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Introduction to the SCPI Language

Syntax

SCPI commands present a hierarchical tree structure and contain multiple sub-systems, each of which is made up of a root keyword and one or more sub-keywords. The command string usually starts with ":", 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".

For example,
:TRIGger:SINGle:EDGE:SOURce <source>
:TRIGger:SINGle:EDGE:SOURce?

TRIGger is the root keyword of the command. **SINGle**, **EDGE** and **SOURce** are the second-level, third-level and fourth-level keywords respectively. The command string starts with "**:**" which separates the multiple-level keywords. **<source>** represents parameters available for setting, "**?**" represents query and the command **: TRIGger:SINGle:EDGE:SOURce** and the parameter **<source>** are separated by "space".

Syntax Rules

SCPI language itself defines a group of sub-system keywords, and at the same time allows users to add or reduce keywords. Those keywords can be some meaningful English words and are easy to remember, which are called mnemonics. Mnemonic has long and short types. The short are the abbreviation of the long.

- **Rule to format mnemonics:**

1) If the letter number of an English word is less than or equal to 4, then the word itself can be the mnemonic.(such as "Free" can be "FREE")
2) If the letter number of an English word exceeds 4, then the first four letters will be the mnemonic.(such as "Frequency" can be "FREQ")
3) If the forth letter is vowel, then mnemonic uses the former three letters. Vowels consists of a, e, i, o, and u.(such as "Power" can be "POW")
4) If it is not a word but a sentence, then use the first letters of the former words and the whole of the last word. (such as "Input Voltage" can be "IVOLtage")

- **Usage of symbols**

1) Space

The space is used to separate command and parameter.

2) Colon :

If the colon is in front of the first character, it means the following is Root Command. When the colon is set between two keywords, then it means moving from the current level to the next level.

3) *asterisk

The commands start with asterisk are named Common Command, which is used to execute IEEE488.2 common commands.

4) Braces {}

The parameters enclosed in the braces are optional and are usually separated by the vertical bar "|". When using this command, one of the parameters must be selected.

5) Vertical Bar |

The vertical bar is used to separate multiple parameters and one of the parameters must be selected when using the command.

6) Triangle Brackets < >

The parameter enclosed in the triangle brackets must be replaced by an effective value.

- **Parameter Type**

1) **Discrete**

The parameter should be one of the values listed. For example,

:TRIGger:SINGle:EDGE:SOURce <source>

:TRIGger:SINGle:EDGe:SOURce?

wherein,

<source> can be set to CH1|CH2|EXT|EXT/5

The query returns the abbreviated format: "CH1", "CH2", "EXT", or "EXT/5".

2) **Integer**

Unless otherwise noted, the parameter can be any integer (NR1 format) within the effective value range. Note that, do not set the parameter to a decimal, otherwise errors will occur. For example,

:CH<n>:OFFSet <offset>

:CH<n>:OFFSet?

wherein,

<n> can be set to 1 or 2, represents CH1 or CH2.

<offset> can be set to any integer between -2000 and 2000.

The query returns any integer between -2000 and 2000.

3) Bool

The parameter could be "OFF", "ON". For example,

:CH1:DISPlay <bool>

:CH1:DISPlay?

wherein,

<bool> can be set to {OFF|ON}

The query returns "OFF" or "ON".

Command Abbreviation

Each SCPI command can be written mixed with uppercase and lowercase according to the syntax rules, and the capital letter part is just the abbreviation of the command. If abbreviation is used, all the capital letters in the command must be written completely. For parameters with units, please refer to the detail parameter specifications in the sub-system.

Example 1：
:ACQuire:MODE SAMPle
Abbreviation Below：
:ACQ:MODE SAMP

Example 2：
:CH1:SCALe 1v
Abbreviation Below：
:CH1:SCAL 1v

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Third-party API

The SCPI protocol of this instrument is based on USB port and LAN communication.
Run the oscilloscope software; click "**Communications**" in the menu bar, choose "**Command Line**". In the SCPI COMMAND LINE dialog, you can send SCPI commands to communicate through SCPI protocol.

IEEE488.2 Common Commands

*CLS

Clear all the event registers in the register set and clear the error queue.

*ESE

Set enable register for the standard event register set.

Parameter

Name	Type	Range	Default Value
<value>	Integer	0 to 255	0

Explanation

The bit 1 and bit 6 of the standard event register are not used and are always treated as 0, therefore, the range of <value> are the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 1 and bit 6 are 0.

Definitions of the Bits in ESE Register:

Bit	weights	Name	Enable
7	128	PON	Power On
6 (Not used)	64	URQ	User Request
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DDE	Dev. Dependent Error
2	4	QYE	Query Error
1 (Not used)	2	RQL	Request Control
0	1	OPC	Operation Complete

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

```
*ESE 16
```

The query below returns "16".

```
*ESE?
```

*ESE?

Query which bit in ESE register is enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

```
*ESE 16
```

The query below returns "16".

```
*ESE?
```

*ESR?

Description

Query the event register for the standard event register set.

Parameter

Name	Type	Range	Default Value
<value>	Integer	0 to 255	0

Explanation

The bit 1 and bit 6 of the standard event register are not used and are always treated as 0, therefore, the query returns the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 1 and bit 6 are 0.

Definitions of the Bits in ESE Register:

Bit	weights	Name	Enable
7	128	PON	Power On
6 (Not used)	64	URQ	User Request
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DDE	Dev. Dependent Error
2	4	QYE	Query Error
1 (Not used)	2	RQL	Request Control
0	1	OPC	Operation Complete

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The query below returns "24" (bit 3 and bit 4 have already been set).

*ESR?

*IDN

Return the ID character string of the instrument.

Description

The query returns the ID character string of the instrument.

Return Format

OWON,<model>,<serial number>,X.XX.XX

<model>：the model number of the instrument.

<serial number>：the serial number of the instrument.

X.XX.XX：the software version of the instrument.

Example

OWON,XDS3102A,1528009,V2.1.1.5

*OPC

Set the "Operation Complete" bit in the standard event register to 1 after the current operation is finished.

*OPC？

Query whether the current operation is finished.

Explanation

Note the difference between the *OPC? and *OPC commands: the latter sets the "Operation Complete" bit (bit 0) in the standard event register to 1 after the current operation is finished.

Return Format

The query returns "1" if the current operation is finished, otherwise returns "0".

*RST

Restore the instrument to its default value.

*SRE

Set enable register for the state byte register set.

Parameter

Name	Type	Range	Default Value
<value>	Integer	0 to 255	0

Explanation

The bit 0 and bit 1 of the state byte register are not used and are always treated as 0, therefore, the range of <value> are the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 0 and bit 1 are 0.

Definitions of the Bits in SRE:

Bit	Weights	Name	Enable
7	128	OPER	Operation Status Reg
6	64	---	Not used
5	32	ESB	Event Status Bit
4	16	MAV	Message Available
3	8	---	Not used
2	4	MSG	Message
1 (Not used)	2	USR	User
0 (Not used)	1	TRG	Trigger

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

```
*SRE 16
```

The query below returns "16".

```
*SRE?
```

*STB?

Query the condition register for the state byte register set.

*TST？

Perform self-test and return the test result.
If the returned bit is "0", the corresponding item of the instrument passed this test, while "1" indicates a failure.

*WAI

Wait for the finish of the operation.

Oscilloscope SCPI commands

:ACQuire Command Subsystem

:ACQuire:MODE

Syntax

:ACQuire:MODE <type>

:ACQuire:MODE?

Description

Set the acquisition mode of the oscilloscope.

Parameter

Name	Type	Range	Default Value
<type>	Discrete	{SAMPle|AVERage|PEAK}	SAMP

Explanation

When "AVERage" is selected, use the :ACQuire:AVERage:NUM command to set the number of averages.

Return format

The query returns "SAMPle", "AVERage" or "PEAK".

Example

The command below selects the average acquisition mode.

:ACQuire:MODE AVERage

The query below returns "AVERage".

:ACQuire:MODE?

:ACQuire:AVERage:NUM <count>

Syntax

:ACQuire:AVERage:NUM <count>

:ACQuire:AVERage:NUM?

Description

Set the number of averages.

Parameter

Name	Type	Range	Default Value
<count>	Discrete	{4|16|64|128}	4

Explanation

At present, the number of averages can be set is "4", "16", "64" and "128". When executing :ACQuire:AVERage:NUM <count> , the acquisition mode of the oscilloscope would be changed to AVERage mode automatically.

Return format

The query returns the number of average in character string.

Example

The command below sets the number of averages to "64".

:ACQuire:AVERage:NUM 64

The query below returns "64":

:ACQuire:AVERage:NUM?

:ACQuire:DEPMEM <mdep>

Syntax

:ACQuire:DEPMEM <mdep>

:ACQuire:DEPMEM?

Description

Set the number of waveform points that the oscilloscope can store in a single trigger sample.

Parameter

Name	Type	Range	Default Value
<mdep>	Discrete	{1K|10K|100K|1M|10M|20M|40M}	1K

Explanation

40M is available when only one channel is turned on.

Return format

The query returns the actual number of points (integer).

Example

The command below sets the memory depth to "10K".

:ACQuire:DEPMEM 10K

The query below returns the actual number of points, for example "10K".

:ACQuire:DEPMEM?

:HORIzontal Command Subsystem

:HORIzontal:SCALe

Syntax

:HORIzontal:SCALe <scale_value>

:HORIzontal:SCALe?

Description

Set the scale of the main time base.

Parameter

Name	Type	Range	Default Value
<scale_value>	Discrete	Please refer to Explanation	----

Explanation：Default to set the main time base.

XDS3102A time base gear:
{2.0ns|5.0ns|10.0ns|20.0ns|50.0ns|100ns|200ns|500ns|1.0us|2.0us|5.0us|10us|20us|50us|100us|200us|500us|1.0ms|2.0ms|5.0ms|10ms|20ms|50ms|100ms|200ms|500ms|1.0s|2.0s|5.0s|10s|20s|50s|100s|200s|500s|1000s}

Return Format

The query returns the horizontal scale in character string.

Example

The command below sets the horizontal scale of channel 1 to 200us/div.

:HORIzontal:SCALe 200us

The query below returns "200us".

:HORIzontal:SCALe?

:HORIzontal:OFFset

Syntax

:HORIzontal:OFFset <value>

:HORIzontal:OFFset?

Description

Set the Horizontal offset of the time base.

Parameter

Name	Type	Range	Default Value
<value>	Integer	-10 to +10000 （horizontal offset div）	0

Return Format

The query returns the offset in character string.

Explanation

If the current main time base is 500 us/div, and the horizontal offset is 2 div, then the horizontal offset time is 1.000 ms.

Example

The command below sets the horizontal offset of channel1 to 1 div.

```
:HORIzontal:OFFset 1
```

The query returns horizontal offset div.

If the current main time base is 500 us/div, and the horizontal offset time is 1.000 ms, the query below returns "2".

```
:HORIzontal:OFFset?
```

:CH Command Subsystem

:CH<n>:DISPlay

Syntax

:CH<n>:DISPlay <bool>
:CH<n>:DISPlay?

Description

Turn the display of the channel on or off.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<bool>	Bool	{OFF|ON}	OFF

Return Format

The query returns "OFF" or "ON".

Example

The command below turns the display of channel1 on.
:CH1:DISPlay ON

The query returns "ON".
:CH1:DISPlay?

:CH<n>:COUPling

Syntax

:CH<n>:COUPling <coupling>
:CH<n>:COUPling?

Description

Set the coupling mode of the channel to "AC", "DC" or "GND".

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<coupling>	Discrete	{AC|DC|GND}	DC

Return Format

The query returns "AC", "DC" or "GND".

Example

The command below sets the input coupling mode of channel 1 to "DC".

:CH1:COUPling DC

The query returns "DC".

:CH1:COUPling?

:CH<n>:PROBe

Syntax

:CH<n>:PROBe <atten>

:CH<n>:PROBe?

Description

Set the attenuation ratio of the probe.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<atten>	Discrete	{0.001X|0.002X|0.005X|0.01X|0.02X|0.05X|0.1X|0.2X|0.5X|1X|2X|5X|10X|20X|50X|100X|200X|500X|1000X}	X10

Return Format

The query returns the attenuation ratio of the probe.

Example

The command below sets the attenuation ratio of the probe connected to channel1 to 10.

:CH1:PROBe 10X

The query returns "10X".

:CH1:PROBe?

:CH<n>:SCALe

Syntax

:CH<n>:SCALe <scale>

:CH<n>:SCALe?

Description

Set the vertical scale of the specified waveform display.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<scale>	Discrete	{1mv|2mv|5mv|10mv|20mv|50mv|100mv|200mv|500mv|1v|2v|5v|10v}	----

Explanation

The attenuation ratio of the probe should be considered when setting the parameter. E.g., the attenuation ratio of the probe is 10X, if you want to set the vertical scale as 10 mv, the command is :CH<n>:SCALe 1mv.

Return Format

The query returns the vertical scale in character string.

Example

The command below sets the vertical scale of channel 1 to 1V/div.

:CH1:SCALe 1v

The query returns "1v".

:CH1:SCALe?

:CH<n>:OFFSet

Syntax

:CH<n>:OFFSet <offset>

:CH<n>:OFFSet?

Description

Set the vertical offset of the specified waveform display.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1

<offset>	Integer	-2000 to 2000	0

Return Format

The query returns the offset div value in Integer.

Example

The command below sets the vertical offset of channel 1 to 1 div.

:CH1:OFFSet 1

The query below returns 1.

:CH1:OFFSet?

:CH<n>:INVErse

Syntax

:CH<n>:INVErse <bool>

:CH<n>:INVErse?

Description

Turn the inverse of the channel on or off.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<bool>	Bool	{OFF|ON}	OFF

Return Format

The query returns "OFF" or "ON".

Example

The command below turns the inverse of channel1 on.

:CH1:INVErse ON

The query returns "ON".

:CH1:INVErse?

:MEASUrement Command Subsystem

:MEASUrement:DISPlay

Syntax

:MEASUrement:DISPlay <bool>

:MEASUrement:DISPlay?

Description

Turn the display of measurement on or off.

Parameter

Name	Type	Range	Default Value
<bool>	Bool	{OFF|ON}	OFF

Return Format

The query returns "ON" or "OFF".

Example

The command below turns the display of measurement on.

:MEASUrement:DISPlay ON

The query returns "ON".

:MEASUrement:DISPlay?

:MEASUrement:CH<n>:<items>

Syntax

:MEASUrement:CH<n>:<items>?

Description

Query the specified measurement value of the selected waveform.

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1
<items>	Discrete	{PERiod|FREQuency|AVERage|MAX|MIN |VTOP|VBASe|VAMP|PKPK|CYCRms|RTime|FTime |PDUTy|NDUTy|PWIDth|NWIDth|OVERShoot |PREShoot|RDELay|FDELay|HARDfrequency}	--

Explanation for <items>

Item	Explanation	Item	Explanation
PERiod	Period	FTime	Fall time
FREQuency	Frequency	PDUTy	Positive Duty Cycle
AVERage	Average	NDUTy	Negative Duty Cycle
MAX	Maximum	PWIDth	Positive Pulse Width
MIN	Minimum	NWIDth	Negative Pulse Width
VTOP	Top	OVERShoot	Overshoot
VBASe	Base	PREShoot	Preshoot
VAMP	Amplitude	RDELay	Delay A→B ↑
PKPK	Peak-Peak	FDELay	Delay A→B ↓
CYCRms	Cycle RMS	HARDfrequency	Counter
RTime	Rise time		

Example

The query below returns the frequency measurement value of CH1.

:MEASUrement:CH1:PERiod?

:MEASUrement:CH<n>

Syntax

:MEASUrement:CH<n>?

Description

Query the all the measurement values of the selected waveform (JSON format).

Parameter

Name	Type	Range	Default Value
<n>	Discrete	{1|2}	1

Example

The query below returns all the measurement values of CH1.

:MEASUrement:CH1?

:MEASUrement:ALL

Syntax

:MEASUrement:ALL?

Description

Query the all the measurement values of CH1 and CH2.

:TRIGger Command Subsystem

:TRIGger:STATUS?

Syntax

:TRIGger:STATUS?

Description

Query the current trigger status.

Parameter

Type	Range	Default Value
Discrete	{AUTO|READy|STOP|SCAN|TRIG}	--

Return Format

The query returns the current trigger status.

Example

The query below returns "AUTO".

:TRIGger: STATUS?

:TRIGger:TYPE <type>

Syntax

:TRIGger:TYPE <type>

:TRIGger:TYPE?

Description

Select the trigger type.

Parameter

Name	Type	Range	Default Value
<type>	Discrete	{SINGle}	SING

Return Format

The query returns the current trigger type.

Example

The command below selects single trigger.

:TRIGger:TYPE SINGle

The query below returns "SINGle".

:TRIGger:TYPE?

:TRIGger:SINGle

:TRIGger:SINGle:MODE <type>

Syntax

:TRIGger:SINGle:MODE <type>

:TRIGger:SINGle:MODE?

Description

Select the trigger mode of single trigger.

Parameter

Name	Type	Range	Default Value
<type>	Discrete	{EDGE|VIDeo|PULSe|SLOPe}	EDGE

Return Format

The query returns the current trigger mode of single trigger.

Example

The command below selects edge as trigger mode.

:TRIGger:SINGle:MODE EDGE

The query below returns "EDGE".

:TRIGger:SINGle:MODE?

:TRIGger:SINGle:EDGE

:TRIGger:SINGle:EDGE:SOURce

Syntax

:TRIGger:SINGle:EDGE:SOURce <source>

:TRIGger:SINGle:EDGE:SOURce?

Description

Select the source of SINGle EDGE trigger.

Parameter

Name	Type	Range	Default Value
<source>	Discrete	{CH1|CH2|EXT|EXT/5}	CH1

Return Format

The query returns "CH1", "CH2", "EXT", or "EXT/5".

Example

The command below selects "CH2" as the source of SINGle EDGE trigger.

:TRIGger:SINGle:EDGE:SOURce CH2

The query below returns "CH2".

:TRIGger:SINGle:EDGE:SOURce?

:TRIGger:SINGle:EDGE:COUPling

Syntax

:TRIGger:SINGle:EDGE:COUPling <coupling>

:TRIGger:SINGle:EDGE:COUPling?

Description

Select the coupling mode under SINGle EDGE trigger.

Parameter

Name	Type	Range	Default Value
<coupling>	Discrete	{DC|AC|HF}	DC

Return Format

The query returns "DC", "AC", or "HF".

Example

The command below selects "AC" as the coupling mode of SINGle EDGE trigger.

:TRIGger:SINGle:EDGE:COUPling AC

The query below returns "AC".

:TRIGger:SINGle:EDGE:COUPling?

:TRIGger:SINGle:EDGE:SLOPe

Syntax

:TRIGger:SINGle:EDGE:SLOPe <slope>

:TRIGger:SINGle:EDGE:SLOPe?

Description

Select the slope of SINGle EDGE trigger.

Parameter

Name	Type	Range	Default Value
<slope>	Discrete	{RISE|FALL}	RISE

Return Format

The query returns "RISE" or "FALL".

Example

The command below selects "FALL" as the slope under SINGle EDGE trigger.

:TRIGger:SINGle:EDGe:SLOPe FALL

The query below returns "FALL".

:TRIGger:SINGle:EDGe:SLOPe?

:TRIGger:SINGle:EDGE:LEVel

Syntax

:TRIGger:SINGle:EDGE:LEVel <level>

:TRIGger:SINGle:EDGE:LEVel?

Description

Set the trigger level under SINGle EDGE trigger.

Parameter

Name	Type	Range	Default Value
<level>	Character string	2mv	--

Return Format

The query returns the trigger level in character string.

Example

The command below sets the trigger level of SINGle EDGE trigger in CH1 to 25mv.

```
:TRIGger:SINGle:EDGE:SOURce CH1;
:TRIGger:SINGle:EDGE:LEVel 25mv
```

The query returns "25mv".

```
:TRIGger:SINGle:EDGE:LEVel?
```

:TRIGger:SINGle:VIDeo

:TRIGger:SINGle:VIDeo:SOURce

Syntax

```
:TRIGger:SINGle:VIDeo:SOURce <source>
:TRIGger:SINGle:VIDeo:SOURce?
```

Description

Select the source of SINGle VIDeo trigger.

Parameter

Name	Type	Range	Default Value
<source>	Discrete	{CH1|CH2}	CH1

Return Format

The query returns "CH1" or "CH2".

Example

The command below selects "CH2" as the source under SINGle VIDeo trigger.

```
:TRIGger:SINGle:VIDeo:SOURce CH2
```

The query below returns "CH2".

```
:TRIGger:SINGle:VIDeo:SOURce?
```

:TRIGger:SINGle:VIDeo:MODU

Syntax

:TRIGger:SINGle:VIDeo:MODU <standard>
:TRIGger:SINGle:VIDeo:MODU?

Description

Select the video standard in SINGle VIDeo trigger.

Parameter

Name	Type	Range	Default Value
<standard>	Discrete	{PAL|SECam|NTSC}	NTSC

Return Format

The query returns "PAL", "SECam" or "NTSC".

Example

The command below select "NTSC" as the video standard under SINGle VIDeo trigger.
:TRIGger:SINGle:VIDeo:MODU NTSC
The query below returns "NTSC".
:TRIGger:SINGle:VIDeo:MODU?

:TRIGger:SINGle:VIDeo:SYNC

Syntax

:TRIGger:SINGle:VIDeo:SYNC <mode>
:TRIGger:SINGle:VIDeo:SYNC?

Description

Select the Synchronization Type among LINE, FIELD, ODDField, EVENfield or LNUMber in SINGle VIDeo trigger.

Parameter

Name	Type	Range	Default Value
<mode>	Discrete	{LINE|FIELd|ODD|EVEN|LNUM}	LINE

Return Format

The query returns "LINE", "FIELd", "ODD", "EVEN" or "LNUM".

Example

The command below select "ODD" as the Synchronization Type under SINGle VIDeo trigger.

:TRIGger:SINGle:VIDeo:SYNC ODD

The query below returns "ODD".

:TRIGger:SINGle:VIDeo:SYNC?

:TRIGger:SINGle:VIDeo:LNUM

Syntax

:TRIGger:SINGle:VIDeo:LNUM <line>

:TRIGger:SINGle:VIDeo:LNUM?

Description

Set the line number in SINGle VIDeo trigger when the synchronization type is "LNUM".

Parameter

Name	Type	Range	Default Value
<line>	Integer	NTSC：1 to 525 PAL：1 to 625 SECam：1 to 625	1

Return Format

The query returns the line number in character string in SINGle VIDeo trigger. The source defaults to the current source.

Example

The command below sets "100" as the Line number in SINGle VIDeo trigger.

:TRIGger:SINGle:VIDeo:LNUM 100

The query below returns "100".

:TRIGger:SINGle:VIDeo:LNUM?

:TRIGger:SINGle:SLOPe

:TRIGger:SINGle:SLOPe:ULevel

Syntax

:TRIGger:SINGle:SLOPe:ULevel <volt>

:TRIGger:SINGle:SLOPe:ULevel?

Description

Set the voltage of the high level in single slope trigger.

Parameter

Name	Type	Range	Default Value
<volt>	Character string	Depend on the voltage division	--

Return Format

The query returns the voltage value of the high level in single slope trigger.

Example

The command below sets the high level to 100mv in single slope trigger.

:TRIGger:SINGle:SLOPe:ULevel 100mv

The query below returns "100mv".

:TRIGger:SINGle:SLOPe:ULevel?

:TRIGger:SINGle:SLOPe:LLevel

Syntax

:TRIGger:SINGle:SLOPe:LLevel <volt>

:TRIGger:SINGle:SLOPe:LLevel?

Description

Set the voltage of the low level in single slope trigger.

Parameter

Name	Type	Range	Default Value
<volt>	Character string	Depend on the voltage division	--

Return Format

The query returns the voltage value of the low level in single slope trigger.

Example

The command below sets the low level to 100mv in single slope trigger.

:TRIGger:SINGle:SLOPe:LLevel 100mv

The query below returns "100mv".

:TRIGger:SINGle:SLOPe:LLevel?

:TRIGger:SINGle:SLOPe:SOURce

Syntax

:TRIGger:SINGle:SLOPe:SOURce <source>
:TRIGger:SINGle:SLOPe:SOURce?

Description

Select the source of SINGle SLOPe trigger.

Parameter

Name	Type	Range	Default Value
<source>	Discrete	{CH1|CH2}	CH1

Return Format

The query returns "CH1" or "CH2".

Example

The command below selects "CH2" as the source under SINGle SLOPe trigger.
:TRIGger:SINGle:SLOPe:SOURce CH2
The query below returns "CH2".
:TRIGger:SINGle:SLOPe:SOURce?

:TRIGger:SINGle:SLOPe:SIGN

Syntax

:TRIGger:SINGle:SLOPe:SIGN <sign>
:TRIGger:SINGle:SLOPe:SIGN?

Description

Select the sign of slope condition in single slope trigger.

Parameter

Name	Type	Range	Default Value
<sign>	Discrete	{>|<|=}	>

Return Format

The query returns ">", "<", or "=".

Example

The command below selects "<" as the sign of slope condition in slope trigger.

:TRIGger:SINGle:SLOPe:SIGN <

The query below returns "<".

:TRIGger:SINGle:SLOPe:SIGN?

:TRIGger:SINGle:SLOPe:TIME

Syntax

:TRIGger:SINGle:SLOPe:TIME <time>

:TRIGger:SINGle:SLOPe:TIME?

Description

Set the time in single slope trigger.

Parameter

Name	Type	Range	Default Value
<time>	Character string	100ns to 10s	--

Return Format

The query returns the time in single slope trigger..

Example

The command below sets the time in single slope trigger to 1ms.

:TRIGger:SINGle:SLOPe:TIME 1ms

The query below returns "1ms".

:TRIGger:SINGle:SLOPe:TIME?

:TRIGger:SINGle:SLOPe:SLOPe

Syntax

:TRIGger:SINGle:SLOPe:SLOPe <slope>

:TRIGger:SINGle:SLOPe:SLOPe?

Description

Select the edge of single slope trigger.

Parameter

Name	Type	Range	Default Value
<slope>	Discrete	{POS|NEG}	POS

Return Format

The query returns the edge of single slope trigger.

Example

The command below selects "POS" as the edge of single slope trigger.

:TRIGger:SINGle:SLOPe:SLOPe POS;

The query below returns "POS".

:TRIGger:SINGle:SLOPe:SLOPe?

:TRIGger:SINGle:PULSe

:TRIGger:SINGle:PULSe:SOURce

Syntax

:TRIGger:SINGle:PULSe:SOURce <source>

:TRIGger:SINGle:PULSe:SOURce?

Description

Select the source of SINGle PULSe trigger.

Parameter

Name	Type	Range	Default Value
<source>	Discrete	{CH1|CH2}	CH1

Return Format

The query returns "CH1" or "CH2".

Example

The command below selects "CH2" as the source under SINGle PULSe trigger.

:TRIGger:SINGle:PULSe:SOURce CH2

The query below returns "CH2".

:TRIGger:SINGle:PULSe:SOURce?

:TRIGger:SINGle:PULSe:SIGN

Syntax

:TRIGger:SINGle:PULSe:SIGN <sign>
:TRIGger:SINGle:PULSe:SIGN?

Description

Select the sign of pulse condition in single pulse trigger.

Parameter

Name	Type	Range	Default Value
<sign>	Discrete	{>|<|=}	>

Return Format

The query returns ">", "<", or "=".

Example

The command below selects "<" as the sign of pulse condition in single pulse trigger.
:TRIGger:SINGle:PULSe:SIGN <
The query below returns "<".
:TRIGger:SINGle:PULSe:SIGN?

:TRIGger:SINGle:PULSe:TIME

Syntax

:TRIGger:SINGle:PULSe:TIME <time>
:TRIGger:SINGle:PULSe:TIME?

Description

Set the time in single pulse trigger.

Parameter

Name	Type	Range	Default Value
<time>	Character string	100ns to 10s	--

Return Format

The query returns the time in single pulse trigger..

Example

The command below sets the time in single pulse trigger to 1ms.

:TRIGger:SINGle:PULSe:TIME 1ms

The query below returns "1ms".

:TRIGger:SINGle:PULSe:TIME?

:TRIGger:SINGle:PULSe:DIR

Syntax

:TRIGger:SINGle:PULSe:DIR <dir>

:TRIGger:SINGle:PULSe:DIR?

Description

Select the direction of single pulse trigger.

Parameter

Name	Type	Range	Default Value
<dir>	Discrete	{POS|NEG}	POS

Return Format

The query returns the edge of single pulse trigger.

Example

The command below selects "POS" as the edge of single pulse trigger.

:TRIGger:SINGle:PULSe:DIR POS

The query below returns "POS".

:TRIGger:SINGle:PULSe:DIR?

:TRIGger:SINGle:PULSe:COUPling

Syntax

:TRIGger:SINGle:PULSe:COUPling <coupling>

:TRIGger:SINGle:PULSe:COUPling?

Description

Select the coupling mode in single pulse trigger.

Parameter

Name	Type	Range	Default Value
<coupling>	Discrete	{DC|AC}	DC

Return Format

The query returns "DC" or "AC".

Example

The command below selects "AC" as the coupling mode in single pulse trigger.

```
:TRIGger:SINGle:PULSe:COUPling AC
```

The query below returns "AC".

```
:TRIGger:SINGle:PULSe:COUPling?
```

:TRIGger:SINGle:SWEEp <mode>

Syntax

```
:TRIGger:SINGle:SWEEp <mode>
:TRIGger:SINGle:SWEEp?
```

Description

Select the trigger mode.

Parameter

Name	Type	Range	Default Value
<mode>	Discrete	{AUTO|NORMal|SINGle}	AUTO

Return Format

The query returns the current trigger mode.

Example

The command below selects normal as trigger mode.

```
:TRIGger:SINGle:SWEEp NORMal
```

The query below returns "NORMal".

```
:TRIGger:SINGle:SWEEp?
```

:TRIGger:SINGle:HOLDoff

Syntax

```
:TRIGger:SINGle:HOLDoff <time>
:TRIGger:SINGle:HOLDoff?
```

Description

Set the trigger holdoff time.

Parameter

Name	Type	Range	Default Value
<time>	Character string	100ns to 10s	100ns

Return Format

The query returns the trigger holdoff time.

Example

The command below sets the trigger holdoff time to 1ms.

:TRIGger:SINGle:HOLDoff 1ms

The query below returns "1ms".

:TRIGger:SINGle:HOLDoff?

:Data Command Subsystem

Because of the huge size of the data get from Dada command, there are 4 bytes in the returned data to indicate the size of the returned data.

:DATA:WAVE:SCREen:HEAD?

Syntax

:DATA:WAVE:SCREen:HEAD?

Description

Get the file header of the screen waveform data file.

Return Format

The query returns a piece of text in JSON format.

Example

The command below return a piece of text as the following sample:

```
{"timebase":{"scale":"1.0ms","hoffset":0},"sample":{"fullscreen":1520,
"slowmove":-1,"datalen":1520,"samplerate":"(500ks/s)","type":"sample",
"depmem":"10k"},"channel":[{"name":"ch1","display":"on","coupling":"a
c","probe":"10x","scale":"5.00mv","offset":50,"frequence":0,"inverse":
"off"},{"name":"ch2","display":"on","coupling":"ac","probe":"10x","sc
ale":"10.0mv","offset":45,"frequence":0,"inverse":"off"}],"datatype":
"screen","runstatus":"auto","trig":{"mode":"single","type":"edge","it
ems":{"channel":"ch1","level":"32.0mv","edge":"rise","coupling":"dc",
"holdoff":"100ns"},"sweep":"auto"}}.
```

:DATA:WAVE:SCREen:HEAD?

:DATA:WAVE:SCREen:CH<x>?

Syntax
:DATA:WAVE:SCREen:CH<x>?

Description
Get the screen waveform data of the specified channel.

Return format
The query returns the screen waveform data of the specified channel.

Explanation
The data point is recorded as 12-bit, a point uses two bytes, little-endian byte order.

Example
Reading flow of the screen waveform data:

:DATA:WAVE:SCREen:HEAD?
:DATA:WAVE:SCREen:CH1?
:DATA:WAVE:SCREen:CH2?

:DATA:WAVE:SCREen:BMP?

Syntax
:DATA:WAVE:SCREen:BMP?

Description
Read the data of the image currently displayed.

Return Format
The query returns the data of the image currently displayed in BMP format.

Example

The command below return the data of the image currently displayed in BMP format.

```
:DATA:WAVE:SCREen:BMP?
```

:DATA:WAVE:DEPMem:All?

Syntax

```
:DATA:WAVE:DEPMem:All?
```

Description

Get the data of the deep memory channel.

Return format

The query returns the data of the deep memory channel.

Explanation

The data point is recorded as 12-bit, a point uses two bytes, little-endian byte order.

Example

The command below return the data of the deep memory channel.

```
:DATA:WAVE:DEPMem:ALL?
```

Other Commands

:AUTOset ON

Syntax

```
:AUTOset ON
```

Description

Enable the waveform auto setting function. The oscilloscope adjusts the vertical scale, horizontal time base and trigger mode according to the input signal automatically to realize optimum waveform display. The function of this command is the same with that of **Autoset** at the front panel.

Example

The command below enables the waveform auto setting function.

```
:AUTOset ON
```

:AUTOscale

Syntax

```
:AUTOscale <bool>
:AUTOscale?
```

Description

Query/set the state of auto scale.

Auto scale is a very useful function for first time users to carry out a simple and quick test on the input signal. The function is applied to follow-up signals automatically even if the signals change at any time. Auto scale enables the instrument to set up trigger mode, voltage division and time scale automatically according to the type, amplitude and frequency of the signals.

Parameter

<bool>

Name	Type	Range	Default Value
<bool>	Bool	{{0|OFF}|{1|ON}}	0|OFF

Return Format

The query returns "OFF" or "ON" in character string.

Example

The command below sets the state of auto scale to ON.

```
:AUTOscale ON
```

The query returns "ON".

```
:AUTOscale?
```

:RUNning <type>

Syntax

```
:RUNning <type>
```

Description

Starts/stops the oscilloscope. The functions of these commands are the same with those of **Run/Stop** at the front panel.

Parameter

Name	Type	Range	Default Value
<type>	Discrete	{RUN|STOP}	--

Example

The command below starts the oscilloscope.

```
:RUNning RUN
```

Arbitrary Function Generator SCPI commands

:FUNCtion Command Subsystem

:FUNCtion

Syntax

:FUNCtion <waveform>

:FUNCtion?

Description

Set/query the waveform function for current channel when using the arbitrary function generator.

Parameter

Name	Type	Range	Default Value
<waveform>	Discrete	{SINE|SQUare|RAMP|PULSe|ARB}	----

Return Format

The query returns <waveform> for current channel in character string.

Explanation:

For the multi-channel generator, this command work on the current selected channel by default. If you want to set other channels, you need to switch channel first (refer to the command :CHANnel, such as :CHANnel:CH2).

Example

```
:FUNCtion RAMP
:FUNCtion?
```

:FUNCtion:FREQuency

Syntax

:FUNCtion:FREQuency <frequency>

:FUNCtion:FREQuency?

Description

Set/query the output frequency of current channel when using the arbitrary function generator.

Parameter

<frequency>, floating point number that represents the frequency, in Hz.

Return Format

The query returns the output frequency of current channel in scientific notation.

Explanation:

This command is not available when the waveform is DC or noise.

Example

The command below sets the output frequency of current channel to 10 kHz.

```
:FUNCtion:FREQuency 10000
```

The query below returns "1.000000e+04".

```
:FUNCtion:FREQuency?
```

:FUNCtion:PERiod

Syntax

```
:FUNCtion:PERiod <period>
:FUNCtion:PERiod?
```

Description

Set/query the output period of current channel when using the arbitrary function generator.

Parameter

<period>, floating point number that represents the period, in seconds.

Return Format

The query returns the output period of current channel in scientific notation.

Explanation:

This command is not available when the waveform is DC or noise.

Example

The command below sets the output period of current channel to 10 μs.

```
:FUNCtion:PERiod 1e-5
```

The query below returns "1.000000e-05".
:FUNCtion:PERiod?

:FUNCtion:PHASe

Syntax

:FUNCtion:PHASe <phase>
:FUNCtion:PHASe?

Description

Set/query the start phase of current channel when using the arbitrary function generator.

Parameter

<phase>, integer that represents the start phase, in degrees.

Return Format

The query returns the start phase of current channel in integer.

Explanation:

This command is not available when the waveform is DC or noise.

Example

The command below sets the start phase of current channel to 100° .
:FUNCtion:PHASe 100

The query below returns 100.
:FUNCtion:PHASe?

:FUNCtion:ALIGnphase

Syntax

:FUNCtion:ALIGnphase 1

Description

This command synchronizes the start phase of Out 1 and Out 2 waveforms when using the arbitrary function generator.

Parameter

Parameter is not needed. Adding "1" only makes the parameter is not null.

Explanation：

This command is not supported for single-channel generator.
If you change the waveform type or parameters, the phase may be not aligned.

Example

The command below synchronizes the start phase of Out 1 and Out 2 waveforms.
:FUNCtion:ALIGnphase 1

:FUNCtion:AMPLitude

Syntax

:FUNCtion:AMPLitude <amplitude>
:FUNCtion:AMPLitude?

Description

Set/query the amplitude (PK-PK) of output function for current channel when using the arbitrary function generator.

Parameter

<amplitude>, floating point number, in Vpp.

Return Format

The query returns the amplitude of current channel in scientific notation.

Explanation：

This command is not available when the waveform is DC.

Example

The command below sets the amplitude of current channel to 1.5 Vpp.
:FUNCtion:AMPLitude 1.5

The query below returns the amplitude of current channel.
:FUNCtion:AMPLitude?

:FUNCtion:OFFSet

Syntax

:FUNCtion:OFFSet <offset>

:FUNCtion:OFFSet?

Description

Set/query the offset of output function for current channel when using the arbitrary function generator.

Parameter

<offset>, floating point number, in V.

Return Format

The query returns the offset of output function for current channel in scientific notation.

Example

The command below sets the offset for current channel to 1 V.

:FUNCtion:OFFSet 1

The query below returns the offset for current channel.

:FUNCtion:OFFSet?

:FUNCtion:HIGHt

Syntax

:FUNCtion:HIGHt <high level>

:FUNCtion:HIGHt?

Description

Set/query the high level of output function for current channel when using the arbitrary function generator.

Parameter

<high level>, floating point number, in V.

Return Format

The query returns the high level of output function for current channel in scientific notation.

Example

The command below sets the high level for current channel to 1 V.

:FUNCtion:HIGHt 1

The query below returns the high level for current channel.

:FUNCtion:HIGHt?

:FUNCtion:LOW

Syntax

:FUNCtion:LOW <low level>
:FUNCtion:LOW?

Description

Set/query the low level of output function for current channel when using the arbitrary function generator.

Parameter

<low level>, floating point number, in V.

Return Format

The query returns the low level of output function for current channel in scientific notation.

Example

The command below sets the low level for current channel to -1 V.
:FUNCtion:LOW -1

The query below returns the low level for current channel.
:FUNCtion:LOW?

:FUNCtion:RAMP:SYMMetry

Syntax

:FUNCtion:RAMP:SYMMetry <symmetry>
:FUNCtion:RAMP:SYMMetry?

Description

Set/query the symmetry of ramp waveform as a percentage for current channel when using the arbitrary function generator.

Parameter

<symmetry>, integer that represents the symmetry, in %.

Return Format

The query returns the symmetry of ramp waveform for current channel in floating point number.

Example

The command below sets the symmetry of ramp waveform for current channel to 60%.

:FUNCtion:RAMP:SYMMetry 60

The query below returns the symmetry of ramp waveform for current channel.

:FUNCtion:RAMP:SYMMetry?

:FUNCtion:PULSe:WIDTh

Syntax

:FUNCtion:PULSe:WIDTh <width>

:FUNCtion:PULSe:WIDTh?

Description

Set/query the pulse width for current channel when using the arbitrary function generator.

Parameter

<width>, floating point number, in seconds.

Return Format

The query returns the pulse width for current channel in scientific notation.

Example

The command below sets the pulse width for current channel to 20 μs.

:FUNCtion:PULSe:WIDTh 2e-5

The query below returns the pulse width for current channel.

:FUNCtion:PULSe:WIDTh?

:FUNCtion:PULSe:DTYCycle

Syntax

:FUNCtion:PULSe:DTYCycle <duty cycle>

:FUNCtion:PULSe:DTYCycle?

Description

Set/query the duty cycle of the pulse waveform as a percentage for current channel when using the arbitrary function generator.

Parameter

<duty cycle>, floating point number, in %.

Return Format

The query returns the duty cycle of the pulse waveform for current channel in floating point number.

Example

The command below sets the duty cycle of the pulse waveform for current channel to 30%.

:FUNCtion:PULSe:DTYCycle 30

The query below returns the duty cycle of the pulse waveform for current channel.

:FUNCtion:PULSe:DTYCycle?

:FUNCtion:ARB:BUILtinwform

Syntax

:FUNCtion:ARB:BUILtinwform <Built_in>

Description

Set the shape of the built-in waveform for current channel when using the arbitrary function generator.

Parameter

Name	Type	Range	Default Value

<Built_in>	Discrete |Integer	{
		StairD|StairU|StairUD|Trapezia|RoundHalf|AbsSine|AbsSineHalf|SineTra|SineVer|NegRamp|AttALT|AmpALT|CPulse|PPulse|NPulse|ExpRise|ExpFall|Sinc|Tan|Cot|Sqrt|X^2|HaverSine|Lorentz|ln|X^3|Cauchy|Besselj|Bessely|Erf|Airy|Rectangle|Gauss|Hamming|Hann|Bartlett|Blackman|Laylight|Triang|DC|Heart|Round|LFMPulse|Rhombus|Cardiac|Noise
		}
		|
		{0,1,2,3...44,45}
			StairD|0

Explanation：

<Built_in> can be set as the character string of the built-in wave name or the corresponding integer number.

Note: The character string of the built-in wave name defined in <Built_in> can not be abbreviated, all the upper and lower case letters are needed.

No.	Built-in wave	No.	Built-in wave	No.	Built-in wave
0	StairD	16	ExpFall	32	Gauss
1	StairU	17	Sinc	33	Hamming
2	StairUD	18	Tan	34	Hann
3	Trapezia	19	Cot	35	Bartlett
4	RoundHalf	20	Sqrt	36	Blackman
5	AbsSine	21	X^2	37	Laylight
6	AbsSineHalf	22	HaverSine	38	Triang
7	SineTra	23	Lorentz	39	DC
8	SineVer	24	In	40	Heart
9	NegRamp	25	X^3	41	Round
10	AttALT	26	Cauchy	42	LFMPulse
11	AmpALT	27	Besselj	43	Rhombus
12	CPulse	28	Bessely	44	Cardiac
13	PPulse	29	Erf	45	Noise
14	NPulse	30	Airy		
15	ExpRise	31	Rectangle		

Example

The command below sets the shape of the built-in waveform for current channel to Sinc.

```
:FUNCtion:ARB:BUILtinwform Sinc
```

The command below sets the shape of the built-in waveform for current channel to HaverSine.

```
:FUNCtion:ARB:BUILtinwform 22
```

:FUNCtion:ARB:FILE

Syntax

```
:FUNCtion:ARB:FILE <path>
:FUNCtion:ARB:FILE?
```

Description

Set/query the arbitrary waveform for current channel when using the arbitrary function generator.

Parameter

<path>, character string.

Return Format

The query returns the name of the arbitrary waveform for current channel in character string.

There are 4 types of the arbitrary waveform source:
1.Bult-in waveform. The query returns the built-in waveform name.
2.The waveform stored in USERn of the internal memory. The query returns USERn.
3.The waveform stored in a USB memory device. The query returns the waveform file name.
4.The waveform transferred by command.

Example

The command below sets the arbitrary waveform for current channel to USER10 of the internal memory.

:FUNCtion:ARB:FILE USER10

The query below returns the name of the arbitrary waveform for current channel.

:FUNCtion:ARB:FILE?

:FILE Command Subsystem

:FILE:DOWNload

Syntax

:FILE:DOWNload <USERn>

Description

Read the data of the arbitrary waveform stored in USERn of the internal memory.

Parameter

<USERn>, character string.

Return Format

1 byte	1 byte	N bytes	USERn file size
#	N, the string length of the USERn file size	USERn file size in character string	Data in USERn

E.g, #42000<DATA>
"#42000" is an ASCII string, <DATA> is the file data of USERn.

Example
The command below reads the waveform file of USER4 in the internal memory.
:FILE:DOWNload USER4

:FILE:UPLoad

Syntax
:FILE:DOWNload <USERn>,<binary>

Description
Upload the data of the arbitrary waveform to USERn of the internal memory.

Parameter
<USERn>, character string.
<binary>, the format is same as the return format of downloading the waveform file. Refer to :FILE:DOWNload <USERn>.

Example
The command below uploads the waveform file to USER4 in the internal memory.
:FILE:UPLoad USER4,#42000<DATA>

:FILE:DELete

Syntax
:FILE:DELete <USERn>

Description
Delete the data of the arbitrary waveform stored in USERn of the internal memory.

Parameter
<USERn>, character string.

Example

The command below deletes the waveform file of USER10 in the internal memory.

```
:FILE:DELete USER10
```

:CHANnel Command Subsystem

:CHANnel

Syntax

```
:CHANnel <CHn>
:CHANnel?
```

Description

Set/query the current channel when using the arbitrary function generator.

Parameter

<CHn>, character string.

Return Format

The query returns <CHn> in character string.

Explanation:

This command is not supported for single-channel generator.

Example

The command below sets the current channel to CH1.

```
:CHANnel CH1
```

The command below returns the current channel.

```
:CHANnel?
```

:CHANnel:CH1

Syntax

```
:CHANnel:CH1 <bool>
:CHANnel:CH1?
```

Description

Query/set the state of CH1 output.

Parameter

<bool>

Name	Type	Range	Default Value
<bool>	Bool	{{0|OFF}|{1|ON}}	0|OFF

Return Format

The query returns "OFF" or "ON" in character string.

Example

The command below sets the state of CH1 output to ON.

:CHANnel:CH1 ON

The query returns "ON".

:CHANnel:CH1?

:CHANnel:CH2

Syntax

:CHANnel:CH2 <bool>

:CHANnel:CH2?

Description

Query/set the state of CH2 output.

Parameter

<bool>

Name	Type	Range	Default Value
<bool>	Bool	{{0|OFF}|{1|ON}}	0|OFF

Return Format

The query returns "OFF" or "ON" in character string.

Example

The command below sets the state of CH2 output to ON.

:CHANnel:CH2 ON

The query returns "ON".

:CHANnel:CH2?