owon®

DGE2000 Series Dual-Channel Arbitrary Waveform Generator Programmer Manual

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1. Introduction to the SCPI Language

1.1. Command Syntax

The command systems present a hierarchy structure (tree system) and each command consists of a "Root" keyword and one or multiple sub-keywords. The keywords are separated by ":" and are followed by the parameter settings available, "?" is added at the end of the command string to indicate query and the command and parameter are separated by "space".

1.2. Symbol Description

Following symbols are usually used to assist to explain the parameters contained in a command.
a) Braces { }
   The options enclosed in a { } are parameters available in the command. Only one option could be selected every time, and all the options are separated by "|". For example, {ON|OFF} indicates that ON or OFF can be selected.
b) Triangle Brackets < >
   The parameter enclosed in < > must be replaced by an effective value.

1.3. Programmed Parameter Type

The commands contain 8 kinds of parameters, different parameters have different setting methods.

(1) arbitrary block
   A specified length of arbitrary data, for example,
   #6377512xxxxx . . . where
   6 indicates that the following 6 digits (377512) specify the length of the data in bytes;
   xxxxx ... indicates the data or #0xxxxx...<LF><&EOI>

(2) boolean
   Boolean numbers or values, for example,
   ON or $\neq$ 0
   OFF or 0

(3) discrete
   A list of specific values, for example,
   MIN, MAX

(4) NR1 numeric

1

Integers, for example,

0, 2, 30, -5

(5) NR2 numeric

Decimal numbers, for example,

0.6, 3.1415926, -2.6

(6) NR3 numeric

Floating point numbers, for example,

3.1415E-7, -8.2E3

(7) NRf numeric

Flexible decimal number that may be type NR1, NR2 or NR3

See NR1, NR2, and NR3 examples

(8) string

Alphanumeric characters (must be within quotation marks)

"Model, 123456"

1.4. Command Abbreviation

All the commands are case-insensitive, so you can use any kind of them. But if abbreviation is used, all the capital letters specified in commands must be written completely. For example,

SOURce1:FREQuency:FIXed 500kHz also can be:

SOUR1:FREQ:FIX 500kHz

2. Commands

COUNter:COUPling

This command sets or queries the coupling mode of the counter to AC or DC.

Syntax
COUNter:COUPling [AC|DC]
COUNter:COUPling?

Arguments
AC means that AC is selected for the coupling mode of the counter.
DC means that DC is selected for the coupling mode of the counter.

Returns
AC|DC

Example
COUNter:COUPling DC
sets the coupling mode of the counter to DC.

COUNter:DUTYcycle? (Query Only)

This query-only command returns the measurement results for duty cycle of the counter.

Syntax
COUNter:DUTYcycle?

Arguments
None

Returns
<dutycycle>::=<NR3>

Examples
:COUNter:DUTYcycle?
might returns 2.265700368E+01.

COUNter:FREQ? (Query Only)

This query-only command returns the measurement results for frequency of the counter.

Syntax
COUNter:FREQ?

Arguments
None

Returns
<frequency>::=<NR3>

Examples
:COUNter:FREQ?
might returns 1.000082563E+02.

COUNter:HFR

This command enables or disables the high-frequency reject of the counter. The query returns the state of high-frequency reject of the counter.

Syntax
COUNter:HFR {ON|OFF|<NR1>}
COUNter:HFR?

Arguments
ON or <NR1>≠0 enables the high-frequency reject of the counter.
OFF or <NR1>=0 disables the high-frequency reject of the counter.

Returns
<NR1>

Examples
COUNter:HFR ON
enables the high-frequency reject of the counter.

COUNter:PERiod? (Query Only)

This query-only command returns the measurement results for period of the counter.

Syntax

COUNter:PERiod?

Arguments

None

Returns

<period>::=<NR3>

Examples

:COUNter:PERiod?

might returns 8.545000251E-03.

COUNter:PULSewidth? (Query Only)

This query-only command returns the measurement results for pulse width of the counter.

Syntax

COUNter:PULSewidth?

Arguments

None

Returns

<pulsewidth>::=<NR3>

Examples

:COUNter:PULSewidth?

might returns 366213017E-03.

COUNter:SENSitivity

This command sets or queries the trigger sensitivity of the counter.

Syntax

COUNter:SENSitivity [LOW|MIDDle|HIGH]
COUNter:SENSitivity?

Arguments

LOW means that Low is selected for the trigger sensitivity of the counter.
MIDDle means that Middle is selected for the trigger sensitivity of the counter.
HIGH means that High is selected for the trigger sensitivity of the counter.

Returns
LOW|MIDDle|HIGH

Example
COUNter:SENSitivity LOW
sets the trigger sensitivity of the counter to Low.

DISPlay:BRIGhtness

This command sets or queries the brightness of the LCD display.

Syntax
DISPlay:BRIGhtness {<brightness>|MINimum|MAXimum}
DISPlay:BRIGhtness?

Arguments
<brightness>::=<NR1>[<units>]
 where:
<NR1> is a range of display brightness from 0 through 100. The larger the value, the higher the screen brightness.
<units>::=[PCT]
MINimum sets the display to the lowest brightness level.
MAXimum sets the display to the highest brightness level.

Returns
<NR1>

Examples
DISPlay:BRIGhtness 90
sets the display brightness to 90%.

DISPlay:SAVer:DELay

This command sets or queries delay time for the screen saver function. The setting range is 1 minute to 999 minutes.

Syntax
DISPlay:SAVer:DELay {<minutes>|MINimum|MAXimum}
DISPlay:SAVer:DELay? {MINimum|MAXimum}

Arguments

<minutes>::=<NR1>[<units>]

where:

<NR1> is the delay time in minutes.

<units>::=MIN

Returns

<minutes>

Examples

DISPlay:SAVer:DELay 30

sets the delay time for the screen saver function to 30 minutes.

DISPlay:SAVer:IMMediate (No Query Form)

This command sets the screen saver state to ON, regardless of the
DISPlay:SAVer[:STATe] command setting.
The screen saver is enabled immediately (without waiting for the delay time).

Syntax

DISPlay:SAVer:IMMediate

Arguments

None

Examples

DISPlay:SAVer:IMMediate

sets the screen saver state to ON.

DISPlay:SAVer[:STATe]

This command sets or queries the screen saver setting of the LCD display. When enabled,
the screen saver function starts automatically if no operations are applied to the
instrument front panel for the delay time set in DISPlay:SAVer:DELay.

Syntax

DISPlay:SAVer[:STATe] {ON|OFF|<NR1>}

DISPlay:SAVer[:STATe]?

Arguments

ON or <NR1>≠0 enables the screen saver function.

OFF or <NR1>=0 disables the screen saver function.

Returns

<NR1>

indicating the screen saver state.

Examples

DISPlay:SAVer:STATe OFF

disables the screen saver function.

HCOPy:SDUMp:DATA? (Query Only)

This query-only command returns a specified length of binary data which consist a BMP screen image.

Syntax

HCOPy:SDUMp:DATA?

Arguments

None

Returns

<data>::=<arbitrary block>

Examples

HCOPy:SDUMp:DATA?

might return the following response:

#6377512xxxxx . . . where

6 indicates that the following 6 digits (377512) specify the length of the data in bytes;

xxxxx ... indicates the BMP image data.

HCOPy:SDUMp[:IMMediate] (No Query Form)

This command copies a screen image and saves the image file to a USB memory. The default file name is n.BMP, where n is a consecutive number from 0. The image files are saved in a folder named Model/IMAGE (Model is the instrument model) in the USB memory.

Syntax

HCOPy:SDUMp[:IMMediate]

Arguments

None

Examples

HCOPy:SDUMp:IMMediate

copies the screen image and may create a file 1.BMP in a USB memory.

*IDN? (Query Only)

This query-only command returns identification information on the instrument.

Syntax

*IDN?

Arguments

None

Returns

<Manufacturer>,<Model>,<Serial Number>,<Firmware Level>

Examples

*IDN?

might return the following response:

Factory,XDG3202,1837001,SCPI:99.0 FV:V1.2.0

OUTPut[1|2]:IMPedance

This command sets the output load impedance for the specified channel. The specified value is used for amplitude, offset, and high/low level settings. You can set the impedance to any value from 1 Ω to 10 kΩ with a resolution of 1 Ω. The default value is 50 Ω. The query returns the current load impedance setting in ohms. If the load impedance is set to INFinity, the query returns "9.9E+37".

Syntax

OUTPut[1|2]:IMPedance {<ohms>|INFinity|MINimum|MAXimum}

OUTPut[1|2]:IMPedance? {MINimum|MAXimum}

Arguments

<ohms>::=<NR3>[<units>]

where:

<units>::=OHM

INFinity sets the load impedance to >10 kΩ.

MINimum sets the load impedance to 1 Ω.

MAXimum sets the load impedance to 10 kΩ.

Returns

<ohms>::=<NR3>

Examples

OUTPut1:IMPedance MAXimum

sets the CH1 load impedance to 10 kΩ.

OUTPut[1|2][:STATe]

This command sets or query the instrument output state for the specified channel.

Syntax

OUTPut[1|2][:STATe] {ON|OFF|<NR1>}

OUTPut[1|2][:STATe]?

Arguments

ON or <NR1>≠0 enables the instrument output.

OFF or <NR1>=0 disables the instrument output.

Returns

<NR1>

Examples

OUTPut1:STATe ON

sets the instrument CH1 output to ON.

*RST (No Query Form)

This command resets the instrument to the factory default settings.

Syntax

*RST

Arguments

None

Examples

*RST

resets the instrument settings to the factory defaults.

[SOURce[1|2]]:AM[:DEPTh]

This command sets or queries the modulation depth of AM modulation for the specified channel. Set the modulation depth from 0% to 100% with resolution of 1%.

Syntax
[SOURce[1|2]]:AM[:DEPTh] {<depth>|MINimum|MAXimum}
[SOURce[1|2]]:AM[:DEPTh]? [MINimum|MAXimum]

Arguments
<depth>::=<NR2>[<units>]
where:
<NR2> is the depth of modulating frequency.
<units>::=PCT
MINimum sets the modulation depth to minimum value. MAXimum sets the modulation depth to maximum value.

Returns
<depth>

Examples
SOURce1:AM:DEPth MAXimum
sets the depth of modulating signal on CH1 to the maximum value.

[SOURce[1|2]]:AM:INTernal:FREQuency

This command sets or queries the internal modulation frequency of AM modulation for the specified channel. Use this command when the internal modulation source is selected. Set the internal modulation frequency from 2 mHz to 100.00 kHz with resolution of 1 mHz.

Syntax
[SOURce[1|2]]:AM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:AM:INTernal:FREQuency? [MINimum|MAXimum]

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the modulation frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples

SOURce1:AM:INTernal:FREQuency 10kHz

sets the CH1 internal modulation frequency to 10 kHz.

[SOURce[1|2]]:AM:INTernal:FUNCtion

Set or query the AM modulation waveform of the specified channel. This command can be used when selecting the internal modulation signal source.

Syntax

[SOURce[1|2]]:AM:INTernal:FUNCtion {SINusoid|SUQare|RAMP|PRNoise}
[SOURce[1|2]]:AM:INTernal:FUNCtion?

Arguments

SINusoid: sine wave

SUQare: square wave

RAMP: ramp wave

PRNoise: noise wave

Returns

SIN, SUQ, RAMP, PRN

Examples

SOURce1:AM:INTernal:FUNCtion SUQare

Set the AM modulation waveform of CH1 to a square wave.

[SOURce[1|2]]:AM:SOURce

This command sets or queries the source of modulating signal of AM modulation for the specified channel.

Syntax

[SOURce[1|2]]:AM:SOURce [INTernal|EXTernal]
[SOURce[1|2]]:AM:SOURce?

Arguments

INTernal means that the carrier waveform is modulated with an internal source.

EXTernal means that the carrier waveform is modulated with an external source.

Returns

INT|EXT

Examples

SOURce1:AM:SOURce INTernal

sets the CH1 source of modulating signal to internal.

[SOURce[1|2]]:AM:STATe

This command enables or disables AM modulation for the specified channel. The query returns the state of AM modulation.

Syntax

[SOURce[1|2]]:AM:STATe {ON|OFF|<NR1>}

[SOURce[1|2]]:AM:STATe?

Arguments

If [SOURce[1|2]] are omitted, CH1 is specified automatically.

ON or <NR1>≠0 enables AM modulation.

OFF or <NR1>=0 disables AM modulation.

Returns

<NR1>

Examples

SOURce1:AM:STATe ON

enables the CH1 AM modulation.

[SOURce[1|2]]:BURSt:GATE:POLarity

This command sets the generator to output a burst when the gated signal at the [Ext Trig/Burst/Fsk In] connector at the rear panel is high level or low level.

This command is only available in gated Burst mode.

Syntax

[SOURce[1|2]]:BURSt:GATE:POLarity{NORMal|INVerted}

[SOURce[1|2]]:BURSt:GATE:POLarity?

Arguments

NORMal sets the polarity to Normal.

INVerted sets the polarity to Inverted.

Returns

NORM|INV

Examples
SOURce1:BURSt:GATE:POLarity INVerted
sets the polarity to INVerted, means the instrument outputs a burst when the gated signal
at the [Ext Trig/Burst/Fsk In] connector at the rear panel is low level.

[SOURce[1|2]]:BURSt:INTernal:PERiod

This command sets or queries the Burst period for the specified channel.

Syntax
[SOURce[1|2]]:BURSt:INTernal:PERiod {<period>|MINimum|MAXimum}
[SOURce[1|2]]:BURSt:INTernal:PERiod?[MINimum|MAXimum]

Arguments
<period>::=<NRf>[<units>]
where
<NRf> is the Burst period.
<units>::=[ns|us|ms|s]

Returns
<period>

Examples
SOURce1:BURSt:INTernal:PERiod 200ns
sets the CH1 Burst period to 200 ns.

[SOURce[1|2]]:BURSt:MODE

This command sets or queries the burst mode for the specified channel.

Syntax
[SOURce[1|2]]:BURSt:MODE {TRIGgered|GATed}
[SOURce[1|2]]:BURSt:MODE?

Arguments
TRIGgered means that triggered mode is selected for burst mode.
GATed means that gated mode is selected for burst mode.

Returns
TRIG|GAT

Examples

SOURce1:BURSt:MODE TRIGgered
selects triggered mode.

[SOURce[1|2]]:BURSt:NCYCles

This command sets or queries the number of cycles (burst count) to be output in burst mode for the specified channel. The query returns 9.9E+37 if the burst count is set to INFinity.

Syntax
[SOURce[1|2]]:BURSt:NCYCles {<cycles>|INFinity|MINimum|MAXimum}
[SOURce[1|2]]:BURSt:NCYCles? {MINimum|MAXimum}

Arguments
<cycles>::=<NRf>
where:
<NRf> is the burst count. The burst count ranges from 1 to 500,000.
INFinity sets the burst count to infinite count.
MINimum sets the burst count to minimum count.
MAXimum sets the burst count to maximum count.

Returns
<cycles>

Examples
SOURce1:BURSt:NCYCles 2
sets the CH1 burst count to 2.

[SOURce[1|2]]:BURSt:SOURce

This command sets or queries the trigger source in the burst mode for the specified channel. This command is available only in the Triggered burst mode.

Syntax
[SOURce[1|2]]:BURSt:SOURce [TIMer|MANual|EXTernal]
[SOURce[1|2]]:BURSt:SOURce?

Arguments
TIMer specifies an internal clock as the trigger source.
MANual specifies a manual trigger input as the trigger source.
EXTernal specifies an external trigger input as the trigger source.

Returns
TIM|MAN|EXT

Examples
SOURce1:BURSt:SOURce EXTernal
sets an external trigger input as the trigger source in the burst mode.

[SOURce[1|2]]:BURSt:STATe

This command enables or disables the burst mode for the specified channel. The query returns the state of burst mode.

Syntax
[SOURce[1|2]]:BURSt:STATe {ON|OFF|<NR1>}
[SOURce[1|2]]:BURSt:STATe?

Arguments
ON or <NR1>≠0 enables the burst mode.
OFF or <NR1>=0 disables the burst mode.

Returns
<NR1>

Examples
SOURce1:BURSt:STATe ON
enables the burst mode for the CH1.

[SOURce[1|2]]:FM[:DEViation]

This command sets or queries the peak frequency deviation of FM modulation for the specified channel. The setting range of frequency deviation depends on the waveform selected as the carrier.

Syntax
[SOURce[1|2]]:FM[:DEViation] {<deviation>|MINimum|MAXimum}
[SOURce[1|2]]:FM[:DEViation]? [MINimum|MAXimum]

Arguments
<deviation>::=<NRf>[<units>]
where:
<NRf> is the frequency deviation.

<units>::=[Hz|kHz|MHz]

Returns
<deviation>

Examples
SOURce1:FM:DEViation 1.0MHz
sets the CH1 frequency deviation to 1.0 MHz.

[SOURce[1|2]]:FM:INTernal:FREQuency

This command sets or queries the internal modulation frequency of FM modulation for the specified channel. Use this command when the internal modulation source is selected.

Set the internal modulation frequency from 2 mHz to 100.00 kHz with resolution of 1 mHz.

Syntax
[SOURce[1|2]]:FM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FM:INTernal:FREQuency? [MINimum|MAXimum]

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the modulation frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FM:INTernal:FREQuency 10kHz
sets the CH1 internal modulation frequency to 10 kHz.

[SOURce[1|2]]:FM:INTernal:FUNCtion

Set or query the FM modulation waveform of the specified channel. This command can be used when selecting the internal modulation signal source.

Syntax
[SOURce[1|2]]:FM:INTernal:FUNCtion {SINusoid|SUQare|RAMP|PRNoise}
[SOURce[1|2]]:FM:INTernal:FUNCtion?

Arguments

SINusoid: sine wave

SUQare: square wave

RAMP: ramp wave

PRNoise: noise wave

Returns

SIN, SUQ, RAMP, PRN

Examples

SOURce1:FM:INTernal:FUNCtion SUQare

Set the FM modulation waveform of CH1 to a square wave.

[SOURce[1|2]]:FM:SOURce

This command sets or queries the source of modulating signal of FM modulation for the specified channel.

Syntax

[SOURce[1|2]]:FM:SOURce [INTernal|EXTernal]

[SOURce[1|2]]:FM:SOURce?

Arguments

INTernal means that the carrier waveform is modulated with the internal source.

EXTernal means that the carrier waveform is modulated with an external source.

Returns

INT|EXT

Examples

SOURce1:FM:SOURce INTernal

sets the CH1 source of modulating signal to internal.

[SOURce[1|2]]:FM:STATe

This command enables or disables FM modulation. The query returns the state of FM modulation.

Syntax

[SOURce[1|2]]:FM:STATe {ON|OFF|<NR1>}

[SOURce[1|2]]:FM:STATe?

Arguments
ON or <NR1>≠0 enables FM modulation.
OFF or <NR1>=0 disables FM modulation.

Returns
<NR1>

Examples
SOURce1:FM:STATe ON
enables the CH1 FM modulation.

[SOURce[1|2]]:FREQuency:CENTer

This command sets or queries the center frequency of sweep for the specified channel.
This command is always used with the [SOURce[1|2]]:FREQuency:SPAN command. The
setting range of center frequency depends on the waveform selected for sweep.

Syntax
[SOURce[1|2]]:FREQuency:CENTer {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FREQuency:CENTer? {MINimum|MAXimum}

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the center frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FREQuency:CENTer 550kHz
sets the CH1 center frequency to 550 kHz.

[SOURce[1|2]]:FREQuency[:FIXed]

This command sets or queries the frequency of output waveform for the specified channel.
The setting range of output frequency depends on the type of output waveform. If you
change the type of output waveform, it might change the output frequency because
changing waveform types impacts on the setting range of output frequency. The resolution
is 1 µHz or 12 digits.

Syntax

[SOURce[1|2]]:FREQuency[:FIXed] {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FREQuency[:FIXed]? {MINimum|MAXimum}

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the output frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FREQuency:FIXed 500kHz
sets the CH1 output frequency to 500 kHz.

[SOURce[1|2]]:FREQuency:SPAN

This command sets or queries the span of frequency sweep for the specified channel.
This command is always used with the [SOURce[1|2]]:FREQuency:CENTer command.
The setting range of frequency span depends on the waveform selected for sweep.

Syntax
[SOURce[1|2]]:FREQuency:SPAN {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FREQuency:SPAN? {MINimum|MAXimum}

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the frequency span.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FREQuency:SPAN 900 kHz
sets the CH1 frequency span to 900 kHz.

[SOURce[1|2]]:FREQuency:STARt

This command sets or queries the start frequency of sweep for the specified channel. This

command is always used with the [SOURce[1|2]]:FREQuency:STOP command. The setting range of start frequency depends on the waveform selected for sweep.

Syntax
[SOURce[1|2]]:FREQuency:STARt {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FREQuency:STARt? {MINimum|MAXimum}

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the start frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FREQuency:STARt 10kHz
sets the sweep start frequency of CH1 to 10 kHz.

[SOURce[1|2]]:FREQuency:STOP

This command sets or queries the stop frequency of sweep for the specified channel. This command is always used with the [SOURce[1|2]]:FREQuency:STARt command. The setting range of stop frequency depends on the waveform selected for sweep.

Syntax
[SOURce[1|2]]:FREQuency:STOP {<frequency>|MINimum|MAXimum}
[SOURce[1|2]]:FREQuency:STOP? {MINimum|MAXimum}

Arguments
<frequency>::=<NRf>[<units>]
where:
<NRf> is the stop frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:FREQuency:STOP 100KHz
sets the stop frequency of CH1 to 100 kHz.

[SOURce[1|2]]:FUNCtion:SHAPe

Set or query the shape of the output waveform.

Syntax
[SOURce[1|2]]:FUNCtion:SHAPe {SINusoid|SQUare|PULSe|RAMP|PRNoise}
[SOURce[1|2]]:FUNCtion:SHAPe?

Arguments
<Built_in>::={SINusoid|SQUare|PULSe|RAMP|PRNoise}

Returns
SIN, SQU, PUL, RAMP, PRN

Examples
SOURce1:FUNCtion:SHAPe RAMP
Set the waveform shape of CH1 to a ramp wave.

[SOURce[1|2]]:FUNCtion:RAMP:SYMMetry

This command sets or queries the symmetry of ramp waveform for the specified channel.
The setting range is 0.0% to 100.0%.

Syntax
[SOURce[1|2]]:FUNCtion:RAMP:SYMMetry {<symmetry>|MINimum|MAXimum}
[SOURce[1|2]]:FUNCtion:RAMP:SYMMetry?

Arguments
<symmetry>::=<NR2>[<units>]
where:
<NR2> is the symmetry.
<units>::=PCT

Returns
<symmetry>

Examples
SOURce1:FUNCtion:RAMP:SYMMetry 80.5
sets the symmetry of the CH1 ramp waveform to 80.5%.

[SOURce[1|2]]:MODE:STATe

This command enables or disables the modulation function for the specified channel. The query returns the state of modulation function.

Syntax
[SOURce[1|2]]:MODE:STATe {ON|OFF|<NR1>}
[SOURce[1|2]]:MODE:STATe?

Arguments
ON or <NR1>≠0 enables the modulation function.
OFF or <NR1>=0 disables the modulation function.

Returns
<NR1>

Examples
SOURce1:MODE:STATe ON
enables the modulation function for the CH1.

[SOURce[1|2]]:PHASe[:ADJust]

This command sets or queries the phase of output waveform for the specified channel.
Set the value in radians or degrees. If no units are specified, the default is RAD. The query returns the value in RAD.
This command is supported when you select a waveform other than DC and Noise.

Syntax
[SOURce[1|2]]:PHASe[:ADJust] {<phase>|MINimum|MAXimum}
[SOURce[1|2]]:PHASe[:ADJust]? {MINimum|MAXimum}

Arguments
<phase>::=<NR3>[<units>]
where:
<NR3> is the phase of output waveform.
<units>::=[RAD|DEG]
If <units> are omitted, RAD is specified automatically. The setting ranges are:
RAD: 0 to +2 PI, relative to phase value
DEG: 0 to +360, relative to phase value

Returns

Examples

SOURce1:PHASe:ADJust MAXimum

sets the maximum value for the phase of CH1 output waveform.

[SOURce[1|2]]:PM[:DEViation]

This command sets or queries the phase deviation of PM modulation for the specified channel.

Syntax

[SOURce[1|2]]:PM[:DEViation] {<deviation>|MINimum|MAXimum}

[SOURce[1|2]]:PM[:DEViation]? [MINimum|MAXimum]

Arguments

<deviation>::=<NR3>[<units>]

where:

<NR3> is the phase deviation.

<units>::=[RAD|DEG]

If <units> are omitted, RAD is specified automatically. The setting ranges are:

RAD: 0 PI to +1 PI, relative to phase value

DEG: 0 to +180, in 1 degree steps, relative to phase value

Returns

<deviation>

Examples

SOURce1:PM:DEViation MAXimum

sets the maximum value for the CH1 phase deviation of PM modulation.

[SOURce[1|2]]:PM:INTernal:FREQuency

This command sets or queries the internal modulation frequency of PM modulation for the specified channel. Use this command when the internal modulation source is selected. Set the internal modulation frequency from 2 mHz to 100.00 kHz with resolution of 1 mHz.

Syntax

[SOURce[1|2]]:PM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}

[SOURce[1|2]]:PM:INTernal:FREQuency? [MINimum|MAXimum]

Arguments

<frequency>::=<NRf>[<units>]
where:
<NRf> is the modulation frequency.
<units>::=[Hz|kHz|MHz]

Returns
<frequency>

Examples
SOURce1:PM:INTernal:FREQuency 10kHz
sets the CH1 internal modulation frequency to 10 kHz.

[SOURce[1|2]]:PM:INTernal:FUNCtion

Set or query the PM modulation waveform of the specified channel. This command can be used when selecting the internal modulation signal source.

Syntax
[SOURce[1|2]]:PM:INTernal:FUNCtion {SINusoid|SUQare|RAMP|PRNoise}
[SOURce[1|2]]:PM:INTernal:FUNCtion?

Arguments
SINusoid: sine wave
SUQare: square wave
RAMP: ramp wave
PRNoise: noise wave

Returns
SIN, SUQ, RAMP, PRN

Examples
SOURce1:PM:INTernal:FUNCtion SUQare
Set the PM modulation waveform of CH1 to a square wave.

[SOURce[1|2]]:PM:SOURce

This command sets or queries the source of modulation signal of PM modulation for the specified channel.

Syntax
[SOURce[1|2]]:PM:SOURce [INTernal|EXTernal]
[SOURce[1|2]]:PM:SOURce?

Arguments

INTernal means that the carrier waveform is modulated with an internal source.

EXTernal means that the carrier waveform is modulated with an external source.

Returns

INT|EXT

Examples

SOURce1:PM:SOURce INTernal

sets the CH1 source of modulating signal to internal.

[SOURce[1|2]]:PM:STATe

This command enables or disables PM modulation. The query returns the state of PM modulation. Select a sine, square, ramp, or arbitrary waveform as the carrier waveform.

Syntax

[SOURce[1|2]]:PM:STATe {ON|OFF|<NR1>}

[SOURce[1|2]]:PM:STATe?

Arguments

ON or <NR1>≠0 enables PM modulation.

OFF or <NR1>=0 disables PM modulation.

Returns

<NR1>

Examples

SOURce1:PM:STATe ON

enables the CH1 PM modulation.

[SOURce[1|2]]:PULSe:DCYCle

This command sets or queries the duty cycle of the pulse waveform for the specified channel.

This parameter is related to the pulse width and when any of them is changed, the other will be modified automatically.

The pulse duty cycle is limited by the minimum pulse width and pulse period.

pulse duty cycle ⩾ 100% ✕ minimum pulse width ÷ pulse period

pulse duty cycle ⩽ 100% ✕ (1 - 2 ✕ minimum pulse width ÷ pulse period)

Syntax

[SOURce[1|2]]:PULSe:DCYCle {<percent>|MINimum|MAXimum}

[SOURce[1|2]]:PULSe:DCYCle? [MINimum|MAXimum]

Arguments

<percent>::=<NR2>[<units>]

where:

<NR2> is the duty cycle.

<units>::=PCT

Returns

<percent>

Examples

SOURce1:PULSe:DCYCle 80.5

sets the duty cycle of the pulse waveform on CH1 to 80.5%.

[SOURce[1|2]]:PULSe:TRANsition[:LEADing]

This command sets or queries the leading edge time of pulse waveform.

Syntax

[SOURce[1|2]]:PULSe:TRANsition[:LEADing] {<seconds>|MINimum|MAXimum}

[SOURce[1|2]]:PULSe:TRANsition[:LEADing]?[MINimum|MAXimum]

Arguments

<seconds>::=<NRf>[<units>]

where

<NRf> is the leading edge time of pulse waveform.

<units>::=[ns|us|ms|s]

Returns

<seconds>

Examples

SOURce1:PULSe:TRANsition:LEADing 200ns

sets the CH 1 leading edge time to 200 ns.

[SOURce[1|2]]:PULSe:TRANsition:TRAiling

This command sets or queries the trailing edge time of pulse waveform.

Syntax

[SOURce[1|2]]:PULSe:TRANsition:TRAiling {<seconds>|MINimum|MAXimum}

[SOURce[1|2]]:PULSe:TRANsition:TRAiling?[MINimum|MAXimum]

Arguments

<seconds>::=<NRf>[<units>]

where

<NRf> is the trailing edge of pulse waveform.

<units>::=[ns|us|ms|s]

Returns

<seconds>

Examples

SOURce1:PULSe:TRANsition:TRAiling 200ns

sets the trailing edge time to 200 ns.

[SOURce[1|2]]:PULSe:WIDTh

This command sets or queries the pulse width for the specified channel.

Syntax

[SOURce[1|2]]:PULSe:WIDTh {<seconds>|MINimum|MAXimum}

[SOURce[1|2]]:PULSe:WIDTh?[MINimum|MAXimum]

Arguments

<seconds>::=<NRf>[<units>]

where

<NRf> is the pulse width.

<units>::=[ns|us|ms|s]

Returns

<seconds>

Examples

SOURce1:PULSe:WIDTh 200ns

sets the CH 1 pulse width to 200 ns.

[SOURce[1|2]]:SWEep:SOURce

This command sets or queries the trigger source in the sweep mode for the specified channel.

Syntax

[SOURce[1|2]]:SWEep:SOURce [TIMer|MANual|EXTernal]
[SOURce[1|2]]:SWEep:SOURce?

Arguments
TIMer specifies an internal clock as the trigger source.
MANual specifies a manual trigger input as the trigger source.
EXTernal specifies an external trigger input as the trigger source.

Returns
TIM|MAN|EXT

Examples
SOURce1:SWEep:SOURce EXTernal
sets an external trigger input as the trigger source in the sweep mode.

[SOURce[1|2]]:SWEep:SPACing

This command selects linear or logarithmic spacing for the sweep for the specified channel.
The query returns the type for the sweep spacing for the specified channel.

Syntax
[SOURce[1|2]]:SWEep:SPACing {LINear|LOGarithmic}
[SOURce[1|2]]:SWEep:SPACing?

Arguments
LINear sets the sweep spacing to linear.
LOGarithmic sets the sweep spacing to logarithmic.

Returns
LIN|LOG

Examples
SOURce1:SWEep:SPACing LINear
sets the CH1 sweep spacing to linear.

[SOURce[1|2]]:SWEep:STATe

This command enables or disables the sweep mode for the specified channel. The query returns the state of sweep mode.

Syntax

[SOURce[1|2]]:SWEep:STATe {ON|OFF|<NR1>}
[SOURce[1|2]]:SWEep:STATe?

Arguments

ON or <NR1>≠0 enables the sweep mode.
OFF or <NR1>=0 disables the sweep mode.

Returns

<NR1>

Examples

SOURce1:SWEep:STATe ON
enables the sweep mode for the CH1.

[SOURce[1|2]]:SWEep:TIME

This command sets or queries the sweep time for the sweep for the specified channel.
The sweep time does not include hold time and return time. The setting range is 1 ms to
500 s.

Syntax

[SOURce[1|2]]:SWEep:TIME {<seconds>|MINimum|MAXimum}
[SOURce[1|2]]:SWEep:TIME?

Arguments

<seconds>::=<NRf>[<units>]
where:
<NRf> is the sweep time in seconds.
<units>::=[ns|us|ms|s]

Returns

<seconds>

Examples

SOURce1:SWEep:TIME 100ms
sets the CH1 sweep time to 100 ms.

[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet

This command sets or queries the offset level for the specified channel.

Syntax

[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet {<voltage>|MINimum|MAXimum}

[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet? {MINimum|MAXimum}

Arguments
<voltage>::=<NR3>[<units>]
where:
<NR3> is the offset voltage level.
<units>::=[mV|V]

Returns
<voltage>

Examples
SOURce1:VOLTage:LEVel:IMMediate:OFFSet 500mV
sets the CH1 offset level to 500 mV.

[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

This command sets or queries the output amplitude for the specified channel. The amplitude resolution is 1 mVpp or four digits.

Syntax
[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
{<amplitude>|MINimum|MAXimum}
[SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]? {MINimum|MAXimum}

Arguments
<amplitude>::=<NR3>[<units>]
where:
<NR3> is the output amplitude.
<units>::=[mVpp|Vpp]

Returns
<amplitude>

Examples
SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 1Vpp
sets the CH1 output amplitude to 1 Vpp.

SYSTem:BEEPer[:IMMediate] (No Query Form)

This command causes the instrument to beep immediately. This command is only available when the beeper is enabled.

Syntax
SYSTem:BEEPer[:IMMediate]

Arguments
None

Examples
SYSTem:BEEPer
causes a beep.

SYSTem:BEEPer:STATe

The SYSTem:BEEPer:STATe command sets the beeper ON or OFF.
The SYSTem:BEEPer:STATe? command returns "0" (OFF) or "1" (ON).
When the beeper is set to ON, the instrument will beep when an error message or a
warning message is displayed on the screen. The instrument does not beep when an
error or warning caused by remote command execution.

Syntax
SYSTem:BEEPer:STATe {ON|OFF|<NR1>}
SYSTem:BEEPer:STATe?

Arguments
ON or <NR1>≠0 enables the beeper.
OFF or <NR1>=0 disables the beeper.

Returns
<NR1>

Examples
SYSTem:BEEPer:STATe ON
enables the beeper function.

SYSTem:ERRor[:NEXT]? (Query Only)

This query-only command returns the contents of the Error/Event queue.

Syntax
SYSTem:ERRor[:NEXT]?

Arguments

None

Returns

<Error/event number>::=<NR1>

<Error/event description>::=<string>

Examples

SYSTem:ERRor:NEXT?

might return the following response:

-201,"Invalid while in local"

If the instrument detects an error or an event occurs, the event number and event
message will be returned.

SYSTem:LANguage

This command sets or queries the language that the instrument uses to display
information on the screen.

Different languages may support different types of languages.

Syntax

SYSTem:LANguage
{SCHinese|TCHinese|ENGLish|PORTuguese|GERMan|POLish|KORean|JAPAnese}

SYSTem:LANguage?

Arguments

SCHinese|TCHinese|ENGLish|PORTuguese|GERMan|POLish|KORean|JAPAnese

specifies which language will be used to display instrument information on the screen.

Returns

SCH|TCH|ENGL|PORT|GERM|POL|KOR|JAPA

Examples

SYSTem:LANguage ENGLish

specifies that the instrument displays information in English.

SYSTem:VERSion? (Query Only)

This query-only command returns the software version of the instrument.

Syntax

SYSTem:VERSion?

Arguments

None

Returns
<Software Version>::=Vx.x.x
where:
x – indicates the version number.

Examples
SYSTem:VERSion?
might return V1.2.4.

TRACe|DATA[:DATA]

This command transfers the waveform data from the external controller to the edit
memory in the instrument. The query returns the binary block data.

Syntax
TRACe|DATA[:DATA] EMEMory,<binary_block_data>
TRACe|DATA[:DATA]? EMEMory

Arguments
<binary_block_data>
where <binary_block_data> is the waveform data in binary format.

Returns
<binary_block_data>

Examples
DATA:DATA EMEMory,#42000<DAB><DAB>...<DAB>
transmits a waveform to the edit memory in the instrument. The block data element
#21000 indicates that 2 is the number of digits in 1000 (byte count) and the 1000 bytes of
binary data are to be transmitted.

3. Command Errors

The following table shows the error messages generated by improper command syntax. Check that the command is properly formed and that it follows the rules in the Syntax and Commands.

Command messages

Code	Message
0 (indicates no error)	
-101	Invalid character
-102	Syntax error
-108	Parameter not allowed
-201	Invalid while in local

Error/Event Queue

The event queue is an FIFO queue, which stores events as they occur in the instrument. The event queue can store up to 64 events.

The oldest error code and text are retrieved by using the following command:

SYSTem:ERRor[:NEXT]?