response</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| END Event Status Enable Register | ESEEND n | ESEEND? | 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     | ---      | ESSEND? | byte     |                                                                           |
| ERROR Event Status Enable Register | 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   | ---      | ESRERR? | byte     |                                                                           |
### 3.3 Frequency Settings

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>FREQ freq</td>
<td>FREQ?</td>
<td>freq</td>
<td></td>
</tr>
<tr>
<td>Frequency Step Value</td>
<td>FIS freq</td>
<td>FIS?</td>
<td>freq</td>
<td></td>
</tr>
<tr>
<td>Frequency Step Up/Down</td>
<td>FRS up_down</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>RF Spectrum</td>
<td>SPREV mode</td>
<td>SPREV?</td>
<td>mode</td>
<td>mode: Invert output waveform = ON</td>
</tr>
</tbody>
</table>

Table 3.3-1 Frequency setting messages
### 3.4 Level Settings

Device messages for setting levels are shown in Tables 3.4-1 to 3.4-2.

#### Table 3.4-1 Level setting messages

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Output</td>
<td>LVL on_off</td>
<td>LVL?</td>
<td>on_off</td>
<td></td>
</tr>
<tr>
<td>Output Level</td>
<td>OLVL level</td>
<td>OLVL? unit</td>
<td>level</td>
<td>unit: Units = DBM</td>
</tr>
<tr>
<td>Output Level Step Value</td>
<td>OIS level</td>
<td>OIS?</td>
<td>level</td>
<td></td>
</tr>
<tr>
<td>Output Level Step</td>
<td>OLS up_down</td>
<td>---</td>
<td>---</td>
<td>up_down: Up/Down = UP</td>
</tr>
<tr>
<td>Output Level Unit</td>
<td>OLU unit</td>
<td>OLU?</td>
<td></td>
<td>unit: Units = DBM</td>
</tr>
<tr>
<td>Volt Unit Display</td>
<td>VDSPL unit</td>
<td>VDSPL?</td>
<td>unit</td>
<td>unit: Voltage unit display system = EMF</td>
</tr>
<tr>
<td>Level Offset</td>
<td>OOF on_off</td>
<td>OOF?</td>
<td>on_off</td>
<td></td>
</tr>
<tr>
<td>Level Offset Value</td>
<td>OOS level</td>
<td>OOS?</td>
<td>level</td>
<td></td>
</tr>
<tr>
<td>Relative Level</td>
<td>ORL on_off</td>
<td>ORL?</td>
<td>on_off</td>
<td></td>
</tr>
<tr>
<td>Relative Level Value</td>
<td>ORLV level</td>
<td>ORLV?</td>
<td>level</td>
<td></td>
</tr>
<tr>
<td>Reference of Relative Level</td>
<td>---</td>
<td>OLR?</td>
<td>level</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Command</td>
<td>Query</td>
<td>Response</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>-----------</td>
<td>----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SG Level Calibration</td>
<td>LVLACAL</td>
<td>---</td>
<td>---</td>
<td>status: ALC status = NORMAL</td>
</tr>
<tr>
<td>ALC Status</td>
<td>---</td>
<td>ALCSTT?</td>
<td>status</td>
<td></td>
</tr>
<tr>
<td>Unleveled Status</td>
<td>--</td>
<td>LVLACCSSTT?</td>
<td>unleveled</td>
<td>unleveled: Output level accuracy status = NORMAL</td>
</tr>
<tr>
<td>Level Status List</td>
<td>---</td>
<td>LVLSTTLST?</td>
<td>unit,offset,unleveled,INTALC,CONTOFF,relative,NORMAL</td>
<td>unit: Voltage unit display = EMF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>offset: Level offset = OFFSETON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>unleveled: Output level accuracy status = NORMAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>INTALC : Fixed Value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>relative: Relative output mode = RELON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NORMAL : Fixed Value</td>
</tr>
</tbody>
</table>
### 3.5 Controlling Waveform Patterns in Waveform Memory

Tables 3.5-1 and Table 3.5-2 show the device messages for controlling waveform patterns loaded into the waveform memory.

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveform Restart</td>
<td>DLRES</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Waveform Status</td>
<td>---</td>
<td>PATRUNSTT?</td>
<td>status</td>
<td>status: playback status = STOP</td>
</tr>
<tr>
<td>Select Pattern file on Wave Memory</td>
<td>LOADEDFILESEL package,pattern</td>
<td>LOADEDFILESEL? package,pattern</td>
<td>package,pattern</td>
<td>package: package name pattern: pattern name</td>
</tr>
<tr>
<td></td>
<td>PAT package,pattern</td>
<td>PAT? package,pattern</td>
<td>package,pattern</td>
<td></td>
</tr>
<tr>
<td>Delete Pattern file on Wave Memory</td>
<td>DELFILEWM package,pattern</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DELPATWM package,pattern</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Delete All Pattern files on Wave Memory</td>
<td>DELFILEWM ALL</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>(Clear Wave Memory)</td>
<td>Number of loaded pattern files</td>
<td>---</td>
<td>LOADEDFILENUM? number</td>
<td>number: Waveform pattern number</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>PATNUM?</td>
<td>number</td>
<td></td>
</tr>
</tbody>
</table>
### Table 3.5-2  Controlling waveform patterns in waveform memory (Continued)

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Loaded Pattern Files</td>
<td>---</td>
<td>LOADEDFILENAME?</td>
<td>package,pattern</td>
<td>number : Waveform pattern number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>number</td>
<td></td>
<td>package : package name</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>PATNAME? number</td>
<td>package,pattern</td>
<td>pattern : pattern name</td>
</tr>
<tr>
<td>Wave Memory Size</td>
<td>---</td>
<td>WMSPC?</td>
<td>blank1,blank2,total</td>
<td>blank1 : Free memory space (byte)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>blank2 : Contiguous free memory space (byte)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>total : Total memory space</td>
</tr>
</tbody>
</table>
### 3.6 Controlling Waveform Patterns in HDD

Table 3.6-1 shows the device messages for controlling waveform patterns in the hard disk.

#### Table 3.6-1  Controlling waveform patterns in HDD

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Pattern File / Query Load Status and Wave Memory</td>
<td>LDFILE package,pattern</td>
<td>LDFILE? package,pattern</td>
<td>status</td>
<td>package: package name</td>
</tr>
<tr>
<td></td>
<td>LDPAT package,pattern</td>
<td>LDPAT? package,pattern</td>
<td></td>
<td>pattern: pattern name</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>status: Loaded</td>
</tr>
<tr>
<td>Cancel Loading</td>
<td>LDCANCEL</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Pattern File Version</td>
<td>---</td>
<td>FILEVER? package,pattern</td>
<td>version</td>
<td>package: package name</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>pattern: pattern name</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>version: Version number</td>
</tr>
<tr>
<td>Hard Disk Drive Size</td>
<td>---</td>
<td>HDDSPC?</td>
<td>total,blank</td>
<td>total: Total hard disk capacity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>blank: Free space in hard disk</td>
</tr>
<tr>
<td>Copy pattern file to Hard Disk Drive</td>
<td>CPYPATTOHDD drive,package</td>
<td>---</td>
<td>---</td>
<td>drive: Name of destination drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>package: package name</td>
</tr>
<tr>
<td>Delete Pattern file on Hard Disk Drive</td>
<td>DELFILEHDD package,pattern</td>
<td>---</td>
<td>---</td>
<td>package: package name</td>
</tr>
<tr>
<td></td>
<td>DELPATHHDD package,pattern</td>
<td>---</td>
<td>---</td>
<td>pattern: pattern name</td>
</tr>
</tbody>
</table>
# 3.7 Modulation and AWGN Settings

Device messages for setting modulation and AWGN are shown in Table 3.7-1.

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulation</td>
<td>MOD on_off</td>
<td>MOD?</td>
<td>on_off</td>
<td></td>
</tr>
<tr>
<td>Sampling Clock</td>
<td>---</td>
<td>SAMPLINGCLK?</td>
<td>freq</td>
<td></td>
</tr>
<tr>
<td>AWGN</td>
<td>AWGN on_off</td>
<td>AWGN?</td>
<td>on_off</td>
<td></td>
</tr>
<tr>
<td>C/N Ratio</td>
<td>PATWMPWRATIO level</td>
<td>PATWMPWRATIO?</td>
<td>level</td>
<td></td>
</tr>
<tr>
<td>Target of C/N Setting</td>
<td>POWRATIOTARGET target</td>
<td>POWRATIOTARGET?</td>
<td>target</td>
<td>target: target to change = CARRIER</td>
</tr>
<tr>
<td>Carrier Power</td>
<td>CARRIERPOW level</td>
<td>CARRIERPOW?</td>
<td>level</td>
<td></td>
</tr>
</tbody>
</table>
### 3.8 External Input Signal Settings

Device messages for external input settings are shown in Table 3.8-1.

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Trigger</td>
<td>SFTRG on_off</td>
<td>SFTRG?</td>
<td>on_off</td>
<td>source: signal source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= EXTRG</td>
</tr>
<tr>
<td>External Trigger Source</td>
<td>STDLYSRC source</td>
<td>STDLYSRC?</td>
<td>source</td>
<td>mode: operating time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= START</td>
</tr>
<tr>
<td>External Trigger Mode</td>
<td>SFTRGMODE mode</td>
<td>SFTRGMODE?</td>
<td>mode</td>
<td>source: signal source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= EXTRG</td>
</tr>
<tr>
<td></td>
<td>STGS mode</td>
<td>STGS?</td>
<td>mode</td>
<td>mode: operating time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= INT</td>
</tr>
<tr>
<td>External Trigger Delay</td>
<td>STDLYSYM delay</td>
<td>STDLYSYM?</td>
<td>delay</td>
<td>delay: delay time</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>STDLYTIME?</td>
<td>time</td>
<td>= (Number of symbols or chips)</td>
</tr>
<tr>
<td>External Trigger Edge</td>
<td>EIST edge</td>
<td>EIST?</td>
<td>edge</td>
<td>edge: polarity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= RISE</td>
</tr>
<tr>
<td>Baseband Reference Clock Source</td>
<td>REFCLKSRC source</td>
<td>REFCLKSRC?</td>
<td>source INT</td>
<td>source: clock source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= INT</td>
</tr>
<tr>
<td>Baseband Reference Clock</td>
<td>REFCLKVAL clock</td>
<td>REFCLKVAL?</td>
<td>clock</td>
<td>clock: reference clock</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= SIXTEENTH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= HALF</td>
</tr>
<tr>
<td>Baseband Reference Clock Condition</td>
<td>---</td>
<td>BBREFCOND?</td>
<td>status</td>
<td>status: lock status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= NORMAL</td>
</tr>
<tr>
<td>Pulse Modulation Source</td>
<td>PMO source</td>
<td>PMO?</td>
<td>source</td>
<td>source: signal source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= INT</td>
</tr>
</tbody>
</table>
### Table 3.8-1  External input signal setting messages (Cont’d)

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Count</td>
<td>FRAMECOUNT integer</td>
<td>FRAMECOUNT?</td>
<td>integer</td>
<td>integer : Number of output frames</td>
</tr>
<tr>
<td>Remote Command Trigger</td>
<td>SFTGGENBUS</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>
3.9 External Output Signal Settings

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker Edit</td>
<td>MARKEREDIT</td>
<td>MARKEREDIT?</td>
<td>mode</td>
<td>marker: marker type</td>
</tr>
<tr>
<td></td>
<td>marker,mode</td>
<td>marker</td>
<td></td>
<td>= 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mode: marker mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= OFF</td>
</tr>
<tr>
<td>Marker Polarity</td>
<td>MARKERPOL</td>
<td>MARKERPOL?</td>
<td>polarity</td>
<td>marker: marker type</td>
</tr>
<tr>
<td></td>
<td>marker,polarity</td>
<td>marker</td>
<td></td>
<td>= 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>polarity: polarity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= POSITIVE</td>
</tr>
<tr>
<td>Marker Pulse Start Offset Value</td>
<td>MARKEREDITOFFSET</td>
<td>MARKEREDITOFFSET?</td>
<td>offset</td>
<td>marker: marker type</td>
</tr>
<tr>
<td></td>
<td>marker,offset</td>
<td>marker</td>
<td></td>
<td>= 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>offset: pulse start offset</td>
</tr>
<tr>
<td>Marker Pulse Width Value</td>
<td>MARKEREDITWIDTH</td>
<td>MARKEREDITWIDTH?</td>
<td>width</td>
<td>marker: marker type</td>
</tr>
<tr>
<td></td>
<td>marker,width</td>
<td>marker</td>
<td></td>
<td>= 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>width: pulse width</td>
</tr>
<tr>
<td>Marker Pulse Cycle Value</td>
<td>MARKEREDITCYCLE</td>
<td>MARKEREDITCYCLE?</td>
<td>cycle</td>
<td>marker: marker type</td>
</tr>
<tr>
<td></td>
<td>marker,cycle</td>
<td>marker</td>
<td></td>
<td>= 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cycle: pulse cycle</td>
</tr>
</tbody>
</table>
### 3.10 Setting Trigger to Be Output to SG Marker of SA/SPA

Tables 3.10-1 shows the device messages for setting the trigger to be output to the SG marker of SA/SPA.

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA Trigger Out</td>
<td>SATRGOUT triggertoSA</td>
<td>SATRGOUT?</td>
<td>triggertoSA</td>
<td>triggertoSA: trigger selection = MARKER1</td>
</tr>
</tbody>
</table>
### 3.11 Display Settings

Device messages for display settings are shown in Table 3.11-1.

**Table 3.11-1  Display setting messages**

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
<th>Query</th>
<th>Response</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG Window Position</td>
<td>SGWINDOWPOS position</td>
<td>SGWINDOWPOS?</td>
<td>position</td>
<td>position: display position = TOP</td>
</tr>
</tbody>
</table>
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 and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)” for detailed specifications of the IEEE488.2 common device messages and application common device messages.

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LOADEDFILENAME? ......................................................... 4-30
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OIS/OIS? ....................................................................... 4-43
OLS ............................................................................... 4-44
OLU/OLU? ..................................................................... 4-45
OLVL/OLVL? ................................................................... 4-46
OOF/OOF? .................................................................... 4-47
OOS/OOS? ..................................................................... 4-48
ORL/ORL? ..................................................................... 4-49
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SYS/SYS? ...................................................................... 4-71
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WMSPC? ........................................................................ 4-72
**ALCSTT?**  
**ALC Status Query**

**Function**

This command queries the output level alarm information.

**Query**

`ALCSTT?`

**Response**

`status`

**Parameter**

<table>
<thead>
<tr>
<th>status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL</td>
<td>Normal state</td>
</tr>
<tr>
<td>ALCALARM</td>
<td>ALC circuit is abnormal.</td>
</tr>
</tbody>
</table>

**Example of Use**

To query level alarm status.

`ALCSTT?`
Chapter 4  Native Device Message Details

AWGN/AWGN?

AWGN

Function

This command turns 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

This command queries the lock status of the baseband reference clock.

Query

BBREFCOND?

Response

status

Parameter

status | Description
--- | ---
NORMAL | Normal
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?
**CARRIERPOW/CARRIERPOW?**

**Carrier Power**

**Function**

This command sets the carrier signal level when AWGN is ON.

**Command**

CARRIERPOW level

**Query**

CARRIERPOW?

**Response**

level

**Parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>level</td>
<td>Carrier signal level when AWGN is ON.</td>
</tr>
</tbody>
</table>

- **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 Command**

AWGN  
AWGN On/Off setting
CPYPATTOHDD
Copy pattern file to Hard Disk Drive

Function

This command copies the waveform pattern file from the specified drive to the internal hard disk drive. Specify a waveform pattern by using a package name. The package name 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 Package name to copy (Character string)
Or, ROOT

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.

When ROOT is specified for <package>, all the patterns 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”
**DELFILEHDD**
Delete Pattern file on Hard Disk Drive

**Function**
This command 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 Command**
`DELPATHDD`  
*Same as* `DELFILEHDD`
DELFILEWM
Delete Pattern file on Waveform Memory

Function

This command deletes the waveform pattern file in the waveform memory.

Command

DELFILEWM package,pattern
DELFILEWM ALL

Parameter

<table>
<thead>
<tr>
<th>parameter</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>package</td>
<td>Package name (Character string)</td>
</tr>
<tr>
<td>ALL</td>
<td>Deleting All Waveform Patterns</td>
</tr>
<tr>
<td>pattern</td>
<td>Pattern name (Character string)</td>
</tr>
</tbody>
</table>

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 Command

DELPATWM Same as DELFILEWM
DELPATHDD
Delete Pattern file on Hard Disk Drive

Function

This command deletes the waveform pattern file on the hard disk.

Same as DELFILEHDD. Refer to section explaining DELFILEHDD.

DELPATWM
Delete Pattern file on Waveform Memory

Function

This command deletes the waveform pattern file in the waveform memory.

Same as DELFILEWM. Refer to section explaining DELFILEWM.

DLRES
Waveform Restart

Function

This command 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

This command sets the polarity of the external trigger input.

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 Command

SFTRG  External trigger On/Off setting.
Chapter 4  Native Device Message Details

ESE0/ESE0?
Extended End Event Status Enable Register

Function

This command 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: Not used
  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 Command

ESR0?  Extended end event status register query.
ESE1/ESE1?
Extended Error Event Status Enable Register

Function
This command sets the extended error event status enable register. When an error event occurs in the specified application, the end summary bit (ESB) value of 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: Not used
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 Command
ESR1?  Extended error event status register query.
ESEEND/ESEEND?
End Event Status Enable Register

Function

This command sets the end event status enable register that can be used for the Signal Generator function. When a specified end event occurs, the end summary bit (ESB) value corresponding to the event is set to 1 (true).

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

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 Command

ESREND?  End event status register query.
ESEERR/ESEERR?
Error Event Status Enable Register

Function

This command sets the error event status enable register that can be used for the Signal Generator function. 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

<table>
<thead>
<tr>
<th>bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>128</td>
<td>Bit 7: Not used</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>Bit 6: Not used</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td>Bit 5: Waveform pattern copy error</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>Bit 4: Waveform pattern loading to waveform memory error</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Bit 3: Not used</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Bit 2: Not used</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Bit 1: Not used</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>Bit 0: Not used</td>
</tr>
</tbody>
</table>

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
ESEEND 16
```

Related Command

ESEERR? Error event status register query.
ESR0?
Extended End Event Status Register Query

Function

This command queries the extended end event status.

Query

ESR0?

Response

n

Parameter

n Extended End Event Status register
Value = bit0 + bit1 + ... + bit7

\[
\begin{align*}
\text{bit7} &= 2^7 = 128 \quad \text{Bit 7: Not used} \\
\text{bit6} &= 2^6 = 64 \quad \text{Bit 6: Not used} \\
\text{bit5} &= 2^5 = 32 \quad \text{Bit 5: Not used} \\
\text{bit4} &= 2^4 = 16 \quad \text{Bit 4: Not used} \\
\text{bit3} &= 2^3 = 8 \quad \text{Bit 3: Not used} \\
\text{bit2} &= 2^2 = 4 \quad \text{Bit 2: Not used} \\
\text{bit1} &= 2^1 = 2 \quad \text{Bit 1: Not used} \\
\text{bit0} &= 2^0 = 1 \quad \text{Bit 0: Signal Generator Function}
\end{align*}
\]

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 query the extended end event status register.

ESR0?

Related Command

ESE0 Extended END event status enable register contents
ESR1?
Extended Error Event Status Register Query

Function

This command queries the extended error event status.

Query

ESR1?

Response

n

Parameter

n
Extended Error Event Status register
Value = bit0 + bit1 + ... + bit7

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2^7 = 128</td>
</tr>
<tr>
<td>6</td>
<td>2^6 = 64</td>
</tr>
<tr>
<td>5</td>
<td>2^5 = 32</td>
</tr>
<tr>
<td>4</td>
<td>2^4 = 16</td>
</tr>
<tr>
<td>3</td>
<td>2^3 = 8</td>
</tr>
<tr>
<td>2</td>
<td>2^2 = 4</td>
</tr>
<tr>
<td>1</td>
<td>2^1 = 2</td>
</tr>
<tr>
<td>0</td>
<td>2^0 = 1</td>
</tr>
</tbody>
</table>

Bit 7: Not used
Bit 6: Not used
Bit 5: Not used
Bit 4: Not used
Bit 3: Not used
Bit 2: Not used
Bit 1: Not used
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 query the extended error event status register.

ESR1?

Related Command

ESE1
Extended ERROR event status enable register contents
ESREND?
Event Status Register Query

Function

This command queries the end event status that is used for the Signal Generator.

Query

ESREND?

Response

\[ n \]

Parameter

\[ n \]
End Event Status register
Value = bit0 + bit1 + ... + bit7

Signal Generator function

- \( \text{bit}7 = 2^7 = 128 \): Bit 7: Not used
- \( \text{bit}6 = 2^6 = 64 \): Bit 6: Not used
- \( \text{bit}5 = 2^5 = 32 \): Bit 5: Completion of waveform pattern copy
- \( \text{bit}4 = 2^4 = 16 \): Bit 4: Completion of waveform pattern loading to waveform memory
- \( \text{bit}3 = 2^3 = 8 \): Bit 3: Not used
- \( \text{bit}2 = 2^2 = 4 \): Bit 2: Not used
- \( \text{bit}1 = 2^1 = 2 \): Bit 1: Not used
- \( \text{bit}0 = 2^0 = 1 \): Bit 0: Not used

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 end event status register value is cleared.

Example of Use

To query the end event status register for the Signal Generator function.

SYS SG
ESREND?

Related Command

ESEERR End event status enable register setting
ESRERR?
Error Event Status Register Query

Function

This command queries the error event status that is used for the Signal Generator function.

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

<table>
<thead>
<tr>
<th>bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>128</td>
<td>Bit 7: Not used</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>Bit 6: Not used</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td>Bit 5: Waveform pattern copy error</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>Bit 4: Waveform pattern loading to waveform memory error</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Bit 3: Not used</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Bit 2: Not used</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Bit 1: Not used</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>Bit 0: Not used</td>
</tr>
</tbody>
</table>

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 query the error event status register for the Signal Generator function.

```
SYS SG
ESRERR?
```

Related Command

ESEERR  Error event status enable register setting
FILEVER?
File Version Query

Function

This command 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 query the "TEST" pattern version number of the package "WCDMA".
FILEVER? "WCDMA","TEST"
FIS/FIS?
Frequency - Step Value

Function

This command sets the fluctuation width (step value) when the frequency is increased/decreased in step.

Command
FIS freq

Query
FIS?

Response
freq

Parameter
freq  Frequency step width
Range  0.01 Hz to 1 GHz
Resolution  0.01 Hz
Default  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 Command
FRS  Setting frequency by stepping up and down
FRAMECOUNT/FRAMECOUNT?

Frame Count

Function

This command sets the Frame Count from the Signal Generator option.

Command

FRAMECOUNT integer

Query

FRAMECOUNT?

Response

integer

Parameter

integer

Specifying the output frame count

Range 1 to 32767
Resolution 1
Default 1

Example of Use

To set the output frame count to 10.
FRAMECOUNT 10

To query the Frame Count from the Signal Generator option.
FRAMECOUNT?
> 10
## FREQ/FREQ?

**Function**

This command sets frequency

**Command**

```
FREQ freq
```

**Query**

```
FREQ?
```

**Response**

```
freq
```

**Parameter**

<table>
<thead>
<tr>
<th>freq</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>250 MHz to 3.6 GHz (*)</td>
</tr>
<tr>
<td></td>
<td>250 MHz to 6 GHz  (**)</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 Hz</td>
</tr>
<tr>
<td>Default</td>
<td>1 GHz</td>
</tr>
<tr>
<td>Response unit</td>
<td>Hz</td>
</tr>
<tr>
<td>Suffix code</td>
<td>HZ, KHZ, KZ, MHZ, MZ, GHZ, GZ</td>
</tr>
<tr>
<td>When omitted:</td>
<td>Hz</td>
</tr>
</tbody>
</table>

(*): When option 020/120 is installed.

(**): When option 021/121 is installed.

**Example of Use**

To set the frequency to 800 MHz

```
FREQ 800MHZ
```
FRS
Frequency Step Up/Down

Function
This command raises/lows 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 Command
FIS Sets the frequency step width.
HDDSPC?
Hard Disk Drive Size Query

Function
This command queries hard disk free space information.

Query
HDDSPC?

Response
total,blank

Parameter
total       Total hard disk size
  Response unit  Byte
blank        Hard disk free space
  Response unit  Byte

Example of Use
To query the hard disk size.
HDDSPC?
Chapter 4  Native Device Message Details

INI
Preset

Function
This command executes initialization.

Command
INI

Details
The application currently selected is the target.

Example of Use
To execute initialization
INI

Related Command
<table>
<thead>
<tr>
<th>PRE</th>
<th>Same function as INI.</th>
</tr>
</thead>
<tbody>
<tr>
<td>*RST</td>
<td>Initialization of all applications</td>
</tr>
</tbody>
</table>
LDCANCEL
Cancel Loading

Function
This command cancels loading waveform patterns to waveform memory.

Command
LDCANCEL

Example of Use
To cancel loading waveform patterns to waveform memory.
LDCANCEL
Chapter 4  Native Device Message Details

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

Function

This command 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 Command

LDPAT
Same as LDFILE

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

Function

This command 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.

Same function as LDFILE. Refer to the descriptions of LDFILE for details.
Chapter 4  Native Device Message Details

LOADEDFILENAME?
Loaded File Name in Waveform Memory

Function
This command 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 query the waveform pattern filename loaded in the waveform memory.
LOADEDFILENAME?  Response > 3
LOADEDFILENAME?  0
LOADEDFILENAME?  1
LOADEDFILENAME?  2

Related Command
LOADEDFILENAME?  Querying the number of waveform pattern files in the waveform memory.
LOADEDFILENUM?
Number of Loaded Files Query

Function
This command 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 1000
  Resolution  1

Example of Use
To query the number of waveform pattern files loaded in the waveform memory.
LOADEDFILENUM?
> 3

Related Command
PATNUM? Same as LOADEDFILENUM?
Chapter 4  Native Device Message Details

LOADEDFILESEL/LOADEDFILESEL?
Select Waveform File

Function
This 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 "TEST" pattern in package "WCDMA".
LOADEDFILESEL "WCDMA", "TEST"

Related Command
PAT  Same as LOADEDFILESEL
LVL/LVL?
RF Output - On/Off

Function
This command turns 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
This command queries the output level accuracy status.

Query
LVLACCSTT?

Response
status

Parameter
status  Output level accuracy status
NORMAL  Normal state
UNLEVELED  Outside performance assurance status

Example of Use
To query the output level accuracy status.
LVLACCSTT?
LVLCAL
SG Level Calibration

Function
This command calibrates the output level.

Command
LVLCAL

Example of Use
To calibrate the output level.
LVLCAL
## LVLSTTLST?

### Level Status List Query

**Function**

This command queries the output level status.

**Query**

LVLSTTLST?

**Response**

unit,offset,unleveled, INTALC,CONTOFF, relative,NORMAL

**Parameter**

- **unit**: Voltage display unit
  - EMF: Open circuit voltage
  - TERM: Termination voltage
- **offset**: Level offset
  - OFFSETON: On
  - OFFSETOFF: Off
- **unleveled**: Output level accuracy status
  - NORMAL: Normal state
  - UNLEVELED: Outside level accuracy assurance
- **INTALC**: Fixed Value
- **CONTOFF**: Fixed Value
- **relative**: Relative output mode
  - RELON: On
  - RELOFF: Off
- **NORMAL**: Fixed Value

**Example of Use**

To query the output level status.

LVLSTTLST?
MARKEREDIT/MARKEREDIT?

Marker Edit

Function

This command 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.

Details

OFF can only be specified if a waveform pattern that consists of 14-bit resolution IQ data is selected. If a 15-bit or 16-bit resolution waveform pattern is selected, the following restrictions apply:

15-bit resolution:  Markers 2 and 3 cannot be set to OFF.
16-bit resolution:  Markers 1 to 3 cannot be set to OFF.

Example of Use

To specify the user setting mode for marker 1.
MARKEREDIT 1,ON
MARKEREDITCYCLE/MARKEREDITCYCLE?
Marker Edit Mode Cycle Value

Function

This command 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   Marker 1
2   Marker 2
3   Marker 3
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
This command 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  Marker 1
2  Marker 2
3  Marker 3
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
This command 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  Marker 1
  2  Marker 2
  3  Marker 3

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

This command sets the polarity of the external output marker signal.

Command

MARKERPOL n,polarity

Query

MARKERPOL? n

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 set the polarity of Marker 1 to negative.
MARKERPOL 1,NEG
MOD/MOD?
Modulation - On/Off

Function

This command 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
OIS/OIS?
Output Level - Set Value

Function

This command 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  Step width of the output level
Range   0.01 to 100.00 dB
Resolution  0.01 dB
Default
Response unit  dB
Suffix code  DB

Example of Use

To set the output level step width to 5.00 dB.
OIS 5.00DB

Related Command

OLS  Setting output level by stepping up and down
Chapter 4  Native Device Message Details

OLS  
Level Set Up/Down

Function

This command increments or decrements the output level by a specified amount.

Command

OLS up_down

Parameter

up_down  
Incrementing or decrementing the output level in step units
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 Command

OIS  
Sets the output level in step units.
**OLU/OLU?**

**Level Unit**

**Function**

This command sets the output level unit.

**Command**

`OLU unit`

**Query**

`OLU?`

**Response**

`unit`

**Parameter**

<table>
<thead>
<tr>
<th>unit</th>
<th>Output level unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBM</td>
<td>dBm</td>
</tr>
<tr>
<td>DBU</td>
<td>dBµV</td>
</tr>
</tbody>
</table>

**Example of Use**

To set the level setting unit to dBm.

`OLU DBM`
OLVL/OLVL?
Output Level

Function
This command sets the output level.

Command
OLVL level

Query
OLVL? unit

Response
level

Parameter

level
Output Level
Range
-40.00 dBm to +20.00 dBm (>25 MHz)(*)
-40.00 dBm to +2.00 dBm (≤25 MHz)(*)
-136.00 dBm to +15.00 dBm (>25 MHz)(**)
-136.00 dBm to −3.00 dBm (≤25 MHz)(**)
Resolution
0.01 dB
Default
-40.00 dBm (*)
-136.00 dBm (**)  
Suffix code
DBM, DBU
When omitted: DBM

(*) When option 022/122 is not installed.
(**) When option 022/122 is installed.

unit
Output level unit (optional)

DBM dBm
DBU dBμV
When omitted: dBm

Details
The range is based on an output level unit of dBm.
The range differs as follows according to the conditions:

When dBμV (Term) is set as the output level unit
Range + 106.99 dB

When dBμV (EMF) is set as the output level unit
Range + 113.01 dB

When Offset is on:
Range + Offset Value
Example of Use

Setting the output level to –30.00 dBm
OLVL -30.00DBM

OOF/OOF?
Level Offset - On/Off

Function
This command sets the output level offset ON/OFF.

Command
OOF on_off

Query
OOF?

Response
on_off

Parameter

<table>
<thead>
<tr>
<th>on_off</th>
<th>Output level offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>On</td>
</tr>
<tr>
<td>OFF</td>
<td>Off</td>
</tr>
</tbody>
</table>

Example of Use
To enable the output level offset.
OOF ON
OOS/OOS?
Level Offset - Level

Function
This command sets the output level offset value.

Command
OOS level

Query
OOS?

Response
level

Parameter
level  Output level offset
Range     -100.00 to 100.00 dB
Resolution  0.01 dB
Default     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
This command sets the relative output level display ON/OFF.

Command
ORL on_off

Query
ORL?

Response
on_off

Parameter
on_off Relative output level
ON On
OFF Off

Example of Use
To enable relative output level display.
ORL ON
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ORLR?
Relative Level - Reference Level

Function

This command 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  Reference level of relative output
Range  
-40.00 dBm to +20.00 dBm (>25 MHz) (*)
-40.00 dBm to +2.00 dBm (≤25 MHz) (*)
-136.00 dBm to +15.00 dBm (>25 MHz) (**) 
-136.00 dBm to -3.00 dBm (≤25 MHz) (**) 

Resolution  0.01 dB
Response unit  dBm

(*)  When option 022/122 is not installed.
(**)  When option 022/122 is installed.

Details

The range is based on an output level unit of dBm.
The range differs as follows according to the conditions:

When dBµV (Term) is set as the output level unit

Range + 106.99 dB

When dBµV (EMF) is set as the output level unit

Range + 113.01 dB

When Offset is on:

Range + Offset Value

Example of Use

To query reference level of relative output
OLVL  -75.00DBM
ORL  ON
ORLR?  Response > -75.00
ORLV/ORLV?

Relative Level

Function

This command 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

60 dB width within the range of –60.00 dB to +60.00 dB (> 25 MHz)(*)
42 dB width within the range of –42.00 dB to +42.00 dB (≤ 25 MHz)(*)
151 dB width within the range of –151.00 dB to +151.00 dB (> 25 MHz)(**)
133 dB width within the range of –133.00 dB to +133.00 dB (≤ 25 MHz)(**)

Resolution 0.01 dB

Response unit dB

(*) When option 022/122 is not installed.

(**) When option 022/122 is installed.

Details

The range differs as follows according to the conditions:

When Offset is on: Range + Offset Value

Example of Use

To set the relative output to +10.00 dB based on an output level of –75.00 dBm.

OLVL –75.00DBM

ORL ON

ORLV 10.00DB
Chapter 4  Native Device Message Details

PAT
Select Waveform File

Function

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

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

PATNAME?
Loaded File Name in Waveform Memory

Function

This command 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

This command queries the number of waveform pattern filenames 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
This command queries the running status of a waveform pattern.

Query
PATRUNSTT?

Response
status

Parameter
status: The waveform pattern running status
   STOP: Stopped
   PLAY: Running

Example of Use
To query the waveform pattern status.
PATRUNSTT?
**Chapter 4  Native Device Message Details**

**PATWMPOWRATIO/PATWMPOWRATIO?**

**Power Ratio**

**Function**

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

**Command**

PATWMPOWRATIO level

**Query**

PATWMPOWRATIO?

**Response**

level

**Parameter**

<table>
<thead>
<tr>
<th>level</th>
<th>C/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>-40 to +40 dB</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01</td>
</tr>
<tr>
<td>Default</td>
<td>-40.00</td>
</tr>
<tr>
<td>Response unit</td>
<td>dB</td>
</tr>
<tr>
<td>Suffix code</td>
<td>DB</td>
</tr>
</tbody>
</table>

**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
This command 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
POWRATIOTARGET/POWRATIOTARGET?
Target of C/N Setting

Function
This command 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 AWGN
CONSTANT Fixed output level (Carrier + AWGN)

Example of Use
To set AWGN as the parameter to be changed when C/N is set.
POWRATIOTARGET NOISE
**PRE**

**Preset**

**Function**

This command executes initialization.

**Command**

PRE

**Details**

The application currently selected is the target.

**Example of Use**

To execute initialization

PRE

**Related Command**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INI</td>
<td>Same as PRE</td>
</tr>
<tr>
<td>*RST</td>
<td>Initializes all applications</td>
</tr>
</tbody>
</table>
Chapter 4  Native Device Message Details

REFCLKSRC/REFCLKSRC?
Baseband Reference Clock Source

Function

This command sets baseband signal reference clock.

Command

REFCLKSRC source

Query

REFCLKSRC?

Response

source

Parameter

source

Baseband signal reference clock

INT
Internal signal (Default)

EXT
External input signal

Example of Use

To set the baseband signal reference clock to external input signal.

REFCLKSRC EXT
REFCLKVAL/REFCLKVAL?
Baseband Reference Clock

Function

This command 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

<table>
<thead>
<tr>
<th>Sampling Clock [MHz]</th>
<th>Baseband Reference Clock Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>0.02 ≤ f &lt; 0.024414062</td>
<td>✓</td>
</tr>
<tr>
<td>0.024414062 ≤ f &lt; 0.048828125</td>
<td>✓</td>
</tr>
<tr>
<td>0.048828125 ≤ f &lt; 0.09765625</td>
<td>✓</td>
</tr>
<tr>
<td>0.09765625 ≤ f &lt; 0.1953125</td>
<td>✓</td>
</tr>
<tr>
<td>0.1953125 ≤ f &lt; 2.5</td>
<td>✓</td>
</tr>
<tr>
<td>2.5 ≤ f &lt; 5</td>
<td>✓</td>
</tr>
<tr>
<td>5 ≤ f &lt; 10</td>
<td>✓</td>
</tr>
<tr>
<td>10 ≤ f &lt; 20</td>
<td>✓</td>
</tr>
<tr>
<td>20 ≤ f &lt; 40</td>
<td>✓</td>
</tr>
<tr>
<td>40 ≤ f &lt; 80</td>
<td>✓</td>
</tr>
<tr>
<td>80 ≤ f &lt; 160</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Example of Use**

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

```
REFCLKVAL 2
```
**SAMPLINGCLK?**

Sampling Clock Query

**Function**

This command 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/SATRGOUT?
SA Trigger Out

Function
This command selects the type of the trigger to be output to the SG marker of SA/SPA.

Command
SATRGOUT triggertoSA

Query
SATRGOUT?

Response
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 the type of the trigger to be output to the SG marker of SA/SPA.
SATRGOUT MARKER1
SFTGGENBUS
Remote Command Trigger

Function
This command triggers the output of waveform pattern. This becomes available when Trigger Source is BUS.

Command
SFTGGENBUS

Example of Use
To trigger the output of waveform pattern.
SFTGGENBUS

SFTRG/SFTRG?
External Trigger - On/Off

Function
This command sets the external trigger ON/OFF.

Command
SFTRG on_off

Query
SFTRG?

Response
on_off

Parameter
on_off External trigger On/Off
ON On
OFF Off

Example of Use
To enable the external trigger.
SFTRG ON
SFTRGMODE/SFTRGMODE?
External Trigger - Mode

Function

This command 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
This command switches the display position of the Signal Generator screen.

Command
SGWINDOWPOS position

Query
SGWINDOWPOS?

Response
position

Parameter
position  Display position
TOP     Top
BOTTOM  Bottom

Example of Use
To display the Signal Generator screen at the bottom.
SGWINDOWPOS BOTTOM
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SPREV/SPREV?
RF Spectrum - Reverse/Normal

Function
This command 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              Normal: 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
STDLYSRC/STDLYSRC?
Start Trigger Delay Source

Function

This command sets the signal source of the external trigger.

Command

STDLYSRC source

Query

STDLYSRC?

Response

source

Parameter

source                             External trigger signal source
  EXTTRG                           External input signal
  KEY                               Trigger key input
  BUS                               Remote Command

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

This command 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.
  Default         0
  Response unit   None (Symbol or chip)
```

Example of Use

To set the start trigger delay time to 30 chips.

```
STDLYSYM 30
```
STDLYTIME?
Start Trigger Delay Time Query

Function

This command queries a value computed by converting the output timing of RF signals into time.

Query

STDLYTIME?

Response

time

Parameter

time Start trigger delay time
Range Varies depending on the selected waveform pattern.
Resolution Varies depending on the selected waveform pattern.
Response unit s

Example of Use

To query the output timing of the external trigger.
STDLYTIME?
> 6.50E-8
STGS/STGS?
External Trigger - Mode

Function
This command sets the external trigger operation mode.

Command
STGS mode

Query
STGS?

Response
mode

Parameter
mode

- INT: Does not use external trigger (Default)
- 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
SYS/SYS?
Application Switch Command/Application Status Query

Function

This command sets the operation target (application) to the signal generator. The execution status of the specified application is returned in response to a query.

Command

SYS SG,window

Query

SYS? SG

Response

status,window

Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>window</td>
<td>Window status (optional)</td>
</tr>
<tr>
<td>ACT</td>
<td>Active (brought to front)</td>
</tr>
<tr>
<td>INACT</td>
<td>Inactive</td>
</tr>
<tr>
<td>MIN</td>
<td>Minimized</td>
</tr>
<tr>
<td>NON</td>
<td>No window displayed (response only)</td>
</tr>
<tr>
<td>When omitted</td>
<td>Same as ACT</td>
</tr>
<tr>
<td>status</td>
<td>Application status</td>
</tr>
<tr>
<td>CURRENT</td>
<td>Operation target</td>
</tr>
<tr>
<td>IDLE</td>
<td>Loaded but not executed</td>
</tr>
<tr>
<td>RUN</td>
<td>Executed but not targeted for operation</td>
</tr>
<tr>
<td>UNLOAD</td>
<td>Not loaded</td>
</tr>
</tbody>
</table>

Example of Use

To switch the operation target to the signal generator.

SYS SG,ACT
Chapter 4  Native Device Message Details

VDSPL/VDSPL?
Volt Unit Display

Function

This command sets the display method when the output level is set in voltage units.

Command

VDSPL unit

Query

VDSPL?

Response

unit

Parameter

unit
Voltage unit display system
EMF
Open circuit 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

This command queries the waveform memory free space.

Query

WMSPC?

Response

blank,consecutive_blank,total

Parameter

blank
Free space (in byte)
consecutive_blank
Contiguous free space (in byte)
total
Total waveform memory size (in byte)

Example of Use

To query the waveform memory free space.