Digital Storage Oscilloscope

GDS-3000 Series

PROGRAMMING MANUAL

GW INSTEK PART NO. 82DS-33040I01

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve products and reserves the right to change specifications, equipment, and maintenance procedures at any time without notice.

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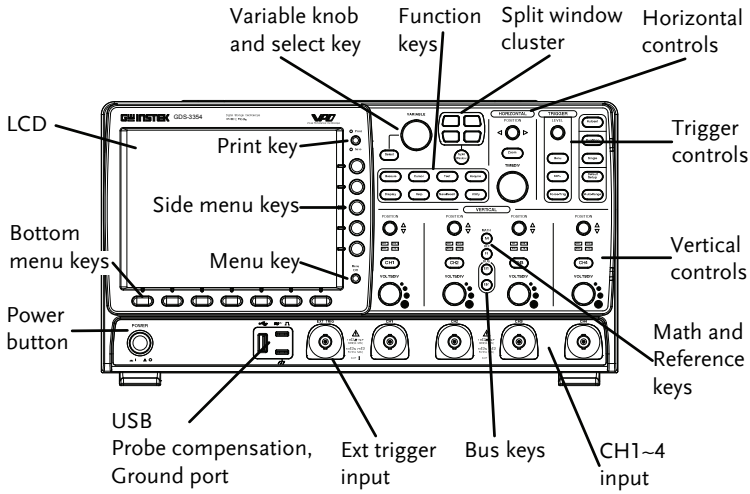
INTERFACE OVERVIEW

This manual describes how to use the GDS-3000's remote command functionality and lists the command details. The Overview chapter describes how to configure the GDS-3000 USB remote control interface, Ethernet interface, GPIB interface (using the optional GPIB to USB adapter) and RS-232 interface.

Front Panel Overview



Interface Configuration

Configure USB Interface

USB configuration	PC side connector	Type A, host
	GDS-3000 side connector	Type B, slave
	Speed	1.1/2.0 (Full speed)
	USB Class	CDC (communications device class)

Panel operation

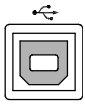
1. Press the Utility key.

2. Press I/O from the bottom menu.

3. Press USB Device Port from the side menu and choose Computer.

4. Press Computer from the side menu.

5. Connect the USB cable to the rear panel slave port.



6. When the PC asks for the USB driver, select dso_vpo.inf downloadable from GW website, www.gwinstek.com, the GDS-3000 product corner. The driver file automatically sets the GDS-3000 as a serial COM port.

Configure RS-232C Interface

RS-232C configuration	Connector	DB-9, Male
	Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200
	Parity	None, Odd, Even
	Data bit	8 (fixed)
	Stop bit	1, 2

Panel operation

1. Press the *Utility* key.

2. Press *I/O* from the bottom menu.

3. Press *RS-232C* from the side menu.

4. Use the side menu to set the Baud Rate.

Baud Rate 2400, 4800, 9600, 19200, 38400, 57600, 115200

5. Press *Stop Bit* to toggle the number of stop bits.

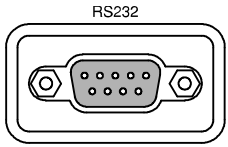
Stop Bits 1, 2

6. Press *Parity* to toggle the parity.

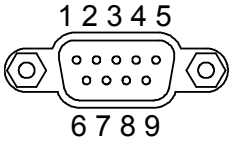
Parity Odd, Even, None

7. Press *Save Now* to save the settings.

8. Connect the RS-232C cable to the rear panel port: DB-9 male connector. For a functionality check, see page 12.



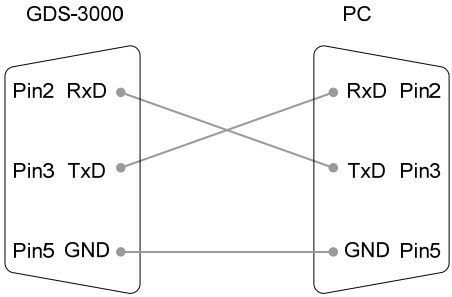
Pin assignment



2: RxD (Receive data)
3: TxD (Transmit data)
5: GND
4, 6 ~ 9: No connection

PC connection

Use the Null Modem connection as in the below diagram.



Configure the Ethernet Interface

Ethernet configuration

- MAC Address
- Instrument Name
- User Password
- Instrument IP Address
- Domain Name
- DNS IP Address
- Gateway IP Address
- Subnet Mask
- HTTP Port 80 (fixed)

Background

The Ethernet interface is used remote control over a network and retrieve scope's screen shot, system information etc,. Please note that the all GDS-3000 series were designed with a build-in web server.

Panel operation

1. Press the *Utility* key.

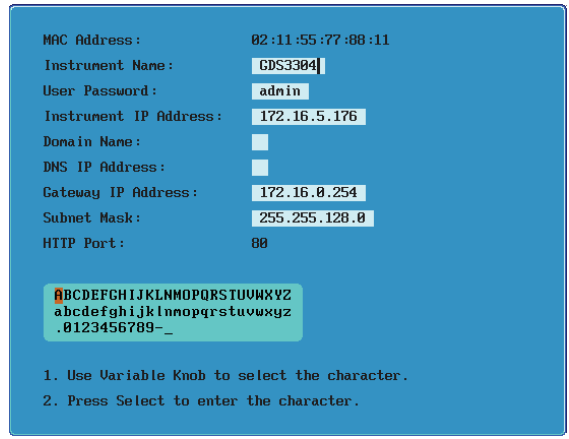
2. Press *I/O* from the bottom menu.

3. Press *Ethernet* from the side menu.

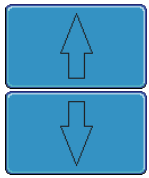
4. Set *DHCP/BOOTP* to *On* or *Off* from the side menu.

Note

IP addresses will automatically be assigned with DHCP/BOOTP set to on. For Static IP Addresses, DHCP/BOOTP should be set to off.



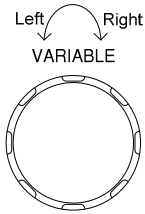
5. Use the *Up* and *Down* arrows on the side menu to navigate each Ethernet configuration item.



Items MAC Address, Instrument Name, User Password, Instrument IP Address, Domain Name, DNS IP Address, Gateway IP Address, Subnet Mask

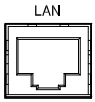
Note: HTTP Port is fixed at 80.

6. Use the Variable knob to highlight a character and use the Select key to choose a character.



Press *Backspace* to delete a character.

7. Connect the Ethernet cable to the rear panel of the GDS-3000.



Configure GPIB Interface

To use GPIB, the optional GPIB to USB (GUG-001) adapter must be used. The GPIB address can be configured for the GUG-001 from the utility menu. See the GUG-001 user manual for more information.

Configure GPIB

1. Insert the GUG-001 USB 2.0 A-B type cable into the rear panel USB device port.

2. Press the *Utility* key.

3. Press *I/O* from the bottom menu.

4. Press USB Device Port from the side menu and choose Computer.

5. Press *GPIB* from the side menu.

6. Use the variable knob to set the GPIB Address from the side menu.

Range 1 ~ 30

GPIB constraints

- Maximum 15 devices altogether, 20m cable length, 2m between each device
- Unique address assigned to each device
- At least 2/3 of the devices turned On
- No loop or parallel connection

USB/RS-232C Remote Control Software

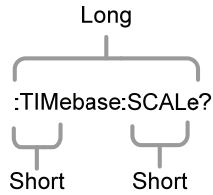
Terminal application (USB/RS-232C)	Invoke the terminal application such as hyper terminal program. For RS-232C, set the COM port, baud rate, stop bit, data bit, and parity accordingly. To check the COM port No, see the Device Manager in the PC. For WinXP, Control panel → System → Hardware tab.
Functionality check	Run this query command via the terminal. *idn? (use line feed character as the message terminator) This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format. GW, GDS-3354, EK200001, V1.08
PC Software (USB only)	The proprietary PC software FreeWave is downloadable from the GWInstek website for remote control.

COMMAND OVERVIEW

The Command overview chapter lists all GDS-3000 commands in functional order as well as alphabetical order. The command syntax section shows you the basic syntax rules you have to apply when using commands.

Command Syntax

Compatible standard	• USB CDC_ACM compatible • SCPI, 1994 (partially compatible)
Command forms	Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.



The commands can be written in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.

Below are examples of correctly written commands.

LONG	:TIMebase:SCALe?	:TIMEBASE:SCALE?
	:timebase:scale?	

	SHORT :TIM:SCAL?		:TIM:SCAL?
Command format	:TIMebase:SCALe <NR3>LF  		1: command header 2: single space 3: parameter 4: message terminator
Parameter	Type	Description	Example
	<Boolean>	boolean logic	0, 1
	<NR1>	Integers	0, 1, 2, 3
	<NR2>	floating point	0.1, 3.14, 8.5
	<NR3>	floating point with an exponent	4.5e-1, 8.25e+1
	<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1
Message terminator	LF	line feed code	
Note	Commands are non-case sensitive.		

List of Commands in Functional Order

COMMAND DETAILS

The Command details chapter shows the detailed syntax, equivalent panel operation, and example for each command. For the list of all commands, see page15.

Common Commands

*IDN? → Query

Description	Returns the manufacturer, model, serial number and version number of the unit.
Syntax	*IDN?
Example	*IDN? GW,GDS-3354,EK200001,V1.08

*LRN? → Query

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

```
:DISPlay:WAVEform VECTOR;PERSistence OFF;INTensity:WAVEform 70;INTensity:GRATic
le 50;GRATicule FULL;:CHANnel CH1:DISPlay ON;BWLimit FULL;COUPling DC;INVert OF
;POSition -1.460E+00;PROBe:RATio 1.000e+00;PROBe:TYPe VOLTAGE;SCALe 5.000E-01;I
Pedance 1E+6;EXPand GROUND;:CHANnel CH2:DISPlay ON;BWLimit FULL;COUPling DC;INV
rt OFF;POSition -6.000E-02;PROBe:RATio 1.000e+00;PROBe:TYPe VOLTAGE;SCALe 2.000
-02;IMPedance 1E+6;EXPand GROUND;:MATH:TYPe DUAL;DISP OFF;DUAL:SOURce1 CH1;SOUR
e2 CH2;OPERator PLUS;POSition 0.000E+00;SCALe 1.000E+00;FFT:SOURce CH1;MAG DB;W
NDow HANNING;POSition 0.000E+00;SCALe ?;:MEASure:GATing OFF;SOURce1 CH1;SOURce2
CH2;:TIMebase:MODe MAIN;SCALe 5.000E-04;POSition 0.000E+00;WINDow:SCALe 1.000E-
5;:ACQuire:MODe HIRES;AVERage 32;:CURSor:SOURce CH2;MODe OFF;H1Position ;H2Posi
ion ;V1Position ;V2Position ;:HARDcopy:MODe SAVE;PRINTINKSaver ON;SAVEINKSaver
N;SAVEFORMat BMP;:TRIGger:FREQuency 1.000E+03;TYPe EDGE;SOURce CH1;COUPle DC;NR
J OFF;REJect OFF;MODe AUTO;HOLDoff 1.000e-08;LEVelH 1.000E+00;LEVelL ?;EDGe:SLO
 POSITIVE;DELay:TYPe TIME;DELay:TIME 0.000;DELay:EVENt 1;DELay:LEVel ?;PULSEWid
h:POLarity POSITIVE;RUNT:POLarity POSITIVE;RISEFall:SLOP POSITIVE;VIDeo:TYPe NT
C;VIDeo:FIELd FIELD1;VIDeo:LINe 1;VIDeo:POLarity NEGATIVE;PULSe:WHEn THAN;PULSe
TIME 0.000;:REF1:DISPlay OFF;TIMebase:POSition 0.000E+00;SCALe 5.000E-04;OFFSet
-1.000E+00;SCALe 5.000E-01;:REF2:DISPlay OFF;TIMebase:POSition 0.000E+00;SCALe
.000E-04;OFFSet -1.000E+00;SCALe 5.000E-01;:REF3:DISPlay OFF;TIMebase:POSition
.000E+00;SCALe 2.000E-04;OFFSet 0.000E+00;SCALe 5.000E-01;:REF4:DISPlay OFF;TIM
base:POSition 0.000E+00;SCALe 2.000E-04;OFFSet 0.000E+00;SCALe 5.000E-01
```

*RCL

Set →

Description	Recalls a set of panel setting.
Syntax	*RCL {1 | 2 | 3 |.... | 20}
Example	*RCL 1 Recalls setup from set 1.

*RST

Set →

Description	Resets the GDS-3000 (recalls the default panel settings).
Syntax	*RST

*SAV

Set →

Description	Saves the current setup to setup file number 1~20.
Syntax	*SAV {1 | 2 | 3 |.... | 20}
Example	*SAV 1 Sets current setup to set 1.

Acquisition Commands

:ACQuire:AVERage

Set → Query →

Description	Selects or returns the number of waveform acquisitions that are averaged in the average acquisition mode.

Syntax	:ACQuire:AVERage {2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | ?}
Parameter	2, 4, 8 ,16, 32, 64, 128, 256
Note	Before using this command, select the average acquisition mode. See the example below.
Example	:ACQuire:MODe AVERage :ACQuire:AVERage 2 Selects the average acquisition mode, and sets the average number to 2.

:ACQuire:MODe

Set → / → Query

Description	Selects or returns the acquisition mode.			
Syntax	:ACQuire:MODe {SAMPle | PDETect | HIRes | AVERage | ?}			
Parameter	SAMPle	Sample mode sampling	PDETect	Peak detect sampling
	HIRes	Hi resolution sampling	AVERage	Average sampling mode
Example	:ACQuire:MODe PDETect Sets the sampling mode to peak detection.			

:ACQuire<x>:MEMory?

→ Query

Description	Returns the data in acquisition memory for the selected channel as a single string.	
Syntax	:ACQuire<x>:MEMory?	
Parameter	<x>	Channel
	1/2/3/4	Channel 1/2/3/4

Example	:ACQuire1:MEMory?
	Memory Length,25000;IntpDistance,0;Trigger Address,12499;Trigger Level,1.00V;Sou
	rce,CH1;Vertical Units,V;Vertical Scale,5.000e-01;Probe,1.000e+00;Vertical Posit
	ion,-1.460e+00;Horizontal Units,S;Horizontal Scale,5.000E-04;Horizontal Position
	,0.000E+00;Horizontal Mode,Main;SincET Mode,Real Time;Sampling Period,2.000e-07;
	Horizontal Old Scale,5.000E-04;Horizontal Old Position,0.000E+00;Firmware,V1.08;
	Time,07-Feb-11 15:35:17;Waveform Data;#550000<50000 bytes binary data><LF>

:ACQuire<x>:STATe? → Query

Description	Returns the status of waveform data.	
Syntax	:ACQuire<x>:STATe?	
Parameter	<x>	Channel
	1/2/3/4	Channel 1/2/3/4
Return parameter	0	Raw data is not ready
	1	Raw data is ready

Example

:ACQuire1:STATe?

0

Returns 0. The channel 1's raw data is not ready.

Note: If the oscilloscope changes the acquisition status from STOP to RUN, the status will be reset as zero.

Autoscale Commands

:AUTOSet

Set ⟶

Description	Runs the Autoset function to automatically configure the horizontal scale, vertical scale, and trigger according to the input signal.
Syntax	:AUTOSet

:AUTORange

Set ⟶

Description	Runs the Autorange function to automatically continuously configure the horizontal and vertical scale according to the input signal.
Syntax	:AUTORange

Vertical Commands

:CHANnel<x>:BWLimit

Set → / → Query

Description	Selects or returns the bandwidth limit on/off.			
Syntax	:CHANnel<x>:BWLimit {FULL | <NR3> | ?}			
Parameter	<x>	Channel	<NR3>	Limit
	1/2/3/4	CH1/2/3/4	20E+6	20MHz
	FULL	Full bandwidth	100E+6	100MHz
			200E+6	200MHz
Return Parameter	<NR3>	Returns the bandwidth.		
	Full	Full bandwidth for the oscilloscope.		
Example	:CHANnel1:BWLimit 2.000E+07			
	Sets the channel 1 bandwidth 20MHz			

:CHANnel<x>:COUPling

Set → / → Query

Description	Selects or returns the coupling mode.			
Syntax	CHANnel<x>:COUPling {AC | DC | GND | ?}			
Parameter	<x>	Channel		Coupling mode
	1/2/3/4	CH1/2/3/4	AC	AC coupling
			DC	DC coupling
			GND	Ground coupling
Return parameter	Returns the coupling mode.			
Example	:CHANnel1:COUPling DC			
	Sets the coupling to DC for Channel 1.			

:CHANnel<x>:DESKew

Set → / → Query

Description	Sets the deskew time in seconds.
Syntax	:CHANnel<x>:DESKew { <NR3> | ?}

Parameter	<x>	Channel	<NR3>	Deskew time
	1/2/3/4	CH1/2/3/4	-5.00E -11~5.00E -11	-50ns to 50 ns.
Return parameter	<NR3>	Returns the deskew time.		
Example	:CHANnel1:DESKew 1.300E-9 Sets the deskew time to 1.3 nano seconds.			

:CHANnel<x>:DISPlay

Set → Query

Description	Turns a channel on/off or returns its status.			
Syntax	:CHANnel<x>:DISPlay {OFF | ON | ?}			
Parameter	<x>	Channel		Channel on/off
	1/2/3/4	CH1/2/3/4	OFF	Off
			ON	On
Return Parameter	ON	Channel is on.	OFF	Channel is off
Example	:CHANnel1:DISPlay ON Turns on Channel 1			

:CHANnel<x>:EXPand

Set → Query

Description	Sets Expand from ground or from center for a channel. Queries the Expand status of a channel.			
Syntax	:CHANnel<x>:EXPand {GND | CENTer | ?}			
Parameter	<x>	Channel	GND	Ground
	1/2/3/4	CH1/2/3/4	CENTer	Center
Return parameter	GND	Expand by ground	CENTER	Expand by center
Example	:CHANnel1:EXPand GND Sets Channel 1 to Expand by ground.			

:CHANnel<x>:IMPedance

Set → / → Query

Description	Sets the impedance of the oscilloscope.			
Syntax	:CHANnel<x>:IMPedance {<NRf> | ?}			
Parameter	<x>	Channel	<NRf>	Impedance
	1/2/3/4	CH1/2/3/4		impedance in ohms.
Return parameter	<NR3>	Returns the impedance value.		
Example	:CHANnel1:IMPedance 5.0E+1 Sets the impedance to 50 ohms.			

:CHANnel<x>:INVert

Set → / → Query

Description	Inverts a channel or returns its status.			
Syntax	:CHANnel<x>:INVert {OFF | ON | ?}			
Parameter	<x>	Channel		Channel invert
	1/2/3/4	CH1/2/3/4	OFF	off
			ON	on
Return parameter	ON	Invert on	OFF	Invert off
Example	:CHANnel1:INVert ON Inverts Channel 1			

:CHANnel<x>:POSition

Set → / → Query

Description	Sets or returns the position level for a channel. Note, the vertical position will only be set to closest allowed value. The position level range depends on the vertical scale. Note: the scale must first be set before the position can be set.
Syntax	:CHANnel<x>:POSition { <NRf> | ?}

Parameter	<x>	Channel	<NRf>	Position
	1/2/3/4	CH1/2/3/4		Range depends on the vertical scale.
Return parameter	Returns the position value as <NR3>			
Example	:CHANnel1:POSition 2.4E–3 Sets the Channel 1 position to 2.4mV/mA :CHANnel1:POSition? 2.4E-3 Returns 2.4mV as the vertical position.			

:CHANnel<x>:PROBe:RATio

Set → / → Query

Description	Sets or returns the probe attenuation factor. Same as: Channel key → variable knob			
Syntax	:CHANnel<x>:PROBe:RATio { <NRf> | ?}			
Parameter	<x>	Channel	<NRf>	Probe attenuation factor
	1/2/3/4	CH1/2/3/4	0.1e+2	10x
Return parameter	<NR3>	Returns the probe factor for the selected channel		
Example	:CHANnel1:PROBe:RATio 1.00E+0 Sets the Channel 1 probe attenuation factor to 1x			

:CHANnel<x>:PROBe:TYPe

Set → / → Query

Description	Sets or returns the probe type (voltage/current).			
Syntax	:CHANnel<x>:PROBe:TYPe { VOLTage | CURRent | ?}			
Parameter	<x>	Channel		Probe type
	1/2/3/4	CH1/2/3/4	VOLTage	Voltage
			CURRent	Current

Return parameter	Returns the probe type.
Example	:CHANnel1:PROBe:TYPe VOLTage Sets the Channel 1 probe type to voltage.

:CHANnel<x>:SCALe

Set → / → Query

Description	Sets or returns the vertical scale. The scale depends on the probe attenuation factor. Note the probe attenuation factor should be set before the scale.
Syntax	:CHANnel<x>:SCALe { <NRf> | ?}

Parameter	<x>	Channel	<NRf>	Vertical scale
	1/2/3/4	CH1/2/3/4	2e–3 ~ 1e+1	2mV ~ 10V (Probe x1)
Return parameter	<NR3>	Returns the vertical scale in volts or amps.		
Example	:CHANnel1:SCAle 2.00E–2 Sets the Channel 1 vertical scale to 20mV/div			

Math Commands

:MATH:DISP

Set → / → Query

Description	Turns the math display on or off on the screen. Note: Math display cannot be used when split screen is on.			
Syntax	:MATH:DISP {OFF|ON|?}			
Parameter	OFF	Math is not displayed on screen		
	ON	Math is displayed on screen		
Return parameter	ON	Display on	OFF	Display off
Example	:MATH:DISP OFF Math is off.			

:MATH:TYPe

Set → / → Query

Description	Queries or sets the Math type to FFT or to dual channel math operations	
Syntax	:MATH:TYPe {DUAL|FFT|?}	
Parameter	DUAL	Dual channel operations
	FFT	FFT operations
Return parameter	Returns the math type.	
Example	:MATH:TYPe DUAL Sets the Math type to dual channel math operation.	

:MATH:DUAL:SOURce<x>

Set → / → Query

Description	Sets the math source for source 1 or 2.
Syntax	:MATH:DUAL:SOURce<x> {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4|?}

Parameter	<x>	Source number: 1/2/3/4
	CH1~4	Channel 1 to 4
	REF1~4	Reference waveforms 1 to 4
Return parameter	Returns the source for the source 1 or 2.	
Example	:MATH:DUAL:SOURce1 CH1 Sets source1 as channel 1.	

:MATH:DUAL:OPERator

Set → Query

Description	Sets the math operator for dual sourced math operations.			
Syntax	:MATH:DUAL:OPERator {PLUS | MINUS | MUL| DIV|?}			
Parameter	PLUS	+ operator	MINUS	- operator
	MUL	× operator	DIV	÷ operator
Return parameter	Returns operator type.			
Example	:MATH:DUAL:OPERator PLUS Sets the math operator as plus (+).			

:MATH:DUAL:POSition

Set → Query

Description	Sets the vertical position of the displayed math result expressed by division.	
Syntax	:MATH:DUAL:POSition <NRf|?>	
Parameter	<NRf>	Vertical position Depends on the vertical scale (Unit/Div)
Return parameter	Returns the position as <NR3>.	

Example	:MATH:DUAL:POSition 1.0E+0 Sets the vertical position to 1.00 unit/div. :Math:DUAL:POSition? 1.0E+0 Returns the position as 1.00 unit/div.

:MATH:DUAL:SCALe

Set / Query

Description	Sets the vertical scale of the displayed math result.	
Syntax	:MATH:DUAL:SCALe {<NRf>|?}	
Parameter	<NRf>	Vertical scale Depends on the vertical scale
Return parameter	Returns the scale as <NR3>	
Example	:MATH:DUAL:SCALe 2.0E-3 Sets the vertical scale to 2mV/2mA. :MATH:DUAL:SCALe? 2.0E-3 Returns the unit/div scale (2mA).	

:MATH:FFT:SOURce

Set / Query

Description	Sets and queries the FFT source.	
Syntax	:MATH:FFT:SOURce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4|?}	
Parameter	CH1~4	Channel 1 to 4
	REF1~4	Reference waveform 1 to 4
Return parameter	Returns the FFT source.	

Example	:MATH:FFT:SOURce CH1 Sets the FFT math source as channel 1. :MATH:FFT:SOURce? CH1 Return the FFT math source as channel 1.

:MATH:FFT:MAG

Set / Query

Description	Sets FFT vertical units as linear or decibels.	
Syntax	:MATH:FFT:MAG {LINEAR|DB|?}	
Parameter	LINEAR	Linear units (Vrms)
	DB	Logarithmic units (dB)
Return parameter	Returns the FFT vertical units.	
Example	:MATH:FFT:MAG DB Sets FFT vertical units are dB.	

:MATH:FFT:WINDow

Set / Query

Description	Sets the windowing filter used for the FFT function.	
Syntax	:MATH:FFT:WINDow {RECTangular|HAMming|HANning|BLAckman|?}	
Parameter	RECTangular	Rectangular window
	HAMming	Hamming window
	HANning	Hanning window
	BLAckman	Blackman window
Return parameter	Returns the FFT window.	
Example	:MATH:FFT:WINDow HAMming Sets the FFT window filter to hamming.	

:MATH:FFT:POSition

Set → / → Query

Description	Sets the vertical position of the displayed FFT result.	
Syntax	MATH:FFT:POSition { <NRf> | ? }	
Parameter	<NRf>	Vertical position
	-12e+0 ~ +12e+0	-12 units/division to +12 units/division.
Return parameter	Returns the vertical position as <NR3>.	
Example	:MATH:FFT:POSition -2e-1 Sets the FFT position to -0.2 divisions.	

:MATH:FFT:SCALe

Set → / → Query

Description	Sets the vertical scale of the displayed FFT result.	
Syntax	:MATH:FFT:SCALe {<NRf>|?}	
Parameter	<NRf>	Vertical scale
	2e-3 ~ 1e+3	2mV~1kV
	1e+0 ~ 2e+1	1~20dB
Return parameter	Returns vertical scale as <NR3>.	
Example	:MATH:FFT:SCAle 1.0e+0 Sets the scale to 1dB.	

Cursor Commands

:CURSor:MODe

Set → / → Query

Description	Sets cursor mode to horizontal (H) or horizontal and vertical (HV).	
Syntax	:CURSor:MODe {OFF | H | HV | ? }	
Parameter	OFF	Turns the cursors off.
	H	Turns the horizontal cursors on.
	HV	Turns horizontal and vertical cursors on.
Return parameter	HV	Horizontal and vertical cursors are on.
	H	Horizontal cursors are on.

Example	:CURSor:MODe OFF Turns the cursors off.

:CURSor:SOURce

Set → / → Query

Description	Sets or queries the cursor source.	
Syntax	:CURSor:SOURce {CH1 | CH2 |CH3 | CH4 |REF1 |REF2 |REF3 |REF4 | ?}	
Parameter	CH1~CH4	Channel 1 to 4
	REF1~4	Reference waveform 1 to 4
Return parameter	Returns the cursor source.	
Example	:CURSor:SOURce CH1 Turns the cursors source as channel 1.	

:CURSor:H1Position

Set → / → Query

Description	Sets the first horizontal cursor (H1) position.	
Syntax	:CURSor:H1Position {<NRf>| ?}	
Parameter	<NRf>	Horizontal position
Return parameter	Returns the cursor position.	
Example	:CURSor:H1Position? -1.34E-3 Returns the H1 cursor position as -1.34ms.	

:CURSor:H2Position

Set → / → Query

Description	Sets the second horizontal cursor (H2) position.	
Syntax	:CURSor:H2Position {<NRf> | ?}	
Parameter	<NRf>	Horizontal Position
Return parameter	Returns the cursor position.	

Example	:CURSor:H2Position 1.5E-3 Sets the H2 cursor position to 1.5ms.

:CURSor:HDELta → Query

Description	Returns the delta of H1 and H2.	
Syntax	:CURSor:HDELta {?}	
Return Parameter	<NR3>	Returns the distance between two horizontal cursors.
Example	:CURSor:HDELta? 5.0E-9 Returns the horizontal delta as 5ns.	

:CURSor:V1Position → Set / → Query

Description	Sets the first vertical cursor (V1) position.	
Syntax	:CURSor:V1Position {<NRf>| ?}	
Parameter	<NRf>	Position Depends on the vertical scale
Return parameter	Returns the cursor position.	
Example	:CURSor:V1Position 1.6E -1 Sets the V1 cursor position to 160mA.	

:CURSor:V2Position → Set / → Query

Description	Sets the first vertical cursor (V2) position.	
Syntax	:CURSor:V2Position {<NRf> | ?}	
Parameter	<NRf>	Position Depends on the vertical scale
Return parameter	Returns the cursor position.	

Example	:CURSor:V2Position 1.1E-1 Sets the V2 cursor position to 110mA.

:CURSor:VDELta → Query

Description	Returns the delta of V1 and V2.	
Syntax	:CURSor:VDELta {?}	
Return Parameter	<NR3>	Returns the difference between two vertical cursors as <NR3>.
Example	:CURSor:VDELta? 4.00E+0 Returns the vertical delta as 4 volts.	

:CURSor:XY:RECTangular:X:POSition<x> Set → / → Query

Description	Sets or queries the horizontal position in XY mode for the x rectangular coordinates for cursor 1 or 2.			
Syntax	:CURSor:XY:RECTangular:X:POSition<x> {NRf|?}			
Parameter	<x> 1, 2	Cursor	<NRf>	Position Horizontal co-ordinates
Return parameter	Returns the cursor position.			
Example	:CURSor:XY:RECTangular:X:POSition1 4.0E-3 Sets the X-coordinate cursor 1 position to 40mV/mA.			

:CURSor:XY:RECTangular:X:DELta → Query

Description	Returns the delta value of cursor 1 and 2 on the X coordinate.
Syntax	:CURSor:XY:RECTangular:X:DELta {?}

Return Parameter	<NR3>	Returns the delta value of cursor 1 and 2 as <NR3>.
Example	:CURSor:XY:RECTangular:X:DELta? 80.0E-3 Returns the horizontal delta as 80mA.	

:CURSor:XY:POLar:RADIUS:POSition<x> → Query

Description	Queries the polar radius in XY mode for the specified cursor, where X can be either 1 or 2.
Syntax	:CURSor:XY:POLar:RADIUS:POSition <x>{?}
Parameter	<x> 1, 2 X1, X2
Return parameter	Returns the product as <NR3>.
Example	:CURSor:XY:POLar:RADIUS:POSition? 80.0E-3 Returns the polar radius as 80.0mV.

:CURSor:XY:POLar:RADIUS:DELta → Query

Description	Queries the difference between X and Y in XY mode for the specified cursor, where X can be either 1 or 2.
Syntax	:CURSor:XY:POLar:RADIUS:DELta {?}
Return parameter	Returns the difference between the cursors X radius and the cursor Y radius as <NR3>.
Example	:CURSor:XY:POLar:RADIUS:DELta? 31.4E-3 Returns the radius as 31.4mV.

:CURSor:XY:POLar:THETA:POSition<x> → Query

Description	Queries the theta in XY mode for the specified cursor, where X can be either 1 or 2.	
Syntax	:CURSor:XY:POLar:THETA:POSition<x> {?}	
Parameter	<x>	Cursor
	1, 2	Cursor1, cursor2
Return parameter	Returns the polar angle as <NR3>.	
Example	:CURSor:XY:POLAR:RADIUS:POSition1? 8.91E+1 Returns the polar angle for cursor1 as 89.1˚.	

:CURSor:XY:POLar:THETA:DELta → Query

Description	Queries the polar angle delta between cursor1 and cursor2.
Syntax	:CURSor:XY:POLar:THETA:DELta {?}
Return parameter	Returns the theta delta between cursor1 and cursor2 as <NR3>.
Example	:CURSor:XY:POLar:THETA:DELta? 9.10E+0 Returns the delta as 9.1 degrees.

:CURSor:XY:PRODuct:POSition<x> → Query

Description	Queries the product in XY mode for the specified cursor, where x can be either 1 or 2.	
Syntax	:CURSor:XY:PRODuct:POSition<x> {?}	
Parameter	<x>	Cursor
	1, 2	Cursor1, Cursor2

Return parameter	Returns the product value of the Cursor1 or Cursor2 as <NR3>.
Example	:CURSor:XY:PRODuct:POSition1? 9.44E-5 Returns the product of cursor1 as 94.4u.

CURSor:XY:PRODuct:DELta → Query

Description	Queries the product delta in XY mode.
Syntax	:CURSor:XY:PRODuct:DELta {?}
Return parameter	Returns the product delta as <NR3>.
Example	:CURSor:XY:PRODuct:DELta? 1.22E-5 Returns the product delta as 12.2uVA.

:CURSor:XY:RATio:POSition<x> → Query

Description	Queries the ratio in XY mode for the specified cursor, where x can be either 1 or 2.	
Syntax	:CURSor:XY:RATio:POSition<x> {?}	
Parameter	<x>	Cursor
	1, 2	Cursor1, cursor2
Return parameter	Returns the ratio as <NR3>.	
Example	:CURSor:XY:RATio:POSition? 6.717E+1 Returns the ratio value.	

:CURSor:XY:RATio:DELta → Query

Description	Queries the ratio delta in XY mode.
Syntax	:CURSor:XY:RATio:DELta {?}

Return parameter	Returns the ratio delta as <NR3> V/A| V/V|A/A
Example	:CURSor:XY:RATio:DELta? 5.39E+1 Returns the ratio delta as 53.9.

Display Commands

:DISPlay:INTensity:WAVEform

Set → Query

Description	Sets or queries the waveform intensity level.	
Syntax	:DISPlay:INTensity:WAVEform {<NRf> | ?}	
Parameter	<NRf>	Range
	0.0E+0~1.0E+2	0~100%
Return parameter	Returns the intensity as <NR3>	
Example	:DISPlay:INTensity:WAVEform 5.0E+1 Sets the waveform intensity to 50%.	

:DISPlay:INTensity:GRATicule

Set → Query

Description	Sets or queries the graticule intensity level.	
Syntax	:DISPlay:INTensity:GRATicule {<NRf> | ?}	
Parameter	<NRf>	Range
	1.0E+0~1.0E+2	10~100%
Return parameter	Returns the intensity as <NR3>	

Example	:DISPlay:INTensity:GRATicule 5.0E+1 Sets the graticule intensity to 50%.

:DISPlay:PERSistence

Set → Query

Description	Sets or queries the waveform persistence level.	
Syntax	:DISPlay:PERSistence {AUTo| INFInite |OFF|<NRf> | ?}	
Parameter	<NRf>	Range
	1.0E-3~1.0E+1, 0.0E+0	100ms~10s, infinite, off
Return parameter	Returns the persistence as {AUTO| INFINITE |OFF|<NR3>}	
Example	:DISPlay:PERSistence 2.0E+0 Sets the persistence to 2 seconds.	

:DISPlay:GRATicule

Set → Query

Description	Sets or queries graticule display type.			
Syntax	:DISPlay:GRATicule {FULL | GRID|CROSs | FRAMe | ?}			
Parameter	FULL		CROSs	
	FRAMe		GRID	
Return parameter	Returns the graticule type.			
Example	:DISPlay:GRATicule FULL Sets the graticule to  . :DISPlay:GRATicule? FULL  is the current graticule type.			

:DISPlay:WAVEform

Set → / → Query

Description	Sets or queries whether the waveforms are drawn as vectors or dots.			
Syntax	:DISPlay:WAVEform {VECTor | DOT | ?}			
Parameter	VECTor	Vectors	DOT	Dots
Return parameter	Returns VECT or DOT.			
Example	:DISPlay:WAVEform VECTor Sets the waveform to vectors.			

Hardcopy Commands

:HARDcopy:START

Set →

Description	Hardcopy start is the equivalent of pressing the Print key on the front panel.
Syntax	:HARDcopy:START

:HARDcopy:MODe

Set → / → Query

Description	Sets or queries whether hardcopy is set to print or save.			
Syntax	:HARDcopy:MODe {PRINT|SAVE|?}			
Parameter	PRINT	Print mode	SAVE	Save mode
Return parameter	Returns the mode .(PRINT/SAVE)			

Example	:HARDcopy:MODe PRINT Sets hardcopy to print.

:HARDcopy:PRINTINKSaver

Set → / → Query

Description	Sets Inksaver On or Off for printing.			
Syntax	:HARDcopy:PRINTINKSaver {OFF|ON|?}			
Parameter	ON	Inksaver ON	OFF	Inksaver OFF
Return parameter	Returns the print Inksaver mode .(ON/OFF)			
Example	:HARDcopy:PRINTINKSaver ON Sets Inksaver to ON for printing.			

:HARDcopy:SAVEINKSaver

Set → / → Query

Description	Sets Inksaver On or Off for saving screen images.			
Syntax	:HARDcopy:SAVEINKSaver {OFF|ON|?}			
Parameter	ON	Inksaver ON	OFF	Inksaver OFF
Return parameter	Returns the screen image Inksaver mode .(ON/OFF)			
Example	:HARDcopy:SAVEINKSaver ON Sets Inksaver to ON for saving screen images.			

:HARDcopy:SAVEFORMat

Set → / → Query

Description	Sets or queries the image save file type.			
Syntax	:HARDcopy:SAVEFORMat {PNG|BMP|?}			
Parameter	PNG	PNG file format	BMP	BMP file format
Return parameter	Returns the image file format. (PNG/BMP)			
Example	:HARDcopy:SAVEFORMat PNG Sets the file format to PNG.			

Measure Commands

:MEASure:GATing

Set → / → Query

Description	Sets or queries the measurement gating.			
Syntax	:MEASure:GATing {OFF|SCREen|CURSor|?}			
Parameter	OFF	Full record	CURSor	Gating between cursors
	SCREen	Gating set to screen width		
Return parameter	Returns the gating. (OFF, SCREEN, CURSOR)			
Example	:MEASure:GATing OFF Turns gating off (full record).			

:MEASure:SOURce<x>

Set → / → Query

Description	Sets or queries the measurement source for source1 or source2.			
Syntax	:MEASure:SOURce<x> {CH1|CH2|CH3|CH4?}			
Parameter	<x>	Source1 or source2	CH1~CH4	Channel 1 to 4
	1,2			
Return parameter	Returns the source (CH1, CH2, CH3,CH4)			
Example	:MEASure:SOURce1 CH1 Sets source1 to channel 1.			

:MEASure:FALL

→ Query

Description	Returns the fall time measurement result.	
Syntax	:MEASure:FALL{?}	
Return parameter	<NR3>	
	Chan Off	Indicates the source channel is not activated.

Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce CH1 :MEASure:FALL? Selects Channel 1, and then measures the fall time.

:MEASure:FOVShoot → Query

Description	Returns the fall overshoot amplitude.
Syntax	:MEASure:FOVShoot{?}
Return parameter	Returns the fall overshoot as a percentage, <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH1 :MEASure:FOVShoot? 1.27E+0 Selects Channel 1, and then measures the fall overshoot.

:MEASure:FPReshoot → Query

Description	Returns fall preshoot amplitude.
Syntax	:MEASure:FPReshoot{?}
Returns	Returns the fall preshoot as <NR3>.
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH1 :MEASure:FPReshoot? Selects Channel 1, and then measures the fall preshoot.

:MEASure:FREQuency → Query

Description	Returns the frequency value.
Syntax	:MEASure:FREQuency{?}
Return parameter	Returns the frequency as <NR3>.
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH1 :MEASure:FREQuency? 1.0E+3 Selects Channel 1, and then measures the frequency.

:MEASure:NWIDth → Query

Description	Returns the first negative pulse width timing.
Syntax	:MEASure:NWIDth{?}
Return parameter	Returns the negative pulse width as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:NWIDth? Selects Channel 1, and then measures the negative pulse width.

:MEASure:PDUTy → Query

Description	Returns the positive duty cycle ratio as percentage.
Syntax	:MEASure:PDUTy{?}
Return parameter	<NR3>

Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:PDUTy? 5.000E+01 Selects Channel 1, and then measures the positive duty cycle.

:MEASure:PERiod → Query

Description	Returns the period.
Syntax	:MEASure:PERiod{?}
Return parameter	Returns the period as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:PERiod? 1.0E-3 Selects Channel 1, and then measures the period.

:MEASure:PWIDth → Query

Description	Returns the first positive pulse width.
Syntax	:MEASure:PWIDth{?}
Return parameter	Returns the first positive pulse width as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:PWIDth? 5.0E-6 Selects Channel 1, and then measures the positive pulse width.

:MEASure:RISe → Query

Description	Returns the first pulse rise time.
Syntax	:MEASure:RISe{?}
Return parameter	Returns the rise time as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:RISe? 8.5E-6 Selects Channel 1, and then measures the rise time.

:MEASure:ROVShoot → Query

Description	Returns the rising overshoot over entire waveform in percentage.
Syntax	:MEASure:ROVShoot{?}
Return parameter	Returns the overshoot as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:ROVShoot? 5.00E+00 Selects Channel 1, and then measures the rise overshoot.

:MEASure:RPReshoot → Query

Description	Returns rising preshoot over entire waveform in percentage.
Syntax	:MEASure:RPReshoot{?}

Return parameter	Returns the riser overshoot as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:RPReshoot? 2.13E-2 Selects Channel 1, and then measures the rise preshoot.

:MEASure:AMPlitude → Query

Description	Returns the amplitude difference between the Vhigh-Vlow.
Syntax	:MEASure:AMPlitude{?}
Return parameter	Returns the amplitude as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:AMPlitude? 3.76E-3 Selects Channel 1, and then measures the amplitude.

:MEASure:AVERage → Query

Description	Returns the average voltage/current of one or more fully period.
Syntax	:MEASure:AVERage{?}
Return parameter	Returns the average as <NR3>
Note	Before using this command, select the measurement channel. See the example below.

Example	:MEASure:SOURce1 CH 1 :MEASure:AVERage? 1.82E-3 Selects Channel 1, and then measures the average value.

:MEASure:HIGH → Query

Description	Returns the high voltage/current.
Syntax	:MEASure:HIGH{?}
Return parameter	Returns the high value as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:HIGH? 3.68E-3 Selects Channel 1, and then measures the high voltage/current.

:MEASure:LOW → Query

Description	Returns the low voltage/current.
Syntax	:MEASure:LOW{?}
Return parameter	Returns the global low value as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:LOW? 1.00E-0 Selects Channel 1, and then measures the low current.

:MEASure: MAX → Query

Description	Returns the maximum amplitude.
Syntax	:MEASure:MAX{?}
Return parameter	Returns the maximum amplitude as <NR3>
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:MAX? 1.90E-3 Selects Channel 1, and then measures the maximum amplitude.

:MEASure:MIN → Query

Description	Returns the minimum amplitude.
Syntax	:MEASure:MIN{?}
Return parameter	Returns the minimum amplitude as <NR3>.
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:MIN? -8.00E-3 Selects Channel 1, and then measures the minimum amplitude.

:MEASure:PK2PK → Query

Description	Returns the peak-to-peak amplitude (difference between maximum and minimum amplitude).
Syntax	:MEASure:PK2Pk{?}

Return parameter	Returns the voltage or current peak to peak measurement as <NR3>.
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:PK2Pk? 2.04E-1 Selects Channel 1, and then measures the peak-to-peak amplitude as 204mA.

:MEASure: RMS → Query

Description	Returns the root-mean-square voltage/current.
Syntax	:MEASure:RMS{?}
Return parameter	Returns the RMS value as <NR3>.
Note	Before using this command, select the measurement channel. See the example below.
Example	:MEASure:SOURce1 CH 1 :MEASure:RMS? 1.31E-3 Selects Channel 1, and then measures the root mean square voltage.

:MEASure:FRRDelay → Query

Description	Returns the delay between the first rising edge of source1 and the first rising edge of source2.
Syntax	:MEASure:FRRDelay{?}
Return parameter	Returns the delay as <NR3>
Note	Select the two source channels before entering this command.

Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:FRRDelay? -4.68E-6 Select channel 1 and 2 as source1/2, and then measure FRR.

:MEASure:FRFDelay → Query

Description	Returns the delay between the first rising edge of source1 and the first falling edge of source2.
Syntax	:MEASure:FRFDelay{?}
Return parameter	Returns the delay as <NR3>
Note	Select the two source channels before entering this command.
Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:FRFDelay? 3.43E-6 Select channel 1 and 2 as source1/2, and then measure FRF.

:MEASure:FFRDelay → Query

Description	Returns the delay between the first falling edge of source1 and the first rising edge of source2.
Syntax	:MEASure:FRRDelay {?}
Return parameter	Returns the FFR delay as <NR3>
Note	Select the two source channels before entering this command.

Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:FRRDelay? -8.56E-6 Select channel 1 and 2 as delay source1/2, and then measure FFR.

:MEASure:FFFDelay → Query

Description	Returns the delay between the first falling edge of source1 and the first falling edge of source2.
Syntax	:MEASure:FFFDelay{?}
Return parameter	Returns the FFF delay as <NR3>
Note	Select the two source channels before entering this command.
Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:FFFDelay? -8.89E-6 Select channel 1 and 2 as delay source1/2, and then measure FFF.

:MEASure:LRRDelay → Query

Description	Returns the delay between the first rising edge of source1 and the last rising edge of source2.
Syntax	:MEASure:LRRDelay{?}
Return parameter	Returns the LRR delay as <NR3>
Note	Select the two source channels before entering this command.

Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 : MEASure:LRRDelay? -8.89E-6 Select channel 1 and 2 as delay source1/2, and then measure LRR.

:MEASure:LRFDelay → Query

Description	Returns the delay between the first rising edge of source1 and the last rising edge of source2.
Syntax	:MEASure:LRFDelay{?}
Return parameter	Returns the LRF delay as <NR3>
Note	Select the two source channels before entering this command.
Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:LRFDelay? -4.99E-6 Select channel 1 and 2 as delay source1/2, and then measure LRF.

:MEASure:LFRDelay → Query

Description	Returns the delay between the first falling edge of source1 and the last rising edge of source2. Same as: Measure key → F1~F5 →Select delay measurement function by VARIABLE knob
Syntax	:MEASure:LFRDelay{?}
Return parameter	Returns the LFR delay as <NR3>
Note	Select the two source channels before entering this command.

Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:LFRDelay? -9.99E-6 Select channel 1 and 2 as delay source1/2, and then measure LFR.

:MEASure:LFFDelay → Query

Description	Returns the delay between the first falling edge of source1 and the last falling edge of source2.
Syntax	:MEASure:LFFDelay{?}
Return parameter	Returns the LFF delay as <NR3>
Note	Select the two source channels before entering this command.
Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:LFFDelay? -9.99E-6 Select channel 1 and 2 as delay source1/2, and then measure LFF.

:MEASure:PHAse → Query

Description	Returns the phase between source 1 and source 2.
Syntax	:MEASure:PHAse{?}
Return parameter	Returns the phase as <NR3>
Note	Select the two source channels before entering this command.

Example	:MEASure:SOURce1 CH 1 :MEASure:SOURce2 CH 2 :MEASure:PHAse? 4.50E+01 Select channel 1 and 2 as phase source1/2, and then measure the phase in degrees.

Reference Commands

:REF<x>:DISPlay

Set → / → Query

Description	Sets or queries a reference waveform to be shown on the display.	
Syntax	:REF<x>:DISPlay {OFF| ON| ?}	
Parameter	<x>	Reference number
	1,2,3,4	REF1~REF4
	OFF	Turns the selected reference waveform off
	ON	Turns the selected reference waveform on
Return parameter	Returns the status of the selected reference waveform. (OFF, ON)	
Example	:REF1:DISPlay ON Turns on reference1 (REF 1) on the display.	

:REF<x>:TIMebase:POSition

Set / Query

Description	Sets or returns the selected reference waveform time base position.			
Syntax	:REF<x>:TIMebase:POSition { <NRf> | ?}			
Parameter	<x>	Reference waveform	<NRf>	
	1,2,3,4	REF1~REF4		Horizontal co-ordinates
Return parameter	Returns the reference waveform position as <NR3>.			
Example	:REF1:TIMebase:POSition -5.000E-5 Selects reference 1, and then sets the horizontal position to -50us.			

:REF<x>:TIMebase:SCALe

Set / Query

Description	Sets or returns the selected reference waveform time base scale.			
Syntax	:REF<x>:TIMebase:SCALe { <NRf> | ?}			
Parameter	<x>	Reference waveform	<NRf>	
	1,2,3,4	REF1~REF4		Horizontal scale
Return parameter	Returns the reference waveform scale as <NR3>.			
Example	:REF1:TIMebase:SCALe 5.00E-4 Selects reference 1, and then sets the horizontal scale to 500us/div.			

:REF<x>:OFFSet

Set → / → Query

Description	Sets or returns the selected reference waveform vertical position (offset).			
Syntax	:REF<x>:OFFSet { <NRf> | ?}			
Parameter	<x>	Reference waveform	<NRf>	
	1,2,3,4	REF1~REF4		Vertical offset
Return parameter	Returns the reference waveform vertical position as <NR3>.			
Example	:REF1:OFFSet -5.000E-2 Selects reference 1, and then sets the vertical position to -50mV/mA.			

:REF<x>:SCALe

Set → / → Query

Description	Sets or returns the selected reference waveform vertical scale.			
Syntax	:REF<x>:SCALe { <NRf> | ?}			
Parameter	<x>	Reference waveform	<NRf>	
	1,2,3,4	REF1~REF4		Vertical scale
Return parameter	Returns the reference waveform vertical scale as <NR3>.			
Example	:REF1:SCALe 5.000E-2 Selects reference 1, and then sets the vertical scale to 50mV|mA/div.			

Run Command

:RUN

Set →

Description	The run command allows the oscilloscope to continuously make acquisitions (equivalent to pressing the Run key on the front panel).
Syntax	:RUN

Stop Command

:STOP

Set →

Description	The stop command stops the oscilloscope making further acquisitions (equivalent to pressing the Stop key on the front panel).
Syntax	:STOP

Single Command

:SINGle

Set →

Description	The single command allows the oscilloscope to capture a single acquisition when trigger conditions have been fulfilled. (equivalent to pressing the Single key on the front panel).
Syntax	:SINGle

Force Command

:FORCe

Set →

Description	The Force command forces an acquisition. (equivalent to pressing the Force key on the front panel).
Syntax	:FORCe

Split Window Command

:WINDow:SOURce

Set →
→ Query

Description	Sets or queries which window is the active window in split screen mode.	
Syntax	:WINDow:SOURce {WIN1| WIN2| WIN3| WIN4 | ?}	
Parameter	WIN1	Sets window1 active
	WIN2	Sets window2 active
	WIN3	Sets window3 active
	WIN4	Sets window4 active
Return parameter	Returns the active window for split-screen mode.	
Example	:WINDow:SOURce WIN1 Sets window1 as the active window.	

Timebase Commands

:TIMebase:POSition

Set → / → Query

Description	Sets or queries the horizontal position.
Syntax	:TIMebase:POSition {<NRf> | ?}
Parameter	<NRf> Horizontal position
Return parameter	Returns the horizontal position as <NR3>
Example	:TIMebase:POSition 5.00E-4 Sets the horizontal position as 500us.

:TIMebase:SCALe

Set → / → Query

Description	Sets or queries the horizontal scale.
Syntax	:TIMebase:SCALe {<NRf> | ?}
Parameter	<NRf> Horizontal scale
Return parameter	Returns the horizontal scale as <NR3>
Example	:TIMebase:SCALe 5.00E-2 Sets the horizontal scale to 50ms/div.

:TIMebase:MODe

Set → / → Query

Description	Sets or queries the time base mode. The time base mode determines the display view window on the scope.

Syntax	:TIMebase:MODe {MAIN | WINDow | SPLIT | XY | ?}	
Parameter	MAIN	Sets the time base mode to main screen.
	WINDow	Sets the time base mode to zoom window.
	SPLIT	Sets the time base mode to split screen. The split windows opening numbers are depended on the channels turned on numbers. For example, if CH1 & CH4 turned on, press the "SPLIT WINDOW" key will open two split windows; if CH1, CH2, CH4 turned on, four split windows will be appeared on the screen.
	XY	Sets the time base mode to XY display.
Return parameter	Returns the time base mode (MAIN, WINDOW, SPLIT, XY)	
Example	:TIMebase:MODe SPLIT Sets the time base mode to split- screen mode.	

:TIMebase:WINDow:POSition

Set → → Query

Description	Sets or queries the zoom horizontal position.	
Syntax	:TIMebase:WINDow:POSition {<NR3> | ?}	
Parameter	<NR3>	Horizontal position for zoom window
Return parameter	Returns the zoom horizontal position as <NR3>	
Example	:TIMebase:WINDow:POSition 2.0E-3 Sets the zoom horizontal position as 20ms.	

:TIMebase:WINDow:SCALe

Set → / → Query

Description	Sets or queries the zoom horizontal scale.	
Syntax	:TIMebase:WINDow:SCALe {<NR3> | ?}	
Parameter	<NR3>	Zoom horizontal scale
	The range will be changed which depends on the time base.	
Return parameter	Returns the zoom horizontal scale as <NR3>	
Example	:TIMebase:WINDow:SCALe 2.0E-3 Sets the zoom horizontal scale to 2ms. *Note: If the oscilloscope is under "ZOOM" mode, the main timebase function will be disable, can not modify anymore.*	

Trigger Commands

:TRIGger:FREQuency → Query

Description	Queries the trigger frequency.
Syntax	:TRIGger:FREQuency{?}
Return parameter	Returns the trigger frequency as <NR3>
Example	:TRIGger:FREQuency? 1.032E+3 Returns the trigger frequency.

:TRIGger:TYPe → Set / → Query

Description	Sets or queries the trigger type.	
Syntax	:TRIGger:TYPe {EDGe | DELay | PULSEWidth | VIDeo | RUNT | RISEFall | ?}	
Parameter	EDGE	Edge trigger
	DELay	Delay trigger
	PULSEWidth	Pulse width trigger
	VIDeo	Video trigger
	RUNT	Runt trigger
	RISEFall	Rise and fall trigger
Return parameter	Returns the trigger type.	
Example	:TRIGger:TYPe EDGE Sets the trigger type to edge.	

:TRIGger:SOURce → Set / → Query

Description	Sets or queries the trigger type.	
Syntax	:TRIGger:SOURce {CH1 | CH2 | CH3 | CH4 | EXT | LINe | ?}	
Parameter	CH1~CH4	Channel 1 to channel 4

	EXT	External source
	LINe	AC Line
Return parameter	Returns the trigger source.	
Example	:TRIGger:SOURce CH1 Sets the trigger source to channel 1.	

:TRIGger:COUPle

Set → / → Query

Description	Sets or queries the trigger coupling.
Syntax	:TRIGger:COUPle {AC | DC | ?}
Parameter	AC DC
Return parameter	Returns the trigger coupling condition.
Example	:TRIGger:COUPle AC Sets the trigger coupling to AC.

:TRIGger:NREJ

Set → / → Query

Description	Sets or queries noise rejection on or off.	
Syntax	:TRIGger:NREJ {OFF| ON| ?}	
Parameter	OFF	Turns noise rejection off
	ON	Turns noise rejection on
Return parameter	Returns the noise rejection status (ON, OFF).	
Example	:TRIGger:NREJ ON Turns noise rejection on.	

:TRIGger:REJect

Set → / → Query

Description	Sets or queries frequency rejection on or off.
Syntax	:TRIGger:REJect {OFF | HF | LF | ?}

Parameter	OFF	Frequency rejection off.
	HF	High frequency filter on
	LF	Low frequency filter on
Return parameter	Returns the status of the frequency filter.	
Example	:TRIGger:REJect OFF Turns the frequency filter off.	

:TRIGger:MODe

Set → Query

Description	Sets or queries the trigger mode.	
Syntax	:TRIGger:MODe {AUTo | NORMal | ?}	
Parameter	AUTo	Auto trigger (Untriggered roll)
	NORMal	Normal trigger
Return parameter	Returns the trigger mode.	
Example	:TRIGger:MODe NORMal Sets the trigger mode to normal.	

:TRIGger:HOLDoff

Set → Query

Description	Sets or queries the holdoff time.	
Syntax	:TRIGger:HOLDoff {<NRf> | ?}	
Parameter	<NRf>	Holdoff time
Return parameter	Returns the trigger holdoff time as <NR3>.	
Example	:TRIGger:HOLDoff 1.00E-8 Sets the trigger holdoff time to 10ns.	

:TRIGger:HLEVel

Set → Query

Description	Sets or queries the high trigger level (applicable for Rise and Fall/Pulse Runt trigger).

Syntax	:TRIGger:HLEVel {<NRf> | ?}	
Parameter	<NRf>	High level value
Return parameter	Returns the trigger high level as <NR3>.	
Example	:TRIGger:HLEVel 3.30E-1 Sets the trigger high level to time to 330mV/mA.	

:TRIGger:LLEVel

Set → / → Query

Description	Sets or queries the low trigger level (applicable for Rise and Fall/Pulse Runt trigger).	
Syntax	:TRIGger:LLEVel {<NRf> | ?}	
Parameter	<NRf>	Low level value
Return parameter	Returns the trigger low level as <NR3>.	
Example	:TRIGger:LLEVel -3.30E-3 Sets the trigger low level to time to -330mV/mA.	

:TRIGger:EDGe:SLOP

Set → / → Query

Description	Sets or queries the trigger slope.	
Syntax	:TRIGger:EDGe:SLOP {RISe | FALL | ?}	
Parameter	RISe	Rising slope
	FALL	Falling slope
Return parameter	Returns the trigger slope.	
Example	:TRIGger:EDGe:SLOP FALL Sets the trigger slope to falling.	

:TRIGger:DELay:TYPe

Set → / → Query

Description	Sets or queries trigger delay type.
Syntax	:TRIGger:DELay:TYPE {TIMe | EVENt | ?}

Parameter	TIMe	Sets the delay type to time.
	EVENt	Sets the delay type to event.
Return parameter	Returns the trigger delay type.	
Example	:TRIGger:DELay:TYPe TIMe Sets the delay type to time delay.	

:TRIGger:DELay:TIMe

Set → Query →

Description	Sets or queries the delay time value.	
Syntax	:TRIGger:DELay:TIMe {<NRf> | ?}	
Parameter		Delay time
	<NRf>	1.00E-8~1.00E+1
Return parameter	Returns the delay time as <NR3>.	
Example	:TRIGger:DELay:TIMe 1.00E-6 Sets the delay time to 1us.	

:TRIGger:DELay:EVENt

Set → Query →

Description	Sets or queries the number of events for the event delay trigger.	
Syntax	:TRIGger:DELay:EVENt {<NR1> | ?}	
Parameter		Delay Event
	<NR1>	1~65535
Return parameter	Returns the number of events as <NR1>.	
Example	:TRIGger:DELay:EVENt 2 Sets the number of events to 2.	

:TRIGger:DELay:LEVel

Set → Query →

Description	Sets or queries the trigger delay level.

Syntax	:TRIGger:DELay:LEVel {<NRf> | ?}	
Parameter	<NRf>	Delay trigger level
Return parameter	Returns the delay trigger as <NR3>	
Example	:TRIGger:DELay:LEVel 5.00E-3 Sets the delay trigger to 5mV/mA.	

:TRIGger:PULSEWidth:POLarity

Set → Query

Description	Sets or queries the pulse width trigger polarity.	
Syntax	:TRIGger:PULSEWidth:POLarity {POSitive | NEGative | ?}	
Parameter	POSitive	Positive polarity
	NEGative	Negative polarity
Return parameter	Returns the pulse width polarity.	
Example	:TRIGger:PULSEWidth:POLarity POSitive Sets the pulse width polarity to positive.	

:TRIGger:RUNT:POLarity

Set → Query

Description	Sets or queries the Pulse Runt trigger polarity.	
Syntax	:TRIGger:RUNT:POLarity {POSitive | NEGative | EITher | ?}	
Parameter	POSitive	Positive polarity
	NEGative	Negative polarity
	EITher	Positive or negative polarity
Return parameter	Returns the pulse runt trigger polarity.	
Example	:TRIGger:RUNT:POLarity POSitive Sets the Pulse Runt trigger polarity to positive.	

:TRIGger:RISEFall :SLOP

Set → / → Query

Description	Sets or queries the Rise & Fall slope.	
Syntax	:TRIGger:RISEFall :SLOP {RISe | FALL | EITher | ?}	
Parameter	RISe	Rising slope
	FALL	Falling slope
	EITher	Either rising or falling slope
Return parameter	Returns the rise & fall slope.	
Example	:TRIGger:RISEFall :SLOP RISe Sets the Rise & Fall slope to rising.	

:TRIGger:VIDeo:TYPe

Set → / → Query

Description	Sets or queries the video trigger type.	
Syntax	:TRIGger:VIDeo:TYPE {NTSC | PAL | SECam | EDTV480P | EDTV576P | HDTV720P | HDTV1080I | HDTV1080P | ?}	
Parameter	NTSC	NTSC
	PAL	PAL
	SECam	Secam
	EDTV480P	Enhanced definition 480P
	EDTV576P	Enhanced definition 576P
	HDTV720P	High definition 720P
	HDTV1080I	High definition 1080i
	HDTV1080P	High definition 1080p
Return parameter	Returns the video trigger type.	
Example	:TRIGger:VIDeo:TYPe NTSC Sets the video trigger to NTSC.	

:TRIGger:VIDeo:FIELd

Set → / → Query

Description	Sets or queries the video trigger field.	
Syntax	:TRIGger:VIDeo:FIELd {FIELD1 | FIELD2 | ALLFields | ALLLines | ?}	
Parameter	FIELD1	Trigger on field 1
	FIELD2	Trigger on field 2
	ALLFields	Trigger on all fields
	ALLLines	Trigger on all lines
Return parameter	Returns the video trigger field.	
Example	:TRIGger:VIDeo:FIELd ALLFields Sets the video trigger to trigger on all field.	

:TRIGger:VIDeo:LINe

Set → / → Query

Description	Sets or queries the video trigger line.	
Syntax	:TRIGger:VIDeo:LINe {<NR1> | ?}	
Parameter	<NR1>	Video line
Return parameter	Returns the video trigger line.	
Example	:TRIGger:VIDeo:LINe 1 Sets the video trigger to line 1.	

:TRIGger:VIDeo:POLarity

Set → / → Query

Description	Sets or queries the video trigger polarity.	
Syntax	:TRIGger:VIDeo:POLarity {POSitive | NEGative | ?}	
Parameter	POSitive	Positive polarity
	NEGative	Negative polarity
Return parameter	Returns the video trigger polarity.	

Example	:TRIGger:VIDeo:POLarity POSitive Sets the video trigger polarity to positive.

:TRIGger:PULSe:WHEn

Set / Query

Description	Sets or queries the pulse width condition trigger settings.	
Syntax	:TRIGger:PULSe:WHEn {THAN | LESSthan | EQual | UNEQual | ?}	
Parameter	THAN	>
	LESSthan	<
	EQual	=
	UNEQual	≠
Return parameter	Returns the pulse width trigger conditions.	
Example	:TRIGger:PULSe:WHEn UNEQual Sets the trigger pulse width conditions to not equal to.	

:TRIGger:PULSe:TIMe

Set / Query

Description	Sets or queries the pulse width time.	
Syntax	:TRIGger:PULSe:TIMe {<NRf> | ?}	
Parameter	<NRf>	Pulse width time 4ns~10s
Return parameter	Returns the pulse width time as <NR3>.	
Example	:TRIGger:PULSe:TIMe 4.00E-5 Sets the trigger pulse width to 40.0us.	

:TRIGger:ALTernate

Set → / → Query

Description	Sets alternating between source triggers on or off.	
Syntax	:TRIGger:ALTernate {OFF | ON |?}	
Parameter	OFF	Alternate off
	ON	Alternate on
Return parameter	Returns the Alternate trigger status (ON, OFF).	
Example	:TRIGger:ALTernate ON	
	Turns on alternating between source triggers.	

:TRIGger:LEVel

Set → / → Query

Description	Sets or queries the trigger level.	
Syntax	:TRIGger:LEVel {<NRf> | ?}	
Parameter	<NRf>	Trigger level value
Return parameter	Returns the trigger level as <NR3>.	
Example	:TRIGger:LEVel 3.30E-3	
	Sets the trigger level to time to 330mV/mA.	
	Note: This command is equal to :TRIGger:HLEVel	

System Commands

:SYSTem:LOCK {OFF|ON|?}

Set → / → Query

Description	Turns the panel lock on off.
Syntax	:SYSTem:LOCK {OFF|ON|?}

Parameter	OFF	System lock off
	ON	System lock on
Return parameter	Returns the status of the panel lock (ON, OFF).	
Example	:SYSTem:LOCK ON Turns the panel lock on.	

Save/Recall Commands

:RECAll:SETUp

Set → → Query

Description	Recalls setup settings from memory or USB.	
Syntax	:RECAll:SETUp {S1~S20 |<file path>("Disk:/xxx.SET","USB:/xxx.SET")}	
Parameter	S1~S20	Recall Set1~Set20
	<file path>	Recall a file from the DSO internal files system or from a USB flash drive.
Example	:RECAll:SETUp S1 Recalls setup setting S1 from memory. :RECAll:SETUp "Disk:/DS0001.SET" Recall setup setting DS0001.SET from system internal disk.	

:RECAll:WAVEform W<n>,REF<x>

Set → Query

Description	Recalls a waveform from wave1~wave20 or from file to REF1~4.	
Syntax	:RECAll:WAVEform{W<n> | <file path> ("Disk:/xxx.LSF","USB:/xxx.LSF")},REF<x>	
Parameter	n	1~20 (Wave1~wave20)
	xxx.LSF	Filename in file path.
	<x>	1,2,3,4 (REF1, REF2, REF3, REF4)
Example	:RECAll:WAVEform W1, REF1 Recalls the waveform stored in Wave1 to reference 1.	
	Note: All the .CSV format files can not be recalled by GDS-3000 series.	

:SAVe:IMAGe

Set → Query

Description	Saves a screen image to the assigned file path with a specified filename.	
Syntax	:SAVe:IMAGe {<file path> ("Disk:/xxx.PNG", "USB:/xxx.BMP)}	
Parameter	xxx.PNG or BMP	File name (8 characters max)
Example	:SAVe:IMAGe "Disk:/pic1.PNG" Saves a screen image named pic1.png to root directory (Disk:/) of the scope. :SAVe:IMAGe "USB:/pic1.BMP" Saves a screen image named pic1.bmp to root directory of external USB flash disk.	

:SAVe:IMAGe:FILEFormat

Set → / → Query

Description	Sets the file format for image.	
Syntax	:SAVe:IMAGe:FILEFormat {PNG | BMP | ?}	
Parameter	PNG	Sets the file format to PNG
	BMP	Sets the file format to BMP
Return parameter	Returns the file format (PNG, BMP).	
Example	:SAVe:IMAGe:FILEFormat PNG Sets the image file format to PNG.	

:SAVe:IMAGe:INKSaver

Set → / → Query

Description	Turns Inksaver on or off.	
Syntax	:SAVe:IMAGe:INKSaver {OFF | ON |?}	
Parameter	OFF	Turns Inksaver off.
	ON	Turns Inksaver on.
Return parameter	Returns Inksaver status (ON, OFF).	
Example	:SAVe:IMAGe:INKSaver ON Turns Inksaver on.	

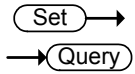
:SAVe:SETUp

Set → / → Query

Description	Saves the current setup to internal memory (Set1~Set20) or the designated file path.	
Syntax	:SAVe:SETUp {<file path> (“Disk:/xxx.SET”, “USB:/xxx.SET) | S1~S20}	
Parameter	S1~S20	Saves the setup to Set1~Set20
	File path	Saves the setup to disk to the specified file path.

Example	:SAVe:SETUp S1 Saves the current setup to Set1 in internal memory. :SAVe:SETUp "Disk:/DS0001.SET" Saves the current setup to DS0001.SET in the external USB flash disk.

:SAVe:WAVEform



Description	Saves a waveform to internal memory or to a designated file path.	
Syntax	:SAVe:WAVEform {CH1~REF4, REF<x> } | {CH1~REF4, W1~W20} | {CH1~ALL, file path}	
Parameter	CH1~REF4,	CH1~CH4, Math, REF1~4
	<x>	1,2,3,4 (REF1, REF2, REF3, REF4)
	W1~W20	Wave1~Wave20
	ALL	All the displayed waveforms on screen.
	File path	Saves the waveform(s) to disk to the specified file path.

Example	:SAVe:WAVEform CH1, REF2 Saves the channel1 waveform to REF2. :SAVe:WAVEform ALL, "Disk:/ALL001" Creates a folder which named "ALL001" and saves all displayed waveform to the "ALL001" directory with LSF format. :SAVe:WAVEform ALL, "Disk:/ALL002.CSV" Save the all channels waveform to root directory (Disk:/) of the internal flash disk with CSV format. :SAVe:WAVEform CH2, "Disk:/DS0003.LSF" Save the channel 2's waveform to root directory (Disk:/) of the internal flash disk with LSF format. *Note: Only LSF file format can be recalled by GDS-3000 series, all the .CSV format files can not be recalled by GDS-3000 series.*

:SAVe:WAVEform:FILEFormat

Set → / → Query

Description	Sets the waveform savefile format.	
Syntax	:SAVe:WAVEform:FILEFormat {INTERNal | SPREADSheet | ?}	
Parameter	INTERNal	Sets the file format to GDS-3000's internal file format, LSF. (xxx.LSF)
	SPREADSheet	Sets the file format to CSV. (xxx.CSV)
Return parameter	Returns the file format (INTERNAL, INTERNAL).	
Example	:SAVe:WAVEform:FILEFormat INTERNal. Sets the file format to LSF.	