Test and Measurement Solutions

PROGRAMMING MANUAL

DIGITAL STORAGE OSCILLOSCOPE
DCS-4605

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1.INTERFACE OVERVIEW

This manual describes how to use the DCS-4605's remote command functionality and lists the command details. The Overview chapter describes how to configure the DCS-4605 USB remote control interface.

1-1.Rear Panel Overview

Fuse socket   Power cord socket   CAL output   USB port
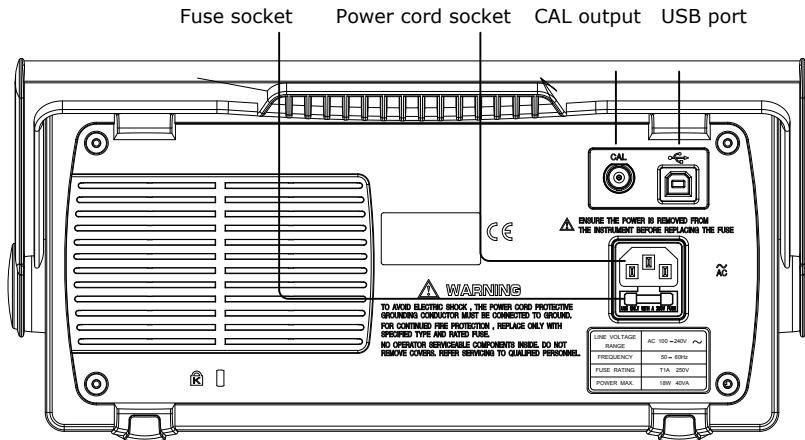
1-2.Configuring the USB Interface

USB connection	PC side connector	Type A, host
	DCS-4605 side connector	Type B, device
	Speed	1.1/2.0 (full speed)

USB driver software	OS	Microsoft Windows 7 or higher
	File name	TEXIO_CDC.inf (Attached CD)

⚠️**CAUTION:** DCS-4605 is allocated to the COM port when installing it. The set is recognized as a serial communications equipment on PC. You must have administrator account to install.

Serial port setting: Speed 12Mbps or less

Data-bits	: 8 bit
Parity	: none
Stop-bit	: 1 bit
Flow-control	: none

Panel operation
1. Connect the USB cable to the USB device port on the rear.

2. When the PC asks for the USB driver or 'Unknown device' listed in Device Manager, install TEXIO-CDC.inf attached CD.
3. On the PC, activate a terminal application such as PuTTY. To check the COM port No., see the Device Manager in the PC.
4. Run this query command via the terminal application.
   *idn?
   This command should return the manufacturer, model number, serial number, and firmware version in the following format.
   TEXIO, DCS-4605, XXXXXXX, V1.00
5. Configuring the command interface is completed. Refer to the other chapters for more details.

⚠️**CAUTION:** If there is no response, please confirm a driver software, COM port number or the connection of the cable and so on.

⚠️**CAUTION:** If you change the setting of the USB port in the connection with the PC, May not be able to communicate. Please restart your PC in this case.

2.COMMAND OVERVIEW

The command syntax section shows you the basic syntax rules you have to apply when using commands.

2-1.Command Syntax

Compatible standard	• USB CDC_ACM compatible • SCPI, 1994 (partially compatible)		

Command format	trig:del:mod <NR1>LF 1: command header
	    1 2 3 4 2: single space
	    3: parameter
	    4: message terminator		
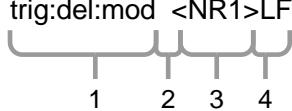
Parameter	Type	Description	Example
	<Boolean>	boolean logic	0, 1
	<NR1>	Integers	0, 1, 2, 3
	<NR2>	decimal numbers	0.1, 3.14, 8.5
	<NR3>	floating point	4.5e-1, 8.25e+1
	<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1
Message terminator	LF^END	line feed code (hexadecimal 0A) with END message	
	LF	line feed code	
	<dab>^END	last data byte with END message	
⚠️ CAUTION:	• Commands are non-case sensitive. • On the real input of the value to the parameter, please do not use the symbol as "<", ">", "|". The above symbols are used to facilitate distinction with this manual.		

3.COMMAND DETAILS

3-1.System Command

A kind of Query or Set is shown. →(Query)   : Query
(Set)→   : Set

3-1-1.*IDN

→(Query)

Description	Returns the oscilloscope ID: manufacturer, model name, serial number, and firmware version. Same as: Utility key → F4	
Syntax	*idn?	
Example	*idn? TEXIO, DCS-4605, XXXXXXX, V1.00	Returns the ID for a DCS-4605.

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3-1-2.*LRN

Description	Returns the oscilloscope settings as a data string.
Syntax	*lrn?
Example	*lrn?

:DISPlay:WAVeform 0;ACCumulate 0;CONTrast 0;GRATicule 0;:CHANnel1:DISPlay 1;BWLimit 0;COUPling 0;INVert 0;OFFSet 2.000e+00;PROBe 3;SCALe 2.000e+00;:CHANnel2:DISPlay 1;BWLimit 0;COUPling 0;INVert 0;OFFSet 2.000e+00;PROBe 3;SCALe 2.000e+00;:CHANnel1:MATH 0;:TIMebase:SWEep 0;SCALe 2.500e-06;DELay 0.000e+00;WINDow:SCALe 2.50000e-07;DELay 0.00000e+00;:ACQuire:MODe 0;AVERage 0;:TRIGger:TYPe 0;SOURce 0;MODe 1;SLOP 0;COUPle 1;REJect 0;NREJ 0;LEVel 0.00000e+00;PULSe:MODe: 0;TIMe 0.00000e+00;:VIDeo:TYPe 1;POLarity 0;FIELd 0;LINe 0;:CURSor:SOURce 1;XDISPlay 0;X1Position 75;X2Position 175;YDISPlay 0;Y1Position 54;Y2Position 154;:REF1:DISPlay 0;LOCate 50;:REF2:DISPlay 0;LOCate -50;:RUN

3-1-3.*RST

Description	Resets the DCS-4605 (recalls the default panel settings).
	Same as: Save/Recall key → F1
Syntax	*rst

⚠ CAUTION:	In the help mode (the screen display of the function explanation), the command is invalid.
⚠ CAUTION:	The saved content in the internal memory is not initialized by the recall function of "Default Setup".

3-1-4.:SYSTem:ERRor

Description	Returns the oscilloscope system error message, if there is any.			
Syntax	< Long >		< Short >	
	:system:error?		:syst:err?	
Parameter	ID	Contents	ID	Contents
	-100	command error	-102	syntax error
	-220	parameter error	-221	settings conflict
	-222	data out of range	-223	too much data
	-224	illegal parameter	-232	invalid format
Example	:system:error? -102		Indicates that the command syntax is wrong.	

:

3-1-5.SYSTem:VERSion

Description	Returns the SCPI version to which the oscilloscope complies to. This is returned as the SCPI version year and revision number (YYYY.V).	
Syntax	< Long > :system:version?	< Short > :syst:vers?
Example	:syst:vers? 1992.0	Returns the SCPI version as 1992.0

3-2.Acquisition Command

3-2-1.:ACQuire:AVERage

<div align="right">

Set ⟶

⟶ Query

</div>
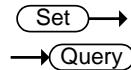
Description	Selects or returns the average number of waveform acquisition in the average acquisition mode.
	Same as: Acquire key → F2

Syntax	< Long >	< Short >
	:acquire:average <NR1>	:acq:aver <NR1>
	:acquire:average?	:acq:aver?

Parameter	<NR1>	Average No.	<NR1>	Average No.
	1	2	5	32
	2	4	6	64
	3	8	7	128
	4	16	8	256

⚠ CAUTION:	Before using this command, select the average acquisition mode. See the example below.

Example	:acquire:mode 2	Selects the average acquisition mode, and select the average number 4.
	:acquire:average 2	

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3-2-2.:ACQuire:MODe
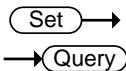
Description	Selects or returns the acquisition mode. Same as: Acquire key → F1 ~ F3			
Syntax	< Long > :acquire:mode <NR1> :acquire:mode?		< Short > :acq:mod <NR1> :acq:mod?	
Parameter	<NR1> 0 1	Mode Normal Peak detect	<NR1> 2	Mode Average
Example	:acquire:mode 2 :acquire:average 2		Selects the average acquisition mode, and select the average number 4.	

3-2-3.:ACQuire<X>:MEMory

Description	Returns the total waveform data in the acquisition memory.	
Syntax	< Long > :acquire<X>:memory?	< Short > :acq<X>:mem?
Parameter	<X> 1/2	Channel Channel1/2
Example	:acquire1:memory?	Returns the channel 1 waveform data.
Data format	Six data elements are concatenated to form one data string. # A B C D E F A: Data size digit B: Data size C: Time interval D: Channel indicator E: Reserved data F: Waveform data **# (1 byte)** The start of data transfer. The value is 0X23 ("#" in ASCII code). **Data size digit (1 bytes)** Indicates the number of digits used for the data string that follows. The data size digit is always 4.	

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Data size (4 bytes)
Indicates the data size. The data size is always 8008 (4000 points per channel).
8 bytes are total of Time interval, Channel indicator, and Reserved data.
Time interval (4 bytes)
Indicates the time interval between two adjacent sampling points in the floating point format, compatible with IEEE 754 standards.
Note: The data is sorted in the little-endian format.
Channel indicator (1 byte)
Indicates the channel, 1 (0X01) or 2 (0X02).
Reserved data (3 bytes)
An unused data block, 3 bytes.
Waveform data (8000 bytes)
The waveform data comprised of 4000 data points. Each point is made up of 2 bytes (16 bits), two's complement, high byte (MSB) first.

Example
Data size digit(4)   Time interval(0X31 09 70 5F)
Data size(8008)   Channel indicator(0X01)
                                        Reserved data

```
000000   23 34 38 30 30 38 31 09-70 5F 01 08 7E 7E FF E5   #480081.p_..~~..
000010   FF E5 FF E5 FF E5 FF E5-FF E5 FF E5 FF E5 FF E6   ...............
000020   FF E5 FF E5 FF E4 FF E4-FF E4 FF E5 FF E5 FF E5   ...............
```

Waveform data after this(FF)

3-3.Autoset Command

3-3-1.:AUToset

$$\boxed{\text{Set}} \longrightarrow$$

Description	Runs the Autoset function to automatically configure the horizontal scale, vertical scale, and trigger according to the input signal. Same as: Auto Set key	
Syntax	< Long > :autoset	< Short > :aut

3-4.Channel / Math Command

3-4-1.:CHANnel<X>:BWLimit

Set →

→ Query
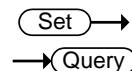
Description	Selects or returns the bandwidth limit on/off.			
	Same as: Channel key → F3			
Syntax	< Long >		< Short >	
	:channel<X>:bwlimit <Boolean>		:chan<X>:bwl <Boolean>	
	:channel<X>:bwlimit?		:chan:bwl?	
Parameter	<X>	Channel	<NR1>	Limit
	1/2	CH1/2	0	Off
			1	On
Example	:channel1:bwlimit 1		Turns on the bandwidth limit for Channel 1.	

3-4-2.:CHANnel<X>:COUPling

Set →

→ Query
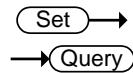
Description	Selects or returns the coupling mode. Same as: Channel key → F1	

Syntax	< Long > :channel<X>:coupling <NR1> :channel<X>:coupling?	< Short > :chan<X>:coup <NR1> :chan:coup?

Parameter	<X> 1/2	Channel CH1/2	<NR1> 0 1 2	Coupling mode AC coupling DC coupling Ground coupling

Example	:channel1:coupling 1	Selects the DC coupling for Channel 1.

3-4-3.:CHANnel<X>:DISPlay

Set →

→ Query
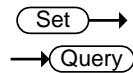
Description	Turns a channel on/off or returns its status. Same as: Channel key	

Syntax	< Long > :channel<X>:display <Boolean> :channel<X>:display?	< Short > :chan<X>:disp <Boolean> :chan<X>:disp?

Parameter	<X> 1/2	Channel CH1/2	<NR1> 0 1	Channel on/off Off On

Example	:channel1:display 1	Turns on Channel 1.

3-4-4.:CHANnel<X>:INVert

Set ⟶
⟶ Query
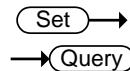
Description	Inverts a channel or returns its status. Same as: Channel key → F2			
Syntax	< Long > :channel<X>:invert <Boolean> :channel<X>:invert?		< Short > :chan<X>:inv <Boolean> :chan<X>:inv?	
Parameter	<X> 1/2	Channel CH1/2	<NR1> 0 1	Channel invert Off On
Example	:channel1:invert 1		Inverts Channel 1.	

3-4-5.:CHANnel<X>:MATH

Set ⟶
⟶ Query
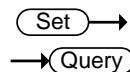
Description	Selects or returns the math operation type. Same as: Math key → F1			
Syntax	< Long > :channel<X>:math <NR1> :channel<X>:math?		< Short > :chan<X>:math <NR1> :chan<X>:math?	
Parameter	<X> 1/2	Channel CH1 or CH2	<NR1> 0 1 2 3	Math operation Math off Add Subtract FFT
Example1	:channel1:math 2		Channel 1 – Channel 2	
Example2	:channel2:math 2		Channel 2 – Channel 1	
Example3	:channel2:math 3		Runs FFT on Channel 2	

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3-4-6.:CHANnel<X>:OFFSet

$\boxed{\text{Set}} \longrightarrow$

$\longrightarrow \boxed{\text{Query}}$

Description	Sets or returns the offset level for a channel. The offset level range depends on the vertical scale. Unit: V
Syntax	< Long > < Short > :channel<X>:offset <NR3> :chan<X>:offs <NR3> :channel<X>:offset? :chan<X>:offs?

Parameter	<X>	Channel	<NR3>	Offset level
	1/2	CH1/2	±0.4	±0.4V (2mV/div~20mV/div)
			±4	±4V (50mV/div~200mV/div)
			±40	±40V (500mV/div~2V/div)
			±300	±300V (5V/div~10V/div)

Example	:channel1:scale 1.00e–2 :channel1:offset 2.00e–2	Sets the Channel 1 scale to 10mV/div. Sets the Channel 1 offset to 20mV.

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3-4-7.:CHANnel<X>:PROBe

 Set →
→ Query
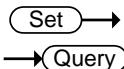
Description	Sets or returns the probe attenuation factor. Same as: Channel key → F4			
Syntax	< Long > :channel<X>:probe<NR1> :channel<X>:probe?		< Short > :chan<X>:prob<NR1> :chan<X>:prob?	
Parameter	<X>	Channel	<NR1>	Probe attenuation factor
	1/2	CH1/2	0 1 2	1x 10x 100x
Example	:channel1:probe 1		Sets the Channel 1 probe attenuation factor to 10x.	

3-4-8.:CHANnel<X>:SCALe

Set →
→ Query
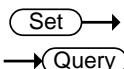
Description	Sets or returns the vertical scale. The scale depends on the probe attenuation factor. Same as: Volts/Div knob Unit: V/div			
Syntax	< Long > :channel<X>:scale <NR3> :channel<X>:scale?		< Short > :chan<X>:scal <NR3> :chan<X>:scal?	
Parameter	<X> 1/2	Channel CH1/2	<NR3> 2e–3 ~ 1e+1 2e–2 ~ 1e+2 2e–1 ~ 1e+3	Vertical scale 2mV ~ 10V (Probe x1) 20mV ~ 100V (Probe x10) 200mV ~ 1000V (Probe x100)
Example	:channel1:probe 0 :channel1:scale 2.00e–3		Sets the Channel 1 probe attenuation factor to x1. Sets the Channel 1 vertical scale to 2mV/div.	

3-5.Math Command

3-5-1.:MATH:OPERator

Set ⟶
⟶ Query
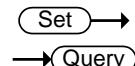
Description	Sets the math operator.			
Syntax	< Long >		< Short >	
	:MATH:OPERator {0|1|2}		:MATH:OPER {0|1|2}	
	:MATH:OPERator?		:MATH:OPER?	
Parameter	0	Addition	1	Subtraction
	2	FFT		
Example	:MATH:OPER 0		Sets the operator to addition.	

3-5-2.:MATH:POSition
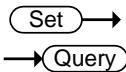
Description	Sets or vertical position (in grid divisions) of the math output waveform.

Syntax	< Long >	< Short >
	:MATH:POSition <NR3>	:MATH:POS <NR3>
	:MATH:POSition?	:MATH:POS?

Parameters	<NR3>	-12.00 ~ +12.00, with 0.00 being the center division.

Example	:MATH:POS 3.00	Sets the position to the 3rd division above the center division.

3-5-3.:MATH:FFT:SOURce
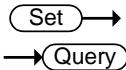
Description	Sets the source channel for FFT math.

Syntax	< Long >	< Short >
	:MATH:FFT:SOURce {1|2}	:MATH:FFT:SOUR {1|2}
	:MATH:FFT:SOURce?	:MATH:FFT:SOUR?

Parameters	1	Channel 1
	2	Channel 2

Example	:MATH:FFT:SOUR 1	Sets the source to CH1

3-5-4.:MATH:FFT:WINDow
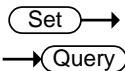
Description	Sets FFT window type.	
Syntax	< Long >	< Short >
	:MATH:FFT:WINDow {0|1|2|3}	:MATH:FFT:WIND {0|1|2|3}
Parameters	0	Hanning window
	1	Flattop window
	2	Rectangular window
	3	Blackman window
Example	:MATH:FFT:WIND 0	Sets the window type to Hanning.

3-5-5.:MATH:FFT:SCALe
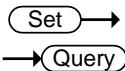
Description	Sets the FFT scale in dB.			
Syntax	< Long >		< Short >	
	:MATH:FFT:SCALe {20|10|5|2|1}		:MATH:FFT:SCAL {20|10|5|2|1}	
Parameters	20	20 dB	2	2 dB
	10	10 dB	1	1 dB
	5	5 dB		
Example	:MATH:FFT:SCAL 5		Sets the vertical scale to 5 dB.	

3-6.Cursor Command

3-6-1.:CURSor:X<X>Position

Set →

→ Query

Description	Sets or returns the horizontal (X axis) cursor position.		
	Same as: Cursor key → F5 (X-Y) →F2 (X1) or F3 (X2) + Variable knob		
Syntax	< Long >		< Short >
	:cursor:x<X>position <NR1>		:curs:x<X>p <NR1>
	:cursor:x<X>position?		:curs:x<X>p?
Parameter	<X>	Cursor 1 or 2	<NR1> Cursor position
	1	Cursor X1	1 - 249
	2	Cursor X2	(0 – 10div)
⚠ CAUTION:	The set data format is <NR1> as follows.		
	1:0div(Left),125:5div(Center),249:10div(Right)		
⚠ CAUTION:	The returned data format is <NR3> as follows.		
	CH1, CH2, Math(CH1±CH2): time (s)		
	Math (FFT): frequency (Hz)		
Example	:cursor:xdisplay 1 :cursor:x1position 125	Puts the horizontal cursor X1 on the center position.	
	:channel:math 3 :cursor:xdisplay 1 :cursor:x1position? → 2.500E+03	Returns the X1 cursor position as 2500Hz in the Math FFT mode.	

3-6-2.:CURSor:Y<X>Position

$\boxed{\text{Set}} \longrightarrow$
$\longrightarrow \boxed{\text{Query}}$

| Description | Selects or returns the vertical (Y axis) cursor position. |
| | Same as: Cursor key →F5 (X-Y) → F2(Y1) or F3(Y2) + Vertical knob |

Syntax	< Long >		< Short >
	:cursor:y<X>position <NR1>		:curs:y<X>p <NR1>
	:cursor:y<X>position?		:curs:y<X>p?

Parameter	<X>	Cursor 1 or 2	<NR1>	Cursor position
	1	Cursor Y1		1 – 199
	2	Cursor Y2		(-4div – 4div)

| ⚠ CAUTION: | The set data format is <NR1> as follows. |
| | 1:-4div(under),100:0div(center),199:4div(upper) |

| ⚠ CAUTION: | The returned data format is <NR3> as follows.CH1, CH2, Math (CH1±CH2):voltage/current(V/A) |
| | Math (FFT): decibel (dB) |

Example	:cursor:ydisplay 1 :cursor:y1position 100	Puts the vertical cursor Y1 on the center position.
	:channel:math 3 :cursor:ydisplay 1 :cursor:y1position? → 2.500E+00	Returns the Y1 cursor position as 2.5dB in the Math FFT mode.

3-6-3.:CURSor:<X>DELta

Description	Returns the distance between two horizontal (X axis) or vertical (Y axis) cursors.	
	Same as: Cursor key →F5 (X-Y) → F4	
Syntax	< Long >	< Short >
	:cursor:<X>delta?	:curs:<X>del?
Parameter	<X>	Horizontal or vertical cursor
	x	Horizontal cursor (X axis)
	y	Vertical cursor (Y axis)
⚠ CAUTION:	The returned data format is <NR3> as follows.	
	CH1, CH2, Math (CH1±CH2): time (s) for horizontal cursor, voltage (V) for vertical cursor	
	Math (FFT): frequency (Hz) for horizontal cursor, decibel (dB) for vertical cursor	
Example	:channel:math 3 :cursor:xdisplay 1 :cursor:xdelta? → 2.500E+03	Returns the frequency (2500Hz) between the two horizontal cursors in the Math FFT mode.
	:channel:math 3 :cursor:ydisplay 1 :cursor:ydelta? → 2.500E+00	Returns the decibel (2.5dB) between the two vertical cursors in the Math FFT mode.

3-6-4.:CURSor:<X>DISplay

Description	Turns the horizontal or vertical cursors on/off.			
	Same as: Cursor key			
Syntax	< Long >		< Short >	
	:cursor:y<X>display <Boolean>		:curs:y<X>dis <Boolean>	
Parameter	<X>	X or Y cursor	<NR1>	Cursor on/off
	x	X (horizontal)	0	Off
	y	Y (vertical)	1	On
Example	:cursor:ydisplay 1		Turn Y cursor on.	

3-6-5.:CURSor:SOURce

Description	Selects or returns the cursor source channel.	
	Same as: Cursor key →F1 (Source)	
Syntax	< Long >	< Short >
	:cursor:source <NR1>	:curs:sour <NR1>
	:cursor:source?	:curs:sour?
Parameter	<NR1>	Cursor source channel
	1	Channel 1
	2	Channel 2
	3	Math result
Example	:cursor:source 2	Selects Channel 2 as the cursor source.

3-7.Display Command

3-7-1.:DISPlay:ACCumulate

Set →

→ Query
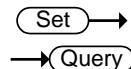
Description	Turns the display accumulate mode on/off or returns its status.	
	Same as: Display key → F2	
Syntax	< Long >	< Short >
	:display:accumulate <Boolean>	:disp:acc <Boolean>
	:display:accumulate?	:disp:acc?
Parameter	<NR1>	Display accumulation
	0	Off
	1	On
Example	:display:accumulate 1	Turns on the accumulation.

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3-7-2.:DISPlay:CONTrast

$\boxed{\text{Set}}\longrightarrow$
$\longrightarrow\boxed{\text{Query}}$
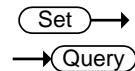
Description	Sets or returns the display contrast level.	
	Same as: Display key → F4	
Syntax	< Long >	< Short >
	:display:contrast <NR1>	:disp:cont <NR1>
	:display:contrast?	:disp:cont?
Parameter	<NR1> Display contrast	
	0 ~ 20 Lowest (0) to the Highest (20)	
Example	:display:contrast 10	Sets the display contrast to the middle (10).

3-7-3.:DISPlay:GRATicule

$\boxed{\text{Set}}\longrightarrow$
$\longrightarrow\boxed{\text{Query}}$
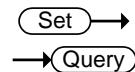
Description	Sets or returns the display grid type.			
	Same as: Display key → F5			
Syntax	< Long >		< Short >	
	:display:graticule <NR1>		:disp:grat <NR1>	
	:display:graticule?		:disp:grat?	
Parameter	<NR1>	Grid type	<NR1>	Grid type
	0	Full mode	2	Frame mode
	1	Cross mode		
Example	:display:graticule 0		Selects the full grid.	

3-7-4.:DISPlay:WAVeform

Set →

→ Query
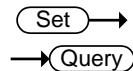
Description	Sets or returns the display waveform type.	
	Same as: Display key → F1	
Syntax	< Long >	< Short >
	:display:waveform <NR1>	:disp:wav <NR1>
	:display:waveform?	:disp:wav?
Parameter	<NR1>	Display waveform type
	0	Vectors
	1	Dots
Example	:display:waveform 0	Selects the vectors waveform.

3-7-5.:REFResh

Set →

Description	Erases the existing waveform and draws a new one.	
	Same as: Display key → F3	
Syntax	< Long >	< Short >
	:refresh	:refr

3-8.Measure Command

3-8-1.:MEASure:FALL

→ Query

Description	Returns the fall time measurement result.	
	Same as: Measure key → F1~F5 → F3 (Fall Time)	
Syntax	< Long >	< Short >
	:measure:fall?	:meas:fall?
Returns	<NR3> Unit: s	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the fall time.
	:measure:fall?	

3-8-2.:MEASure:FOVShoot

→ Query

Description	Returns the fall overshoot ratio for the waveform amplitude.	
	Same as: Measure key → F1 ~ F5 → F3 (FOVShoot)	
Syntax	< Long >	< Short >
	:measure:fovshoot?	:meas:fovs?
Returns	<NR2> with % sign	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the fall overshoot ratio.
	:measure:fovshoot?	

3-8-3.:MEASure:FPReshoot

→ Query

Description	Returns fall preshoot ratio for the waveform amplitude.	
	Same as: Measure key → F1 ~ F5 → F3 (FPREShoot)	
Syntax	< Long >	< Short >
	:measure:fpreshoot?	:meas:fpr?
Returns	<NR2> with % sign	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the fall preshoot ratio.
	:measure:fpreshoot?	

3-8-4.:MEASure:FREQuency

→ Query

Description	Returns the frequency value.	
	Same as: Measure key → F1~F5 → F3 (Frequency)	
Syntax	< Long >	< Short >
	:measure:frequency?	:meas:freq?
Returns	<NR3> Unit: Hz	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the frequency.
	:measure:frequency?	

3-8-5.:MEASure:NWIDth

Description	Returns the first negative pulse width timing.	
	Same as: Measure key → F1~F5 → F3 (–Width)	
Syntax	< Long >	< Short >
	:measure:nwidth?	:meas:nwid?
Returns	<NR3> Unit :s	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the negative pulse width.
	:measure:nwidth?	

3-8-6.:MEASure:PDUTy

Description	Returns the positive duty cycle ratio.	
	Same as: Measure key → F1~F5 → F3 (DutyCycle)	
Syntax	< Long >	< Short >
	:measure:pduty?	:meas:pdut?
Returns	<NR2> with % sign	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the positive duty cycle.
	:measure:pduty?	

3-8-7.:MEASure:PERiod

$\rightarrow$ (Query)

Description	Returns the period.
	Same as: Measure key → F1 ~ F5 → F3 (Period)

Syntax	< Long >	< Short >
	:measure:period?	:meas:per?

Returns	<NR3> Unit: s	

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the period.
	:measure:period?	

3-8-8.:MEASure:PWIDth

$\rightarrow$ (Query)

Description	Returns the first positive pulse width.
	Same as: Measure key → F1 ~ F5 → F3 (+Width)

Syntax	< Long >	< Short >
	:measure:pwidth?	:meas:pwid?

Returns	<NR3> Unit: s	

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the positive pulse width.
	:measure:pwidth?	

3-8-9.:MEASure:RISe

→ Query

Description	Returns the rise time measurement result.	
	Same as: Measure key → F1~F5 → F3 (RiseTime)	
Syntax	< Long >	< Short >
	:measure:rise?	:meas:ris?
Returns	<NR3> Unit: s	

⚠️ **CAUTION:** Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the rise time.
	:measure:rise?	

3-8-10.:MEASure:ROVShoot

→ Query

Description	Returns rise overshoot ratio for the waveform amplitude in percentage.	
	Same as: Measure key → F1 ~ F5 → F3 (ROVShoot)	
Syntax	< Long >	< Short >
	:measure:rovshoot?	:meas:rovs?
Returns	<NR2> with % sign	

⚠️ **CAUTION:** Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the rise overshoot ratio.
	:measure:rovshoot?	

3-8-11.:MEASure:RPReshoot

$\rightarrow$ Query

Description	Returns rise preshoot ratio for the waveform amplitude in percentage.	
	Same as: Measure key → F1 ~ F5 → F3 (RPReshoot)	
Syntax	< Long >	< Short >
	:measure:rpreshoot?	:meas:rpr?
Returns	<NR2> with % sign	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the rise preshoot ratio.
	:measure:rpreshoot?	

3-8-12.:MEASure:SOURce

Set →
$\rightarrow$ Query

Description	Selects the measurement channel.	
Syntax	< Long >	< Short >
	:measure:source <NR1>	:meas:sour <NR1>
	:measure:source?	:meas:sour?
Parameter	<NR1>	
	1 / 2	Channel 1/2
Example	:measure:source 1	Selects Channel 1, and then measures the rise time.
	:measure:rise?	

3-8-13.:MEASure:VAMPlitude

→ Query

Description	Returns the voltage difference between the global high voltage and the global low voltage.	
	Same as: Measure key → F1 ~ F5 → F3 (Vamp)	
Syntax	< Long >	< Short >
	:measure:vamplitude?	:meas:vamp?
Returns	<NR3> Unit: V	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the Voltage amplitude.
	:measure:vamplitude?	

3-8-14.:MEASure:VAVerage

→ Query

Description	Returns the average voltage.	
	Same as: Measure key → F1 ~ F5 → F3 (Vav)	
Syntax	< Long >	< Short >
	:measure:vaverage?	:meas:vav?
Returns	<NR3> Unit: V	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the average Voltage.
	:measure:vaverage?	

3-8-15.:MEASure:VHI

Description	Returns the global high voltage.
	Same as: Measure key → F1 ~ F5 → F3 (Vhi)

Syntax	< Long >	< Short >
	:measure:vhi?	:meas:vhi?

Returns	<NR3> Unit: V

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1,
	:measure:vhi?	and then measures the global high Voltage.

3-8-16.:MEASure:VLO

Description	Returns the global low voltage.
	Same as: Measure key → F1 ~ F5 → F3 (Vlo)

Syntax	< Long >	< Short >
	:measure:vlo?	:meas:vlo?

Returns	<NR3> Unit: V

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1,
	:measure:vlo?	and then measures the global low Voltage.

3-8-17.:MEASure:VMAX

→ Query

Description	Returns the maximum amplitude.	
	Same as: Measure key → F1 ~ F5 → F3 (Vmax)	
Syntax	< Long >	< Short >
	:measure:vmax?	:meas:vmax?
Returns	<NR3> Unit: V	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the maximum amplitude.
	:measure:vmax?	

3-8-18.:MEASure:VMIN

→ Query

Description	Returns the minimum amplitude.	
	Same as: Measure key → F1 ~ F5 → F3 (Vmin)	
Syntax	< Long >	< Short >
	:measure:vmin?	:meas:vmin?
Returns	<NR3> Unit: V	
⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.	
Example	:measure:source 1	Selects Channel 1, and then measures the minimum amplitude.
	:measure:vmin?	

3-8-19.:MEASure:VPP

Description	Returns the peak-to-peak amplitude (difference between maximum and minimum amplitude).
	Same as: Measure key → F1 ~ F5 → F3 (Vpp)

Syntax	< Long >	< Short >
	:measure:vpp?	:meas:vpp?

Returns	<NR3> Unit: V

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the peak-to-peak amplitude.
	:measure:vpp?	

3-8-20.:MEASure:VRMS

Description	Returns the root-mean-square voltage.
	Same as: Measure key → F1 ~ F5 → F3 (Vrms)

Syntax	< Long >	< Short >
	:measure:vrms?	:meas:vrms?

Returns	<NR3> Unit: V

⚠ CAUTION:	Before using this command, select the measurement channel. See the example below.

Example	:measure:source 1	Selects Channel 1, and then measures the root mean square voltage.
	:measure:vrms?	

3-9.Go No-Go Command

3-9-1.:GONogo:CLEar

$\boxed{\text{Set}} \longrightarrow$

Description	Clears the Go No-Go test result ratio. This is the equivalent to clearing the "failed" to "total tests" result ratio as shown in the Go-NoGo menu.
	Same as: Utility key → More (F5) →Go-NoGo Menu(F1)→Ratio:(F5).
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:GONogo:CLEar :GON:CLE

3-9-2.:GONogo:EXECute

Set ⟶

⟶ Query
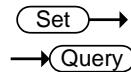
Description	Starts or stops the Go-NoGo testing. Same as: Utility key → More (F5) →Go-NoGo Menu(F1)→Go-NoGo(F4).	
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long > :GONogo:EXECute {0|1} :GONogo:EXECute?	< Short > :GON:EXEC {0|1} :GON:EXEC?
Parameter/ Return parameter	0 1	Off. Stop Go-NoGo testing. On. Start Go-NoGo testing.
Example	:GON:EXEC 0	Turn Go-NoGo off.

3-9-3.:GONogo:FUNCtion

Set ⟶

⟶ Query

Description	Initializes the oscilloscope for the Go-NoGo mode. This command must be used to initialize the oscilloscope for Go-NoGo mode before any Go-NoGo commands can be executed. To exit from Go-NoGo mode, use this function to un-initialize Go-NoGo mode.	
Syntax	< Long > :GONogo:FUNCtion {0|1} :GONogo:FUNCtion?	< Short > :GON:FUNC {0|1} :GON:FUNC ?
Parameter/ Return parameter	0 1	Un-initialize the oscilloscope from Go-NoGo mode. Initialize the oscilloscope for Go-NoGo mode.
Example	:GON:FUNC 1	Initialize the scope.

3-9-4.:GONogo:NGCount?

Description	Returns the test result count ratio (failed count, total count).	
Syntax	< Long >	< Short >
	:GON:NGC?	:GON:NGC?
Return parameter	<NR1>, <NR1>	<failed count>,<total count>
Example	:GON:NGC? >2,128	2 fails from 128 Go-NoGo tests.

3-9-5.:GONogo:NGDefine

|		
Description	Sets or queries the Go-NoGo boundary template conditions.	
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long >	< Short >
	:GONogo:NGDefine {0|1}	:GON:NGD {0|1}
	:GONogo:NGDefine?	:GON:NGD
Parameter/ Return parameter	0	No-Go when the waveform doesn't exceed the boundary template.
	1	No-Go when the waveform exceeds the boundary template.
Example	:GON:NGD 1	NoGo conditions set to when outside template.

3-9-6.:GONogo:SOURce

Set →
→ Query
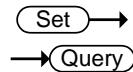
Description	Sets the Go-NoGo channel source.
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short > :GONogo:SOURce {1|2} :GON:SOUR {1|2} :GONogo:SOURce? :GON:SOUR?
Parameter/ Return parameter	1 Sets the source to channel 1 2 Sets the source to channel 2
Example	:GON:SOUR 1 Sets the source to channel 1.

3-9-7.:GONogo:VIOLation

Set →
→ Query
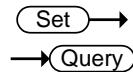
|	
Description	Sets or queries the Go-NoGo violation conditions.
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short > :GONogo:VIOLation {0|1} :GON:VIOL {0|1} :GONogo:VIOLation? :GON:VIOL?
Parameter/ Return parameter	0 Violation condition = "Continue" 1 Violation condition = "Stop"
Example	:GON:VIOL 1 Sets the violation condition to "Continue".

3-9-8.:TEMPlate:MODe

Set →
→ Query

Description	Sets or queries the Go-NoGo template mode. When Auto mode is selected, CH1 or CH2 are used as the template source. When Normal mode is selected, the template source can be selected from internal memory (W1~W15, RefA or RefB).	
Note	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long >	< Short >
	:TEMPlate:MODe {0|1}	:TEMP:MOD {0|1}
	:TEMPlate:MODe?	:TEMP:MOD?
Parameter/ Return parameter	0 Select Normal template mode.	
	1 Select Auto template mode.	
Example	:TEMP:MOD 1	Set to Auto mode.

3-9-9.:TEMPlate:MAX

Set →
→ Query

Description	Sets or queries the template used for the MAX boundary (W1~W15, RefA).
Note	A template can only be defined for the MAX or MIN template, not both.
	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:TEMPlate:MAX <NR1> :TEMP:MAX <NR1>
	:TEMPlate:MAX? :TEMP:MAX?
Parameter/ Return parameter	0 Set RefA as the MAX template.
	1~15 Set W1 ~ W15 as the MAX template
Example	:TEMP:MAX? RefA is the template.
	>1

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3-9-10.:TEMPlate:MIN

$$\text{Set} \longrightarrow$$
$$\longrightarrow \text{Query}$$

Description	Sets or queries the template used for the MIN boundary (W1~W15, RefB).
Note	A template can only be defined for the MAX or MIN template, not both.
	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:TEMPlate:MIN <NR1> :TEMP:MIN <NR1>
	:TEMPlate:MIN? :TEMP:MIN?

Parameter/ Return parameter	0	Set RefB as the MIN template.
	1~15	Set W1 ~ W15 as the MIN template

Example	:TEMP :MIN ?	RefB is the template.
	>1	

3-9-11.:TEMPlate:POSition:MAX

Set →
→ Query
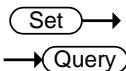
Description	Sets and queries the position of the MAX template in grid divisions. 1 grid division = 25 on-screen pixels.	
Note	This command will not alter the position of the waveform (RefA, W1~15) in memory, unless the template is saved with the :TEMPlate:SAVe :MAXimum command.	
	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.	
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long >	< Short >
	:TEMPlate:POSition:MAX <NR2>	:TEMP:POS:MAX <NR2>
	:TEMP:POS:MAX?	:TEMP:POS:MAX?
Parameter/ Return parameter	<NR2>	-12.00 ~ 12.00 Div. 0 represents the center division.
Example	:TEMP:POS:MAX 2.00	Sets the template to the 2nd grid division above the center division.

3-9-12.:TEMPlate:POSition:MIN

Set →

→ Query

| Description	Sets and queries the position of the MIN template in grid divisions. 1 grid division = 25 on-screen pixels.	
Note	This command will not alter the position of the waveform (RefA, W1~15) in memory, unless the template is saved with the :TEMPlate:SAVe :MINimum command.	
	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.	
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long >	< Short >
	:TEMPlate:POSition:MIN <NR2>	:TEMP:POS:MIN <NR2>
	:TEMP:POS:MIN?	:TEMP:POS:MIN?
Parameter/ Return parameter	<NR2>	-12.00 ~ 12.00 Div. 0 represents the center division.
Example	:TEMP:POS:MIN 2.00	Sets the template to the 2nd grid division above the center division.

3-9-13.:TEMPlate:SAVe:MAXimum

<div style="text-align: right">Set →</div>

Description	Saves the maximum template.
	Same as: Utility key → More (F5) →Go-NoGo Menu(F1)→Template Edit(F1)→Save & Create(F4).
Note	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:TEMPlate:SAVe:MAXimum :TEMP:SAV:MAX

3-9-14.:TEMPlate:SAVe:MINimum

<div style="text-align: right">Set →</div>

Description	Saves the minimum template.
	Same as: Utility key → More (F5) →Go-NoGo Menu(F1)→Template Edit(F1)→Save & Create(F4).
Note	Before this command can be used, please set the template mode to normal using the :TEMPlate:MODe 0 command.
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:TEMPlate:SAVe:MINimum :TEMP:SAV:MIN

3-9-15.:TEMPlate:TOLerance

Set →
→ Query
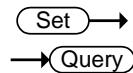
Description	Sets or queries the tolerance (as a percentage) of the auto template.	
Note	Before this command can be used, please set the template mode to auto using the :TEMPlate:MODe 1 command.	
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.	
Syntax	< Long >	< Short >
	:TEMPlate:TOLerance <NR2>	:TEMP:TOL <NR2>
		:TEMP:TOL?
	:TEMPlate:TOLerance?	
Parameter/ Return parameter	<NR2> 0.4 ~ 40.0 (0.4% ~ 40%).	
Example	:TEMP:TOL 10	Sets the tolerance to 10%.

3-9-16.:TEMPlate:SAVe:AUTo

$\boxed{\text{Set}} \longrightarrow$

|	
Description	Saves the auto template.
	Same as: Utility key → More (F5) →Go-NoGo Menu(F1)→Template Edit(F1)→Save & Create(F4).
Note	Before this command can be used, please set the template mode to auto using the :TEMPlate:MODe 1 command.
	Before any Go-NoGo command can be used, please use the :GONogo:FUNCtion 1 command to initialize the oscilloscope.
Syntax	< Long > < Short >
	:TEMPlate:SAVe:AUTo :TEMP:SAV:AUT

3-10.Data Logging Command

3-10-1.:DATALOG:STATE

$\qquad$ (Set) →
$\qquad$ → (Query)
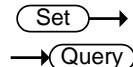
| Description	Turns the datalogging function on/off. Same as: Utility key → More (F5) →Data Logging Menu(F3)→Data Logging (F1).	
Syntax	< Long > :DATALOG:STATE {0|1} :DATALOG:STATE?	< Short > :DATALOG:STATE {0|1} :DATALOG:STATE?
Parameter/ Return parameter	0 1	Off. Stop data logging function. On. Start data logging function.
Example	:DATALOG:STATE 1	Turn data logging on.

3-10-2.:DATALOG:SOURce

$\qquad$ (Set) →
$\qquad$ → (Query)
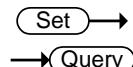
Description	Sets or queries the data logging source channel.	
Syntax	< Long > :DATALOG:SOURce{1|2} :DATALOG:SOURce?	< Short > :DATALOG:SOUR{1|2} :DATALOG:SOUR?
Parameter/ Return parameter	1 2	Sets CH1 as the source channel Sets CH2 as the source channel
Example	:DATALOG:SOUR 1	Set source as CH1.

### 3-10-3.:DATALOG:SAVe

Set →
→ Query
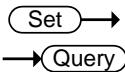
Description	Sets the save type as waveform or image.	
Syntax	< Long >	< Short >
	:DATALOG:SAVe {0|1}	:DATALOG:SAV {0|1}
	:DATALOG:SAVe?	:DATALOG:SAV?
Parameter/ Return parameter	0	Save as image
	1	Save as waveform
Example	:DATALOG:SAVe 1	Set the save type to waveform.

3-10-4.:DATALOG:INTerval

Set →
→ Query
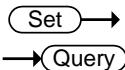
Description	Sets or queries the interval time between each recording.	
Syntax	< Long >	< Short >
	:DATALOG:INTerval <NR1>	:DATALOG:INT
	:DATALOG:INTerval?	<NR1>
		:DATALOG:INT?
Parameter/ Return parameter	<NR1>	Discrete time intervals in seconds: {2|3|4|5|10|20|30|60|120|300|600|1200| 1800}
Example	:DATALOG:INT 2	Sets the interval time to 2 seconds.

3-10-5.:DATALOG:DURation

Set →
→ Query
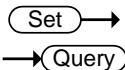
Description	Sets or queries the duration time of each recording.	
Syntax	< Long >	< Short >
	:DATALOG:DURation <NR1>	:DATALOG:DUR <NR1>
	:DATALOG:DURation?	:DATALOG:DUR?
Parameter/ Return parameter	<NR1>	Discrete recording time in minutes: {5|10|15|20|25|30|60|90|120|150|180|210| 240|270|300|330|360|390|420|450|480| 510|540|570|600|1200|1800|2400|3000| 3600|4200|4800|5400|6000}
Example	:DATALOG:DUR 5	Sets the recording time to 5 minutes.

3-11.Save/Recall Command

3-11-1.:MEMory<X>:RECall:SETup

$\boxed{\text{Set}} \longrightarrow$

Description	Recalls a panel setting from the internal memory.	
	Same as: Save/Recall key (recall) → F2	
Syntax	< Long >	< Short >
	:memory<x>:recall:setup	:mem<x>:rec:set
Parameter	<X>	Internal memory
	1 ~ 15	S1 ~ S15
Example	:memory1:recall:setup	Recalls the settings from the internal memory S1.

3-11-2.:MEMory<X>:RECall:WAVeform

<div align="right">(Set)━━▶</div>

Description	Recalls a waveform from the internal memory and saves it to a reference waveform.
	Same as: Save/Recall key (recall) → F3

Syntax	< Long >	< Short >
	:memory<x>:recall:waveform <NR1>	:mem<x>:rec:wav <NR1>

Parameter	<X>	Internal memory
	1 ~ 15	W1 ~ W15
	<NR1>	Reference waveform
	1, 2	RefA, RefB

Example	:memory1:recall:waveform 1	Recalls a waveform from the internal memory W1 and saves it to the reference waveform A.

3-11-3.:MEMory<X>:SAVe:SETup

<div align="right">(Set)━━▶</div>

Description	Saves the current panel settings to an internal memory.
	Same as: Save/Recall key (save) → F1

Syntax	< Long >	< Short >
	:memory<x>:save:setup	:mem<x>:sav:set

Parameter	<X>	Internal memory
	1 ~ 15	S1 ~ S15

Example	:memory1:save:setup	Save the current panel settings to the memory S1.

3-11-4.:MEMory<X>:SAVe:WAVeform

$\boxed{\text{Set}} \longrightarrow$

Description	Saves a reference waveform to the internal memory.			
	Same as: Save/Recall key (save) → F2			
Syntax	< Long >		< Short >	
	:memory<x>:save:waveform <NR1>		:mem<x>:sav:wav <NR1>	
Parameter	<X>	Internal memory		
	1 ~ 15	W1 ~ W15		
	<NR1>	Reference waveform		
		1	CH1	2	CH2
		3	Math	4	RefA
		5	RefB		
Example	:memory1:save:waveform 1	Saves the reference waveform A to the internal memory W1.		

3-11-5.*RCL

$\boxed{\text{Set}} \longrightarrow$

Description	Recalls a set of panel setting from one of the fifteen internal memories, S1 to S15.	
	Same as: Save/Recall key (recall) → F3	
Syntax	*rcl <NR1>	
Parameter	<NR1>	Settings
	1 to 15	S1 to S15
Example	*rcl 1	Recalls the panel settings from S1.

3-11-6.:REF<X>:DISPlay

Set ⟶

⟶ Query
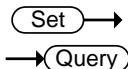
Description	Recalls a reference waveform into the display or returns its status. Same as: Save/Recall key (recall) → F5 → F2 or F3			
Syntax	< Long >		< Short >	
	:ref<x>:display <Boolean>		:ref<x>disp <Boolean>	
	:ref<x>:display?		:ref<x>disp?	
Parameter	<X>	Reference	<Boolean>	Reference on/off
	1	A	0	Off
	2	B	1	On
Example	:ref1:display 1		Turns on the reference waveform A.	

3-11-7.:REF<X>:LOCate

Set ⟶

⟶ Query

Description	Moves or returns the position of a reference waveform. Same as: Save/Recall key → F5 → Variable knob Value of position is; 0 as display center, 25 per 1div.			
Syntax	< Long >		< Short >	
	:ref<x>:locate <NR1>		:ref<x>:loc <NR1>	
	:ref<x>:locate?		:ref<x>:loc?	
Parameter	<X>	Reference	<NR1>	Position
	1	A	−100 to +100	
	2	B		
⚠ CAUTION:	Before using this command, turn on a reference waveform. See the example below.			
Example	:ref1:display 1 :ref1:locate 0		Turns on the reference waveform A and move it to ±0 position.	

55

3-11-8.:REF<X>:SAVe

Description	Saves an input signal as a reference waveform.			
	Same as: Save/Recall key (save) → F2 → F2 → F3			
Syntax	< Long >		< Short >	
	:ref<x>:save <NR1>		:ref<x>sav <NR1>	
Parameter	<X>	Reference	<NR1>	Source
	1	A	1	Channel 1
	2	B	2	Channel 2
			3	Math
Example	:ref1:save 1		Saves the Channel 1 signal as the reference waveform A.	

3-11-9.*SAV

Description	Saves the current panel settings into the internal memory.	
	Same as: Save/Recall key ↩ → F1	
Syntax	*sav	
Parameter	<NR1>	Internal memory
	1 to 15	S1 to S15
Example	*sav 1	Saves the current panel settings into S1.

3-12.Time (Horizontal) Command

3-12-1.:TIMebase:DELay

Set ⟶
⟶ Query
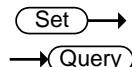
Description	Sets or returns the horizontal delay time (sec).	
	Unit: s	
Syntax	< Long >	< Short >
	:timebase:delay <NR3>	:tim:del <NR3>
	:timebase:delay?	:tim:del?
Example	:timebase:delay 0	Sets the horizontal delay to 0 sec.

3-12-2.:TIMebase:SCALe

Set →

→ Query
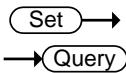
Description	Selects or returns the horizontal scale.
	Same as: Time/div knob
	Unit: s/div
Syntax	< Long > < Short >
	:timebase:scale <NR3> :tim:scal <NR3>

Parameter	s/div	<NR3>	s/div	<NR3>	s/div	<NR3>
	1ns	$1e^{-9}$	5us	$5e^{-6}$	25ms	$25e^{-3}$
	2.5ns	$2.5e^{-9}$	10us	$10e^{-6}$	50ms	$50e^{-3}$
	5ns	$5e^{-9}$	25us	$25e^{-6}$	100ms	$100e^{-3}$
	10ns	$10e^{-9}$	50us	$50e^{-6}$	250ms	$250e^{-3}$
	25ns	$25e^{-9}$	100us	$100e^{-6}$	500ms	$500e^{-3}$
	50ns	$50e^{-9}$	250us	$250e^{-6}$	1s	1
	100ns	$100e^{-9}$	500us	$500e^{-6}$	2.5s	2.5
	250ns	$250e^{-9}$	1ms	$1e^{-3}$	5s	5
	500ns	$500e^{-9}$	2.5ms	$2.5e^{-3}$	10s	10
	1us	$1e^{-6}$	5ms	$5e^{-3}$	25s	25
	2.5us	$2.5e^{-6}$	10ms	$10e^{-3}$	50s	50

Example	:timebase:scale 1	Selects 1s/div as the horizontal scale.

3-12-3.:TIMebase:SWEep

Set ⟶
⟶ Query
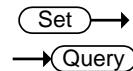
Description	Selects or returns the horizontal sweep mode.
	Same as: Horizontal menu key → F1 ~ F5

Syntax	< Long >	< Short >
	:timebase:sweep <NR1>	:tim:swe <NR1>
	:timebase:sweep?	:tim:swe?

Parameter	<NR1>	Sweep mode	<NR1>	Sweep mode
	0	Main timebase	1	Window
	2	Window zoom	3	Roll mode
	4	XY mode		

Example	:timebase:sweep 0	Selects the main timebase as the horizontal sweep mode.

3-12-4.:TIMebase:WINDow:DELay

Set ⟶
⟶ Query
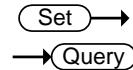
Description	Sets or returns the horizontal delay time of the zoomed window.
	Same as: Horizontal menu key → F2 (Window) → Horizontal Position knob
	Unit: s

Syntax	< Long >	< Short >
	:timebase:window:delay <NR3>	:tim:wind:del <NR3>

Example	:timebase:window:delay 1.0e-3	Sets the delay time to 1ms.

3-12-5.:TIMebase:WINDow:SCALe

<div style="text-align:right">Set ⟩⟶
⟶⟨ Query ⟩</div>
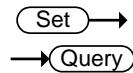
Description	Sets or returns the display range (time scale) of the zoomed window.	
	Same as: Horizontal menu key → F2 (Window) → Time/div knob	
	Unit: s/div	
Syntax	< Long >	< Short >
	:timebase:window:scale <NR3>	:tim:wind:scal<NR3>
Example	:timebase:window:scale 100e-9	Sets the display range of zoomed window to 100ns/div.

3-13.Trigger Command

3-13-1.:FORCe

$\boxed{\text{Set}} \rightarrow$

Description	Manually triggers the DCS-4605 and displays the input signals. Same as: (Trigger) Force key
Syntax	<Long format> <Short format> :force :forc

3-13-2.:RUN

$\boxed{\text{Set}} \rightarrow$

Description	Starts waiting for a trigger condition. Same as: Run key
Syntax	:run

3-13-3.:SINGle

Set →

Description	Selects the single trigger mode and starts waiting for a trigger condition.
	Same as: (Trigger) Single key

Syntax	<Long format>	<Short format>
	:single	:singl

3-13-4.:STOP

Set →

Description	Stops waiting for a trigger condition or acquiring waveform.
	Same as: Stop key

Syntax	:stop

3-13-5.*TRG
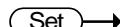
Set →

Description	Manually triggers the DCS-4605 and displays the input signals.
	Same as: (Trigger) Force key

Syntax	*trg

3-13-6.:TRIGger:COUPle

Set →

→ Query

Description	Selects or returns the trigger coupling mode.	
	Same as: Trigger menu key → F4 → F2	
Syntax	< Long >	< Short >
	:trigger:couple <NR1>	:trig:coup <NR1>
	:trigger:couple?	:trig:coup?
Parameter	<NR1> Coupling mode	
	0 AC	
	1 DC	

⚠ **CAUTION:** Before using this command, select the edge or pulse trigger. See the example below.

Example	:trigger:type: 0	Selects the edge trigger and DC coupling mode.
	:trigger:couple 1	

3-13-7.:TRIGger:FREQuency

→ Query

Description	Returns the trigger frequency readout.	
Syntax	< Long >	< Short >
	:trigger:frequency?	:trig:freq?
Returns	<NR3> Unit: Hz	

3-13-8.:TRIGger:LEVel

Set →
→ Query
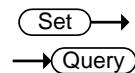
Description	Selects or returns the trigger level.		
	Same as: Trigger level knob		
	Unit: V		
Syntax	< Long >		< Short >
	:trigger:level <NR3>		:trig:lev <NR3>
	:trigger:level?		:trig:lev?
Parameter	<NR3>	Trigger level in voltage	
Example	:trigger:level 0		Sets the trigger level at ±0.

3-13-9.:TRIGger:MODe

Set →
→ Query
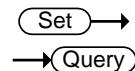
|			
Description	Selects or returns the trigger mode.		
	Same as: Trigger key → F5		
Syntax	< Long >		< Short >
	:trigger:mode <NR1>		:trig:mod <NR1>
	:trigger:mode?		:trig:mod?
Parameter	<NR1>	Trigger mode	
	1	Auto	
	2	Normal	
⚠ CAUTION:	Before using this command, select the edge or pulse trigger. See the example below.		
Example	:trigger:type: 0 :trigger:mode 2		Selects the edge trigger and normal trigger mode.

3-13-10.:TRIGger:NREJ

Set →

→ Query
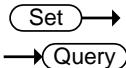
| Description	Turns the noise rejection mode on/off. Same as: Trigger key → F4 → F4	
Syntax	< Long > :trigger:nrej <Boolean> :trigger:nrej?	< Short > :trig:nrej <Boolean> :trig:nrej?
Parameter	<Boolean> Noise rejection mode 0 Off 1 On	
⚠ CAUTION:	Before using this command, select the edge or pulse trigger. See the example below.	
Example	:trigger:type 0 :trigger:nrej 0	Selects the edge trigger and turns off the noise rejection.

3-13-11.:TRIGger:PULSe:MODe

Set →

→ Query
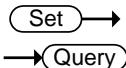
Description	Selects the trigger mode in the pulse trigger. Same as: Trigger key → F1(Pulse) → F3			
Syntax	< Long > :trigger:pulse:mode <NR1> :trigger:pulse:mode?		< Short > :trig:puls:mod <NR1> :trig:puls:mod?	
Parameter	<NR1> 0 1	Mode < >	<NR1> 2 3	Mode = ≠
⚠ CAUTION:	Before using this command, select the pulse trigger. See the example below.			
Example	:trigger:type 2 :trigger:pulse:mode 0		Selects the pulse trigger and < (smaller than) as the trigger mode.	

3-13-12.:TRIGger:PULSe:TIMe

$\boxed{\text{Set}} \longrightarrow$

$\longrightarrow \boxed{\text{Query}}$
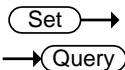
| Description	Selects the trigger pulse time(width) in the pulse trigger. Same as: Trigger key → F1(Pulse) → F3 → Variable knob Unit: s	
Syntax	< Long > :trigger:pulse:time <NR3> :trigger:pulse:time?	< Short > :trig:puls:tim <NR3> :trig:puls:tim?
Parameter	<NR3> $20e^{-9}$ ~ 10	Trigger pulse time(width) 20ns ~ 10s
⚠ CAUTION:	Before using this command, select the pulse trigger. See the example below.	
Example	:trigger:type 2 :trigger:pulse:time 1	Selects the pulse trigger and sets the trigger pulse time as 1sec.

3-13-13.:TRIGger:REJect

$\boxed{\text{Set}} \longrightarrow$

$\longrightarrow \boxed{\text{Query}}$
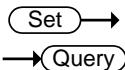
| Description	Selects the trigger rejection filter. Same as: Trigger key → F4 → F3	
Syntax	< Long > :trigger:reject <NR1> :trigger:reject?	< Short > :trig:rej <NR1> :trig:rej?
Parameter	<NR1> 0 1 2	Rejection filter off LF HF
⚠ CAUTION:	Before using this command, select the edge or pulse trigger. See the example below.	
Example	:trigger:type 0 :trigger:reject 1	Selects the edge trigger and LF rejection filter.

3-13-14.:TRIGger:SLOPe

$$\boxed{\text{Set}} \longrightarrow$$
$$\longrightarrow \boxed{\text{Query}}$$
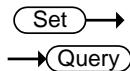
Description	Selects the trigger slope.	
	Same as: Trigger key → F4 → F1	
Syntax	< Long >	< Short >
	:trigger:slope <NR1>	:trig:slop <NR1>
	:trigger:slope?	:trig:slop?
Parameter	<NR1>	Trigger slope
	0	+ (positive)
	1	– (negative)
⚠ CAUTION:	Before using this command, select the edge or pulse trigger. See the example below.	
Example	:trigger:type 0	Selects the edge trigger and negative trigger slope.
	:trigger:slope 1	

3-13-15.:TRIGger:STATe

Description	Queries the present trigger state.

Syntax	< Long >	< Short >
	:trigger:state?	:trig:stat?

Return Parameter	<NR1>	Trigger state
	0	Un-triggered
	1	Triggered

⚠️ **CAUTION:** This function is designed for triggering with slow time-bases or for single shot events. This query will return 0 before the trigger point and 1 after a trigger point (if any).

However with quicker time-bases in auto mode, a periodic waveform is constantly re-sampled and thus re-triggered each time, resulting in the query returning 0 before each trigger. Therefore with quicker time bases, this will usually result in 0 being returned, even if the waveform is shown as triggered.

Example	:trigger:state?	Returns the current trigger
	0	state as un-triggered.

3-13-16.:TRIGger:SOURce

Set →
→ Query

| Description | Selects the trigger source channel. |
| | Same as: Trigger key → F2 |

Syntax	< Long >		< Short >
	:trigger:source <NR1>		:trig:sour <NR1>
	:trigger:source?		:trig:sour?

Parameter	<NR1>	Trigger source	<NR1>	Trigger source
	0	Channel 1	2	External input
	1	Channel 2	3	Line

Example	:trigger:source 0	Selects Channel 1 as the trigger source.

3-13-17.:TRIGger:TYPe

Set →
→ Query

| Description | Selects the trigger type. |
| | Same as: Trigger key → F1 |

Syntax	< Long >		< Short >
	:trigger:type <NR1>		:trig:typ <NR1>
	:trigger:type?		:trig:typ?

Parameter	<NR1>	Trigger type	<NR1>	Trigger type
	0	Edge	2	Pulse
	1	Video		

Example	:trigger:type 0	Selects the edge trigger type.

3-13-18.:TRIGger:VIDeo:FIELd

Set ⟶
⟶ Query

Description	Selects the trigger field in the video trigger.
	Same as: Trigger key → F1(Video) → F5

Syntax	< Long >		< Short >	
	:trigger:video:field <NR1>		:trig:vid:fiel <NR1>	
	:trigger:video:field?		:trig:vid:fiel?	

Parameter	<NR1>	Field	<NR1>	Field
	0	Line	2	even
	1	odd		

⚠ CAUTION:	Before using this command, select the video trigger. See the example below.

Example	:trigger:type 1	Selects the video trigger and odd trigger field.
	:trigger:video:field 1	

3-13-19.:TRIGger:VIDeo:LINe

Set →
→ Query

Description	Selects the trigger field line in the video trigger.
	Same as: Trigger key → F1(Video) → F5 → Variable knob

Syntax	< Long >	< Short >
	:trigger:video:line <NR1>	:trig:vid:lin <NR1>
	:trigger:video:line?	:trig:vid:lin?

Parameter	<NR1>	Line range	<NR1>	Line range
	1 ~ 263	NTSC odd	1 ~ 313	PAL/SECAM odd
	1 ~ 262	NTSC even	1 ~ 312	PAL/SECAM even

⚠ CAUTION:	Before using this command, select the video trigger, TV standard, and odd or even trigger field. See the example below.

Example	:trigger:type 1	Selects the video trigger,
	:trigger:video:type 0	PAL,
	:trigger:video:field 1	odd field triggering,
	:trigger:video:line 313	and line 313.

3-13-20.:TRIGger:VIDeo:POLarity

Set →
→ Query
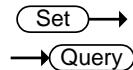
Description	Selects the video trigger polarity. Same as: Trigger key → F1(Video) → F4	
Syntax	< Long >	< Short >
	:trigger:video:polarity <NR1>	:trig:vid:pol <NR1>
	:trigger:video:polarity?	:trig:vid:pol?
Parameter	<NR1>	Polarity
	0	Positive
	1	Negative
⚠ CAUTION:	Before using this command, select the video trigger. See the example below.	
Example	:trigger:type 1	Selects the video trigger
	:trigger:video:polarity 0	and positive polarity.

3-13-21.:TRIGger:VIDeo:TYPe

Set →
→ Query
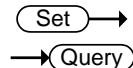
Description	Selects the TV standard in the video trigger. Same as: Trigger key → F1(Video) → F3			
Syntax	< Long >		< Short >	
	:trigger:video:type <NR1>		:trig:vid:typ <NR1>	
	:trigger:video:type?		:trig:vid:typ?	
Parameter	<NR1>	Type	<NR1>	Type
	0	PAL	2	SECAM
	1	NTSC		
⚠ CAUTION:	Before using this command, select the video trigger. See the example below.			
Example	:trigger:type 1		Selects the video trigger	
	:trigger:video:type 0		and PAL standard.	

Test and Measurement Solutions

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