MSO3000 and DPO3000 Series Digital Phosphor Oscilloscopes

Programmer Manual

077-0301-02

Tektronix

MSO3000 and DPO3000 Series Digital Phosphor Oscilloscopes

Programmer Manual

Revision C

www.tektronix.com

077-0301-02

Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Table of Contents

Getting Started

This manual explains the use of commands for remotely controlling your oscilloscope. With this information, you can write computer programs to perform functions, such as setting the front-panel controls, taking measurements, performing statistical calculations, and exporting data for use in other programs. You can use these commands with these oscilloscope models:

MSO3054, MSO3034, MSO3032, MSO3014, MSO3012 , DPO3054, DPO3052, DPO3034, DPO3032, DPO3014, DPO3012

Instrument Functionality Updates that Impact the Programmatic Command Set

The following lists some of the instrument functionality updates that impact the programmatic command set, along with links to some of the corresponding commands:

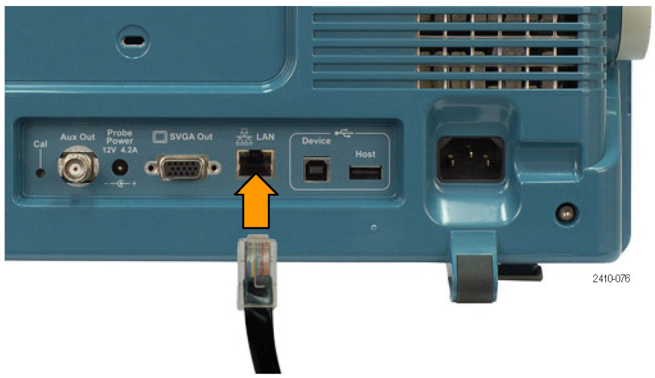
Feature	Use these commands
Support for the MIL-STD-1553 bus (requires the DPO3AERO application module)	(See page 2-13, *Bus Command Group*.) (See page 2-57, *Trigger Command Group*.) (See page 2-45, *Search Command Group*.)
Support for the FlexRay bus (requires the DPO3FLEX application module)	(See page 2-13, *Bus Command Group*.) (See page 2-57, *Trigger Command Group*.) (See page 2-45, *Search Command Group*.)
Ability to trigger and search on pulse width ranges	TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:LOWLimit, TRIGger:A:PULSEWidth:HIGHLimit SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit
Support for timeout trigger and search	TRIGger:A:TYPe, SEARCH:SEARCH<x>:TRIGger:A:TYPe
Ability to query instrument configuration settings	(See page 2-17, *Configuration Command Group*.)
Ability to turn waveform display persistence off or on	DISplay:PERSistence OFF
Support for choosing the number of waveforms included in an envelope for envelope acquisition mode	ACQuire:NUMEnv
Ability to import .CSV waveform files	RECAll:WAVEform
Support for socket server interface	(See page 1-2, *Setting Up Remote Communications Hardware*.)
Ability to select solid graticule	DISplay:GRAticule
Ability to transfer licenses between modules and oscilloscope	APPLication:LICENSE:SLOT<x>:LOCation?, APPLication:LICENSE:SLOT<x>:TRANSFER, APPLication:LICENSE:SLOT<x>:TYPe?
Ability to press and hold front panel buttons (only the Cursors button is currently supported)	FPAnel:HOLD

Setting Up Remote Communications Hardware

You can remotely communicate between your oscilloscope and PC via Ethernet, USB, GPIB, or via a socket server.

Ethernet

If you are using Ethernet, start by connecting an appropriate Ethernet cable to the Ethernet port (RJ-45 connector) on the rear panel of your oscilloscope. This connects the oscilloscope to a 10/100 Base-T local area network.



To change the Ethernet settings on your oscilloscope, do the following:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **Ethernet Network Settings**.
5. On the side menu, if you are on a DHCP Ethernet network and using a through cable, set DHCP/BOOTP to **On**.
6. If you are using a cross-over cable, set DHCP/BOOTP to **Off**, and push **Change Instrument Settings** to set a hard coded IP address.

USB

If you are using USB, start by connecting the appropriate USB cable to the USB 2.0 high-speed (HS) device port on the rear panel of your oscilloscope. This port requires that the cable connected from the port to the host computer meets the USB 2.0 specification for high speed connections. Typically, such cables should be 3 feet or shorter in length, but this is determined by the quality of the cable and, with higher quality cables, this length can be extended. (It is also dependent upon the drive capability of the host USB port to which the instrument is connected.) The use of high quality short cables is recommended to avoid USB connection problems.

With USB, the system automatically configures itself. To verify that the USB is enabled:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **USB/Computer**, and verify that USB is enabled.
5. If USB is disabled, push **Connect to computer** on the side menu.

After connection, the host, with appropriate software, can list the oscilloscope as a USB device with the following parameters.

Table 1-1: USB Device Parameters

Parameter	Value
Manufacturer ID	0x0699 (decimal 1689)
Product ID	0x0410 (decimal 1040) DPO3012
	0x0411 (decimal 1041) DPO3014
	0x0412 (decimal 1042) DPO3032
	0x0413 (decimal 1043) DPO3034
	0x0414 (decimal 1044) DPO3052
	0x0415 (decimal 1045) DPO3054
	0x0420 (decimal 1056) MSO3012
	0x0421 (decimal 1057) MSO3014
	0x0422 (decimal 1058) MSO3032
	0x0423 (decimal 1059) MSO3034
	0x0425 (decimal 1061) MSO3054
Serial number	Serial number
Manufacturer description	“Tektronix”
Interface description	“USBTMC-USB488”

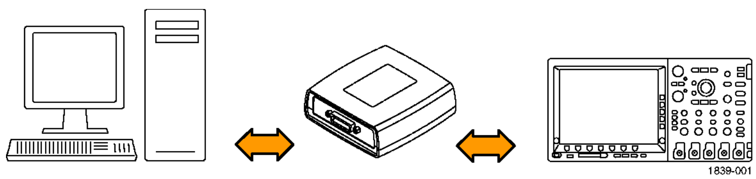
GPIB

To use GPIB, start by connecting an appropriate USB cable to the USB 2.0 high-speed device port on the rear panel of your oscilloscope. Connect the other end to the TEK-USB-488 Adapter host port. Then connect a GPIB cable from the TEK-USB-488 Adapter to your PC.

Supply power to the Adapter in either of these two ways:

1. Use the optional 5 V_{DC} power adapter connected to the 5 V_{DC} power input on the Adapter.
2. Use an appropriate USB cable connected to a powered USB host port on your PC and the Device port on the TEK-USB-488 Adapter.

The oscilloscope has a USB 2.0 high-speed device port to control the oscilloscope through USBTMC or GPIB with a TEK-USB-488 Adapter. The USBTMC protocol allows USB devices to communicate using IEEE488 style messages. This lets you run your GPIB software applications on USB hardware.



Before setting up the oscilloscope for remote communication using the electronic (physical) GPIB interface, you should familiarize yourself with the following GPIB requirements:

- A unique device address must be assigned to each device on the bus. No two devices can share the same device address.
- No more than 15 devices can be connected to any one line.
- One device should be connected for every 6 feet (2 meters) of cable used.
- No more than 65 feet (20 meters) of cable should be used to connect devices to a bus.
- At least two-thirds of the devices on the network should be powered on while using the network.
- Connect the devices on the network in a star or linear configuration. Do not use loop or parallel configurations.

To function correctly, your oscilloscope must have a unique device address. The default setting for the GPIB configuration is GPIB Address 1.

To change the GPIB address settings, do the following:

1. On the front panel, push **Utility**.
2. Push **Utility Page**.
3. Select **I/O** with the Multipurpose knob.
4. Push **GPIB**.
5. Enter the GPIB address on the side menu, using the multipurpose knob. This will set the GPIB address on an attached TEK-USB-488 Adapter.

The oscilloscope is now set up for bidirectional communication with your controller.

Setting Up Remote Communications Software

Connect your oscilloscope directly to a computer to let the PC analyze your data, collect screen images, or to control the oscilloscope using a program of your own creation. Three ways to connect your oscilloscope to a computer are through the VISA drivers, the e*Scope Web-enabled tools, or via a socket server.

Using VISA

VISA lets you use your MS-Windows computer to acquire data from your oscilloscope for use in an analysis package that runs on your PC, such as Microsoft Excel, National Instruments LabVIEW, Tektronix OpenChoice Desktop software, or your own custom software. You can use a common communications connection, such as USB, Ethernet, or GPIB, to connect the computer to the oscilloscope.

To set up VISA communications between your oscilloscope and a computer:

1. Load the VISA drivers on your computer. Also, load your application, such as OpenChoice Desktop. You will find the drivers and OpenChoice Desktop software on the appropriate CD that comes with your oscilloscope or at the Tektronix software finder Web page (www.tektronix.com).
2. Connect the oscilloscope to your computer with the appropriate USB or Ethernet cable. You will find the drivers and OpenChoice Desktop software on the appropriate CD that comes with your oscilloscope or at the Tektronix software finder Web page (www.tektronix.com/downloads).
3. On the front panel, push **Utility**.
4. Push **Utility Page** on the lower menu.
5. Turn multipurpose knob **a** and select **I/O.**
6. If you are using USB, the system sets itself up automatically for you, if USB is enabled. Check **USB** on the lower menu to be sure that USB is enabled. If it is not enabled, push **USB.** Then push **Connect to Computer** on the side menu.
7. To use Ethernet, push **Ethernet Network Settings** on the lower menu. Use the side menu buttons to adjust your network settings, as needed. For more information, see the e*Scope setup information below.
8. If you want to change socket server parameters, push **Socket Server** and enter new values through the resulting side menu.
9. If you are using GPIB, push **GPIB**. Enter the GPIB address on the side menu, using multipurpose knob **a.**
10. Run your application software on your computer.

Quick Tips

- Your oscilloscope shipped with a CD containing a variety of Windows-based software tools for efficient connectivity between your oscilloscope and your computer. These include toolbars that speed connectivity with Microsoft Excel and Word. There are also two standalone acquisition programs called NI LabVIEW SignalExpress™, Tektronix Edition and Tektronix OpenChoice Desktop.
- The rear-panel USB 2.0 device port is the correct USB port for computer connectivity. Use the rear- and front-panel USB 2.0 host ports to connect your oscilloscope to USB flash drives, printers and keyboards. Use the USB Device port to connect your oscilloscope to a PC or a PictBridge printer.

Using e*Scope

With e*Scope, you can use a web browser on your computer to send and receive commands using any connected MSO/DPO3000 Series oscilloscope. To set up e*Scope communications between your oscilloscope and a Web browser running on a remote computer:

1. Connect the oscilloscope to your computer network with an appropriate Ethernet cable.
2. On the front panel, push **Utility**.
3. Push **Utility Page** on the lower menu.
4. Turn multipurpose knob **a** and select **I/O**.
5. Push **Ethernet Network Settings**.
6. Push **Change Instrument Settings** to display and change the instrument setup on your oscilloscope. Optional: enter an **Instrument IP address** if you'd like to manually configure it.
7. Push **Test Connection** to check if your oscilloscope can find an attached network.
8. Start your browser on your remote computer. In the browser address line, enter the host name, a dot, and the domain name together. Alternatively, just enter the IP address of the instrument. Either way, you should then see the e*Scope page on your Web browser on your computer screen.
9. Click on the Data tab on the e*Scope page. Under **Talk/Listen,** you may enter and send commands to the connected oscilloscope.

Using a Socket Server

A socket server provides two-way communication over an Internet Protocol-based computer network. You can use your oscilloscope's socket server feature to let your oscilloscope talk to a remote-terminal device or computer.

To set up and use a socket server between your oscilloscope and a remote terminal or computer:

1. Connect the oscilloscope to your computer network with an appropriate Ethernet cable.
2. Push **Utility**.
3. Push **Utility Page**.
4. Turn multipurpose knob **a** and select **I/O**.
5. Push **Socket Server**.
6. On the resulting Socket Server side menu, push the top entry to highlight **Enabled**.
7. Choose whether the protocol should be **None** or **Terminal**. A communication session run by a human at a keyboard typically uses a terminal protocol. An automated session might handle its own communications without using such a protocol.
8. If required, change the port number by rotating multipurpose knob **a.**
9. If required, press **OK** to set the new port number.

10. After setting up the socket server parameters, you can now have the computer talk to the oscilloscope. If you are running an MS Windows PC, you could run its default client with its command-like interface. One way to do this is by typing " `Telnet` " in the Run window. The Telnet window will open on the PC.

***NOTE.** On MS Windows 7, you must first enable Telnet for it to work.*

---

11. Start a terminal session between your computer and your oscilloscope by typing in an open command with the oscilloscope's LAN address and port #.

You can obtain the LAN address by pushing the **Ethernet Network Settings** bottom menu item and then **Change Instrument Settings** on the resulting side menu.

You can obtain the port number by pushing the **Socket Server** bottom menu item and viewing the **Current Port** side menu item.

For example, if the oscilloscope IP address was `123.45.67.89` and the port # was the default of `4000`, you could open a session by writing into the MS Windows Telnet screen:

```
o 123.45.67.89 4000
```

12. You can now type in a standard query, as found in the programmer manual, such as `*idn?`

The Telnet session window will respond by displaying a character string describing your instrument.

You can type in more queries and view more results on this Telnet session window. You can find the syntax for relevant queries and related status codes in other sections of this manual.

***NOTE.** Do not use the computer's backspace key during an MS Windows' Telnet session with the oscilloscope.*

Socket Server Terminal Protocol Mode Commands. Following are Tektronix Instrument Control Terminal Session Control commands:

!t <timeout> : set the response timeout in milliseconds.

!d : send device clear to the instrument.

!r : read response from instrument.

!h : print this usage info.

NOTE. *Commands containing a ? are treated as queries, and the responses are read automatically.*

Documentation

The following documents are available for download on the Manuals Finder Web site at *www.tektronix.com/downloads*:

MSO3000 and DPO3000 Series User Manual. Information about installing and operating the oscilloscope.

Getting Started with OpenChoice ™ Solutions Manual. Options for getting data from your oscilloscope into any one of several available analysis tools.

MSO3000 and DPO3000 Series Technical Reference. Oscilloscope specifications and a performance verification procedure.

TekVISA Programmer Manual. Description of TekVISA, the Tektronix implementation of the VISA Application Programming Interface (API). TekVISA is industry-compliant software for writing interoperable oscilloscope drivers in a variety of Application Development Environments (ADEs).

Command Syntax

You can control the operations and functions of the oscilloscope through the Ethernet port or the USB 2.0 device port using commands and queries. The related topics listed below describe the syntax of these commands and queries. The topics also describe the conventions that the oscilloscope uses to process them. See the *Command Groups* topic in the table of contents for a listing of the commands by command group, or use the index to locate a specific command.

Backus-Naur Form Notation

This documentation describes the commands and queries using Backus-Naur Form (BNF) notation. Refer to the following table for the symbols that are used.

Table 2-1: Symbols for Backus-Naur Form

Symbol	Meaning
< >	Defined element
=	Is defined as
|	Exclusive OR
{ }	Group; one element is required
[ ]	Optional; can be omitted
. . .	Previous element(s) may be repeated
( )	Comment

Command and Query Structure

Commands consist of set commands and query commands (usually called commands and queries). Commands modify oscilloscope settings or tell the oscilloscope to perform a specific action. Queries cause the oscilloscope to return data and status information.

Most commands have both a set form and a query form. The query form of the command differs from the set form by its question mark at the end. For example, the set command `ACQuire:MODe` has a query form `ACQuire:MODe?`. Not all commands have both a set and a query form. Some commands have set only and some have query only.

Messages

A command message is a command or query name followed by any information the oscilloscope needs to execute the command or query. Command messages may contain five element types, defined in the following table.

Table 2-2: Command Message Elements

Symbol	Meaning
<Header>	This is the basic command name. If the header ends with a question mark, the command is a query. The header may begin with a colon (:) character. If the command is concatenated with other commands, the beginning colon is required. Never use the beginning colon with command headers beginning with a star (*).
<Mnemonic>	This is a header subfunction. Some command headers have only one mnemonic. If a command header has multiple mnemonics, a colon (:) character always separates them from each other.
<Argument>	This is a quantity, quality, restriction, or limit associated with the header. Some commands have no arguments while others have multiple arguments. A <space> separates arguments from the header. A <comma> separates arguments from each other.
<Comma>	A single comma is used between arguments of multiple-argument commands. Optionally, there may be white space characters before and after the comma.
<Space>	A white space character is used between a command header and the related argument. Optionally, a white space may consist of multiple white space characters.

Commands

Commands cause the oscilloscope to perform a specific function or change one of the settings. Commands have the structure:

```
[:]<Header>[<Space><Argument>[<Comma> <Argument>]...]
```

A command header consists of one or more mnemonics arranged in a hierarchical or tree structure. The first mnemonic is the base or root of the tree and each subsequent mnemonic is a level or branch off the previous one. Commands at a higher level in the tree may affect those at a lower level. The leading colon (:) always returns you to the base of the command tree.

Queries

Queries cause the oscilloscope to return status or setting information. Queries have the structure:

- [:]<Header>
- [:]<Header>[<Space><Argument> [<Comma><Argument>]...]

You can specify a query command at any level within the command tree unless otherwise noted. These branch queries return information about all the mnemonics below the specified branch or level.

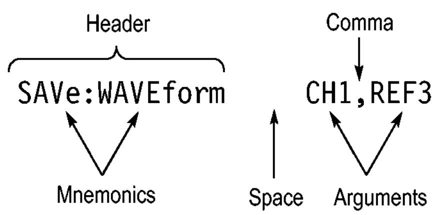
Headers

Use the HEADer command to control whether the oscilloscope returns headers as part of the query response. If header is on, the query response returns command headers, then formats itself as a valid set command. When header is off, the response includes only the values. This may make it easier to parse and extract the information from the response. The table below shows the difference in responses.

Table 2-3: Comparison of Header Off and Header On Responses

Query	Header Off	Header On
TIME?	14:30:00	:TIME “14:30:00”
ACQuire:NUMAVg?	100	:ACQUIRE:NUMAVG 100

Command Parts



Clearing the oscilloscope

You can clear the Output Queue and reset the oscilloscope to accept a new command or query by using the selected Device Clear (DCL) function.

Command Entry

The following rules apply when entering commands:

- You can enter commands in upper or lower case.
- You can precede any command with white space characters. White space characters include any combination of the ASCII control characters 00 through 09 and 0B through 20 hexadecimal (0 through 9 and 11 through 32 decimal).
- The oscilloscope ignores commands consisting of any combination of white space characters and line feeds.

Abbreviating

You can abbreviate many oscilloscope commands. Each command in this documentation shows the minimum acceptable abbreviations in capitals. For example, you can enter the command ACQuire:NUMAvg simply as ACQ:NUMA or acq:numa.

Abbreviation rules may change over time as new oscilloscope models are introduced. Thus, for the most robust code, use the full spelling.

If you use the HEADer command to have command headers included as part of query responses, you can further control whether the returned headers are abbreviated or are full-length with the VERBose command.

Concatenating

You can concatenate any combination of set commands and queries using a semicolon (;). The oscilloscope executes concatenated commands in the order received.

When concatenating commands and queries, you must follow these rules:

1. Separate completely different headers by a semicolon and by the beginning colon on all commands except the first one. For example, the commands `TRIGger:MODe NORMal` and `ACQuire:NUMAVg 8`, can be concatenated into the following single command:

   ```
   TRIGger:MODe NORMal;:ACQuire:NUMAVg 8
   ```

2. If concatenated commands have headers that differ by only the last mnemonic, you can abbreviate the second command and eliminate the beginning colon. For example, you can concatenate the commands `ACQuire:MODe ENVelope` and `ACQuire:NUMAVg 8` into a single command:

   ```
   ACQuire:MODe ENVelope; NUMAVg 8
   ```

   The longer version works equally well:

   ```
   ACQuire:MODe ENVelope;:ACQuire:NUMAVg 8
   ```

3. Never precede a star (*) command with a colon:

   ```
   ACQuire:STATE 1;*OPC
   ```

   Any commands that follow will be processed as if the star command was not there so the commands, `ACQuire:MODe ENVelope;*OPC;NUMAVg 8` will set the acquisition mode to envelope and set the number of acquisitions for averaging to 8.

4. When you concatenate queries, the responses to all the queries are concatenated into a single response message. For example, if the display graticule is set to Full and the display style is set to dotsonly, the concatenated query `DISplay:GRAticule?;STYle:DOTsonly?` will return the following.

   If the header is on:

   ```
   DISPLAY:GRATICULE FULL;:DISPLAY:STYLE:DOTSONLY 1
   ```

If the header is off:

`FULL;1`

5. Set commands and queries may be concatenated in the same message. For example,

   `ACQuire:MODe SAMple;NUMAVg?;STATE?`

   is a valid message that sets the acquisition mode to sample. The message then queries the number of acquisitions for averaging and the acquisition state. Concatenated commands and queries are executed in the order received.

   Here are some invalid concatenations:

   `DISPlay:STYle:NORMal;ACQuire:NUMAVg 8` (no colon before ACQuire)

   `DISPlay:GRAticule FULL;:DOTSONLY OFF` (extra colon before `DOTSonly`. You could use `DISPlay:DOTsonly OFF` instead)

   `DISPlay:GRAticule FULL;:*TRG` (colon before a star (*) command)

   `MATH:HORizontal:SCAle 1.0e-1;HORizontal:POSition 5.0el` (levels of the mnemonics are different; either remove the second use of `HORizontal:` or place `:MATH` in front of `HORizontal:POSition`)

Terminating

This documentation uses `<EOM>` (End of Message) to represent a message terminator.

Table 2-4: End of Message Terminator

Symbol	Meaning
<EOM>	Message terminator

The end-of-message terminator must be the END message (EOI asserted concurrently with the last data byte). The last data byte may be an ASCII line feed (LF) character.

This oscilloscope does not support ASCII LF only message termination. The oscilloscope always terminates outgoing messages with LF and EOI.

Constructed Mnemonics

Some header mnemonics specify one of a range of mnemonics. For example, a channel mnemonic can be CH1, CH2, CH3, or CH4. You use these mnemonics in the command just as you do any other mnemonic. For example, there is a CH1:POSition command, and there is also a CH2:POSition command. In the command descriptions, this list of choices is abbreviated as CH<x>.

Cursor Position Mnemonics

When cursors are displayed, commands may specify which cursor of the pair to use.

Table 2-5: Channel Mnemonics

Symbol	Meaning
CH<x>	A channel specifier; <x> is 1 through 4.

Table 2-6: Cursor Mnemonics

Symbol	Meaning
CURSOR<x>	A cursor selector; <x> is either 1 or 2.
POSITION<x>	A cursor selector; <x> is either 1 or 2.
HPOS<x>	A cursor selector; <x> is either 1 or 2.

Math Specifier Mnemonics

Commands can specify the mathematical waveform to use as a mnemonic in the header.

Table 2-7: Math Specifier Mnemonics

Symbol	Meaning
Math<x>	A math waveform specifier; <x> is 1.

Measurement Specifier Mnemonics

Commands can specify which measurement to set or query as a mnemonic in the header. Up to four automated measurements may be displayed.

Table 2-8: Measurement Specifier Mnemonics

Symbol	Meaning
MEAS<x>	A measurement specifier; <x> is 1 through 4.

Channel Mnemonics

Commands specify the channel to use as a mnemonic in the header.

Reference Waveform Mnemonics

Commands can specify the reference waveform to use as a mnemonic in the header.

Table 2-9: Reference Waveform Mnemonics

Symbol	Meaning
REF<x>	A reference waveform specifier; <x> is 1, 2, 3, or 4 for 4-channel oscilloscopes and 1 or 2 for 2-channel oscilloscopes.

Argument Types

Commands use arguments such as enumeration, numeric, quoted string and block. Each of these arguments are listed in detail below.

Enumeration

Enter these arguments as unquoted text words. Like key words, enumeration arguments follow the same convention where the portion indicated in uppercase is required and that in lowercase is optional.

For example: `SAVe:WAVEform:FILEFormat INTERNal`

Numeric

Many oscilloscope commands require numeric arguments. The syntax shows the format that the oscilloscope returns in response to a query. This is also the preferred format when sending the command to the oscilloscope though any of the formats will be accepted. This documentation represents these arguments as described below.

Table 2-10: Numeric Arguments

Symbol	Meaning
<NR1>	Signed integer value
<NR2>	Floating point value without an exponent
<NR3>	Floating point value with an exponent
<bin>	Digital data in binary format

Most numeric arguments will be automatically forced to a valid setting, by either rounding or truncating, when an invalid number is input, unless otherwise noted in the command description.

Quoted String

Some commands accept or return data in the form of a quoted string, which is simply a group of ASCII characters enclosed by a single quote (') or double quote ("). The following is an example of a quoted string: `"This is a quoted string"`. This documentation represents these arguments as follows:

Table 2-11: Quoted String Argument

Symbol	Meaning
<QString>	Quoted string of ASCII text

A quoted string can include any character defined in the 7-bit ASCII character set. Follow these rules when you use quoted strings:

1. Use the same type of quote character to open and close the string. For example: `"this is a valid string"`.
2. You can mix quotation marks within a string as long as you follow the previous rule. For example: `"this is an 'acceptable' string"`.
3. You can include a quote character within a string by repeating the quote. For example: `"here is a "" mark"`.
4. Strings can have upper or lower case characters.
5. If you use a GPIB network, you cannot terminate a quoted string with the END message before the closing delimiter.
6. A carriage return or line feed embedded in a quoted string does not terminate the string. The return is treated as another character in the string.
7. The maximum length of a quoted string returned from a query is 1000 characters.

Here are some invalid strings:

- `"Invalid string argument'` (quotes are not of the same type)
- `"test<EOI>"` (termination character is embedded in the string)

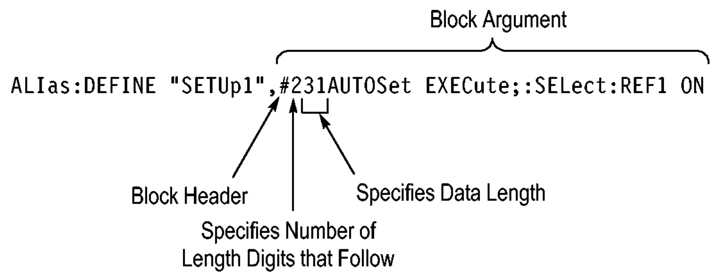
Block

Several oscilloscope commands use a block argument form, as defined in the table below.

Table 2-12: Block Argument

Symbol	Meaning
<NZDig>	A nonzero digit character in the range of 1–9
<Dig>	A digit character, in the range of 0–9
<DChar>	A character with the hexadecimal equivalent of 00 through FF (0 through 255 decimal)
<Block>	A block of data bytes defined as: <Block> ::= {#<NZDig><Dig>[<Dig>...][<DChar>...] |#0[<DChar>...]<terminator>}

<NZDig> specifies the number of <Dig> elements that follow. Taken together, the <NZDig> and <Dig> elements form a decimal integer that specifies how many <DChar> elements follow.


Block Argument
ALIas:DEFINE "SETUp1",#231AUTOSet EXECute;:SELect:REF1 ON
Block Header
Specifies Data Length
Specifies Number of
Length Digits that Follow

Command Groups

This manual lists the MSO/DPO3000 Series IEEE488.2 commands in two ways. First, it presents them by functional groups. Then, it lists them alphabetically. The functional group list starts below. The alphabetical list provides detail on each command. (See page 2-93, *Commands Listed in Alphabetical Order*.)

Acquisition Command Group

Use the commands in the Acquisition Command Group to set up the modes and functions that control how the oscilloscope acquires signals input to the channels, and processes them into waveforms.

Using the commands in this group, you can do the following:

- Start and stop acquisitions.
- Control whether each waveform is simply acquired, averaged, or enveloped over successive acquisitions of that waveform.
- Set the controls or conditions that start and stop acquisitions.
- Control acquisition of channel waveforms.
- Set acquisition parameters.

Table 2-13: Acquisition Commands

Command	Description
ACQuire?	Returns the acquisition parameters
ACQuire:MAGnivu	Sets or returns the MagniVu feature
ACQuire:MAXSamplerate?	Returns the maximum real-time sample rate
ACQuire:MODe	Sets or returns the acquisition mode
ACQuire:NUMACq?	Returns the number of acquisitions that have occurred
ACQuire:NUMAVg	Sets or returns the number of acquisitions for an averaged waveform
ACQuire:NUMEnv	This command controls the number of envelopes (when acquisition mode has been set to ENVelope using ACQuire:MODe). The number of envelopes can be set from 1 to 2000 in increments of 1, or to INFInite.
ACQuire:STATE	Starts or stops the acquisition system
ACQuire:STOPAfter	Sets or returns whether the acquisition is continuous or single sequence

Alias Command Group

Use the Alias commands to define new commands as a sequence of standard commands. You may find this useful when repeatedly using the same commands to perform certain tasks like setting up measurements.

Aliases are similar to macros but do not include the capability to substitute parameters into alias bodies. The alias mechanism obeys the following rules:

- The alias name must consist of a valid IEEE488.2 message unit, which may not appear in a message preceded by a colon, comma, or a command or query program header.
- The alias name may not appear in a message followed by a colon, comma, or question mark.
- An alias name must be distinct from any keyword or keyword short form.
- An alias name cannot be redefined without first being deleted using one of the alias deletion functions.
- Alias names do not appear in response messages.

Table 2-14: Alias Commands

Command	Description
ALIas	Sets or returns the alias state
ALIas:CATalog?	Returns a list of the currently defined alias labels
ALIas:DEFine	Assigns a sequence of program messages to an alias label
ALIas:DELEte	Removes a specified alias
ALIas:DELEte:ALL	Deletes all existing aliases
ALIas:DELEte[:NAMe]	Removes a specified alias
ALIas[:STATE]	Sets or returns the alias state

Bus Command Group

Use the Bus commands when working with serial or parallel bus measurements.

- Install the DPO3EMBD application module when working with I²C or SPI bus signals.
- Install the DPO3AUTO module when working with CAN or LIN bus signals.
- Install the DPO3COMP module when working with RS-232, RS-422, RS-485, and UART bus signals.
- Install the DPO3AUDIO module when working with I²S, Left Justified (LJ), Right Justified (RJ), and TDM bus signals.
- Install the DPO3AERO module when working with MIL-STD-1553 bus signals.
- Install the DPO3FLEX module when working with FlexRay bus signals.

NOTE. *Parallel bus trigger and analysis functionality is included standard with the MSO Series.*

NOTE. *The Search Command Group and the Trigger Command Group also contain bus-related commands.*

Table 2-15: Bus Commands

Commands	Description
BUS	Returns the parameters for each bus
BUS:B<x>:AUDio:BITDelay	Sets or returns the number of delay bits for the AUDIO bus
BUS:B<x>:AUDio:BITOrder	Sets or returns the bit order for the AUDIO bus
BUS:B<x>:AUDio:CHANnel:SIZe	Sets or returns the number of bits per channel for the AUDIO bus
BUS:B<x>:AUDio:CLOCk:POLarity	Sets or returns the clock polarity for the AUDIO bus
BUS:B<x>:AUDio:CLOCk:SOUrce	Sets or returns the clock source waveform for the AUDIO bus
BUS:B<x>:AUDio:DATa:POLarity	Sets or returns the data polarity for the AUDIO bus
BUS:B<x>:AUDio:DATa:SIZe	Sets or returns the number of bits per word for the AUDIO bus
BUS:B<x>:AUDio:DATa:SOUrce	Sets or returns the data source waveform for the AUDIO bus

Table 2-15: Bus Commands (cont.)

Commands	Description
BUS:B<x>:AUDio:DISplay:FORMat	Sets or returns the display format for the AUDIO bus
BUS:B<x>:AUDio:FRAME:SIZe	Sets or returns the number of channels in each frame for the AUDIO bus
BUS:B<x>:AUDio:FRAMESync:POLarity	Sets or returns the frame sync polarity for the AUDIO bus
BUS:B<x>:AUDio:FRAMESync:SOUrce	Sets or returns the frame sync source waveform for the AUDIO bus
BUS:B<x>:AUDio:TYPe	Sets or returns the audio format (type) for the AUDIO bus
BUS:B<x>:AUDio:WORDSel:POLarity	Sets or returns the word select polarity for the AUDIO bus
BUS:B<x>:AUDio:WORDSel:SOUrce	Sets or returns the word select source waveform for the AUDIO bus
BUS:B<x>:CAN:BITRate	Sets or returns the bit rate for the CAN bus
BUS:B<x>:CAN:PRObe	Sets or returns the probing method used to probe the CAN bus
BUS:B<x>:CAN:SAMPLEpoint	Sets or returns the sample point (in %) to sample during each bit period
BUS:B<x>:CAN:SOUrce	Sets or returns the CAN data source
BUS:B<x>:DISplay:FORMAt	Sets the display format for the numerical information in the specified bus waveform
BUS:B<x>:DISplay:TYPe	Sets the display type for the specified bus
BUS:B<x>:FLEXray:BITRate	This command specifies the bit rate for FlexRay
BUS:B<x>:FLEXray:CHannel	This command specifies the FlexRay ID format
BUS:B<x>:FLEXray:SIGnal	Specifies which FlexRay standard to use: BDIFFBP, BM or TXRX.
BUS:B<x>:FLEXray:SOUrce	This command specifies the FlexRay data source
BUS:B<x>:I2C:ADDRess:RWINClude	Sets and returns whether the read/write bit is included in the address
BUS:B<x>:I2C{:CLOCK|:SCLK}:SOUrce	Sets or returns the I2C SCLK source
BUS:B<x>:I2C{:DATA|:SDATA}:SOUrce	Sets or returns the I2C SDATA source
BUS:B<x>:LABel	Sets or returns the waveform label for the specified bus
BUS:B<x>:LIN:BITRate	Sets or returns the bit rate for LIN
BUS:B<x>:LIN:IDFORmat	Sets or returns the LIN ID format
BUS:B<x>:LIN:POLARity	Sets or returns the LIN polarity

Table 2-15: Bus Commands (cont.)

Commands	Description
BUS:B<x>:LIN:SAMPLEpoint	Sets or returns the sample point (in %) at which to sample during each bit period
BUS:B<x>:LIN:SOUrce	Sets or returns the LIN data source
BUS:B<x>:LIN:STANDard	Sets or returns the LIN standard
BUS:B<x>:MIL1553B:POLarity	This command sets the MIL-STD-1553 bus polarity to normal or inverted.
BUS:B<x>:MIL1553B:RESPonsetime: MAXimum	This command specifies the maximum response time to a valid command issued.
BUS:B<x>:MIL1553B:RESPonsetime: MINimum	This command specifies the minimum response time to a valid command issued.
BUS:B<x>:MIL1553B:SOUrce	This command specifies the MIL-STD-1553 bus source for differential input.
BUS:B<x>:PARallel:BIT<x>:SOUrce	Sets or returns the parallel bit source for the specified bus
BUS:B<x>:PARallel:CLOCK:EDGE	Sets or returns the parallel clock edge for the specified bus
BUS:B<x>:PARallel:CLOCK:ISCLOCKed	Sets or returns the parallel bus clock function for the specified bus
BUS:B<x>:PARallel:CLOCK:SOUrce	Sets or returns the parallel clock source for the specified bus
BUS:B<x>:PARallel:WIDth	Sets or returns the width of the parallel bus
BUS:B<x>:POSition	Sets or returns the position of the specified bus waveform
BUS:B<x>:RS232C:BITRate	Sets or returns the RS-232 bit rate for the specified bus
BUS:B<x>:RS232C:DATABits	Sets or returns the number of bits for the data frame
BUS:B<x>:RS232C:DELIMiter	Sets or returns the RS-232 delimiting value for a packet on the specified bus
BUS:B<x>:RS232C:DISplaymode	Sets or returns the display mode for the specified bus display and event table
BUS:B<x>:RS232C:PARity	Sets or returns the parity for RS-232 data
BUS:B<x>:RS232C:POLarity	Sets or returns the RS-232C polarity for the specified bus
BUS:B<x>:RS232C:RX:SOUrce	Sets or returns the RS-232 RX source
BUS:B<x>:RS232C:TX:SOUrce	Sets or returns the RS-232 TX Source
BUS:B<x>:SPI{:CLOCK|:SCLK}:POLARity	Sets or returns the SPI SCLK polarity
BUS:B<x>:SPI{:CLOCK|:SCLK}:SOUrce	Sets or returns the SPI SCLK source
BUS:B<x>:SPI:DATA{:IN|:MISO}:POLARity	Sets or returns the SPI MISO polarity
BUS:B<x>:SPI:DATA{:IN|:MISO}:SOUrce	Sets or returns the SPI MISO source

Table 2-15: Bus Commands (cont.)

<table>
<tr><th>Commands</th><th>Description</th></tr>
<tr><td>BUS:B<x>:SPI:DATA{:OUT|:MOSI}:POLARity</td><td>Sets or returns the SPI MOSI polarity</td></tr>
<tr><td>BUS:B<x>:SPI:DATA{:OUT|:MOSI}:SOUrce</td><td>Sets or returns the SPI MOSI source</td></tr>
<tr><td>BUS:B<x>:SPI{:SELect|:SS}:POLARity</td><td>Sets or returns the SPI SS polarity</td></tr>
<tr><td>BUS:B<x>:SPI{:SELect|:SS}:SOUrce</td><td>Sets or returns the SPI SS source</td></tr>
<tr><td>BUS:B<x>SPI:FRAMing</td><td>Sets or returns the type of SPI framing</td></tr>
<tr><td>BUS:B<x>:STATE</td><td>Turns the specified bus on and off</td></tr>
<tr><td>BUS:B<x>:TYPE</td><td>Sets or returns the specified bus type</td></tr>
<tr><td>BUS:LOWerthreshold:CH<x></td><td>Sets or returns the lower threshold for each channel</td></tr>
<tr><td>BUS:THReshold:D<x></td><td>Sets or returns the threshold for a digital channel</td></tr>
<tr><td>BUS:UPPerthreshold:CH<x></td><td>Sets or returns the upper threshold for each channel</td></tr>
</table>

Calibration and Diagnostic Command Group

The Calibration and Diagnostic commands provide information about the current state of oscilloscope calibration. They also initiate internal signal path calibration (SPC) or execute diagnostic tests. Commands that are specific to factory calibration are not described in this manual. They are described in the Service manual, located on the DPO3000 Documentation CD-ROM in PDF format. You can also order a printed copy.

Table 2-16: Calibration and Diagnostic Commands

Command	Description
*CAL?	Instructs the oscilloscope to perform self-calibration and returns the oscilloscope self calibration status
CALibrate:FACtory:STATus?	Returns the factory calibration status value saved in nonvolatile memory
CALibrate:INTERNal	Starts a signal path compensation
CALibrate:INTERNal:STARt	Starts the internal signal path calibration
CALibrate:INTERNal:STATus?	Returns the current status of the internal signal path calibration
CALibrate:RESults?	Returns the status of all calibration subsystems without performing an SPC operation
CALibrate:RESults:FACtory?	Returns the status of internal and factory calibration
CALibrate:RESults:SPC?	Returns the results of the last SPC operation
DIAg:LOOP:OPTion	Sets the self-test loop option
DIAg:LOOP:OPTion:NTIMes	Sets the self-test loop option to run N times
DIAg:LOOP:STOP	Stops the self-test at the end of the current loop
DIAg:RESUlt:FLAg?	Returns the pass/fail status from the last self-test sequence execution
DIAg:RESUlt:LOG?	Returns the internal results log from the last self-test sequence execution
DIAg:SELect:<function>	Selects one of the available self-test areas
DIAg:STATE	Sets the oscilloscope operating state
DIAg:SELect	Sets the type of diagnostics grouping

Configuration Command Group

Use the queries in the Configuration Command Group to determine whether a particular feature is present.

Table 2-17: Configuration Commands

Command	Description
CONFIGuration:ADVMATH?	This query returns a boolean value to indicate whether the advanced math feature is present.
CONFIGuration:ANALOg:GNDCPLG?	This query returns a boolean value to indicate whether the ground coupling feature for analog channels is present.
CONFIGuration:ANALOg:MAXBANDWidth?	This query returns the maximum bandwidth for analog channels.
CONFIGuration:ANALOg: MAXSAMPLERate?	This query returns the maximum sample rate for analog channels.
CONFIGuration:ANALOg:NUMCHANnels?	This query returns the number of analog channels.
CONFIGuration:ANALOg:RECLENS?	This query returns a comma-separated list of supported record lengths for the analog channels.
CONFIGuration:ANALOg:VERTINVert?	This query returns a boolean value to indicate whether the vertical invert feature for analog channels is present.
CONFIGuration:APPLications:LIMITMask?	This query returns a boolean value to indicate whether the optional mask/limit test application feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:APPLications:POWer?	This query returns a boolean value to indicate whether the optional power application feature is present.
CONFIGuration:AUXIN?	This query returns a boolean value to indicate whether the instrument has an auxiliary input.
CONFIGuration:BUSWAVEFORMS:AUDIO?	This query returns a boolean value to indicate whether the optional audio bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:CAN?	This query returns a boolean value to indicate whether the optional CAN bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS: ETHERNET?	This query returns a boolean value to indicate whether the optional Ethernet triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:BUSWAVEFORMS: FLEXRAY?	This query returns a boolean value to indicate whether the optional FlexRay bus triggering and analysis feature is present.

Table 2-17: Configuration Commands (cont.)

Command	Description
CONFIGuration:BUSWAVEFORMS:I2C?	This query returns a boolean value to indicate whether the optional I²C bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:LIN?	This query returns a boolean value to indicate whether the optional LIN bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS: MIL1553B?	This query returns a boolean value to indicate whether the optional MIL-STD-1553 bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS: NUMBUS?	This query returns the number of bus waveforms.
CONFIGuration:BUSWAVEFORMS: PARALLEL?	This query returns a boolean value to indicate whether the parallel bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:RS232?	This query returns a boolean value to indicate whether the optional RS232 bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:SPI?	This query returns a boolean value to indicate whether the optional SPI bus triggering and analysis feature is present.
CONFIGuration:BUSWAVEFORMS:USB?	This query returns a boolean value to indicate whether the USB bus triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:BUSWAVEFORMS:USB: HS?	This query returns a boolean value to indicate whether the high-speed USB bus triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:DIGITAl:MAGNIVU?	This query returns a boolean value to indicate whether the instrument supports the MagniVu feature for digital channels. If there are no digital channels, the value returned is 0.
CONFIGuration:DIGITAl: MAXSAMPLERate?	This query returns the maximum sample rate for digital channels, in samples per second. If there are no digital channels, the value returned is 0.
CONFIGuration:DIGITAl:NUMCHANnels?	This query returns the number of digital channels.
CONFIGuration:EXTVIDEO?	This query returns a boolean value to indicate whether the optional extended video trigger features are present.

Table 2-17: Configuration Commands (cont.)

Command	Description
CONFIGuration:HISTOGRAM?	This query returns a boolean value to indicate whether the histogram feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:NETWORKDRIVES?	This query returns a boolean value to indicate whether network drives are present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:NUMMEAS?	This query returns the number of periodic measurements.
CONFIGuration:REFS:NUMREFS?	This query returns the number of reference waveforms.
CONFIGuration:RF:ADVTRIG?	This query returns a boolean value to indicate whether the advanced RF trigger feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:RF:MAXBANDWidth?	This query returns the maximum bandwidth, in Hertz, for RF channels. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:RF:NUMCHANnels?	This query returns the number of RF channels present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.
CONFIGuration:ROSC?	This query returns a boolean value to indicate whether the external reference oscillator (ROSC) input is present.

Cursor Command Group

Use the commands in the Cursor Command Group to control the cursor display and readout. You can use these commands to control the setups for cursor 1 and cursor 2, such as cursor position.

You can also use the commands to select one of the following cursor functions:

- Off. Turns off the display of all cursors.
- Waveform Cursors. Consists of two cursors. Waveform cursors enable you to conveniently measure waveform amplitude and time.
- Screen Cursors. Consists of two pairs of independent horizontal and vertical cursors. You can use these cursors to indicate an arbitrary position within the waveform display area.

Table 2-18: Cursor Commands

Command	Description
CURSor?	Returns the cursor settings
CURSor:DDT?	Returns the cursor deltaY/deltaT (dY/dT) readout
CURSor:FUNCtion	Sets or returns the cursor type
CURSor:HBArs?	Returns the hbar cursor settings
CURSor:HBArs:DELTa?	Returns the hbars cursors vertical difference
CURSor:HBArs:POSITION<x>	Sets or returns the hbar cursor<x> vertical position
CURSor:HBArs:UNIts	Returns the hbar cursor units
CURSor:HBArs:USE	Sets the horizontal bar cursor measurement scale, for use with ratio cursors
CURSor:MODe	Sets or returns whether cursors move in unison or separately
CURSor:VBArs?	Sets or returns the position of vertical bar cursors
CURSor:VBArs:ALTERNATE<x>?	Returns the alternate readout for the waveform (Vbar) cursors
CURSor:VBArs:DELTa?	Returns the horizontal difference between vbar cursors
CURSor:VBArs:HPOS<x>?	Returns the vertical value of the specified vertical bar tick
CURSor:VBArs:POSITION<x>	Sets or returns the vbar cursor<x> horizontal position
CURSor:VBArs:UNIts	Sets or returns the horizontal units for vbar cursors
CURSor:VBArs:USE	Sets the vertical bar cursor measurement scale

Table 2-18: Cursor Commands (cont.)

Command	Description
CURSor:VBArs:VDELTa?	Returns the vertical difference between the two vertical bar cursor ticks
CURSor:XY:POLar:RADIUS:DELta?	Returns the difference between the cursors X radius and the cursor Y radius
CURSor:XY:POLar:RADIUS:POSITION<x>?	Returns the polar radius of the specified cursor
CURSor:XY:POLar:RADIUS:UNIts?	Returns the polar radius units
CURSor:XY:POLar:THETA:DELta?	Returns the XY cursor polar coordinate delta
CURSor:XY:POLar:THETA:POSITION<x>?	Returns the cursor X or cursor Y polar coordinate
CURSor:XY:POLar:THETA:UNIts?	Returns the cursor polar coordinate units
CURSor:XY:PRODUCT:DELta?	Returns the difference between the cursors X position and cursor Y position
CURSor:XY:PRODUCT:POSITION<x>?	Returns the position of the X or Y cursor used to calculate the X × Y cursor measurement
CURSor:XY:PRODUCT:UNIts?	Returns the XY cursor product units
CURSor:XY:RATIO:DELta?	Returns the ratio of the difference between the cursor X position and cursor Y position
CURSor:XY:RATIO:POSITION<x>?	Returns the X or Y position for the specified cursor
CURSor:XY:RATIO:UNIts?	Returns the X and Y cursor units for the ratio measurement
CURSor:XY:READOUT	Sets or returns the XY cursor readout selection
CURSor:XY:RECTangular:X:DELta?	Returns the X delta value in rectangular coordinates
CURSor:XY:RECTangular:X:POSITION<x>	Sets or returns the cursor X rectangular coordinates
CURSor:XY:RECTangular:X:UNIts?	Returns the cursor X rectangular units
CURSor:XY:RECTangular:Y:DELta?	Returns the cursor Y delta value in rectangular coordinates
CURSor:XY:RECTangular:Y:POSITION<x>>	Sets or returns the cursor Y rectangular coordinate
CURSor:XY:RECTangular:Y:UNIts?	Returns the cursor Y rectangular units

Display Command Group

Use the commands in the Display Command Group to change the graticule style, the display intensities, and to set the characteristics of the waveform display. Also, use it to send messages to the display.

NOTE. *Your settings globally affect all displayed waveforms.*

Table 2-19: Display Commands

Command	Description
DISplay?	Returns the current display settings
DISplay:CLOCk	Sets or returns the display of the date/time stamp
DISplay:DIGital:HEIght	Sets or returns the number of available digital waveform position slots
DISplay:GRAticule	This command specifies the type of graticule the oscilloscope displays.
DISplay:INTENSITy?	Returns all the display intensity settings
DISplay:INTENSITy:BACKLight	Sets or returns the backlight intensity for the display
DISplay:INTENSITy:GRAticule	Sets or returns the graticule intensity for the display
DISplay:INTENSITy:WAVEform	Sets or returns the intensity of the waveforms
DISplay:PERSistence	Sets or returns the display persistence setting
DISplay:STYle:DOTsonly	Sets a dots-only display
DISplay:XY	This command turns on or off the XY display mode.
MESSage	Sets or queries message box (screen annotation) parameters
MESSage:BOX	Sets or returns the coordinates of the message box
MESSage:CLEAR	Clears the contents of the message box
MESSage:SHOW	Sets or returns the contents of the message box
MESSage:STATE	Controls the display of the message box

Ethernet Command Group

Use the commands in the Ethernet Command Group to set up the Ethernet remote interface.

Table 2-20: Ethernet Commands

Command	Description
ETHERnet:DHCPbootp	Sets or returns the network initialization search for a DHCP/BOOTP server

Table 2-20: Ethernet Commands (cont.)

Command	Description
ETHERnet:DNS:IPADDress	Sets or returns the network Domain Name Server (Dns) IP address
ETHERnet:DOMAINname	Sets or returns the network domain name
ETHERnet:ENET:ADDress?	Returns the Ethernet address value assigned to the oscilloscope
ETHERnet:GATEWay:IPADDress	Sets or returns the remote interface gateway IP address
ETHERnet:HTTPPort	Sets or returns the remote interface HTTP port value
ETHERnet:IPADDress	Sets or returns the IP address assigned to the oscilloscope
ETHERnet:NAME	Sets or returns the network name assigned to the oscilloscope
ETHERnet:PASSWord	Sets or returns the Ethernet access password
ETHERnet:PING	Causes the oscilloscope to ping the gateway IP address
ETHERnet:PING:STATUS?	Returns the results from pinging the gateway IP address
ETHERnet:SUBNETMask	Sets or returns the remote interface subnet mask value

File System Command Group

Use the commands in the File System Command Group to help you use USB media. You can use the commands to do the following:

- List the contents of a directory
- Create and delete directories
- Create, read, rename, or delete a file
- Format media

When using these commands, keep the following points in mind:

- File arguments are always enclosed within double quotes: "E:/MYDIR/TEK00001.SET"
- File names follow the non-case sensitive, MSDOS format: [DRIVE:][\PATH\]filename
- Path separators may be either forward slashes (/) or back slashes (\)

NOTE. *Using back slash as a path separator may produce some unexpected results, depending on how your application treats escaped characters. Many applications recognize the sequence of back slash followed by an alphabetic character as an escaped character, and, as such, interpret that alphabetic character as a control character. For example, the sequence "\n" may be interpreted as a newline character; "\t" may be interpreted as a tab character. To ensure that this interpretation does not occur, you can use double back slashes. For example, "E:\\testfile.txt".*

Table 2-21: File System Commands

Command	Description
FILESystem?	Returns the directory listing of the current working directory and the number of bytes of free space available
FILESystem:CWD	Sets or returns the current working directory for FILESystem commands
FILESystem:DELEte	Deletes a named file or directory
FILESystem:DIR?	Returns a list of directory contents
FILESystem:FORMat	Formats a named drive
FILESystem:FREESpace?	Returns the number of bytes of free space on the current drive
FILESystem:MKDir	Creates a new directory
FILESystem:READFile	Writes the contents of the specified file to the specified interface
FILESystem:REName	Assigns a new name to an existing file
FILESystem:RMDir	Deletes a named directory
FILESystem:WRITEFile	Writes the specified block data to the oscilloscope current working directory

Hard Copy Command Group

Use the commands in the Hard Copy Command Group to make hard copies. PictBridge commands belong to a separate group. (See page 2-35, *PictBridge Command Group*.)

Table 2-22: Hard Copy Commands

Command	Description
HARDCopy	Sends a copy of the screen display to the selected printer
HARDCopy:ACTIVeprinter	Sets or returns the currently active printer
HARDCopy:INKSaver	Changes hard copy output to print color traces and graticule on a white background

Table 2-22: Hard Copy Commands (cont.)

Command	Description
HARDCopy:LAYout	Sets or returns the page orientation for hard copy
HARDCopy:PREVIEW	Previews the current screen contents with the InkSaver palette applied
HARDCopy:PRINTer:ADD	Adds a network printer to the list of available printers
HARDCopy:PRINTer:DELete	Removes a network printer from the list of available printers
HARDCopy:PRINTer:LIST?	Returns the list of currently attached printers
HARDCopy:PRINTer:REName	Renames a network printer in the list of available printers

Horizontal Command Group

Use the commands in the Horizontal Command Group to control the oscilloscope horizontal parameters.

Table 2-23: Horizontal Commands

Command	Description
HORizontal?	Returns settings for the horizontal commands
HORizontal:DELay:MODe	Sets or returns the horizontal delay mode
HORizontal:DELay:TIMe	Sets or returns the horizontal delay time (position) that is used when delay is on
HORizontal:DIGital:RECOrdlength: MAGnivu?	Returns the record length of the MagniVu digital acquisition
HORizontal:DIGital:RECOrdlength:MAIN?	Returns the record length of the main digital acquisition
HORizontal:DIGital:SAMPLERate: MAGnivu?	Returns the sample rate of the Magnivu digital acquisition
HORizontal:DIGital:SAMPLERate:MAIN?	Returns the sample rate of the main digital acquisition
HORizontal:POSition	Sets or returns the horizontal position, in percent, that is used when delay is off
HORizontal:PREViewstate?	Returns the display system preview state
HORizontal:RECOrdlength	Sets or returns the record length
HORizontal:SAMPLERate	Sets or returns the sample rate
HORizontal:SCAle	Sets or returns the horizontal scale
HORizontal:DIGital:RECOrdlength: MAGnivu?	Returns the record length of the MagniVu digital acquisition
HORizontal:DIGital:RECOrdlength:MAIN?	Returns the record length of the main digital acquisition
HORizontal:DIGital:SAMPLERate: MAGnivu?	Returns the sample rate of the Magnivu digital acquisition
HORizontal:DIGital:SAMPLERate:MAIN?	Returns the sample rate of the main digital acquisition

Mark Command Group

Use the commands in the Mark Command Group to identify areas of the acquired waveform that warrant further investigation.

Table 2-24: Mark Commands

Command	Description
MARK	Moves to the next or previous reference mark on the waveform. Returns the current mark position
MARK:CREATE	Creates a mark on a particular waveform or all waveforms in a column
MARK:DELEte	Deletes a mark on a particular waveform, all waveforms in a column, or all marks
MARK:FREE?	Returns how many marks are free to be used
MARK:SELected:END?	Returns the end of the selected mark, in terms of 0 to 100% of the waveform
MARK:SELected:FOCUS?	Returns the focus of the selected mark, in terms of 0 to 100% of the waveform
MARK:SELected:MARKSINCOLumn?	Returns how many marks are in the current zoom pixel column
MARK:SELected:OWNer?	Returns the owner of the selected mark
MARK:SELected:SOURCE?	Returns the source waveform of the selected mark
MARK:SELected:STARt?	Returns the start of the selected mark, in terms of 0 to 100% of the waveform
MARK:SELected:STATe?	Returns the on or off state of the selected mark
MARK:SELected:ZOOm:POSition?	Returns the position of the selected mark, in terms of 0 to 100% of the upper window
MARK:TOTal?	Returns how many marks are used

Math Command Group

Use the commands in the Math Command Group to create and define a math waveform. Use the available math functions to define your math waveform.

The math waveform you create depends on sources listed in the math expression. If you change these sources, the math waveform you previously defined will be affected.

Math expressions can be simple, containing no mathematical computation, such as CH1, which specifies that a waveform shows the signal source of Channel 1. Math expressions can also be complex, consisting of up to 128 characters and comprising many sources, functions, and operands.

When a live waveform is updated or a reference waveform is altered, math waveforms containing those waveforms as sources are also updated to reflect the changes. Remember that sources must exist, but do not need to be displayed, to be used in and to update math waveforms.

Table 2-25: Math Commands

Command	Description
MATH[1]?	Returns the definition of the math waveform
MATH[1]:DEFine	Sets or returns the current math function as a text string
MATH[1]:HORizontal:SCAle	Sets or returns the math horizontal display scale for FFT or for Dual Math waveforms
MATH[1]:HORizontal:UNIts	Returns the math waveform horizontal unit value
{MATH|MATH1}:LABel	Sets or queries the waveform label for the math waveform
MATH[1]:SPECTral:MAG	Sets or returns the units of spectral magnification in the math string
MATH[1]:SPECTral:WINdow	Sets or returns the window function for math waveform spectral input data
MATH[1]:VERTical:POSition	Sets or returns the vertical position of the currently selected math type
MATH[1]:VERTical:SCAle	Sets or returns the vertical scale of the currently selected math type
MATH[1]:VERTical:UNIts	Returns the math waveform vertical units
MATH[1]:HORizontal:POSition	Sets or returns the math horizontal display position for FFT or (non-live) math reference waveforms
MATH[1]:TYPe	Sets or returns the math waveform mode type

Table 2-25: Math Commands (cont.)

Command	Description
MATHVAR?	Returns all numerical values used within math expressions
MATHVAR:VAR<x>	Sets or returns numerical values you can use within math expressions

Measurement Command Group

Use the commands in the Measurement Command Group to control the automated measurement system.

Up to four automated measurements can be displayed on the screen. In the commands, these measurement readouts are named MEAS<x>, where <x> is the measurement number.

In addition to the four displayed measurements, the measurement commands let you specify an additional measurement, IMMed. The immediate measurement has no front-panel equivalent. Immediate measurements are never displayed. Because they are computed only when needed, immediate measurements slow the waveform update rate less than displayed measurements.

Whether you use displayed or immediate measurements, use the VALue query to obtain measurement results.

Measurement commands can set and query measurement parameters. You can assign some parameters, such as waveform sources, differently for each measurement. Other parameters, such as reference levels, have only one value, which applies to all measurements.

Table 2-26: Measurement Commands

Command	Description
MEASUrement?	Returns all measurement parameters
MEASUrement:CLEARSNapshot	Removes the measurement snapshot display
MEASUrement:GATing	Sets or returns the measurement gating
MEASUrement:IMMed?	Returns all immediate measurement setup parameters
MEASUrement:IMMed:DELay?	Returns information about the immediate delay measurement
MEASUrement:IMMed:DELay:DIRection	Sets or returns the search direction to use for immediate delay measurements
MEASUrement:IMMed:DELay:EDGE<x>	Sets or returns the slope of the edge used for immediate delay “from” and “to” waveform measurements

Table 2-26: Measurement Commands (cont.)

Command	Description
MEASUrement:IMMed:SOUrce<x>	Sets or returns the source for the current single channel measurement
MEASUrement:IMMed:SOUrce1	Sets or returns the “from” source for all single channel immediate measurements
MEASUrement:IMMed:SOUrce2	Sets or returns the source to measure “to” for phase or delay immediate measurements
MEASUrement:IMMed:TYPe	Sets or returns the type of the immediate measurement
MEASUrement:IMMed:UNIts?	Returns the units of the immediate measurement
MEASUrement:IMMed:VALue?	Returns the value of the immediate measurement
MEASUrement:INDICators?	Returns all measurement indicator parameters
MEASUrement:INDICators:HORZ<x>?	Returns the position of the specified horizontal measurement indicator
MEASUrement:INDICators:NUMHORZ?	Returns the number of horizontal measurement indicators currently being displayed
MEASUrement:INDICators:NUMVERT?	Returns the number of vertical measurement indicators currently being displayed
MEASUrement:INDICators:STATE	Sets or returns the state of visible measurement indicators
MEASUrement:INDICators:VERT<x>?	Returns the value of the specified vertical measurement indicator
MEASUrement:MEAS<x>?	Returns all measurement parameters
MEASUrement:MEAS<x>:COUNt?	Returns the number of values accumulated since the last statistical reset
MEASUrement:MEAS<x>:DELay?	Returns the delay measurement parameters for the specified measurement
MEASUrement:MEAS<x>:DELay:DIRection	Sets or returns the search direction to use for delay measurements
MEASUrement:MEAS<x>:DELay:EDGE<x>	Sets or returns the slope of the edge to use for delay “from” and “to” waveform measurements
MEASUrement:MEAS<x>:MAXimum?	Returns the maximum value found since the last statistical reset
MEASUrement:MEAS<x>:MEAN?	Returns the mean value accumulated since the last statistical reset
MEASUrement:MEAS<x>:MINImum?	Returns the minimum value found since the last statistical reset

Table 2-26: Measurement Commands (cont.)

Command	Description
MEASUrement:MEAS<x>:SOUrce<x>	Sets or returns the source for the specified measurement
MEASUrement:MEAS<x>:SOURCE[1]	Sets or returns the channel from which measurements are taken
MEASUrement:MEAS<x>:SOURCE2	Sets or returns the channel to which measurements are sent
MEASUrement:MEAS<x>:STATE	Sets or returns whether the specified measurement slot is computed and displayed
MEASUrement:MEAS<x>:STDdev?	Returns the standard deviation of values accumulated since the last statistical reset
MEASUrement:MEAS<x>:TYPe	Sets or returns the measurement<x> type
MEASUrement:MEAS<x>:UNIts?	Returns measurement<x> units
MEASUrement:MEAS<x>:VALue?	Returns the value of measurement<x>
MEASUrement:METHod	Sets or returns the method used for calculating reference levels
MEASUrement:REFLevel?	Returns the current reference level parameters
MEASUrement:REFLevel:ABSolute:HIGH	Sets or returns the top reference level for rise and fall time
MEASUrement:REFLevel:ABSolute:LOW	Sets or returns the low reference level for rise and fall time
MEASUrement:REFLevel:ABSolute:MID	Sets or returns the mid reference level for measurements
MEASUrement:REFLevel:ABSolute:MID<x>	Sets or returns the mid reference level in absolute units (e.g. volts)
MEASUrement:REFLevel:ABSolute:MID2	Sets or returns the mid reference level for delay "to" measurements
MEASUrement:REFLevel:METHod	Specifies or returns the reference level units used for measurement calculations
MEASUrement:REFLevel:PERCent:HIGH	Sets or returns the top reference percent level for rise and fall time
MEASUrement:REFLevel:PERCent:LOW	Sets or returns the low reference percent level for rise and fall time
MEASUrement:REFLevel:PERCent:MID	Sets or returns the mid reference percent level for waveform measurements
MEASUrement:REFLevel:PERCent:MID<x>	Sets or returns the mid reference level for the specified channel in percent
MEASUrement:REFLevel:PERCent:MID2	Sets or returns the mid reference percent level for second waveform measurements
MEASUrement:SNAPShot	Displays the measurement snapshot list

Table 2-26: Measurement Commands (cont.)

Command	Description
MEASUrement:STATIstics:MODE	Turns measurement statistics on or off
MEASUrement:STATIstics	Clears or returns all of the statistics accumulated for all period measurements (MEAS1 through MEAS4)
MEASUrement:STATIstics:WEIghting	Controls the responsiveness of the mean and standard deviation to waveform changes

Miscellaneous Command Group

Use the commands in the Miscellaneous Command Group to perform actions that do not fit into other categories.

Several commands and queries are common to all 488.2-1987 devices. The 488.2-1987 standard defines these commands. The common commands begin with an asterisk (*) character.

Table 2-27: Miscellaneous Commands

Command	Description
APPLication:LICENSE:SLOT<x>:LOCation?	This query returns the application license location. < x> can be slot number 1–4.
APPLication:LICENSE:SLOT<x>: TRANSFER	You can use this command to transfer an application license from the module to internal memory in the oscilloscope, and transfer it back.
APPLication:LICENSE:SLOT<x>:TYPe?	This query returns the application license type of the module that is currently inserted in the specified application module slot.
AUTOSet	Sets the vertical, horizontal, and trigger controls of the oscilloscope to automatically acquire and display the appropriate waveform(s). This is equivalent to pressing the front panel Autoset button
AUTOSet:ENAble	Enables or disables the autoset feature
CLEARMenu	Clears the current menu from the display
DATE	Sets or returns the date displayed by the oscilloscope
*DDT	Sets or returns the commands that will be executed by the group execute trigger
FPAnel:HOLD	This command is used to emulate the button push-and-hold feature. Presently, only the Cursors button is supported by this command.

Table 2-27: Miscellaneous Commands (cont.)

Command	Description
FPAnel:PRESS	Simulates the action of pressing a specified front-panel button
FPAnel:TURN	Duplicates the action of turning a specified front-panel control knob
GPIBUsb:ADDress?	Returns the current GPIB address
GPIBUsb:ID?	Returns the identification string of the connected adaptor module and firmware version
HEADer	Sets or returns the Response Header Enable State
ID?	Returns identifying information about the oscilloscope and its firmware
*IDN?	Returns the same information as the ID? command except the data is formatted according to Tektronix Codes & Formats
LANGuage	Sets or returns the user interface display language
LOCk	Sets or returns the front panel lock state
*LRN?	Returns a listing of oscilloscope settings
MESSage	Sets or queries message parameters
NEWpass	Changes the password for user protected data
PASSWord	Enables the *PUD and NEWpass set commands
REM	Specifies a comment, which is ignored by the oscilloscope
SET?	Returns a listing of oscilloscope settings
TEKSecure	Initializes both waveform and setup memories
TIME	Sets or returns the time displayed by the oscilloscope
TOTaluptime?	Returns the total number of hours that the oscilloscope has been turned on since the nonvolatile memory was last programmed
*TRG	Performs the group execute trigger (GET)
*TST?	Tests the interface and returns the status
UNLock	Unlocks front panel
USBTMC?	Returns the USBTMC information used by the USB hosts to determine the instrument interfaces

Table 2-27: Miscellaneous Commands (cont.)

Command	Description
USBTMC:PRODUCTID:DECimal?	Returns the product ID of the USBTMC device in decimal format
USBTMC:PRODUCTID:HEXadecimal?	Returns the product ID of the USBTMC device in hexadecimal format
USBTMC:SERIALnumber?	Returns the serial number of the USBTMC device
USBTMC:VENDORID:DECimal?	Returns the vendor ID of the USBTMC device in decimal format
USBTMC:VENDORID:HEXadecimal?	Returns the vendor ID of the USBTMC device in hexadecimal format
VERBose	Sets or returns the verbose state

PictBridge Command Group

Use the commands in the PictBridge Command Group to store printer settings.

Table 2-28: PictBridge Commands

Command	Description
PICTBridge:DATEPrint	Enables or disables printing the date on the print output
PICTBridge:DEFault	Sets the arguments for all PICTBridge commands to their default values
PICTBridge:IDPrint	Enables or disables printing the oscilloscope model and serial number on the print output
PICTBridge:IMAGESize	Sets or returns the image print size
PICTBridge:PAPERSize	Sets the output print paper size
PICTBridge:PAPERType	Sets or returns the paper type
PICTBridge:PRINTQual	Sets or returns the output print quality
USBDevice:CONFigure	Enables or disables the rear USB port for use with Pictbridge printers

Power Command Group

Use the commands in the Power Command Group for power analysis. The power measurements include:

- Power quality
- Switching loss
- Safe operating area
- Harmonics
- Ripple
- Modulation analysis

This command group is available when the DPO3PWR application module is installed.

Table 2-29: Power Commands

Command	Description
POWer:CURRENTSOurce	Sets or returns the current source for the power application
POWer:DISplay	Sets or returns the display state for the power application
POWer:GATESOurce	Sets or returns the gate source for the power application
POWer:GATing	Sets or returns the power application gating
POWer:HARMonics:DISPlay:SELect	Sets or returns the harmonics to be displayed when the harmonics standard is None
POWer:HARMonics:DISPlay:TYPe	Sets or returns the display type for harmonics tests
POWer:HARMonics:FREQRef	Sets or returns the frequency reference waveform for harmonics tests
POWer:HARMonics:FREQRef:FIXEDFREQValue	Sets or returns the fixed reference frequency value for harmonics measurements
POWer:HARMonics:IEC:CLAss	Sets or returns the filtering class for IEC harmonics
POWer:HARMonics:IEC:FILter	Sets or returns the enabled state for filtering of IEC harmonics
POWer:HARMonics:IEC:FUNDamental	Sets or returns the fundamental current for IEC harmonics
POWer:HARMonics:IEC:GROUPing	Sets or returns the enabled state for grouping of IEC harmonics
POWer:HARMonics:IEC:INPUTPOWer	Sets of returns the class D input power for IEC harmonics
POWer:HARMonics:IEC:LINEFREQuency	Sets or returns the line frequency for the IEC standard
POWer:HARMonics:IEC:OBSPERiod	Sets or returns the IEC observation period
POWer:HARMonics:IEC:POWERFACtor	Sets or returns the power factor for IEC harmonics

Table 2-29: Power Commands (cont.)

Command	Description
POWer:HARMonics:MIL:FUNDamental:CALCmethod	Sets or returns the measurement method for the MIL harmonics fundamental frequency
POWer:HARMonics:MIL:FUNDamental:USER:CURRent	Sets or returns RMS amperes for User calculation method
POWer:HARMonics:MIL:LINEFREQuency	Sets or returns the line frequency for MIL-STD-1399 harmonics tests
POWer:HARMonics:MIL:POWERLEVel	Sets or returns the power level for MIL-STD-1399 harmonics tests
POWer:HARMonics:NR_HARMonics	Sets of returns the number of harmonics (a value in the range of 20 to 400) when the harmonics standard is NONe
POWer:HARMonics:RESults:HAR<1-400>:FREQuency?	Returns the frequency of the harmonic
POWer:HARMonics:RESults:HAR<1-400>:IECMAX?	The IEC standard specifies harmonics measurements to be computed in windows of time, with each time window being nominally 200 ms. This returns the maximum of the RMS magnitude of the harmonic, computed across successive 200 ms time windows within an observation period entered by the user
POWer:HARMonics:RESults:HAR<1-400>:LIMit?	The IEC and MIL standards specify a limit for each harmonic magnitude. Returns the limit in absolute units, or as a percentage of the fundamental as specified by the standard. IEC Class C (Table 2) and MIL standards specify the limit as a percentage of the fundamental
POWer:HARMonics:RESults:HAR<1-400>:PHASe?	Returns the phase of the harmonic in degrees. The phase is measured relative to the zero-crossing of the reference waveform. When there is no reference waveform, the phase is relative to the fundamental component
POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute?	Returns the RMS magnitude of the harmonic expressed in absolute units
POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent?	Returns the RMS magnitude of the harmonic expressed as a percentage of the fundamental
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit?	Returns PASS, FAIL or NA. Specifies if the IEC Class A higher harmonic limit (and conditions) are met
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL?	Returns PASS, FAIL or NA. Specifies if the Normal IEC harmonic limits are met

Table 2-29: Power Commands (cont.)

Command	Description
POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit?	Returns PASS, FAIL or NA. Specifies if the higher harmonic limit (and conditions) for the 21st and higher order odd harmonics are met
POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL?	Returns the test result for the specified harmonic for the MIL-STD-1399 testing standard
POWer:HARMonics:RESults:IEC:FUNDamental?	Returns the IEC fundamental frequency
POWer:HARMonics:RESults:IEC:HARM3ALTernate?	Returns the IEC harmonics test result for the 3rd harmonic: PASS, FAIL or NA
POWer:HARMonics:RESults:IEC:HARM5ALTernate?	Returns the IEC harmonics test result for the 5th harmonic: PASS, FAIL or NA
POWer:HARMonics:RESults:IEC:POHC?	Returns the IEC POHC measurement
POWer:HARMonics:RESults:IEC:POHL?	Returns the IEC POHL measurement
POWer:HARMonics:RESults:IEC:POWer?	Returns the IEC input power measurement
POWer:HARMonics:RESults:IEC:POWERFactor?	Returns the IEC power factor measurement
POWer:HARMonics:RESults:PASSFail?	Returns the overall harmonics test result: PASS, FAIL or NA
POWer:HARMonics:RESults:RMS?	Returns the root mean square value of the source waveform
POWer:HARMonics:RESults:SAVe	Saves the harmonic results to the specified file in CSV format
POWer:HARMonics:RESults:THDF?	Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the fundamental component of the source waveform
POWer:HARMonics:RESults:THDR?	Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the source waveform
POWer:HARMonics:SOURce	Sets or returns the source waveform for harmonics tests
POWer:HARMonics:STANDard	Sets or returns the standard for harmonics tests
POWer:INDICators	Sets or returns the state of the measurement indicators for the power application
POWer:MODulation:SOUrce	Sets or returns the source waveform for modulation tests
POWer:MODulation:TYPe	Sets or returns the modulation type
POWer:QUALity:APPpwr?	Returns the apparent power measurement
POWer:QUALity:DISplay:APPpwr	Sets or returns the display state for the apparent power readout

Table 2-29: Power Commands (cont.)

Command	Description
POWer:QUALity:DISplay:FREQuency	Sets or returns the display state for the frequency readout
POWer:QUALity:DISplay:ICRESTfactor	Sets or returns the display state for the current crest factor readout
POWer:QUALity:DISplay:IRMS	Sets or returns the display state for the RMS current (IRMS) readout
POWer:QUALity:DISplay:PHASEangle	Sets or returns the display state for the phase angle readout
POWer:QUALity:DISplay:POWERFACtor	Sets or returns the display state for the power factor readout
POWer:QUALity:DISplay:REACTpwr	Sets or returns the display state for the reactive power readout
POWer:QUALity:DISplay:TRUEpwr	Sets or returns the display state for the true power readout
POWer:QUALity:DISplay:VCRESTfactor	Sets or returns the display state for the voltage crest factor readout
POWer:QUALity:DISplay:VRMS	Sets or returns the display state for the RMS voltage (VRMS) readout
POWer:QUALity:FREQREFerence	Sets or returns the power quality frequency reference
POWer:QUALity:FREQuency?	Returns the frequency measurement
POWer:QUALity:ICRESTfactor?	Returns the current crest factor measurement
POWer:QUALity:IRMS?	Returns the RMS current measurement
POWer:QUALity:PHASEangle?	Returns the phase angle measurement
POWer:QUALity:POWERFACtor?	Returns the power factor measurement
POWer:QUALity:REACTpwr?	Returns the reactive power measurement
POWer:QUALity:TRUEpwr?	Returns the true power measurement
POWer:QUALity:VRMS?	Returns the RMS voltage measurement
POWer:REFLevel:ABSolute	Sets the reference levels to their default unit values
POWer:REFLevel:ABSolute:HIGH	Sets or returns the top reference level for rise time
POWer:REFLevel:ABSolute:LOW	Sets or returns the low reference level for rise time
POWer:REFLevel:ABSolute:MID<1-3>	Sets or returns the mid reference level for measurements
POWer:REFLevel:HYSTeresis	Sets or returns the measurement reference level hysteresis value
POWer:REFLevel:METHod	Sets or returns the method used to calculate the 0% and 100% reference level

Table 2-29: Power Commands (cont.)

Command	Description
POWer:REFLevel:PERCent	Sets the reference levels to the default percentage values
POWer:REFLevel:PERCent:HIGH	Sets or returns the top reference percent level for rise time
POWer:REFLevel:PERCent:LOW	Sets or returns the low reference percent level for rise time
POWer:REFLevel:PERCent:MID<1-3>	Sets or returns the mid reference percent level for waveform measurements
POWer:RIPPle	Sets the vertical offset of the source waveform
POWer:RIPPle:RESults:AMPLitude?	Returns the peak-to-peak ripple measurement
POWer:RIPPle:RESults:MAX?	Returns the maximum of the peak-to-peak ripple measurements
POWer:RIPPle:RESults:MEAN?	Returns the mean of the peak-to-peak ripple measurements
POWer:RIPPle:RESults:MIN?	Returns the minimum of the peak-to-peak ripple measurement
POWer:RIPPle:RESults:STDdev?	Returns the standard deviation of the peak-to-peak ripple measurements
POWer:RIPPle:SOUrce	Sets or returns the source waveform for ripple tests
POWer:SOA:LINear:XMAX	Sets or returns the user XMAX value for use in linear SOA calculations
POWer:SOA:LINear:XMIN	Sets or returns the user XMIN value for use in linear SOA calculations
POWer:SOA:LINear:YMAX	Sets or returns the user YMAX value for use in linear SOA calculations
POWer:SOA:LINear:YMIN	Sets or returns the user YMIN value for use in linear SOA calculations
POWer:SOA:LOG:XMAX	Sets or returns the user XMAX value for use in log SOA calculations
POWer:SOA:LOG:XMIN	Sets or returns the user XMIN value for use in log SOA calculations
POWer:SOA:LOG:YMAX	Sets or returns the user YMAX value for use in log SOA calculations
POWer:SOA:LOG:YMIN	Sets or returns the user YMIN value for use in log SOA calculations
POWer:SOA:MASK:DEFine	Sets or returns the X (Volts) and Y (Amps) coordinates of the current SOA mask
POWer:SOA:MASK:MAXAmps	Sets or returns the maximum current applied to SOA mask testing

Table 2-29: Power Commands (cont.)

Command	Description
POWer:SOA:MASK:MAXVolts	Sets or returns the maximum voltage applied to SOA mask testing
POWer:SOA:MASK:MAXWatts	Sets or returns the maximum power applied to SOA mask testing
POWer:SOA:MASK:NR_PT?	Returns the number of mask points defined
POWer:SOA:MASK:STATe	Sets or returns the state of the mask for SOA calculations
POWer:SOA:MASK:STOPOnviol	Sets or returns the enabled state of the mask stop on violation condition
POWer:SOA:PLOTTYPe	Sets or returns the SOA plot type
POWer:SOA:RESult:FAILures:QTY?	Returns the number of failures in the test
POWer:SOA:RESult:NUMACq?	Returns the number of acquisitions in the test
POWer:SOA:RESult:STATe?	Returns the pass/fail state of the SOA test
POWer:STATIstics	Clears all the accumulated statistics of all measurements
POWer:STATIstics:MODE	Enables or disables the display of the measurement statistics
POWer:STATIstics:WEIghting	Sets the number of samples which are included for the statistics computations for mean and the standard deviation
POWer:SWLoss:CONDCALCmethod	Sets or returns the power application switching loss conduction calculation method
POWer:SWLoss:CONDuction:ENERGY:MAX?	Returns the maximum conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:ENERGY:MEAN?	Returns the mean conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:ENERGY:MIN?	Returns the minimum conduction energy for the switching loss calculation
POWer:SWLoss:CONDuction:POWER:MAX?	Returns the maximum conduction power for the switching loss calculation
POWer:SWLoss:CONDuction:POWER:MEAN?	Returns the mean conduction power for the switching loss calculation
POWer:SWLoss:CONDuction:POWER:MIN?	Returns the minimum conduction power for the switching loss calculation
POWer:SWLoss:DISplay	Sets or returns the display selection for switching loss results
POWer:SWLoss:GATe:POLarity	Sets or returns the switching loss gate polarity
POWer:SWLoss:GATe:TURNON	Sets or returns the gate turn on level for switching loss power measurements

Table 2-29: Power Commands (cont.)

Command	Description
POWer:SWLoss:NUMCYCles?	Returns the number of cycles counted for the switching loss calculation
POWer:SWLoss:RDSon	Sets or returns RDSON value for use in switching loss calculations when the conduction calculation method is RDSON
POWer:SWLoss:REFLevel:ABSolute:GATEMid	Sets or returns the mid voltage reference level used in switching loss power measurements in volts
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent	Sets or returns the low current reference level used in switching loss power measurements in amperes
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage	Sets or returns the low voltage reference level used in switching loss power measurements in volts
POWer:SWLoss:REFLevel:PERCent:GATEMid	Sets or returns the mid voltage reference level used in switching loss power measurements in percentage
POWer:SWLoss:REFLevel:PERCent:LOWCurrent	Sets or returns the low current reference level used in switching loss power measurements in percentage
POWer:SWLoss:REFLevel:PERCent:LOWVoltage	Sets or returns the low voltage reference level used in switching loss power measurements in percentage
POWer:SWLoss:TOFF:ENERGY:MAX?	Returns the maximum Toff energy for the switching loss calculation
POWer:SWLoss:TOFF:ENERGY:MEAN?	Returns the mean Toff energy for the switching loss calculation
POWer:SWLoss:TOFF:ENERGY:MIN?	Returns the minimum Toff energy for the switching loss calculation
POWer:SWLoss:TOFF:POWER:MAX?	Returns the number of maximum Toff power switching loss calculation
POWer:SWLoss:TOFF:POWER:MEAN?	Returns the mean Toff power for the switching loss calculation
POWer:SWLoss:TOFF:POWER:MIN?	Returns the minimum Toff power for the switching loss calculation
POWer:SWLoss:TON:ENERGY:MAX?	Returns the maximum Ton energy for the switching loss calculation
POWer:SWLoss:TON:ENERGY:MEAN?	Returns the mean Ton energy for the switching loss calculation
POWer:SWLoss:TON:ENERGY:MIN?	Returns the minimum Ton energy for the switching loss calculation
POWer:SWLoss:TON:POWER:MAX?	Returns the maximum Ton power for the switching loss calculation

Table 2-29: Power Commands (cont.)

Command	Description
POWer:SWLoss:TON:POWER:MEAN?	Returns the mean Ton power for the switching loss calculation
POWer:SWLoss:TON:POWER:MIN?	Returns the minimum Ton power for the switching loss calculation
POWer:SWLoss:TOTal:ENERGY:MAX?	Returns the maximum total energy for the switching loss calculation
POWer:SWLoss:TOTal:ENERGY:MEAN?	Returns the mean total energy for the switching loss calculation
POWer:SWLoss:TOTal:ENERGY:MIN?	Returns the minimum total energy for the switching loss calculation
POWer:SWLoss:TOTal:POWER:MAX?	Returns the maximum total power for the switching loss calculation
POWer:SWLoss:TOTal:POWER:MEAN?	Returns the mean total power for the switching loss calculation
POWer:SWLoss:TOTal:POWER:MIN?	Returns the minimum total power for the switching loss calculation
POWer:SWLoss:VCEsat	Sets or returns VCESAT value for use in switching loss calculations when the conduction calculation method is VCESAT
POWer:TYPe	Sets or returns the power application measurement type
POWer:VOLTAGESOurce	Sets or returns the voltage source for the power application

Save and Recall Command Group

Use the commands in the Save and Recall Command Group to store and retrieve waveforms and settings. When you save a setup, you save all the settings of the oscilloscope. When you recall a setup, the oscilloscope restores itself to the state it was in when you originally saved the setting.

Table 2-30: Save and Recall Commands

Command	Description
FACtory	Resets the oscilloscope to factory default settings
*RCL	Recalls saved oscilloscope settings
RECAll:SETUp	Recalls saved oscilloscope settings

Table 2-30: Save and Recall Commands (cont.)

Command	Description
RECAll:WAVEform	This command (no query form) recalls a stored waveform to a reference location. Only the first waveform in a .CSV file is recalled for multiple waveform .CSV files. Recall of digital waveforms (D0 through D15) is not supported.
*SAV	Stores the state of the oscilloscope to a specified memory location
SAVe:ASSIgn:TYPe	Sets or returns the assignment of the Save button
SAVe:EVENTtable:BUS<x>	Saves event table data from bus<x> to a specified file
SAVe:IMAGe	Saves a capture of the screen image to the specified file
SAVe:IMAGe:FILEFormat	Sets or returns the file format to use for saving screen images. The file format is not automatically determined by the file name extension. You need to choose a file name with an extension which is consistent with the selected file format
SAVe:IMAGe:INKSaver	Sets or returns the current inksaver setting for the SAVe:IMAGe command
SAVe:IMAGe:LAYout	Sets or returns the layout to use for saved screen images
SAVe:SETUp	Saves the state of the oscilloscope to a specified memory location or file
SAVe:WAVEform	Saves a waveform to one of the reference memory locations or a file
SAVe:WAVEform:FILEFormat	Sets or returns the format for saved waveforms
SAVe:WAVEform:GATIng	Specifies whether save waveform operations should save the entire waveform or a specified portion of the waveform
SETUP<x>:DATE?	Returns the date when the specified oscilloscope setup was saved
SETUP<x>:LABEL	Sets or returns the specified oscilloscope setup label
SETUP<x>:TIME?	Returns the time when the specified oscilloscope setup was saved

Search Command Group

The search commands let you analyze your source waveform record for conditions specified by a search's criteria. Once these criteria are matched, the oscilloscope places a search mark at that location in the waveform record. You can then navigate or save the marks. (See page 2-27, *Mark Command Group*.)

When performing an edge, pulse width, runt, rise/fall time, time-out, or bus search, you can use only one waveform at a time.

When performing a logic or a setup/hold search, you can use more than one displayed waveform at the same time. For example, with a logic search, you can search for instances when CH1 is high and CH2 is low.

With pulse width searching, the oscilloscope can search for pulses with widths less than, greater than, equal to, or not equal to a specified time. Additionally, it can search for pulses with widths within, or outside of a range of two different specified times. Searching can take place on either positive or negative pulses.

NOTE. *Although it is possible to trigger using a video signal, it is not possible to do a search using a video signal.*

To see example command sequences showing different searches and triggers, see Appendix G. (See page E-1, *Search and Trigger Command Sequence Examples*.)

Searching using Thresholds

All search types except bus searches use thresholds, which are vertical values that the source waveform must cross in order for a mark to be placed. For example, if you set the search type to EDGE, and the search source to CH1, the search's slope to RISE, and the search's threshold value to 1.5V, then that search will find all places where CH1 transitions from below 1.5 volts to above 1.5 volts.

Each individual search source waveform has two threshold values: a low threshold and a high threshold. Note that if you change the search source waveform, you must explicitly set the thresholds. For example, if you set the search's CH1 lower threshold to 1.5 volts, and then decide to change the search's source waveform to CH2, you must then explicitly set CH2's lower threshold value to the value you would like (it will not automatically be 1.5 volts). If you have an edge search set up on CH1 with the threshold you'd like, then decide to change to a logic search and change the threshold on CH1 to fit your logic search, and then change back to an edge search, your initial threshold setting on the edge search will be lost.

- Install the DPO3EMBD application module when working with I2C or SPI bus signals.
- Install the DPO3AUTO module when working with CAN or LIN bus signals.
- Install the DPO3COMP module when working with RS-232, RS-422, RS-485, and UART bus signals.
- Install the DPO3AUDIO module when working with I2S, Left Justified (LJ), Right Justified (RJ), and TDM bus signals.
- Install the DPO3AERO module when working with MIL-STD-1553 bus signals.
- Install the DPO3FLEX module when working with FlexRay bus signals.

Search Commands

Command	Description
SEARCH?	Returns all search-related settings
SEARCH:SEARCH<x>:COPy	Copies the search criteria to the trigger, or the trigger criteria to the search.
SEARCH:SEARCH<x>:STATE	Sets the search state to on or off
SEARCH:SEARCH<x>:TOTAL?	Returns the total number of matches for search <x>
SEARCH:SEARCH<x>:TRIGger:A:BUS?	This command returns the bus type being used in a search operation (CAN, I2C, SPI, RS-232, MIL-STD-1553, LIN, audio, FlexRay or Parallel).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition	This command sets the condition (start of frame or matching data) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue	This command sets the upper word value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet	This commands sets the data offset value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier	This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue	This command sets the lower word value to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD	This command sets the alignment of the data (left, right or either) to be used to search on audio bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition	This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used to search on CAN bus data.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection	This command sets the data direction (read, write or either) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier	This command sets the qualifier (<, >, =, not =, <=) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe	This command sets the length of the data string, in bytes, to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue	This command sets the binary data value to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype	This command sets the frame type (data, remote, error or overload) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe	This command sets the addressing mode (standard or extended format) to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue	This command sets the binary address value to be used to search on CAN bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition	This command specifies the condition to use when searching on FlexRay bus data (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue	This command specifies the upper data value of the range to be used when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue	This command specifies the low data value to be used when searching on the FlexRay bus cycle count field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue	This command specifies the high value to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet	This command specifies the offset of the data string in bytes to be used when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus data field.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe	This command specifies the length of the data string, in bytes, to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue	This command specifies the low value to use when searching on the FlexRay bus data field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE	This command specifies which end of file type to use (static, dynamic or any) when searching on the FlexRay bus EOF field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE	This command specifies the error type to use when searching on the FlexRay bus signal.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue	This command specifies the high value to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier	This command specifies the qualifier to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue	This command specifies the low value to use when searching on the FlexRay bus frame ID field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType	This command specifies the frame type (normal, payload, null, sync or startup) to use when searching on FlexRay bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC	This command specifies the CRC portion of the binary header string to be used when searching on FlexRay bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount	This command specifies to use the cycle count portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID	This command specifies to use the frame ID portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits	This command specifies to use the indicator bits portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength	This command specifies to use the payload length portion of the binary header string when searching on the FlexRay bus header.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe	Sets or returns the I2C address mode to 7 or 10-Bit
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe	Sets or returns the I2C address type to I2C special addresses
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue	Sets or returns the binary address string to be used for I2C search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition	Sets or returns the search condition for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection	Sets or returns the I2C search condition to be valid on a READ, WRITE or either
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe	Sets or returns the length of the data string in bytes to be used for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue	Sets or returns the binary data string to be used for I2C search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition	Sets or returns the search condition for a LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue	Sets or returns the binary data string to be used for LIN searches if the search condition is ID or IDANDDATA
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier	Sets or returns the LIN data qualifier
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe	Sets or returns the length of the data string in bytes
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue	Sets or returns the binary data string used for a LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE	Sets or returns the error type used for a LIN Search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue	Sets or returns the binary address string used for LIN search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue	When the MIL-STD-1553 bus search condition is set to `COMMAND`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit of the range for the remote terminal address field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier	When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies the qualifier to be used with the remote terminal address field.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue	When the MIL-STD-553 bus search condition is set to `COMMAND`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the value of the 5–bit remote terminal address to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt	When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the search.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the Command word parity that is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit	When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies that the transmit/receive bit (bit 9) is to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition	This command specifies the condition to use (sync, command, status, data, time, or error) when searching on MIL-STD-1553 bus data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity	When the MIL-STD-1553 bus search condition is set to DATa, this command specifies the data parity bit to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue	When the MIL-STD-1553 bus search condition is set to DATa, this command specifies the data binary pattern to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE	When the MIL-STD-1553 bus search condition is set to ERRor, this command specifies the signaling error type to be used in the search: Parity, Sync, Manchester or Data.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue	When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue	When the MIL-STD-1553 bus search condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the qualifier to be used with the address field.

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF	When theMIL-STD-1553 bus search condition is set to STATus, this command specifies the status word terminal flag bit value (bit 19) to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity	When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status parity bit value to be used in the search.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG).

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG).
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier	When the MIL-STD-1553 bus search condition is set to TIMe, this command specifies the trigger data time qualifier.
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue	Sets or returns the binary data string to be used for a Parallel search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition	Sets or returns the trigger condition for an RS-232 trigger
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe	Sets or returns the length of the data string for an RS-232 trigger, if the trigger condition is RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue	Sets or returns the binary data string for an RS-232 trigger, if the condition involves RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe	Sets or returns the length of the data string to be used for an RS-232 Trigger, if the Trigger condition is TX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue	Sets or returns the binary data string to be used for an RS-232 trigger, if the condition involves RX
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition	Sets or returns the search condition for SPI search
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:VALue	Sets or returns the binary data string to be used for SPI search if the search condition is MISO or MISOMOSI
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:VALue	Sets or returns the binary data string for an SPI search if the search condition is MISO or MISOMOSI
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe	Sets or returns the length of the data string in bytes to be used for SPI search
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce	Sets or returns a bus serial search. <x> is the search number
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe	Sets or returns the slope for an edge search
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce	Sets or returns the source waveform for an edge search
SEARCH:SEARCH<x>:TRIGger:A:LEVel	Sets or returns the level for an edge search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>	Sets or returns the level for an edge search of the specified channel
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH	Sets or returns the math waveform level for edge search
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>	Sets or returns the reference waveform level for edge search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion	Sets or returns the logic operator for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE	Sets or returns whether the clock edge is rise or fall for a logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce	Sets or returns the clock source definition for logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>	Sets or returns the criteria for a logic search to determine where to place a mark for digital channel <x>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:D<x>	Sets or returns the criteria for a pattern search to determine where to place a mark for digital channel <x>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:MATH	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:REF<x>	Sets or returns the Boolean logic criteria for the logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn	Sets or returns the condition for generating a logic pattern search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit	Sets or returns the maximum time that the selected pattern may be true
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit	Sets or returns the minimum time that the selected pattern may be true
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>	Sets or returns the channel threshold level for an logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH	Sets or returns the math waveform threshold level for logic search
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>	Sets or returns the reference waveform threshold level for logic search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>	Sets or returns the lower waveform threshold level for all channel waveform searches
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH	Sets or returns the lower waveform threshold level for all math waveform searches
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>	Sets or returns the lower waveform threshold level for all reference waveform searches
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit	This command specifies the upper limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit to specify the lower limit of the range.)
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit	This command specifies the lower limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity	Sets or returns the polarity for a pulse search
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce	Sets or returns the source waveform for a pulse search
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn	This command specifies to search the waveform record for pulses with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth), OR whose widths fall outside of or within a specified range of two values (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit).
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth	Sets or returns the pulse width setting for a pulse width search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity	Sets or returns the polarity setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce	Sets or returns the source setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn	Sets or returns the condition setting for a runt search
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth	Sets or returns the width setting for a runt search

Search Commands (cont.)

Command	Description
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE	Sets or returns the clock slope setting for a setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce	Sets or returns the clock source setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold	Sets or returns the clock threshold setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce	Sets or returns the data source setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold	Sets or returns the data threshold setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime	Sets or returns the hold time setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime	Sets or returns the setup time setting for an setup/hold search
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:CH<x>	Sets or returns the trigger search setup and hold threshold for the selected channel
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}	Sets or returns the trigger search setup and hold threshold for the math waveform
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>	Sets or returns the trigger search setup and hold threshold for the selected reference waveform
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime	Sets or returns the transition time setting for an transition search
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity	Sets or returns the polarity setting for an transition search
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce	Sets or returns the source setting for an transition search
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn	Sets or returns the condition setting for an transition search
SEARCH:SEARCH<x>:TRIGger:A:TYPe	Sets or returns the trigger type setting for a search
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>	Sets or returns the waveform upper threshold level for all channel waveform searches
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH	Sets or returns the waveform upper threshold level for all math waveform searches
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>	Sets or returns the waveform upper threshold level for all reference waveform searches

Status and Error Command Group

Use the commands in the Status and Error Command Group to determine the status of the oscilloscope and control events.

Several commands and queries used with the oscilloscope are common to all IEEE488.2 compliant devices. The IEEE Std 488.2-1987 defines these commands and queries. The common commands begin with an asterisk (*) character.

Table 2-31: Status and Error Commands

Command	Description
ALLEv?	Returns all events and their messages
BUSY?	Returns oscilloscope status
*CLS	Clears status
DESE	Sets or returns the bits in the Device Event Status Enable Register
*ESE	Sets or returns the bits in the Event Status Enable Register
*ESR?	Returns the contents of the Standard Event Status Register
EVENT?	Returns event code from the event queue
EVMsg?	Returns event code, message from the event queue
EVQty?	Return number of events in the event queue
*OPC	Generates the operation complete message in the standard event status register when all pending operations are finished Or returns "1" when all current operations are finished
*PSC	Sets or returns the power on status flag
*PUD	Sets or returns a string of protected user data
*RST	Resets the oscilloscope to factory default settings
*SRE	Sets or returns the bits in the Service Request Enable Register
*STB?	Returns the contents of the Status Byte Register
*WAI	Prevents the oscilloscope from executing further commands until all pending operations finish

Trigger Command Group

Use the commands in the Trigger Command Group to control all aspects of triggering for the oscilloscope.

There are two triggers: A and B. Where appropriate, this command set has parallel construction between triggers.

You can set the A or B triggers to edge mode. Edge triggering lets you display a waveform at or near the point where the signal passes through a voltage level of your choosing.

You can also set the A trigger to pulse width, logic, video, runt, timeout, rise/fall time (also called transition), setup and hold and bus modes.

With pulse width triggering, the oscilloscope triggers whenever it detects a pulse that is less than, greater than, equal to, or not equal to a specified duration (width). Additionally, it can trigger when the pulse width is within, or outside of a range of two different specified times. You can trigger on either positive or negative pulses.

Logic triggering lets you logically combine the signals on one or more channels; the oscilloscope then triggers when it detects a certain combination of signal levels.

Video triggering enables you to trigger on the most common Standard Definition video standards.

Runt triggering lets you trigger on a pulse amplitude that crosses one threshold but fails to cross a second threshold before recrossing the first.

Timeout triggering causes a trigger whenever no pulse has been detected within a specified amount of time.

Rise/fall time (also called transition) triggering causes a trigger on pulse edges that traverses between two thresholds at a rate faster than or slower than the specified time.

Setup and Hold causes a trigger when a logic data input changes state inside of the setup or hold time relative to a clock edge.

You can use your oscilloscope to trigger on a variety of data buses, if you have the appropriate application module installed. (The exception is the parallel bus trigger and analysis functionality, which is included standard with the MSO Series.) Once you specify which bus (1–4) to trigger on, you must then set the appropriate trigger criteria according to the bus type (i.e., parallel, I^{2}C, etc.)

NOTE. *When performing a setup/hold or logic trigger or search, you can use more than one displayed waveform at the same time. When performing an edge, pulse width, runt, rise/fall time, time-out or bus trigger or search, you can use only one waveform at a time.*

To see example command sequences showing different triggers and searches, see Appendix G. (See page E-1, *Search and Trigger Command Sequence Examples*.)

- Install the DPO3EMBD application module when working with I2C or SPI bus signals.
- Install the DPO3AUTO module when working with CAN or LIN bus signals.
- Install the DPO3COMP module when working with RS-232, RS-422, RS-485, and UART bus signals.
- Install the DPO3AUDIO module when working with I2S, Left Justified (LJ), Right Justified (RJ), and TDM bus signals.
- Install the DPO3AERO module when working with MIL-STD-1553 bus signals.
- Install the DPO3FLEX module when working with FlexRay bus signals.

Table 2-32: Trigger Commands

Command	Description
TRIGger	Forces a trigger event to occur
TRIGger:A	Sets A trigger level to 50% or returns current A trigger parameters
TRIGger:A:BUS	This command specifies the bus type to be used in a trigger operation (CAN, I2C, SPI, RS-232, MIL-STD-1553, LIN, audio, FlexRay or Parallel).
TRIGger:A:BUS:B<x>:AUDio:CONDition	This command sets the condition (start of frame or matching data) to be used when triggering on audio bus data.
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue	This command sets the upper word value to be used when triggering on audio bus data.
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet	This command sets the data offset value to be used when triggering on audio bus data.
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier	This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used when triggering on audio bus data.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue	This command sets the lower word value to be used when triggering on audio bus data.
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD	This command sets the alignment of the data (left, right or either) to be used to search on audio bus data.
TRIGger:A:BUS:B<x>:CAN:CONDition	This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection	This command sets the data direction (read, write or nocare) to be used to search on CAN bus data.
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier	This command sets the qualifier (<, >, =, not =, <=) to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe	This command sets the length of the data string, in bytes, to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN:DATa:VALue	This command sets the binary data value to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN:FRAMEtype	This command sets the frame type (data, remote, error or overload) to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe	This command sets the addressing mode (standard or extended format) to be used when triggering on CAN bus data.
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue	This command sets the binary address value to be used when triggering on CAN bus data.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:FLEXray:CONDition	This command specifies the condition to use when triggering on the FlexRay bus signal (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error).
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue	This command specifies the high value when triggering on the FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue	This command specifies the low value when triggering on the FlexRay bus cycle count field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue	This command specifies the high value when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet	This command specifies the offset of the data string, to use, in bytes, when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier	This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe	This command specifies the length of the data string, in bytes, when triggering on the FlexRay bus data field.
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue	This command specifies the low value when triggering on the FlexRay bus data field.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE	This command specifies which end of file type to use (static, dynamic or any) when triggering on the FlexRay bus EOF field.
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE	This command specifies the error type when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue	This command specifies the binary data string to be used for FlexRay frame ID high value
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier	This command specifies the qualifier when triggering on the FlexRay bus frame ID.
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue	This command specifies the binary data string to be used for FlexRay frame ID low value
TRIGger:A:BUS:B<x>:FLEXray:FRAMEType	This command specifies the frame type (normal, payload, null, sync or startup) when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC	This command specifies the CRC portion of the binary header string when triggering on the FlexRay bus signal.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount	This command specifies the cycle count portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID	This command specifies the frame ID portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits	This command specifies the indicator bits portion of the binary header string when triggering on the FlexRay bus header.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength	This command specifies the payload length portion of the binary header string when triggering on the FlexRay bus header.
TRIGger:A:BUS:B<x>:LIN:CONDition	Sets or returns the trigger condition for LIN
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue	Sets or returns the binary data string to be used for LIN trigger
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier	Sets or returns the LIN data qualifier
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe	Sets or returns the length of the data string in bytes to be used for LIN trigger
TRIGger:A:BUS:B<x>:LIN:DATa:VALue	Sets or returns the binary data string
TRIGger:A:BUS:B<x>:LIN:ERRTYPE	Sets or returns the error type
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue	Sets or returns the binary address string used for LIN trigger
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe	Sets or returns the I2C address mode to 7 or 10-bit
TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe	Sets or returns the I2C address type to USER
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue	Sets or returns the binary address string used for the I2C trigger
TRIGger:A:BUS:B<x>:I2C:CONDition	Sets or returns the trigger condition for I2C trigger
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection	Sets or returns the I2C trigger condition valid on a READ, WRITE, or either
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe	Sets or returns the length of the data string in bytes to be used for I2C trigger
TRIGger:A:BUS:B<x>:I2C:DATa:VALue	Sets or returns the binary data string used for I2C triggering

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue	When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the qualifier to be used with the remote terminal address field.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue	When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the Command word parity that is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress	When the MIL-STD-1553 bus trigger condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the trigger.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit	When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies that the transmit/receive bit (bit 9) is to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:CONDition	This command specifies the condition (sync, command, status, data, time, or error) to use when triggering on a MIL-STD-1553 bus signal.
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity	When the MIL-STD-1553 bus trigger condition is set to `DATa`, this command specifies the data parity bit to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue	When the MIL-STD-1553 bus trigger condition is set to `DATa`, this command specifies the data binary pattern to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE	When the MIL-STD-1553 bus trigger condition is set to `ERRor`, this command specifies the signaling error type to be used in the trigger: Parity, Sync, Manchester or Data.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue	When the MIL-STD-1553 bus trigger condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier	When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the qualifier to be used with the address field.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue	When the MIL-STD-1553 bus trigger condition is set to STATus, and the qualifier is set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual, this command specifies the value of the 5–bit remote terminal address to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word instrumentation bit value (bit 10) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME	When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the trigger.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ	When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF	When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word subsystem flag bit value (bit 17) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF	When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word terminal flag bit value (bit 19) to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity	When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status parity bit value to be used in the trigger.
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit	When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG).
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit	When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG).

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier	When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies the trigger data time qualifier.
TRIGger:A:BUS:B<x>:PARallel:VALue	Sets or returns the binary data string to be used for a Parallel trigger
TRIGger:A:BUS:B<x>:RS232C:CONDition	Sets or returns the condition for an RS-232C trigger
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe	Sets or returns the length of the data string in Bytes for an RX RS-232 Trigger
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue	Sets or returns the binary data string for an RX RS-232 trigger
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe	Sets or returns the length of the data string for a TX RS-232 trigger
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue	Sets or returns the binary data string for an RS-232 trigger if the trigger condition involves TX
TRIGger:A:BUS:B<x>:SPI:CONDition	Sets or returns the trigger condition for SPI triggering
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue	Sets or returns the binary data string to be used for a SPI trigger if the trigger condition is MISO or MISOMOSI
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue	Sets or returns the binary data string to be used for a SPI trigger if the trigger condition is MOSI or MISOMOSI
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe	Sets or returns the length of the data string in bytes to be used for SPI trigger if the trigger condition is MISO, MOSI, or MISOMOSI
TRIGger:A:BUS:SOUrce	Sets or returns the source for a Serial bus trigger
TRIGger:A:EDGE?	Returns the source, coupling and source for the A edge trigger

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:EDGE:COUPling	Sets or returns the type of coupling for the A edge trigger
TRIGger:A:EDGE:SLOpe	Sets or returns the slope for the A edge trigger
TRIGger:A:EDGE:SOUrce	Sets or returns the source for the A edge trigger
TRIGger:A:HOLDoff?	Returns the A trigger holdoff parameters
TRIGger:A:HOLDoff:TIMe	Sets or returns the A trigger holdoff time
TRIGger:A:LEVel	Sets or returns the trigger level for the A trigger
TRIGger:A:LEVel:AUXin	Sets or returns the trigger level for the AUXIN port
TRIGger:A:LEVel:CH<x>	Specifies or returns the trigger level for the specified trigger channel
TRIGger:A:LEVel:D<x>	Sets or returns the trigger level for the specified digital channel
TRIGger:A:LOGIc?	Returns all A trigger logic settings
TRIGger:A:LOGIc:CLAss	This command sets the class of the logic trigger (logic or setup/hold). This command is used in conjunction with the TRIGger:A:TYPe command.
TRIGger:A:LOGIc:FUNCtion	Sets or returns the logical combination of the input channels for the A logic trigger
TRIGger:A:LOGIc:INPut?	Returns the logic input values for all channels
TRIGger:A:LOGIc:INPut:CH<x>	Specifies or returns the logic setting for the specified channel
TRIGger:A:LOGIc:INPut:CLOCk:EDGE	Sets the polarity of the clock channel
TRIGger:A:LOGIc:INPut:CLOCk:SOUrce	Sets or returns the channel to use as the clock source

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:LOGIc:INPut:D<x>	Sets or returns the logic pattern for a trigger on digital channel<x>
TRIGger:A:LOGIc:PATtern?	Returns the conditions for generating an A logic pattern trigger
TRIGger:A:LOGIc:PATtern:DELTatime	Sets or returns the pattern trigger delta time value
TRIGger:A:LOGIc:PATtern:INPut:D<x>	Sets or returns the A logic trigger pattern for a trigger on digital channel<x>
TRIGger:A:LOGIc:PATtern:WHEn	Sets or returns the pattern logic condition on which to trigger the oscilloscope
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit	Sets or returns the maximum time that the selected pattern may be true and still generate an A logic pattern trigger
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit	Sets or returns the minimum time that the selected pattern may be true and still generate an A logic pattern trigger
TRIGger:A:LOGIc:THReshold:CH<x>	Sets or queries the trigger A logic threshold voltage for the specified channel
TRIGger:A:LOGIc:THReshold:D<x>	Sets or returns the trigger A logic threshold level for the specified digital channel
TRIGger:A:LOWerthreshold:CH<x>	Sets or returns the lower threshold for the channel selected
TRIGger:A:LOWerthreshold:D<x>	Sets the A trigger lower threshold for the digital channel selected
TRIGger:A:LOWerthreshold{:EXT|:AUX}	Sets or returns the lower threshold for the Auxiliary input.
TRIGger:A:MODe	Sets or returns the A trigger mode
TRIGger:A:PULse?	Returns the A pulse trigger parameters

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:PULse:CLAss	This command sets the type of pulse on which to trigger (runt, width, transition or timeout). This command is used in conjunction with the TRIGger:A:TYPe command.
TRIGger:A:PULSEWIDth?	Returns the trigger A pulse width parameters
TRIGger:A:PULSEWidth:HIGHLimit	This command specifies the upper limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:LOWLimit to specify the lower value of the range.)
TRIGger:A:PULSEWidth:LOWLimit	This command specifies the lower limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)
TRIGger:A:PULSEWidth:POLarity	Sets or returns the polarity for the A pulse width trigger
TRIGger:A:PULSEWidth:SOUrce	Sets or returns the source for the pulse width trigger
TRIGger:A:PULSEWidth:WHEn	This command specifies to trigger when a pulse is detected with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using TRIGger:A:PULSEWidth:WIDth), OR whose width falls outside of or within a specified range of two values (set using TRIGger:A:PULSEWidth:LOWLimit and TRIGger:A:PULSEWidth:HIGHLimit).

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:PULSEWidth:WIDth	Sets or returns the width setting for the pulse width trigger
TRIGger:A:RUNT?	Returns the current A runt pulse trigger logic parameters
TRIGger:A:RUNT:POLarity	Sets or returns the polarity for the A pulse runt trigger
TRIGger:A:RUNT:SOUrce	Sets or returns the source for the A runt trigger
TRIGger:A:RUNT:WHEn	Sets or returns the type of pulse width the trigger checks for when it uncovers a runt
TRIGger:A:RUNT:WIDth	Sets or returns the minimum width for A pulse runt trigger
TRIGger:A:SETHold?	Returns settings for setup and hold violation triggering
TRIGger:A:SETHold:CLOCk?	Returns clock edge polarity, voltage threshold and source input for setup/hold triggering
TRIGger:A:SETHold:CLOCk:EDGE	Sets or returns the clock edge polarity for setup and hold triggering
TRIGger:A:SETHold:CLOCk:SOUrce	Sets or returns the clock source for the A logic trigger setup and hold input
TRIGger:A:SETHold:CLOCk:THReshold	Sets or returns the clock voltage threshold for setup and hold trigger
TRIGger:A:SETHold:DATa?	Returns the voltage threshold and data source for the setup/hold trigger
TRIGger:A:SETHold:DATa:SOUrce	Sets or returns the data source for the setup and hold trigger
TRIGger:A:SETHold:DATa:THReshold	Sets or returns the data voltage threshold for setup and hold trigger
TRIGger:A:SETHold:HOLDTime	Sets or returns the hold time for the setup and hold violation triggering

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:SETHold:SETTime	Sets or returns the setup time for setup and hold violation triggering
TRIGger:A:SETHold:THReshold:CH<x>	Sets or queries the threshold for the channel
TRIGger:A:SETHold:THReshold:D<x>	Sets the A trigger setup and hold threshold for the selected digital channel
TRIGger:A:UPPerthreshold:CH<x>	Sets the upper threshold for the channel selected
TRIGger:A{:TRANsition|:RISEFall}?	Returns the delta time, polarity, and both upper and lower threshold limits for the transition time trigger
TRIGger:A{:TRANsition|:RISEFall}:DELTatime	Sets or returns the delta time used in calculating the transition value
TRIGger:A{:TRANsition|:RISEFall}:POLarity	Sets or returns the polarity for the A pulse transition trigger
TRIGger:A{:TRANsition|:RISEFall}:SOUrce	Sets or returns the source for transition trigger
TRIGger:A{:TRANsition|:RISEFall}:WHEn	Sets or returns the relationship of delta time to transitioning signal
TRIGger:A:TYPe	This command sets the type of A trigger (edge, logic, pulse, bus or video). If you set the trigger type to LOGIc, you also need to set the logic trigger class (logic or setup/hold) using the command TRIGger:A:LOGIc:CLAss. If you set the trigger type to PULSe, you also need to set the pulse trigger class (runt, width, transition or timeout), using the command TRIGger:A:PULse:CLAss. If you set the trigger type to BUS, you also need to set the bus type (CAN, I^{2}C, SPI, RS-232, MIL-STD-1553, LIN, audio, FlexRay or parallel) using the command TRIGger:A:BUS.

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:A:VIDeo?	Returns the video parameters for the A trigger
TRIGger:A:VIDeo:CUSTom:FORMat	This command sets the video trigger format (either interlaced or progressive) to use for triggering on video signals.
TRIGger:A:VIDeo:CUSTom:LINEPeriod	This command sets the line period for the standard under test.
TRIGger:A:VIDeo:CUSTom:SYNCInterval	This command sets the sync interval for the standard under test to use for triggering on video signals. This is only required for BiLevel Custom.
TRIGger:A:VIDeo:HOLDoff:FIELD	This command sets the video trigger holdoff, in terms of video fields, to use for triggering on video signals.
TRIGger:A:VIDeo:LINE	This command sets the video line number to use for triggering on video signals.
TRIGger:A:VIDeo:POLarity	This command sets the polarity to use for triggering on video signals.
TRIGger:A:VIDeo:SOUrce	This command sets the source channel to use for triggering on video signals.
TRIGger:A:VIDeo:STANdard	This command sets the standard to use for triggering on video signals (NTSC, PAL, SECAM, HDTV, bi-level custom or tri-level custom).
TRIGger:A:VIDeo{:SYNC|:FIELD}	This command sets the video field or line to use for triggering on video signals.
TRIGger:B	Sets the B trigger level to 50% or returns the B trigger parameters
TRIGger:B:BY	Sets or returns B trigger time or event qualifiers
TRIGger:B:EDGE?	Returns B trigger edge type parameters

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:B:EDGE:COUPling	Sets or returns the type of B trigger coupling
TRIGger:B:EDGE:SLOpe	Sets or returns the B edge trigger slope
TRIGger:B:EDGE:SOUrce	Sets or returns the B edge trigger source
TRIGger:B:EVENTS?	Returns the current B trigger events parameter
TRIGger:B:EVENTS:COUNt	Sets or returns the number of events that must occur before the B trigger occurs
TRIGger:B:LEVel	Sets or returns the level for the B trigger
TRIGger:B:LEVel:CH<x>	Sets or returns the level for the B trigger for a specific channel
TRIGger:B:LEVel:D<x>	Sets or returns the B trigger level for digital channel<x>
TRIGger:B:LOWerthreshold:CH<x>	Sets or returns the B trigger lower threshold for the channel selected
TRIGger:B:LOWerthreshold:D<x>	Sets or queries the B trigger lower threshold for the digital channel selected
TRIGger:B:STATE	Returns the current state of the B trigger
TRIGger:B:TIMe	Sets or returns the B trigger delay time
TRIGger:B:TYPe	Sets or returns the type of B trigger
TRIGger:B:UPPerthreshold:CH<x>	Sets or returns the B trigger upper threshold for the channel selected
TRIGger:EXTernal?	Returns external trigger parameters
TRIGger:EXTernal:PRObe	Sets or returns the attenuation factor value of the external probe connector
TRIGger:EXTernal:YUNIts?	Returns the external trigger vertical (Y) units value

Table 2-32: Trigger Commands (cont.)

Command	Description
TRIGger:FREQuency?	Returns the trigger frequency in Hertz. This command
TRIGger:STATE?	Returns the current state of the triggering system

Vertical Command Group

Use the commands in the Vertical Command Group to control the vertical setup of all live (channel) waveforms for acquisition and display of channel, reference, and math waveforms.

Use the command CH<x>:YUNits to set the vertical units for each channel. The vertical units affect the "Probe Type" that is shown in the "Probe Setup" menu:

- Setting `CH<x>:YUNits` to "`V`" causes the probe type to be displayed as "Voltage".
- When `CH1:AMSVIAVOLTs:ENAble` is set to `OFF`, setting `CH<x>:YUNits` to "`A`" causes the probe type to be displayed as "Current".
- Setting `CH<x>:YUNits` to anything else causes the probe type not to be displayed (neither "Voltage" nor "Current" are highlighted).

Table 2-33: Vertical Commands

Command	Description
AUXin?	Returns auxiliary input parameters
AUXin:PRObe	Returns all information concerning the probe attached to auxiliary input
AUXin:PRObe:AUTOZero	Sets the TekVPI probe attached to the auxiliary input to autozero
AUXin:PRObe:COMMAND	Sets the state of the specified probe control
AUXin:PRObe:DEGAUss	Starts a degauss/autozero cycle on a TekVPI current probe attached to the auxiliary input
AUXin:PRObe:DEGAUss:STATE?	Returns the degauss state of the TekVPI current probe attached to the auxiliary input
AUXin:PRObe:FORCEDRange	Sets or returns the range of the TekVPI probe attached to the auxiliary input
AUXin:PRObe:GAIN	Sets or returns the gain factor of the probe that is attached to the auxiliary input
AUXin:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the auxiliary input
AUXin:PRObe:ID:TYPE?	Returns the type of probe that is attached to the auxiliary input

Table 2-33: Vertical Commands (cont.)

Command	Description
AUXin:PRObe:RESistance?	Returns the resistance of the probe that is attached to the Auxiliary input
AUXin:PRObe:SIGnal	Sets or returns the input bypass setting on VPI probes that support input bypass
AUXin:PRObe:UNIts?	Returns the units of measure of the probe that is attached to the auxiliary input
CH<x>?	Returns vertical parameters for the specified channel
CH<x>:AMPSVIAVOLTs:ENAble	Sets or returns the state of the amps via volts feature
CH<x>:AMPSVIAVOLTs:FACtor	Sets or returns the amps via volts factor
CH<x>:BANdwidth	Sets or returns the bandwidth of the specified channel
CH<x>:COUPling	Sets or returns the coupling setting for the specified channel
CH<x>:DESKew	Sets or returns the deskew time for the specified channel
CH<x>:INVert	Sets or returns the invert function for the specified channel
CH<x>:LABel	Sets or returns the waveform label for channel <x>
CH<x>:OFFSet	Sets or returns the channel offset
CH<x>:POSition	Sets or returns the channel vertical position
CH<x>:PRObe?	Returns the gain, resistance, units, and ID of the probe that is attached to the specified channel
CH<x>:PRObe:AUTOZero	Sets the TekVPI probe attached to the specified channel input to autozero
CH<x>:PRObe:COMMAND	Sets the state of the specified probe control
CH<x>:PRObe:DEGAUss	Starts a degauss/autozero cycle on a TekVPI current probe attached to the specified channel input
CH<x>:PRObe:DEGAUss:STATE?	Returns the state of the probe degauss
CH<x>:PRObe:FORCEDRange	Sets or returns the range on a TekVPI probe attached to the specified channel
CH<x>:PRObe:GAIN	Sets or returns the gain factor of the probe that is attached to the specified channel
CH<x>:PRObe:ID?	Returns the type and serial number of the probe that is attached to the specified channel
CH<x>:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the specified channel

Table 2-33: Vertical Commands (cont.)

Command	Description
CH<x>:PRObe:ID:TYPE?	Returns the type of probe that is attached to the specified channel
CH<x>:PRObe:MODel	Sets or returns the probe model for the specified channel
CH<x>:PRObe:PROPDELay	Sets or returns the propagation delay for the probe connected to the specified channel
CH<x>:PRObe:RECDESkew?	Returns the recommended deskew for the probe connected to the specified channel
CH<x>:PRObe:RESistance?	Returns the resistance of the probe that is attached to the specified channel
CH<x>:PRObe:SIGnal	Sets or returns the input bypass setting of channel <x>TekVPI probe
CH<x>:PRObe:UNIts?	Returns the units of measure of the probe that is attached to the specified channel
CH<x>:SCAle	Sets or returns the vertical scale of the specified channel
CH<x>:TERmination	Sets or returns channel input termination
CH<x>:YUNits	Sets or returns the units for the specified channel
D<x>	Returns parameters for digital channel<x>
D<x>:LABel	Sets or returns the waveform label for digital channel<x>
D<x>:POSition	Sets or returns the vertical position for digital channel<x>
D<x>:THREshold	Sets or returns the logical threshold for digital channel<x>
DESkew	Causes the deskew values for all channels to be set to the recommended values
DESkew:DISPlay	Sets or returns the state of the deskew table display
REF<x>?	Returns reference waveform settings for waveform reference <x>
REF<x>:DATE?	Returns the date that a reference waveform was stored
REF<x>:HORizontal:DELay:TIMe	Sets or returns the horizontal delay time for reference waveform <x>, where x is the reference channel number. The delay time is expressed in seconds and is limited to ±5 times the reference horizontal scale
REF<x>:HORizontal:SCAle	Sets or returns the horizontal scale for a reference waveform

Table 2-33: Vertical Commands (cont.)

Command	Description
REF<x>:LABel	Sets or returns the specified reference waveform label
REF<x>:TIMe?	Returns the time that a reference waveform was stored
REF<x>:VERTical:POSition	Sets or returns the vertical position of the specified reference waveform
REF<x>:VERTical:SCAle	Sets or returns the reference waveform vertical scale in vertical units/div
SELect	Returns information on which waveforms are on or off and which waveform is selected
SELect:BUS<x>	Turns on or off the specified bus waveform or returns whether the specified bus channel is on or off
SELect:CH<x>	Turns on or off the specified waveform or returns whether the specified channel is on or off
SELect:CONTROl	Sets or returns the waveform that is selected as the implied recipient of channel-related commands
SELect:D<x>	Turns on the display of digital channel<x> and resets the acquisition
SELect:MATH[1]	Turns on or off the math waveform or returns whether the math waveform is on or off
SELect:REF<x>	Turns on or off the specified reference waveform or returns whether the specified reference waveform is on or off

Waveform Transfer Command Group

The `CURVe` and other commands and queries in the Waveform Transfer Command Group are used to transfer waveform data points to and from the oscilloscope. The waveform data points are a collection of values that represent the amplitude of the waveform samples. One data value usually represents one data point in the waveform record. Only one waveform can be transferred at a time.

Each waveform you transfer has an associated waveform preamble, which contains information such as data format, horizontal scale, vertical scale, and the other settings in effect when the waveform was created. When you transfer a waveform, you need to specify at least some of the general and preamble settings (using the `DATa, WFMInpre` or `WFMOutpre` commands) before you specify the raw data point information (using the `CURVe` command or query.)

Waveform data can be transferred to or from the oscilloscope using the Ethernet or USBTMC interfaces in binary or ASCII format. Binary data transfer is considerably more efficient than ASCII data transfer. Binary data is transferred to and from the oscilloscope using the IEEE488.2 arbitrary block format (7.7.6 of the IEEE488.2 spec) which we refer to in this document as "binary block format". A binary block is represented as:

#N<N-Digits><binary data>

Where:

The "#" is the arbitrary block token.

N is a single hexadecimal digit specifying how many decimal digits immediately follow.

<N-Digits> is a decimal number N digits long, that specifies the number of binary data bytes to follow.

<binary data> is the binary data which should be exactly N-Digits bytes in length.

NOTE. *If you would like to save or recall a waveform to or from a file, use the SAVe:WAVEform and RECAll:WAVEform commands.*

Transferring a Waveform From an Oscilloscope to a Computer

Use the `DATa` commands and `WFMOutpre` commands to specify the attributes of the waveform being transferred from the oscilloscope. You must, at a minimum, specify the waveform source (using the `DATa:SOUrce` command) and data format (using the `DATa:ENCdg` and `DATa:WIDth` commands).

Then, use the `WFMOutpre?` query, which provides the context needed to interpret the waveform data points. Finally, use the `CURVE?` query to transfer the waveform data points. (You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.)

NOTE. *In order to guarantee that the waveform data returned from `CURVE?` queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using ACQuire:STOPAfter `SEQuence`.*

NOTE. *The `WFMOutpre:BYT_Nr` and `WFMOutpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMOutpre:BYT_Nr 2` causes `WFMOutpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMOutpre:BIT_Nr` to 16 causes `WFMOutpre:BYT_Nr` to be set to 2.*

Following is an example command sequence that illustrates how to transfer waveform data from the oscilloscope to the computer.

In this case, let's say you'd like to transfer 10,000 points from channel 1, in ASCii format with 1 byte per point, to your computer program.

Table 2-34: Example Command Sequence for Transferring Waveform Data From Oscilloscope to Computer

Item	Description
:DATa:SOUrce CH1	Sets the source waveform to be transferred to Channel 1.
:DATa:STARt 1	This, along with `DATa:STOP`, specifies the portion of the waveform record that will be transferred .
:DATa:STOP 10000	
:DATa:ENCdg ASCIi	Sets the data format to ASCII. (This command replaces `WFMOutpre:ENCdg`, `WFMOutpre:BN_Fmt` and `WFMOutpre:BYT_Or` with a single command.)
:DATa:WIDth 1	Sets 1 byte per point (same as `WFMOutpre:BYT_Nr`).
:HEADer 1	Turning on `HEADer` and `VERBose` will allow you to view the `WFMOutpre?` parameters in context.
:VERBose	1
:WFMOutpre?	The `WFMOutpre?` query provides the information needed to interpret the waveform data point information that will be returned from the `CURVe` query.
:HEADer 0	You may want to turn the header off before doing the `CURVe` query, because with the header on, a `CURVe` query will return the `CURVe` command header followed by a space and the ASCII waveform data.
:CURVe?	Transfers the data points.

NOTE. *For more command sequence examples as well as several comprehensive examples of what the `WFMOutpre?` query might return using different data sources, see Appendix D. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

NOTE. *When you do a `WFMOutpre?` query in an interactive session during program development, it's a good idea to first turn on the header and verbose features (using the `HEADer` and `VERBose` commands) in order to see the returned values in context.*

Waveform Sources. Valid waveform sources that can be transferred from the oscilloscope (using the `DATa:SOUrce` command) include:

CH1 – CH4 – Analog channels. When `DATa:SOUrce` is set to one of these sources, the data points represent digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. These data points can be transferred in signed or unsigned integer formats.

D0 – D15 — The digital input channels (MSO models only). When `DATa:SOUrce` is set to one of these, the data points are binary states (0 or 1). These data points can be transferred in widths of 1 or 2 bytes, as signed or unsigned integers.

DIGital — The Digital Collection. These data points are binary states (0 or 1) that can be transferred in widths of 4 or 8 bytes, as signed or unsigned integers. For ASCII encoding, the data is transferred as hexadecimal values with leading zeroes suppressed. When `DATa:SOUrce` is set to DIGital, this represents a collection of information that differs depending on the data width (set using either the `DATa:WIDth` or `WFMOutpre:BYT_Nr` command.)

- When the data width is set to 4 bytes, the Digital Collection is the states of digital channels D0 – D15, plus the digital representations of analog channels 1 – 4, plus the trigger state.
- When the data width is set to 8 bytes, the Digital Collection is the transition state information for digital channels D0 – D15, plus the digital representations of analog channels 1 – 4. For more information, see the section below "Further Explanation of Digital Collection Data". (MSO models only.)

MATH — The format of MATH data is dependent upon the sources for the math waveform. For analog channel sources, the format is that for the analog channels described above.

REF1-REF4 — The format of REF data is dependent upon the sources from which the reference waveform was created. For analog channel sources, the format is that for the analog channels described above.

NOTE. *When you change the `DATa:SOUrce` setting, all of the associated settings for the waveform preamble (`WFMOutpre` commands) are automatically adjusted for the specified source waveform. The specified source waveform must be turned on.*

Data Encoding and Widths. Data transferred from the oscilloscope using the `CURVe` query can be sent in either ASCII or binary formats. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header, immediately followed by the binary data.

You can specify the format for waveform transfers from the oscilloscope using the combination of `WFMOutpre:ENCdg, WFMOutpre:BN_Fmt` and

WFMOutpre:BYT_Or commands. Or else you can simply use the DATa:ENCdg command, which combines all three.

ASCII data is represented by signed integer values for analog and digital channels. The range of the values depends on the data width (specified using the WFMOutpre:BYT-Nr or DATa:WIDth command). One byte wide data ranges from -128 to 127. Two byte wide data ranges from -32768 to 32767. For digital channels D0 through D15, the values returned are 0 or 1. For the Digital Collection, ASCII data is returned in hexadecimal format with any leading zeroes omitted.

Transferring a Waveform From a Computer to an Oscilloscope's Internal Reference Memory

Waveforms sent from a computer program TO the oscilloscope are always stored in one of the internal reference memory locations (REF1-4). Use DATa:DESTination to specify the reference memory location, as well other DATa commands to specify record start and stop points. Next, use the WFMInpre commands to specify the waveform's data format, scale, domain and other attributes that will be used to convert raw data points into the scope's internal waveform points. Then, use WFMInpre? to verify your settings. Finally, use the CURVe command to transfer the raw data points.

Following is an example command sequence that illustrates how to transfer waveform data to the oscilloscope's internal reference memory.

In this case, let's say you have created a waveform on your computer and would like to transfer 10,000 data points of it, in ASCii format with 1 byte per point, to your oscilloscope's internal reference memory location REF2.

NOTE. *The WFMInpre:BYT_Nr and WFMInpre:BIT_Nr settings are directly related; setting one causes the other to be set accordingly. For example, WFMInpre:BYT_Nr 2 causes WFMInpre_BIT_Nr to be set to 16 (2 * 8 bits/byte). Similarly, setting WFMInpre:BIT_Nr to 16 causes WFMInpre:BYT_Nr to be set to 2.*

Table 2-35: Example Command Sequence for Transferring Waveform Data From Computer to Oscilloscope

Item	Description
:DATa:DESTination REF2	Selects REF 2 as the internal reference memory location that the incoming waveform will be transferred to.
:DATa:STARt 1	This, along with DATa:STOP, specifies the starting and ending points of the waveform record that will be transferred to REF2.
:DATa:STOP	10000
:WFMInpre:BYT_Nr 1	Sets the number of bytes per data point in the waveform data to be sent to REF2 to 1.
:WFMInpre:BIT_Nr 8	Sets the number of bits per binary data point to 8.
:WFMInpre:ENCdg ASCII	Specifies that the incoming waveform uses the ASCII format.
:WFMInpre:NR_Pt 10000	Sets the number of data points that are being sent to REF2 to 10000.

Table 2-35: Example Command Sequence for Transferring Waveform Data From Computer to Oscilloscope (cont.)

Item	Description
:WFMInpre:PT_Fmt Y	Specifies that the incoming waveform is a normal one, where one ASCII or binary data point is transmitted for each point in the waveform record (as opposed to envelope).
:WFMInpre:XUNit "S"	Sets the horizontal units of the x-axis of the data points to seconds.
:WFMInpre:XINcr 4.0000E-9	Sets the horizontal interval between the incoming waveform points, using the units specified above.
:WFMInpre:XZERo -20.0000E-6	Sets the position value of the first data point in the incoming waveform record.
:WFMInpre:YUNit "V"	Specifies that Volts are the vertical units of the data points being sent.
:WFMInpre:YMUlt 4.0000E-3	Specifies the vertical scale multiplying factor used to convert the incoming data points from digitizing levels into the units specified above.
:WFMInpre:YOFf 0.0E+0	Specifies that the vertical position in digitizing levels of the incoming reference waveform is 0.
:WFMInpre:YZEro 0.0E+0	Specifies that the vertical offset of the incoming waveform is 0.
:HEADer 1	Turning on `HEADer` and `VERBose` will allow the `WFMInpre?` parameters to be viewed in context.
:VERBose 1	
:WFMInpre?	Do this query to verify your settings.
:CURVe <10,000 ASCIi data points, each separated by a comma>	Sends the data points to REF2.

Scaling Waveform Data

Once you transfer waveform data from an oscilloscope to a computer, you can convert the data points (which are digitizing levels) into engineering units such as Volts or Amps for analysis using information from the waveform preamble.

The following is an example for converting transferred data into the appropriate engineering units. The transfer data is from an analog waveform in YT (single point) format. (See WFMInpre:PT_Fmt for the definition of the point formats.) The data points returned from the `CURVE?` query for analog channel data are in digitizing levels. The YMULT value is in vertical units (e.g. volts) per digitizing level.

Formula for computing horizontal (time) point value:

$$X_i = XZEro + XINcr * (i - 1)$$

Formula for computing vertical (amplitude) point value:

$$Y_i = YZEro + (YMUlt * DataPoint_i)$$

where:

i is the index of a curve data point (1–based: first data point is point number 1)

X_i is the ith horizontal value in XUNits

Y_i is the ith vertical value in YUNits

$DataPoint_i$ is the waveform data point value, in digitizing levels.

Commands used:

```
:DATa:SOUrce CH1
:DATa:START 1
:DATa:STOP 1000
:WFMOutpre:NR_pt?  1000
:WFMOutpre:XUNit?  “s”
:WFMOutpre:XZEro?  -500.000E-3
:WFMOutpre:XINcr?  1.0000E-3
:WFMOutpre:YUNit?  “V”
:WFMOutpre:YZEro?  0.0E+0
:WFMOutpre:YMUlt?  4.0000E-3
:WFMOutpre:BYT_nr?  1
```

Horizontal (time) values:

X_i = XZEro + XINcr * (i - 1)

= -500ms + 1ms * (i – 1)

X_1 = -500ms + 1ms * (1 - 1)

= -500ms

X_2 = -500ms + 1ms * (2 - 1)

= -499ms

. . .

X_{1000} = -500ms + 1ms * (1000 - 1) = 499ms

Vertical (amplitude) values:

Y_i = YZEro + (YMUlt * $DataPoint_i$)

= 0.0V + (0.004 * $DataPoint_i$)

YZERO is in vertical units; in this example, 0.0 Volts.

YMULT is in vertical units per digitizing level (DL), in this example, 0.004 Volts per digitizing level.

From `CURVe` query:

$DataPoint_1$ = -10

$DataPoint_2$ = -11

$DataPoint_{1000} = 23$

$Y_1 = 0.0V + (0.004V/DL * -10DL) = –0.040V$

$Y_2 = 0.0V + (0.004V/DL * -11DL) = –0.044V$

$Y_{1000} = 0.0V + (0.004V/DL * 23DL) = 0.092V$

Further Explanation of the Digital Collection (MSO models only)

When the waveform source is set to DIGital using the `DATa:SOUrce` command, a `WFMOutpre?` and `CURVe?` query (or a `WAVFRM?` query) will return the Digital Collection data. The format and content of this data will depend upon the width that has been specified using the `DATa:WIDth` command, which can be either 4 or 8 bytes per point.

4 Byte Data. When the data width is set to 4 bytes (using either DATa:WIDth or WFMOutpre:BYT_Nr, the Digital Collection represents

- the states of digital channels D0 – D15,
- the digital representations of analog Channels 1 – 4, and
- the trigger state.

In this case, the Digital Collection data returned will be 32-bit packed integers, where each point is represented as follows. Note that the trigger state bit described below is only available when ACQuire:MAGnivu is 1 (on).

Table 2-36: Digital Collection: 4 Byte Data

Bit number	Description
31– 22	not used
21	trigger state
20	not used (always 1)
19	CH4 digital state
18	CH3 digital state
17	CH2 digital state
16	CH1 digital state
15	D15 state
...	
1	D1 state
0	D0 state

8 Byte Data. When the data width is set to 8 bytes, the Digital Collection represents

- the transition state information for digital channels D0 – D15 and
- the digital representations of analog Channels 1 – 4.

The "transition state" refers to MSB and LSB bits which together represent the state of the digital channel during the sampling period, as follows:

MSB	LSB	Transition/State
0	0	Low
0	1	High
1	0	Single transition
1	1	Multiple transitions

If the width specified using the DATa:WIDth command is 8 bytes, the Digital Collection data returned will be 64-bit packed integers, where each point is represented as follows:

Table 2-37: Digital Collection: 8 Byte Data

Bit Number	Description
63 — 52	not used
51	CH4 transition state MSB
50	CH3 transition state MSB
49	CH2 transition state MSB
48	CH1 transition state MSB
47	D15 transition state MSB
...	
33	D1 transition state MSB
32	D0 transition state MSB
31 — 20	not used
19	CH4 transition state LSB
18	CH3 transition state LSB
17	CH2 transition state LSB
16	CH1 transition state LSB
15	D15 transition state LSB
...	
1	D1 transition state LSB
0	D0 transition state LSB

For example, to find the transition state of the digital channel D0, set DATa:SOUrce to `DIGITAL` and DATa:WIDth to 8. Look at bits 0 and 32 in the data returned by the `CURVe?` or `WAVFrm?` queries, where bit 0 is the transition state LSB and bit 32 is the transition state MSB for D0.

Table 2-38: Waveform Transfer Commands

Command	Description
CURVe	The CURVe command transfers the waveform data points TO the oscilloscope's internal reference memory location (REF1–4), which is specified by the DATa:DESTination command. The CURVe? query transfers data FROM the oscilloscope; the source waveform is specified by the DATa:SOUrce command. The first and last data points are specified by the DATa:STARt and DATa:STOP commands. Associated with each waveform transferred using the CURVe command or query is a waveform preamble that provides the data format, scale and associated information needed to interpret the waveform data points. The preamble information for waveforms sent TO the oscilloscope is specified using the WFMInpre commands. The preamble information for waveforms transferred FROM the oscilloscope is specified or queried using the WFMOutpre commands. If the waveform is not displayed, the query form generates an error. The CURVe command and CURVe? query transfer waveform data in ASCII or binary format. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header immediately followed by the binary data.
DATa	These commands specify the format and location of waveform data that is transferred using the CURVe command, or return the format and location of the waveform data that is transferred with the CURVe? query. You can use the INIT argument to reset all of the DATa parameters to default values. (Note that the *RST and FACtory commands do not reset the DATa parameters.) You can use the SNap argument to automatically set the DATa:STARt and DATa:STOP values to the starting and stopping point of the waveform cursors (if on). Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.
DATa:DESTination	This command specifies the reference memory location (REF1–4) for storing waveform data transferred into the oscilloscope using the CURVe command.
DATa:ENCdg	This command specifies the encoding format for outgoing waveform data. This command is equivalent to setting WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or. Setting the DATa:ENGdg value causes the corresponding WFMOutpre values to be updated.
DATa:SOUrce	This command specifies the source waveform to be transferred from the oscilloscope using the CURVe? query. The valid waveform sources are CH1-CH4, MATH, REF1-REF4, D0-D15, and DIGital. Setting DATa:SOUrce automatically constrains the following to valid values for the specified source waveform: WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr and WFMOutpre:BN_Fmt.
DATa:STARt	This command specifies the starting data point for incoming or outgoing waveform transfer using the CURVe command or query. (Use DATa:STOP to specify the ending data point.) You can set the DATa:STARt and DATa:STOP values automatically to the starting and stopping points of the waveform cursors, if on, using DATa SNap. Note that setting DATa:STARt and DATa:STOP automatically sets WFMOutpre:NR_Pt.
DATa:STOP	This command specifies the final data point that will be transferred when using the CURVe command or query for incoming or outgoing waveform transfer. (UseDATa:STARt to specify the starting data point.)
DATa:WIDth	This command specifies the width, in bytes per point, for waveform data transferred from the scope via the CURVe? query. (This command is synonymous with WFMOutpre:BYT_Nr .) When the source isCH1-CH4, REF1-REF4, MATH or D0-D15, the default width is 1 byte.

Table 2-38: Waveform Transfer Commands (cont.)

Command	Description
WAVFrm?	This query returns the waveform preamble and the waveform data for the source waveform specified by the `DATa:SOUrce` command. This command is equivalent to sending both`WFMOutpre?` and `CURVe?`, with the additional provision that the response to `WAVFrm?` is guaranteed to provide a synchronized preamble and curve.
WFMInpre?	Returns the waveform formatting and scaling specifications to be applied to the next incoming `CURVe` command data.
WFMInpre:BIT_Nr	This command specifies the number of bits per data point in the waveform data to be sent to the oscilloscope using the `CURVe` command. Changing this value also changes the value of WFMInpre:BYT_Nr.
WFMInpre:BN_Fmt	This command specifies the format of the data for outgoing waveforms when `WFMInpre:ENCdg` is set to `BINary`. The format can either be RI (signed integer) or RP (positive integer).
WFMInpre:BYT_Nr	This command specifies the number of bytes per data point in the waveform data to be sent to the oscilloscope using the `CURVe` command. Changing this value also changes the value of WFMInpre:BIT_Nr.
WFMInpre:BYT_Or	This command specifies which byte of incoming binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMInpre:ENCdg is set to BINary and WFMInpre:BYT_Nr is 2.
WFMInpre:CENTERFREQuency	This command specifies the center frequency of an incoming RF trace. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.
WFMInpre:DOMain	This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns TIMe.
WFMInpre:ENCdg	This command specifies the type of encoding of the incoming waveform data to be sent to the oscilloscope using the `CURVe` command. Supported types are BINary and ASCii.
WFMInpre:NR_Pt	This command specifies the number of data points that are in the incoming waveform record to be sent to the oscilloscope using the `CURVe` command.
WFMInpre:PT_Fmt	This command specifies the format of the data points to be sent to the oscilloscope using the `CURVE` command. This can be Y for YT format, or ENV for envelope format (min/max pairs). Regardless of the argument used, the scale, offset, and so on are interpreted similarly. When ENV is used, waveform data is interpreted as min-max pairs (the minimum value precedes the maximum for each pair); when Y is used, it is interpreted over a single point.
WFMInpre:PT_Off	The set form of this command is ignored. The query form always returns a 0.
WFMInpre:REFLevel	This command specifies the Reference Level of the incoming waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.
WFMInpre:SPAN	This command specifies the frequency span of an incoming RF trace. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.
WFMInpre:WFMTYPe	This command specifies the type of waveform that is being transferred to the oscilloscope for storage in one of the REF1 — REF4 memory locations. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns ANALOG.

Table 2-38: Waveform Transfer Commands (cont.)

Command	Description
WFMInpre:XINcr	This command specifies the horizontal interval between incoming waveform points sent to the oscilloscope using the `CURVE` command. The units can be time, in seconds, or frequency, in hertz, and can be specified or queried using the `WFMInpre:XUNit` command.
WFMInpre:XUNit	This command specifies the horizontal units of the x-axis of the data points being sent to the oscilloscope using the `CURVE` command. This value can be in "s" or "Hz".
WFMInpre:XZEro	This command specifies the position value of the first data point in the incoming waveform record being sent to the oscilloscope using the `CURVE` command. The units are determined or queried using the `WFMInpre:XUNit` command and are typically time, in seconds, or frequency, in hertz. This time or frequency is relative to the time or frequency of the trigger, which is always 0. Thus, the XZEro value can be negative.
WFMInpre:YMUlt	This command specifies the vertical scale multiplying factor to be used to convert the incoming data point values being sent to the oscilloscope, from digitizing levels into the units specified by the `WFMInpre:YUNit` command. For one byte waveform data, there are 256 digitizing levels. For two byte waveform data there are 65,536 digitizing levels.
WFMInpre:YOFf	This command specifies the vertical position of the destination reference waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. Variations in this number are analogous to changing the vertical position of the waveform.
WFMInpre:YUNit	This command specifies the vertical units of data points in the incoming waveform record sent to the oscilloscope using the `CURVE` command. This can be any of several string values, depending upon the vertical units of the waveform being sent.
WFMInpre:YZEro	This command specifies the vertical offset of the destination reference waveform in units specified by the `WFMInpre:YUNit` command. Variations in this number are analogous to changing the vertical offset of the waveform. The `WFMInpre:YMUlt`, `WFMInpre:YOFf`, and `WFMInpre:YZEro` commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units).
WFMOutpre?	This query returns the information needed to interpret the waveform data points returned by the `CURVe?` query. It returns the waveform transmission and formatting parameters for the waveform specified by the DATa:SOUrce command.
WFMOutpre:BIT_Nr	This command specifies the number of bits per data point in the outgoing waveform being transferred using the `CURVe?` query. Changing the value of WFMOutpre:BIT_Nr also changes the values of WFMOutpre:BYT_Or and DATa:WIDth.
WFMOutpre:BN_Fmt	This command specifies the format of the binary data for outgoing waveforms when `WFMOutpre:ENCdg` is set to `BINary`. The format can be RI (signed integer) or RP (positive integer) for analog channels. Changing the value of WFMOutpre:BN_Fmt also changes the value of DATa:ENCdg. The waveform is specified by the DATa:SOUrce command.
WFMOutpre:BYT_Nr	This command specifies the data width for the outgoing waveform specified by the DATa:SOUrce command. (This command is synonymous with`DATa:WIDTH.)` Note that changing WFMOutpre:BYT_Nr also changes WFMOutpre:BIT_Nr and DATa:WIDth.
WFMOutpre:BYT_Or	This command specifies which byte of outgoing binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMOutpre:ENCdg is set to BINary and WFMOutpre:BYT_Nr is 2.

Table 2-38: Waveform Transfer Commands (cont.)

Command	Description
WFMOutpre:CENTERFREQuency?	This query returns the center frequency of an incoming waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.
WFMOutpre:DOMain?	This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns TIMe.
WFMOutpre:ENCdg	This command specifies the type of encoding (BINary or ASCii) of the outgoing waveform data queried using the `CURVe?` query. (This can also be set using the DATa:ENCdg command, which provides the ability to set `WFMOutpre:ENCdg`, `WFMOutpre:BN_Fmt`, and `WFMOutpre:BYT_Or` using a single command.)
WFMOutpre:NR_Pt?	This query returns the number of data points in the waveform record that will be transmitted in response to a `CURVe?` query. This value is the adjusted range specified by `DATA:START` and `DATA:STOP` commands. Note that the oscilloscope automatically adjusts the `DATA:START` and `DATA:STOP` values when the `DATA:STOP` value is less than the `DATA:START` value, and when the `DATA:START` and/or `DATA:STOP` value is greater than the record length of the source waveform. The adjusted `DATA:START` and `DATA:STOP` values determine `WFMOUTPRE:NR_PT`. (You can use `DATa:STARt` and `DATa:STOP` to transfer partial waveforms.) If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.
WFMOutpre:PT_Fmt?	This query returns the point format of the data points in the outgoing waveform record transferred using the `CURVe?` query. The returned values can be Y, which indicates normal waveform points for YT format, or ENV, which indicates envelope mode format in which the data is returned as a series of min/max pairs. The minimum value precedes the maximum. The outgoing waveform is specified by the DATa:SOUrce command. The query command will time out and an error will be generated if the waveform specified by DATa:SOUrce is not turned on.
WFMOutpre:PT_Off?	This query always returns 0 if the outgoing waveform specified by `DATA:SOUrce` is on or displayed.
WFMOutpre:PT_ORder?	This query returns the point ordering, which is always linear.
WFMOutpre:REFLEvel?	This query returns the Reference Level of an outgoing waveform. This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns 0.0000.
WFMOutpre:SPAN?	This query returns the frequency span of the outgoing waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.
WFMOutpre:WFId?	This query returns a string that describes several aspects of the acquisition parameters for the source waveform, including Source, Coupling, Vertical Scale, Horizontal Scale, Record Length and Acquisition Mode. If the waveform specified by DATa:SOUrce command is not turned on, an error will be generated.
WFMOutpre:WFMTYPe?	This query returns the type of the outgoing waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns ANALOG.
WFMOutpre:XINcr?	This query returns the horizontal point spacing in units of time (seconds), or frequency (hertz) between data points in the waveform record transferred using the `CURVe?` query. This value corresponds to the sampling interval.

Table 2-38: Waveform Transfer Commands (cont.)

Command	Description
WFMOutpre:XUNit?	This query indicates the horizontal units of the x-axis of the waveform record transferred using the `CURVe?` query. Typically, this value is "s" when the waveform source is displayed in the time domain, and "Hz" when the waveform source is displayed in the frequency domain. When the waveform source is Math or a reference waveform, the value can be "s" or "Hz".
WFMOutpre:XZEro?	This query returns the time coordinate, in seconds, or frequency, in hertz, of the first data point in the outgoing waveform record transferred using the `CURVe?` query. This time or frequency is relative to the time of the trigger, which is always 0. Thus, the XZEro time or frequency can be negative.
WFMOutpre:YMUlt?	This query returns the vertical scale multiplying factor used to convert the waveform data point values in the outgoing waveform record from digitizing levels to the YUNit units. You can determine the units by using the `WFMOutpre:YUNit` query. See the description of the WFMInpre:YMUlt command to see how this scale factor is used to convert waveform sample values to volts.
WFMOutpre:YOFf?	This query returns the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. See the description of WFMInpre:YOFf to see how this position is used to convert waveform sample values to volts.
WFMOutpre:YUNit?	This query returns the units of data points in the outgoing waveform record transferred using the `CURVe?` query. This can be any of several string values, depending upon the vertical units of the source waveform (specified by the DATa:SOUrce command). Typically, this is “V” for volts.
WFMOutpre:YZEro?	This query returns the vertical offset of the source waveform. You can determine the units using the WFMOutpre:YUNit? query. See the description of WFMInpre:YZEro to see how this offset is used to convert waveform sample values to volts.

Zoom Command Group

Use the commands in the Zoom Command Group to expand and position the waveform display horizontally, without changing the time base settings.

Table 2-39: Zoom Commands

Command	Description
ZOOm?	Returns the current horizontal positioning and scaling of the zoom display
ZOOm:MODe	Sets or returns the zoom mode
ZOOm:ZOOM<x>?	Returns the current horizontal positioning and scaling of the display. <x> can only be 1
ZOOm:ZOOM<x>:FACtor?	Returns the zoom factor of the zoom window. <x> can only be 1

Table 2-39: Zoom Commands (cont.)

Command	Description
ZOOm:ZOOM<x>:POSition	Sets or returns the horizontal position of the zoom window, in terms of 0 to 100.0% of the zoom window. <x> can only be 1
ZOOm:ZOOM<x>:SCAle	Sets or returns the horizontal scale of the zoom window. <x> can only be 1
ZOOm:ZOOM<x>:STATE	Specifies or returns a trace as zoomed, on or off. <x> can only be 1

Commands Listed in Alphabetical Order

ACQuire? (Query Only)

Returns the following current acquisition parameters:

- Stop after
- Acquisition state
- Mode
- Number of averages
- Sampling mode

Group Acquisition

Syntax

```
ACQuire?
```

Related Commands ACQuire:MODe, ACQuire:NUMACq?, ACQuire:NUMAVg, ACQuire:STOPAfter

ACQuire:MAGnivu

Sets or returns the MagniVu feature, which provides up to 32 times signal detail for fast viewing of short events. This feature is not recommended for slow data formats such as RS-232.

***NOTE.** MagniVu channel sampling is available on MSO oscilloscopes only.*

Group Acquisition

Syntax

```
ACQuire:MAGnivu {OFF|ON|0|1}
ACQuire:MAGnivu?
```

Arguments `OFF, 0` disables the MagniVu feature; any other value turns this feature on.

`ON, 1` enables the MagniVu feature.

ACQuire:MAXSamplerate? (Query Only)

Returns the maximum real-time sample rate, which varies from model to model.

Group Acquisition

Syntax

```
ACQuire:MAXSamplerate?
```

Examples `ACQUIRE:MAXSAMPLERATE?` might return 2.5000E+9 in a DPO3034 indicating the maximum real-time sample rate is 2.5GS/s.

ACQuire:MODe

Sets or returns the acquisition mode of the oscilloscope for all live waveforms.

Waveforms are the displayed data point values taken from acquisition intervals. Each acquisition interval represents a time duration set by the horizontal scale (time per division). The oscilloscope sampling system always samples at the maximum rate, so the acquisition interval may include than one sample.

The acquisition mode (which you set using this ACQuire:MODe command) determines how the final value of the acquisition interval is generated from the many data samples.

Group Acquisition

Syntax

```
ACQuire:MODe {SAMple|PEAKdetect|HIRes|AVErage|ENVelope}
ACQuire:MODe?
```

Related Commands ACQuire:NUMAVg, CURVe

Arguments

`SAMple` specifies that the displayed data point value is the first sampled value that is taken during the acquisition interval. In sample mode, all waveform data has 8 bits of precision. You can request 16 bit data with a CURVe query but the lower-order 8 bits of data will be zero. SAMple is the default mode.

`PEAKdetect` specifies the display of high-low range of the samples taken from a single waveform acquisition. The high-low range is displayed as a vertical column that extends from the highest to the lowest value sampled during the acquisition interval. PEAKdetect mode can reveal the presence of aliasing or narrow spikes.

`HIRes` specifies Hi Res mode where the displayed data point value is the average of all the samples taken during the acquisition interval. This is a form of averaging, where the average comes from a single waveform acquisition. The number of samples taken during the acquisition interval determines the number of data values that compose the average.

`AVErage` specifies averaging mode, in which the resulting waveform shows an average of SAMple data points from several separate waveform acquisitions. The oscilloscope processes the number of waveforms you specify into the acquired waveform, creating a running exponential average of the input signal. The number of waveform acquisitions that go into making up the average waveform is set or queried using the ACQuire:NUMAVg command.

`ENVelope` specifies envelope mode, where the resulting waveform shows the PEAKdetect range of data points from every waveform acquisition.

Examples

`ACQUIRE:MODE ENVELOPE` sets the acquisition mode to display a waveform that is an envelope of many individual waveform acquisitions.

`ACQUIRE:MODE?` might return`:ACQuire:MODe AVERAGE` indicating that the displayed waveform is the average of the specified number of waveform acquisitions.

ACQuire:NUMACq? (Query Only)

Returns the number of waveform acquisitions that have occurred since starting acquisition with the ACQuire:STATE:RUN command. This value is reset to zero when any acquisition, horizontal, or vertical arguments that affect the waveform are changed. The maximum number of acquisitions that can be counted is 2^{32} 1.

Group

Acquisition

Syntax

`ACQuire:NUMACq?`

Related Commands

ACQuire:STATE

Returns

`ACQuire:NUMACq?` might return `:ACQUIRE:NUMACQ 350` indicating that 350 acquisitions have occurred since executing an ACQuire:STATE RUN command.

ACQuire:NUMAVg

Sets or returns the number of waveform acquisitions that make up an averaged waveform. Use the ACQuire:MODe command to enable the Average mode. Sending this command is equivalent to turning a multipurpose knob to enter the number of waveform acquisitions to average.

Group Acquisition

Syntax

```
ACQuire:NUMAVg <NR1>
ACQuire:NUMAVg?
```

Related Commands ACQuire:MODe

Arguments `<NR1>` is the number of waveform acquisitions to average. The range of values is from 2 to 512 in powers of two.

Examples `ACQUIRE:NUMAVG 16` specifies that 16 waveform averages will be performed before exponential averaging starts.

`ACQUIRE:NUMAVG?` might return `:ACQUIRE:NUMAVG 64` indicating that there are 64 acquisitions specified for averaging.

ACQuire:NUMEnv

This command controls the number of envelopes (when acquisition mode has been set to ENVelope using ACQuire:MODe). The number of envelopes can be set from 1 to 2000 in increments of 1, or to INFInite. Setting the value to a number greater than 2000 sets the number of envelopes to INFInite.

Group Acquisition

Syntax

```
ACQuire:NUMEnv {<NR1>|INFInite}
ACQuire:NUMEnv?
```

Related Commands ACQuire:MODe, ACQuire:STATE

Arguments `<NR1>` is an integer that specifies the number of envelopes to use when the acquisition mode has been set to ENVelope.

`INFInite` specifies to use an infinite number of envelopes.

Examples `ACQuire:NUMEnv` 22 sets the number of envelopes to 22.

`ACQuire:NUMEnv?` returns the number of envelopes that has been specified, either an integer or INFINITE.

ACQuire:STATE

Starts or stops acquisitions. When state is set to ON or RUN, a new acquisition will be started. If the last acquisition was a single acquisition sequence, a new single sequence acquisition will be started. If the last acquisition was continuous, a new continuous acquisition will be started.

If RUN is issued in the middle of completing a single sequence acquisition (for example, averaging or enveloping), the acquisition sequence is restarted, and any accumulated data is discarded. Also, the oscilloscope resets the number of acquisitions. If the RUN argument is issued while in continuous mode, acquisition continues.

Group Acquisition

Syntax

```
ACQuire:STATE {OFF|ON|RUN|STOP|<NR1>}
ACQuire:STATE?
```

Related Commands ACQuire:STOPAfter

Arguments

`OFF` stops acquisitions.

`STOP` stops acquisitions.

`ON` starts acquisitions.

`RUN` starts acquisitions.

`<NR1>` = 0 stops acquisitions; any other value starts acquisitions.

Examples

`ACQUIRE:STATE RUN` starts the acquisition of waveform data and resets the count of the number of acquisitions.

`ACQUIRE:STATE?` might return:`ACQUIRE:STATE 0` indicating that the acquisition is stopped.

ACQuire:STOPAfter

Sets or returns whether the oscilloscope continually acquires acquisitions or acquires a single sequence.

Group Acquisition

Syntax

```
ACQuire:STOPAfter {RUNSTop|SEQuence}
ACQuire:STOPAfter?
```

Related Commands

ACQuire:STATE

Arguments

`RUNSTop` specifies that the oscilloscope will continually acquire data, if ACQuire:STATE is turned on.

`SEQuence` specifies that the next acquisition will be a single-sequence acquisition.

Examples

`ACQUIRE:STOPAFTER RUnSTOP` sets the oscilloscope to continually acquire data.

`ACQUIRE:STOPAFTER?` might return`:ACQUIRE:STOPAFTER SEQUENCE` indicating that the next acquisition the oscilloscope makes will be of the single-sequence type.

ALIas

Sets or returns the state of alias functionality. Use Alias commands to define new commands as a sequence of standard commands. You may find this useful when repeatedly using the same commands to perform certain tasks like setting up measurements. Aliases are similar to macros but do not include the capability to substitute parameters into alias bodies.

To use Alias commands, first define the alias, then turn on the alias state.

Group

Alias

Syntax

```
ALIas {OFF|ON|<NR1>}
ALIas?
```

Related Commands

ALIas:DEFine

ALIas[:STATE]

Arguments

`OFF` turns alias expansion off. If a defined alias is sent when ALIas is off, a command error (110) will be generated.

`ON` turns alias expansion on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.

`<NR1>` = 0 disables alias mode; any other value enables alias mode.

Examples

`ALIAS ON` turns the alias feature on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.

`ALIAS?` might return `:ALIAS 1` indicating that the alias feature is on.

ALIas:CATalog? (Query Only)

Returns a list of the currently defined alias labels, separated by commas. If no aliases are defined, the query returns the string "".

Group

Alias

Syntax

```
ALIas:CATalog?
```

Examples

`ALIAS:CATALOG?` might return the string `:ALIAS:CATALOG "SETUP1","TESTMENU1","DEFAULT"` showing that there are three aliases named SETUP1, TESTMENU1, and DEFAULT.

ALIas:DEFine

Assigns a sequence of program messages to an alias label. These messages are then substituted for the alias whenever it is received as a command or query, provided that ALIas:STATE has been turned on. The query form of this command returns the definitions of a selected alias.

NOTE. *Attempting to give two aliases the same name causes an error. To give a new alias the name of an existing alias, the existing alias must first be deleted.*

Group

Alias

Syntax

```
ALIas:DEFine <QString><,>{<QString>|<Block>}
ALIas:DEFine?  <QString>
```

Related Commands

ALIas[:STATE]

Arguments

The first `<QString>` is the alias label.

This label cannot be a command name. Labels must start with a letter and can contain only letters, numbers, and underscores; other characters are not allowed. The label must be less than or equal to 12 characters.

The second`<QString>` or `<Block>` is a complete sequence of program messages.

The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 256 characters.

Examples

`ALIAS:DEFINE "ST1",":RECALL:SETUP 5;:AUTOSET EXECUTE;:SELECT:CH1 ON"` defines an alias named "ST1" that sets up the oscilloscope.

`ALIAS:DEFINE? "ST1"` returns `:ALIAS:DEFINE "ST1",#246 :RECALL:SETUP 5;:AUTOSET EXECUTE;:SELECT:CH1 ON`

ALIas:DELEte (No Query Form)

Removes a specified alias and is identical to ALIas:DELEte:NAMe. An error message is generated if the named alias does not exist.

Group

Alias

Syntax

```
ALIas:DELEte <QString>
```

Related Commands

*ESR?, ALIas:DELEte:ALL

Arguments

`<QString>` is the name of the alias to be removed. Using `ALIas:DELEte` without specifying an alias causes an execution error. `<QString>` must be a previously defined value.

Examples

`ALIAS:DELETE "SETUP1"` deletes the alias named SETUP1.

ALIas:DELEte:ALL (No Query Form)

Deletes all existing aliases.

Group

Alias

Syntax

```
ALIas:DELEte:ALL
```

Related Commands

ALIas:DELEte, ALIas:DELEte[:NAMe]

Examples ALIAS:DELETE:ALL deletes all existing aliases.

ALIas:DELEte[:NAMe] (No Query Form)

Removes a specified alias. This command is identical to ALIas:DELEte

Group Alias

Syntax ALIas:DELEte[:NAMe] <QString>

Arguments <QString> is the name of the alias to remove. Using ALIas:DELEte[:NAMe] without specifying an alias causes an execution error. <QString> must be an existing alias.

Examples ALIAS:DELETE[:NAME] "STARTUP" deletes the alias named STARTUP.

ALIas[:STATE]

Turns aliases on or off. This command is identical to the ALIas command.

Group Alias

Syntax

```
ALIas[:STATE] {<NR1>|OFF|ON}
ALIas[:STATE]?
```

Arguments OFF or <NR1> = 0 turns alias expansion off. If a defined alias is sent when ALIas:STATE is OFF, a command error (102) is generated.

ON or <NR1>0 turns alias expansion on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.

Examples ALIAS[:STATE] OFF turns the command alias feature off.

ALIAS[:STATE]? returns 0 when the alias feature is off.

ALLEv? (Query Only)

Prompts the oscilloscope to return all events and their messages (delimited by commas), and removes the returned events from the Event Queue. Use the *ESR?

query to enable the events to be returned. This command is similar to repeatedly sending *EVMsg? queries to the oscilloscope.

Group
Status and Error

Syntax
`ALLEv?`

Related Commands
*ESR?, EVMsg?

Examples
`ALLEV?` might return `:ALLEV 2225, "Measurement error, No waveform to measure; "420, "Query UNTERMINATED;"`

APPLication:LICENSE:SLOT<x>:LOCation? (Query Only)

This query returns the application license location. < x> can be slot number 1–4.

NOTE. *In order to use many of the advanced oscilloscope features, you must purchase an application module license. The module can be inserted into any of the four application module slots in the oscilloscope. However, more than four concurrent applications can be supported at the same time even though there are only four slots. The license can be transferred from the physical application module to an internal location in the oscilloscope, enabling the simultaneous use of more than four.*

Group
Miscellaneous

Syntax
`APPLication:LICENSE:SLOT<x>:LOCation?`

Related Commands
APPLication:LICENSE:SLOT<x>:TRANSFER,

APPLication:LICENSE:SLOT<x>:TYPe?

Returns
`SCOPE` - The application license has been transferred to the oscilloscope and is active internally within the scope.

`MODULE` - The application license is in the module and has not been transferred to the scope.

`BOTH` - The application license is in the module and the license from another application module of the same type has already been transferred to the scope.

`NEITHER` - The application license is neither in the module nor in the scope's internal memory. (In this situation, the license must have been transferred to a different oscilloscope.)

`NONE` - There is no application module in the slot.

Examples `APPLication:LICENSE:SLOT1:LOCation?` might return SCOPE, indicating that the license is active internally within the scope.

APPLication:LICENSE:SLOT<x>:TRANSFER (No Query Form)

You can use this command to transfer an application license from the module to internal memory in the oscilloscope, and transfer it back. When a license has been transferred to the oscilloscope, the module can be removed from the slot, thereby freeing up the slot for another application module to be inserted.

Once the license has been transferred from the module to internal memory, the license is no longer present in the module and the module cannot be used to enable the application. The license can be transferred back to the module from the oscilloscope's internal memory. < x> can be slot number 1–4.

NOTE. *In order to use many of the advanced oscilloscope features, you must purchase an application module license. The module can be inserted into any of the four application module slots in the oscilloscope. However, more than four concurrent applications can be supported at the same time even though there are only four slots.*

Conditions If the application license currently resides in the module and the license does not also reside in the scope, it is transferred to the scope and the license is no longer in the module.

If the application license currently resides in the scope and the license does not also reside in the module, the license is transferred from the scope to the module.

If the application module slot is empty, an error event is posted to the event queue so indicating and no operation is performed.

If the application license resides in both the scope and the module, an error event is posted to the event queue so indicating and no operation is performed.

If the application license resides in neither the scope nor the module, an error event is posted to the event queue so indicating and no operation is performed.

Group Miscellaneous

Syntax `APPLication:LICENSE:SLOT<x>:TRANSFER EXECute`

Related Commands APPLication:LICENSE:SLOT<x>:LOCation?,

APPLication:LICENSE:SLOT<x>:TYPe?

APPLication:LICENSE:SLOT<x>:TYPe? (Query Only)

This query returns the application license type of the module that is currently inserted in the specified application module slot. If there is no application module in the slot, `NONE` is returned. < x> can be slot number 1–4.

***NOTE.** In order to use many of the advanced oscilloscope features, you must purchase an application module license. The module can be inserted into any of the four application module slots in the oscilloscope. However, more than four concurrent applications can be supported at the same time even though there are only four slots.*

Group Miscellaneous

Syntax `APPLication:LICENSE:SLOT<x>:TYPe?`

Related Commands APPLication:LICENSE:SLOT<x>:TRANSFER,

APPLication:LICENSE:SLOT<x>:LOCation?

Examples `APPLication:MODule:SLOT1:TYPe?` might return `DPO3FLEX`, indicating that the DPO3FLEX license is installed in slot 1.

AUTOSet (No Query Form)

Sets the vertical, horizontal, and trigger controls of the oscilloscope to automatically acquire and display the selected waveform.

Group Miscellaneous

Syntax `AUTOSet {EXECute|UNDo}`

Arguments

`EXECute` autosets the displayed waveform.

`UNDo` restores the oscilloscope settings to those present prior to the autoset execution.

Examples

`AUTOSET EXECUTE` vertical, horizontal, and trigger controls of the oscilloscope to automatically acquire and display the selected waveform.

AUTOSet:ENAble

Enables or disables the autoset feature. This is useful for classroom purposes where the instructor wants the students to achieve the desired instrument settings without the benefit of the autoset feature. This setting is not saved in setup files or SET? or *LRN? queries. The default state is 1 (autoset enabled).

Group

Miscellaneous

Syntax

```
AUTOSet:ENAble {OFF|ON|0|1}
AUTOSet:ENAble?
```

Arguments

`OFF or 0` disables autoset.

`ON or 1` enables autoset.

Examples

`AUTOSET:ENABLE 1` enables the front-panel **Autoset** button.

`AUTOSET:ENABLE`? might return `AUTOSET:ENABLE 0` indicating that the autoset feature is disabled.

AUXin? (Query Only)

Returns all auxiliary input parameters.

Group

Vertical

Syntax

```
AUXin?
```

AUXin:PRObe

Returns all information concerning the probe attached to auxilary input.

Group Vertical

Syntax
```
AUXin:PRObe
AUXin:PRObe?
```

Examples `AUXIN:PROBE?` might return `AUXIN:PROBE:ID:TYPE "No Probe Detected";SERNUMBER "";:AUXIN:PROBE:UNITS "";RESISTANCE 1.0000E+6` giving information about the probe attached to the AUX In input.

AUXin:PRObe:AUTOZero (No Query Form)

Sets the TekVPI probe attached to the Aux In input to autozero. The oscilloscope will ignore this command if the Auxiliary input does not have a TekVPI probe connected to it.

Group Vertical

Syntax
```
AUXin:PRObe:AUTOZero {EXECute}
```

Arguments `EXECute` sets the probe to autozero.

Examples
```
AUXin:PROBE:AUTOZERO EXECUTE
```

AUXin:PRObe:COMMAND (No Query Form)

Sets the state of the probe control specified with the first argument to the state specified with the second argument. The commands and states are unique to the attached probe type. Only certain VPI probes support this command. See the probe documentation for how to set these string arguments.

Group Vertical

Syntax
```
AUXin:PRObe:COMMAND <QString>, <QString>
```

Arguments `<QString>` are quoted strings specifying the probe command and value to set in the probe attached to the auxiliary input.

Examples `AUXIN:PROBE:COMMAND “OUTPUT”, “ON”` turns the output of a Tektronix VPI-DPG probe on.

`AUXIN:PROBE:COMMAND “MODE”, “4–4V1MHz”` sets a Tektronix VPI-DPG probe to the 4-4V1MHz mode.

`AUXIN:PROBE:COMMAND?“MODE”` might return `AUXIN:PROBE:COMMAND “MODE”,“4-4V1MHZ”`.

AUXin:PRObe:DEGAUss (No Query Form)

Starts a degauss/autozero cycle on a TekVPI current probe attached to the Aux In input. If you send this command to a probe that does not support this function, it is ignored.

Group Vertical

Syntax `AUXin:PRObe:DEGAUss {EXECute}`

Arguments `EXECute` starts a probe degauss cycle.

Examples `AUXin:PROBE:DEGAUSS EXECUTE` degausses the probe attached to the Aux In input.

AUXin:PRObe:DEGAUss:STATE? (Query Only)

Returns the state of the probe degauss (`NEEDED`, `RECOMMENDED`, `PASSED`, `FAILED`, `RUNNING`). The command will return `PASSED` for probes that do not support degauss operations.

Group Vertical

Syntax `AUXin:PRObe:DEGAUss:STATE?`

Examples `AUXin:PROBE:DEGAUSS:STATE?` might return:
`AUXin:PROBE:DEGAUSS:STATE PASSED` indicating that the probe has been degaussed.

AUXin:PRObe:FORCEDRange

Changes or returns the range on a TekVPI probe attached to the Aux In input.

Group Vertical

Syntax
```
AUXin:PRObe:FORCEDRange <NR3>
AUXin:PRObe:FORCEDRange?
```

Arguments `<NR3>` is the probe range, which is probe dependent.

AUXin:PRObe:GAIN

Sets or returns the gain factor of a probe that is attached to the Aux In input.

Group Vertical

Syntax
```
AUXin:PRObe:GAIN <NR3>
AUXin:PRObe:GAIN?
```

Arguments `<NR3>` is the probe gain, which is probe dependent.

Examples `AUXin:PROBE:GAIN?` might return `:AUXin:PROBE:GAIN 100.0000E-3` indicating that the attached 10x probe delivers 0.1 V to the Aux In BNC for every 1.0 V applied to the probe input.

AUXin:PRObe:ID:SERnumber? (Query Only)

Returns the serial number of the probe that is attached to the auxiliary input.

Group Vertical

Syntax
```
AUXin:PRObe:ID:SERnumber?
```

AUXin:PRObe:ID:TYPE? (Query Only)

Returns the type of probe that is attached to the auxiliary input.

Group Vertical

Syntax `AUXin:PRObe:ID:TYPE?`

AUXin:PRObe:RESistance? (Query Only)

Returns the resistance of the probe attached to the front panel Aux In connector.

Group Vertical

Syntax `AUXin:PRObe:RESistance?`

Examples `AUXin:PRObe:RESistance?` might return `:AUXin:PROBE:RESISTANCE 1.0000E+6` indicating that the input resistance of the probe attached to the front panel Aux In connector is 1 MΩ.

NOTE. *This query will return 0.0 if no probe is attached or the attached probe does not report the input resistance.*

AUXin:PRObe:SIGnal

This command changes the input bypass setting on VPI probes that support input bypass, for example the TCP0001. If sent to a probe that does not support input bypass, it is ignored.

Group Vertical

Syntax `AUXin:PRObe:SIGnal {BYPass|PASS}`
`AUXin:PRObe:SIGnal?`

Arguments `ByPass` sets the probe to Bypass mode.

`PASS` sets the probe to Pass mode.

AUXin:PRObe:UNIts? (Query Only)

Returns a string describing the units of measure of the probe attached to the Aux In input.

Group Vertical

Syntax `AUXin:PRObe:UNIts?`

Examples `AUXin:PROBE:UNITS?` might return `:AUXin:PROBE:UNITS "V"` indicating that the units of measure for the attached probe are volts.

BUS?

Returns the parameters for each bus. These parameters affect either the Serial Trigger Setup or the Bus Display.

Conditions This command requires a DPO3AUTO, DPO3EMBD, or DPO3COMP application module.

Group Bus

Syntax `BUS`

BUS:B<x>:AUDio:BITDelay

Sets or returns the number of delay bits for the AUDIO bus.

NOTE. *This command is applicable only for TDM audio bus type (`BUS:B<x>AUDio:TYPe TDM`)*

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax
```
BUS:B<x>:AUDio:BITDelay <NR1>
BUS:B<x>:AUDio:BITDelay?
```

Arguments `<NR1>` specifies the number of delay bits.

Examples

BUS:B1:AUDIO:BITDELAY 2 sets the bit delay to 2.

BUS:B1:AUDIO:BITDELAY? might return :BUS:B1:AUDIO:BITDELAY 1 indicating that the number of delay bits is 1.

BUS:B<x>:AUDio:BITOrder

Sets or returns the bit order for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:BITOrder {MSB|LSB}
BUS:B<x>:AUDio:BITOrder?
```

Arguments

MSB specifies that the most significant bit will be expected first in the order.

LSB specifies that the least significant bit will be expected first in the order.

Examples

BUS:B1:AUDIO:BITORDER LSB sets the bit order to LSB.

BUS:B1:AUDIO:BITORDER? might return :BUS:B1:AUDIO:BITORDER MSB indicating that the MSB is first in the bit order.

BUS:B<x>:AUDio:CHANnel:SIZe

Sets or returns the number of bits per channel for the AUDIO bus.

NOTE. *This command is applicable only for TDM audio bus type (BUS:B<x>AUDio:TYPe TDM)*

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:CHANnel:SIZe <NR1>
BUS:B<x>:AUDio:CHANnel:SIZe?
```

Arguments

<NR1> specifies the number of bits per channel.

Examples

`BUS:B1:AUDIO:CHANNEL:SIZE 8` sets the number of bits per channel to 8.

`BUS:B1:AUDIO:CHANNEL:SIZE?` might return `:BUS:B1:AUDIO:CHANNEL:SIZe 24` indicating that the number of bits per channel is 24.

BUS:B<x>:AUDio:CLOCk:POLarity

Sets or returns the clock polarity for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:CLOCk:POLarity {FALL|RISe}
BUS:B<x>:AUDio:CLOCk:POLarity?
```

Arguments

`FALL` sets falling edge as the clock polarity.

`RISe` sets rising edge as the clock polarity.

Examples

`BUS:B1:AUDIO:CLOCK:POLARITY Fall` sets the clock polarity to Fall.

`BUS:B1:AUDIO:CLOCK:POLARITY?` might return `:BUS:B1:AUDIO:CLOCK:POLARITY RISe` indicating that the clock polarity is set to Rise.

BUS:B<x>:AUDio:CLOCk:SOUrce

Sets or returns the clock source waveform for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:CLOCk:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:AUDio:CLOCk:SOUrce?
```

Arguments

`CH1–Ch4 or D0–D15` specifies the clock source for the audio bus.

Examples

`BUS:B1:AUDIO:CLOCK:SOURCE D1` sets D1 as the clock source for the audio bus.

`BUS:B1:AUDIO:CLOCK:SOURCE?` might return `:BUS:B1:AUDIO:CLOCK:SOURCE CH1` indicating that the clock source is set to CH1.

BUS:B<x>:AUDio:DATa:POLarity

Sets or returns the data polarity for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:DATa:POLarity {NORMal|INVERTed}
BUS:B<x>:AUDio:DATa:POLarity?
```

Arguments

`NORMal` specifies positive data polarity for the audio bus.

`INVERTed` specifies negative data polarity for the audio bus.

Examples

`BUS:B1:AUDIO:DATA:POLARITY INVERTed` sets the data polarity to Inverted.

`BUS:B1:AUDIO:DATA:POLARITY?` might return `:BUS:B1:AUDIO:DATA:POLARITY NORMAL` indicating that the data polarity is set to Normal.

BUS:B<x>:AUDio:DATa:SIZe

Sets or returns the number of bits per word for the AUDIO bus.

NOTE. *The number of bits specified for this command must be always less than or equal to the number of bits per channel (BUS:B<x>:AUDio:CHANnel:SIZe)*

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:DATa:SIZe <NR1>
BUS:B<x>:AUDio:DATa:SIZe?
```

Arguments

`NR1` specifies the number of bits per word.

Examples

`BUS:B1:AUDIO:DATA:SIZE 8` sets the number of bits per word to 8.

`BUS:B1:AUDIO:DATA:SIZE?` might return `:BUS:B1:AUDIO:DATA:SIZE 24` indicating that the number of bits per word is set to 24.

BUS:B<x>:AUDio:DATa:SOUrce

Sets or returns the data source waveform for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:DATa:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:AUDio:DATa:SOUrce?
```

Arguments

`CH1–Ch4 or D0–D15` specifies the channel to use for data source for the audio bus.

Examples

`BUS:B1:AUDIO:DATA:SOURCE D1` sets the data source to D1.

`BUS:B1:AUDIO:DATA:SOURCE?` might return `:BUS:B1:AUDIO:DATA:SOURCE CH3` indicating that the data source is set to CH3.

BUS:B<x>:AUDio:DISplay:FORMat

Sets or returns the display format for the AUDIO bus.

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:DISplay:FORMat
{BINary|HEXadecimal|SIGNEDDECimal}
BUS:B<x>:AUDio:DISplay:FORMat?
```

Arguments

`BINary` specifies a binary data display.

`HEXadecimal` specifies a hexadecimal data display.

`SIGNEDDECimal` specifies a signed decimal data display.

Examples

`BUS:B1:AUDIO:DISPLAY:FORMAT BINARY` sets the display format to Binary.

`BUS:B1:AUDIO:DISPLAY:FORMAT?` might return `:BUS:B1:AUDIO:DISPLAY:FORMAT SIGNEDDECIMAL` indicating that the display format is set to signed decimal.

BUS:B<x>:AUDio:FRAME:SIZe

Sets or returns the number of channels in each frame for the AUDIO bus.

NOTE. *This command is applicable only for TDM audio bus type (`BUS:B<x>AUDio:TYPe TDM`)*

Conditions

This command requires a DPO3AUDIO application module.

Group

Bus

Syntax

```
BUS:B<x>:AUDio:FRAME:SIZe <NR1>
BUS:B<x>:AUDio:FRAME:SIZe?
```

Arguments

`<NR1>` specifies the number of channels in each frame.

Examples

`BUS:B1:AUDIO:FRAME:SIZE 2` sets the frame size to 2.

`BUS:B1:AUDIO:FRAME:SIZE?` might return `:BUS:B1:AUDIO:FRAME:SIZE 8` indicating that the number of channels in each frame is set to 8.

BUS:B<x>:AUDio:FRAMESync:POLarity

Sets or returns the frame sync polarity for the AUDIO bus.

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax

```
BUS:B<x>:AUDio:FRAMESync:POLarity {FALL|RISe}
BUS:B<x>:AUDio:FRAMESync:POLarity?
```

Arguments `FALL` specifies the falling edge as the frame sync polarity.

`RISe` specifies the rising edge as the frame sync polarity.

Examples `BUS:B1:AUDIO:FRAMESYNC:POLARITY FALL` sets the falling edge for frame sync polarity.

`BUS:B1:AUDIO:FRAMESYNC:POLARITY?` might return `:BUS:B1:AUDIO:FRAMESYNC:POLARITY RISe` indicating that the polarity is set to Rise.

BUS:B<x>:AUDio:FRAMESync:SOUrce

Sets or returns the frame sync source waveform for the AUDIO bus.

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax

```
BUS:B<x>:AUDio:FRAMESync:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:AUDio:FRAMESync:SOUrce?
```

Arguments `CH1–CH4 or D0–D15` specifies the channel to use as the frame sync source.

Examples `BUS:B1:AUDIO:FRAMESYNC:SOURCE CH1` sets CH1 as the frame sync source.

`BUS:B1:AUDIO:FRAMESYNC:SOURCE?` might return `:BUS:B1:AUDIO:FRAMESYNC:SOURCE Ch2` indicating that the source is set to Ch2.

BUS:B<x>:AUDio:TYPe

Sets or returns the audio format (type) for the AUDIO bus.

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax

```
BUS:B<x>:AUDio:TYPe {I2S|LJ|RJ|TDM}
BUS:B<x>:AUDio:TYPe?
```

Arguments

`I2S` specifies I^2S audio format.

`LJ` specifies left-justified audio format.

`RJ` specifies right justified audio format.

`TDM` specifies time-division multiplexing audio format.

Examples

`BUS:B1:AUDIO:TYPE RJ` sets right-justified as the audio format.

`BUS:B1:AUDIO:TYPE?` might return `:BUS:B1:AUDIO:TYPE I2S` indicating that the audio format is set to I^2S.

BUS:B<x>:AUDio:WORDSel:POLarity

Sets or returns the word select polarity for the AUDIO bus.

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax

```
BUS:B<x>:AUDio:WORDSel:POLarity {NORMal|INVERTed}
BUS:B<x>:AUDio:WORDSel:POLarity?
```

Arguments

`NORMal` specifies positive WORDSel polarity.

`INVERTed` specifies negative WORDSel polarity.

Examples

`BUS:B1:AUDIO:WORDSEL:POLARITY NORMal` sets normal as the word select polarity.

`BUS:B1:AUDIO:WORDSEl:POLARITY?` might return `:BUS:B1:AUDIO:WORDSEL:POLARITY NORMAL` indicating that the word select polarity is set to normal.

BUS:B<x>:AUDio:WORDSel:SOUrce

Sets or returns the word select source waveform for the AUDIO bus.

Conditions This command requires a DPO3AUDIO application module.

Group Bus

Syntax

```
BUS:B<x>:AUDio:WORDSel:SOUrce {CH1|CH2|CH3|CH4
|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:AUDio:WORDSel:SOUrce?
```

Arguments `CH1–CH4` specifies the channel to use as the word select source.

`D0-D15` specifies the digital channel to use as the word select source.

Examples `BUS:B1:AUDIO:WORDSEL:SOURCE CH1` sets CH1 as the word select source.

`BUS:B1:AUDIO:WORDSEL:SOURCE?` might return `:BUS:B1:AUDIO:WORDSEL:SOURCE CH2` indicating that the word select source is set to CH2.

BUS:B<x>:CAN:BITRate

Sets or returns the bit rate for CAN bus <x>, where x is the bus number.

Conditions This command requires a DPO3AUTO application module.

Group Bus

Syntax

```
BUS:B<x>:CAN:BITRate
<NR1>|{RATE10K|RATE20K|RATE33K|RATE37K|RATE50K|RATE62K|
RATE83K|RATE92K|RATE100K|RATE125K|RATE250K|RATE500K|
RATE800K|RATE1M}
BUS:B<x>:CAN:BITRate?
```

Arguments

<NR1> sets the bit rate to the closest bit rate supported by the instrument.

RATE10K sets the bit rate to 10 kbps.

RATE20K sets the bit rate to 20 kbps.

RATE33K sets the bit rate to 33 kbps.

RATE37K sets the bit rate to 37 kbps.

RATE50K sets the bit rate to 50 kbps.

RATE62K sets the bit rate to 62 kbps.

RATE83K sets the bit rate to 83 kbps.

RATE97K sets the bit rate to 97 kbps.

RATE100K sets the bit rate to 100 kbps.

RATE125K sets the bit rate to 125 kbps.

RATE250K sets the bit rate to 250 kbps.

RATE500K sets the bit rate to 500 kbps.

RATE800K sets the bit rate to 800 kbps.

RATE1M sets the bit rate to 1 Mbps.

Returns

The query always returns the numerical bit rate value.

Examples

`bus:b1:can:bitrate rate400k` sets the CAN bit rate to 400K.

`bus:b1:can:bitrate?` might return `:BUS:B1:CAN:BITRATE RATE800K` indicating the bit rate is set to 800K.

BUS:B<x>:CAN:PRObe

Sets or returns the probing method to probe CAN bus <x>, where x is the bus number.

Conditions

This command requires a DPO3AUTO application module.

Group

Bus

Syntax

```
BUS:B<x>:CAN:PRObe {CANH|CANL|RX|TX|DIFFerential}
BUS:B<x>:CAN:PRObe?
```

Arguments `CANH` specifies the single-ended CANH signal, as specified by the CAN standard.

`CANL` specifies the single-ended CANL signal, as specified by the CAN standard.

`RX` specifies the receive signal on the bus side of the CAN transceiver.

`TX` specifies the transmit signal.

`DIFFerential` specifies the differential CAN signal.

BUS:B<x>:CAN:SAMPLEpoint

Sets or returns the sampling point during each bit period for bus <x>, where x is the bus number.

Conditions This command requires a DPO3AUTO application module.

Group Bus

Syntax

```
BUS:B<x>:CAN:SAMPLEpoint <NR1>
BUS:B<x>:CAN:SAMPLEpoint?
```

Arguments `<NR1>` is the sample point in percent. Values are limited to 25, 30, ... 70, 75.

BUS:B<x>:CAN:SOUrce

Sets or returns the CAN bus data source for bus <x>, where x is the bus number.

Conditions This command requires a DPO3AUTO application module.

Group Bus

Syntax

```
BUS:B<x>:CAN:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}

BUS:B<x>:CAN:SOUrce?
```

Arguments `CH1–CH4` is the analog channel to use as the data source.

`D0–D15` is the digital channel to use as the data source.

BUS:B<x>:DISplay:FORMAt

Sets or returns the display format for the numerical information in the bus waveform <x>, where x is the bus number.

Table 2-40: Supported display formats

Bus type	Display format
Audio	BINary | HEXadecimal | ASCII | SIGNEDDECimal [1]
CAN	BINary | HEXadecimal
FlexRay	BINary | HEXadecimal | MIXed
I²C	BINary | HEXadecimal
LIN	BINary | HEXadecimal | MiXed
MIL-STD-1553	BINary | HEXadecimal | ASCII|MIXed|BLOCKHEX
Parallel	BINary | HEXadecimal
RS232C	BINary | HEXadecimal | ASCII
SPI	BINary | HEXadecimal

1 SIGNEDDECimal is set using the audio application BUS:B<x>:AUDio:DISplay:FORMat command.

Conditions

This command requires the application module appropriate for the bus. (See page 2-13, *Bus Command Group*.)

Group

Bus

Syntax

```
BUS:B<x>:DISplay:FORMAt
{BINary|HEXadecimal|ASCII|MIXed|BLOCKHEX}
```

```
BUS:B<x>:DISplay:FORMAt?
```

Related Commands

BUS:B<x>:TYPE

Arguments

`BINary` – All values are displayed in binary.

`HEXadecimal` – All values are displayed in hexadecimal.

`ASCII` – All values are displayed in an ASCII format, for RS-232 only.

`MIXed` – Values are displayed in a mixture of hexadecimal, binary, and decimal, depending on the field.

`BLOCKHEX` – Displays the 16-bits of each payload as a block of 4 hexadecimal digits.

BUS:B<x>:DISplay:TYPe

Sets or returns the display type for bus <x>, where x is the bus number. You can set up the bus to display the protocol information, the logic waveforms that comprise the bus, or both.

Group Bus

Syntax

```
BUS:B<x>:DISplay:TYPe {BUS|BOTh}
BUS:B<x>:DISplay:TYPe?
```

Arguments `BUS` displays the bus waveforms only.

`BOTh` displays both the bus and logic waveforms.

BUS:B<x>:FLEXray:BITRate

Specifies the bit rate for FlexRay. The maximum bitrate is 100 Mbps.`B<x>` is the serial bus number, which can be 1–4.

Conditions This command requires a DPO3FLEX application module.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:BITRate <NR1>
BUS:B<x>:FLEXray:BITRate?
```

Arguments `<NR1>` specifies the FlexRay bit rate. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

Examples `BUS:B1:FLEXRAY:BITRATE 9600` sets the FlexRay bit rate to 9600 bits per second.

`BUS:B1:FLEXRAY:BITRATE?` might return `BUS:B1:FLEXRAY:BITRATE 10000000` indicating the FlexRay bit rate is 10,000,000 bits per second.

BUS:B<x>:FLEXray:CHannel

Specifies the FlexRay ID format. `B<x>` is the serial bus number, which can be 1–4.

Conditions This command requires a DPO3FLEX application module.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:CHannel {A|B}
BUS:B<x>:FLEXray:CHannel?
```

Arguments `A` sets the FlexRay ID format to channel A.

`B` sets the FlexRay ID format to channel B.

Examples `BUS:B1:FLEXRAY:CHANNEL B` sets the FlexRay ID format to channel B.

`BUS:B1:FLEXRAY:CHANNEL?` might return `BUS:B1:FLEXRAY:CHANNEL A` indicating that FlexRay ID format is channel A.

BUS:B<x>:FLEXray:SIGnal

Specifies which FlexRay standard to use: BDIFFBP, BM or TXRX. `B<x>` is the serial bus number, which can be 1–4.

Conditions This command requires a DPO3FLEX application module.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:SIGnal {BDIFFBP|BM|TXRX}
BUS:B<x>:FLEXray:SIGnal?
```

Arguments `BDIFFBP` sets the FlexRay standard to BDIFFBP.

`BM` sets the FlexRay standard to BM.

`TXRX` sets the FlexRay standard to TXRX.

Examples `BUS:B1:FLEXRAY:SIGNAL BM` sets the FlexRay standard is BM.

`BUS:B1:FLEXRAY:SIGNAL?` might return `BUS:B1:FLEXRAY:SIGNAL BDIFFBP` indicating the FlexRay standard is BDIFFBP.

BUS:B<x>:FLEXray:SOUrce

Specifies the FlexRay bus as the data source.

Conditions This command requires a DPO3FLEX application module.

Group Bus

Syntax

```
BUS:B<x>:FLEXray:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}

BUS:B<x>:FLEXray:SOUrce?
```

Arguments

CH1–CH4 specifies the analog channel to use as the data source waveform for the FlexRay bus.

D0–D15 specifies the digital channel to use as the data source waveform for the FlexRay bus. (MSO models only.)

Examples

BUS:B1:FLEXRAY:SOURCE CH4 sets the FlexRay source to channel 4.

BUS:B1:FLEXRAY:SOURCE? might return BUS:B1:FLEXRAY:SOURCE CH1 indicating the FlexRay source is channel 1.

BUS:B<x>:I2C:ADDRess:RWINClude

Sets and returns whether the read/write bit is included in the address.

Group Bus

Syntax

```
BUS:B<x>:I2C:ADDRess:RWINClude {<NR1>|OFF|ON}
BUS:B<x>:I2C:ADDRess:RWINClude?
```

Arguments

<NR1> = 0 does not include the read/write bit in the address; any other value includes the read/write bit in the address.

OFF does not include the read/write bit in the address.

ON includes the read/write bit in the address.

Examples

`BUS:B1:I2C:ADDRESS:RWINCLUDE ON` includes the read/write bit in the address.

`BUS:B1:I2C:ADDRESS:RWINCLUDE?` might return `BUS:B1:I2C:ADDRESS:RWINCLUDE 0` indicating the read/write bit is not included in the address.

BUS:B<x>:I2C{:CLOCK|:SCLK}:SOUrce

Sets or returns the I2C SCLK source for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD or DPO3COMP application module.

Group

Bus

Syntax

```
BUS:B<x>:I2C{:CLOCK|:SCLK}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11
|D12|D13|D14|D15}
```

```
BUS:B<x>:I2C{:CLOCK|:SCLK}:SOUrce?
```

Arguments

`CH1–CH4` specifies the analog channel to use as the I2C SCLK source.

`D0–D15` specifies the digital channel to use as the I2C SCLK source.

BUS:B<x>:I2C{:DATA|:SDATA}:SOUrce

Sets or returns the I2C SDATA source for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Bus

Syntax

```
BUS:B<x>:I2C{:DATA|:SDATA}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11
|D12|D13|D14|D15}
```

```
BUS:B<x>:I2C{:DATA|:SDATA}:SOUrce?
```

Arguments

CH1–CH4 specifies the analog channel to use as the I2C SDATA source.

D0–D15 specifies the digital channel to use as the I2C SDATA source.

BUS:B<x>:LABel

Sets or returns the waveform label for bus < x>, where x is the bus number 1 through 4.

Group

Bus

Syntax

```
BUS:B<x>:LABel <Qstring>
BUS:B<x>:LABel?
```

Arguments

<Qstring> is an alpha-numeric string of text, enclosed in quotes, that contains the text label information for bus <x>. The text string is limited to 30 characters.

BUS:B<x>:LIN:BITRate

Sets or returns the bit rate for LIN.

Group

Bus

Syntax

```
BUS:B<x>:LIN:BITRate <NR1>
BUS:B<x>:LIN:BITRate?
```

Arguments

<NR1> is the LIN bit rate.

Examples

BUS:B1:LIN:BITRATE 9600 sets the bit rate 9600.

BUS:B1:LIN:BITRATE? might return BUS:B1:LIN:BITRATE 2400 indicating the bit rate is set to 2400.

BUS:B<x>:LIN:IDFORmat

Sets or returns the LIN ID format.

Group Bus

Syntax

```
BUS:B<x>:LIN:IDFORmat {NOPARity|PARity}
BUS:B<x>:LIN:IDFORmat?
```

Arguments

`NOPARity` sets the LIN id format to no parity.

`PARity` sets the LIN id format to parity.

Examples

`BUS:B1:LIN:IDFORMAT PARITY` sets the LIN id format to parity.

`BUS:B1:LIN:IDFORMAT?` might return `BUS:B1:LIN:IDFORMAT NOPARITY` indicating the LIN id format is no parity.

BUS:B<x>:LIN:POLARity

Sets or returns the LIN polarity.

Group Bus

Syntax

```
BUS:B<x>:LIN:POLARity {NORMal|INVerted}
BUS:B<x>:LIN:POLARity?
```

Arguments

`NORMal` specifies normal LIN polarity.

`INVerted` specifies inverted LIN polarity.

Examples

`BUS:B1:LIN:POLARITY INVERTED` sets the LIN polarity to INVERTED..

`BUS:B1:LIN:POLARITY?` might return `BUS:B1:LIN:POLARITY NORMAL` indicating the LIN polarity is normal.

BUS:B<x>:LIN:SAMPLEpoint

Sets or returns the sample point (in %) at which to sample during each bit period.

Group Bus

Syntax

```
BUS:B<x>:LIN:SAMPLEpoint <NR1>
BUS:B<x>:LIN:SAMPLEpoint?
```

Arguments <NR1> is the sample point (in %) at which to sample during each bit period.

Examples `BUS:B1:LIN:SAMPLEPOINT 10` sets the sample point is at 10% of the bit period.

`BUS:B1:LIN:SAMPLEPOINT?` might return `BUS:B1:LIN:SAMPLEPOINT 50` indicating that the sample point is at 50% of the bit period.

BUS:B<x>:LIN:SOUrce

Sets or returns the LIN data source.

Group Bus

Syntax

```
BUS:B<x>:LIN:SOUrce {CH1|CH2|CH3|CH4|}
BUS:B<x>:LIN:SOUrce?
```

Arguments `CH<x>` specifies the LIN source channel where x is 1 to 4.

Examples `BUS:B1:LIN:SOURCE CH4` sets the LIN source to channel 4.

`BUS:B1:LIN:SOURCE?` might return `BUS:B1:LIN:SOURCE CH1` indicating the LIN source is channel 1.

BUS:B<x>:LIN:STANDard

Sets or returns the LIN standard.

Group Bus

Syntax

```
BUS:B<x>:LIN:STANDard {V1X|V2X|MIXed}
BUS:B<x>:LIN:STANDard?
```

Arguments `V1X` sets the LIN standard to V1X.

`V2X` sets the LIN standard to V2X.

`MIXed` sets the LIN standard to MIXED.

Examples

`BUS:B1:LIN:STANDARD V1X` sets the LIN standard is V1X.

`BUS:B1:LIN:STANDARD?` might return `BUS:B1:LIN:STANDARD V2X` indicating the LIN standard is V2X.

BUS:B<x>:MIL1553B:POLarity

This command sets the MIL-STD-1553 bus polarity to normal or inverted.

Conditions

This command requires a DPO3AERO application module.

Group

Bus

Syntax

```
BUS:B<x>:MIL1553B:POLarity {NORMal|INVERTed}
BUS:B<x>:MIL1553B:POLarity?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

BUS:B<x>:MIL1553B:SOUrce

Arguments

`NORMal` — A high-low transition represents a 1 on the Data+ line.

`INVERTed` — A high-low transition represents a 0 on the Data+ line.

Examples

`BUS:B1:MIL1553B:POLarity INVERTED` sets the MIL-STD-1553 bus polarity so that a high-low transition represents a 0 on the Data+ line..

`BUS:B1:MIL1553B:POLarity?` might return NORMAL.

BUS:B<x>:MIL1553B:RESPonsetime:MAXimum

This command specifies the maximum response time to a valid command issued. `B<x>` is the serial bus number, which can be 1–4.

NOTE. *The MIL-STD-1553 specification requires devices to respond to a valid command within 4 to 12 microseconds.*

Conditions

This command requires a DPO3AERO application module.

Group

Bus

Syntax

```
BUS:B<x>:MIL1553B:RESPonsetime:MAXimum <NR3>
BUS:B<x>:MIL1553B:RESPonsetime:MAXimum?
```

Related Commands

BUS:B<x>:MIL1553B:RESPonsetime:MINimum

Arguments

`<NR3>` is a floating point number that specifies the maximum response time, in seconds.

Examples

`BUS:B1:MIL1553B:RESPonsetime:MAXimum` 12.0E-6 specifies the maximum response time to a valid command received to be 12.0000E-6 microseconds.

`BUS:B1:MIL1553B:RESPonsetime:MAXimum?` might return 12.0000E-6.

BUS:B<x>:MIL1553B:RESPonsetime:MINimum

This command specifies the minimum response time to a valid command issued.`B<x>` is the serial bus number, which can be 1–4.

NOTE. *The MIL-STD-1553 specification requires devices to respond to a valid command within 4 to 12 microseconds.*

Conditions

This command requires a DPO3AERO application module.

Group

Bus

Syntax

```
BUS:B<x>:MIL1553B:RESPonsetime:MINimum <NR3>
BUS:B<x>:MIL1553B:RESPonsetime:MINimum?
```

Related Commands

BUS:B<x>:MIL1553B:RESPonsetime:MAXimum

Arguments

`<NR3>` is a floating point number that specifies the minimum response time in seconds.

Examples

`BUS:B1:MIL1553B:RESPonsetime:MINimum` 4.0E-6 specifies the minimum response time to a valid command received to 4.0E-6 microseconds.

`BUS:B1:MIL1553B:RESPonsetime:MINimum?` might return 4.0000E-6.

BUS:B<x>:MIL1553B:SOUrce

This command specifies the MIL-STD-1553 bus source for differential input. The supported source waveforms are channels 1–4, math waveform, and reference waveforms 1–4. The default is channel 1. `B<x>` is the serial bus number, which can be 1–4.

Conditions This command requires a DPO3AERO application module.

Group Bus

Syntax

```
BUS:B<x>:MIL1553B:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4}
BUS:B<x>:MIL1553B:SOUrce?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments `CH1–4` specifies to use one of the analog channels as the MIL-STD-1553 source for differential input. The number of channels available depends upon the model.

`MATH` specifies to use the math waveform as the MIL-STD-1553 source for differential input.

`REF1–4` specifies to use one of the reference waveforms as the MIL-STD-1553 bus source for differential input.

Examples `BUS:B1:MIL1553B:SOUrce ref4` specifies to use reference waveform 4 as the source for MIL-STD-1553 input.

`BUS:B1:MIL1553B:SOUrce?` might return `CH2,` indicating that channel 2 is the currently specified source for MIL-STD-1553 input.

BUS:B<x>:PARallel:BIT<x>:SOUrce

Sets or returns the parallel bit source for B<x>, where x is the bus number and Bit<x> is the bit number.

Group Bus

Syntax

```
BUS:B<x>:PARallel:BIT<x>:SOUrce
{CH1|CH2|CH3|CH4|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11
|D12|D13|D14|D15}
BUS:B<x>:PARallel:BIT<x>:SOUrce?
```

Arguments

`CH1–CH4` or `D0–D15` specifies the bit source B<x>. BIT<x> specifies the bit number.

BUS:B<x>:PARallel:CLOCK:EDGE

Sets or returns the parallel clock edge for bus <x>, where x is the bus number.

Group

Bus

Syntax

```
BUS:B<x>:PARallel:CLOCK:EDGE {EITher|RISing|FALling}
BUS:B<x>:PARallel:CLOCK:EDGE?
```

Arguments

`EIther` specifies either edge as the clock edge.

`RISing` specifies the rising edge as the clock edge.

`FALling` specifies the falling edge as the clock edge.

BUS:B<x>:PARallel:CLOCK:ISCLOCKed

Sets or returns the parallel bus clock function for bus <x>, where x is the bus number.

Group

Bus

Syntax

```
BUS:B<x>:PARallel:CLOCK:ISCLOCKed {YES|NO}
BUS:B<x>:PARallel:CLOCK:ISCLOCKed?
```

Arguments

`YES` specifes that the Parallel bus is clocked.

`NO` specifes that the Parallel bus is not clocked.

BUS:B<x>:PARallel:CLOCK:SOUrce

Sets or returns the Parallel bus source <x>, where x is the bus number.

Group Bus

Syntax
```
BUS:B<x>:PARallel:CLOCK:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:PARallel:CLOCK:SOUrce?
```

Arguments `CH1–CH4` or `D0–D15` specifies the channel to use as the Parallel bit source.

BUS:B<x>:PARallel:WIDth

Sets or returns the number of bits used for the width of the Parallel bus <x>, where x is the bus number.

Group Bus

Syntax
```
BUS:B<x>:PARallel:WIDth <NR1>
BUS:B<x>:PARallel:WIDth?
```

Arguments `<NR1>` is the number of bits.

BUS:B<x>:POSition

Sets or returns the position of the bus <x> waveform on the display, where x is the bus number 1 through 4.

Conditions This command requires a DPO3AUTO, DPO3EMBD, or DPO3COMP application module.

Group Bus

Syntax
```
BUS:B<x>:POSition <NR3>
BUS:B<x>:POSition?
```

Arguments `<NR3>` specifies the position.

BUS:B<x>:RS232C:BITRate

Sets or returns the RS-232 bit rate for bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Bus

Syntax
```
BUS:B<x>:RS232C:BITRate <NR1>
BUS:B<x>:RS232C:BITRate?
```

Arguments `<NR1>` is the bit rate in bits-per-second: 50, 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 14400, 15200, 19200, 28800, 31250, 38400, 56000, 57600, 76800, 115200, 128000, 230400, 460800, 921600, 1382400, 1843200, 2764800. You can enter any positive integer, and the instrument will coerce the value to the closest supported bit rate.

BUS:B<x>:RS232C:DATABits

Sets or returns the number of RS-232 data bits for bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Bus

Syntax
```
BUS:B<x>:RS232C:DATABits {7|8|9}
BUS:B<x>:RS232C:DATABits?
```

Arguments 7 specifies seven bits in the RS-232 data frame.

8 specifies eight bits in the RS-232 data frame.

8 specifies nine bits in the RS-232 data frame.

BUS:B<x>:RS232C:DELIMiter

Sets or returns the RS-232 delimiting value for a packet on bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Bus

Syntax

```
BUS:B<x>:RS232C:DELIMiter {NULl|LF|CR|SPace|XFF}
BUS:B<x>:RS232C:DELIMiter?
```

Arguments

`NULl` specifies 0x00.

`LF` specifies 0x0A.

`CR` specifies 0x0D.

`XFF` specifies 0xFF.

BUS:B<x>:RS232C:DISplaymode

Sets or returns the display mode for the bus <x> display and event table, where x is the bus number.

Conditions

This command requires a DPO3COMP application module.

Group

Bus

Syntax

```
BUS:B<x>:RS232C:DISplaymode {FRAme|PACKET}
BUS:B<x>:RS232C:DISplaymode?
```

Arguments

`FRAme` displays each frame as a single entity.

`PACKET` displays a group of frames terminated with a single frame defined by the `BUS:B<x>:RS232C:DELImiter` command or the front panel.

BUS:B<x>:RS232C:PARity

Sets or returns the RS-232C parity for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3COMP application module.

Group

Bus

Syntax

```
BUS:B<x>:RS232C:PARity {NONe|EVEN|ODD}
BUS:B<x>:RS232C:PARity?
```

Arguments

NONe specifies no parity.

EVEN specifies even parity.

ODD specifies odd parity.

BUS:B<x>:RS232C:POLarity

Sets or returns the RS-232C polarity for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3COMP application module.

Group

Bus

Syntax

```
BUS:B<x>:RS232C:POLarity {NORMal|INVERTed}
BUS:B<x>:RS232C:POLarity?
```

Arguments

NORMal sets the RS-232C bus polarity to positive.

INVERTed sets the RS-232C bus polarity to negative.

BUS:B<x>:RS232C:RX:SOUrce

Sets or returns the RS-232 RX source for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3COMP application module.

Group

Bus

Syntax

```
BUS:B<x>:RS232C:RX:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:RS232C:RX:SOUrce?
```

Arguments

CH1–CH4 or D0–D15 specifies the channel to use for the RS-232 RX source.

BUS:B<x>:RS232C:TX:SOUrce

Sets or returns the RS-232 TX Source for bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Bus

Syntax
```
BUS:B<x>:RS232C:TX:SOUrce {CH1|CH2|CH3|CH4|
D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15}
BUS:B<x>:RS232C:TX:SOUrce?
```

Arguments `CH1–CH4` or `D0–D15` specifies the channel to use as the RS-232 TX source.

BUS:B<x>:SPI{:CLOCK|:SCLK}:POLARity

Sets or returns the SPI SCLK polarity for bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax
```
BUS:B<x>:SPI{:CLOCK|:SCLK}:POLARity {FALL|RISe}
BUS:B<x>:SPI{:CLOCK|:SCLK}:POLARity?
```

Arguments `FALL` specifies the falling edge.

`RISe` specifies the rising edge.

BUS:B<x>:SPI{:CLOCK|:SCLK}:SOUrce

Sets or returns the SPI SCLK source for bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax
```
BUS:B<x>:SPI{:CLOCK|:SCLK}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}
BUS:B<x>:SPI{:CLOCK|:SCLK}:SOUrce?
```

Arguments CH1-CH4 or D0–D15 is the channel to use as the SPI SCLK source.

BUS:B<x>:SPI:DATA{:IN|:MISO}:POLARity

Sets or returns the SPI MISO polarity for bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATA{:IN|:MISO}:POLARity {LOW|HIGH}
BUS:B<x>:SPI:DATA{:IN|:MISO}:POLARity?
```

Arguments LOW specifies an active low polarity.

HIGH specifies an active high polarity.

BUS:B<x>:SPI:DATA{:IN|:MISO}:SOUrce

Sets or returns the SPI MISO source for bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATA{:IN|:MISO}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}
BUS:B<x>:SPI:DATA{:IN|:MISO}:SOUrce?
```

Arguments CH1-CH4 or D0–D15 is the channel to use as the SPI MISO source.

BUS:B<x>:SPI:DATA{:OUT|:MOSI}:POLARity

Sets or returns the SPI MOSI polarity for bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATA{:OUT|:MOSI}:POLARity {LOW|HIGH}
BUS:B<x>:SPI:DATA{:OUT|:MOSI}:POLARity?
```

Arguments `LOW` specifies the active low polarity.

`HIGH` specifies the active high polarity.

BUS:B<x>:SPI:DATA{:OUT|:MOSI}:SOUrce

Sets or returns the SPI MOSI source for bus <x, where x is the bus number>.

Conditions This command requires a DPO3EMBD application module.

Group Bus

Syntax

```
BUS:B<x>:SPI:DATA{:OUT|:MOSI}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}
BUS:B<x>:SPI:DATA{:OUT|:MOSI}:SOUrce?
```

Arguments `CH1-CH4` or `D0–D15` is the channel to use as the SPI MISO source.

BUS:B<x>SPI:FRAMing

Sets or returns the type of SPI framing.

Group Bus

Syntax

```
BUS:B<x>SPI:FRAMing {SS|IDLEtime}
BUS:B<x>SPI:FRAMing ?
```

Related Commands

Arguments SS specifies framing by SS (non 2-wire).

IDLEtime specifies framing by Idle Time (2-wire).

Examples

`BUS:B1:SPI:FRAMING SS` sets the SPI framing type to SS.

`BUS:B1:SPI:FRAMING IDELTIME` might return `BUS:B1:SPI:FRAMING IDELTIME` indicating the SPI framing type is set to IDLETIME.

BUS:B<x>:SPI{:SELect|:SS}:POLARity

Sets or returns the SPI SS polarity for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Bus

Syntax

```
BUS:B<x>:SPI{:SELect|:SS}:POLARity {LOW|HIGH}
BUS:B<x>:SPI{:SELect|:SS}:POLARity?
```

Arguments

`LOW` specifies an active low polarity.

`HIGH` specifies an active high polarity.

BUS:B<x>:SPI{:SELect|:SS}:SOUrce

Sets or returns the SPI SS source for bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Bus

Syntax

```
BUS:B<x>:SPI{:SELect|:SS}:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10
|D11|D12|D13|D14|D15}
BUS:B<x>:SPI{:SELect|:SS}:SOUrce?
```

Arguments

`CH1–CH4` or `D0–D15` is the channel to use as the SPI SS source.

BUS:B<x>:STATE

Sets or returns the on/off state of bus <x>, where x is the bus number.

Group Bus

Syntax
```
BUS:B<x>:STATE {<NR1>|OFF|ON}
BUS:B<x>:STATE?
```

Related Commands SELect:BUS<x>

Arguments ON or <NR1> ≠ 0 turns on the bus.

OFF or <NR1> = 0 turns off the bus.

BUS:B<x>:TYPE

Sets or returns the bus type for <x>, where x is the bus number. The supported bus types are dependent on the oscilloscope model and the installed application keys.

Group Bus

Syntax
```
BUS:B<x>:TYPE
{I2C|SPI|CAN|RS232C|PARallel|LIN|FLEXRay|AUDio|MIL1553B}
BUS:B<x>:TYPE?
```

Arguments I2C specifies the Inter-IC bus.

SPI specifies the Serial Peripheral Interface bus (not available on two-channel models). Supported up to 50 Mbits.

CAN specifies the Controller Area Network bus.

RS232C specifies the RS-232C bus.

PARallel specifies the Parallel bus.

LIN specifies the LIN bus.

FLEXRay specifies the FLexRay bus.

AUDio specifies the audio bus.

MIL1553B specifies the MIL-STD-1553 bus.

BUS:LOWerthreshold:CH<x>

Sets the lower threshold for each channel. This applies to all search and trigger types that use the channel. This command supersedes the :BUS:THReshold:CH<x> above.

Group

Bus

Syntax

```
BUS:LOWerthreshold:CH<x> {<NR3>|ECL|TTL}
BUS:LOWerthreshold:CH<x>?
```

Arguments

<NR3> specifies the threshold in volts.

ECL specifies a preset ECL high level of -1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

BUS:LOWERTHRESHOLD:CH1 TTL sets the CH1 lower threshold to 800mV.

BUS:LOWERTHRESHOLD:CH1? might return :BUS:LOWERTHRESHOLD:CH1 -800.0000E-3 indicating the CH1 lower threshold is -800 mV.

BUS:THReshold:D<x>

Sets or returns the threshold for digital channel <x>, where x is the digital channel number. This will apply to all Search and Trigger Types that use the channel.

Conditions

This command requires a DPO3COMP application module or RS-232C.

Group

Bus

Syntax

```
BUS:THReshold:D<x> {<NR3>|ECL|TTL}
BUS:THReshold:D<x>?
```

Related Commands

TRIGger:A:LEVel:D<x>

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> specifies the threshold level in volts.

BUS:UPPerthreshold:CH<x>

Sets the upper threshold for each channel. This applies to all search and trigger types that use the channel.

Group

Bus

Syntax

```
BUS:UPPerthreshold:CH<x> {<NR3>|ECL|TTL}
BUS:UPPerthreshold:CH<x>?
```

Arguments

`<NR3>` specifies the threshold in volts.

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

Examples

`BUS:UPPERTHRESHOLD:CH1 800.0000E-3` sets the CH1 upper threshold to 800 mV.

`BUS:UPPERTHRESHOLD:CH1?` might return `:BUS:UPPERTHRESHOLD:CH1 -800.0000E-3` indicating that the CH1 upper threshold is set to -800 mV.

BUSY? (Query Only)

Returns the status of the oscilloscope. This command allows you to synchronize the operation of the oscilloscope with your application program.

Group

Status and Error

Syntax

```
BUSY?
```

Related Commands

*OPC, *WAI

Returns

`<NR1>` = 0 means the oscilloscope is not busy processing a command whose execution time is extensive.

`<NR1>` = 1 means the oscilloscope is busy processing one of the commands listed in the table below.

Commands that affect BUSY? response

Operation	Command
Single sequence acquisition	ACQuire:STATE ON or ACQuire:STATE RUN or ACQuire:STATE1 (when ACQuire:STOPAfter is set to SEQuence)
Hard copy operation	HARDCopy STArt
Calibration step	Refer to the optional oscilloscope Service Manual.

Examples `BUSY?` might return `:BUSY 1` indicating that the oscilloscope is currently busy.

*CAL? (Query Only)

Performs an internal self-calibration and returns the oscilloscope calibration status.

NOTE. *Disconnect or otherwise remove all input signals prior to starting self-calibration. The self-calibration can take several minutes to complete.*

No other commands are executed until calibration is complete.

Group Calibration and Diagnostic

Syntax `*CAL?`

Returns `<NR1>` = 1 indicates the calibration did not complete successfully.

`<NR1>` = 0 indicates the calibration completed without errors.

Examples `*CAL?` starts the internal signal path calibration and might return 0 to indicate that the calibration was successful.

CALibrate:FACtory:STATus? (Query Only)

Returns the factory calibration status value saved in nonvolatile memory.

Group Calibration and Diagnostic

Syntax `CALibrate:FACtory:STATus?`

Examples `CAL:FAC:STAT?` might return `CALIBRATE:FACTORY:STATUS PASS` indicating that factory calibration passed.

CALibrate:INTERNal (No Query Form)

This command starts a signal path compensation.

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal`

Arguments None

Examples `CALIBRATE:INTERNAL` starts a serial path compensation cycle.

CALibrate:INTERNal:STARt (No Query Form)

Starts the internal signal path calibration (SPC) of the oscilloscope. You can use the CALibrate:INTERNal:STATus? query to return the current status of the internal signal path calibration of the oscilloscope.

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STARt`

Related Commands CALibrate:RESults:SPC?

Examples `CALIBRATE:INTERNAL:START` initiates the internal signal path calibration of the oscilloscope.

CALibrate:INTERNal:STATus? (Query Only)

Returns the current status of the oscilloscope internal signal path calibration for the last SPC operation.

Group Calibration and Diagnostic

Syntax `CALibrate:INTERNal:STATus?`

Related Commands *CAL?

Returns This query will return one of the following:

- `INIT` indicates the oscilloscope has not had internal signal path calibration run.
- `PASS` indicates the signal path calibration completed successfully.
- `FAIL` indicates the signal path calibration did not complete successfully.
- `RUNNING` indicates the signal path calibration is currently running.

Examples `CAL:INTERN:STAT?` might return `:CALIBRATE:INTERNAL:STATUS INIT` indicating that the current status of the internal signal path calibration is that it has not been run.

CALibrate:RESults? (Query Only)

Returns the status of internal and factory calibrations, without performing any calibration operations. The results returned do not include the calibration status of attached probes. The `CALibrate:RESults?` query is intended to support GO/NoGO testing of the oscilloscope calibration readiness: all returned results should indicate PASS status if the oscilloscope is "fit for duty". It is quite common, however, to use uncalibrated probes (particularly when the oscilloscope inputs are connected into a test system with coaxial cables).

Group Calibration and Diagnostic

Syntax `CALibrate:RESults?`

Related Commands *CAL?

CALibrate:RESults:FACtory? (Query Only)

Returns the status of internal and factory calibration, without performing any calibration operations.

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:FACtory?`

CALibrate:RESults:SPC? (Query Only)

Returns the status of the SPC operation. This query does not initiate a SPC.

Group Calibration and Diagnostic

Syntax `CALibrate:RESults:SPC?`

Related Commands *CAL?

Returns `INIT` indicates that SPC has never successfully completed.

`PASS` indicates that the last SPC operation passed.

`FAIL` indicates that the last SPC operation failed.

`RUNNING` indicates that the SPC operation is running.

Examples `CALIBRATE:RESULTS:SPC?` returns the results of the last SPC operation: either PASS or FAIL.

CH<x>? (Query Only)

Returns the vertical parameters for channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>?`

CH<x>:AMPSVIAVOLTs:ENAble

Sets or returns the state of the amps via volts feature for the specified channel. This feature supports measuring current via the voltage drop across a resistor.

Group Vertical

Syntax

```
CH<x>:AMPSVIAVOLTs:ENAble {<NR1>|OFF|ON}
CH<x>:AMPSVIAVOLTs:ENAble?
```

Arguments

`OFF` sets the amps via volts function for channel <x> to off.

`ON` sets the amps via volts function for channel <x> to on.

`<NR1>` = 0 sets the amps via volts function to off. Any other value sets the function to on.

Examples

`CH1:AMSVIAVOLTS:ENABLE ON` turns on the amps via volts feature for channel 1.

CH<x>:AMPSVIAVOLTs:FACtor

Sets or returns the amps via volts factor for the specified channel.

Group

Vertical

Syntax

```
CH<x>:AMPSVIAVOLTs:FACtor <NR3>
CH<x>:AMPSVIAVOLTs:FACtor?
```

Arguments

`<NR3>` is a double-precision ASCII string that represents the amps via volts factor.

Examples

`CH1:AMPSVIAVOLTS:FACTOR 15.5` sets the amps via volts factor for channel 1 to 15.5.

CH<x>:BANdwidth

Sets or returns the selectable low-pass bandwidth limit filter for channel <x>, where x is the channel number.

Group

Vertical

Syntax

```
CH<x>:BANdwidth {TWEnty|ONEfifty|FULl|<NR3>}
CH<x>:BANdwidth?
```

Arguments

`TWEnty` sets the upper bandwidth limit of channel <x> to 20 MHz.

`ONEfifty` sets the upper bandwidth limit of channel <x> to 150 MHz.

FULl disables any optional bandwidth limiting. The specified channel operates at its maximum attainable bandwidth.

<NR3> is a double-precision ASCII string. The oscilloscope rounds this value to an available bandwidth using geometric rounding, and then uses this value to set the upper bandwidth limit.

NOTE. *Other values may be possible depending on the attached probes.*

Examples

CH1:BANDWIDTH TWENTY sets the bandwidth of channel 1 to 20 MHz.

CH<x>:COUPling

Sets or returns the input attenuator coupling setting for channel <x>, where x is the channel number.

Group

Vertical

Syntax

```
CH<x>:COUPling {AC|DC|GND}
CH<x>:COUPling?
```

Arguments

AC sets channel <x> to AC coupling.

DC sets channel <x> to DC coupling.

GND sets channel<x> to ground. Only a flat, ground-level waveform will be displayed.

Examples

CH2:COUPLING GND sets channel 2 to ground.

CH3:COUPling? might return :CH3:COUPling DC indicating that channel 3 is set to DC coupling.

CH<x>:DESKew

Sets or returns the deskew time for channel <x>, where x is the channel number. You can adjust the deskew time to add an independent, channel-based delay time to the delay (set by the horizontal position control and common to all channels) from the common trigger point to first sample taken for each channel. This lets you compensate individual channels for different delays introduced by their individual input hook ups.

Group Vertical

Syntax

```
CH<x>:DESKew <NR3>
CH<x>:DESKew?
```

Arguments `<NR3>` is the deskew time for channel <x>, ranging from -100 ns to +100 ns with a resolution of 1 ps.

Examples `CH4:DESKew 5.0E-9` sets the deskew time for channel 4 to 5 ns.

`CH2:DESKew?` might return `:CH2:DESKEW 2.0000E-09` indicating that the deskew time for channel 2 is set to 2 ns.

CH<x>:INVert

Sets or returns the invert function for channel <x>, where is the channel number. When on, the invert function inverts the waveform for the specified channel.

NOTE. *This command inverts the waveform for display purposes only. The oscilloscope does not use an inverted waveform for triggers or trigger logic inputs.*

Group Vertical

Syntax

```
CH<x>:INVert {ON|OFF}
CH<x>:INVert?
```

Arguments `OFF` sets the invert function for channel <x> to off.

`ON` sets the invert function for channel <x> to on.

Examples `CH4:INVert ON` inverts the waveform on channel 4.

`CH2:INVert?` might return `:CH2:INVERT 0` indicating that channel 2 is not inverted.

CH<x>:LABel

Sets or returns the waveform label for channel <x>, where x is the channel number.

Group Vertical

Syntax

```
CH<x>:LABel <Qstring>
CH<x>:LABel?
```

Arguments

`<Qstring>` is an alpha-numeric string of text, enclosed in quotes, that contains the text label information for the channel <x> waveform. The text string is limited to 30 characters.

CH<x>:OFFSet

Sets or returns the vertical offset for channel <x>, where x is the channel number.

This command offsets the vertical acquisition window (moves the level at the vertical center of the acquisition window) for the specified channel. Visualize offset as scrolling the acquisition window towards the top of a large signal for increased offset values, and scrolling towards the bottom for decreased offset values. The resolution of the vertical window sets the offset increment for this control.

Offset adjusts only the vertical center of the acquisition window for channel waveforms to help determine what data is acquired. The oscilloscope always displays the input signal minus the offset value.

The channel offset range depends on the vertical scale factor.

Table 2-41: Channel Offset Range

	Offset range	
V/Div Setting	**1 MΩ Input**	**50/75 Ω Input**
1 mV/div — 50 mV/div	±1 V	±1 V
50.5 mV/div — 99.5 mV/div	±0.5 V	±0.5 V
100 mV/div — 500 mV/div	±10 V	±5 V
505 mV/div — 995 mV/div	±5 V	±5 V
1 V/div — 5 V/div [1]	±100 V	±5 V
5.05 V/div — 10 V/div [1]	±50 V	N/A

[1] For 50/75 Ω input, 1 V/div is the maximum setting.

***NOTE.** The above table describes oscilloscope behavior only when no probe is attached, and when the external attenuation factor is 1.0.*

Group

Vertical

Syntax

```
CH<x>:OFFSet <NR3>
CH<x>:OFFSet?
```

Related Commands CH<x>:POSition

Arguments `<NR3>` is the offset value for the specified channel <x>.

Examples `CH3:OFFSet 2.0E-3` sets the offset for channel 3 to 2 mV.

`CH4:OFFSet?` might return `:CH4:OFFSET 1.0000E-03` indicating that the offset for channel 4 is set to 1 mV.

CH<x>:POSition

Sets or returns the vertical position of channel <x>, where x is the channel number. The position value is applied to the signal before it is digitized.

Increasing the position value of a waveform causes the waveform to move up. Decreasing the position value causes the waveform to move down. The position value determines the vertical graticule coordinate at which input signal values, minus the present offset setting for that channel, are displayed. For example, if the position for Channel 3 is set to 2.0 and the offset is set to 3.0, then input signals equal to 3.0 units are displayed 2.0 divisions above the center of the screen (at 1 V/div).

Group Vertical

Syntax

```
CH<x>:POSition <NR3>
CH<x>:POSition?
```

Related Commands CH<x>:OFFSet, REF<x>:VERTical:POSition, MATH[1]:VERTical:POSition

Arguments `<NR3>` is the position value for channel <x>, in divisions, from the center graticule. The range is 8 to -8 divisions.

Examples `CH2:POSition 1.3` positions the Channel 2 input signal 1.3 divisions above the center graticule.

`CH1:POSition?` might return `:CH1:POSITION -1.3000` indicating that the current position of Channel 1 is 1.3 divisions below the center graticule.

CH<x>:PRObe? (Query Only)

Returns all information concerning the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PRObe?`

CH<x>:PRObe:AUTOZero (No Query Form)

Sets the TekVPI probe attached to channel <x> to zero, where x is the channel number

Group Vertical

Syntax `CH<x>:PRObe:AUTOZero EXECute`

Arguments `Execute` auto zeros the probe.

CH<x>:PRObe:COMMAND (No Query Form)

Sets the state of the probe control specified with the first argument to the state specified with the second argument. The commands and states are unique to the attached probe type. Only certain VPI probes support this command. See the probe documentation for how to set these string arguments.

Group Vertical

Syntax `CH<x>:PRObe:COMMAND <QString>, <QString>`

Arguments `<QString>` are quoted strings specifying the probe command and value to set in the probe attached to the specified channel.

Examples `CH1:PROBE:COMMAND “MODE”, “4-4V1MHz”` sets a Tektronix VPI-DPG probe to the 4-4V1MHz mode.

`CH1:PROBE:COMMAND “OUTPUT”, “ON”` turns the output of a Tektronix VPI-DPG probe on.

`CH1:PROBE:COMMAND?“MODE”` might return `CH1:PROBE:COMMAND “MODE”,“4-4V1MHZ”`.

CH<x>:PRObe:DEGAUss (No Query Form)

Starts a degauss auto-zero cycle on a TekVPI current probe attached to the input channel specified by <x>, where x is the channel number.

Group

Vertical

Syntax

`CH<x>:PRObe:DEGAUss EXECute`

Arguments

`EXECute` initiates the degauss operation.

CH<x>:PRObe:DEGAUss:STATE? (Query Only)

Returns the state of the probe degauss for the channel specified by <x>, where is x is the channel number.

NOTE. *This command will return* `PASSED` *for probes that do not support degauss operations.*

Group

Vertical

Syntax

`CH<x>:PRObe:DEGAUss:STATE?`

Returns

`NEEDED` indicates the probe should be degaussed before taking measurements.

`RECOMMENDED` indicates the measurement accuracy might be improved by degaussing the probe.

`PASSED` indicates the probe is degaussed.

`FAILED` indicates the degauss operation failed.

`RUNNING` indicates the probe degauss operation is currently in progress.

CH<x>:PRObe:FORCEDRange

Sets or returns the range of a TekVPI probe attached to the channel specified by <x>, where x is the channel number.

***NOTE.** This command will return `PASSED` for probes that do not support degauss operations.*

Group Vertical

Syntax

```
CH<x>:PRObe:FORCEDRange <NR3>
CH<x>:PRObe:FORCEDRange?
```

Arguments `<NR3>` specifies the range, which is probe specific.

Returns This command returns `0.0` for probes that do no support forced range.

CH<x>:PRObe:GAIN

Sets or returns the gain factor for the probe attached to the channel specified by <x>, where x is the channel number. The "gain" of a probe is the output divided by the input transfer ratio. For example, a common 10x probe has a gain of 1.

Group Vertical

Syntax

```
CH<x>:PRObe:GAIN <NR3>
CH<x>:PRObe:GAIN?
```

Related Commands CH<x>:SCAle

Arguments `<NR3>` is the probe gain. Allowed values depend on the specific probe.

Examples `CH2:PROBE:GAIN?` might return `:CH2:PROBE:GAIN 0.1000E+00` indicating that the attached 10x probe delivers 1.0 V to the channel 2 BNC for every 10 V applied to the probe input.

CH<x>:PRObe:ID? (Query Only)

Returns the type and serial number of the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PROBe:ID?`

Examples `CH2:PROBE:ID?` might return `:CH2:PROBE:ID:TYPE "10X";SERNUMBER "N/A"` indicating that a passive 10x probe of unknown serial number is attached to channel 2.

CH<x>:PRObe:ID:SERnumber? (Query Only)

Returns the serial number of the probe attached to channel <x>, where x is the channel number.

NOTE. *For Level 0 and 1 probes, the serial number will be "".*

Group Vertical

Syntax `CH<x>:PROBe:ID:SERnumber?`

Examples `CH1:PROBE:ID:SERNUMBER?` might return `:CH1:PROBE:ID:SERNUMBER "B010289"` indicating that the serial number of the probe attached to channel 1 is B010289.

CH<x>:PRObe:ID:TYPE? (Query Only)

Returns the type of probe attached to the channel specified by <x>, where x is the channel number. Level 2 (or higher) probes supply their exact product nomenclature; for Level 0 or 1 probes, a generic *"No Probe Detected"* message is returned.

NOTE. *Use the command CH<x>:YUNits to query the probe type – either "Voltage" or "Current".*

Group Vertical

Syntax `CH<x>:PROBe:ID:TYPE?`

Examples `CH1:PROBE:ID:TYPE?` might return `:CH1:PROBE:ID:TYPE "P6203"` indicating that P6203-type probe is attached to channel 1.

CH<x>:PRObe:MODel

Sets or returns the probe model for the specified channel. If a coded probe is attached or the specified model is not recognized, an error event is set. The argument must be a supported probe.

To find the list of supported probes, push the front-panel channel **1**, **2**, **3**, or **4** button, then push the lower-menu **More** item as many times as needed to select **Deskew**. Push **Probe Model** on the side menu and turn knob **a** to help you read from the resulting list. Alternatively, you can push **Test** > **Analysis** > **Deskew** > **Configure** > **Probe Model** and read from the resulting list.

Group Vertical

Syntax

```
CH<x>:PRObe:MODel<String>
CH<x>:PRObe:MODel?
```

CH<x>:PRObe:PROPDELay

Sets or returns the propagation delay for the probe connected to the specified channel.

Group Vertical

Syntax

```
CH<x>:PRObe:PROPDELay<NR3>
CH<x>:PRObe:PROPDELay?
```

Arguments `<NR3>` specifies the propagation time delay for the connected probe.

Examples `CH1:PROBE:PROPDELAY 100E-12` sets the CH1 propagation delay to 100 ps.

`CH1:PROBE:PROPDELAY?` might return `:CH1:PROBE:PROPDELAY 1.1E-9` indicating that the CH1 propagation delay is set to 1.1 ns.

CH<x>:PRObe:RECDESkew? (Query Only)

Returns the recommended deskew for the probe connected to the specified channel.

Group Vertical

Syntax `CH<x>:PRObe:RECDESkew?`

CH<x>:PRObe:RESistance? (Query Only)

Returns the resistance factor of the probe attached to channel <x>, where x is the channel number.

Group Vertical

Syntax `CH<x>:PRObe:RESistance?`

Examples `CH2:PROBE:RESISTANCE?` might return `:CH2:PROBE:RESISTANCE 10.0000E+6` indicating that the input resistance of the probe attached to Channel 2 is 1 MΩ.

NOTE. *This query will return 0.0 if no probe is attached or the attached probe does not report the input resistance.*

CH<x>:PRObe:SIGnal

Sets or returns the input bypass setting of a TekVPI probe attached to channel <x>, where x is the channel number. The probe must support input bypass, for example TCP0001. This command is ignored if sent to an unsupported probe.

Group Vertical

Syntax

```
CH<x>:PRObe:SIGnal {BYPass|PASS}
CH<x>:PRObe:SIGnal?
```

Arguments `BYPass` sets the probe to Bypass mode.

`PASS` sets the probe to Pass mode.

CH<x>:PRObe:UNIts? (Query Only)

Returns a string describing the units of measure for the probe attached to channel <x>, where x is the channel number.

NOTE. *Use the command CH<x>:YUNits to set the probe type to "Voltage" or "Current".*

Group Vertical

Syntax `CH<x>:PRObe:UNIts?`

Examples `CH4:PROBE:UNITS?` might return `:CH4:PROBE:UNITS "V"` indicating that the units of measure for the probe attached to channel 4 are volts.

CH<x>:SCAle

Sets or returns the vertical scale for the channel specified by <x>, where x is the channel number.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects channel waveforms differently from other waveforms:

- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.
- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.

Group Vertical

Syntax

```
CH<x>:SCAle <NR3>
CH<x>:SCAle?
```

Related Commands CH<x>:OFFSet, CH<x>:POSition, REF<x>:VERTical:SCAle, MATH[1]:VERTical:SCAle

Arguments `<NR3>` is the vertical channel scale in units-per-division. The value entered here is truncated to three significant digits.

Examples

`CH4:SCALE 100E-03` sets the channel 4 scale to 100 mV per division.

`CH2:SCALE?` might return `:CH2:SCALE 1.0000` indicating that the current scale setting of channel 2 is 1 V per division.

CH<x>:TERmination

Sets the connected-disconnected status of a 50 Ω resistor, which may be connected between the specified channel's coupled input and oscilloscope ground. The channel is specified by <x>. There is also a corresponding query that requests the termination parameter and translates this enumeration into one of the two float values.

Group

Vertical

Syntax

```
CH<x>:TERmination {FIFty|SEVENTYFive|MEG|<NR3>}
CH<x>:TERmination?
```

Arguments

`FIFty` sets the channel <x> input resistance to 50 Ω.

`SEVENTYFive` sets the channel <x> input resistance to 75 Ω.

`MEG` sets the channel <x> input resistance to 1 MΩ.

`<NR3>` specifies the channel <x> input resistance numerically.

Examples

`CH4:TERMINATION 50.0E+0` establishes 50 Ω impedance on channel 4.

`CH2:TERMINATION?` might return `:CH2:TERMINATION 50.0E+0` indicating that channel 2 is set to 50 Ω impedance.

CH<x>:YUNits

Sets or returns the units for the channel specified by <x>, where x is the channel number. String arguments are case insensitive and any unsupported units will generate an error.

Supported units are:
%, /Hz, A, A/A, A/V, A/W, A/dB, A/s, AA, AW, AdB, As, B, Hz, IRE, S/s, V, V/A, V/V, V/W, V/dB, V/s, VV, VW, VdB, Volts, Vs, W, W/A, W/V, W/W, W/dB, W/s, WA, WV, WW, WdB, Ws, dB, dB/A, dB/V, dB/W, dB/dB, dBA, dBV, dBW, dBdB, day, degrees, div, hr, min, ohms, percent, s

The vertical units affect the “Probe Type” that is shown in the “Probe Setup” menu:

- Setting `CH<x>:YUNits` to “`V`” causes the probe type to be displayed as “Voltage”.
- When `CH1:AMSVIAVOLTs:ENAble` is set to `OFF`, setting `CH<x>:YUNits` to “`A`” causes the probe type to be displayed as “Current”.
- Setting `CH<x>:YUNits` to anything else causes the probe type not to be displayed (neither “Voltage” nor “Current” are highlighted).

Group Vertical

Syntax

```
CH<x>:YUNits <QString>
CH<x>:YUNits?
```

Arguments `QString` is a string of text surrounded by quotes, specifying the supported units.

CLEARMenu (No Query Form)

Clears the current menu from the display. This command is equivalent to pressing the front panel Menu off.

Group Miscellaneous

Syntax

```
CLEARMenu
```

*CLS (No Query Form)

Clears the following:

- Event Queue
- Standard Event Status Register
- Status Byte Register (except the MAV bit)

If the *CLS command immediately follows an <EOI>, the Output Queue and MAV bit (Status Byte Register bit 4) are also cleared. The MAV bit indicates that information is in the output queue. The device clear (DCL) GPIB control message will clear the output queue and thus MAV. *CLS does not clear the output queue or MAV.

*CLS can suppress a Service Request that is to be generated by an *OPC. This will happen if a single sequence acquisition operation is still being processed when the *CLS command is executed.

Group Status and Error

Syntax `*CLS`

Related Commands DESE, *ESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Examples `*CLS` clears the oscilloscope status data structures.

CONFIGuration:ADVMATH? (Query Only)

This query returns a boolean value to indicate whether the advanced math feature is present.

Group Configuration

Syntax `CONFIGuration:ADVMATH?`

Related Commands MATH[1]:TYPe `ADVanced`

Returns `<NR1>` = 1 if the advanced math feature is present.

`<NR1>` = 0 if the advanced math feature is not present.

CONFIGuration:ANALOg:GNDCPLG? (Query Only)

This query returns a boolean value to indicate whether the ground coupling feature for analog channels is present.

Group Configuration

Syntax `CONFIGuration:ANALOg:GNDCPLG?`

Related Commands (See page 2-75, *Vertical Command Group*.)

Returns `<NR1>` = 1 if the ground coupling feature is present.

`<NR1>` = 0 if the ground coupling feature is not present.

CONFIGuration:ANALOg:MAXBANDWidth? (Query Only)

This query returns the maximum bandwidth for analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:MAXBANDWidth?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns <NR3>, which is a floating point number that represents the maximum bandwidth, in Hertz, for the analog channels.

CONFIGuration:ANALOg:MAXSAMPLERate? (Query Only)

This query returns the maximum sample rate for analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:MAXSAMPLERate?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns <NR3>, which is a floating point number that represents the maximum sample rate, in samples per second, for the analog channels.

CONFIGuration:ANALOg:NUMCHANnels? (Query Only)

This query returns the number of analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:NUMCHANnels?`

Returns <NR1>

CONFIGuration:ANALOg:RECLENS? (Query Only)

This query returns a comma-separated list of supported record lengths for the analog channels.

Group Configuration

Syntax `CONFIGuration:ANALOg:RECLENS?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns List of `<NR1>` values.

CONFIGuration:ANALOg:VERTINVert? (Query Only)

This query returns a boolean value to indicate whether the vertical invert feature for analog channels is present.

Group Configuration

Syntax `CONFIGuration:ANALOg:VERTINVert?`

Related Commands (See page 2-75, *Vertical Command Group*.)

Returns `<NR1>` = 1 if the vertical invert feature is present.

`<NR1>` = 0 if the vertical invert feature is not present.

CONFIGuration:APPLications:LIMITMask? (Query Only)

This query returns a boolean value to indicate whether the optional mask/limit test application feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:APPLications:LIMITMask?`

Returns 0

CONFIGuration:APPLications:POWer? (Query Only)

This query returns a boolean value to indicate whether the optional power application feature is present. (Enabling this feature requires installation of a DPO3PWR application module.)

Group Configuration

Syntax `CONFIGuration:APPLications:POWer?`

Related Commands (See page 2-35, *Power Command Group*.)

Returns `<NR1>` = 1 if the power application feature is present.

`<NR1>` = 0 if the power application feature is not present.

CONFIGuration:AUXIN? (Query Only)

This query returns a boolean value to indicate whether the instrument has an auxiliary input.

Group Configuration

Syntax `CONFIGuration:AUXIN?`

Related Commands (See page 2-75, *Vertical Command Group*.)

Returns `<NR1>` = 1 if the instrument has an auxiliary input.

`<NR1>` = 0 if the instrument does not have an auxiliary input.

CONFIGuration:BUSWAVEFORMS:AUDIO? (Query Only)

This query returns a boolean value to indicate whether the optional audio bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3AUDIO application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:AUDIO?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the audio bus feature is present.

`<NR1>` = 0 if the audio bus feature is not present.

CONFIGuration:BUSWAVEFORMS:CAN? (Query Only)

This query returns a boolean value to indicate whether the optional CAN bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3AUTO application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:CAN?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the CAN bus feature is present.

`<NR1>` = 0 if the CAN bus feature is not present.

CONFIGuration:BUSWAVEFORMS:ETHERNET? (Query Only)

This query returns a boolean value to indicate whether the optional Ethernet triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:ETHERNET?`

Returns 0

CONFIGuration:BUSWAVEFORMS:FLEXRAY? (Query Only)

This query returns a boolean value to indicate whether the optional FlexRay bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3FLEX application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:FLEXRAY?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the FlexRay bus feature is present.

`<NR1>` = 0 if the FlexRay bus feature is not present.

CONFIGuration:BUSWAVEFORMS:I2C? (Query Only)

This query returns a boolean value to indicate whether the optional I^2C bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3EMBD application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:I2C?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the I^2C bus feature is present.

<NR1> = 0 if the I^2C bus feature is not present.

CONFIGuration:BUSWAVEFORMS:LIN? (Query Only)

This query returns a boolean value to indicate whether the optional LIN bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3AUTO application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:LIN?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns <NR1> = 1 if the LIN bus feature is present.

<NR1> = 0 if the LIN bus feature is not present.

CONFIGuration:BUSWAVEFORMS:MIL1553B? (Query Only)

This query returns a boolean value to indicate whether the optional MIL-STD-1553 bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3AERO application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:MIL1553B?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns <NR1> = 1 if the MIL-STD-1553 bus feature is present.

<NR1> = 0 if the MIL-STD-1553 bus feature is not present.

CONFIGuration:BUSWAVEFORMS:NUMBUS? (Query Only)

This query returns the number of bus waveforms.

Group

Configuration

Syntax

`CONFIGuration:BUSWAVEFORMS:NUMBUS?`

Related Commands

(See page 2-13, *Bus Command Group*.)

Returns

`<NR1>`

CONFIGuration:BUSWAVEFORMS:PARALLEL? (Query Only)

This query returns a boolean value to indicate whether the parallel bus triggering and analysis feature is present. (This feature is only available for the MSO3000 Series oscilloscopes. Unlike other bus features, the parallel bus feature does not require an application module.)

Conditions

Group

Configuration

Syntax

`CONFIGuration:BUSWAVEFORMS:PARALLEL?`

Related Commands

(See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns

`<NR1>` = 1 if the parallel bus feature is present.

`<NR1>` = 0 if the parallel bus feature is not present.

CONFIGuration:BUSWAVEFORMS:RS232? (Query Only)

This query returns a boolean value to indicate whether the optional RS232 bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3COMP application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:RS232?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the RS232 bus feature is present.

`<NR1>` = 0 if the RS232 bus feature is not present.

CONFIGuration:BUSWAVEFORMS:SPI? (Query Only)

This query returns a boolean value to indicate whether the optional SPI bus triggering and analysis feature is present. (Enabling this feature requires installation of a DPO3EMBD application module.)

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:SPI?`

Related Commands (See page 2-13, *Bus Command Group*.)

(See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the SPI bus feature is present.

`<NR1>` = 0 if the SPI bus feature is not present.

CONFIGuration:BUSWAVEFORMS:USB? (Query Only)

This query returns a boolean value to indicate whether the USB bus triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:USB?`

Returns 0

CONFIGuration:BUSWAVEFORMS:USB:HS? (Query Only)

This query returns a boolean value to indicate whether the high-speed USB bus triggering and analysis feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:BUSWAVEFORMS:USB:HS?`

Returns 0

CONFIGuration:DIGITAl:MAGNIVU? (Query Only)

This query returns a boolean value to indicate whether the instrument supports the MagniVu feature for digital channels. If there are no digital channels, the value returned is 0.

Group Configuration

Syntax `CONFIGuration:DIGITAl:MAGNIVU?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns `<NR1>` = 1 if MagniVu is present.

`<NR1>` = 0 if MagniVu is not present.

CONFIGuration:DIGITAl:MAXSAMPLERate? (Query Only)

This query returns the maximum sample rate for digital channels, in samples per second. If there are no digital channels, the value returned is 0.

Group Configuration

Syntax `CONFIGuration:DIGITAl:MAXSAMPLERate?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns `<NR3>`, which is a floating point number.

CONFIGuration:DIGITAl:NUMCHANnels? (Query Only)

This query returns the number of digital channels.

Group Configuration

Syntax `CONFIGuration:DIGITAl:NUMCHANnels?`

Related Commands (See page 2-27, *Horizontal Command Group*.)

Returns `<NR1>`

CONFIGuration:EXTVIDEO? (Query Only)

This query returns a boolean value to indicate whether the optional extended video trigger features are present. (Enabling this feature requires installation of a DPO3VID application module.)

Group Configuration

Syntax `CONFIGuration:EXTVIDEO?`

Related Commands (See page 2-57, *Trigger Command Group*.)

(See page 2-45, *Search Command Group*.)

Returns `<NR1>` = 1 if the extended video trigger features are present.

`<NR1>` = 0 if the extended video trigger features are not present.

CONFIGuration:HISTOGRAM? (Query Only)

This query returns a boolean value to indicate whether the histogram feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:HISTOGRAM?`

Returns 0

CONFIGuration:NETWORKDRIVES? (Query Only)

This query returns a boolean value to indicate whether network drives are present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:NETWORKDRIVES?`

Returns 0

CONFIGuration:NUMMEAS? (Query Only)

This query returns the number of periodic measurements.

Group Configuration

Syntax `CONFIGuration:NUMMEAS?`

Related Commands (See page 2-30, *Measurement Command Group*.)

Returns `<NR1>`

CONFIGuration:REFS:NUMREFS? (Query Only)

This query returns the number of reference waveforms.

Group Configuration

Syntax `CONFIGuration:REFS:NUMREFS?`

Related Commands (See page 2-75, *Vertical Command Group*.)

Returns `<NR1>`

CONFIGuration:RF:ADVTRIG? (Query Only)

This query returns a boolean value to indicate whether the advanced RF trigger feature is present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:RF:ADVTRIG?`

Returns 0

CONFIGuration:RF:MAXBANDWidth? (Query Only)

This query returns the maximum bandwidth, in Hertz, for RF channels. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:RF:MAXBANDWidth?`

Returns 0

CONFIGuration:RF:NUMCHANnels? (Query Only)

This query returns the number of RF channels present. As the MSO/DPO3000 Series oscilloscopes do not support this feature, this query always returns 0.

Group Configuration

Syntax `CONFIGuration:RF:NUMCHANnels?`

Returns 0

CONFIGuration:ROSC? (Query Only)

This query returns a boolean value to indicate whether the external reference oscillator (ROSC) input is present.

Group Configuration

Syntax `CONFIGuration:ROSC?`

Returns `<NR1>` = 1 if a ROSC input is present.

`<NR1>` = 0 if a ROSC input is not present.

CURSor?

Returns all of the current cursor settings.

Group Cursor

Syntax `CURSor?`

Examples `CURSOR?` might return the following as the current cursor settings:
`:CURSOR:FUNCTION SCREEN;HBARS:POSITION1 0.0000;POSITION2 0.0000;UNITS BASE;:CURSOR:MODE INDEPENDENT;VBARS:POSITION1 -19.0006E-6;POSITION2 -18.9994E-6;UNITS SECONDS`

CURSor:DDT? (Query Only)

Returns the cursor deltaY/deltaT (dY/dT) readout.

Conditions This command requires a DPO3PWR application module.

Group Cursor

Syntax `CURSor:DDT?`

Examples `CURSOR:DDT?` might return `:CURSOR:DDT -166.6670` indicating that the cursor dV/dt read out is -166.6670

CURSor:FUNCtion

Sets or returns the cursor type. Cursors are attached to the selected waveform in Waveform mode and are attached to the display area in Screen mode.

Group Cursor

Syntax

```
CURSor:FUNCtion {OFF|SCREEN|WAVEform}
CURSor:FUNCtion?
```

Arguments `OFF` removes the cursors from the display but does not change the cursor type.

`SCREEN` specifies both horizontal and vertical bar cursors, which measure the selected waveform in horizontal and vertical units. Use these cursors to measure anywhere in the waveform display area.

`WAVEform` specifies paired cursors in YT display format for measuring waveform amplitude and time. In XY and XYZ format, these cursors indicate the amplitude positions of an XY pair (Ch1 vs Ch2 voltage, where Ch1 is the X axis and Ch2 is the Y axis) relative to the trigger.

Examples `CURSOR:FUNCTION WAVEFORM` selects the paired cursors for measuring waveform amplitude and time.

`CURSOR:FUNCTION?` might return `:CURSor:FUNCtion SCREEN` indicating that the screen cursors are currently selected.

CURSor:HBArs? (Query Only)

Returns the current settings for the horizontal bar cursors.

Group Cursor

Syntax `CURSor:HBArs?`

Examples `CURSOR:HBARS?` might return the horizontal bar setting as `:CURSOR:HBARS:POSITION1` 320.0000E-03;POSITION2-320.0000E-03;UNITS BASE

CURSor:HBArs:DELTa? (Query Only)

Returns the vertical difference between the two horizontal bar cursors.

Group Cursor

Syntax `CURSor:HBArs:DELTa?`

Related Commands CURSor:HBArs:UNIts

Returns A floating point value with an exponent.

Examples `CURSOR:HBARS:DELTA?` might return `:CURSOR:HBARS:DELTA 5.0800E+00` indicating that the difference between the two cursors is 5.08.

CURSor:HBArs:POSITION<x>

Sets or returns the horizontal bar cursor position relative to ground, which is expressed in vertical units (usually volts). The cursor is specified by x, which can be 1 or 2.

Group Cursor

Syntax

```
CURSor:HBArs:POSITION<x> <NR3>
CURSor:HBArs:POSITION<x>?
```

Related Commands CURSor:FUNCtion

Arguments <NR3> specifies the cursor position relative to ground.

Examples `CURSOR:HBARS:POSITION1 25.0E-3` positions Cursor 1 of the horizontal cursors at 25 mV.

`CURSOR:HBARS:POSITION2?` might return `:CURSOR:HBARS:POSITION2 -64.0000E-03` indicating that Cursor 2 of the horizontal bar cursors is at -64 mV.

CURSor:HBArs:UNIts

Sets or returns the units for the horizontal bar cursors.

Group Cursor

Syntax

```
CURSor:HBArs:UNIts {BASE|PERCent}
CURSor:HBArs:UNIts?
```

Arguments `BASE` selects the vertical units for the selected waveform.

`PERCent` selects ratio cursors.

Examples `CURSOR:HBARS:UNITS` might return `:CURSOR:HBARS:UNITS BASE` indicating that the units for the horizontal bar cursors are base.

CURSor:HBArs:USE (No Query Form)

Sets the horizontal bar cursor measurement scale. This command is only applicable when ratio cursors are on.

Group Cursor

Syntax

```
CURSor:HBArs:USE {CURrent|HALFgrat}
```

Related Commands CURSor:HBArs:UNIts

Arguments `CURrent` sets the H Bar measurement scale so that 0% is the current position of the lowest H Bar cursor and 100% is the current position of the highest H Bar cursor.

`HALFgrat` sets H Bar measurement scale so that half the screen major divisions (four on the DPO3000) is 100%, where 0% is -2 divisions and 100% is +2 divisions from the center horizontal graticule.

Examples

`CURSOR:HBARS:USE HALFGRAT` sets the H Bar measurement scale so that four screen major divisions equals 100%.

CURSor:MODe

Sets or returns whether the two cursors move linked together in unison or separately. This applies to the Waveform cursors display mode.

Conditions

This command is only applicable when waveform cursors are displayed.

Group

Cursor

Syntax

```
CURSor:MODe {TRACk|INDependent}
CURSor:MODe?
```

Arguments

`TRACk` ties the navigational functionality of the two cursors together. For cursor 1 adjustments, this ties the movement of the two cursors together; however, cursor 2 continues to move independently of cursor 1.

`INDependent` allows independent adjustment of the two cursors.

Examples

`CURSOR:MODE TRACK` specifies that the cursor positions move in unison.

`CURSOR:MODE?` might return `:CURSOR:MODE TRACK` indicating that the two cursors move in unison.

CURSor:VBArs? (Query Only)

Returns the current settings for the vertical bar cursors.

Group

Cursor

Syntax

```
CURSor:VBArs?
```

Examples

`CURSOR:VBARS?` might return the following vertical bar settings `:CURSOR:VBARS:UNITS SECONDS;POSITION1` 1.0000E-06;POSITION2 9.0000E-06

CURSor:VBArs:ALTERNATE<x>? (Query Only)

Returns the alternate readout for the waveform (Vbar) cursors specified by <x>. This alternate readout is in effect for a bus or digital waveform.

Group

Cursor

Syntax

`CURSor:VBArs:ALTERNATE<x>?`

Arguments

`X = 1` specifies vertical bar cursor1.

`X = 2` specifies vertical bar cursor2.

CURSor:VBArs:DELTa? (Query Only)

Returns the horizontal difference between the two vertical bar cursors. The units are specified by the CURSor:VBArs:UNIts command.

This is equivalent to watching the cursor readout in the display while using the appropriate cursor mode.

Group

Cursor

Syntax

`CURSor:VBArs:DELTa?`

Related Commands

CURSor:VBArs:UNIts

Returns

`<NR3>`

Examples

`CURSOR:VBARS:DELTA?` might return `:CURSOR:VBARS:DELTa 1.0640E+00` indicating that the time between the vertical bar cursors is 1.064 s.

CURSor:VBArs:HPOS<x>? (Query Only)

Returns the vertical value of the specified vertical bar ticks for cursor <x>.

Group Cursor

Syntax
```
CURSor:VBArs:HPOS<x>?
```

Related Commands CURSor:VBArs:UNIts

Arguments <x> specifies the cursor. Valid values are 1 and 2.

Returns <NR3> indicates the value of one of the ticks. The units are the same as used in the selected waveform.

Examples `CURSor:VBArs:HPOS2?` might return CURSOR:VBARS:HPOS2 100E-3, indicating that the waveform value where the cursor intersects it is 0.100.

CURSor:VBArs:POSITION<x>

Sets or returns the horizontal position for the specified vertical bar cursor. The cursor is specified by <x>, which can be 1 or 2. Values are with respect to trigger position or the zero reference point for the designated waveform (if horizontal units are not set to time). Use the CURSor:VBArs:UNIts command to specify units.

Group Cursor

Syntax
```
CURSor:VBArs:POSITION<x> <NR3>
CURSor:VBArs:POSITION<x>?
```

Related Commands CURSor:VBArs:UNIts

Arguments <NR3> specifies the cursor position.

Returns A floating point value with an exponent.

Examples `CURSor:VBArs:POSITION2 9.00E-6` positions the cursor2 vertical bar cursor at 9 ms.

`CURSor:VBArs:POSITION1?` this command might return `:CURSOR:VBARS:POSITION1 1.0000E-06` indicating that the cursor1 vertical bar is positioned at 1 µs.

CURSor:VBArs:UNIts

Sets or returns the units for the vertical bar cursors.

Group Cursor

Syntax

```
CURSor:VBArs:UNIts {SEConds|HERtz|DEGrees|PERcent}
CURSor:VBArs:UNIts?
```

Arguments `SEConds` sets the units of the vertical bar cursors for the time domain (seconds).

`HERtz` sets the units of the vertical bar cursors for the frequency domain (Hertz).

`DEGrees` sets the units to degrees for measuring phase.

`PERcent` sets the units to percent for use with ratio cursors.

Returns `SECONDS`, `HERTZ`, `DEGREES`, or `PERCENT`, depending on the current vertical bar cursor units.

Examples `CURSOR:VBARS:UNITS HERtz` sets the units of the VBArs cursors to 1/seconds.

`CURSOR:VBARS:UNITS?` might return `:CURSOR:VBARS:UNITS SECONDS` indicating that the units for the vertical bar cursor are currently set to seconds.

CURSor:VBArs:USE (No Query Form)

Sets the vertical bar cursor measurement scale.

Conditions This command is only applicable when ratio cursors are on.

Group Cursor

Syntax

```
CURSor:VBArs:USE {CURrent|HALFgrat}
```

Related Commands CURSor:VBArs:UNIts

Arguments

`CURrent` sets the V Bar measurement scale so that 0% is the current position of the left-most V Bar cursor and 100% is the current position of the right-most V Bar cursor.

`HALFgrat` resets the ratio range to the default positions on the screen, half of the number of horizontal divisions (four on the MSO/DPO3000), from 25% to 75% of the screen.

Examples

`CURSOR:VBARS:USE CURRENT` sets the V Bar measurement scale to use the current cursor positions as 0% and 100% of scale if units are set to %.

CURSor:VBArs:VDELTa? (Query Only)

Returns the vertical difference between the two vertical bar cursor ticks.

Group

Cursor

Syntax

`CURSor:VBArs:VDELTa?`

Related Commands

CURSor:HBArs:UNIts

Returns

`<NR3>` indicates the vertical difference between the two vertical bar cursors' ticks.

Examples

`CURSOR:VBARS:VDELTA?` might return CURSOR:VBARS:VDELTA 1.064E+0, indicating that the vertical difference between the vertical bar cursors ticks is 1.064 units.

CURSor:XY:POLar:RADIUS:DELta? (Query Only)

Returns the difference between the cursors X radius and the cursor Y radius (ΔY¸ ΔX). The ratio is calculated as (cursor 2 Y - cursor 1 Y) ÷ (cursor 2 X - cursor 1 X).

Group

Cursor

Syntax

`CURSor:XY:POLar:RADIUS:DELta?`

CURSor:XY:POLar:RADIUS:POSITION<x>? (Query Only)

Returns the polar radius for the specified cursor, where x can be either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:POLar:RADIUS:POSITION<x>?
```

CURSor:XY:POLar:RADIUS:UNIts? (Query Only)

Returns the polar radius units.

Group Cursor

Syntax
```
CURSor:XY:POLar:RADIUS:UNIts?
```

CURSor:XY:POLar:THETA:DELta? (Query Only)

Returns the XY cursor polar angle delta.

Group Cursor

Syntax
```
CURSor:XY:POLar:THETA:DELta?
```

CURSor:XY:POLar:THETA:POSITION<x>? (Query Only)

Returns the cursor X or cursor Y polar coordinate, where x is either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:POLar:THETA:POSITION<x>?
```

CURSor:XY:POLar:THETA:UNIts? (Query Only)

Returns the cursor coordinate units.

Group Cursor

Syntax
```
CURSor:XY:POLar:THETA:UNIts?
```

CURSor:XY:PRODUCT:DELta? (Query Only)

Returns the difference between the cursors X position and cursor Y position. The ΔX × ΔY value is calculated as (X2 - X1) × (Y2 - Y1).

Group Cursor

Syntax `CURSor:XY:PRODUCT:DELta?`

CURSor:XY:PRODUCT:POSITION<x>? (Query Only)

Returns the position of the X or Y cursor used to calculate the X × Y cursor measurement, Position 1 = (X1 × Y1); Position 2 = (X2 × Y2). The cursor is specified by x, which can be 1 or 2.

Group Cursor

Syntax `CURSor:XY:PRODUCT:POSITION<x>?`

CURSor:XY:PRODUCT:UNIts? (Query Only)

Returns the XY cursor product units.

Group Cursor

Syntax `CURSor:XY:PRODUCT:UNIts?`

CURSor:XY:RATIO:DELta? (Query Only)

Returns the ratio of the difference between the cursors X position and cursor Y position (ΔY¸ ΔX). The ratio is calculated as (Y2 - Y1) / (X2 - X1).

Group Cursor

Syntax `CURSor:XY:RATIO:DELta?`

CURSor:XY:RATIO:POSITION<x>? (Query Only)

Returns the X (horizontal) or Y (vertical) position for the specified cursor, which can be 1 (X) or 2 (Y). The ratio is calculated as Position 1 = (Y1/X1); Position 2 = (Y2/X2).

Group Cursor

Syntax

```
CURSor:XY:RATIO:POSITION<x>?
```

CURSor:XY:RATIO:UNIts? (Query Only)

Returns the cursor X and cursor Y units for the ratio measurement.

Group Cursor

Syntax

```
CURSor:XY:RATIO:UNIts?
```

CURSor:XY:READOUT

Sets or returns the XY cursor readout selection. This command is useful for oscilloscope models with limited display room. Oscilloscopes with sufficient display, such as the DPO/MSO4000 series, show all the readouts simultaneously.

Group Cursor

Syntax

```
CURSor:XY:READOUT {RECTangular|POLARCord|PRODuct|RATio}
CURSor:XY:READOUT?
```

Arguments

`RECTangular` specifies the XY readout as rectangular coordinates.

`POLARCord` specifies the XY readout as polar coordinates.

`PRODuct` specifies the XY readout in X*Y format.

`RATio` specifies the XY readout in X:Y format.

CURSor:XY:RECTangular:X:DELta? (Query Only)

Returns the cursor X delta value in rectangular coordinates.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:X:DELta?
```

CURSor:XY:RECTangular:X:POSITION<x>

Sets or returns the X rectangular coordinate for cursor 1 or cursor 2. The cursor is specified by x and can be either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:X:POSITION<x> <NR3>
CURSor:XY:RECTangular:X:POSITION<x>?
```

Arguments `<NR3>` is the coordinate in volts.

CURSor:XY:RECTangular:X:UNIts? (Query Only)

Returns the cursor X rectangular units.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:X:UNIts?
```

CURSor:XY:RECTangular:Y:DELta? (Query Only)

Returns the cursor Y delta value in rectangular coordinates.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:Y:DELta?
```

CURSor:XY:RECTangular:Y:POSITION<x>

Sets or returns the Y rectangular coordinate for cursor 1 or cursor 2. The cursor is specified by x and can be either 1 or 2.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:Y:POSITION<x> <NR3>
CURSor:XY:RECTangular:Y:POSITION<x>?
```

Arguments `<NR3>` is the coordinate in volts.

CURSor:XY:RECTangular:Y:UNIts? (Query Only)

Returns the cursor Y rectangular units.

Group Cursor

Syntax
```
CURSor:XY:RECTangular:Y:UNIts?
```

CURVe

The `CURVe` command transfers the waveform data points TO the oscilloscope's internal reference memory location (REF1–4), which is specified by the `DATa:DESTination` command. The `CURVe?` query transfers data FROM the oscilloscope; the source waveform is specified by the `DATa:SOUrce` command. The first and last data points are specified by the `DATa:STARt` and `DATa:STOP` commands.

Associated with each waveform transferred using the `CURVe` command or query is a waveform preamble that provides the data format, scale and associated information needed to interpret the waveform data points. The preamble information for waveforms sent TO the oscilloscope is specified using the `WFMInpre` commands. The preamble information for waveforms transferred FROM the oscilloscope is specified or queried using the `WFMOutpre` commands. If the waveform is not displayed, the query form generates an error.

The `CURVe` command and `CURVe?` query transfer waveform data in ASCII or binary format. ASCII data is sent as a comma-separated list of decimal values. Binary data is sent with the IEEE488.2 binary block header immediately followed by the binary data. The IEEE488.2 binary block header is defined as follows:

#N<N-digits>

where: N is a single decimal or hexadecimal digit indicating the number of digits to follow. <N-digits> are the decimal digits representing the number of bytes in the data that immediately follows this binary block header.

The Waveform Transfer command group text contains more comprehensive information. (See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *In order to guarantee that the waveform data returned from* `CURVE?` *queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using* *ACQuire:STOPAfter* `SEQuence`.

NOTE. *For command sequence examples, see Appendix D. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

Group

Waveform Transfer

Syntax

```
CURVe {<Block>|<asc curve>}
CURVe?
```

Related Commands

DATa:DESTination

DATa:ENCdg

DATa:SOUrce

DATa:STARt

DATa:STOP

WFMInpre?

WFMOutpre?

ACQuire:MODe

Arguments

`<Block>` is the waveform data in binary format. The waveform is formatted as follows:

<IEEE488.2 binary block header><data><newline>

<IEEE488.2 binary block> is the header, which is defined as #N<N-digits>

N is a single decimal or hexadecimal digit indicating the number of digits to follow.

<N-digits> are the decimal digits representing the number of bytes in the data that immediately follows this binary block header. (Use the WFMInpre:BYT_Nr command to set the width for waveforms transferred into the oscilloscope. Use WFMOutpre:BYT_Nr to set the width for waveforms transferred out from the oscilloscope.)

<data> is the curve data.

<newline> is a single byte new line character at the end of the data.

`<asc curve>` is the waveform data in ASCII format. The format for ASCII data is `<NR1>`[,`<NR1>`...], where each `<NR1>` represents a data point.

Examples

`CURVe 0,1,4,32,-120 …` — This command sends ASCII data values to the specified destination reference waveform (DATa:DESTination).

`CURVe #510000<10000 binary bytes>` — This command sends 10,000 binary data bytes to the specified destination reference waveform (DATa:DESTination).

`CURVE`? with ASCII encoding, START and STOP of 1 and 10 respectively, and a width set to 1 might return `:CURVe 61,62,61,60,60,-59,-59,-58,-58,-59`

`CURVe?` with ASCII encoding, START and STOP of 1 and 5 respectively, and `DATa:SOUrce` set to `RF_NORMal` might return `:CURVE 1.20635E-11,6.30522E-12,1.46334E-11,8.97143E-12,4.87173E-12.`

NOTE. *Curve data is transferred from the oscilloscope asynchronously, depending on the length of the curve record. Such transfers may require several seconds to complete. During this period, the oscilloscope will not respond to the user controls. You can interrupt these asynchronous data transfers by sending a device clear message to the oscilloscope or by interrupting the query with another command or query. In order to verify that curve data has been completely transferred, it is recommended that you follow such queries with an *ESR? query to verify there are no error bits set. You can also check the event queue to determine the cause of the error, if any. If the error was caused by an interrupted query, then the asynchronous data transfer was not complete when the *ESR? query was sent. In such cases, it may be necessary to increase the program's time-out value to ensure that all data is transferred and read.*

DATa

These commands specify the format and location of waveform data that is transferred using the CURVe command, or return the format and location of the waveform data that is transferred with the CURVe? query. You can use the `INIT` argument to reset all of the `DATa` parameters to default values. (Note that the `*RST` and `FACtory` commands do not reset the `DATa` parameters.) You can use the `SNap` argument to automatically set the `DATa:STARt` and `DATa:STOP` values to the starting and stopping point of the waveform cursors (if on). Note that setting `DATa:STARt` and `DATa:STOP` automatically sets `WFMOutpre:NR_Pt.`

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa {INIT|SNAp}
DATa?
```

Related Commands

CURVe,

DATa:STARt,

DATa:STOP,

DATa:ENCdg,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments

`INIT` initializes the waveform data parameters to their factory defaults except for DATa:STOP, which is set to the current acquisition record length. The data waveform preamble parameters are initialized to the following values:

:DATa:SOUrce CH1

:DATa:DESTination REF1

:WFMInpre:BYT_NR 1

:WFMInpre:BIT_NR 8

:WFMInpre:ENCDG BINARY

:WFMInpre:BN_FMT RI

:WFMInpre:BYT_OR MSB

:WFMInpre:PT_FMT Y

:WFMOutpre:BYT_NR 1

:WFMOutpre:BIT_NR 8

:WFMOutpre:ENCDG BINARY

:WFMOutpre:BN_FMT RI

:WFMOutpre:BYT_OR MSB

:WFMOutpre:NR_PT <current acquisition record length>

:WFMOutpre:PT_FMT Y

`SNAp` sets DATa:STARt and DATa:STOP to match the current waveform cursor positions.

Examples

`DATA?` might return `:DATA:DESTINATION REF1:ENCDG` RIBINARY;SOURCE CH1;START 1;STOP 500;WIDTH 1

`DATA INIT` initializes the waveform data parameters to their factory defaults.

DATa:DESTination

This command specifies the reference memory location (REF1–4) for storing waveform data transferred into the oscilloscope using the CURVe command.

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:DESTination REF<x>
DATa:DESTination?
```

Related Commands

CURVe

Arguments

`REF<x>` is the reference location where the waveform will be stored.

Examples

`DATA:DESTINATION?` might return `:DATA:DESTINATION REF3` indicating that reference 3 is the currently selected reference memory location for incoming waveform data. `DATA:DESTINATION REF1` indicates that incoming waveform data be stored in reference 1.

DATa:ENCdg

This command specifies the encoding format for outgoing waveform data. This command is equivalent to setting WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or. Setting the DATa:ENGdg value causes the corresponding WFMOutpre values to be updated.

NOTE. *This command and query does not apply to incoming waveform data.*

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group

Waveform Transfer

Syntax

```
DATa:ENCdg
{ASCIi|FAStest|RIBinary|RPBinary|SRIbinary|SRPbinary}
```

```
DATa:ENCdg?
```

Related Commands

WFMOutpre:ENCdg,

WFMOutpre:BN_Fmt,

WFMOutpre:BYT_Or

Arguments

ASCIi specifies to use ASCII encoding for the waveform data queried using the CURVe? query. Data values are returned as signed decimal integers for analog channel data, or hexadecimal values for Digital Collection data with 4 or 8 bytes per point. The maximum number of ASCII data points that can be queried using the CURVe? query is 1 million points. If more than 1 million points are desired, you must use one of the binary encodings. If ASCII is the value, then BN_Fmt and BYT_Or are ignored.

FAStest specifies the encoding which results in the fastest waveform data transfer rate. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BIN_Fmt RI and WFMOutpre:BYT_Or MSB.

RIBinary specifies the signed integer data point format, with the most significant byte transferred first.

When DATa:WIDTH is set to 1, the range is from -128 through 127. When DATa:WIDTH is 2, the range is from -32,768 through 32,768. Center screen is 0 (zero). The upper limit is the top of the screen and the lower limit is the bottom of the screen. The default encoding is RIBINARY. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BN_Fmt RI and WFMOutpre:BYT_Or MSB.

RPBinary specifies the positive integer data-point representation, with the most significant byte transferred first.

When BYT_Nr is 1, the range of data values is 0 through 255. When BYT_Nr is 2, the range of data values is 0 to 65,535. The center of the screen is 127 for 1-byte data and is 32768 for 2-byte data. The upper limit is the top of the screen and the lower limit is the bottom of the screen. This sets the following: :WFMOutpre:ENCdg BINary,:WFMOutpre:BN_Fmt RP and WFMOutpre:BYT_Or MSB.

SRIbinary specifies the signed integer format. It is the same as RIBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BIN_Fmt RI and WFMOutpre:BYT_Or LSB.

SRPbinary specifies the positive integer format. It is the same as RPBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This sets the following: WFMOutpre:ENCdg BINary, WFMOutpre:BN_Fmt RP and WFMOutpre:BYT_Or LSB.

Table 2-42: DATa and WFMOutpre Parameter Settings

DATa:ENCdg	WFMOutpre Settings			
Setting	:ENCdg	:BN_Fmt	:BYT_Or	:BYT_NR
ASCii	ASC	N/A	N/A	1,2,4,8
FAStest	BIN	RI	MSB	1,2
RIBinary	BIN	RI	MSB	1,2
RPBinary	BIN	RP	MSB	1,2
SRIbinary	BIN	RI	LSB	1,2
SRPbinary	BIN	RP	LSB	1,2
FPbinary	BIN	FP	MSB	4
SFPbinary	BIN	FP	LSB	4

Examples

DATA:ENCDG? might return :DATa:ENCDG SRPBINARY for the format of the outgoing waveform data.

DATA:ENCDG RPBinary sets the data encoding format to be a positive integer where the most significant byte is transferred first.

DATa:SOUrce

This command specifies the source waveform to be transferred from the oscilloscope using the CURVe? query. The valid waveform sources are CH1-CH4, MATH, REF1-REF4, D0-D15, or DIGital. Setting DATa:SOUrce automatically constrains the following to valid values for the specified source waveform: WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr and WFMOutpre:BN_Fmt.

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF1|REF2|REF3|REF4|D0|D1|D2|D3
|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D15|DIGital}
```

```
DATa:SOUrce?
```

Related Commands

CURVe

Arguments

`CH1–CH4` specifies which analog channel waveform data will be transferred from the oscilloscope to the controller, channels 1 through 4.

`MATH` specifies that the Math waveform data will be transferred from the oscilloscope to the controller.

`REF1–REF4` specifies which Reference waveform data will be transferred from the oscilloscope to the controller.

`D0–D15` specifies which digital channel waveform data will be transferred from the oscilloscope to the controller. (MSO models only)

`DIGital` specifies that the Digital Collection waveform data will be transferred from the oscilloscope to the controller. (MSO models only)

Examples

`DATA:SOURCE?` might return `:DATA:SOURCE REF3` indicating that the source for the waveform data which is transferred using a CURVe? query is reference 3.

`DATA:SOURCE CH1` specifies that the CH1 waveform will be transferred in the next CURVe? query.

DATa:STARt

This command specifies the starting data point for incoming or outgoing waveform transfer using the `CURVe` command or query. (Use `DATa:STOP` to specify the ending data point.) You can set the `DATa:STARt` and `DATa:STOP` values automatically to the starting and stopping points of the waveform cursors, if on, using `DATa SNap`. Note that setting `DATa:STARt` and `DATa:STOP` automatically sets `WFMOutpre:NR_Pt.`

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:STARt <NR1>
DATa:STARt?
```

Related Commands

CURVe,

DATa,

DATa:STOP,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments

`<NR1>` is the first data point that will be transferred, which ranges from 1 to the record length. Data will be transferred from `<NR1>` to `DATa:STOP` or the record length, whichever is less. If `<NR1>` is greater than the record length, the last data point in the record is transferred.

`DATa:STARt` and `DATa:STOP` are order independent. When `DATa:STOP` is greater than `DATa:STARt`, the values will be swapped internally for the `CURVe?` query.

Examples

`DATA:START?` might return `:DATA:START 214` indicating that data point 214 is the first waveform data point that will be transferred.

`DATA:START 10` specifies that the waveform transfer will begin with data point 10.

DATa:STOP

This command specifies the final data point that will be transferred when using the CURVe command or query for incoming or outgoing waveform transfer. (Use`DATa:STARt` to specify the starting data point.)

NOTE. *The oscilloscope automatically adjusts the `DATa:START` and `DATa:STOP` values for `CURVe` queries when the `DATa:STOP` value is less than the `DATa:START` value, and also when the `DATa:START` and/or `DATa:STOP` values are greater than the record length of the source waveform. The adjusted `DATa:START` and `DATa:STOP` values determine`WFMOutpre:NR_Pt.`*

You can set the `DATa:STARt` and `DATa:STOP` values to automatically to the starting and stopping points of the waveform cursors, if on, using the `DATa` command with the SNap argument. Note that setting `DATa:STARt` and `DATa:STOP` automatically sets `WFMOutpre:NR_Pt.`

Changes to the record length value are not automatically reflected in the `DATa:STOP` value. As record length is varied, the `DATa:STOP` value must be explicitly changed to ensure the entire record is transmitted. In other words, curve results will not automatically and correctly reflect increases in record length if the difference of DATa:STARt and `DATa:STOP` remains smaller than the increased record length. Note that `DATa:STOP` can be larger than the record length. (Use WFMOutpre:NR_Pt? to find how many samples are available.)

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
DATa:STOP <NR1>
DATa:STOP?
```

Related Commands

CURVe,

DATa,

DATa:STARt,

WFMInpre:NR_Pt,

WFMOutpre:NR_Pt?

Arguments

`<NR1>` is the last data point that will be transferred, which ranges from 1 to the record length. If`<NR1>` is greater than the record length, then data will be transferred up to the record length. If both `DATa:START` and `DATa:STOP` are greater than the record length, the last data point in the record is returned.

`DATa:STARt` and `DATa:STOP` are order independent. When `DATa:STOP` is less than `DATa:STARt`, the values will be swapped internally for the `CURVe?` query.

If you always want to transfer complete waveforms, set `DATa:STARt` to 1 and `DATa:STOP` to the record length of the source waveform, or larger.

Examples

`DATA:STOP?` might return `DATA:STOP 14900` indicating that 14900 is the last waveform data point that will be transferred.

`DATA:STOP 15000` specifies that the waveform transfer will stop at data point 15000.

DATa:WIDth

This command specifies the width, in bytes per point, for waveform data transferred from the scope via the `CURVe?` query. (This command is synonymous with `WFMOutpre:BYT_Nr` .) When the source is `CH1-CH4, REF1-REF4, or`

`MATH,` the default width is 1 byte. When the source is `DIGital,` the default width is 4 bytes.

NOTE. *This command is equivalent to the `WFMOutpre:BYT_Nr` command.*

(See page 2-78, Waveform Transfer Command Group.)

Group Waveform Transfer

Syntax

```
DATa:WIDth <NR1>
DATa:WIDth?
```

Related Commands CURVe?,

DATa:SOUrce,

DATa:DESTination,

WFMOutpre:BYT_Nr

Arguments `<NR1>` is an integer that indicates the number of bytes per point for the outgoing waveform data when queried using the `CURVe?` command. For analog channels, the values can be 1 or 2. For digital channels (D0 through D15), the values can be 1 or 2. For the digital collection (`DATa:SOUrce DIGital`), the values can be 4 or 8.

Examples `DATa:WIDth 2` sets the width of waveform data to be read from the scope to 2 bytes.

`DATa:WIDth?` might return 1, indicating that a width of 1 byte has been set.

DATE

Sets or returns the date the oscilloscope displays.

Group Miscellaneous

Syntax

```
DATE <QString>
DATE?
```

Related Commands TIME

Arguments

`<QString>` is a date in the form "yyyy-mm-dd" where yyyy refers to a four-digit year number, mm refers to a two-digit month number from 01 to 12, and dd refers to a two-digit day number in the month.

Examples

`DATE "2006-01-24"` specifies that the date is set to January 24, 2006.

`DATE?` might return `:DATE 2006-01-24` indicating the current date is set to January 24, 2006.

*DDT

Allows you to specify a command or a list of commands that execute when the oscilloscope receives a *TRG command or the GET IEEE488.2 interface message. Define Device Trigger (*DDT) is a special alias that the *TRG command uses.

Group

Miscellaneous

Syntax

```
*DDT {<Block>|<QString>}
*DDT?
```

Related Commands

ALIas, *TRG

Arguments

`<Block>` is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters. The format of this argument is always returned as a query.

`<QString>` is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters.

Examples

`*DDT #OACQUIRE:STATE RUN` specifies that the acquisition system will be started each time a *TRG command is sent.

DESE

Sets or returns the bits in the Device Event Status Enable Register (DESER). The DESER is the mask that determines whether events are reported to the Standard Event Status Register (SESR), and entered into the Event Queue. For a detailed discussion of the use of these registers, see Registers.

Group
Status and Error

Syntax
```
DESE <NR1>
DESE?
```

Related Commands
*CLS, *ESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Arguments
`<NR1>` sets the binary bits of the DESER according to this value, which ranges from 1 through 255. For example, DESE 209 sets the DESER to the binary value 11010001 (that is, the most significant bit in the register is set to 1, the next most significant bit to 1, the next bit to 0, etc.).

The power-on default for DESER is all bits set if *PSC is 1. If *PSC is 0, the DESER maintains the previous power cycle value through the current power cycle.

***NOTE.** Setting the DESER and ESER to the same value allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the *ESE command to set the ESER.*

Examples
`DESE 209` sets the DESER to binary 11010001, which enables the PON, URQ, EXE and OPC bits.

`DESE?` might return `:DESE 186`, showing that the DESER contains the binary value 10111010.

DESkew (No Query Form)

Causes the deskew values for all channels to be set to the recommended values. Equivalent to pressing the "Set all deskews to recommended values" button in the application UI.

***NOTE.** The actual deskew values for each channel can be set or queried using the CH<x>:DESKew command.*

Group
Vertical

Syntax
```
DESkew {SETALLtorec}
```

Arguments
`<SETALLtorec>` sets the deskew for all channels to the recommended values.

DESkew:DISPlay

Sets or returns the state of the deskew table display.

Group Vertical

Syntax

```
DESkew:DISPlay {OFF|ON|0|1}
DESkew:DISPlay?
```

Arguments OFF or 0 turns off the deskew table display.

ON or 1 turns on the deskew table display.

DIAg:LOOP:OPTion

Sets the self-test loop option.

Group Calibration and Diagnostic

Syntax

```
DIAg:LOOP:OPTion {ALWAYS|FAIL|ONFAIL|ONCE|NTIMES}
```

Arguments ALWAYS continues looping until the self tests (diagnostics) are stopped via the front panel or by an oscilloscope command.

FAIL causes looping until the first self test (diagnostic) failure or until self tests (diagnostics) are stopped.

ONFAIL causes looping on a specific test group as long as a FAIL status is returned from the test.

ONCE executes self test (diagnostics test) sequence once.

NTIMES runs “n” number of loops.

Examples DIAG:LOOP:OPTION ONCE runs one loop of self tests.

DIAg:LOOP:OPTion:NTIMes

Sets the self-test loop option to run N times.

Group Calibration and Diagnostic

Syntax

```
DIAg:LOOP:OPTion:NTIMes <NR1>
DIAg:LOOP:OPTion:NTIMes?
```

Arguments

`<NR1>` is the number of self-test loops.

Examples

`DIAG:LOOP:OPTION:NTIMES 3` sets the self-test loop to run three times.

`DIAG:LOOP:OPTION:NTIMES?` might return `:DIAG:LOOP:OPTION:NTIMES 5`, indicating the self-test loop is set to run five times.

DIAg:LOOP:STOP (No Query Form)

Stops the self-test at the end of the current loop.

Group

Calibration and Diagnostic

Syntax

```
DIAg:LOOP:STOP
```

Examples

`DIAG:LOOP:STOP` stops the self test at the end of the current loop.

DIAg:RESUlt:FLAg? (Query Only)

Returns the pass/fail status from the last self-test sequence execution. Use this query to determine which test(s) has failed.

Group

Calibration and Diagnostic

Syntax

```
DIAg:RESUlt:FLAg?
```

Related Commands

DIAg:RESUlt:LOG?

Returns

`PASS` indicates that all of the selected self (diagnostic) tests have passed.

`FAIL` indicates that at least one of the selected self (diagnostic) tests has failed.

`IN PROGRESS` indicates that at least one of the selected self (diagnostic) tests is ongoing.

`NOT RUN` indicates that the selected diagnostic test suite has not been run since the instrument was powered on.

Examples DIAG:RESULT:FLAG? might return DIAG:RESULT:FLAG PASS.

DIAg:RESUlt:LOG? (Query Only)

Returns the internal results log from the last self-test sequence execution. The list contains all modules and module interfaces that were tested along with the pass/fail status of each.

Group Calibration and Diagnostic

Syntax DIAg:RESUlt:LOG?

Related Commands DIAg:RESUlt:FLAg?

Returns <QString> in the following format:

<Status>--<Module name>[,<Status>--<Module name>...]

Examples DIAG:RESULT:LOG? might return :DIAG:RESULT:LOG "NOT RUN--CPU,NOT RUN--DISPLAY,NOT RUN--FPANEL,NOT RUN--IO,NOT RUN--ACQ,NOT RUN--RO M,NOT RUN--APPKEY"

DIAg:SELect (No Query Form)

Sets the type of diagnostics grouping.

Group Calibration and Diagnostic

Syntax DIAg:SELect {ALL|APPKey|CPU|DISplay|FPAnel|IO|ROM|ACQ}

Arguments ALL runs all diagnostic groups.

APPKey runs just the application key diagnostic group.

CPU runs just the CPU diagnostic group.

DISplay runs just the display circuit diagnostic group.

FFPAnel runs just the front panel diagnostic group.

IO runs just the IO board diagnostic group.

`ROM` runs just the IO board diagnostic group.

`ACQ` runs just the acquisition system diagnostic group.

DIAg:SELect:<function> (No Query Form)

Runs self-tests on the specified system subsystem.

Group Calibration and Diagnostic

Syntax `DIAg:SELect:<function>`

Arguments `<function>` specifies a single oscilloscope subsystem on which to run self tests (diagnostics). Valid values are:

`ACQ` tests the acquisition system.

`APPKey` tests the application keys.

`CPU` tests the CPU.

`DISplay` tests the display.

`FPAnel` tests the front panel controls.

`IO` tests the IO ports.

`ROM` tests the system read only memory.

Examples `DIAG:SELECT:CPU` sets the oscilloscope to run just CPU tests.

DIAg:STATE (No Query Form)

This command starts or stops the oscilloscope self-test. Depending on the argument, self-test capabilities are either turned on or off.

Group Calibration and Diagnostic

Syntax `DIAg:STATE {EXECute|ABORt}`

Arguments `EXECute` starts diagnostics.

`ABORt` stops diagnostics at the end of the current loop.

Examples `DIAG:STATE EXECute` starts diagnostics.

DISplay? (Query Only)

Returns the current display settings.

Group Display

Syntax `DISplay?`

DISplay:CLOCk

Sets or returns whether the oscilloscope displays the date and time. The query form of this command returns an ON (1) or an OFF (0).

Group Display

Syntax

```
DISplay:CLOCk {ON|OFF|<NR1>}
DISplay:CLOCk?
```

Related Commands DATE, TIME

Arguments `ON` enables the display of date and time.

`OFF` disables the display of date and time.

`<NR1>` = 0 disables the display of date and time; any other value enables the display of date and time.

Examples `DISPLAY:CLOCK ON` enables display of date and time.

`DISPLAY:CLOCK?` might return `:DISPLAY:CLOCK 1` indicating that the display of date and time is currently enabled.

DISplay:DIGital:HEIght

Sets or returns the number of available digital waveform position slots.

***NOTE.** If the number of live digital channels exceeds the number of slots, their height is reduced to a smaller size, allowing all digital channels to be displayed.*

Group Display

Syntax
```
DISplay:DIGital:HEIght {SMAll|MEDium|LARge}
DISplay:DIGital:HEIght?
```

Arguments SMAll sets the height to 40.

MEDium sets the height to 20.

LARge sets the height to 10.

DISplay:GRAticule

This command specifies the type of graticule the oscilloscope displays.

Group Display

Syntax
```
DISplay:GRAticule {CROSSHair|FRAme|FULl|GRId|SOLid}
DISplay:GRAticule?
```

Arguments CROSSHair specifies a frame and cross hairs.

FRAme specifies a frame only.

FULl specifies a frame, a grid and cross hairs.

GRId specifies a frame and grid only.

SOLid specifies a solid graticule.

Examples DISPLAY:GRATICULE FRAme sets the graticule type to display the frame only.

DISPLAY:GRATICULE? might return :DISPLAY:GRATICULE FULL indicating that all graticule elements are selected.

DISplay:INTENSITy? (Query Only)

Returns the display intensity settings.

Group Display

Syntax
```
DISplay:INTENSITy?
```

Examples `DISPLAY:INTENSITY?` might return: `:DISPLAY:INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT HIGH`

DISplay:INTENSITy:BACKLight

Sets and returns the waveform backlight intensity settings.

Group Display

Syntax

```
DISplay:INTENSITy:BACKLight {LOW|MEDium|HIGH}
DISplay:INTENSITy:BACKLight?
```

Examples `DISPLAY:INTENSITY:BACKLIGHT?` might return `DISPLAY:INTEnsITY:BACKLIGHT HIGH`

DISplay:INTENSITy:GRAticule

Sets and returns the display graticule intensity settings.

Group Display

Syntax

```
DISplay:INTENSITy:GRAticule <NR1>
DISplay:INTENSITy:GRAticule?
```

Arguments `<NR1>` is the graticule intensity and ranges from 0 to 100 percent.

Examples `DISPLAY:INTENSITY:GRATICULE?` might return `DISPLAY:INTEnsITY:GRATICULE 30`

DISplay:INTENSITy:WAVEform

Sets and returns the display waveform intensity settings.

Group Display

Syntax

```
DISplay:INTENSITy:WAVEform <NR1>
DISplay:INTENSITy:WAVEform?
```

Arguments

`<NR1>` is the waveform intensity and ranges from 1 to 100 percent.

Examples

`DISPLAY:INTENSITY:WAVEFORM?` might return
`DISPLAY:INTENsITY:WAVEFORM 60`

as the intensity of the waveforms.

DISplay:PERSistence

Sets or returns the display persistence. This affects the display only.

Group

Display

Syntax

```
DISplay:PERSistence {<NR3>|CLEAR|AUTO|INFInite|OFF}
DISplay:PERSistence?
```

Arguments

`<NR3>` is a floating point number that specifies the time of the persistence.

`CLEAR` resets the persist time count down and clears the display of acquired points.

`INFInite` displays waveform points until a control change resets the acquisition system.

NOTE. *When persistence is set to infinite, it does not mean that the brightness of any pixel should never decrease. The brightness of a pixel is proportionally dependent on the ratio between its intensity, which does NOT decrease at infinite persistence, and the maximum value of intensity of any pixel on the screen. Thus, if a particular pixel gets hit less often than others, its brightness will decrease over time. It will become less bright relative to the pixels that get hit more often.*

`AUTO` specifies that the oscilloscope automatically determines the best waveform persistence based on the value of waveform intensity (DISplay:INTENSITy:WAVEform)

`OFF` turns off DPO mode (0 seconds of persistence).

Examples

`DISPLAY:PERSISTENCE 3` specifies that the waveform points are displayed fading for 3 seconds before they completely disappear.

DISplay:STYle:DOTsonly

Turns on or off the dots-only mode for the waveform display.

Group Display

Syntax

```
DISplay:STYle:DOTsonly {ON|OFF|<NR1>}
DISplay:STYle:DOTsonly?
```

Arguments ON or <NR1> ≠ 0 turns on the dots-only display.

OFF or <NR1> = 0 turns off the dots-only display.

DISplay:XY

This command turns on or off the XY display mode.

Group Display

Syntax

```
DISplay:XY {OFF|TRIGgered}
DISplay:XY?
```

Related Commands All CURSOR:XY commands.

Arguments OFF — The channels are displayed individually as a function of time.

TRIGgered — The channels are displayed in "X-Y" pairs with CH1 being displayed as a function of CH2, and so on.

Examples DISplay:XY TRIG specifies to use the XY display mode.

DISPLAY:XY? might return OFF, indicating that the XY display mode is not currently on.

D<x>

Sets or returns parameters for digital channel <x>, where x is the channel number.

Group Vertical

Syntax

```
D<x>
```

D<x>:LABel

Sets or returns the waveform label for digital channel <x>, where x is the channel number.

Group Vertical

Syntax

```
D<x>:LABel <Qstring>
D<x>:LABel?
```

Arguments `<Qstring>` is an alpha-numeric string of text, enclosed in quotes, that contains the text label information for the digital channel <x> waveform. The text string is limited to 30 characters.

Examples `D4:LABEL?` might return `:D4:LABEL “Clk Wfm 4”`.

D<x>:POSition

Sets or returns the vertical position for digital channel <x>, where x is the channel number.

NOTE. *Unlike analog channels, which use the center baseline as the zero point, digital channels use the bottom logic level as the zero point. Because of the slot model used to describe digital channel position, the oscilloscope rounds off divisions to the nearest slot.*

Group Vertical

Syntax

```
D<x>:POSition <NR3>
D<x>:POSition?
```

Arguments `<NR3>` is the position of the digital channel in slot units. Use the oscilloscope front-panel controls to place the channel; then query the channel to obtain an exact value for the position.

D<x>:THREshold

Sets or returns the logical threshold for digital channel <x>, where x is the channel number.

Group Vertical

Syntax

```
D<x>:THREshold {ECL|TTL|<NR3>}
D<x>:THREshold?
```

Arguments ECL sets the digital threshold for channel <x> to a preset ECL high level of –1.3V.

TTL sets the digital threshold for channel <x> to a preset TTL high level of 1.4V.

<NR3> specifies the digital threshold for channel <x> in volts.

Examples D5:THRESHOLD ECL sets the threshold for D5 digital channel to ECL levels.

D14:threshold? might return :D14:THRESHOLD 1.2500 indicating that the threshold level for the D14 digital channel is 1.25 volts.

*ESE

Sets and queries the bits in the Event Status Enable Register (ESER). The ESER prevents events from being reported to the Status Byte Register (STB). For a detailed discussion on how to use registers, see Registers.

Group Status and Error

Syntax

```
*ESE <NR1>
*ESE?
```

Related Commands *CLS, DESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Arguments <NR1> specifies the binary bits of the ESER according to this value, which ranges from 0 through 255.

The power-on default for the ESER is 0 if *PSC is 1. If *PSC is 0, the ESER maintains the previous power cycle value through the current power cycle.

NOTE. *Setting the DESER and the ESER to the same values allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the DESE command to set the DESER.*

Examples *ESE 209 sets the ESER to binary 11010001, which enables the PON, URQ, EXE, and OPC bits.

*ESE? might return 186, showing that the ESER contains the binary value 10111010.

*ESR? (Query Only)

Returns the contents of the Standard Event Status Register (SESR). *ESR? also clears the SESR (reading the SESR clears it). For a detailed discussion on how to use registers, see Registers.

Group Status and Error

Syntax `*ESR?`

Related Commands ALLEv?, *CLS, DESE, *ESE, EVENT?, EVMsg?, *SRE, *STB?

Examples *ESR? might return 213, showing that the SESR contains the binary value 11010101.

ETHERnet:DHCPbootp

Sets or returns the network initialization search for a DHCP/BOOTP server.

Group Ethernet

Syntax

```
ETHERnet:DHCPbootp {ON|OFF}
ETHERnet:DHCPbootp?
```

Arguments `ON` enables the oscilloscope to search the network for a DHCP or BOOTP server in order to automatically assign a dynamic IP address to the oscilloscope.

NOTE. *Do not use DHCP/BOOTP searching if your oscilloscope has been assigned a static address on a network. If you set this command to ON, the DHCP/BOOTP search will delete or change your static IP address information.*

`OFF` disables the oscilloscope to search the network for a DHCP or BOOTP server.

Examples `ETHERNET:DHCPBOOTP ON` sets the oscilloscope to search for a DHCP or BOOTP server and assign a dynamic IP address to the oscilloscope.

ETHERnet:DNS:IPADDress

Sets or returns the network Domain Name Server (Dns) IP address.

Group Ethernet

Syntax

```
ETHERnet:DNS:IPADDress <QString>
ETHERnet:DNS:IPADDress?
```

Arguments `<QString>` is a standard IP address value, enclosed in quotes.

Examples `ETHERNET:DNS:IPADDRESS “128.196.13.352”` sets the Dns IP address that the oscilloscope uses to communicate with the network.

ETHERnet:DOMAINname

Sets or returns the network domain name.

Group Ethernet

Syntax

```
ETHERnet:DOMAINname <Qstring>
ETHERnet:DOMAINname?
```

Arguments `<QString>` is the network domain name, enclosed in quotes.

Examples `ETHERNET:DOMAINNAME “Alpha1.Mycorp.com”` sets the domain name that the oscilloscope uses to communicate with the network.

ETHERnet:ENET:ADDress? (Query Only)

Returns the Ethernet address value assigned to the oscilloscope. This is assigned at the factory and can not be changed.

Group Ethernet

Syntax

```
ETHERnet:ENET:ADDress?
```

Examples

`ETHERNET:ENET:ADDRESS?` returns an Ethernet address such as `08:00:11:01:02:03`

ETHERnet:GATEWay:IPADDress

Sets or returns the remote interface gateway IP address.

Group

Ethernet

Syntax

```
ETHERnet:GATEWay:IPADDress <QString>
ETHERnet:GATEWay:IPADDress?
```

Arguments

`<QString>` is a standard IP address value, enclosed in quotes.

Examples

`ETHERNET:GATEWAY:IPADDRESS “128.143.16.1”` sets the gateway IP address.

ETHERnet:HTTPPort

Sets or returns the remote interface HTTP port value.

Group

Ethernet

Syntax

```
ETHERnet:HTTPPort <QString>
ETHERnet:HTTPPort?
```

Arguments

`<QString>` is an integer port number, enclosed in quotes.

NOTE. *Consider the following if you are using the e*Scope™ control software. If you don't enter a port address in the URL, then the* `ETHERnet:HTTPPort` *value must be set to "80", which is the default port for HTTP protocol. If you use a URL with a port address (for example: http://DPO3104-04WKL4:1234), the port number is specified by the number after the colon. Set the* `ETHERnet:HTTPPort` *value to this same number.*

Examples

`ETHERNET:HTTPPORT “80”` sets the HTTP port value to 80.

ETHERnet:IPADDress

Sets or returns the IP address assigned to the oscilloscope.

Group
Ethernet

Syntax
```
ETHERnet:IPADDress <QString>
ETHERnet:IPADDress?
```

Arguments
<QString> is a standard IP address value, enclosed in quotes.

Examples
`ETHERNET:IPADDRESS` “123.121.13.214” sets the oscilloscope's IP address.

ETHERnet:NAME

Sets or returns the network name assigned to the oscilloscope.

Group
Ethernet

Syntax
```
ETHERnet:NAME <QString>
ETHERnet:NAME?
```

Arguments
`<QString>` is the network name assigned to the oscilloscope, enclosed in quotes.

Examples
`ETHERNET:NAME` “labscope1” sets the oscilloscope's network name.

ETHERnet:PASSWord

Sets or returns the HTTP Ethernet access password. If a password is set, the user must enter the password before the user's Web browser can access the oscilloscope.

Group
Ethernet

Syntax
```
ETHERnet:PASSWord <new>
ETHERnet:PASSWord?
```

Arguments
`<new>` is a new password, enclosed in quotes.

Examples `ETHERNET:PASSWORD ”ZEN53”` replaces the current Ethernet password with the new password ZEN53.

`ETHERNET:PASSWORD?` might return :ETHERNET:PASSWORD “ZEN53”.

ETHERnet:PING (No Query Form)

Causes the oscilloscope to ping the gateway IP address.

Group Ethernet

Syntax

```
ETHERnet:PING EXECute
```

Examples `ETHERNET:PING EXECUTE` causes the oscilloscope to ping the gateway IP address.

ETHERnet:PING:STATUS? (Query Only)

Returns the results from sending the ETHERnet:PING command to ping the gateway IP address.

Group Ethernet

Syntax

```
ETHERnet:PING:STATUS?
```

Returns `OK` is returned if the computer at the gateway IP address answers.

`NORESPOnse` is returned if the computer at the gateway IP address does not answer.

`INPROGRESS` is returned if the ping operation is still executing.

ETHERnet:SUBNETMask

Sets or returns the remote interface subnet mask value.

Group Ethernet

Syntax

```
ETHERnet:SUBNETMask <QString>
ETHERnet:SUBNETMask?
```

Arguments `<QString>` is the subnet mask value, enclosed in quotes.

Examples `ETHERNET:SUBNETMASK` “255.255.255.0” sets the subnet mask value using standard IP address notation format.

EVENT? (Query Only)

Returns an event code from the Event Queue that provides information about the results of the last *ESR? read. EVENT? also removes the returned value from the Event Queue.

Group Status and Error

Syntax `EVENT?`

Related Commands ALLEv?, *CLS, DESE, *ESE, *ESR?, EVMsg?, *SRE, *STB?

Examples `EVENT?` might return `:EVENT 110`, showing that there was an error in a command header. (See page 3-13, *Messages*.)

EVMsg? (Query Only)

Removes a single event code from the Event Queue that is associated with the results of the last *ESR? read and returns the event code along with an explanatory message. For information, see Event Handling.

Group Status and Error

Syntax `EVMsg?`

Related Commands ALLEv?

*CLS, DESE, *ESE, *ESR?, EVENT?, *SRE, *STB?

Returns The event code and message in the following format:

<Event Code><Comma><QString>[<Event Code><Comma><QString>...]<QString>::= <Message>;[<Command>] where <Command> is the command that caused the error and may be returned when a

command error is detected by the oscilloscope. As much of the command will be returned as possible without exceeding the 60 character limit of the <Message> and <Command> string combined. The command string is right-justified.

Examples `EVMSG?` might return `:EVMSG 110,"Command header error"`.

EVQty? (Query Only)

Returns the number of event codes in the Event Queue. This is useful when using the ALLEv? query, which returns the exact number of events.

Group Status and Error

Syntax `EVQty?`

Related Commands ALLEv?, EVENT?, EVMsg?

Examples `EVQTY?` might return `:EVQTY 3`, indicating the number of event codes in the Event Queue.

FACtory (No Query Form)

Resets the oscilloscope to its factory default settings.

This command does the following:

- Clears the Event Status Enable Register
- Clears the Service Request Enable Register
- Sets the Device Event Status Enable Register to 255
- Purges all defined aliases
- Enables all Command Headers
- Sets the macro defined by *DDT to a "zero-length field"
- Clears the pending operation flag and associated operations

This command does not reset the following:

- Communication settings
- Selected GPIB address.
- Sate of the VXI-11 (Ethernet IEEE Std 488.2) interface.
- Calibration data that affects device specifications
- Protected user data
- Stored settings
- Power On Status Clear Flag
- Oscilloscope password

Group Save and Recall

Syntax `FACtory`

Related Commands *PSC, *RCL, RECAll:SETUp, *RST, *SAV, SAVe:SETUp

Arguments None

Examples `FACTORY` resets the oscilloscope to its factory default settings.

FILESystem? (Query Only)

Returns the directory listing of the current working directory and the number of bytes of free space available. This query is the same as the FILESystem:DIR? query and the FILESystem:FREESpace? query.

Group File System

Syntax `FILESystem?`

Related Commands FILESystem:CWD, FILESystem:DELEte, FILESystem:DIR?, FILESystem:REName

Arguments None.

Examples `FILESYSTEM?` might return

```
:FILESYSTEM:DIR
"tek00000.bmp","elusiveGlitch1.png","TEMP.TMP",
"file1.wfm","file2.wfm", "MATH1.wfm","
REF1.wfm","REF2.wfm";FREESPACE 30212096
```

FILESystem:CWD

Sets or returns the current working directory (CWD) for FILESystem commands. The default working directory is "D:/". Anytime you use this command to change the directory, the directory that you specify is retained as the current working directory until you either change the directory or you delete the directory. If you delete the current working directory, the oscilloscope resets current working directory to the default directory (D:) the next time the oscilloscope is powered on or the next time you execute a file system command.

This command supports the permutations of file and directory names supported by Microsoft Windows:

- Relative path names; for example, "./Temp"
- Absolute path names; for example, "D:/MyWaveform"
- Implied relative path names; for example "newfile.txt" becomes "D:/TekScope/newfile.txt" if the current working directory is "D:/TekScope"

Group File System

Syntax `FILESystem:CWD {<new working directory path>}`

Arguments `<new working directory path>` is a quoted string that defines the current working; a directory name can be up to 128 characters.

Examples `FILESYSTEM:CWD "D:/TekScope/images"` sets the current working directory to images.

`FILESYSTEM:CWD?` might return

`:FILESYSTEM:CWD "D:/TekScope/Waveforms"` indicating that the current working directory is set to Waveforms.

FILESystem:DELEte (No Query Form)

This command deletes a named file. If you specify a directory name, it will delete the directory and all of its contents, the same as the RMDir command. You can also specify the filename as *.* to delete all of the files in the current or specified directory.

Group File System

Syntax `FILESystem:DELEte <file path>`

Related Commands FILESystem:CWD

FILESystem:RMDir

Arguments `<file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

The argument `*.*` will delete all files and subdirectories within the current working directory.

Examples `FILESYSTEM:DELETE "NOT_MINE.SET"` deletes the file named NOT_MINE.SET from the current working directory.

FILESystem:DIR? (Query Only)

Returns a list of quoted strings. Each string contains the name of a file or directory in the current working directory.

Group File System

Syntax `FILESystem:DIR?`

Related Commands FILESystem:CWD, FILESystem:MKDir

Arguments None

Returns `FILESystem:DIR?` returns a list of files and directories in the current working directory.

Examples `FILESYSTEM:DIR?` might return

```
:FILESYSTEM:DIR
"tek00000.png","my_CAN_setup.set","savedWfm1.isf","myImages"
```

FILESystem:FORMat (No Query Form)

Formats a mass storage device. This command should be used with extreme caution as it causes all data on the specified mass storage device to be lost. Drive letters (e.g., E:) are case sensitive and must be upper case. For all other FILESYSTEM commands, drives letters are not case sensitive. Example: FILES:FORMAT "E:/" Formats the USB flash drive installed in the oscilloscope's front panel USB port.

Group File System

Syntax `FILESystem:FORMat`

Arguments <drive name> is a quoted string that defines the disk drive to format.

Examples `FILESYSTEM:FORMAT "E:/"`

Formats the USB flash drive installed in the oscilloscope's front panel USB port.

FILESystem:FREESpace? (Query Only)

Returns the number of bytes of free space on the current drive.

Group File System

Syntax `FILESystem:FREESpace?`

Related Commands FILESystem:FREESpace?, FILESystem:CWD

FILESystem:MKDir (No Query Form)

Creates a new folder.

Group File System

Syntax `FILESystem:MKDir <directory path>`

Related Commands FILESystem:CWD, FILESystem:DIR?

Arguments `<directory path>` is a quoted string that specifies the directory to create

Examples `FILESYSTEM:MKDIR "E:/NewDirectory"` creates the directory named *NewDirectory* at the root of the E drive.

These two commands create the directory MyNewSubDirectory within the existing directory MyDirectory at the root of the E drive:

```
FILESYSTEM:CWD "E:/MyDirectory"; FILESYSTEM:MKDIR
"MyNewSubDirectory"
```

This, of course, assumes that *E:/MyDirectory* already existed and was not a read-only directory.

FILESystem:READFile (No Query Form)

Writes the contents of the specified file to the specified interface. If the specified file does not exist or is not readable, an appropriate error event is posted.

Group File System

Syntax `FILESystem:READFile <QString>`

Related Commands FILESystem:CWD

Arguments `<QString>` is a quoted string that defines the file name and path. If the file path is within the current working directory, specify only the file name.

Examples `FILESYSTEM:READFILE “E:/test_data/tek00016CH1.csv”` reads the content of the specified file, if the file exists and is readable, and sends the content of the file to the current interface.

FILESystem:REName (No Query Form)

Assigns a new name to an existing file.

Group File System

Syntax `FILESystem:REName <old file path>,<new file path>`

Related Commands FILESystem:CWD

Arguments `<old file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

`<new file path>` is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Examples `FILESYSTEM:RENAME "E:/TEK00000.SET","D:/MYSETTING.SET"` gives the file named TEK00000.SET the new name of MYSETTING.SET. The file remains in the root directory on the D drive.

FILESystem:RMDir (No Query Form)

Deletes a named directory. This command deletes the specified directory and all of its contents. The directory must not be a read-only directory.

Group File System

Syntax `FILESystem:RMDir <directory path>`

Related Commands FILESystem:CWD

Arguments `<directory path>` is a quoted string that defines the directory name and path. If the file path is within the current working directory, you need only specify the file name.

Examples `FILESYSTEM:RMDIR "E:/OldDirectory"` removes the directory named OldDirectory from the root of the D drive.

FILESystem:WRITEFile (No Query Form)

Writes the specified block data to a file in the oscilloscope current working directory. If the specified file does not exist or is not readable, an appropriate error event is posted.

Group File System

Syntax `FILESystem:WRITEFile <file path>, <data>`

Related Commands FILESystem:CWD

Arguments `<file path>` is the quoted string that defines the file name and path. If the path is within the current working directory, specify the file name only.

`<data>` can be either DEFINITE LENGTH encoding or INDEFINITE LENGTH ARBITRARY BLOCK PROGRAM DATA encoding as described in IEEE488.2.

FPAnel:HOLD (No Query Form)

This command is used to emulate the button push-and-hold feature. Presently, only the Cursors button is supported by this command, even though any of the button enumerations described for `FPAnel:PREss` are accepted. (When the Cursors button on the front panel is held, the cursor menu is displayed on screen.)

This command contains two arguments: a button, and an optional hold time.

Group Miscellaneous

Syntax `FPAnel:HOLD CURsor [,<NR1>]`

Related Commands FPAnel:PRESS, FPAnel:TURN

Arguments `CURsor` — currently this is the only button supported by this command. If the hold time is not specified, it defaults to 1200 milliseconds. The range is 0 to 10,000 milliseconds. The system expects a minimum of 1 second to recognize a hold.

`<NR1>` (optional), an integer, is the hold time — ie. the time to emulate holding the button down before releasing it, in milliseconds. If the hold time is not specified, it defaults to 1200 milliseconds.

Examples `FPAnel:HOLD CURsor` — This simulates pressing and holding the CURSOR button for 1200 milliseconds.

FPAnel:PRESS (No Query Form)

Simulates the action of pressing a specified front-panel button.

When the front panel is locked, the front-panel button and multipurpose knob operations are suspended. The `FPAnel:PRESS` and the FPAnel:TURN commands will also not work. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands.

Group

Miscellaneous

Syntax

```
FPAnel:PRESS <button>
```

Arguments

`<button>` is the name of a front-panel button. Most of the argument names associate directly with their front panel buttons. For example, AUTOSet is for the Autoset button. The few commands that do not have obvious associations are listed below.

Table 2-43: FPAnel:PRESS arguments

Argument	Description
ACQuire	**Acquire** button
AUTOset	**Autoset** button
BMENU<x>	Screen bottom menu buttons, where <x>=1 for the left-most bottom menu button and <x>=7 for the right-most bottom menu button
B<x>	Bus select buttons, where <x> = 1,2.
CH<x>	Channel select button, where <x>=1 for channel 1, <x>=2 for channel 2, and so on
CURsor	**Cursors** button
D15D0	**D15–D0** button
DEFaultsetup	**Default Setup** button
FINe	**Fine** button
FORCetrig	**Force Trig** button
HARDcopy	Hardcopy button
INTensity	**Intensity** button
MAGnify	Magnify (zoom) button (not the zoom/pan knob)
MARk	Mark **Set/Clear** button
MATh	**M** button
MENUOff	**Menu Off** button
MEASurement	**Measure** button
NEXt	Next arrow button

Table 2-43: FPAnel:PRESS arguments (cont.)

Argument	Description
PAUse	Play/pause button
PREv	Previous arrow button
REF	**R** button
RMENU<x>	Screen side menu buttons, where <x>=1 for the top-most side menu button and <x>=5 for the bottom-most side menu button
RUnstop	**Run/Stop** button
SAVEBUtton	**Save** button
SAVERecall	Save/Recall **Menu** button
SEArch	**Search** button
SELect	**Select** button
SINGleseq	**Single** button
TESt	**Test** button
TRIGger	Trigger **Menu** button
UTILity	**Utility** button

Examples `FPANEL:PRESS AUTOSET` executes the oscilloscope Autoset function.

FPAnel:TURN (No Query Form)

Simulates the action of turning a specified front-panel control knob.

When the front panel is locked, the front-panel button and multipurpose knob operations are suspended. The FPAnel:PRESS and `FPAnel:TURN` commands will also not work, and, they will not generate an error. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands. For example, to set the trigger level to 50%, you could use TRIGger:A SETLevel. To force a trigger, you could use TRIGger FORCe.

Group Miscellaneous

Syntax

```
FPAnel:TURN <knob>,<n>
```

Arguments `<knob>` is the name of a rotating control.

A comma (,) separates the control knob argument from the numeric rotation value argument. You do not need a white space between the arguments and the comma.

<n> represents the rotation direction and magnitude of rotation. Negative values represent a counterclockwise knob rotation, and positive values represent a clockwise rotation. The magnitude of <n> specifies the amount of the turn, where <n> = 1 represents turning the knob one unit, <n> = 2 represents turning the knob two units, <n> = 4 represents turning the knob four units, and so on. The range of units depends on which front panel knob is specified.

Table 2-44: FPAnel:TURN arguments

Argument	Description
GPKNOB1	**Multipurpose a** knob
GPKNOB2	**Multipurpose b** knob
HORZPos	Horizontal **Position** knob
HORZScale	Horizontal **Scale** knob
PANKNOB1	Outer pan knob
TRIGLevel	Trigger **Level** knob
VERTPOS<n>	Vertical **Position** knob
VERTSCALE<n>	Vertical **Scale** knob
ZOOM	Inner zoom knob

Examples `FPANEL:TURN TRIGLEVEL,10` duplicates turning the front-panel Trigger Level knob clockwise by 10 units.

GPIBUsb:ADDress? (Query Only)

Returns the current GPIB address setting for a connected TEK-USB-488 adaptor module.

Group Miscellaneous

Syntax `GPIBUsb:ADDress?`

GPIBUsb:ID? (Query Only)

Returns the identification string of the connected TEK-USB-488 adaptor module and firmware version. If a TEK-USB-488.2 module is not connected, the system returns “Not detected”.

Group Miscellaneous

Syntax `GPIBUsb:ID?`

HARDCopy (No Query Form)

Sends a hard copy of the screen display to the currently active printer using the current palette and layout settings.

Group Hard Copy

Syntax
```
HARDCopy {START}
HARDCopy?
```

Related Commands *WAI, *CLS

Arguments `START` sends a block of data representing the current screen image to the requested port. The data sent is in the image format specified by the SAVe:IMAGe:FILEFormat command and the compression level is controlled by the selected format (BMP and TIFF are uncompressed where as PNG is compressed). The SAVe:IMAGe:INKSaver determines whether the data sent is in InkSaver mode.

***NOTE.** The Hardcopy command with no arguments is equivalent to pressing the "HardCopy" button on the front panel, when the data is sent to the printer. As there is no front panel equivalent of the HARDCOPY START, you can choose to save the images to a different location using the "SAVE" button.*

Examples `HARDCOPY` initiates a screen copy to the active printer.

HARDCopy:ACTIVeprinter

Sets or returns the currently active printer. When a hard copy operation is performed, the output will be sent to this printer. One of two methods of specifying the printer can be used: specifying an index value obtained from looking at the list of attached printers or by specifying the printer name.

Group Hard Copy

Syntax
```
HARDCopy:ACTIVeprinter {<NR1>|<name>}
HARDCopy:ACTIVeprinter?
```

Arguments

<NR1> is the index of the desired printer as returned from HARDCopy:PRINTer:LIST?

<name> is the name of the printer as specified in the printer list. This name is case sensitive and must be entered exactly as shown in the list.

HARDCopy:INKSaver

Changes hard copy output to print traces and graticule on a white background while retaining waveform color information (except for channel 1, which prints as dark blue because yellow does not show up well and is difficult to see on a white background). This option can significantly reduce print time and quantities of ink required compared with WYSIWYG dark background images.

Group

Hard Copy

Syntax

```
HARDCopy:INKSaver?
```

Arguments

ON or <NR1> ≠ 0 sets the ink saver mode on.

OFF or <NR1> = 0 sets the ink saver mode off.

Examples

HARDCOPY:INKSAVER ON will cause subsequent hard copy output to display the screen on a white background.

HARDCopy:LAYout

Sets or returns the page orientation for hard copy. If you set the layout to LANdscape, the printer will print hard copies in landscape mode where the long edge of the screen will print to the long edge of the sheet of paper. If you set the layout to PORTRait, the printer will print hard copies in portrait mode.

This command is not applicable for PictBridge hardcopies.

Group

Hard Copy

Syntax

```
HARDCopy:LAYout {PORTRait|LANdscape}
HARDCopy:LAYout?
```

Arguments

PORTRait orients the screen image vertically on the printed page.

LANdscape orients the screen image horizontally on the printed page.

Examples

`HARDCOPY:LAYOUT LANDSCAPE` sets the hard copy page orientation to Landscape.

`HARDCOPY:LAYOUT?` might return `:HARDCOPY:LAYOUT PORTRAIT` indicating that the hard copy page orientation is set to portrait.

HARDCopy:PREVIEW (No Query Form)

Displays a preview of the current screen contents with the InkSaver palette applied.

Group

Hard Copy

Syntax

```
HARDCopy:PREVIEW {ON|OFF|<NR1>}
```

Arguments

`ON` or `<NR1>` $\neq 0$ turns preview mode on.

`OFF` or `<NR1>` $= 0$ turns preview mode off.

HARDCopy:PRINTer:ADD (No Query Form)

Adds a network printer to the list of available printers. All three arguments must be present, but only one of server name or server IP address may be specified. An empty string can be used for blank arguments.

Group

Hard Copy

Syntax

```
HARDCopy:PRINTer:ADD <name>,<server>,<address>
```

Arguments

`<name>` is the name of the network printer queue.

`<server>` is the host name of the print (LPR) server.

`<address>` is the IP address of the print server.

HARDCopy:PRINTer:DELete (No Query Form)

Removes a network printer from the list of available printers. The printer name is case sensitive.

Group

Hard Copy

Syntax `HARDCopy:PRINTer:DELete <name>`

Arguments `<name>` is the name of the printer to be deleted.

HARDCopy:PRINTer:LIST? (Query Only)

Returns a list of currently attached printers.

Group Hard Copy

Syntax `HARDCopy:PRINTer:LIST?`

HARDCopy:PRINTer:REName (No Query Form)

Renames a network printer on the list of available printers, replacing the currently stored settings with the settings specified in this command. Four arguments must be present, but the arguments may be empty strings if the value for a field is to be deleted.

Group Hard Copy

Syntax

```
HARDCopy:PRINTer:REName
<name>,<new_name>,<new_server>,<new_address>
```

Arguments `<name>` is the name of the printer to be deleted.

`<new_name>` is the new name for this printer.

`<new_server>` is the new print server for this printer.

`<new_address>` is the new IP address for the server.

HEADer

Sets or returns the Response Header Enable State that causes the oscilloscope to either include or omit headers on query responses.

NOTE. *This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk); these commands never return headers. This command does affect the Response Header Enable State of both the USBTMC and VXI-11 interfaces. Refer to the Introduction for additional information.*

Group Miscellaneous

Syntax

```
HEADer {OFF|ON|<NR1>}
HEADer?
```

Related Commands VERBose

Arguments OFF sets the Response Header Enable State to false. This causes the oscilloscope to omit headers on query responses, so that only the argument is returned.

ON sets the Response Header Enable State to true. This causes the oscilloscope to include headers on applicable query responses. You can then use the query response as a command.

<NR1> = 0 sets the Response Header Enable State to false; any other value sets this state to true.

Examples HEADER OFF specifies that the oscilloscope omits headers on query responses, so that only the argument is returned.

HEADER? might return :HEADER 1 indicating that the oscilloscope is including headers on applicable query responses.

HORizontal? (Query Only)

Returns all settings for the horizontal commands.

Group Horizontal

Syntax

```
HORizontal?
```

Examples HORIZONTAL? might return the following horizontal settings :HORIZONTAL:DELAY:MODE 1;TIME 0.0000;:HORIZONTAL:MAIN:SCALE 20.0000E-9;SAMPLERATE 2.5000E+9;UNITS "s";UNITS:STRING "s";:HORIZONTAL:SAMPLERATE 2.5000E+9;RECORDLENGTH 5000000

HORizontal:DELay:MODe

Sets or returns the horizontal delay mode.

Group Horizontal

Syntax

```
HORizontal:DELay:MODe {OFF|ON|<NR1>}
HORizontal:DELay:MODe?
```

Related Commands

HORizontal:POSition

Arguments

`OFF` sets the Horizontal Delay Mode to off. This causes the HORizontal:POSition command to operate like the HORIZONTAL POSITION knob on the front panel.

`ON` sets the Horizontal Delay Mode to on. This causes the HORizontal:DELay:TIMe command to operate like the HORIZONTAL POSITION knob on the front panel.

`<NR1>` = 0 sets the Horizontal Delay Mode to off; any other value sets this mode to on.

Examples

`HORIZONTAL:DELAY:MODE OFF` sets the Horizontal Delay Mode to off, allowing the horizontal position command to operate like the HORIZONTAL POSITION knob on the front panel.

`HORIZONTAL:DELAY:MODE?` might return `HORIZONTAL:DELAY:MODE OFF` indicating that the Horizontal Delay Mode is off and that the horizontal position command operates like the HORIZONTAL POSITION knob on the front panel.

HORizontal:DELay:TIMe

Sets or returns the horizontal delay time (position) that is used when delay is on (the default mode).

Group

Horizontal

Syntax

```
HORizontal:DELay:TIMe <NR3>
HORizontal:DELay:TIMe?
```

Related Commands

HORizontal:POSition

Arguments

`NR3` is the delay in seconds.

Examples

`HORizontal:DELay:TIME 0.3` sets the delay of acquisition data so that the resulting waveform is centered 300 ms after the trigger occurs.

HORizontal:DIGital:RECOrdlength:MAGnivu? (Query Only)

Returns the record length of the MagniVu digital acquisition.

Group Horizontal

Syntax `HORizontal:DIGital:RECOrdlength:MAGnivu?`

HORizontal:DIGital:RECOrdlength:MAIN? (Query Only)

Returns the record length of the main digital acquisition.

Group Horizontal

Syntax `HORizontal:DIGital:RECOrdlength:MAIN?`

HORizontal:DIGital:SAMPLERate:MAGnivu? (Query Only)

Returns the sample rate of the MagniVu digital acquisition.

Group Horizontal

Syntax `HORizontal:DIGital:SAMPLERate:MAGnivu?`

HORizontal:DIGital:SAMPLERate:MAIN? (Query Only)

Returns the sample rate of the main digital acquisition.

Group Horizontal

Syntax `HORizontal:DIGital:SAMPLERate:MAIN?`

HORizontal:POSition

Sets or returns the horizontal position, in percent, that is used when delay is off. If Horizontal Delay Mode is turned off, this command is equivalent to adjusting the HORIZONTAL POSITION knob on the front panel. When Horizontal Delay

Mode is on, this command stores a new horizontal position that is used when Horizontal Delay Mode is turned off.

Group

Horizontal

Syntax

```
HORizontal:POSition <NR3>
HORizontal:POSition?
```

Related Commands

HORizontal:DELay:TIMe

Arguments

<NR3> is the horizontal position expressed as the percentage of the waveform acquired before the trigger.

Examples

`HORIZONTAL:POSITION 50` sets the horizontal position to 50%.

`HORIZONTAL:POSITION`? might return `:HORIZONTAL:POSITION 100` indicating that the horizontal position is set to 100%.

HORizontal:PREViewstate? (Query Only)

Returns a boolean value to indicate whether the display system is in the preview state.

Group

Horizontal

Syntax

```
HORizontal:PREViewstate?
```

Returns

<NR1> = 1 if the display system is in the preview state.

<NR1> = 0 if the display system is not in the preview state.

HORizontal:RECOrdlength

Sets the horizontal record length. The query form of this command returns the current horizontal record length.

Group

Horizontal

Syntax

```
HORizontal:RECOrdlength <NR1>
HORizontal:RECOrdlength?
```

Arguments

<NR1> represents the supported values for horizontal record lengths, which are: 1000, 10000, 100000, 1000000, or 5000000.

Examples

HORIZONTAL:RECORDLENGTH 10000 specifies that 10000 data points will be acquired for each record.

HORIZONTAL:RECORDLENGTH? might return :HORIZONTAL:RECOrdlength 1000 indicating that the horizontal record length is equal to 1000 data points.

HORizontal:SAMPLERate

Sets or returns the current horizontal sample rate.

Group

Horizontal

Syntax

```
HORizontal:SAMPLERate <NR3>
HORizontal:SAMPLERate?
```

Arguments

<NR3> is the rate in samples per second.

HORizontal:SCAle

Sets or returns the time base horizontal scale.

Group

Horizontal

Syntax

```
HORizontal:SCAle <NR3>
HORizontal:SCAle?
```

Arguments

<NR3> specifies the range from 1 ns to 1000 s, depending on the record length.

Examples

HORIZONTAL:SCALE 2E-6 sets the main scale to 2µs per division.

HORIZONTAL:SCALE? might return :HORIZONTAL:MAIN:SCALE 2.0000E-06 indicating that the main scale is currently set to 2 µs per division.

ID? (Query Only)

Returns identifying information about the oscilloscope and related firmware.

Group Miscellaneous

Syntax `ID?`

Related Commands *IDN?

Examples `ID?` might return `TEK/DPO3034,CF:91.1CT,FV:v1.0000`. This indicates the oscilloscope model number, configured format, and firmware version number.

*IDN? (Query Only)

Returns the oscilloscope identification code.

Group Miscellaneous

Syntax `*IDN?`

Related Commands ID?

Examples `*IDN?` might return `:TEKTRONIX,DPO3034,SN123456789,CF:91.1CT FV:v1.00000` indicating the oscilloscope model number, serial number, configured number, and firmware version number.

LANGuage

Sets or returns the user interface display language. This command only affects the oscilloscope displayed language. Remote commands and their responses are always in English.

Group Miscellaneous

Syntax

```
LANGuage
{ENGLish|FRENch|GERMan|ITALian|SPANish|PORTUguese|JAPAnese|
KOREan|RUSSian|SIMPlifiedchinese|TRADitionalchinese}
```

`LANGuage?`

Examples `LANGUAGE?` might return `:LANGUAGE ENGLISH`.

LOCk

Enables or disables all front-panel buttons and knobs. There is no front panel equivalent.

When the front panel is locked, neither theFPAnel:PRESS nor the FPAnel:TURN commands will work. They will not generate an error event either. You can work around this by using the appropriate programmatic interface commands, instead of the front-panel commands. For example, to set the trigger level to 50%, you could use TRIGger:A SETLevel. To force a trigger, you could use TRIGger FORCe.

Group Miscellaneous

Syntax

```
LOCk {ALL|NONe}
LOCk?
```

Related Commands USBTMC:SERIALnumber?

Arguments `ALL` disables all front-panel controls.

`NONe` enables all front-panel controls. This is equivalent to the UNLock `ALL` command.

Examples `LOCK ALL` locks the front-panel controls.

`LOCK?` might return `:LOCK NONE` indicating that the front-panel controls are enabled by this command.

*LRN? (Query Only)

Returns the commands that list the oscilloscope settings except for configuration information for the calibration values, the WFMInpre? query, and the WFMOutpre? query. This query allows you to record or "learn" the current oscilloscope settings. You can use these commands to return the oscilloscope to the state it was in when you made the *LRN? query. This command is identical to the SET? Command.

Group Miscellaneous

Syntax *LRN?

Related Commands SET?

Examples *LRN? might return a long response, part of which could be as follows:

```
:ACQUIRE:STOPAFTER RUnSTOP;STATE 1;MODE SAMPLE;NUMENV
INFINITE;NUMAVG 16;SAMPLINGMODE RT;:HEADER 1;:LOCK
NONE;:LANGUAGE ENGLISH;:VERBOSE 1;:ALIAS:STATE
0;:DISPLAY:COLOR:PALETTE NORMAL;:DISPLAY:STYLE:DOTSONLY
0;:DISPLAY:PERSISTENCE 0.0000;CLOCK 1;GRATICULE
FULL;INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT
HIGH;:HARDCOPY :INKSAVER OFF;LAYOUT LANDSCAPE;PREVIEW
0;:SAVE:IMAGE:FILEFORMAT BMP;:SAVE:WAVEFORM:FILEFORMAT
INTERNAL;:SAVE:ASSIGN:TYPE SETUP;:TRIGGER:A:MODE
AUTO;TYPE EDGE;LE VEL 20.0000E-3;LEVEL:CH1
20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:
UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3
800.0000E-3;CH4 800.0000E-3;:TRIGG ER:A:LOWERTHRESHOLD:CH1
20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:H
OLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE
CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS
SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2
0.0000;CH3 0.0 000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1
X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE; EDGE
RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2
X;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN
TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT
4.0000E-9;:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE
RISE;THRESHOLD 20.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE
CH2;THRESHOLD 0.0000;:TRIGGER:A:SETHOLD:HOLDTIME
4.0000E-9;SETTIME 4.0000E-9; :TRIGGER:A:PULSE:CLASS
TRANSITION;:TRIGGER:A:PULSEWIDTH:SOURCE
CH1;POLARITY POSITIVE;WHEN LESSTHAN;WIDTH
4.0000E-9;:TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE; WHEN
OCCURS;WIDTH 4.0000E-9;:TRIGGER:A:TRANSITION:SOURCE CH1
```

...

MARK

Moves to the next or previous reference mark on the waveform. Returns the current mark position.

Group Mark

Syntax
```
MARK {NEXT|PREVious}
MARK?
```

Arguments

`NEXT` moves to the next reference mark on the right.

`PREVious` moves to the next reference mark on the left.

MARK:CREATE (No Query Form)

Creates a mark on a specified waveform or all waveforms in a column.

Group

Mark

Syntax
```
MARK:CREATE {CH<x>|MATH|B<x>|REF<x>|DIGital|COLUMN}
```

Arguments

`CH<x>` creates the mark on a channel waveform, where <x> is the channel number.

`MATH` creates the mark on the math waveform.

`B<x>` creates the mark on a bus waveform, where <x> is the bus number.

`REF<x>` creates the mark on a reference waveform, where <x> is the reference waveform number.

`DIGital` creates the mark on a digital waveform. (An error will result if no digital channel is turned on.)

`COLUMN` creates marks on all waveforms in the current zoom pixel column.

MARK:DELEte (No Query Form)

Deletes a mark on a particular waveform, all waveforms in a column, the selected mark, or all marks.

Group

Mark

Syntax
```
MARK:DELEte {CH<x>|MATH|B<x>|REF<x>|DIGital|COLUMN}
```

Arguments

`CH<x>` deletes the mark on a channel waveform, where <x> is the channel number.

`MATH` deletes the mark on the math waveform.

`B<x>` deletes the mark on a bus waveform, where <x> is the bus number.

`REF<x>` deletes the mark on a reference waveform, where <x> is the reference waveform number.

`DIGital` deletes all marks on all digital channels.

`COLUMN` deletes marks on all waveforms in the current zoom pixel column.

MARK:FREE? (Query Only)

Returns how many marks are available for use.

Group Mark

Syntax `MARK:FREE?`

MARK:SELected:END? (Query Only)

Returns the end of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:END?`

MARK:SELected:FOCUS? (Query Only)

Returns the focus of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:FOCUS?`

MARK:SELected:MARKSINCOLumn? (Query Only)

Returns the number of marks in the current zoom pixel column.

Group Mark

Syntax `MARK:SELected:MARKSINCOLumn?`

MARK:SELected:OWNer? (Query Only)

Returns the owner of the selected mark.

Group Mark

Syntax `MARK:SELected:OWNer?`

Returns `<QString>` is the owner of the mark.

Examples `MARK:SELECTED:OWNER?` might return: `USER, SEARCH1`

MARK:SELected:SOURCE? (Query Only)

Returns the source waveform for the selected mark.

Group Mark

Syntax `MARK:SELected:SOURCE?`

MARK:SELected:STARt? (Query Only)

Returns the starting point of the selected mark, 0 to 100% of the waveform.

Group Mark

Syntax `MARK:SELected:STARt?`

MARK:SELected:STATe? (Query Only)

Returns the on or off state of the selected mark. The selected mark is at or near the center of the screen. If you press the front-panel Set/Clear button, this mark will disappear.

Group Mark

Syntax `MARK:SELected:STATe?`

MARK:SELected:ZOOm:POSition? (Query Only)

Returns the position of the selected mark, 0 to 100% of the zoom overview window.

Group Mark

Syntax `MARK:SELected:ZOOm:POSition?`

MARK:TOTal? (Query Only)

Returns how many marks are currently in use.

Group Mark

Syntax `MARK:TOTal?`

{MATH|MATH1}:LABel

Sets or queries the waveform label for the math waveform.

Group Math

Syntax

```
{MATH|MATH1}:LABel <QString>
{MATH|MATH1}:LABel?
```

Arguments `<QString>` is the quoted string used as the label for the math waveform.

Examples `MATH:LABEL “Output”` sets the label for the math waveform to Output.

`MATH:LABEL?` might return `MATH:LABEL "Sum of channel 1 and channel 2"` indicating the current label for the math waveform.

MATH[1]? (Query Only)

Returns the definition of the math waveform. The returned data depends on the setting of the MATH[1]:TYPe command.

Group Math

Syntax

```
MATH[1]?
```

Related Commands MATH[1]:TYPe

Examples `MATH?` or `MATH1?` might return `:MATH:TYPE DUAL;DEFINE "CH1+CH2";VERTICAL:SCALE 100.0000E-3;POSITION 0.0000;UNITS "V";:MATH:HORIZONTAL:SCALE 4.0000E-6;POSITION 50.0000;UNITS "s";:MATH:SPECTRAL:MAG DB;WINDOW HANNING`

MATH[1]:DEFine

Sets or returns the current math function as a text string.

Dual math is defined if the string is of the form `<wfm> <operation> <wfm>`, where the <wfm>s are any combination of live channels or reference waveforms, <operation> is any of +, -, * or /, and the MATH[1]:TYPe is DUAL.

FFT math is defined if the string is in the form `FFT(<wfm>)`, where <wfm> is any live channel or reference waveform, and theMATH[1]:TYPe is FFT.

Advanced math is defined if the contents of the string can be parsed by the advanced math parser without errors and the MATH[1]:TYPe is ADVanced.

On the front panel, the Dual Wfm Math, FFT and Advanced Math menus contain controls that allow building equivalent math expressions to those described above.

Group Math

Syntax

```
MATH[1]:DEFine <QString>
MATH[1]:DEFine?
```

Related Commands MATHVAR:VAR<x>, MATH[1]:TYPe

Arguments `<QString>` quoted string argument is the mathematical expression that defines the waveform.

Table 2-45: Advanced Math expression elements

Expression	Description
CH1-CH4, REF1-REF4	Specifies a waveform data source.
FFT(, INTG(, DIFF(	Executes a Fast Fourier Transform, integration, or differentiation operation on the expression that follows. The FFT operator must be the first (left-most) operator in an expression. All these operations must end with a right parenthesis.
AMPlitude(, AREa(, BURst(, CARea(CMEan(, CRMs(, DELay(, FALL(, FREQuency(, HIGH(, LOW(, MAXimum(, MEAN(, MINImum(, NDUty(, NOVershoot(, NWIdth(, PDUTy(, PERIod(, PHAse(PK2pk(, POVershoot(, PWIdth(, RISe(, RMS(, !(	Executes the selected measurement operation on the waveform (active or reference) that follows. All these operations must end with a right parenthesis.
LOG(, EXP(, SQRT(, SINE(, COSINE(, TANGENT(	Executes trigonometric and other functions. All these operations must end with a right parenthesis.
VAR1, VAR2	Adds the user-defined variable to the expression. Refer to the MATHVAR<x> command.
+ , - , * , /	Executes an addition, subtraction, multiplication, or division operation on the following expression. + and - are also unary; use - to negate the expression that follows.
<, >, <=, >=, ==, ≠, ||, &&	Executes relational and logical operations.
( ) ,	Parentheses provide a way to control evaluation order in an expression. The comma is used to separate the "from" and "to" waveforms in Delay and Phase measurement operations.
1-0 , . , E	Specifies a numeric value in (optional) scientific notation.

Examples

`MATH1:DEFINE" CH1+CH2"` adds the Ch 1 waveform and Ch 2 waveform, storing the results in Math 1.

`MATH:DEFINE?` might return `:MATH1:DEFINE "CH2*REF2"` as the expression that defines Math 1.

MATH[1]:HORizontal:POSition

Sets or returns the math horizontal display position for FFT or (non-live) math reference waveforms.

Group Math

Syntax
```
MATH[1]:HORizontal:POSition <NR3>
MATH[1]:HORizontal:POSition?
```

Arguments <NR3> is the % of the math waveform that precedes center screen. It can vary from 0.0 to 100.0.

Examples `MATH:HORIZONTAL:POSITION 10` sets the horizontal position to 10% pretrigger

MATH[1]:HORizontal:SCAle

Sets or returns the math horizontal display scale for FFT or for dual math waveforms that have source waveforms that are reference waveforms. The horizontal scale of a dual math waveform with a channel source waveform is set through the HORizontal:SCAle command.

Group Math

Syntax
```
MATH[1]:HORizontal:SCAle <NR3>
MATH[1]:HORizontal:SCAle?
```

Arguments <NR3> is the math horizontal scale in seconds.

Examples `MATH:HORIZONTAL:SCALE?` might return `MATH:HORIZONTAL:SCALE 2.0E-4` indicating that the math horizontal scale is 200 μ

MATH[1]:HORizontal:UNIts

Returns the math waveform horizontal measurement unit value.

Group Math

Syntax
```
MATH[1]:HORizontal:UNIts?
```

Examples `MATH:HORIZONTAL:UNITS?` might return `MATH:HORIZONTAL:UNITS "?"`

indicating that the math horizontal unit label for unknown values is the default question mark unit.

MATH[1]:SPECTral:MAG

Sets or returns the units of the Spectral Magnification function in the math string.

Group Math

Syntax

```
MATH[1]:SPECTral:MAG {LINEAr|DB}
MATH[1]:SPECTral:MAG?
```

Arguments `LINEAR` sets the SpectralMag units to linear.

`DB` sets the SpectralMag units to decibels.

Examples `MATH1:SPECTRAL:MAG DB` sets the SpectralMag units for Math1 to decibels.

`MATH1:SPECTRAL:MAG?` might return `:MATH1:SPECTRAL:MAG DB` indicating that the SpectralMag units for Math1 are set to decibels.

MATH[1]:SPECTral:WINdow

Sets or returns the window function for the spectral analyzer input data for the specified math waveform. A spectral window determines what the filter shape of the spectral analyzer will be in the frequency domain. It can be described by a mathematical function that is multiplied point-by-point times the input data to the spectral analyzer.

Group Math

Syntax

```
MATH[1]:SPECTral:WINdow
{RECTangular|HAMming|HANning|BLAckmanharris}
MATH[1]:SPECTral:WINdow?
```

Arguments `RECTangular` window function is equivalent to multiplying all gate data by one.

`HAMming` window function is based on a cosine series.

`HANning` window function is based on a cosine series.

BLAckmanharris window function is based on a cosine series.

Examples MATH1:SPECTRAL:WINDOW HANNING applies a Hanning window to the spectral analyzer input data.

MATH1:SPECTRAL:WINDOW? might return :MATH1:SPECTRAL:WINDOW HAMMING indicating that the window function used to multiply the spectral analyzer input data is the Hamming window.

MATH[1]:TYPe

Sets or returns the math waveform mode type.

Group Math

Syntax

```
MATH[1]:TYPe {ADVanced|DUAL|FFT}
MATH[1]:TYPe?
```

Arguments ADVanced sets the math waveform mode to advanced math.

DUAL sets the math waveform mode to dual waveform math.

FFT sets the math waveform mode to FFT math.

Examples MATH:TYPE FFT sets the math waveform mode to FFT.

MATH:TYPE FFT;:MATH:DEFINE "FFT(CH1)" sets the math type to FFT and displays an FFT waveform of the channel 1 waveform, using the current FFT scale and window settings.

MATH:TYPE ADVANCED;:MATH:DEFINE "INTG(REF1*CH3)+DELAY(CH1,CH2)" sets the math type to FFT and displays an advanced math waveform that is the integration of the product of REF1 and CH3 plus the result of the delay measurement between channel 1 and 2.

MATH[1]:VERTical:POSition

Sets or returns the vertical position of the currently selected math type.

Group Math

Syntax

```
MATH[1]:VERTical:POSition <NR3>
MATH[1]:VERTical:POSition?
```

Related Commands CH<x>:POSition, REF<x>:VERTical:POSition

Arguments `<NR3>` is the desired position in divisions from the center graticule.

Examples `MATH1:VERTICAL:POSITION 1.3E+00` positions the Math 1 input signal 1.3 divisions higher than a position of 0.

`MATH1:VERTICAL:POSITION?` might return `:MATH1:VERTICAL:POSITION -1.3000E+00` indicating that the current position of Math 1 is 1.3 divisions below the center graticule.

MATH[1]:VERTical:SCAle

Sets or returns the vertical scale of the currently selected math type.

Group Math

Syntax

```
MATH[1]:VERTical:SCAle <NR3>
MATH[1]:VERTical:SCAle?
```

Related Commands CH<x>:SCAle, REF<x>:VERTical:SCAle

Arguments `<NR3>` is the scale-per-division in the current math vertical units. The range is from 1.0E-12 through 500.0E+12.

Examples `MATH1:VERTICAL:SCALE 100E-03` sets the Math scale to 100 mV per division.

`MATH:VERTICAL:SCALE?` might return `:MATH:VERTICAL:SCALE 1.0000E+00` indicating that the current scale setting of Math is 1 V per division.

MATH[1]:VERTical:UNIts

Returns the math waveform vertical measurement unit value.

Group Math

Syntax MATH[1]:VERTical:UNIts?

Examples MATH:VERTICAL:UNITS? might return MATH:VERTICAL:UNITS "joules" indicating that the math vertical unit label for unknown values is joules.

MATHVAR? (Query Only)

Queries both numerical values you can use within math expressions.

Group Math

Syntax MATHVAR?

Related Commands MATHVAR:VAR<x>, MATH[1]:DEFine

Returns <NR3> are the stored numerical values.

Examples MATHVAR? returns the values of all variables stored in locations 1 through 2.

MATHVAR:VAR<x>

Sets or returns one of two different numerical values you can use within math expressions. These values can range from -10.0e-18 to 1.0e+15; the default values are 0.0. <x> specifies the location, 1 or 2, in which you can store values. Stored math variables can be referenced within math expressions as VAR1 and VAR2.

For example, the following command defines MATH1 as the product of Channel 1 and math variable 1: MATH1:DEFINE "CH1 * VAR1".

Group Math

Syntax

```
MATHVAR:VAR<x> <NR3>
MATHVAR:VAR<x>?
```

Related Commands MATHVAR:VAR<x>, MATH[1]:DEFine

Arguments <NR3> specifies the numerical value to be stored in location x <1 through 2>.

Examples

`MATHVAR:VAR2 -2.43E-5` stores the value -2.43e-5 in the second math variable location.

`MATHVAR:VAR2?` might return `:MATHVAR:VAR2 24.3000E-6` for the expression stored in location 2.

MEASUrement? (Query Only)

Returns all measurement parameters.

Group

Measurement

Syntax

```
MEASUrement?
```

Examples

`MEASUREMENT?` might return `:MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:IMMED:TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;:MEASUREMENT:MEAS1:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS1:STATE 1;TYPE FREQUENCY;UNITS "Hz";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0 000;STDDEV 0.0000;:MEASUREMENT:MEAS2:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS2:STATE 1;TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:MEAS3: DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS3:STATE 1;TYPE PK2PK;UNITS "V";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:MEAS4:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:MEAS4:STATE 0;TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2;COUNT 0;MAXIMUM 0.0000;MEAN 0.0000;MINIMUM 0.0000;STDDEV 0.0000;:MEASUREMENT:METHOD AUTO;REFLEVEL:METHOD PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1 0.0000;MID2 0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90.0000;LOW 10.0000;MID1 50.0000;MID2 50.0000;:MEASUREMENT:INDICATORS:STATE OFF;NUMHORZ 0;NUMVERT 0;HORZ1 99.0000E +36;HORZ2 99.0000E+36;HORZ3 99.0000E+36;HORZ4 99.0000E+36;VERT1 99.0000E+36;VERT2 99.0000E+36;VERT3 99.0000E+36;VERT4 99.0000E+36;:MEASUREMENT:STATISTICS:MODE OFF;WEIGHTING 32;:MEASUREMENT:GATING SCREEN`.

MEASUrement:CLEARSNapshot (No Query Form)

Removes the measurement snapshot display.

Group Measurement

Syntax `MEASUrement:CLEARSNapshot`

Related Commands CLEARMenu

MEASUrement:GATing

Specifies or returns the measurement gating setting.

Group Measurement

Syntax

```
MEASUrement:GATing {OFF|SCREen|CURSor}
MEASUrement:GATing?
```

Arguments `OFF` turns off measurement gating (full record).

`SCREen` turns on gating, using the left and right edges of the screen.

`CURSor` limits measurements to the portion of the waveform between the vertical bar cursors, even if they are off screen.

Examples `MEASUREMENT:GATING CURSOR` turns on measurement gating using the cursors as limits.

`MEASUREMENT:GATING?` might return `:MEASUREMENT:GATING CURSOR` indicating that measurements are limited to the portion of the waveform between the vertical bar cursors.

MEASUrement:IMMed? (Query Only)

Returns all immediate measurement setup parameters.

Group Measurement

Syntax `MEASUrement:IMMed?`

Examples

`MEASUREMENT:IMMED?` might return
`:MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE;:MEASUREMENT:IMMED:TYPE PERIOD;UNITS "s";SOURCE1 CH1;SOURCE2 CH2`

MEASUrement:IMMed:DELay? (Query Only)

Returns information about the immediate delay measurement. This command is equivalent to viewing the delay measurement settings on the measurement readout.

Group

Measurement

Syntax

```
MEASUrement:IMMed:DELay?
```

Examples

`MEASUREMENT:IMMED:DELAY?` might return
`:MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS; EDGE1 RISE;EDGE2 RISE`

MEASUrement:IMMed:DELay:DIRection

Sets or returns the starting point and direction that determines the delay "to" edge when taking an immediate delay measurement.

***NOTE.** Use the MEASUrement:IMMed:SOUrce2 command to specify the delay "to" waveform.*

Group

Measurement

Syntax

```
MEASUrement:IMMed:DELay:DIRection {BACKWards|FORWards}
MEASUrement:IMMed:DELay:DIRection?
```

Related Commands

MEASUrement:IMMed:SOUrce2

Arguments

`BACKWards` starts the search at the end of the waveform and looks for the last rising or falling edge in the waveform.

`FORWards` starts the search at the beginning of the waveform and looks for the first rising or falling edge in the waveform.

Examples

`MEASUREMENT:IMMED:DELAY:DIRECTION FORWARDS` starts searching from the beginning of the waveform record and looks for the first rising or falling edge.

`MEASUREMENT:IMMED:DELAY:DIRECTION?` might return `:MEASUREMENT:IMMED:DELAY:DIRECTION BACKWARDS` indicating that searching begins at the end of the waveform record and looks for the last rising or falling edge.

MEASUrement:IMMed:DELay:EDGE<x>

Sets or returns the slope of the edge the oscilloscope uses for the delay "from" or "to" waveform when taking an immediate delay measurement.

Group

Measurement

Syntax

```
MEASUrement:IMMed:DELay:EDGE<x> {FALL|RISe}
MEASUrement:IMMed:DELay:EDGE<x>?
```

Related Commands

MEASUrement:IMMed:SOUrce1

MEASUrement:IMMed:SOUrce2

Arguments

`<x>` specifies which waveform to use, where <x> = 1 is the "from" waveform, and <x> = 2 is the "to" waveform.

`FALL` specifies the falling edge.

`RISe` specifies the rising edge.

Examples

`MEASUREMENT:IMMED:DELAY:EDGE1 RISE` specifies that the "from" waveform rising edge be used for the immediate delay measurement.

`MEASUREMENT:IMMED:DELAY:EDGE1?` returns either RISE or FALL.

MEASUrement:IMMed:SOUrce1

Sets or returns the source for all single source immediate measurements and specifies the source to measure "from" when taking an immediate delay measurement or phase measurement.

NOTE. *If you do not specify a numerical suffix, the source is assumed to be SOURCE 1.*

Group Measurement

Syntax
```
MEASUrement:IMMed:SOUrce1 {CH<x>|MATH<y>|REF<x>|D<x>}
MEASUrement:IMMed:SOUrce1?
```

Related Commands MEASUrement:IMMed:SOUrce2

Arguments `CH<x>` is an input channel waveform. The x variable can be expressed as an integer, where x is the channel number.

`MATH<y>` is a math waveform. The y variable can be expressed as an integer of 1.

`REF<X>` is a reference waveform. The x variable can be expressed as an integer, where x is the reference channel number.

`D<X>` is a digital waveform. The x variable can be expressed as an integer, where x is the digital channel number. Digital channels are available only on MSO models.

Examples `MEASUREMENT:IMMED:SOURCE1 1 MATH1`

specifies Math1 as the immediate measurement source.

`MEASUREMENT:IMMED:SOURCE1?` might return `:MEASUREMENT:IMMED:SOURCE1 CH3` indicating that channel 3 is the immediate measurement source.

MEASUrement:IMMed:SOUrce2

Sets or returns the source to measure "to" for phase or delay immediate measurements.

Tip: Source2 measurements only apply to phase and delay measurement types, which require both a target (Source1) and reference (Source2) source.

Group Measurement

Syntax
```
MEASUrement:IMMed:SOUrce2 {CH<x>|MATH<y>|REF<x>|D<x>}
MEASUrement:IMMed:SOUrce2?
```

Related Commands MEASUrement:IMMed:SOUrce1

Arguments

`CH<x>` is an input channel waveform, where x is the channel number.

`MATH<y>` is a math waveform. The y variable can be expressed as an integer of 1.

`REF<X>` is a reference waveform, where x is the reference channel number.

`D<X>` is a digital waveform. The x variable can be expressed as an integer, where x is the digital channel number. Digital channels are available only on MSO models.

Examples

`MEASUREMENT:IMMED:SOURCE2 REF3` sets the waveform in reference memory location 3 as the delay "to" source when making delay measurements.

`MEASUREMENT:IMMED:SOURCE2?` might return `:MEASUREMENT:IMMED:SOURCE2 MATH1` indicating that Math1 is the immediate measurement source.

MEASUrement:IMMed:SOUrce<x>

For SOURce1: Sets or returns the source for all single channel measurements. For delay or phase measurements, sets or returns the waveform to measure "from".

For SOUrce2: Sets or returns the waveform to measure "to" when taking a delay measurement or phase measurement.

Group

Measurement

Syntax

```
MEASUrement:IMMed:SOUrce<x> {CH1|CH2|CH3|CH4|MATH|D<x>}
MEASUrement:IMMed:SOUrce<x>?
```

Arguments

`CH1–CH4` or `MATH` is the source waveform.

`D<X>` is a digital waveform. The x variable can be expressed as an integer, where x is the digital channel number. Digital channels are available only on MSO models.

MEASUrement:IMMed:TYPe

Sets or returns the immediate measurement type.

Digital channel measurements do not have a user-settable midRef threshold. If you specify a digital channel measurement that is not available on MSO models, measurement error 2200: measurement system error occurs and 9.9e37 is returned.

Group

Measurement

Syntax

```
MEASUrement:IMMed:TYPe
{AMPlitude|AREa|BURst|CARea|CMEan|CRMs|DELay|FALL|FREQuency
|HIGH|LOW|MAXimum|MEAN|MINImum|NDUty|NEDGECount|NOVershoot
|NPULSECount|NWIdth|PEDGECount|PDUty
|PERIod|PHAse|PK2Pk|POVershoot|PPULSECount|PWIdth|RISe|RMS}
MEASUrement:IMMed:TYPe?
```

Arguments

`AMPlitude` measures the amplitude of the selected waveform. In other words, it measures the high value less the low value measured over the entire waveform or gated region.

Amplitude = High - Low

`AREa` measures the voltage over time. The area is over the entire waveform or gated region and is measured in volt-seconds. The area measured above the ground is positive, while the area below ground is negative.

`BURst` measures the duration of a burst. The measurement is made over the entire waveform or gated region.

`CARea` (cycle area) measures the voltage over time. In other words, it measures, in volt-seconds, the area over the first cycle in the waveform or the first cycle in the gated region. The area measured above the common reference point is positive, while the area below the common reference point is negative.

`CMEan` (cycle mean) measures the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region.

`CRMs` (cycle RMS) measures the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region.

`DELay` measures the time between the middle reference (default = 50%) amplitude point of the source waveform and the destination waveform.

`FALL` measures the time taken for the falling edge of the first pulse in the waveform or gated region to fall from a high reference value (default is 90%) to a low reference value (default is 10%).

`FREQuency` measures the first cycle in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

`HIGH` measures the High reference (100% level, sometimes called Topline) of a waveform.

`LOW` measures the Low reference (0% level, sometimes called Baseline) of a waveform.

`MAXimum` finds the maximum amplitude. This value is the most positive peak voltage found. It is measured over the entire waveform or gated region.

`MEAN` amplitude measurement finds the arithmetic mean over the entire waveform or gated region.

`MINImum` finds the minimum amplitude. This value is typically the most negative peak voltage. It is measured over the entire waveform or gated region.

`NDUty` (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on the first cycle in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

`NEDGECount` is the count of falling edges.

`NOVershoot` (negative overshoot) finds the negative overshoot value over the entire waveform or gated region.

Negative Overshoot = ((Low - Minimum) / Amplitude) × 100%)

`NPULSECount` is the count of negative pulses.

`NWIdth` (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform or gated region.

`PDUty` (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on the first cycle in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

`PEDGECount` is the count of rising edges.

`PERIod` is the time required to complete the first cycle in a waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.

`PHAse` measures the phase difference (amount of time a waveform leads or lags the reference waveform) between two waveforms. The measurement is made between the middle reference points of the two waveforms and is expressed in degrees, where 360° represents one waveform cycle.

`PK2Pk` (peak-to-peak) finds the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region.

`POVershoot` is the positive overshoot value over the entire waveform or gated region.

Positive Overshoot = ((Maximum - High) / Amplitude) ×100%

`PPULSECount` is the count of positive pulses.

`PWIdth` (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform or gated region.

`RISe` timing measurement finds the rise time of the waveform. The rise time is the time it takes for the leading edge of the first pulse encountered to rise from a low reference value (default is 10%) to a high reference value (default is 90%).

`RMS` amplitude measurement finds the true Root Mean Square voltage in the entire waveform or gated region.

Examples `MEASUREMENT:IMMED:TYPE FREQUENCY` defines the immediate measurement to be a frequency measurement.

`MEASUREMENT:IMMED:TYPE?` might return `:MEASUREMENT:IMMED:TYPe RMS` indicating that the immediate measurement is the true Root Mean Square voltage.

MEASUrement:IMMed:UNIts? (Query Only)

Returns the units of the immediate measurement:

VOLTS, VOLTS SQUARED, SEC, HERTZ, PERCENT, DIVS, SAMPLES, OHMS, AMPS, WATTS, MINUTES, DEGREES, UNKNOWN, AMPS SQUARED, HOURS, DAYS, DB, BYTES, INVERSE HERTZ, IRE, V OVER V, V OVER A, VOLTS WATTS, V OVER W, VOLTS DB, V OVER DB, A OVER V, A OVER A, AMPS WATTS, A OVER W, AMPS DB, A OVER DB, WATTS VOLTS, W OVER V, WATTS AMPS, W OVER A, WATTS SQUARED, W OVER W, WATTS DB, W OVER DB, DB VOLTS, DB OVER V, DB AMPS, DB OVER A, DB WATTS, DB OVER W, DB SQUARED, DB OVER DB, VOLTS SEC, AMPS SEC, WATTS SEC, V OVER S, A OVER S, W OVER S

Group Measurement

Syntax `MEASUrement:IMMed:UNIts?`

Examples `MEASUREMENT:IMMED:UNITS?` might return

`:MEASUREMENT:IMMED:UNIts "s"`

indicating that units for the immediate measurement are in seconds.

MEASUrement:IMMed:VALue? (Query Only)

Returns the value of the measurement specified by the MEASUrement:IMMed:TYPe command. The measurement is immediately taken on the source(s) specified by a MEASUrement:IMMed:SOUrce1 command.

NOTE. *A change to HORizontal:MAIn:SCALe or CH<x>:SCALe will not necessarily have taken affect if immediately followed by this command.*

Group Measurement

Syntax `MEASUrement:IMMed:VALue?`

Related Commands MEASUrement:IMMed:TYPe, MEASUrement:IMMed:SOUrce1, *ESR?, ALLEv?

Examples `MEASUREMENT:IMMED:VALUE?` might return `:MEASUREMENT:IMMED:VALUE 9.9000E+37.` If the measurement has an error or warning associated with it, then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEv? commands.

MEASUrement:INDICators? (Query Only)

Returns all measurement indicator parameters.

Group Measurement

Syntax `MEASUrement:INDICators?`

Examples `MEASUREMENT:INDICATORS?` might return `MEASUREMENT:INDICATORS:STATE MEAS1;NUMHORZ 0;NUMVERT 4;HORZ1 7.5E0;HORZ2 -3.400000095367E0;HORZ3 0.0E0;HORZ4 0.0E0;VERT1 -6.351123E-6;VERT2 -3.179753E-6;VERT3 -6.40943E-6;VERT4 -6.403E-6`

MEASUrement:INDICators:HORZ<x>? (Query Only)

Returns the position of the specified horizontal measurement indicator <x>, where <x> can be 1, 2, 3, or 4.

Group Measurement

Syntax `MEASUrement:INDICators:HORZ<x>?`

Examples `MEASUREMENT:INDICATORS:HORZ1?` might return `MEASUREMENT:INDICATORS:HORZ1 -2.0E-3` indicating that horizontal indicator1 has a value of -2mV.

MEASUrement:INDICators:NUMHORZ? (Query Only)

Returns the number of horizontal measurement indicators currently being displayed.

Group Measurement

Syntax `MEASUrement:INDICators:NUMHORZ?`

Examples `MEASUREMENT:INDICATORS:NUMHORZ?` might return `MEASUREMENT:INDICATORS:NUMHORZ 2` indicating there are currently 2 horizontal lines drawn on the graticule. The indicators show where the measurement specified by MEASUrement:INDICators:STATE is being performed.

MEASUrement:INDICators:NUMVERT? (Query Only)

Returns the number of vertical measurement indicators currently being displayed.

Group Measurement

Syntax `MEASUrement:INDICators:NUMVERT?`

Examples `MEASUREMENT:INDICATORS:NUMVERT?` might return `MEASUREMENT:INDICATORS:NUMVERT 2` indicating there are currently 2 vertical lines drawn on the graticule. The indicators show where the measurement specified by MEASUrement:INDICators:STATE is being performed.

MEASUrement:INDICators:STATE

Sets or returns the state of visible measurement indicators.

Group Measurement

Syntax

```
MEASUrement:INDICators:STATE {OFF|MEAS<x>}
MEASUrement:INDICators:STATE?
```

Arguments

`OFF` turns the visible measurement indicators off.

`MEAS<x>` displays the visible measurement indicators for measurement <x>, where <x> can be 1, 2, 3, or 4.

NOTE. *There must be an active measurement before you can activate an indicator for a specified measurement.*

Examples

`MEASUREMENT:INDICATORS:STATE MEAS2` turns on the display of visible measurement indicators for measurement 2.

`MEASUREMENT:INDICATORS:STATE?` might return `MEASUREMENT:INDICATORS:STATE OFF` indicating that no measurement indicators are active.

MEASUrement:INDICators:VERT<x>? (Query Only)

Returns the value of the specified vertical measurement indicator <x> from the trigger point, where <x> can be 1, 2, 3, or 4. A negative value means that the indicator is positioned earlier in the waveform record than the trigger point.

Group

Measurement

Syntax

```
MEASUrement:INDICators:VERT<x>?
```

Examples

`MEASUREMENT:INDICATORS:VERT2?` might return `MEASUREMENT:INDICATORS:VERT2 -3.724507E-6` indicating that the second measurement indicator is positioned 3.72 μs before the trigger point.

MEASUrement:MEAS<x>? (Query Only)

Returns all measurement parameters for the specified active measurement <x>.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>?
```

MEASUrement:MEAS<x>:COUNt? (Query Only)

Returns the number of values accumulated for this measurement since the last statistical reset. Values may be ignored if they generated an error. Measurements are specified by x, which ranges from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:COUNt?`

Examples `MEASUREMENT:MEAS3:COUNT?` might return `:MEASUREMENT:MEAS3:COUNT 3247`.

MEASUrement:MEAS<x>:DELay? (Query Only)

Returns the delay measurement parameters for the measurement specified by <x>, which ranges from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:DELay?`

Examples `MEASUREMENT:MEAS1?` might return `:MEASUREMENT:MEAS1:DELAY:DIRECTION FORWARDS;EDGE1 RISE;EDGE2 RISE`.

MEASUrement:MEAS<x>:DELay:DIRection

Sets or returns the starting point and direction that determines the delay "to" edge when taking a delay measurement. Use the MEASUrement:MEAS<x>:SOURCE2 command to specify the waveform.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:DELay:DIRection {BACKWards|FORWards}
MEASUrement:MEAS<x>:DELay:DIRection?
```

Related Commands MEASUrement:MEAS<x>:SOURCE2

Arguments

BACKWards means the search starts at the end of the waveform and looks for the last rising or falling edge in the waveform. Use the MEASUrement:MEAS<x>:DELay:EDGE<x> command to specify the slope of the edge.

FORWards means the search starts at the beginning of the waveform and looks for the first rising or falling edge in the waveform. Use the MEASUrement:MEAS<x>:DELay:EDGE<x> command to specify the slope of the edge.

Examples

MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS starts searching from the end of the waveform record.

MEASUREMENT:MEAS3:DELAY:DIRECTION? might return :MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS indicating that the current search direction is backwards.

MEASUrement:MEAS<x>:DELay:EDGE<x>

Sets or returns the slope of the edge used for the delay "from" or "to" waveform when taking an immediate delay measurement. The waveform is specified by MEASUrement:MEAS<x>:SOURCE[1].

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:DELay:EDGE<x> {FALL|RISe}
MEASUrement:MEAS<x>:DELay:EDGE<x>?
```

Arguments

<x> specifies which waveform to use, where <x> = 1 is the "from" waveform, and <x> = 2 is the "to" waveform.

FALL specifies the falling edge.

RISe specifies the rising edge.

Examples

MEASUREMENT:MEAS1:DELAY:EDGE1 RISE specifies that the "from" waveform rising edge be used for the immediate delay measurement.

MEASUREMENT:MEAS1:DELAY:EDGE1? returns either RISE or FALL.

MEASUrement:MEAS<x>:MAXimum? (Query Only)

Returns the maximum value found for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:MAXimum?`

Examples `MEASUREMENT:MEAS3:MAXIMUM?` might return `:MEASUREMENT:MEAS3:MAXIMUM 4.18E-9.`

MEASUrement:MEAS<x>:MEAN? (Query Only)

Returns the mean value accumulated for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:MEAN?`

Examples `MEASUREMENT:MEAS1:MEAN?` might return `:MEASUREMENT:MEAS1:MEAN 514.71E-09.`

MEASUrement:MEAS<x>:MINImum? (Query Only)

Returns the minimum value for this measurement since the last statistical reset. Measurements are specified by <x>, which ranges from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:MINImum?`

Examples `MEASUREMENT:MEAS1:MINIMUM?` might return `:MEASUREMENT:MEAS1:MINIMUM 1.75E-09.`

MEASUrement:MEAS<x>:SOURCE[1]

Sets or returns the source for all single source measurements and specifies the source to measure "from" when taking a delay measurement or phase measurement. Measurements are specified by <x>, which ranges from 1 through 4.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:SOURCE[1] {CH<x>|MATH<y>|REF<x>}
MEASUrement:MEAS<x>:SOURCE[1]?
```

Arguments

`CH<x>` is an input channel waveform, where x is the channel number.

`MATH<y>` is a math waveform, where y is 1.

`REF<x>` is a reference waveform, where x is the reference channel number.

Examples

`MEASUREMENT:MEAS2:SOURCE1 MATH1` specifies Math 1 as the measurement 2 source.

`MEASUREMENT:MEAS1:SOURCE1?` might return `:MEASUREMENT:MEAS1:SOURCE[1] MATH1` indicating that Math1 is the measurement 2 source.

MEASUrement:MEAS<x>:SOURCE2

Sets or returns the reference source to measure "to" when taking a delay measurement or phase measurement. Measurements are specified by <x>, which ranges from 1 through 4.

Tip: Source2 measurements only apply to phase and delay measurement types, which require both a target (Source1) and reference (Source2) source.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:SOURCE2 {CH<x>|MATH<y>|REF<x>|D<x>}
MEASUrement:MEAS<x>:SOURCE2?
```

Related Commands MEASUrement:MEAS<x>:TYPe

Arguments

`CH<x>` is an input channel waveform, where x is the channel number.

`MATH<y>` is the math waveform, which is always 1.

`REF<x>` is a reference waveform, where x is the reference channel number.

`D<x>` is a digital waveform, where x is the digital channel number. Digital channels are available only on MSO models.

Examples

`MEASUREMENT:MEAS4:SOURCE2 CH1` specifies CH1 as the delay "to" source when making delay measurement.

`MEASUREMENT:MEAS2:SOURCE2?` might return `:MEASUREMENT:MEAS2:SOURCE2 MATH1` indicating that Math 1 is the measurement 2 source.

MEASUrement:MEAS<x>:SOUrce<x>

For SOURce1: Sets or returns the source for all single channel measurements. For delay or phase measurements, sets or returns the waveform to measure "from".

For SOUrce2: Sets or returns the waveform to measure "to" when taking a delay measurement or phase measurement.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:SOUrce<x> {CH<x>|MATH|D<x>}
MEASUrement:MEAS<x>:SOUrce<x>?
```

Arguments

`CH<x>` is an input channel waveform, where x is the channel number.

`MATH` is the math waveform.

`REF<x>` is a reference waveform, where x is the reference channel number.

`D<x>` is a digital waveform, where x is the digital channel number. Digital channels are available only on MSO models.

MEASUrement:MEAS<x>:STATE

Sets or returns whether the specified measurement slot is computed and displayed. The measurement slot is specified by <x>, which ranges from 1 through 4.

For a measurement to display, you must have selected a source waveform and defined the measurement you want to take and display. You select the measurement using the MEASUrement:MEAS<x>:SOURCE[1] command. You define the measurement type using the MEASUrement:MEAS<x>:TYPe command.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:STATE {OFF|ON|<NR1>}
MEASUrement:MEAS<x>:STATE?
```

Related Commands MEASUrement:MEAS<x>:SOURCE[1], MEASUrement:MEAS<x>:TYPe

Arguments `OFF` disables calculation and display of the specified measurement slot.

`ON` enables calculation and display of the specified measurement slot.

`<NR1>` = 0 disables calculation and display of the specified measurement slot; any other value enables calculation and display of the specified measurement slot.

Examples `MEASUREMENT:MEAS2:STATE ON` computes and displays the measurement defined as measurement 2.

`MEASUREMENT:MEAS1:STATE?` might return `:MEASUREMENT:MEAS1:STATE 0` indicating that measurement defined for measurement slot 1 is disabled.

MEASUrement:MEAS<x>:STDdev? (Query Only)

Returns the standard deviation of values accumulated for this measurement since the last statistical reset. Measurements are specified by <x>, the measurement slots, from 1 through 4.

Group Measurement

Syntax `MEASUrement:MEAS<x>:STDdev?`

Examples `MEASUREMENT:MEAS1:STDDEV?` might return `:MEASUREMENT:MEAS1:STDDEV 21.0E-12.`

MEASUrement:MEAS<x>:TYPe

Sets or returns the measurement type defined for the specified measurement slot. The measurement slot is specified by <x>, which ranges from 1 through 4.

Digital channel measurements do not have a user-settable midRef threshold. If you specify a digital channel measurement that is not available on MSO models, measurement error 2200: measurement system error occurs and 9.9e37 is returned.

Group Measurement

Syntax

```
MEASUrement:MEAS<x>:TYPe
{AMPlitude|AREa|BURst|CARea|CMEan|CRMs|DELay|FALL|FREQuency
|HIGH|LOW|MAXimum|MEAN|MINImum|NDUty|NEDGECount|NOVershoot
```

```
|NPULSECount|NWIdth|PDUty|PEDGECount|PERIod|PHAse|PK2Pk
|POVershoot|PPULSECount|PWIdth|RISe|RMS}
MEASUrement:MEAS<x>:TYPe?
```

Arguments

`AMPlitude` measures the amplitude of the selected waveform. In other words, it measures the high value less the low value measured over the entire waveform or gated region.

Amplitude = High - Low

`AREa` measures the voltage over time. The area is over the entire waveform or gated region and is measured in volt-seconds. The area measured above the ground is positive, while the area below ground is negative.

`BURst` measures the duration of a burst. The measurement is made over the entire waveform or gated region.

`CARea` (cycle area) measures the voltage over time. In other words, it measures, in volt-seconds, the area over the first cycle in the waveform or the first cycle in the gated region. The area measured above the common reference point is positive, while the area below the common reference point is negative.

`CMEan` (cycle mean) measures the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region.

`CRMs` (cycle RMS) measures the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region.

`DELay` measures the time between the middle reference (default = 50%) amplitude point of the source waveform and the destination waveform.

`FALL` measures the time taken for the falling edge of the first pulse in the waveform or gated region to fall from a high reference value (default is 90%) to a low reference value (default is 10%).

`FREQuency` measures the first cycle in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

`HIGH` measures the High reference (100% level, sometimes called Topline) of a waveform.

`LOW` measures the Low reference (0% level, sometimes called Baseline) of a waveform.

`MAXimum` finds the maximum amplitude. This value is the most positive peak voltage found. It is measured over the entire waveform or gated region.

`MEAN` amplitude measurement finds the arithmetic mean over the entire waveform or gated region.

`MINImum` finds the minimum amplitude. This value is typically the most negative peak voltage. It is measured over the entire waveform or gated region.

`NDUty` (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on the first cycle in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

`NEDGECount` is the count of negative edges.

`NOVershoot` (negative overshoot) finds the negative overshoot value over the entire waveform or gated region.

Negative Overshoot = ((Low - Minimum) / Amplitude) × 100%)

`NPULSECount` is the count of negative pulses.

`NWIdth` (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform or gated region.

`PDUty` (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on the first cycle in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

`PEDGECount` is the count of positive edges.

`PERIod` is the time required to complete the first cycle in a waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.

`PHAse` measures the phase difference (amount of time a waveform leads or lags the reference waveform) between two waveforms. The measurement is made between the middle reference points of the two waveforms and is expressed in degrees, where 360° represents one waveform cycle.

`PK2Pk` (peak-to-peak) finds the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region.

`POVershoot` is the positive overshoot value over the entire waveform or gated region.

Positive Overshoot = ((Maximum - High) / Amplitude) ×100%

`PPULSECount` is the count of positive pulses.

`PWIdth` (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform or gated region.

`RISe` timing measurement finds the rise time of the waveform. The rise time is the time it takes for the leading edge of the first pulse encountered to rise from a low reference value (default is 10%) to a high reference value (default is 90%).

`RMS` amplitude measurement finds the true Root Mean Square voltage in the entire waveform or gated region.

Examples
MEASUREMENT:MEAS2:TYPE FREQUENCY defines measurement 2 as a measurement of the frequency of a waveform.

MEASUREMENT:MEAS1:TYPE? might return :MEASUREMENT:MEAS1:TYPE RMS indicating that measurement 1 is defined to measure the RMS value of a waveform.

MEASUrement:MEAS<x>:UNIts? (Query Only)

Returns the units associated with the specified measurement. The measurement slots are specified by <x>, which ranges from 1 through 4.

Group
Measurement

Syntax
MEASUrement:MEAS<x>:UNIts?

Related Commands
MEASUrement:MEAS<x>:TYPe

Examples
MEASUREMENT:MEAS1:UNITS? might return :MEASUREMENT:MEAS1:UNIts % indicating units for measurement 1 are set to percent.

MEASUrement:MEAS<x>:VALue? (Query Only)

Returns a calculate value for the measurement specified by <x>, which ranges from 1 through 4.

***NOTE.** This is the same value as displayed on-screen. If measurement statistics are enabled, a new value is calculated with every waveform. In addition, this value is updated approximately every 1/3 second. If you are acquiring a long acquisition record, the oscilloscope may take longer to update.*

Group
Measurement

Syntax
MEASUrement:MEAS<x>:VALue?

Related Commands
MEASUrement:MEAS<x>:UNIts?, *ESR?, ALLEv?

Examples
MEASUREMENT:MEAS1:VALUE? might return :MEASUREMENT:MEAS1:VALue 2.8740E-06. If the measurement has an error or warning associated with it,

then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEv? commands.

MEASUrement:METHod

Sets or returns the method used to calculate the 0% and 100% reference level.

Group

Measurement

Syntax

```
MEASUrement:METHod {Auto|HIStogram|MINMax}
MEASUrement:METHod?
```

Related Commands

MEASUrement:REFLevel:PERCent:HIGH, MEASUrement:REFLevel:PERCent:LOW, MEASUrement:REFLevel:PERCent:MID, MEASUrement:REFLevel:PERCent:MID2

Arguments

`Auto` selects the best method for each data set.

`HIStogram` sets the high and low waveform levels statistically using a histogram algorithm.

`MINMax` uses the highest and lowest values of the waveform record. This selection is best for examining waveforms with no large, flat portions of a common value, such as sine waves and triangle waves.

Examples

`MEASUREMENT:METHOD?` might return `:MEASUREMENT:METHOD MINMAX` indicating that the reference levels are set to MIN and MAX.

MEASUrement:REFLevel? (Query Only)

Returns the current reference level parameters.

Group

Measurement

Syntax

```
MEASUrement:REFLevel?
```

Examples

`MEASUREMENT:REFLEVEL?` might return these reference level settings `:MEASUREMENT:REFLEVEL:METHOD PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1 0.0000 ;MID2`

```
0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90.0000;LOW
10.0000;MID1 50.0000 ;MID2 50.0000
```

MEASUrement:REFLevel:ABSolute:HIGH

Sets or returns the high reference level, and is the upper reference level when MEASUrement:REFLevel:METHod is set to Absolute. This command affects the results of rise and fall measurements.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:ABSolute:HIGH <NR3>
MEASUrement:REFLevel:ABSolute:HIGH?
```

Related Commands MEASUrement:REFLevel:METHod, MEASUrement:IMMed:TYPe, MEASUrement:MEAS<x>:TYPe

Arguments `<NR3>` is the high reference level, in volts. The default is 0.0 V.

Examples `MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH 1.71` sets the high reference level to 1.71 V.

`MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH?` might return `:MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH 1.7100E+00` indicating that the absolute high reference level is set to 1.71 V.

MEASUrement:REFLevel:ABSolute:LOW

Sets or returns the low reference level, and is the lower reference level when MEASUrement:REFLevel:METHod is set to Absolute.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:ABSolute:LOW <NR3>
MEASUrement:REFLevel:ABSolute:LOW?
```

Related Commands MEASUrement:REFLevel:METHod, MEASUrement:IMMed:TYPe, MEASUrement:MEAS<x>:TYPe

Arguments `<NR3>` is the low reference level, in volts. The default is 0.0 V.

Examples `MEASUREMENT:REFLEVEL:ABSOLUTE:LOW 0.0` sets the low reference level to 0.0 V.

`MEASUREMENT:REFLEVEL:ABSOLUTE:LOW?` might return `:MEASUREMENT:REFLEVEL:ABSOLUTE:LOW 0.0000E+00` indicating that the absolute low reference level is set to 0.0 V.

MEASUrement:REFLevel:ABSolute:MID[1]

Sets or returns the mid reference level, and is the 50% reference level when MEASUrement:REFLevel:METHod is set to Absolute. This command affects the results of period, frequency, delay, and all cyclic measurements.

***NOTE.** this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:ABSolute:MID[1] <NR3>
MEASUrement:REFLevel:ABSolute:MID[1]?
```

Related Commands MEASUrement:REFLevel:METHod

Arguments `<NR3>` is the mid reference level, in volts. The default is 0.0 V.

Examples `MEASUREMENT:REFLEVEL:ABSOLUTE:MID 1 .71` sets the mid reference level to .71 V.

`MEASUREMENT:REFLEVEL:ABSOLUTE:MID?` might return `:MEASUREMENT:REFLEVEL:ABSOLUTE:MID 0.7100E+00` indicating that the absolute mid1 reference level is set to .71 V.

MEASUrement:REFLevel:ABSolute:MID2

Sets or returns the mid reference level for the "to" waveform when taking a delay measurement, and is the 50% reference level when MEASUrement:REFLevel:METHod is set to Absolute. This command affects the results of delay measurements.

***NOTE.** this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group

Measurement

Syntax

```
MEASUrement:REFLevel:ABSolute:MID2 <NR3>
MEASUrement:REFLevel:ABSolute:MID2?
```

Related Commands

MEASUrement:REFLevel:METHod

Arguments

`<NR3>` is the mid reference level, in volts. The default is 0.0 V.

Examples

`MEASUREMENT:REFLEVEL:ABSOLUTE:MID2 0.5` sets the mid reference level for the delay waveform to 0.5 V.

`MEASUREMENT:REFLEVEL:ABSOLUTE:MID2?` might return `:MEASUREMENT:REFLEVEL:ABSOLUTE:MID2 0.5000E+00` indicating that the absolute mid2 reference level is set to 0.5 V.

MEASUrement:REFLevel:ABSolute:MID<x>

Sets or returns the mid reference level for channel <x>, where x is the measurement channel.

Group

Measurement

Syntax

```
MEASUrement:REFLevel:ABSolute:MID<x> <NR3>
MEASUrement:REFLevel:ABSolute:MID<x>?
```

Arguments

`<NR3>` is the mid reference level in volts.

MEASUrement:REFLevel:METHod

Specifies or returns the reference level units used for measurement calculations.

***NOTE.** this command affects the associated reference level parameter for all MEASurements:IMMed and the eight periodic measurements. To change the parameter for individual measurements, use the MEASUrement:MEAS<x>:REFLevel commands.*

Group

Measurement

Syntax

```
MEASUrement:REFLevel:METHod {ABSolute|PERCent}
MEASUrement:REFLevel:METHod?
```

Arguments

`ABSolute` specifies that the reference levels are set explicitly using the MEASUrement:REFLevel:ABSolute commands. This method is useful when precise values are required (for example, when designing to published interface specifications, such as RS-232-C).

`PERCent` specifies that the reference levels are calculated as a percent relative to HIGH and LOW. The percentages are defined using the MEASUrement:REFLevel:PERCent commands.

Examples

`MEASUREMENT:REFLEVEL:METHOD ABSOLUTE` specifies that explicit user-defined values are used for the reference levels.

`MEASUREMENT:REFLEVEL:METHOD?` might return `:MEASUREMENT:REFLEVEL:METHOD PERCENT` indicating that the reference level units used are calculated as a percent relative to HIGH and LOW.

MEASUrement:REFLevel:PERCent:HIGH

Sets or returns the percent (where 100% is equal to HIGH) used to calculate the high reference level when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of rise and fall measurements.

***NOTE.** This command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group

Measurement

Syntax
```
MEASUrement:REFLevel:PERCent:HIGH <NR3>
MEASUrement:REFLevel:PERCent:HIGH?
```

Related Commands MEASUrement:REFLevel:METHod, MEASUrement:IMMed:TYPe, MEASUrement:MEAS<x>:TYPe

Arguments `<NR3>` is the high reference level, ranging from 0 to 100%. The default high reference level is 90%.

Examples `MEASUREMENT:REFLEVEL:PERCENT:HIGH 95` sets the high reference level to 95% of HIGH.

`MEASUREMENT:REFLEVEL:PERCENT:HIGH?` might return `:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90` indicating that the percentage high reference level is set to 90% of HIGH.

MEASUrement:REFLevel:PERCent:LOW

Sets or returns the percent (where 100% is equal to HIGH) used to calculate the low reference level when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of rise and fall measurements.

***NOTE.** this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax
```
MEASUrement:REFLevel:PERCent:LOW <NR3>
MEASUrement:REFLevel:PERCent:LOW?
```

Related Commands MEASUrement:REFLevel:METHod, MEASUrement:IMMed:TYPe, MEASUrement:MEAS<x>:TYPe

Arguments `<NR3>` is the low reference level, ranging from 0 to 100%. The default low reference level is 10%.

Examples `MEASUREMENT:REFLEVEL:PERCENT:LOW 15` sets the high reference level to 15% of HIGH.

`MEASUREMENT:REFLEVEL:PERCENT:LOW?` might return `:MEASUREMENT:REFLEVEL:PERCENT:LOW 10` indicating that the percentage high reference level is set to 10% of HIGH.

MEASUrement:REFLevel:PERCent:MID[1]

Sets or returns the percent (where 100% is equal to HIGH) that is used to calculate the mid reference level when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of period, frequency, delay, and all cyclic measurements.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:MID[1] <NR3>
MEASUrement:REFLevel:PERCent:MID[1]?
```

Related Commands MEASUrement:REFLevel:METHod

Arguments `<NR3>` is the mid reference level, ranging from 0 to 100%. The default mid reference level is 50%.

Examples `MEASUREMENT:REFLEVEL:PERCENT:MID 1 60` sets the mid reference level to 60% of HIGH.

`MEASUREMENT:REFLEVEL:PERCENT:MID?` might return `:MEASUREMENT:REFLEVEL:PERCENT:MID 65` indicating that the percentage mid reference level is set to 65% of HIGH.

MEASUrement:REFLevel:PERCent:MID2

Sets or returns the percent (where 100% is equal to HIGH) that is used to calculate the mid reference level for the second waveform specified when MEASUrement:REFLevel:METHod is set to Percent. This command affects the results of delay measurements.

NOTE. *this command affects the associated reference level parameter for all MEASurements:IMMed and the four periodic measurements.*

Group Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:MID2 <NR3>
MEASUrement:REFLevel:PERCent:MID2?
```

Related Commands MEASUrement:REFLevel:METHod

Arguments `<NR3>` is the mid reference level, ranging from 0 to 100%. The default mid reference level is 50%.

Examples `MEASUREMENT:REFLEVEL:PERCENT:MID2 40` sets the mid2 reference level to 40% of HIGH.

`MEASUREMENT:REFLEVEL:PERCENT:MID2?` might return `:MEASUREMENT:REFLEVEL:PERCENT:MID2 45` indicating that the percentage mid2 reference level is set to 45% of HIGH.

MEASUrement:REFLevel:PERCent:MID<x>

Sets or returns the mid reference level for channel <x>, where x is the measurement channel.

Group Measurement

Syntax

```
MEASUrement:REFLevel:PERCent:MID<x> <NR3>
MEASUrement:REFLevel:PERCent:MID<x>?
```

Arguments `<NR3>` is the mid reference level in percent.

MEASUrement:SNAPShot (No Query Form)

Displays the measurement snapshot list on the oscilloscope screen. The list contains the immediate values for all available measurements of the active signal.

Group Measurement

Syntax

```
MEASUrement:SNAPShot
```

MEASUrement:STATIstics (No Query Form)

Clears all of the statistics accumulated for all periodic measurements (MEAS1 through MEAS4).

The query form returns statistic settings.

Group

Measurement

Syntax

```
MEASUrement:STATIstics RESET
MEASUrement:STATIstics?
```

Arguments

`RESET` clears the measurements.

MEASUrement:STATIstics:MODE

Controls the operation and display of management statistics.

Group

Measurement

Syntax

```
MEASUrement:STATIstics:MODE {OFF|ON}
MEASUrement:STATIstics:MODE?
```

Related Commands

MEASUrement:STATIstics

Arguments

`OFF` turns all measurements off. This is the default value.

`ON` turns on statistics and displays all statistics for each measurement.

Examples

`MEASUREMENT:STATISTICS:MODE OFF` turns statistic measurements off.

`MEASUREMENT:STATISTICS:MODE?` might return `:MEASUREMENT:STATISTICS:MODE ON` indicating that measurement statistics are turned on and all statistics are being displayed for each measurement.

MEASUrement:STATIstics:WEIghting

Sets or returns the time constant for mean and standard deviation statistical accumulations.

Group Measurement

Syntax

```
MEASUrement:STATIstics:WEIghting <NR1>
MEASUrement:STATIstics:WEIghting?
```

Related Commands MEASUrement:STATIstics:MODE

Arguments `<NR1>` is the number of samples used for the mean and standard deviation statistical accumulations.

Examples `MEASUREMENT:STATISTICS:WEIGHTING 4` sets statistical weighting to four samples.

`MEASUREMENT:STATISTICS:WEIGHTING?` might return `:MEASUREMENT:STATISTICS:WEIGHTING 4` indicating that measurement statistics weighting is currently set to 4 samples.

MESSage

This command sets or queries message box (screen annotation) parameters.

Group Display

Syntax

```
MESSage
MESSage?
```

Examples `MESSAGE?` might return `MESSAGE:SHOW "TP401";BOX 271,82,292,114;STATE 0` indicating the message parameters.

MESSage:BOX

Sets or returns the co-ordinates of the message box. This command does not display the message unless MESSage:STATE is on.

X1 and Y1 are the screen coordinates of the top left corner of the message box. X2 and Y2 are the screen coordinates of the bottom right corner of the message box. All four coordinates are returned by the query.

Changing the text in the message box, using the MESSAGE:SHOW command, automatically resizes the message box. If you want a custom message box size, send the MESSAGE:BOX command after changing the text using the MESSAGE:SHOW command.

Message box settings and data are saved and restored in saved setups.

Group Display

Syntax
```
MESSage:BOX <X1>,<Y1>[,<X2>,<Y2>]
MESSage:BOX?
```

Related Commands MESSage:STATE, MESSage:SHOW, MESSage:CLEAR

Arguments `<X1>` and `<X2>` = 0 to 1023, and are pixel positions along the horizontal axis. `<X1>` defines the left and `<X2>` defines the right side of the window.

`<Y1>` and `<Y2>` = 0 to 767, and are pixel positions along the vertical axis. `<Y1>` defines the top and `<Y2>` defines the bottom of the window. The reserved height of all characters is 16 pixels so the window must be at least that high to fully display characters. `<X2> and <Y2>` are optional because the `MESSAGE:SHOW` command automatically sizes the box to fit the message. All four values are returned in a query.

MESSage:CLEAR (No Query Form)

Clears the contents of the message box.

Group Display

Syntax
```
MESSage:CLEAR
```

Related Commands MESSage:BOX, MESSage:SHOW, MESSage:STATE

Examples MESSage:CLEAR
clears the contents of the message box

MESSage:SHOW

Sets or returns the contents of the message box. MESSage:SHOW <Qstring> defines the content of the message box. Change in string length causes automatic resize of the message box to fit the text. The box may be resized using the MESSage:BOX command. The MESSage:STATE command is used to turn on and off the message box display.

Group

Display

Syntax

```
MESSage:SHOW <QString>
MESSage:SHOW?
```

Related Commands

MESSage:BOX, MESSage:CLEAR, MESSage:STATE

Arguments

`<QString>` is the message and can include any of the characters shown in the Character Set, Appendix A. The maximum length of the message is 1000 characters; the instrument ignores longer strings.

The message box size is set to fit the message. You can also set the message area height and width using the MESSage:BOX command. The length of the message that fits in the message area depends on the contents of the message because the width of characters varies.

If the message exceeds the limits of the message box, either horizontally or vertically, the portion of the message that exceeds the limits will not be displayed. The message string itself is not altered. The entire message can be returned as a query response regardless of what is displayed in the message box.

The message is left-justified, and is displayed on a single line starting with the top most line in the window. A new line character can be embedded in the string to position the message on multiple lines. You can also use white space and tab characters to position the message within a line. Text which does not fit within the message box is truncated. Defining a message box text string erases any previously displayed text within the message box.

You can send a tab by transmitting a tab character (\t or \x09) followed characters representing the most significant eight bits followed by significant eight bits of a 16-bit number. The number specifies the position relative to the left margin of the message area. For example, to tab send TAB (\t or \x09), NUL (decimal 0), and CR (decimal 13).

For example, using hexadecimal escape sequences, MESSAGE:SHOW '\x09\x01\x17Hello' when sent as a command would cause the 'Hello' to be displayed starting at pixel position 279 relative to the left margin set by the MESSAGE:BOX command. If you want to display characters starting at position 279, then 279 = 0x0117; split the hexadecimal number into two characters 0x01 and 0x17 and send \x09\x01\x17.

Special characters which control decoration are two character sequences where the first character is an escape (0x1b) and the second character is as described below.

Bit 7	0
Bit 6	If set, inverse video is toggled from current state and the following text is displayed in the new inverse state until the state is toggled again. Remaining bits are ignored

Bit 5	If set, the color index in the four LSB's (bits 0 through 3) is applied to the foreground or background color depending on the fg/bg bit (bit 4).	
Bit 4	If set, color change is applied to the background, otherwise applies to the foreground.	
Bit 0 – 3	Specifies the color index (0 through 15) to change color as specified below:	
	Index 0	Black (background)
	Index 1	Yellow (Ch 1)
	Index 2	Cyan (Ch 2)
	Index 3	Magenta (Ch 3)
	Index 4	Green (Ch 4)
	Index 5	Red (math)
	Index 6	White (reference)
	Index 7	Orange
	Index 8	Gray (Graticule)
	Index 9	White (text)
	Index 10	Tek blue
	Index 11	Bright blue
	Index 12	Undefined
	Index 13	Blue
	Index 14	Undefined
	Index 15	Dark blue
Bit 4	If set, the foreground color is set to the default foreground color.	
Bit 3	If set, the background color is set to the default background color.	
Bit 2	Undefined	
Bit 1	Undefined	
Bit 0	Undefined	

The ESC (escape) character followed by the @ character turns inverse video on or off and can be embedded in the message string. Example: "abcESC@defESC@ ghi" specifies the string "abcdefghi" where the "def" portion is displayed in inverse video.

Example: "abcESC#defESC)ESC@ghi" specifies the string "abcdefghi" where the "def" portion appears in the channel 3 color (magenta) and the "ghi" portion appears in the normal text color except it's in inverse video.

An alternate way to enter characters is octal escape sequences. This consists of a backslash followed by numerals in the standard C language printf fashion.

Another way to enter characters is \xnn where the nn is the hexadecimal value of the character to display.

An advantage of these methods is that any controller program can be used. Another advantage is it's easy to access characters with the high bit set, that is, those characters with a decimal value greater than 127.

An alternate way to enter certain characters is with a backslash followed by a single character (following "standard" Unix) as described in the table below.

n	Newline (carriage return and line feed)
\	Backslash (\\ is required to get a backslash character)
t	Horizontal tab; the next 2 characters specify the pixel column to tab to as explained earlier

If a backslash is followed by an undefined special character, the backslash is ignored and the character following it is accepted as is.

NOTE. *The use of any escape codes other than those described above may produce unpredictable results.*

Examples

MESSage:SHOW "Hello World"
displays "Hello world" in the upper left corner of the box (you can define the box size with the MESSAGE BOX command).

MESSage:SHOW "←@Hello World←@ ... hello"
displays "Hello world ... hello" in the upper left corner of the box and the word "world" is displayed in inverse video. In this example, ← stands for the escape character. The escape character may appear differently for you depending on your controller program.

MESSage:STATE

Controls the display of the message box.

Group

Display

Syntax

```
MESSage:STATE {OFF|ON|0|1}
MESSage:STATE?
```

Related Commands

MESSage:BOX

MESSage:SHOW, MESSage:CLEAR

Arguments

`OFF or <NR1> = 0` removes the message box from the screen.

`ON or <NR1> ≠ 0` displays the message box and its contents on the screen.

NEWpass (No Query Form)

This command changes the password that enables access to password protected data. The PASSWord command must be successfully executed before using this command or an execution error will be generated.

Group

Miscellaneous

Syntax

`NEWpass <QString>`

Related Commands

*PUD

PASSWord

Arguments

`<QString>` is the new password, which can contain up to 16 characters.

Examples

`NEWPASS "mypassword"` creates a new password (mypassword) for accessing your protected data.

*OPC

Generates the operation complete message in the Standard Event Status Register (SESR) when all pending commands that generate an OPC message are complete. The *OPC? query places the ASCII character "1" into the output queue when all such OPC commands are complete. The *OPC? response is not available to read until all pending operations finish. (See page 3-1, *Status and Events*.)

The *OPC command allows you to synchronize the operation of the oscilloscope with your application program. (See page 3-7, *Synchronization Methods*.)

Table 2-46: Commands that Generate an OPC Message

Operation	Command
Single sequence acquisition	ACQuire:STATE {ON|NR 1}
	AUXin:PRObe:DEGAUss EXECute
	CH<x>:PRObe:DEGAUss EXECute
	DIAg:STATE EXECute
	RECAll:SETUp <file path>
	RECAll:WAVEform <file path>,REF<x>
	SAVe:IMAGe <file path>
	SAVe:SETUp <file path>
	SAVe:WAVEform <wfm>, {REF<x>}
	TEKSecure
Hard copy operation	HARDCopy START
Calibration step	{STARt|PREVious|CONTinue}

Group Status and Error

Syntax

```
*OPC
*OPC?
```

Related Commands BUSY?, *WAI

Examples `*OPC` generates the operation complete message in the SESR at the completion of all pending OPC operations.

`*OPC?` might return 1 to indicate that all pending OPC operations are finished.

PASSWord(No Query Form)

Enables the *PUD and NEWpass set commands. Sending PASSWord without any arguments disables these same commands. Once the password is successfully entered, the *PUD and NEWpass commands are enabled until the oscilloscope is powered off, or until the FACtory command or the PASSWord command with no arguments is issued.

To change the password, you must first enter the valid password with the PASSWord command and then change to your new password with the NEWpass command. Remember that the password is case sensitive.

Group Miscellaneous

Syntax `PASSWord <QString>`

Related Commands NEWpass, *PUD

Arguments `<QString>` is the password and can include up to 10 characters. The factory default password is "XYZZY" and is always valid.

Examples `PASSWORD "XYZZY"` enables the *PUD and NEWpass set commands.

`PASSWORD` disables the *PUB and NEWpass set commands. You can still use the query version of *PUD.

PICTBridge:DATEPrint

Enables or disables printing the date on the print output

Group PictBridge

Syntax

```
PICTBridge:DATEPrint {DEFLT|OFF|ON}
PICTBridge:DATEPrint?
```

Arguments `DEFLT` is the default setting of the printer.

`ON` enables the date print on the print output.

`OFF` disables the date print on the print output.

Examples `PICTBRIDGE:DATEPRINT ON` enables the date print on the print output.

`PICTBRIDGE:DATEPRINT`? might return `PICTBRIDGE:DATEPRINT DEFLT` indicating the default setting of the printer.

PICTBridge:DEFault (No Query Form)

Sets the arguments for all PictBridge commands to their default values. The default values are same as printer default settings.

Group PictBridge

Syntax `PICTBridge:DEFault`

Examples

PICTBRIDGE:DEFAULT sets all PICTBridge commands to their default values.

PICTBridge:IDPrint

Enables or disables printing the oscilloscope model and serial number on the print output.

Group

PictBridge

Syntax

```
PICTBridge:IDPrint {DEFLT|OFF|ON}
PICTBridge:IDPrint?
```

Related Commands

Arguments

DEFLT is the default setting of the printer.

ON enables the oscilloscope model and serial number print on the print output.

OFF disables the oscilloscope model and serial number print on the print output.

Examples

PICTBRIDGE:IDPRINT ON enables the printing of oscilloscope model and serial number on the print output.

PICTBRIDGE:IDPRINT? might return PICTBRIDGE:IDPRINT OFF indicating that the ID print is disabled on the print output.

PICTBridge:IMAGESize

Sets or returns the image print size.

Group

PictBridge

Syntax

```
PICTBridge:IMAGESize
{DEFLT|IN2P5BY3P25|L|IN4BY6|L2|IN8BY10|L4|E|CARD|HAGAKIPcard
|CM6BY8|CM7BY10|CM9BY13|CM10BY15|CM13BY18|CM15BY21|CM18BY24|
A4|LETTER}
PICTBridge:IMAGESize?
```

Arguments

DEFLT for a default image print size.

IN2P5BY3P25 for a 2_5*3_25 image print size.

L for a 3_5*5 image print size.

IN4BY6 for a 4*6 image print size.

L2 for a 5*7 image print size.

IN8BY10 for a 8*10 image print size.

L4 for a 254 MM*178 MM image print size.

E for a 110 MM*74 MM image print size.

CARD for a 89 MM*55 MM image print size.

HAGAKIPcard for a 100 MM*148 MM image print size.

CM6BY8 for a 6 CM*8 CM image print size.

CM7BY10 for a 7 CM*10 CM image print size.

CM9BY13 for a 9 CM*13 CM image print size.

CM10BY15 for a 10 CM*15 CM image print size.

CM13BY18 or a 13 CM*18 CM image print size.

CM15BY21 for a 15 CM*21 CM image print size.

CM18BY24 for a 18 CM*24 CM image print size.

A4 for a A4 image print size.

LETTER for a Letter image print size.

Examples

PICTBRIDGE:IMAGESIZE CARD sets the image print size to 89 MM* 55 MM.

PICTBRIDGE:IMAGESIZE? might return PICTBRIDGE:IMAGESIZE DEFLT indicating the default image print size.

PICTBridge:PAPERSize

Sets the output print paper size.

Group

PictBridge

Syntax

```
PICTBridge:PAPERSize
DEFLT|L|L2|HAGAKIPCARD|MM54BY86|MM100BY150|IN4BY6|IN8BY10
|LETTER|IN11BY17|A0|A1|A2|A3|A4|A5|A6|A7|A8
|A9|B0|B1|B2|B3|B4|B5|B6|B7|B8|B9|ROLL89MM
|ROLL127MM|ROLL100MM|ROLL210MM}
PICTBridge:PAPERSize?
```

Arguments

`DEFLT` for a default paper size.

`L` for a paper size L

`L2` for a paper size 2L.

`HAGAKIPCARD` for a paper size Hagaki.

`MM54BY86` for a card paper size.

`MM100BY150` for paper size of 100*150 MM.

`IN4BY6` for a paper size of 4*6.

`IN8BY10` for a paper size of 8*10.

`LETTER` for a letter paper size.

`IN11BY17` for a paper size of 11*17.

`A0` for a A0 paper size.

`A1` for a A1 paper size.

`A2` for a A2 paper size.

`A3` for a A3 paper size.

`A4` for a A4 paper size.

`A5` for a A5 paper size.

`A6` for a A6 paper size.

`A7` for a A7 paper size.

`A8` for a A8 paper size..

`A9` for a A9 paper size.

`B0` for a B0 paper size.

`B1` for a B1 paper size.

`B2` for a B2 paper size.

`B3` for a B3 paper size.

`B4` for a B4 paper size.

`B5` for a B5 paper size.

`B6` for a B6 paper size.

`B7` for a B7 paper size.

`B8` for a B8 paper size.

`B9` for a B9 paper size.

`ROLL89MM` for a 89 MM Roll paper size.

`ROLL127MM` for a 127 MM Roll paper size.

`ROLL100MM` for a 100 MM Roll paper size.

`ROLL210MM` for a 210 MM Roll paper size.

Examples

`PICTBRIDGE:PAPERSIZEL` sets the paper size to L.

`PICTBRIDGE:PAPERSIZE?` might return `PICTBRIDGE:PAPERSIZE DEFLT` indicating the paper size is set to Default.

PICTBridge:PAPERType

Sets or returns the paper type.

Group

PictBridge

Syntax

```
PICTBridge:PAPERType {DEFLT|PLAIN|PHOTO|FASTPHOTO}
PICTBridge:PAPERType?
```

Arguments

`DEFLT` for a default print paper type.

`PLAIN` for a plain print paper type.

`PHOTO` for a photo print paper type.

`FASTPHOTO` for a fastphoto print paper type.

Examples

`PICTBRIDGE:PAPERTYPE PLAIN` sets the paper type to Plain.

`PICTBRIDGE:PAPERTYPE?` might return `PICTBRIDGE:PAPERTYPE DEFLT` indicating the default paper type.

PICTBridge:PRINTQual

Sets or returns the output print quality.

Group

PictBridge

Syntax

```
PICTBridge:PRINTQual {DEFLT|NRMAL|FINE|DRAFT}
PICTBridge:PRINTQual?
```

Arguments

DEFLT for the default quality print.

NRMAL for a normal quality print.

FINE for a fine quality print.

DRAFT for a draft quality print.

Examples

PICTBRIDGE:PRINTQUAL FINE sets the print quality to Fine.

PICTBRIDGE:PRINTQUAL? might return PICTBRIDGE:PRINTQUAL DEFLT indicating the default quality print.

POWer:CURRENTSOurce

Sets or returns the current source for the power application.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:CURRENTSOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4}
POWer:CURRENTSOurce?
```

Arguments

CH1–CH4 sets an analog channel as the current source.

REF1–REF4 sets a reference as the current source.

Examples

POWER:CURRENTSOURCE CH1 sets the current source as CH1.

POWER:CURRENTSOURCE? might return POWER:CURRENTSOURCE CH2 indicating that CH2 is the current source.

POWer:DISplay

Sets or returns the display state for the power application. This is the equivalent to pressing the front-panel **Test** button and then selecting the power application. The same control is provided for each application.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:DISplay {OFF|ON|0|1}
POWer:DISplay?
```

Arguments

OFF or 0 turns off the display settings.

ON or 1 turns on the display settings.

Examples

POWER:DISPLAY 1 turns on the display.

POWER:DISPLAY? might return :POWER:DISPLAY 0 indicating that the display is off.

POWer:GATESOurce

Sets or returns the gate source for the power application.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:GATESOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4|NONe}
POWer:GATESOurce?
```

Arguments

CH1–CH4 sets an analog channel as the gate source.

REF1–REF4 sets a reference as the gate source.

NONe is set when the gate source is not used in the application.

Examples

POWER:GATESOURCE CH1 sets the gate source as CH1.

POWER:GATESOURCE? might return POWER:GATESOURCE CH2 indicating that CH2 is the gate source.

POWer:GATing

Sets or returns the power application gating.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:GATing {OFF|SCREen|CURSor}
POWer:GATing?
```

Arguments

`OFF` turns off measurement gating (full record).

`SCREen` turns on gating, using the left and right edges of the screen.

`CURSor` limits measurements to the portion of the waveform between the vertical bar cursors, even if they are off screen.

Examples

`POWER:GATING CURSor` sets cursor gating on the oscilloscope.

`POWER:GATING`? might return `POWER:GATING OFF` indicating that gating is turned off on the oscilloscope.

POWer:HARMonics:DISPlay:SELect

Sets or returns the harmonics to be displayed when the harmonics standard is NONe.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:DISPlay:SELect {ODD|EVEN|ALL}
POWer:HARMonics:DISPlay:SELect?
```

Arguments

`ODD` to display only odd harmonics.

`EVEN` to display only even harmonics.

`ALL` to display both odd and even harmonics.

Examples

`POWER:HARMONICS:DISPLAY:SELECT EVEN` displays only even harmonics.

`POWER:HARMONICS:DISPLAY:SELECT`? might return `:POWER:HARMONICS:DISPLAY:SELECT ALL` indicating that both odd and even harmonics are displayed.

POWer:HARMonics:DISPlay:TYPe

Sets or returns the display type for harmonics tests.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:DISPlay:TYPe {GRAph|TABle}
POWer:HARMonics:DISPlay:TYPe?
```

Arguments `GRAph` displays harmonic tests results in graphical format.

`TABle` displays harmonic tests results in tabular format.

Examples `POWER:HARMONICS:DISPLAY:TYPE GRAph` sets the display type to graphical.

`POWER:HARMONICS:DISPLAY:TYPE?` might return `:POWER:HARMONICS:DISPLAY:TYPE TAB` indicating that the display type is set to tabular.

POWer:HARMonics:FREQRef

Sets or returns the frequency reference used when the harmonic standard is None.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:FREQRef
{VOLTage|CURRent|HARMSOURce|FIXEDFREQuency}
POWer:HARMonics:FREQRef?
```

Arguments `VOLTage` to use a voltage waveform as the frequency reference.

`CURRent` to use a current waveform as the frequency reference.

`HARMSOURce` to use a harmonic source waveform as the frequency reference.

`FIXEDFREQuency` to use a fixed frequency value instead of a waveform for the frequency reference.

Examples `POWER:HARMONICS:FREQREF VOLTage` sets voltage source as the frequency reference.

`POWER:HARMONICS:FREQREF?` might return `:POWER:HARMONICS:FREQREF FIXEDFREQ` indicating that the frequency reference is a fixed value.

POWer:HARMonics:FREQRef:FIXEDFREQValue

Sets or returns the frequency value when the :FREQRef selection is `FIXEDFREQuency`.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:FREQRef:FIXEDFREQValue <NR3>
POWer:HARMonics:FREQRef:FIXEDFREQValue?
```

Arguments `<NR3>` is the fixed frequency value.

Examples `POWER:HARMONICS:FREQREF:FIXEDFREQVALUE 100` sets the frequency to 100 Hz.

`POWER:HARMONICS:FREQREF:FIXEDFREQVALUE?` might return `:POWer:HARMonics:FREQREF:FIXEDFREQVALUE 60` indicating that the fixed frequency value is set to 60 Hz.

POWer:HARMonics:IEC:CLAss

Sets or returns the equipment class for IEC harmonics.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:IEC:CLAss {A|B|C1|C2|C3|D}
POWer:HARMonics:IEC:CLAss?
```

Arguments `A` specifies Class A Equipment.

`B` specifies Class B Equipment.

`C1` specifies Class C Equipment that use Table 1 limits of the IEC standard.

`C2` specifies Class C Equipment that use Table 2 limits of the IEC standard.

`C3` specifies Class C Equipment that use Table 3 limits of the IEC standard.

`D` specifies Class D Equipment.

Examples

`POWER:HARMONICS:IEC:CLASSB` sets Equipment Class B for IEC harmonics.

`POWER:HARMONICS:IEC:CLASS?` might return `:POWER:HARMONICS:IEC:CLASS A` indicating that the Equipment Class is A for IEC harmonics.

POWer:HARMonics:IEC:FILter

Sets or returns the enabled state for filtering of IEC harmonics.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:FILter {OFF|ON|0|1}
POWer:HARMonics:IEC:FILter?
```

Arguments

`ON` or 1 enables filtering of IEC harmonics.

`OFF` or 0 disables filtering of IEC harmonics.

Examples

`POWER:HARMONICS:IEC:FILTER OFF` disables filtering of IEC harmonics.

`POWER:HARMONICS:IEC:FILTER?` might return `:POWER:HARMONICS:IEC:FILTER 1` indicating that the IEC harmonics are filtered.

POWer:HARMonics:IEC:FUNDamental

Sets or returns the rated fundamental current for IEC harmonics. Valid values ranges from 0 to 16 in increments of 0.1. The unit is ampere.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:FUNDamental <NR3>
POWer:HARMonics:IEC:FUNDamental?
```

Arguments

`<NR3>` is the fundamental current in amperes.

Examples

`POWER:HARMONICS:IEC:FUNDAMENTAL 1` sets the fundamental current to 1.0000 A.

`POWER:HARMONICS:IEC:FUNDAMENTAL?` might return `:POWER:HARMONICS:IEC:FUNDAMENTAL 16` indicating that the fundamental current for IEC harmonics is set to 16.0000 A.

POWer:HARMonics:IEC:GROUPing

Sets or returns the enabled state for grouping of IEC harmonics.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:GROUPing {OFF|ON|1|0}
POWer:HARMonics:IEC:GROUPing?
```

Arguments

`ON` or 1 enables grouping of IEC harmonics.

`OFF` or 0 disables grouping of IEC harmonics.

Examples

`POWER:HARMONICS:IEC:GROUPING OFF` disables grouping of IEC harmonics.

`POWER:HARMONICS:IEC:GROUPING?` might return `:POWER:HARMONICS:IEC:GROUPING 1` indicating that the grouping is enabled for IEC harmonics.

POWer:HARMonics:IEC:INPUTPOWer

Sets or returns the class D rated input power for IEC harmonics.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:INPUTPOWer <NR3>
POWer:HARMonics:IEC:INPUTPOWer?
```

Arguments

`<NR3>` is the class D input power. Valid values range from 0 to 600 in increments of 10. The unit of measure is watts.

Examples

`POWER:HARMONICS:IEC:INPUTPOWER 600` sets the class D input power to 600 W.

`POWER:HARMONICS:IEC:INPUTPOWER?` might return `:POWER:HARMONICS:IEC:INPUTPOWER 100` indicating that the class D input power is set to 100 W.

POWer:HARMonics:IEC:LINEFREQuency

Sets or returns the line frequency for the IEC standard.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:LINEFREQuency <NR3>
POWer:HARMonics:IEC:LINEFREQuency?
```

Arguments

`<NR3>` is the line frequency. The valid values are 50 and 60.

Examples

`POWER:HARMONICS:IEC:LINEFREQUENCY 50` sets the line frequency to 50 Hz.

`POWER:HARMONICS:IEC:LINEFREQUENCY?` might return `:POWER:HARMONICS:IEC:LINEFREQUENCY 60` indicating that the line frequency value is set to 60 Hz.

POWer:HARMonics:IEC:OBSPERiod

Sets or returns the IEC observation period.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:IEC:OBSPERiod <NR3>
POWer:HARMonics:IEC:OBSPERiod?
```

Arguments

`<NR3>` is the IEC observation period. Valid values range from 0.2 to 10 s.

Examples `POWER:HARMONICS:IEC:OBSPERIOD 3` sets the IEC observation period to 3.0000 s.

`POWER:HARMONICS:IEC:OBSPERIOD?` might return `:POWER:HARMONICS:IEC:OBSPERIOD 10` indicating that the IEC observation period is set to 10 s.

POWer:HARMonics:IEC:POWERFACtor

Sets or returns the rated power factor for IEC harmonics.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:HARMonics:IEC:POWERFACtor <NR3>
POWer:HARMonics:IEC:POWERFACtor?
```

Arguments `<NR3>` is the power factor. Valid values range from 0 to 1 in increments of 0.1.

Examples `POWER:HARMONICS:IEC:POWERFACTOR 1` sets the power factor to 1.0000.

`POWER:HARMONICS:IEC:POWERFACTOR?` might return `:POWER:HARMONICS:IEC:POWERFACTOR 900.0000E-03` indicating that the power factor is set to 0.9.

POWer:HARMonics:MIL:FUNDamental:CALCmethod

Sets or returns the measurement method for the MIL harmonics fundamental current for use in calculating limits.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:HARMonics:MIL:FUNDamental:CALCmethod {MEAS|USER}
POWer:HARMonics:MIL:FUNDamental:CALCmethod?
```

Arguments `MEAS` specifies that the value of the fundamental current used in calculating limits is measured.

USER specifies that the value of the fundamental current used in calculating limits is user defined.

Examples POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD USER sets the measurement method to User.

POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD? might return :POWER:HARMONICS:MIL:FUNDAMENTAL:CALCMETHOD MEAS indicating that the measurement method is set to Meas.

POWer:HARMonics:MIL:FUNDamental:USER:CURRent

Sets or returns RMS amperes for USER CALCmethod.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:MIL:FUNDamental:USER:CURRent <NR3>
POWer:HARMonics:MIL:FUNDamental:USER:CURRent?
```

Arguments <NR3> is the current in amperes for USER CALCmethod.

Examples POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT 2 sets the RMS fundamental current to 2 A in calculating limits.

POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT? might return :POWER:HARMONICS:MIL:FUNDAMENTAL:USER:CURRENT 1.0000 indicating that the RMS fundamental current for use in calculating limits is 1.0000 A.

POWer:HARMonics:MIL:LINEFREQuency

Sets or returns the line frequency for MIL-STD-1399 harmonics tests.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:MIL:LINEFREQuency <NR3>
POWer:HARMonics:MIL:LINEFREQuency?
```

Arguments

<NR3> is the line frequency for MIL standard. Valid values are 60 and 400 Hz.

Examples

POWER:HARMONICS:MIL:LINEFREQUENCY 60 sets the MIL line frequency to 60 Hz.

POWER:HARMONICS:MIL:LINEFREQUENCY? might return :POWER:HARMONICS:MIL:LINEFREQUENCY 400 indicating that the MIL line frequency is set to 400 Hz.

POWer:HARMonics:MIL:POWERLEVel

Sets or returns the power level for calculating limits for MIL-STD-1399 harmonics tests.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:MIL:POWERLEVel {LOW|HIGH}
POWer:HARMonics:MIL:POWERLEVel?
```

Arguments

LOW specifies low power level for MIL-STD-1399 harmonics tests.

HIGH specifies high power level for MIL-STD-1399 harmonics tests.

Examples

POWER:HARMONICS:MIL:POWERLEVEL HIGH sets the MIL power level to High.

POWER:HARMONICS:MIL:POWERLEVEL? might return :POWER:HARMONICS:MIL:POWERLEVEL LOW indicating that the MIL power level is set to Low.

POWer:HARMonics:NR_HARMonics

Sets or returns the number of harmonics when the harmonics standard is NONe.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:NR_HARMonics <NR3>
POWer:HARMonics:NR_HARMonics?
```

Arguments

<NR3> is the number of harmonics. Values range from 20 to 400.

Examples

`POWER:HARMONICS:NR_HARMONICS 100` sets the number of harmonics to 100.

`POWER:HARMONICS:NR_HARMONICS?` might return `:POWer:HARMonics:NR_HARMONICS 40` indicating that the number of harmonics is set to 40.

POWer:HARMonics:RESults:HAR<1-400>:FREQuency? (Query Only)

Returns the frequency of the harmonic.

NOTE. *The command returns NA, if the current harmonic standard is set to a new standard other than the returned query.*

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:HARMonics:RESults:HAR<1-400>:FREQuency?
```

Examples

`POWER:HARMONICS:RESULTS:HAR400:FREQUENCY?` might return `:POWER:HARMONICS:RESULTS:HAR400:FREQUENCY 24000` indicating that the harmonic frequency is set to 24000.

POWer:HARMonics:RESults:HAR<1-400>:IECMAX? (Query Only)

The IEC Standard specifies harmonics measurements to be computed in time windows, with each time window being nominally 200 ms. This returns the maximum of the RMS magnitude of the harmonic, computed across successive 200 ms time windows within an observation period entered by the user.

NOTE. *The command returns NA, if the current harmonic standard is set to a new standard other than the returned query.*

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:IECMAX?`

Examples `POWER:HARMONICS:RESULTS:HAR400:IECMAX?` might return `:POWER:HARMONICS:RESULTS:HAR400:IECMAX 1.0` indicating that the maximum value is 1.0 A for 400th harmonic.

POWer:HARMonics:RESults:HAR<1-400>:LIMit? (Query Only)

The IEC and MIL standards specify a limit for each harmonic magnitude. Returns the limit in absolute units, or as a percentage of the fundamental as specified by the standard. IEC Class C (Table 2) and MIL standards specify the limit as a percentage of the fundamental.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:LIMit?`

Examples `POWER:HARMONICS:RESULTS:HAR3:LIMIT?` might return `:POWER:HARMONICS:RESULTS:HAR3:LIMIT 2.30` indicating that the harmonic magnitude limit for IEC standard for the 3rd harmonic is set to 2.30 A.

POWer:HARMonics:RESults:HAR<1-400>:PHASe? (Query Only)

Returns the phase of the harmonic in degrees. The phase is measured relative to the zero-crossing of the reference waveform. When there is no reference waveform, the phase is relative to the fundamental component.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:PHASe?`

Examples `POWER:HARMONICS:RESULTS:HAR400:PHASE?` might return `:POWER:HARMONICS:RESULTS:HAR400:PHASE 0` indicating that the harmonic phase is set to 0 in degrees.

POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute? (Query Only)

Returns the RMS magnitude of the harmonic in absolute units.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:RMS:ABSolute?`

Examples `POWER:HARMONICS:RESULTS:HAR400:RMS:ABSOLUTE?` might return `:POWER:HARMONICS:RESULTS:HAR400:RMS:ABSOLUTE 1.0` indicating that the RMS magnitude of the harmonic is set to 1.0 A.

POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent? (Query Only)

Returns the RMS magnitude of the harmonic expressed as a percentage of the fundamental.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:RMS:PERCent?`

Examples `POWER:HARMONICS:RESULTS:HAR400:RMS:PERCENT?` might return `:POWER:HARMONICS:RESULTS:HAR400:RMS:PERCENT 33` indicating that the RMS magnitude of the harmonic is set to 33 %.

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit? (Query Only)

Specifies if the IEC Class A higher harmonic limit and conditions are met.

NOTE. *The command returns NA if the standard does not specify a limit, or the equipment is not class A.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:CLASSALIMit?`

Returns `PASS`, `FAIL`, or `NA`

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL? (Query Only)

Specifies if the Normal IEC harmonic limits are met.

NOTE. *The command returns NA if the standard does not specify a limit.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL?`

Returns `PASS`, `FAIL`, or `NA`

POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit? (Query Only)

Specifies if the higher harmonic limit and conditions for the 21st and higher order odd harmonics are met.

NOTE. *The command returns NA if the limit does not apply for a specific harmonic.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:POHCLIMit?`

Returns `PASS`, `FAIL`, or `NA`

POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL? (Query Only)

Returns the test result for the specified harmonic for the MIL-STD-1399 testing standard.

This query is analogous to that for the IEC 61000-3-2 standard POWer:HARMonics:RESults:HAR<1-400>:TEST:IEC:NORMAL? command.

NOTE. *The command returns NA if the standard does not specify a limit for the specific harmonic.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:HAR<1-400>:TEST:MIL:NORMAL?`

Returns `PASS`, `FAIL`, or `NA`

POWer:HARMonics:RESults:IEC:FUNDamental? (Query Only)

Returns the measured IEC fundamental current used in calculating limits.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:FUNDamental?`

Examples `POWER:HARMONICS:RESULTS:IEC:FUNDAMENTAL?` might return `:POWER:HARMONICS:RESULTS:IEC:FUNDAMENTAL 1.0` indicating that the IEC fundamental frequency is set to 1.0 A.

POWer:HARMonics:RESults:IEC:HARM3ALTernate? (Query Only)

Returns the IEC harmonics test result for the 3rd harmonic.

NOTE. *The command returns NA if the limit does not apply.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:HARM3ALTernate?`

Returns `PASS`, `FAIL`, or `NA`

Examples `POWER:HARMONICS:RESULTS:IEC:HARM3ALTERNATE?` might return `POWER:HARMONICS:RESULTS:IEC:HARM3ALTERNATE PASS` indicating the test result.

POWer:HARMonics:RESults:IEC:HARM5ALTernate? (Query Only)

Returns the overall harmonics test result for the 5th harmonic.

NOTE. *The command returns NA if the harmonic limit does not apply.*

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:HARM5ALTernate?`

Returns `PASS`, `FAIL`, or `NA`

Examples `POWER:HARMONICS:RESULTS:IEC:HARM5ALTERNATE?` might return `POWER:HARMONICS:RESULTS:IEC:HARM5ALTERNATE PASS` indicating the test result.

POWer:HARMonics:RESults:IEC:POHC? (Query Only)

Returns the IEC POHC measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POHC?`

Examples `POWER:HARMONICS:RESULTS:IEC:POHC?` might return `:POWER:HARMONICS:RESULTS:IEC:POHC 0.5 A` indicating that the IEC POHC is set to 0.5 A.

POWer:HARMonics:RESults:IEC:POHL? (Query Only)

Returns the IEC POHL measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POHL?`

Examples `POWER:HARMONICS:RESULTS:IEC:POHL?` might return `:POWER:HARMONICS:RESULTS:IEC:POHL 0.5` indicating that the IEC POHL is set to 0.5 A.

POWer:HARMonics:RESults:IEC:POWer? (Query Only)

Returns the measured IEC input power that is used to calculate limits.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POWer?`

Examples POWER:HARMONICS:RESULTS:IEC:POWER? might return :POWER:HARMONICS:RESULTS:IEC:POWER 5 indicating that the IEC power is set to 5 W.

POWer:HARMonics:RESults:IEC:POWERFactor? (Query Only)

Returns the measured IEC power factor measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:IEC:POWERFactor?`

Examples POWER:HARMONICS:RESULTS:IEC:POWERFACTOR? might return :POWER:HARMONICS:RESULTS:IEC:POWERFACTOR 9.1900E+37 indicating that the IEC power factor is set to 9.1900E+37.

POWer:HARMonics:RESults:PASSFail? (Query Only)

Returns the overall harmonics test result.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:PASSFail?`

Returns PASS, FAIL, or NA

Examples POWER:HARMONICS:RESULTS:PASSFAIL? might return :POWER:HARMONICS:RESULTS:PASSFAIL PASS indicating that the harmonics test passed.

POWer:HARMonics:RESults:RMS? (Query Only)

Returns the root mean square value of the harmonics source waveform.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:RMS?`

Examples `POWER:HARMONICS:RESULTS:RMS?` might return `:POWER:HARMONICS:RESULTS:RMS 1.0` indicating that the harmonics source waveform RMS is set to 1.0.

POWer:HARMonics:RESults:SAVe (No Query Form)

Saves the harmonic results to the specified file in CSV format.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:SAVe <String>`

POWer:HARMonics:RESults:THDF? (Query Only)

Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the fundamental component of the source waveform.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:HARMonics:RESults:THDF?`

Examples `POWER:HARMONICS:RESULTS:THDF?` might return `:POWER:HARMONICS:RESULTS:THDF 40` indicating that the THDF is set to 40.

POWer:HARMonics:RESults:THDR? (Query Only)

Returns the Total Harmonic Distortion (THD) in percentage, measured as a ratio to the RMS value of the source waveform.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:RESults:THDR?
```

Examples `POWER:HARMONICS:RESULTS:THDR?` might return `:POWER:HARMONICS:RESULTS:THDR 40` indicating that the THDR is set to 40.

POWer:HARMonics:SOURce

Sets or returns the source waveform for harmonics tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:SOURce {VOLTage|CURRent}
POWer:HARMonics:SOURce?
```

Arguments `VOLTage` specifies voltage source waveform for harmonic tests.

`CURRent` specifies current source waveform for harmonic tests.

Examples `POWER:HARMONICS:SOURCE VOLTage` sets voltage source for harmonic tests.

`POWER:HARMONICS:SOURCE?` might return `:POWer:HARMonics:SOURCE CURRENT` indicating that the harmonic source is set to current.

POWer:HARMonics:STANDard

Sets or returns the standard for harmonics tests.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:HARMonics:STANDard {NONe|IEC|MIL}
POWer:HARMonics:STANDard?
```

Arguments `NONe` sets no standard for harmonic tests.

`IEC` sets IEC 610003-2 standard for harmonic tests.

`MIL` sets MIL1399 standard for harmonic tests.

Examples `POWER:HARMONICS:STANDARD IEC` sets IEC standard for harmonic tests.

`POWER:HARMONICS:STANDARD?` might return `:POWer:HARMonics:STANDard NONe` indicating that no standard is set.

POWer:INDICators

Sets or returns the state of the measurement indicators for the power application.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:INDICators {OFF|ON|0|1}
POWer:INDICators?
```

Arguments `OFF` or 0 turns off the measurement indicators.

`ON` or 1 turns on the measurement indicators.

Examples `POWER:INDICATORS 1` turns on the indicator.

`POWER:INDICATORS?` might return `:POWER:INDICators 0` indicating that the indicator is off.

POWer:MODulation:SOUrce

Sets or returns the source waveform for modulation tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:MODulation:SOUrce {VOLTage|CURRent}
POWer:MODulation:SOUrce?
```

Arguments

`VOLTage` specifies voltage source waveform for modulation tests.

`CURRent` specifies current source waveform for modulation tests.

Examples

`POWER:MODULATION:SOURCE CURRent` sets the modulation source to Current.

`POWER:MODULATION:SOURCE?` might return `:POWER:MODULATION:SOURCE VOLT` indicating that the modulation source is set to Voltage.

POWer:MODulation:TYPe

Sets or returns the modulation type.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:MODulation:TYPe
{PWIdth|NWIdth|PERIod|PDUty|NDUty|FREQuency}
POWer:MODulation:TYPe?
```

Arguments

`PWIdth` (positive width) is the distance (time) between the middle reference (default = 50%) amplitude points of a positive pulse. The measurement is made on all the cycles in the waveform or gated region.

`NWIdth` (negative width) measurement is the distance (time) between the middle reference (default = 50%) amplitude points of a negative pulse. The measurement is made on all the cycles in the waveform or gated region.

`PERIod` is the time required to complete the first cycle in a waveform or the gated region. The time is measured between the mid reference (default being 50%) amplitude points of the waveform.

`PDUty` (positive duty cycle) is the ratio of the positive pulse width to the signal period, expressed as a percentage. It is measured on all the cycles in the waveform or gated region.

Positive Duty Cycle = ((Positive Width)/Period) × 100%

`NDUty` (negative duty cycle) is the ratio of the negative pulse width to the signal period, expressed as a percentage. The duty cycle is measured on all the cycles in the waveform or gated region.

Negative Duty Cycle = ((Negative Width) / Period) × 100%

`FREQuency` measures all the cycles in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.

Frequency = 1 / Period

Examples

`POWER:MODULATION:TYPE NWIDTH` sets the modulation type to Negative Width.

`POWER:MODULATION:TYPE?` might return `:POWER:MODULATION:TYPE PWI` indicating that the modulation type is set to Positive Width.

POWer:QUALity:APPpwr? (Query Only)

Returns the apparent power measurement.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

`POWer:QUALity:APPpwr?`

Examples

`POWER:QUALITY:APPPWR?` might return `:POWER:QUALITY:APPpwr 100` indicating that the apparent power value is set to 100 VA.

POWer:QUALity:DISplay:APPpwr

Sets or returns the display state for the apparent power readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:QUALity:DISplay:APPpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:APPpwr?
```

Arguments `OFF` or 0 turns off the apparent power display.

`ON` or 1 turns on the apparent power display.

Examples `POWER:QUALITY:DISPLAY:APPPWR 1` turns on the apparent power display.

`POWER:QUALITY:DISPLAY:APPPWR?` might return `:POWER:QUALITY:DISPLAY:APPPWR 0` indicating that the apparent power display is off.

POWer:QUALity:DISplay:FREQuency

Sets or returns the display state for the frequency readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:QUALity:DISplay:FREQuency {OFF|ON|0|1}
POWer:QUALity:DISplay:FREQuency?
```

Arguments `OFF` or 0 turns off the frequency display.

`ON` or 1 turns on the frequency display.

Examples `POWER:QUALITY:DISPLAY:FREQUENCY 1` turns on the frequency readout display.

`POWER:QUALITY:DISPLAY:FREQUENCY?` might return `:POWER:QUALITY:DISPLAY:FREQUENCY 0` indicating that the frequency readout display is off.

POWer:QUALity:DISplay:ICRESTfactor

Sets or returns the display state for the current crest factor readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:QUALity:DISplay:ICRESTfactor {OFF|ON|0|1}
POWer:QUALity:DISplay:ICRESTfactor?
```

Arguments OFF or 0 turns off the current crest factor display.

ON or 1 turns on the current crest factor display.

Examples POWER:QUALITY:DISPLAY:ICRESTFACTOR 1 turns on the current crest factor display.

POWER:QUALITY:DISPLAY:ICRESTFACTOR? might return :POWER:QUALITY:DISPLAY:ICRESTFACTOR 0 indicating that the current crest factor display is off.

POWer:QUALity:DISplay:IRMS

Sets or returns the display state for the RMS current readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:QUALity:DISplay:IRMS {OFF|ON|0|1}
POWer:QUALity:DISplay:IRMS?
```

Arguments OFF or 0 turns off the RMS current display.

ON or 1 turns on the RMS current display.

Examples

`POWER:QUALITY:DISPLAY:IRMS 1` turns on the RMS current display.

`POWER:QUALITY:DISPLAY:IRMS?` might return `:POWER:QUALITY:DISPLAY:IRMS 0` indicating that the RMS current display is off.

POWer:QUALity:DISplay:PHASEangle

Sets or returns the display state for the phase angle readout.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:DISplay:PHASEangle {OFF|ON|0|1}
POWer:QUALity:DISplay:PHASEangle?
```

Arguments

`OFF` or 0 turns off the phase angle display.

`ON` or 1 turns on the phase angle display.

Examples

`POWER:QUALITY:DISPLAY:PHASEANGLE 1` turns on the phase angle display.

`POWER:QUALITY:DISPLAY:PHASEANGLE?` might return `:POWER:QUALITY:DISPLAY:PHASEANGLE 0` indicating that the phase angle display is off.

POWer:QUALity:DISplay:POWERFACtor

Sets or returns the display state for the power factor readout.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:DISplay:POWERFACtor {OFF|ON|0|1}
POWer:QUALity:DISplay:POWERFACtor?
```

Arguments

`OFF` or 0 turns off the power factor display.

`ON` or 1 turns on the power factor display.

Examples

`POWER:QUALITY:DISPLAY:POWERFACTOR 1` turns on the power factor display.

`POWER:QUALITY:DISPLAY:POWERFACTOR?` might return `:POWER:QUALITY:DISPLAY:POWERFACTOR 0` indicating that the power factor display is off.

POWer:QUALity:DISplay:REACTpwr

Sets or returns the display state for the reactive power readout.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:DISplay:REACTpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:REACTpwr?
```

Arguments

`OFF` or 0 turns off the reactor power display.

`ON` or 1 turns on the reactor power display.

Examples

`POWER:QUALITY:DISPLAY:REACTPWR 1` turns on the reactor power display.

`POWER:QUALITY:DISPLAY:REACTPWR?` might return `:POWER:QUALITY:DISPLAY:REACTPWR 0` indicating that the reactor power display is off.

POWer:QUALity:DISplay:TRUEpwr

Sets or returns the display state for the true power readout.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:DISplay:TRUEpwr {OFF|ON|0|1}
POWer:QUALity:DISplay:TRUEpwr?
```

Arguments

`OFF` or 0 turns off the true power display.

`ON` or 1 turns on the true power display.

Examples `POWER:QUALITY:DISPLAY:TRUEPWR 1` turns on the true power display.

`POWER:QUALITY:DISPLAY:TRUEPWR?` might return `:POWER:QUALITY:DISPLAY:TRUEPWR 0` indicating that the true power display is off.

POWer:QUALity:DISplay:VCRESTfactor

Sets or returns the display state for the voltage crest factor readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:QUALity:DISplay:VCRESTfactor {OFF|ON|0|1}
POWer:QUALity:DISplay:VCRESTfactor?
```

Arguments `OFF` or 0 turns off the voltage crest factor display.

`ON` or 1 turns on the voltage crest factor display.

Examples `POWER:QUALITY:DISPLAY:VCRESTFACTOR 1` turns on the voltage crest factor display.

`POWER:QUALITY:DISPLAY:VCRESTFACTOR?` might return `:POWER:QUALITY:DISPLAY:VCRESTFACTOR 0` indicating that the voltage crest factor display is off.

POWer:QUALity:DISplay:VRMS

Sets or returns the display state for the RMS voltage readout.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:QUALity:DISplay:VRMS {OFF|ON|0|1}
POWer:QUALity:DISplay:VRMS?
```

Arguments

OFF or 0 turns off the RMS voltage display.

ON or 1 turns on the RMS voltage display.

Examples

POWER:QUALITY:DISPLAY:VRMS0 turns off the RMS voltage display.

POWER:QUALITY:DISPLAY:VRMS? might return :POWER:QUALITY:DISPLAY:VRMS 1 indicating that the RMS voltage display is on.

POWer:QUALity:FREQREFerence

Sets or returns the power quality frequency reference.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:FREQREFerence {VOLTage|CURRent}
POWer:QUALity:FREQREFerence?
```

Arguments

VOLTage sets voltage as the power quality frequency reference source.

CURRent sets current as the power quality frequency reference source.

Examples

POWER:QUALITY:FREQREFERENCE CURRent sets current as the power quality frequency reference source.

POWER:QUALITY:FREQREFERENCE? might return :POWER:QUALITY:FREQREFERENCE VOLTAGE indicating that the power quality frequency reference source is set to Voltage.

POWer:QUALity:FREQuency? (Query Only)

Returns the frequency measurement.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:QUALity:FREQuency?
```

Examples `POWER:QUALITY:FREQUENCY?` might return `:POWER:QUALITY:FREQUENCY 60` indicating that the frequency is set to 60 Hz.

POWer:QUALity:ICRESTfactor? (Query Only)

Returns the current crest factor measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:ICRESTfactor?`

Examples `POWER:QUALITY:ICRESTFACTOR?` might return `:POWER:QUALITY:ICRESTfactor 1.4` indicating that the current crest factor value is set to 1.4.

POWer:QUALity:IRMS? (Query Only)

Returns the RMS current measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:IRMS?`

Examples `POWER:QUALITY:IRMS?` might return `:POWER:QUALITY:IRMS 1.00` indicating that the RMS current value is set to 1.00 A.

POWer:QUALity:PHASEangle? (Query Only)

Returns the phase angle measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:PHASEangle?`

Examples `POWER:QUALITY:PHASEANGLE?` might return `:POWER:QUALITY:PHASEANGLE 0` indicating that the phase angle is set to 0.

POWer:QUALity:POWERFACtor? (Query Only)

Returns the power factor measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:POWERFACtor?`

Examples `POWER:QUALITY:POWERFACTOR?` might return `:POWER:QUALITY:POWERFACTOR 1.0` indicating that the power factor is set to 1.0.

POWer:QUALity:REACTpwr? (Query Only)

Returns the reactive power measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:REACTpwr?`

Examples `POWER:QUALITY:REACTPWR?` might return `:POWER:QUALITY:REACTpwr 100` indicating that the reactor power value is set to 100 VAR.

POWer:QUALity:TRUEpwr? (Query Only)

Returns the true power measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:TRUEpwr?`

Examples `POWER:QUALITY:TRUEPWR?` might return `:POWER:QUALITY:TRUEpwr 1000 W` indicating that the true power value is set to 1000 W.

POWer:QUALity:VRMS? (Query Only)

Returns the RMS voltage measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:QUALity:VRMS?`

Examples `POWER:QUALITY:VRMS?` might return `:POWER:QUALITY:VRMS 115` indicating that the RMS voltage value is set to 115 V.

POWer:REFLevel:ABSolute (No Query Form)

Sets the reference levels to their default unit values.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:REFLevel:ABSolute {SETTODEFaults}`

Arguments `SETTODEFaults` sets the reference levels to their default values.

POWer:REFLevel:ABSolute:HIGH

Sets or returns the top reference level for power measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:REFLevel:ABSolute:HIGH <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:HIGH?
```

Arguments <NR3> is the absolute high value in volts. Default value is 0.0E+0

Examples `POWER:REFLEVEL:ABSOLUTE:HIGH 2` sets the absolute high value to 2.000.

`POWER:REFLEVEL:ABSOLUTE:HIGH?` might return `POWER:REFLEVEL:ABSOLUTE:HIGH 2` indicating that the absolute high value is set to 2 V.

POWer:REFLevel:ABSolute:LOW

Sets or returns the low reference level for power measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:REFLevel:ABSolute:LOW <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:LOW?
```

Arguments <NR3> is the absolute low value in volts. Default value is 0.0E+0.

Examples `POWER:REFLEVEL:ABSOLUTE:LOW 1.0` sets the absolute high value to 1.0000.

`POWER:REFLEVEL:ABSOLUTE:LOW?` might return `POWER:REFLEVEL:ABSOLUTE:LOW 1.0000` indicating that the absolute low value is set to 1 V.

POWer:REFLevel:ABSolute:MID<1-3>

Sets or returns the mid reference level for measurements. MID3 is specific to the power application.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:REFLevel:ABSolute:MID<1-3> <NR3>; Ranges={D,-1e6,+1E6}
POWer:REFLevel:ABSolute:MID<1-3>?
```

Arguments `<NR3>` is the absolute mid reference value.

Examples `POWER:REFLEVEL:ABSOLUTE:MID1 1` sets the mid reference voltage to 1V.

`POWER:REFLEVEL:ABSOLUTE:MID1?` might return `POWER:REFLEVEL:ABSOLUTE:MID1 0.0E+0` indicating that the absolute reference voltage level is set to 0.0E+0 V.

POWer:REFLevel:HYSTeresis

Sets or returns the measurement reference level hysteresis value.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:REFLevel:HYSTeresis <NR3>
POWer:REFLevel:HYSTeresis?
```

Arguments `<NR3>` is the hysteresis value.

Examples `POWER:REFLEVEL:HYSTERESIS 30` sets the hysteresis value to 30.

`POWER:REFLEVEL:HYSTERESIS?` might return `POWER:REFLEVEL:HYSTERESIS 10` indicating that the hysteresis value is set to 10.

POWer:REFLevel:METHod

Sets or returns the method used to calculate the 0% and 100% reference level.

Conditions This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:REFLevel:METHod {ABSolute|PERCent}
POWer:REFLevel:METHod?
```

Arguments

`ABSolute` specifies that the reference levels are set explicitly using the `MEASUrement:REFLevel:ABSolute` commands. This method is useful when precise values are required.

`PERCent` specifies that the reference levels are calculated as a percent of the signal amplitude. The percentages are defined using the `MEASUrement:REFLevel:PERCent` commands.

Examples

`POWER:REFLEVEL:METHOD ABSOLUTE` specifies that explicit user-defined values are used for the reference levels.

`POWER:REFLEVEL:METHOD?` might return `POWER:REFLEVEL:METHOD PERCENT` indicating that the reference level units used are calculated as a percent relative to HIGH and LOW.

POWer:REFLevel:PERCent (No Query Form)

Sets the reference levels to the default percentage values.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:REFLevel:PERCent <SETTODEFaults>
```

Arguments

`SETTODEFaults` sets the reference levels to their default percentage values.

POWer:REFLevel:PERCent:HIGH

Sets or returns the top reference percent level for power measurements.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:REFLevel:PERCent:HIGH <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:HIGH?
```

Arguments

`<NR3>` is the high value in percent.

Examples

`POWER:REFLEVEL:PERCENT:HIGH 95` sets the high reference level to 95% of the signal amplitude.

`POWER:REFLEVEL:PERCENT:HIGH?` might return `:POWER:REFLEVEL:PERCENT:HIGH 90` indicating that the percentage high reference level is set to 90% of the signal amplitude.

POWer:REFLevel:PERCent:LOW

Sets or returns the low reference percent level for power measurements.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:REFLevel:PERCent:LOW <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:LOW?
```

Arguments

`<NR3>` is the low value in percentage.

Examples

`POWER:REFLEVEL:PERCENT:LOW 15` sets the low reference level to 15% of the signal amplitude.

`POWER:REFLEVEL:PERCENT:LOW?` might return `:POWER:REFLEVEL:PERCENT:LOW 10` indicating that the percentage low reference level is set to 90% of the signal amplitude.

POWer:REFLevel:PERCent:MID<1-3>

Sets or returns the mid reference percent level for waveform measurements. Mid3 is specific to the power application.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:REFLevel:PERCent:MID<1-3> <NR3>; Ranges={D,0.0,100.0}
POWer:REFLevel:PERCent:MID<1-3>?
```

Arguments

`<NR3>` is the mid value in percentage.

Examples

`POWER:REFLEVEL:PERCENT:MID1 25` sets the mid reference voltage to 25%.

`POWER:REFLEVEL:PERCENT:MID1?` might return `POWER:REFLEVEL:PERCENT:MID1 50.0000` indicating that the mid reference voltage level is set to 50%.

POWer:RIPPle (No Query Form)

Does a vertical autoset for ripple measurements or sets the vertical offset to 0.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:RIPPle {VERTAUTOset|VERTDEFault}
```

Arguments

`VERTAUTOset` automatically scales the source waveform to optimize ripple measurements.

`VERTDEFault` sets the vertical offset of the source waveform to 0 volts (for voltage source) or 0 amperes (for current source).

POWer:RIPPle:RESults:AMPLitude? (Query Only)

Returns the peak-to-peak ripple measurement.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:RIPPle:RESults:AMPLitude?
```

Examples

`POWER:RIPPLE:RESULTS:AMPLITUDE?` might return `:POWER:RIPPLE:RESULTS:AMPLITUDE 1` indicating that the peak-to-peak amplitude is set to 1 V.

POWer:RIPPle:RESults:MAX? (Query Only)

Returns the maximum of the peak-to-peak ripple measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:RIPPle:RESults:MAX?`

Examples `POWER:RIPPLE:RESULTS:MAX?` might return `:POWER:RIPPLE:RESULTS:MAX 1.1` indicating that the maximum peak-to-peak amplitude is set to 1.1 V.

POWer:RIPPle:RESults:MEAN? (Query Only)

Returns the mean of the peak-to-peak ripple measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:RIPPle:RESults:MEAN?`

Examples `POWER:RIPPLE:RESULTS:MEAN?` might return `:POWER:RIPPLE:RESULTS:MEAN 1.0` indicating that the mean peak-to-peak amplitude is set to 1.0 V.

POWer:RIPPle:RESults:MIN? (Query Only)

Returns the minimum of the peak-to-peak ripple measurement.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:RIPPle:RESults:MIN?`

Examples `POWER:RIPPLE:RESULTS:MIN?` might return `:POWER:RIPPLE:RESULTS:MIN 0.9` indicating that the minimum peak-to-peak amplitude is set to 0.9 V.

POWer:RIPPle:RESults:STDdev? (Query Only)

Returns the standard deviation of the peak-to-peak ripple measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:RIPPle:RESults:STDdev?
```

Examples `POWER:RIPPLE:RESULTS:STDDEV?` might return `:POWER:RIPPLE:RESULTS:STDDEV 0.14` indicating that the standard deviation of the peak-to-peak amplitude is set to 0.14.

POWer:RIPPle:SOUrce

Sets or returns the source waveform for ripple tests. The voltage source waveform is specified using the POWer:VOLTAGESOurce command and the current waveform is specified using the POWer:CURRENTSOurce command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:RIPPle:SOUrce {VOLTage|CURRent}
```

Arguments `VOLTage` specifies voltage source waveform for ripple tests.

`CURRent` specifies current source waveform for ripple tests.

Examples `POWER:RIPPLE:SOURCE CURRent` sets the ripple source to Current.

`POWER:RIPPLE:SOURCE?` might return `:POWER:RIPPLE:SOURCE VOLT` indicating that the ripple source is set to Voltage.

POWer:SOA:LINear:XMAX

Sets or returns the user XMAX value for use in linear SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LINear:XMAX <NR3>
POWer:SOA:LINear:XMAX?
```

Arguments `<NR3>` is the XMAX value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:XMAX 700` sets the XMAX value to 700.0000.

`POWER:SOA:LINEAR:XMAX ?` might return `:POWER:SOA:LINear:XMAX 500.0000` indicating that the XMAX value for linear plot type is set to 500.0000.

POWer:SOA:LINear:XMIN

Sets or returns the user XMIN value for use in linear SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LINear:XMIN <NR3>
POWer:SOA:LINear:XMIN?
```

Arguments `<NR3>` is the XMIN value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:XMIN 2` sets the XMIN value to 2.0000.

`POWER:SOA:LINEAR:XMIN ?` might return `:POWER:SOA:LINear:XMIN 0.0E+0` indicating that the XMIN value for linear plot type is set to 0.0E+0.

POWer:SOA:LINear:YMAX

Sets or returns the user YMAX value for use in linear SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SOA:LINear:YMAX <NR3>
POWer:SOA:LINear:YMAX?
```

Arguments `<NR3>` is the YMAX value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:YMAX 700` sets the YMAX value to 700.0000.

`POWER:SOA:LINEAR:YMAX ?` might return `:POWER:SOA:LINear:YMAX 50.0000` indicating that the YMAX value for linear plot type is set to 50.0000.

POWer:SOA:LINear:YMIN

Sets or returns the user YMIN value for use in linear SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SOA:LINear:YMIN <NR3>
POWer:SOA:LINear:YMIN?
```

Arguments `<NR3>` is the YMIN value used for linear SOA calculations.

Examples `POWER:SOA:LINEAR:YMIN 2` sets the YMIN value to 2.0000.

`POWER:SOA:LINEAR:YMIN ?` might return `:POWER:SOA:LINear:YMIN 0.0E+0` indicating that the YMIN value for linear plot type is set to 0.0E+0.

POWer:SOA:LOG:XMAX

Sets or returns the user XMAX value for use in Log SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LOG:XMAX <NR3>
POWer:SOA:LOG:XMAX?
```

Arguments `<NR3>` is the XMAX value used for log SOA calculations.

Examples `POWER:SOA:LOG:XMAX 1` sets the XMAX value to 1.0000.

`POWER:SOA:LOG:XMAX ?` might return `:POWER:SOA:LOG:XMAX 1.0000E+3` indicating that the XMAX value for log plot type is set to 1.0000E+3.

POWer:SOA:LOG:XMIN

Sets or returns the user XMIN value for use in Log SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LOG:XMIN <NR3>
POWer:SOA:LOG:XMIN?
```

Arguments `<NR3>` is the XMIN value used for log SOA calculations.

Examples `POWER:SOA:LOG:XMIN 2` sets the XMIN value to 2.0000.

`POWER:SOA:LOG:XMIN ?` might return `:POWER:SOA:LOG:XMIN 100.0000E-3` indicating that the XMIN value for log plot type is set to 100.0000E-3.

POWer:SOA:LOG:YMAX

Sets or returns the user YMAX value for use in Log SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LOG:YMAX <NR3>
POWer:SOA:LOG:YMAX?
```

Arguments <NR3> is the YMAX value used for log SOA calculations.

Examples POWER:SOA:LOG:YMAX 10 sets the YMAX value to 10.0000.

POWER:SOA:LOG:YMAX ? might return :POWER:SOA:LOG:YMAX 100.0000 indicating that the YMAX value for log plot type is set to 100.0000.

POWer:SOA:LOG:YMIN

Sets or returns the user YMIN value for use in Log SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SOA:LOG:YMIN <NR3>
POWer:SOA:LOG:YMIN?
```

Arguments <NR3> is the YMIN value used for log SOA calculations.

Examples POWER:SOA:LOG:YMIN 1 sets the YMIN value to 1.0000.

POWER:SOA:LOG:YMIN ? might return :POWER:SOA:LOG:YMIN 100.0000E-3 indicating that the YMIN value for log plot type is set to 100.0000E-3.

POWer:SOA:MASK:DEFine

Sets or returns the X (Volts) and Y (Amps) coordinates of the current SOA mask. You can specify the number of points from 2 to 10, minimum being 2. Successive X values must be ≥ the preceding X values. The number of XY points sent determines the value of NR_PT.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SOA:MASK:DEFine <NR3>
POWer:SOA:MASK:DEFine?
```

Arguments

<NR3> represents SOA mask coordinates.

Examples

`POWER:SOA:MASK:DEFINE 10` specifies the SOA mask coordinates as 0.0E+0,0.0E+0,0.0E+0,0.0E+0,0.0E+0,30.0000,25.0000,30.0000,300.0000, 2.5000,300.0000,2.4000,300.0000,2.2000,300.0000,1.9000,300.0000,1.3000, 300.0000,0.0E+0.

`POWER:SOA:MASK:DEFINE ?` might return `:POWER:SOA:MASK:DEFINE 0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000,300.0000,0.0E+0` indicating that the SOA mask coordinates are set to 0.0E+0,30.0000,25.0000,30.0000,300.0000,2.5000,300.0000,0.0E+0.

POWer:SOA:MASK:MAXAmps

Sets or returns the maximum current applied to SOA mask testing.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:MASK:MAXAmps <NR3>
POWer:SOA:MASK:MAXAmps?
```

Arguments

<NR3> is the maximum current applied to SOA mask testing.

Examples

`POWER:SOA:MASK:MAXAMPS 40` sets the SOA mask testing current to 40 A.

`POWER:SOA:MASK:MAXAMPS ?` might return `:POWER:SOA:MASK:MAXAMPS 30.0000` indicating that the SOA mask testing maximum current is set to 30 A.

POWer:SOA:MASK:MAXVolts

Sets or returns the maximum voltage applied to SOA mask testing.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:MASK:MAXVolts <NR3>
POWer:SOA:MASK:MAXVolts?
```

Arguments

<NR3> is the maximum voltage applied to SOA mask testing.

Examples

POWER:SOA:MASK:MAXVOLTS 200 sets the SOA mask testing voltage to 200 V.

POWER:SOA:MASK:MAXVOLTS ? might return :POWER:SOA:MASK:MAXVOLTS 300.0000 indicating that the SOA mask testing maximum voltage is set to 300 V.

POWer:SOA:MASK:MAXWatts

Sets or returns the maximum power applied to SOA mask testing.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:MASK:MAXWatts <NR3>
POWer:SOA:MASK:MAXWatts?
```

Arguments

<NR3> is the maximum power applied to SOA mask testing.

Examples

POWER:SOA:MASK:MAXWATTS 1000 sets the SOA mask testing power to 1.0000E+3 W.

POWER:SOA:MASK:MAXWATTS ? might return :POWER:SOA:MASK:MAXWATTS 750.0000 indicating that the SOA mask testing maximum power is set to 750 W.

POWer:SOA:MASK:NR_PT? (Query Only)

Returns the number of mask points defined.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:MASK:NR_PT?
```

Examples `POWER:SOA:MASK:NR_PT?` might return `:POWER:SOA:MASK:NR_PT 4` indicating that the number of mask points defined is 4.

POWer:SOA:MASK:STATe

Sets or returns the state of the mask for SOA calculations.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SOA:MASK:STATe {OFF|LIMITS|POINTS}
POWer:SOA:MASK:STATe?
```

Arguments `OFF` disables mask testing.

`LIMITS` enables mask testing based on limits specified using POWer:SOA:MASK:MAXAmps, POWer:SOA:MASK:MAXVolts, and POWer:SOA:MASK:MAXWatts commands

`POINTS` enables mask testing based on masks points defined.

Examples `POWER:SOA:MASK:STATE POINTS` enables mask testing power based on points defined.

`POWER:SOA:MASK:STATE?` might return `:POWER:SOA:MASK:STATE LIMITS` indicating that the mask testing is enabled based on limits.

POWer:SOA:MASK:STOPOnviol

Sets or returns the enabled state of the mask stop on violation condition.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SOA:MASK:STOPOnviol {OFF|ON|0|1}
POWer:SOA:MASK:STOPOnviol?
```

Arguments

`OFF` or 0 enables mask stop on violations.

`ON` or 1 disables mask stop on violations.

Examples

`POWER:SOA:MASK:STOPONVIOL 1` disables the state of the mask stop on violation condition.

`POWER:SOA:MASK:STOPONVIOL ?` might return `:POWER:SOA:MASK:STOPONVIOL 0` indicating that the mask stop is enabled.

POWer:SOA:PLOTTYPe

Sets or returns the Safe Operating Area (SOA) plot type.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:PLOTTYPe {LOG|LINear}
POWer:SOA:PLOTTYPe?
```

Arguments

`LOG` for logarithmic SOA plot type.

`LINear` for linear SOA plot type.

Examples

`POWER:SOA:PLOTTYPE LINear` sets the SOA plot type to Linear.

`POWER:SOA:PLOTTYPE ?` might return `:POWER:SOA:PLOTTYPE LOG` indicating that the SOA plot type is set to Log.

POWer:SOA:RESult:FAILures:QTY? (Query Only)

Returns the number of failures in the test.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SOA:RESult:FAILures:QTY?
```

Examples `POWER:SOA:RESULT:FAILURES:QTY?` might return `:POWER:SOA:RESULT:FAILURES 0` indicating that the number of failures is 0.

POWer:SOA:RESult:NUMACq? (Query Only)

Returns the number of acquisitions in the test.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SOA:RESult:NUMACq?`

Examples `POWER:SOA:RESULT:NUMACQ?` might return `:POWER:SOA:RESULT:NUMACQ 10` indicating that the number of acquisitions is 10.

POWer:SOA:RESult:STATe? (Query Only)

Returns the pass/fail state of the SOA test.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SOA:RESult:STATe?`

Returns `PASS` or `FAIL`

Examples `POWER:SOA:RESULT:STATE?` might return `:POWER:SOA:MASK:STATE PASS` indicating that the SOA test state is PASS.

POWer:STATIstics (No Query Form)

Clears all the accumulated statistics of all measurements. Performs the same function as the MEASUrement:STATIstics command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:STATIstics {RESET}
```

Arguments `RESET` clears the measurement statistics.

POWer:STATIstics:MODE

Enables or disables the display of the measurement statistics. Performs the same function as the MEASUrement:STATIstics:MODE command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:STATIstics:MODE {OFF|ALL}
POWer:STATIstics:MODE?
```

Arguments `ALL` turns on measurement statistics display.

`OFF` turns all measurements statistics off.

Examples `POWER:STATISTICS:MODE OFF` turns measurements statistics display off.

`POWER:STATISTICS:MODE?` might return `:MEASUREMENT:STATISTICS:MODE ALL` indicating that measurement statistics are turned on and all statistics are being displayed for each measurement.

POWer:STATIstics:WEIghting

Sets the number of samples which are included for the statistics computations for mean and the standard deviation. Performs the same function as the MEASUrement:STATIstics:WEIghting command.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:STATIstics:WEIghting <NR1>;Ranges {L,2,1000}
POWer:STATIstics:WEIghting?
```

Arguments

`<NR1>` is the number of samples used for the mean and standard deviation statistical accumulations

Examples

`POWER:STATISTICS:WEIGHTING 4` sets statistical weighting to four samples.

`POWER:STATISTICS:WEIGHTING ?` might return `:POWER:STATISTICS:WEIGHTING 4` indicating that statistics weighting is currently set to 4 samples.

POWer:SWLoss:CONDCALCmethod

Sets or returns the power application switching loss conduction calculation method.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:CONDCALCmethod {VOLTage|RDSon|VCEsat}
POWer:SWLoss:CONDCALCmethod?
```

Arguments

`VOLTage` sets voltage as the conduction calculation method.

`RDSon` sets RDSon as the conduction calculation method.

`VCEsat` sets VCEsat as the conduction calculation method.

Examples

`POWER:SWLOSS:CONDCALCMETHOD RDSon` sets the conduction calculation method to RDSon.

`POWER:SWLOSS:CONDCALCMETHOD ?` might return `:POWER:SWLOSS:CONDCALCMETHOD VOLT` indicating that the conduction calculation method is set to Voltage.

POWer:SWLoss:CONDuction:ENERGY:MAX? (Query Only)

Returns the maximum conduction energy for the switching loss calculation.

Conditions

This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:ENERGY:MAX?`

Examples `POWER:SWLOSS:CONDUCTION:ENERGY:MAX?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MAX 1` indicating that the maximum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:ENERGY:MEAN? (Query Only)

Returns the mean conduction energy in the conduction period for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:ENERGY:MEAN?`

Examples `POWER:SWLOSS:CONDUCTION:ENERGY:MEAN?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MEAN 1` indicating that the mean conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:ENERGY:MIN? (Query Only)

Returns the minimum conduction energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:ENERGY:MIN?`

Examples `POWER:SWLOSS:CONDUCTION:ENERGY:MIN?` might return `:POWER:SWLOSS:CONDUCTION:ENERGY:MIN 1` indicating that the minimum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:CONDuction:POWER:MAX? (Query Only)

Returns the maximum conduction power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWER:MAX?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MAX?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MAX 1` indicating that the maximum conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:CONDuction:POWER:MEAN? (Query Only)

Returns the mean conduction power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWER:MEAN?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MEAN?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MEAN 1` indicating that the mean conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:CONDuction:POWER:MIN? (Query Only)

Returns the minimum conduction power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:CONDuction:POWER:MIN?`

Examples `POWER:SWLOSS:CONDUCTION:POWER:MIN?` might return `:POWER:SWLOSS:CONDUCTION:POWER:MIN 1` indicating that the minimum conduction power switching loss calculation is set to 1 W.

POWer:SWLoss:DISplay

Sets or returns the display selection for switching loss results: All measurements, energy loss measurements or power loss measurements.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SWLoss:DISplay {ALL|ENERGYLoss|POWERLoss}
POWer:SWLoss:DISplay?
```

Arguments `ALL` displays both energy and power loss measurements in the results.

`ENERGYLoss` displays only energy loss measurements in the results.

`POWERLoss` displays only power loss measurements in the results.

Examples `POWER:SWLOSS:DISPLAY ENERGYLoss` displays only energy loss measurements in the results.

`POWER:SWLOSS:DISPLAY ?` might return `:POWER:SWLOSS:DISPLAY ALL` indicating that the results displays both energy and power loss measurements.

POWer:SWLoss:GATe:POLarity

Sets or returns the switching loss gate polarity.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SWLoss:GATe:POLarity {FALL|RISe}
POWer:SWLoss:GATe:POLarity?
```

Arguments

FALL sets falling edge as the switching loss gate polarity.

RISe sets rising edge as the switching loss gate polarity.

Examples

POWER:SWLOSS:GATE:POLARITY FALL sets the gate polarity to Fall.

POWER:SWLOSS:GATE:POLARITY ? might return :POWER:SWLOSS:GATE:POLARITY RISE indicating that the gate polarity is set to Rise.

POWer:SWLoss:GATe:TURNON

Sets or returns the gate turn on level for switching loss power measurements.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:GATe:TURNON <NR3>
POWer:SWLoss:GATe:TURNON?
```

Examples

POWER:SWLOSS:GATE:TURNON 3.5 sets the gate turn on level to 3.5000.

POWER:SWLOSS:GATE:TURNON ? might return :POWER:SWLOSS:GATE:TURNON 1.5 indicating that the gating turn on level is set to 1.5.

POWer:SWLoss:NUMCYCles? (Query Only)

Returns the number of cycles counted for the switching loss calculation.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:NUMCYCles?  <NR3>
```

Examples

POWER:SWLOSS:NUMCYCLES? might return the number of cycles for switching loss calculation, if the POWer:TYPe is set to Switching Loss (POWer:TYPe:SWITCHingLoss). If the query times out with the Switching

Loss power enabled, it indicates the possibility of incorrect settings and might return the following :

*ESR?
20
ALLEV?
2202,"Measurement error, No period found;
:power:swloss:numcycles?",410,"Query INTERRUPTED"

POWer:SWLoss:RDSon

Sets or returns the user RDSON value for use in switching loss calculations when the conduction calculation method is RDSON.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SWLoss:RDSon <NR3>
POWer:SWLoss:RDSon?
```

Arguments `<NR3>` is the RDSON switching loss calculation.

Examples `POWER:SWLOSS:RDSON 30` sets the RDSon value to 30.0000.

`POWER:SWLOSS:RDSON ?` might return `:POWER:SWLOSS:RDSon 20.0000E-3` indicating that the RDSon value is set to 20.0000E-3.

POWer:SWLoss:REFLevel:ABSolute:GATEMid

Sets or returns the mid voltage reference level used in switching loss power measurements in volts.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SWLoss:REFLevel:ABSolute:GATEMid <NR3>
POWer:SWLoss:REFLevel:ABSolute:GATEMid?
```

Arguments

<NR3> is the mid voltage reference level in volts.

Examples

POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID 100 sets the absolute gate mid reference voltage to 100.0000 V.

POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID ? might return :POWER:SWLOSS:REFLEVEL:ABSOLUTE:GATEMID 50.0000 indicating that the gate mid reference voltage is set to 50.0000 V.

POWer:SWLoss:REFLevel:ABSolute:LOWCurrent

Sets or returns the low current reference level used in switching loss power measurements in amperes.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent <NR3>
POWer:SWLoss:REFLevel:ABSolute:LOWCurrent?
```

Arguments

<NR3> is the low voltage current level in amperes.

Examples

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT 2.8 sets the absolute reference low current to 2.8000 A.

POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT ? might return :POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWCURRENT 5.0000 indicating that the absolute reference low current is set to 5.0000 A.

POWer:SWLoss:REFLevel:ABSolute:LOWVoltage

Sets or returns the low voltage reference level used in switching loss power measurements in volts.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage <NR3>
POWer:SWLoss:REFLevel:ABSolute:LOWVoltage?
```

Arguments

`<NR3>` is the low voltage reference level in volts.

Examples

`POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE 2.5` sets the absolute reference low voltage to 2.5000 V.

`POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE ?` might return `:POWER:SWLOSS:REFLEVEL:ABSOLUTE:LOWVOLTAGE 5.0000` indicating that the absolute reference low voltage is set to 5.0000 V.

POWer:SWLoss:REFLevel:PERCent:GATEMid

Sets or returns the mid voltage reference level used in switching loss power measurements in percent.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:SWLoss:REFLevel:PERCent:GATEMid <NR3>
POWer:SWLoss:REFLevel:PERCent:GATEMid?
```

Arguments

`<NR3>` is the mid voltage reference level in volts.

Examples

`POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID 30` sets the gate mid reference voltage to 30%.

`POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID ?` might return `:POWER:SWLOSS:REFLEVEL:PERCENT:GATEMID 50.0000` indicating that the gate mid reference voltage is set to 50%.

POWer:SWLoss:REFLevel:PERCent:LOWCurrent

Sets or returns the low current reference level used in switching loss power measurements in percent.

Conditions

This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SWLoss:REFLevel:PERCent:LOWCurrent <NR3>
POWer:SWLoss:REFLevel:PERCent:LOWCurrent?
```

Arguments `<NR3>` is the low voltage reference level percent.

Examples `POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT 15` sets the reference low current to 15%.

`POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT ?` might return `:POWER:SWLOSS:REFLEVEL:PERCENT:LOWCURRENT 5.0000` indicating that the reference low current is set to 5%.

POWer:SWLoss:REFLevel:PERCent:LOWVoltage

Sets or returns the low voltage reference level used in switching loss power measurements in percent.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax
```
POWer:SWLoss:REFLevel:PERCent:LOWVoltage <NR3>
POWer:SWLoss:REFLevel:PERCent:LOWVoltage?
```

Arguments `<NR3>` is the low voltage reference level in percent.

Examples `POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE 10` sets the reference low voltage to 10%.

`POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE ?` might return `:POWER:SWLOSS:REFLEVEL:PERCENT:LOWVOLTAGE 5.0000` indicating that the reference low voltage is set to 5%.

POWer:SWLoss:TOFF:ENERGY:MAX? (Query Only)

Returns the maximum Toff energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:ENERGY:MAX?`

Examples `POWER:SWLOSS:TOFF:ENERGY:MAX?` might return `:POWER:SWLOSS:TON:ENERGY:MAX 1` indicating that the maximum Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:ENERGY:MEAN? (Query Only)

Returns the mean Toff energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TOFF:ENERGY:MEAN?` might return `:POWER:SWLOSS:TON:ENERGY:MEAN 1` indicating that the mean Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:ENERGY:MIN? (Query Only)

Returns the minimum Toff energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:ENERGY:MIN?`

Examples `POWER:SWLOSS:TOFF:ENERGY:MIN?` might return `:POWER:SWLOSS:TON:ENERGY:MIN 1` indicating that the minimum Toff energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOFF:POWER:MAX? (Query Only)

Returns the maximum Toff power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:POWER:MAX?`

Examples `POWER:SWLOSS:TOFF:POWER:MAX?` might return `:POWER:SWLOSS:TON:POWER:MAX 1` indicating that the maximum Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TOFF:POWER:MEAN? (Query Only)

Returns the mean Toff power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:POWER:MEAN?`

Examples `POWER:SWLOSS:TOFF:POWER:MEAN?` might return `:POWER:SWLOSS:TON:POWER:MEAN 1` indicating that the mean Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TOFF:POWER:MIN? (Query Only)

Returns the minimum Toff power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOFF:POWER:MIN?`

Examples `POWER:SWLOSS:TOFF:POWER:MIN?` might return `:POWER:SWLOSS:TON:POWER:MIN 1` indicating that the minimum Toff power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:ENERGY:MAX? (Query Only)

Returns the maximum Ton energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MAX?`

Examples `POWER:SWLOSS:TON:ENERGY:MAX?` might return `:POWER:SWLOSS:TON:ENERGY:MAX 1` indicating that the maximum Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:ENERGY:MEAN? (Query Only)

Returns the mean Ton energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TON:ENERGY:MEAN?` might return `:POWER:SWLOSS:TON:ENERGY:MEAN 1` indicating that the mean Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:ENERGY:MIN? (Query Only)

Returns the minimum Ton energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:ENERGY:MIN?`

Examples `POWER:SWLOSS:TON:ENERGY:MIN?` might return `:POWER:SWLOSS:TON:ENERGY:MIN 1` indicating that the minimum Ton energy switching loss calculation is set to 1 J.

POWer:SWLoss:TON:POWER:MAX? (Query Only)

Returns the maximum Ton power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:POWER:MAX?`

Examples `POWER:SWLOSS:TON:POWER:MAX?` might return `:POWER:SWLOSS:TON:POWER:MAX 1` indicating that the maximum Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:POWER:MEAN? (Query Only)

Returns the mean Ton power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:POWER:MEAN?`

Examples `POWER:SWLOSS:TON:POWER:MEAN?` might return `:POWER:SWLOSS:TON:POWER:MEAN 1` indicating that the mean Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TON:POWER:MIN? (Query Only)

Returns the minimum Ton power for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TON:POWER:MIN?`

Examples `POWER:SWLOSS:TON:POWER:MIN?` might return `:POWER:SWLOSS:TON:POWER:MIN 1` indicating that the minimum Ton power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:ENERGY:MAX? (Query Only)

Returns the maximum total energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MAX?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MAX?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MAX 1` indicating that the maximum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:ENERGY:MEAN? (Query Only)

Returns the mean total energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MEAN?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MEAN?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MEAN 1` indicating that the mean conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:ENERGY:MIN? (Query Only)

Returns the minimum total energy for the switching loss calculation.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:ENERGY:MIN?`

Examples `POWER:SWLOSS:TOTAL:ENERGY:MIN?` might return `:POWER:SWLOSS:TOTAL:ENERGY:MIN 1` indicating that the minimum conduction energy switching loss calculation is set to 1 J.

POWer:SWLoss:TOTal:POWER:MAX? (Query Only)

Returns the maximum total power loss.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:POWER:MAX?`

Examples `POWER:SWLOSS:TOTAL:POWER:MAX?` might return `:POWER:SWLOSS:TOTAL:POWER:MAX 1` indicating that the maximum total power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:POWER:MEAN? (Query Only)

Returns the mean total power loss.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:POWER:MEAN?`

Examples `POWER:SWLOSS:TOTAL:POWER:MEAN?` might return `:POWER:SWLOSS:TOTAL:POWER:MEAN 1` indicating that the mean total power switching loss calculation is set to 1 W.

POWer:SWLoss:TOTal:POWER:MIN? (Query Only)

Returns the minimum total power loss.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax `POWer:SWLoss:TOTal:POWER:MIN?`

Examples `POWER:SWLOSS:TOTAL:POWER:MIN?` might return `:POWER:SWLOSS:TOTAL:POWER:MIN 1` indicating that the minimum total power switching loss calculation is set to 1 W.

POWer:SWLoss:VCEsat

Sets or returns VCESAT value for use in switching loss calculations when the conduction calculation method is VCESAT.

Conditions This command requires a DPO3PWR application module.

Group Power

Syntax

```
POWer:SWLoss:VCEsat <NR3>
POWer:SWLoss:VCEsat?
```

Arguments `<NR3>` is the VCEsat switching loss calculation.

Examples

`POWER:SWLOSS:VCESAT 5` sets the VCEsat value to 5.0000.

`POWER:SWLOSS:VCESAT ?` might return `:POWER:SWLOSS:VCEsat 2.0000` indicating that the VCEsat value is set to 2.0000.

POWer:TYPe

Sets or returns the power application measurement type.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:TYPe {NONe|QUALity|SWITCHingloss|SOA
|HARMonics|RIPPle|MODULationanalysis|DESKew}
POWer:TYPe?
```

Arguments

`NONe` Use to set the measurement type to None.

`QUALity` Use the power quality functions to obtain measurements and statistics about the general power quality in your test circuit

`SWITCHingloss` Use the switching loss functions to obtain the power loss and energy loss across the acquired waveform, including turn-on loss, turn-off loss, conduction loss, and total loss. Typically, use these functions to characterize losses in power supply switching devices, as they switch on and off.

`SOA` Use the safe operating functions to obtain an X-Y display of the switching device-under-test's voltage and current. Also use them to perform a mask test of the X-Y signal relative to the graphical X-Y description of the device specification table. The safe operating area is typically the voltage and current values that a semiconductor can operate without damaging itself.

`HARMonics` Use the harmonics functions to obtain the frequency spectrum of the source waveform and associated measurement values. Harmonic measurements can help one perform in-depth troubleshooting of power quality problems.

`RIPPle` Use the ripple functions to obtain measurements and statistics for the AC components of the acquired waveform. Ripples are often found on top of a large DC signal.

`MODULationanalysis` Use the modulation functions to obtain a trend plot of a measurement value across the acquired waveform. This is useful for showing the variations in the modulated switching signal.

`DESKew` Run the deskew procedure to match the delays through the probes. Different probes introduce different delays between the probe tip and the oscilloscope. Many oscilloscope users do not have to worry about this because they use the same type of probe on all channels. Power measurement users, however, frequently use both a voltage probe and a current probe. A current probe typically has a larger delay than a voltage probe, so setting deskew values becomes important.

Examples

`POWER:TYPE HARMonics` sets the measurement type to Harmonics.

`POWER:TYPE`? might return `POWER:TYPE NON` indicating that no measurement type is set.

POWer:VOLTAGESOurce

Sets or returns the voltage source for the power application.

Conditions

This command requires a DPO3PWR application module.

Group

Power

Syntax

```
POWer:VOLTAGESOurce {CH1|CH2|CH3|CH4|REF1|REF2|REF3|REF4}
POWer:VOLTAGESOurce?
```

Arguments

`CH1–CH4 or REF1–REF4` sets channel or ref as the voltage source.

Examples

`POWER:VOLTAGESOURCE CH1` sets the voltage source as CH1.

`POWER:VOLTAGESOURCE`? might return `POWER:VOLTAGESOURCE CH1` indicating that the voltage source is set to CH1.

*PSC

Sets or returns the power-on status flag that controls the automatic power-on handling of the DESER, SRER, and ESER registers. When *PSC is true, the DESER register is set to 255 and the SRER and ESER registers are set to 0 at power-on. When *PSC is false, the current values in the DESER, SRER, and ESER registers are preserved in nonvolatile memory when power is shut off and are restored at power-on.

Group

Status and Error

Syntax

```
*PSC {OFF|ON|NR1>}
*PSC?
```

Related Commands DESE, *ESE, FACtory, *RST, *SRE

Arguments

`OFF` sets the power-on status clear flag to false.

`ON` sets the power-on status clear flag to true.

`<NR1>` = 0 sets the power-on status clear flag to false. This disables the power-on clear allowing the oscilloscope to possibly assert SRQ after power-on; any other value sets the power-on status clear flag to true, enabling the power-on status clear preventing any SRQ assertion after power on.

Examples

`*PSC 0` sets the power-on status clear flag to false.

`*PSC?` might return 1 to indicate that the power-on status clear flag is set to true.

*PUD

Sets or returns a string of Protected User Data. This data is protected by the PASSWord command. You can modify it only by first entering the correct password. This password is not necessary to query the data.

Group Status and Error

Syntax

```
*PUD {<Block>|<QString>}
*PUD?
```

Related Commands PASSWord

Arguments

`<Block>` is a block containing up to 300 ASCII characters.

`<QString>` is a string containing up to 300 ASCII characters.

Examples

`*PUD #229This oscilloscope belongs to me` stores the string "This oscilloscope belongs to me" in the user protected data area.

`*PUD?` might return `#221PROPERTY OF COMPANY X`

*RCL (No Query Form)

This command restores the state of the oscilloscope from a copy of the settings stored in memory (The settings are stored using the *SAV command).

Group Save and Recall

Syntax `*RCL <NR1>`

Related Commands FACtory, *LRN?, RECAll:SETUp, *RST, *SAV, SAVe:SETUp

Arguments `<NR1>` is a value in the range from 1 to 10, which specifies a saved setup storage location.

Examples `*RCL 3` restores the oscilloscope from a copy of the settings stored in memory location 3.

RECAll:SETUp (No Query Form)

Restores the state of the oscilloscope from a copy of the settings stored in memory. The settings are stored using the `*SAV` command.

Group Save and Recall

Syntax `RECAll:SETUp {FACtory|<NR1>|<file path>}`

Related Commands FACtory, *RCL, *RST, *SAV, SAVe:SETUp, FILESystem:CWD

Arguments `FACtory` restores the factory setup.

`<NR1>` is a value in the range from 1 to 10, which specifies a saved setup storage location.

`<file path>` specifies a location for an oscilloscope setup file. <file path> is a quoted string that defines the file name and path. Input the file path using the form `<drive>:/<dir>/<filename>.<extension>` and one or <dir>s are optional. If you do not specify them, the oscilloscope will read the file from the default directory (see FILESystem:CWD). <filename> stands for a filename; the use of wildcard characters in filenames is not supported. Filename extensions are not required, but highly recommended.

Examples

`RECALL:SETUP FACTORY` recalls (and makes current) the oscilloscope setup to its factory defaults.

`RECALL:SETUP 2` recalls the oscilloscope setup from setup storage location 2.

`RECALL:SETUP "TEK00000.SET"` recalls the setup from the file TEK00000.SET in the current working directory.

RECAll:WAVEform (No Query Form)

This command (no query form) recalls a stored waveform to a reference location. Only the first waveform in a .CSV file is recalled for multiple waveform .CSV files. Recall of digital waveforms (D0 through D15) is not supported.

Group

Save and Recall

Syntax

```
RECAll:WAVEform <QString>,REF<x>
```

Related Commands

SAVe:WAVEform, FILESystem:CWD, FILESystem?

Arguments

`<QString>` is a quoted string that specifies a location for an oscilloscope file. The file name and path should be input using the form `<drive>:/<dir>/<filename>.<extension>`.

`REF<x>` specifies a location in internal reference memory. Reference memory location values range from 1 through 4.

***NOTE.** The use of <drive>: and <dir>/ are optional; if you do not specify the drive and directory, then the instrument will write them to the current working directory as specified by FILESystem:CWD.*

Examples

`RECALL:WAVEFORM "TEK00000.ISF",REF1` recalls the waveform stored in the file named TEK00000.ISF from the current directory for waveforms to the reference location 1.

REF<x>? (Query Only)

Returns reference waveform settings for the reference waveform <x>.

Group

Vertical

Syntax

```
REF<x>?
```

Examples

`REF1?` might return `:REF1:LABEL "Race Condition";VERTICAL:POSITION 0.0E+0;SCALE 100.0000E-6;:REF1:HORIZONTAL:DELAY:TIME 0.0E+;:REF1:HORIZONTAL:SCALE 4.0000E-6;:REF1:DATE "01-08-09";TIME "20:21:38"`.

REF<x>:DATE? (Query Only)

Returns the date that reference waveform data for channel <x> was copied into the internal reference memory, where x is the reference channel number.

Group

Vertical

Syntax

```
REF<x>:DATE?
```

REF<x>:HORizontal:DELay:TIMe

Sets or returns the horizontal delay time for reference waveform <x>, where x is the reference channel number. The delay time is expressed in seconds and is limited to ±5 times the reference horizontal scale.

Group

Vertical

Syntax

```
REF<x>:HORizontal:DELay:TIMe <NR3>
REF<x>:HORizontal:DELay:TIMe?
```

Arguments

`<NR3>` is the delay time in seconds.

Examples

`REF2:HORIZONTAL:DELAY:TIME 4.0E-6` sets the horizontal delay time for the REF2 waveform to 4 µs.

REF<x>:HORizontal:SCAle

Sets or returns the horizontal scale for reference waveform <x>, where x is the reference channel number.

Group Vertical

Syntax

```
REF<x>:HORizontal:SCAle <NR3>
REF<x>:HORizontal:SCAle?
```

Arguments `<NR3>` is the horizontal scale in seconds.

Examples `REF1:HORIZONTAL:SCALE?` might return `REF1:HORIZONTAL:SCALE 4.0E-4`.

REF<x>:LABel

Sets or returns the reference waveform label for the channel specified by <x>, where x is the reference channel number.

Group Vertical

Syntax

```
REF<x>:LABel <Qstring>
REF<x>:LABel?
```

Arguments `<Qstring>` is an alpha-numeric string of text, enclosed in quotes, that contains the label text for the reference channel <x> waveform. The text string is limited to 30 characters.

Examples `REF4:LABEL?` might return `:REF4:LABEL “Clk Wfm 2”`.

REF<x>:TIMe? (Query Only)

Returns the time that reference waveform data was copied into the internal reference memory for reference channel <x>, where x is the reference channel number.

Group Vertical

Syntax

```
REF<x>:TIMe?
```

Examples `REF4:TIME?` might return “`16:54:05`”.

REF<x>:VERTical:POSition

Sets or returns the vertical position of the reference waveform specified by <x>, where x is the reference channel number.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform. The position value determines the vertical graticule coordinate at which signal values are displayed. For example, if the position for Reference 3 is set to 2.0, the signal represented by that reference will be displayed at 2.0 divisions above the center of the screen.

Group

Vertical

Syntax

```
REF<x>:VERTical:POSition <NR3>
REF<x>:VERTical:POSition?
```

Related Commands

CH<x>:POSition, MATH[1]:VERTical:POSition

Arguments

`<NR3>` is the desired position, in divisions from the center horizontal graticule. The range is from -4.0 to 4.0 divisions.

Examples

`REF2:VERTICAL:POSITION 1.3E+00` positions the Reference 2 input signal 1.3 divisions above the center horizontal graticule.

`REF1:VERTICAL:POSITION?` might return `:REF1:VERTICAL:POSITION -1.3000E+00` indicating that the current position of Reference 1 is 1.3 divisions below the center horizontal graticule.

REF<x>:VERTical:SCAle

Sets or returns the vertical scale for the reference waveform specified by <x>, where x is the reference channel number.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects reference and math waveforms differently from channel waveforms:

- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.
- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.

Group

Vertical

Syntax

```
REF<x>:VERTical:SCAle <NR3>
REF<x>:VERTical:SCAle?
```

Related Commands

CH<x>:SCAle, MATH[1]:VERTical:SCAle

Arguments

`<NR3>` is the gain in user units-per-division.

Examples

`REF4:VERTICAL:SCALE 100E-03` sets the Reference 4 scale to 100 mV per division.

`REF4:VERTICAL:SCALE?` might return `:REF2:VERTICAL:SCALE 1.0000e+00` indicating that the current vertical scale setting for Reference 2 is 1 V per division.

REM (No Query Form)

Embeds a comment within programs as a means of internally documenting the programs. The oscilloscope ignores these embedded comment lines.

Group

Miscellaneous

Syntax

```
REM <QString>
```

Arguments

`<QString>` is a string that can contain a maximum of 80 characters.

Examples

`REM "This is a comment"` is a comment string that the oscilloscope will ignore.

*RST (No Query Form)

Resets the oscilloscope to the factory default settings. The *RST command does not alter the following:

- Calibration data that affect device specifications
- The Output Queue
- The Service Request Enable Register setting
- The Power-on status clear flag setting
- Alias definitions
- Stored settings
- The *PUD? Response
- Any of the values associated with the DATA command.
- Oscilloscope password

Group Status and Error

Syntax `*RST`

Related Commands FACtory, RECAll:SETUp, SAVe:SETUp, *PSC, *RCL, *SAV

Arguments None

Examples `*RST` resets the oscilloscope settings to factory defaults.

*SAV (No Query Form)

Stores the state of the oscilloscope to a specified memory location. You can use the *RCL command to restore the oscilloscope to this saved state at a later time.

Group Save and Recall

Syntax `*SAV <NR1>`

Related Commands *RCL, RECAll:SETUp, SAVe:SETUp

Arguments

`<NR1>` specifies a location in which to save the state of the oscilloscope. Location values range from 1 through 10. Using an out-of-range location value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Examples

`*SAV 2` saves the current oscilloscope state in memory location 2.

SAVe:ASSIgn:TYPe

Sets or returns the assignment of the data to be saved when the front-panel Save button is pressed.

Group

Save and Recall

Syntax

```
SAVe:ASSIgn:TYPe {IMAGe|WAVEform|SETUp}
SAVe:ASSIgn:TYPe?
```

Arguments

`IMAGe` assigns the Save button to save screen images.

`WAVEform` assigns the Save button to save waveforms.

`SETUp` assigns the Save button to save setups.

SAVe:EVENTtable:BUS<x> (No Query Form)

Saves the data from bus<x> to a specified file and location; where x is the bus number

Group

Save and Recall

Syntax

```
SAVe:EVENTtable:BUS<x> <file path>
```

Arguments

`<file path>` is a quoted string that defines the file name and path location where the event table will be stored.

NOTE. *<filename> stands for a filename of up to 125 characters, followed by a period (".") and the three-character extension. Waveform files should have a .csv extension for comma-separated spreadsheet format files.*

SAVe:IMAGe (No Query Form)

Saves a capture of the screen image into the specified file. Supported image formats are PNG, Windows Bitmap, and TIFF. If an extension for a supported file type is added to the file name, then the corresponding format will be used. If no supported extension is added to the file, the format to use will be determined by the value obtained from the :SAVe:IMAGe:FILEFormat? query.

Group Save and Recall

Syntax `SAVe:IMAGe <file path>`

Related Commands SAVe:ASSIgn:TYPe

Arguments `<file path>` is a filename, including path, where the image will be saved. If you do not specify a directory, the oscilloscope will store the file in the current working directory. File name extensions are not required but are highly recommended. The images will be saved in the current working directory.

SAVe:IMAGe:FILEFormat

Sets or returns the file format to use for saving screen images.

NOTE. *The file format is not automatically determined by the file name extension. You need to choose a file format with an extension which is consistent with the selected file format.*

Group Save and Recall

Syntax

```
SAVe:IMAGe:FILEFormat {PNG|BMP|TIFf}
SAVe:IMAGe:FILEFormat?
```

Related Commands SAVe:IMAGe

Arguments `PNG` saves the file in Portable Network Graphics format.

`BMP` saves the file in Microsoft Windows bitmap format.

`TIFf` saves the file in Tagged Image File Format.

SAVe:IMAGe:INKSaver

Sets or returns the current ink saver setting for the SAVe:IMAGe command. If set to "ON" or "1", images will be generated using the ink saver palette. If set to "OFF" or "0", images will be generated using the standard palette.

Group Save and Recall

Syntax

```
SAVe:IMAGe:INKSaver {OFF|ON|0|1}
SAVe:IMAGe:INKSaver?
```

Related Commands SAVe:IMAGe

Arguments `OFF` or 0 generates images from the Inksaver palette.

`ON` or 1 generates images using the Standard palette.

SAVe:IMAGe:LAYout

Sets or returns the layout to use for saved screen images.

Group Save and Recall

Syntax

```
SAVe:IMAGe:LAYout {LANdscape|PORTRait}
SAVe:IMAGe:LAYout?
```

Arguments `LANdscape` specifies that screen images are saved in landscape format.

`PORTRait` specifies that screen images are saved in portrait format.

SAVe:SETUp (No Query Form)

Stores the state of the oscilloscope to a specified memory location. You can later use the *RCL command to restore the oscilloscope to this saved state.

Group Save and Recall

Syntax

```
SAVe:SETUp {<file path>|<NR1>}
```

Related Commands *RCL, RECAll:SETUp, *SAV

Arguments `<file path>` is the target location for storing the setup file. <file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>:<dir>/<filename>. <extension> and one or <dir>s are optional. If you do not specify them, the oscilloscope will store the file in the current working directory. <filename> stands for a filename. (Use of wildcard characters in filenames is not supported.) Filename extensions are not required but are highly recommended. For setups, use the extension ".SET".

`<NR1>` specifies a location for saving the current front-panel setup. The front-panel setup value ranges from 1 to 10. Using an out-of-range value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Examples `SAVE:SETUP 5` saves the current oscilloscope setup in memory location 5.

`SAVE:SETUP "TEK00000.SET"` saves the current oscilloscope setup in the file TEK00000.SET in the current working directory.

SAVe:WAVEform (No Query Form)

This command saves a specified waveform or all displayed waveforms (excluding serial bus waveforms). Only individual analog waveforms (CH<x>, MATH and REF<x>) can be saved to reference memory locations.

You can save all displayed waveforms, excluding serial bus waveforms, to a single CSV file when the `SAVE:WAVEFORM:FILEFORMAT` is set to `SPREADSHEET`.

You can save all displayed waveforms, excluding serial bus waveforms and digital channels (MSO models) to consecutive ISF (internal save format) files when the `SAVE:WAVEFORM:FILEFORMAT` is set to `INTERNAL`.

Group Save and Recall

Syntax

```
SAVe:WAVEform [<wfm>,{REF<x>}] | [<wfm>, <QString>] | [ALL,
<QString>]
```

Related Commands RECAll:WAVEform, SAVe:WAVEform:FILEFormat

Arguments `<wfm>, <REF<x>>` saves the specified waveform to the specified reference memory location. <wfm> can be any live analog channel (where <x> is the channel number), the MATH1 waveform, or another reference waveform (such as REF1).

`<wfm>, <QString>` saves the specified waveform to the file specified in the quoted string argument. Any live channel (such as CH1), the MATH1 waveform, any reference waveform can be saved to a file.

`ALL, <QString>` saves all displayed waveforms, excluding serial bus waveforms, to a single CSV file specified by the quoted string argument when the `SAVE:WAVEFORM:FILEFORMAT` is set to `SPREADSHEET`, or saves all displayed waveforms, excluding serial bus waveforms and digital channel waveforms (MSO models) to individual ISF (internal save format) files with a file name prefix specified by the argument with an underscore (_) and the waveform ID (such as CH1, REF1, MATH) appended to the file name(s).

Examples

`SAVE:WAVEFORM CH1,REF1` saves the CH1 waveform in reference memory location 1.

`:SAVE:WAVEFORM:FILEFORMAT SPREADSHEET; :SAVE:WAVEFORM ALL, "E:/test_folder/test1_all.csv"` saves all displayed waveforms (excluding serial bus waveforms) to `E:/test_folder/test1_all.csv`.

`:SAVe:WAVEform:FILEFormat INTERNal; :SAVe:WAVEform ALL, "E:/test_folder/test1"` saves all displayed waveforms (excluding serial bus waveforms and digital channels for MSO models) to individual files named `E:/test_folder/test1_<wfm>.isf` (for example `test1_CH1.isf`).

SAVe:WAVEform:FILEFormat

Specifies or returns the file format for saved waveforms. Waveform header and timing information is included in the resulting file of non-internal formats. The oscilloscope saves DPO waveforms as a 500 x 200 matrix, with the first row corresponding to the most recently acquired data. The values specified by DATa:STARt and DATa:STOP determine the range of waveform data to output. In the event that DATa:STOP value is greater than the current record length, the current record length determines the last output value.

Group

Save and Recall

Syntax

```
SAVe:WAVEform:FILEFormat {INTERNal|SPREADSheet}
SAVe:WAVEform:FILEFormat?
```

Related Commands

CURVe, DATa, DATa:STARt, DATa:STOP, SAVe:WAVEform, WFMInpre:NR_Pt, WFMOutpre:NR_Pt?

Arguments

`INTERNal` specifies that waveforms are saved in an internal format, using a .isf filename extension. These files can be recalled as reference waveforms. When this argument is specified, the settings specified via the DATa:STARt and DATa:STOP commands have no meaning as the entire waveform is saved.

`SPREADSheet` specifies that waveform data is saved in a format that contains comma delimited values. These waveform data files are named using the .csv filename extension. Saving waveforms in CSV format enables spreadsheet programs to import the data.

Examples

`SAVE:WAVEFORM:FILEFORMAT INTERNAL` specifies that the internal file format is the format used for saving waveforms.

`SAVE:WAVEFORM:FILEFORMAT?` might return `:SAVE:WAVEFORM:FILEFORMAT INTERNAL` indicating that waveforms are saved using the internal format.

SAVe:WAVEform:GATIng

Specifies whether save waveform operations should save the entire waveform (NONe) or a specified portion of the waveform.

Group

Save and Recall

Syntax

```
SAVe:WAVEform:GATIng {NONe|CURSors|SCREEN}
SAVe:WAVEform:GATIng?
```

Arguments

`CURSors` turns on cursors and the gates are the waveform record points at the cursor positions.

`NONe` saves the entire waveform.

`SCREEN`, if zoom is on, the gates are the start and end waveform record points of the zoom (upper) graticule, otherwise the gates are the start and end waveform record points of the main graticule.

Examples

`SAVE:WAVEFORM:GATING CURSors` specifies that, when the waveform gating is set to cursors, save waveform operations should save the waveform points between the cursors. If cursors are turned off, waveform gating automatically reverts to NONE.

SEARCH? (Query Only)

Returns all search-related settings.

Group

Search

Syntax

```
SEARCH?
```

Examples

SEARCH? might return:

```
:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI:COND SS;DAT:MOSI:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI: DAT:MISO:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:SPI:DAT:SIZ
1;:SEARCH:SEARCH1:TRIG:A:BUS:B1:I2C:COND
STAR;DAT:VAL "XXXXXXXX";SIZ 1;DIR
NOCARE;:SEARCH:SEARCH1:TRIG:A:BUS:B1:I2C:ADDR:MOD ADDR7;TYP
USER;VAL "XXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B1:CAN:COND
SOF;FRAME DATA;DAT:VAL "XXXXXXXX";SIZ 1;D IR
NOCARE;QUAL EQU;:SEARCH:SEARCH1:TRIG:A:BUS:B1:CAN:ID:MOD
ST;VAL "XXXXXXXXXXX";:SEARCH:SEARCH1:TRI
G:A:BUS:B2:SPI:COND SS;DAT:MOSI:VAL
"XXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:B2:SPI:DAT:MISO:VAL
"XXXXX XXX";:SEARCH:SEARCH1:TRIG:A:BUS:B2:SPI:DAT:SIZ
1;:SEARCH:SEARCH1:TRIG:A:BUS:B2:I2C:COND
STAR;DAT:VAL "XXXXXXXX";SIZ 1;DIR
NOCARE;:SEARCH:SEARCH1:TRIG:A:BUS:B2:I2C:ADDR:MOD ADDR7;TYP
USER;VAL "XXXXXXX" ;:SEARCH:SEARCH1:TRIG:A:BUS:B2:CAN:COND
SOF;FRAME DATA;DAT:VAL "XXXXXXXX";SIZ 1;DIR NOCARE;QUAL
EQU; :SEARCH:SEARCH1:TRIG:A:BUS:B2:CAN:ID:MOD ST;VAL
"XXXXXXXXXXX";:SEARCH:SEARCH1:TRIG:A:BUS:SOU B1;:SEA
RCH:SEARCH1:TRIG:A:TYP EDG;LEV 0.0000;LEV:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH
0.0000;RE F1 0.0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:UPP:CH1 800.0000E-3;CH2
800.000 0E-3;CH3 800.0000E-3;CH4 800.0000E-3;MATH
800.0000E-3;REF1 800.0000E-3;REF2 800.0000E-3;REF3 800.000
0E-3;REF4 800.0000E-3;:SEARCH:SEARCH1:TRIG:A:LOW:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH 0.
0000;REF1 0.0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:EDGE:SOU CH1;SLO
RIS;:SE ARCH:SEARCH1:TRIG:A:LOGI:FUNC AND;THR:CH1
0.0000;CH2 0.0000;CH3 0.0000;CH4 0.0000;MATH
0.0000;REF1 0 .0000;REF2 0.0000;REF3 0.0000;REF4
0.0000;:SEARCH:SEARCH1:TRIG:A:LOGI:INP:CH1 X;CH2 X;CH3
X;CH4 X;MA TH X;REF1 X;REF2 X;REF3 X;REF4 X;CLOC:SOU
NONE;EDGE RIS;:SEARCH:SEARCH1:TRIG:A:LOGI:PAT:INP:CH1
X;CH 2 X;CH3 X;CH4 X;MATH X;REF1 X;REF2 X;REF3 X;REF4
X;:SEARCH:SEARCH1:TRIG:A:LOGI:PAT:WHE TRU;WHE:LESSL
8.0000E-9;L 8.0000E-9;:SEARCH:SEARCH1:TRIG:A:PULSEW:SOU
CH1;POL POS;WHE LESS;WID 8.0000E-9;:SEA
RCH:SEARCH1:TRIG:A:RUNT:SOU CH1;POL POS;WHE OCCURS;WID
8.0000E-9;:SEARCH:SEARCH1:TRIG:A:TRAN:SOU CH1 ;POL POS;WHE
SLOW;DELT 8.0000E-9;:SEARCH:SEARCH1:TRIG:A:SETH:CLOC:SOU
```

```
CH1;EDGE RIS;THR 0.0000;:SEARC H:SEARCH1:TRIG:A:SETH:DAT:SOU
CH2;THR 0.0000;:SEARCH:SEARCH1:TRIG:A:SETH:HOLDT
8.0000E-9;SETT 8.0000 E-9;:SEARCH:SEARCH1:STATE 0
```

SEARCH:SEARCH<x>:COPy (No Query Form)

Copies the search criteria to the trigger, or the trigger criteria to a search. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:COPy {SEARCHtotrigger|TRIGgertosearch}
```

Arguments

`SEARCHtotrigger` copies the search criteria to the trigger

`TRIGgertosearch` copies the trigger criteria to the search

SEARCH:SEARCH<x>:STATE

Sets the search state to on or off. <x> is the search number, which is always 1. The query form returns the search state.

Group Search

Syntax

```
SEARCH:SEARCH<x>:STATE {<NR1>|OFF|ON}
SEARCH:SEARCH<x>:STATE?
```

Arguments

`OFF` or `<NR1>` = 0 sets the search state to off.

`ON` or `<NR1>` ≠ 0 sets the search state to on.

SEARCH:SEARCH<x>:TOTAL? (Query Only)

Returns the total number of matches for the search. The total number of matches may be than the number of marks placed. <x> is the search number, which is always 1.

Group Search

Syntax `SEARCH:SEARCH<x>:TOTAL?`

Returns `<NR1>` is the total number of matches.

SEARCH:SEARCH<x>:TRIGger:A:BUS? (Query Only)

Queries the `SEARCH:SEARCH<x>:TRIGger:A:BUS` settings. <x> is the search number, which is always 1. There are two serial buses, B1 and B2.

To set the search type to bus, use SEARCH:SEARCH<x>:TRIGger:A:TYPe BUS.

Conditions This command requires the appropriate application module for the bus. (See page 2-13, *Bus Command Group*.)

Group Search

Syntax `SEARCH:SEARCH<x>:TRIGger:A:BUS?`

Returns `I2C` specifies the Inter-IC bus.

`SPI` specifies the Serial Peripheral Interface bus (not available on two-channel models).

`CAN` specifies the Controller Area Network bus.

`RS232C` specifies the RS-232C bus.

`PARallel` specifies the Parallel bus.

`LIN` specifies the LIN bus.

`FLEXRay` specifies the FLexRay bus.

`AUDio` specifies the audio bus.

`MIL1553B` specifies the MIL-STD-1553 bus.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:CONDITION SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B2:SPI:CONDITION SS;:SEARCH:SEARCH1:TRIGGER:A:BUS:B1:SPI:DATA:MOSI:VALUE "XX"`.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition

This command sets the condition (start of frame or matching data) to be used to search on audio bus data.`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition
{SOF|DATA}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition?
```

Arguments `SOF` specifies to search on the start of frame.

`DATA` specifies to search on matching data.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue

This command sets the upper word value to be used to search on audio bus data. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue to search on the lower word value.) The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue
<String>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue?
```

Arguments `<String>` specifies the upper word value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet

This commands sets the data offset value to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet?
```

Arguments `<NR1>` is the data offset value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier

This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier?
```

Arguments `LESSthan` sets the qualifier to less than.

`MOREthan` sets the qualifier to greater than.

`EQual` sets the qualifier to equal.

`UNEQual` sets the qualifier to not equal.

`LESSEQual` sets the qualifier to less than or equal.

`MOREEQual` sets the qualifier to greater than or equal.

`INrange` sets the qualifier to in range.

`OUTrange` sets the qualifier to out of range.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue

This command sets the lower word value to be used to search on audio bus data. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue to set the upper word value.) The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue
<String>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:VALue?
```

Arguments <String> is the lower word value.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD

This command sets the alignment of the data (left, right or either) to be used to search on audio bus data. The search condition must be set to DATA using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:CONDition.

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD
{EITher|LEFt|RIGht}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:AUDio:DATa:WORD?
```

Arguments

EITher aligns the data to either left or right.

LEFt aligns the data to the left.

RIGht aligns the data to the right.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition

This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used to search on CAN bus data. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AUTO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition
{SOF|FRAMEtype|IDentifier|DATA|IDANDDATA|EOF|ACKMISS:ERROR}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition?
```

Arguments

SOF specifies a search based on the start of frame.

FRAMEtype specifies a search based on the frame type.

IDentifier specifies a search based on the frame identifier.

DATA specifies a search based on the frame data.

IDANDDATA specifies a search based on the frame identifier and data.

EOF specifies a search based on the end of frame.

ACKMISS specifies a search based on the missing ACK field.

ERROR specifies a search based on a bit stuffing error.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection

This command sets the data direction (read, write or nocare) to be used to search on CAN bus data. This only applies if the search condition has been set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection
{READ|WRITE|NOCARE}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:DIRection?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition

Arguments READ specifies the read direction.

WRITE specifies the write direction.

NOCARE specifies either a read or write direction.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

This command sets the qualifier (<, >, =, not =, <=) to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|EQual}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue

Arguments LESSthan searches for bus data less than the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

`MOREthan` searches for bus data greater than the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

`EQual` searches for bus data equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

`UNEQual` searches for bus data not equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

`LESSEQual` searches for bus data less equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

`EQual` searches for bus data equal to the value specified by SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe

This command sets the length of the data string, in bytes, to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:SIZe?
```

Arguments `<NR1>` is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue

This command sets the binary data value to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

Arguments `<bin>` is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype

This command sets the frame type (data, remote, error or overload) to be used to search on CAN bus data. This only applies if the search condition has been set to FRAMEtype (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype
{DATA|REMote|ERRor|OVERLoad}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:FRAMEtype?
```

Arguments `DATA` specifies a data frame.

`REMote` specifies a remote frame.

`ERRor` specifies an error frame.

`OVERLoad` specifies an overload frame.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe

This command sets the addressing mode (standard or extended format) to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:MODe {STandard|EXTended}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:MODe?
```

Arguments STandard specifies an 11-bit identifier field.

EXTended specifies a 29-bit identifier field.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue

This command sets the binary address value to be used to search on CAN bus data. This only applies if the search condition has been set to IDANDDATA or DATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN:CONDition).

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:CAN{:IDentifier|:
ADDRess}:VALue?
```

Arguments <bin> is the address in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

This command specifies the condition to use when searching on FlexRay bus data (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error).

SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number, which can be 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition
{SOF|FRAMETypeid|CYCLEcount|HEADer|DATA|IDANDDATA|EOF|ERROR}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition?
```

Arguments

SOF sets the search condition to start of frame.

FRAMETypeid sets the search condition to a frame type id.

CYCLEcount sets the search condition to cycle count.

HEADer sets the search condition to header.

DATA sets the search condition to data.

IDANDDATA sets the search condition to ID and data.

EOF sets the search condition to EOF.

ERROR sets the search condition to an error.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION ERROR sets the FlexRay condition to ERROR

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CONDITION SOF indicating the FlexRay condition is start of frame.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue

This command specifies the upper data value of the range to be used when searching on the FlexRay bus cycle count field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue to set the low value.) The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:
HIVALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:
HIVALue?
```

Arguments `<QString>` is a quoted string that is the cycle count high value.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "110010"` sets the cycle count high value to 110010.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "XXXXXX"` indicating the cycle count high value is set to don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus cycle count field. The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:
B<x>:FLEXray:CYCLEcount:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual
|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:
QUALifier?
```

Arguments LESSthan sets the cycle count qualifier to less than.

MOREthan sets the cycle count qualifier to greater than.

EQual sets the cycle count qualifier to equal.

UNEQual sets the cycle count qualifier to not equal.

LESSEQual sets the cycle count qualifier to less than or equal.

MOREEQual sets the cycle count qualifier to greater than or equal.

INrange sets the cycle count qualifier to in range.

OUTrange sets the cycle count qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER LESSthan` sets the cycle count qualifier to less than.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER EQUAL` indicating the cycle count qualifier is set to =.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue

This command specifies the low data value to be used when searching on the FlexRay bus cycle count field. The search condition must be set to CYCLEcount (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:
VALue?
```

Arguments

`<QString>` is a quoted string that is the cycle count binary value.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE “110010”` sets the cycle count value to 110010.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE "XXXXXX"` indicating the cycle count value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue

This command specifies the high value to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition).`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

Arguments `<QString>` is a quoted string that is the data field high binary value.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE “11001010”` sets the high value 11001010.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "XXXXXXXX"` indicating the high value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet

This command specifies the offset of the data string in bytes to be used when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition).`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet
<NR1>
```

`SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet?`

Arguments

`<NR1>` is the data offset in bytes. A byte offset of -1 signifies don't care, and no byte offset is used. The instrument will search or match any byte value that fits.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 10` sets the FLEXRAY data offset to 10 bytes.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 0` indicating the offset is set to 0 bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier?
```

Arguments

`LESSthan` sets the data qualifier to less than.

`MOREthan` sets the data qualifier to greater than.

`EQual` sets the data qualifier to equal.

`UNEQual` sets the data qualifier to not equal.

`LESSEQual` sets the data qualifier to less than or equal.

`MOREEQual` sets the data qualifier to greater than or equal.

`INrange` sets the data qualifier to in range.

`OUTrange` sets the data qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER LESSTHAN` sets the data qualifier to less than.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER EQUAL` indicating the data qualifier is =.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe

This command specifies the length of the data string, in bytes, to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe?
```

Arguments

`<NR1>` is the length of the data string in bytes. Length range is 1 to 8.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 8` sets the data size to 8 bytes.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 1` indicating the data size is 1 byte.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue

This command specifies the low value to use when searching on the FlexRay bus data field. The search condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition

Arguments

`<QString>` is a quoted string that is the low binary data string to be used for a FlexRay search if the search condition is set to `IDANDDATA`.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE “11001010”` sets the binary data string to 11001010.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE "XXXXXXXX"` indicates the binary data string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE

This command specifies which end of file type to use (static, dynamic or any) when searching on the FlexRay bus EOF field. The search condition needs to be set to EOF (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE
{STATic|DYNAMic|ANY}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE?
```

Arguments

`STATic` sets the FlexRay end of frame type to STATIC.

`DYNAMic` sets the FlexRay end of frame type to DYNAMIC.

`ANY` sets the FlexRay end of frame type to ANY type.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE ANY` sets the FlexRay end of frame type to any type.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE STATIC indicating the FlexRay end of frame type is static.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE

This command specifies the error type to use when searching on the FlexRay bus signal. The search condition needs to be set to ERROR (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE
{CRCHeader|CRCTrailer|SYNCFrame|STARTupnosync|NULLFRStatic|
NULLFRDynamic}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE?
```

Arguments

CRCHeader sets the error type to CRC header.

CRCTrailer sets the error type to CRC trailer.

SYNCFrame sets the error type to sync frame.

STARTupnosync sets the error type to start up with no sync.

NULLFRStatic sets the error type to null frame static.

NULLFRDynamic sets the error type to null frame dynamic.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE SYNCFRAME sets the error type to sync frame

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE CRCHEADER indicating the FlexRay error type is CRCHEADER

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue

This command specifies the high value to use when searching on the FlexRay bus frame ID field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue to set the low value.) The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue?
```

Arguments <QString> is a quoted string representing the binary data string used for FlexRay frame ID high value.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE “00101100101”` sets the frame id high value to 00101100101.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE "XXXXXXXXXXX"` indicating the frame id high value is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier

This command specifies the qualifier to use when searching on the FlexRay bus frame ID field. The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:
B<x>:FLEXray:FRAMEID:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:
QUALifier?
```

Arguments

`LESSthan` sets the frame ID qualifier to less than.

`MOREthan` sets the frame ID qualifier to more than.

`EQual` sets the frame ID qualifier to equal.

`UNEQual` sets the frame ID qualifier to unequal

`LESSEQual` sets the frame ID qualifier to less than or equal.

`MOREEQual` sets the frame ID qualifier to greater than or equal.

`INrange` sets the frame ID qualifier to in range.

`OUTrange` sets the frame ID qualifier to outside of range.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER OUTRANGE` sets the frame ID qualifier to out of range.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER EQUAL` indicating the frame ID qualifier is EQUAL.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue

This command specifies the low value to use when searching on the FlexRay bus frame ID field. (Use SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue to set the high value.) The search condition needs to be set to IDentifier (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue?
```

Arguments

`<QString>` is a quoted string representing the binary data string used for FlexRay frame ID low value.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "11001101010"` sets the value of the frame ID is 11001101010.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "10110010101" indicating the value of the frame ID is 10110010101.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType

This command specifies the frame type (normal, payload, null, sync or startup) to use when searching on FlexRay bus data. The search condition needs to be set to FRAMEType (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType
{NORMal|PAYLoad|NULL|SYNC|STARTup}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:FRAMEType?
```

Arguments

NORMal sets the frame type to normal.

PAYLoad sets the frame type to payload.

NULL sets the frame type to NULL.

SYNC sets the frame type to sync.

STARTup sets the frame type to start up.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE STARTUP sets the flexray frame type to startup.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE NORMAL indicating the FlexRay frame type is normal.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC

This command specifies the CRC portion of the binary header string to be used when searching on FlexRay bus data. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:

CONDition). `SEARCH<x>` is the search number, which is always 1, `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC?
```

Arguments `<QString>` is a quoted string representing the CRC portion of the binary header string used for FlexRay search.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC “00110010101”` sets the CRC protion of the binary header string 00110010101.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC "XXXXXXXXXXX"` indicating the CRC protion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount

This command specifies to use the cycle count portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
CYCLEcount <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
CYCLEcount?
```

Arguments `<QString>` is a quoted string representing the cycle count portion of the binary header string used for FlexRay search.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "001101" sets the cycle count to 001101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "XXXXXX" indicating the cycle count is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID

This command specifies to use the frame ID portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2. .

Conditions

This command requires a DPO3FLEX application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID?
```

Arguments

<QString> is a quoted string representing the frame ID portion of the binary header string used for a FlexRay search.

Examples

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "10110010101" sets the frame ID portion of the binary header string to 10110010101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "XXXXXXXXXXX" indicating the frame ID portion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits

This command specifies to use the indicator bits portion of the binary header string when searching on the FlexRay bus header. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits?
```

Arguments <QString> is a quoted string representing the indicator bits portion of the binary header string used in a FlexRay search.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "10100"` sets the indicator bits of the header to 10100.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "XXXXX"` indicating the indicator bits of the header are don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength

This command specifies to use the payload length portion of the binary header string when searching on the FlexRay bus header. This command specifies the payload length to be used in a FlexRay search. The search condition needs to be set to HEADer (using SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:CONDition). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3FLEX application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:FLEXray:HEADER:
PAYLength?
```

Arguments `<QString>` is a quoted string representing the payload length portion of the binary header string used for a FlexRay search.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH "1001101"` sets the payload length portion of the binary header string to 1001101.

SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH "XXXXXXX" indicating the payload length portion of the binary header string is don't cares.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe

Sets or returns the I2C address mode to 7 or 10-Bit. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe
{ADDR7|ADDR10}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe?
```

Arguments ADDR7 specifies 7-bit addresses.

ADDR10 specifies 10-bit addresses.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe

Sets or returns the I2C address type. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
{GENeralcall|STARtbyte|HSmode|EEPROM|USER}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe?
```

Arguments GENeralcall specifies the GENeralcall address type.

STARtbyte specifies the STARtbyte address type.

HSmode specifies the HSmode address type

`EEPROM` specifies the EEPROM address type.

`USER` specifies a user address.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue

Sets or returns the binary address string to be used for an I2C trigger search if the search condition is ADDR or ADDRANDDATA. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue?
```

Arguments `<bin>` is the address in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition

Sets or returns the search condition for an I2C trigger search. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition
{STARt|STOP|REPEATstart|ACKMISS|ADDRess|DATA|ADDRANDDATA}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:CONDition?
```

Arguments `STARt` specifies a search based on a start condition.

`STOP` specifies a search based on a stop condition.

`REPEATstart` specifies a search based on a repeat of start condition.

`ACKMISS` specifies a search based on a missing acknowledgement condition.

`ADDRess` specifies a search based on an address.

DATA specifies a search based on a data condition.

ADDRANDDATA specifies a search based on an address and data condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection

Sets or returns the I2C search condition to be valid on a Read, Write, or Either condition. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection
{READ|WRITE|NOCARE}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:DIRection?
```

Arguments READ specifies a read condition.

WRITE specifies a write condition.

NOCARE specifies either a read or write condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe

Sets or returns the length of the data string in bytes to be used for an I2C trigger search if the search condition is DATA or ADDRANDDATA. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:SIZe?
```

Arguments <NR1> is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue

Sets or returns the binary data string to be used for an I2C trigger search if the search condition is DATA or ADDRANDDATA. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:I2C:DATa:VALue?
```

Arguments `<bin>` is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition

Sets or returns the search condition for a LIN search.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition
{SYNCField|IDentifier|DATA|IDANDDATA|WAKEup|SLEEP|ERROR}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:CONDition?
```

Arguments SYNCField specifies to search on the sync field.

IDentifier specifies to search on the identifier.

DATA specifies to search on the data.

IDANDDATA specifies to search on the identifier and the data.

WAKEup specifies to search on wake up.

SLEEP specifies to search on sleep.

ERROR specifies to search on errors.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:CONDITION?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:CONDITION SYNCFIELD` indicating a search on the sync field.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue

Sets or returns the binary data string to be used for LIN searches if the search condition is ID or IDANDDATA.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue?
```

Arguments `<QString>` is a quoted string of 1s, 0s, or Xs representing the binary data string to be used for LIN searches if the search condition is ID or IDANDDATA.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"` indicating the high value is don't care.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier

Sets or returns the LIN data qualifier. This only applies if the trigger condition is IDANDDATA or DATA.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier?
```

Arguments `LESSthan` sets the LIN data qualifier to less than.

`MOREthan` sets the LIN data qualifier to greater than.

`EQual` sets the LIN data qualifier to equal.

`UNEQual` sets the LIN data qualifier to not equal.

`LESSEQual` sets the LIN data qualifier to less than or equal.

`MOREEQual` sets the LIN data qualifier to greater than or equal.

`INrange` sets the LIN data qualifier to in range.

`OUTrange` sets the LIN data qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER LESSthan` sets the data qualifier to less than.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER EQUAL` indicating the data qualifier is equal.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe

Sets or returns the length of the data string in bytes to be used for LIN Search, if search condition is DATA or IDANDDATA.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:SIZe?
```

Arguments

`<NR1>` is the length of the data in bytes.

Examples

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE 8` sets the LIN data size is 8 bytes.

`SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:SIZE 1` indicating that the LIN data size is 1 byte.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue

Sets or returns the binary data string used for a LIN search if the search condition is ID or IDANDDATA.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:DATa:VALue?
```

Arguments

`<QString>` is the binary data string for the search.

Examples SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:VALUE? might return SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:DATA:VALUE "XXXXXXXX" indicating the data value is don't care.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE

Sets or returns the error type used for a LIN Search.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE
{SYNC|PARity|CHecksum|HEADertime|RESPtime|FRAMetime}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:ERRTYPE?
```

Arguments

`SYNC` specifies a sync error type.

`PARity` specifies a parity error type.

`CHecksum` specifies a checksum error type.

`HEADertime` specifies a header time error type.

`RESPtime` specifies a response time error type.

`RAMetime` specifies a frame time error type.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:ERRTYPE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:ERRTYPE SYNC` indicating a SYNC error type.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue

Sets or returns the binary address string used for LIN search if search condition is ID or IDANDDATA.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue?
```

Arguments `<QString>` is a quoted string specifying the binary address string to be used for LIN search if search condition is ID or IDANDDATA.

Examples `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE?` might return `SEARCH:SEARCH1:TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "XXXXXX"` indicating the binary address is undefined.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

When the MIL-STD-1553 bus search condition is set to `COMMAND`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit of the range for the remote terminal address field. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue to specify the lower limit of the range.) `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:HIVALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:HIVALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

Arguments QString is a quoted string of up to 5 characters where the allowable characters are 0, 1, and X.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue` “01000” sets the upper limit of the remote terminal address range to 01000 (when the search condition has been set to `MIL1553B`, and the qualifier has been set to `INrange` or `OUTrange).`

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue?` might return “XXXXX”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies the qualifier to be used with the remote terminal address field. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:
COMMAND:ADDRess:QUALifier {LESSthan|MOREthan|EQual
|UNEQual|LESSEQual|MOREEQual|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:QUALifier?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

Arguments

`LESSthan` sets the Command Address qualifier to less than.

`MOREthan` sets the Command Address qualifier to greater than.

`EQual` sets the Command Address qualifier to equal.

`UNEQual` sets the Command Address qualifier to not equal.

`LESSEQual` sets the Command Address qualifier to less than or equal.

`MOREEQual` sets the Command Address qualifier to greater than or equal.

`INrange` sets the Command Address qualifier to in range.

`OUTrange` sets the Command Address qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier EQual` sets the qualifier to be used with the remote terminal address to equal.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier?` might return INRANGE.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

When the MIL-STD-1553 bus search condition is set to `COMMAND`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the value of the 5–bit remote terminal address to be used in the search. When the MIL-STD-1553 bus search condition is set to `COMMAND`, and the qualifier is set to `INrange` or `OUTrange,` this command specifies the lower limit of the remote terminal address range. The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:VALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
ADDRess:VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue "01000"` sets the remote terminal address to be used in the search to 01000.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue?` might return 01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the search. (Use the commandSEARCH:SEARCH<x>:

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress to specify Word Count or Mode Code.) In Word Count mode, this field defines the number of data words that is to be transmitted, or received, depending on the T/R bit setting. (Use the commandSEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit to set the T/R bit.) A word count value of 0 actually indicates a transfer of 32 data words. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

Arguments `QString` is a quoted string of up to 5 characters, where the allowable characters are 0, 1 and X.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt “01000”` sets the bit pattern for the Word Count/Mode Code field to 01000.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt?` might return “XXXXX”.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity

When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies the Command word parity that is to be used in the search. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity ZERo sets the Command word parity bit to 0.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity? might return 0, 1 or X.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

When the MIL-STD-1553 bus search condition is set to COMMAND, this command specifies the 5 bit sub-address that is to be used in the search. When the sub-address value is set to 00000 or 11111 binary, it specifies that the command is a “Mode Code” command. Any other value specifies that it is a “Word Count” command. The default is all X’s (don’t care). SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

NOTE. *The sub-address field is used to direct data to different functions within the subsystem for values 1 — 30.*

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
SUBADdress <QString>

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:
SUBADdress?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:COMMAND:SUBADdress "01000"` sets the sub-address to be used in the search to 01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

When the MIL-STD-1553 bus search condition is set to `COMMAND`, this command specifies that the transmit/receive bit (bit 9) is to be used in the search. The transmit/receive bit defines the direction of information flow, and is always from the point of view of the remote terminal. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit
{RX|TX|X}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments

`RX` (logic 0) directs the instrument to search for a TX or "transmit" from a remote terminal .

`TX` (logic 1) directs the instrument to search for an RX or "receive" from a remote terminal.

`X` indicates "don't care".

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX` directs the instrument to search for a TX or "transmit" from a remote terminal.

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX?` might return TX.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

This command specifies a word type or condition within a MIL-STD-1553 bus word to search for. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

***NOTE.** There are three types of MIL-STD-1553 (Aircraft) bus words: Command, Status, and Data, all sharing a common structure twenty bits in length. The first three bits are used as a synchronization field. The last bit is the odd parity of the previous 16 bits.*

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition
{SYNC|COMMAND|STATus|DATA|TIMe|ERRor}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition?
```

Related Commands

Most of the other `SEARCH:SEARCH1:TRIGger:A:BUS:B<x>:MIL1553B` commands are impacted by the setting of this command.

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

BUS:B<x>:MIL1553B:SOUrce

Arguments

`SYNC` refers to the 3–bit sync pulse that precedes each word.

`COMMAND` is one of 3 16–bit word types. It specifies the function that a remote terminal is to perform.

`STATus` is one of 3 16–bit word types. Remote terminals respond to valid message transmissions via status words.

`DATA` is one of 3 16–bit word types.

`TIMe` specifies to search for either the RT (remote terminal response time), or the IMG (Inter-message Gap). Use the commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier, SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit, and SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit to specify the time parameters.

`ERRor` specifies to search for a signaling error. (You can specify which type of error — Parity, Sync, Manchester or Non-contiguous Data — by using the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE.)

NOTE. *Use the `SEARCH:SEARCH1:TRIGger:A:BUS:B<x>:MIL1553B:CONDition:STATus:BIT` commands to set the following bits:*

9 — message error
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

10 — instrumentation
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

11 — SRQ (service request)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

15 — BCR (broadcast command received)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

16 — busy
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

17 — subsystem flag
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

18 — DBCA (dynamic bus control acceptance)
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

19 — terminal flag
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:CONDition STAT` sets the word type to search for to `STATus`.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:CONDition?` might return DATA.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

When the MIL-STD-1553 bus search condition is set to `DATa`, this command specifies the data parity bit to be used in the search. Returned values are 0, 1, or X (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

Arguments `0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:PARity 1` sets the data parity bit to be used in a MIL-STD-1553 bus search to 1.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:PARity?` might return 0, indicating that the data parity bit to be used in a MIL-STD-1553 bus search is set to 0.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

When the MIL-STD-1553 bus search condition is set to `DATa`, this command specifies the data binary pattern to be used in the search. This is a 16-bit field.

SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue
<QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

Arguments QString is a quoted string of up to 16 characters, where the allowable characters are 0, 1, and X.

Examples SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:VALue "01000" sets the data binary pattern to be used in a MIL-STD-1553 bus search to 01000.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:DATa:VALue? might return XXXXXXXXXXX01000.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE

When the MIL-STD-1553 bus search condition is set to ERRor, this command specifies the signaling error type to be used in the search: Parity, Sync, Manchester or Data. SEARCH<x> is the search number, which is always 1, and B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
{PARity|SYNC|MANCHester|DATA}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments PARity — an incorrect parity setting.

SYNc — the high to low, or low to high transition doesn't happen in the middle of the sync time as it should.

MANCHester — no transition in a bit time.

DATA — a non-contiguous data error.

Examples `SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:ERRTYPE PARity` sets the error type to be used in the search to PARITY.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:ERRTYPE?` might return SYNC.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

When the MIL-STD-1553 bus search condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue to specify the lower limit.) The default is all X's (don't care).`SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
HIVALue <QString>
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
HIVALue?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue` "01000" sets the upper limit of the range of the terminal address to 01000 (when the search condition is set to `MIL1553B`, and the qualifier is set to `INrange` or `OUTrange).`

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:HIVALue?` might return "XXXXX".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the qualifier to be used with the address field. `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
QUALifier {LESSthan|MOREthan|EQual|UNEQual|LESSEQual|
MOREEQual|INrange| OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
QUALifier?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

Arguments

`LESSthan` sets the Status Address qualifier to less than.

`MOREthan` sets the Status Address qualifier to greater than.

`EQual` sets the Status Address qualifier to equal.

`UNEQual` sets the Status Address qualifier to not equal.

`LESSEQual` sets the Status Address qualifier to less than or equal.

`MOREEQual` sets the Status Address qualifier to greater than or equal.

`INrange` sets the Status Address qualifier to in range.

`OUTrange` sets the Status Address qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier MOREthan` sets the qualifier to be used with the address field to greater than.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier?` might return MORETHAN.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

When the MIL-STD-1553 bus search condition is set to `STATus`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the value of the 5–bit remote terminal address to be used in the search. When the MIL-STD-1553 bus search condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange,` this command specifies the lower limit of the range. (Use the command SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue to specify the upper limit of the range.) The default is all X's (don't care). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:
VALue?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000" sets the value of the 5–bit remote terminal address to be used in the search, when the qualifier has been set to LESSthan, MOREthan, EQual, UNEQual, LESSEQual or MOREEQual.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000" sets the lower limit of the range to 01000, if the qualifier has been set to INrange or OUTrange.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue? might return "01000".

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the search. SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR NOCARE sets the BCR bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
BUSY?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BUSY NOCARE sets the status word busy bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BUSY? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
DBCA?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA NOCARE sets the status word dynamic bus control acceptance (DBCA) bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the status word instrumentation bit value (bit 10) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
INSTR {0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
INSTR?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:INSTR NOCARE` sets the status word status word instrumentation bit value to be used in the search to X.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:INSTR?` might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME NOCARE sets the status word message error bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default).

SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SRQ NOCARE sets the status word SRQ bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SRQ? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the search. Returned values are 0, 1, or X (don't care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
SUBSF {0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:
SUBSF?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SUBSF NOCARE sets the status word subsystem flag bit value to be used in the search to X.

SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:SUBSF? might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

When the MIL-STD-1553 bus search condition is set to STATus, this command specifies the status word terminal flag bit value (bit 19) to be used in the search. Returned values are 0, 1, or X (don’t care, which is the default). SEARCH<x> is the search number, which is always 1, and B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X (“don’t care”) which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:TF NOCARE` sets the status word terminal flag bit value to be used in the search to X.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:TF?` might return 1.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity

When the MIL-STD-1553 bus search condition is set to `STATus`, this command specifies the status parity bit value to be used in the search. Returned values are 0, 1, or X (don’t care, which is the default). `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X (“don’t care”) which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X (“don’t care”) which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:PARity ONE` sets the parity bit value to be used in the search to 1.`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:STATus:PARity?` might return X, indicating that the parity doesn't matter.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

When the MIL-STD-1553 bus search condition is set to `TIMe`, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG). (You can specify RT or IMG using the SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments

`<NR3>` is a floating point number that specifies either the minimum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit 3.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to 3.00 µS.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit?` might return 2.0000e-6, indicating that the RT or IMG has been set to 2.00 µS.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

When the MIL-STD-1553 bus search condition is set to `TIMe`, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG). (You can specify RT or IMG using the SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) `SEARCH<x>` is the search number, which is always 1, and `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

Arguments `<NR3>` is a floating point number that specifies either the maximum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit 80.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to be used in the search to 80.0 µS.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit?` might return 100.0000e-6, indicating that the RT or IMG has been set to 100.00 µS.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

When the MIL-STD-1553 bus search condition is set to `TIMe`, this command specifies the search data time qualifier. (This includes a smaller set of arguments than other qualifier commands.)`B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier
{LESSthan|MOREthan|INrange|OUTrange}
```

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:CONDition

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments

`LESSthan` sets the Time qualifier to less than minimum.

`MOREthan` sets the Time qualifier to greater than maximum

`INrange` sets the Time qualifier to inside range.

`OUTrange` sets the Time qualifier to out of range.

Examples

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier LESSthan` sets the Time qualifier to less than minimum.

`SEARCH:SEARCH1:TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier?` might return OUTRANGE.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue

Sets or returns the binary data string to be used for a Parallel trigger search. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue <QString>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:PARallel:VALue?
```

Arguments

`<QString>` is the binary data string.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition

Sets or returns the condition for an RS-232 trigger search. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions

This command requires a DPO3COMP application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition
{RXSTArt|RXDATA|RXENDPacket|TXSTArt|TXDATA|TXENDPacket}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:CONDition?
```

Arguments

RXSTArt specifies a search based on the RX Start Bit.

RXDATA specifies a search based on RX Data.

RXENDPacket specifies a search based on the RX End of Packet condition.

TXSTArt specifies a search base on the TX Start Bit.

TXDATA specifies a search based on TX Data.

TXENDPacket specifies a search based on the TX End of Packet condition.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe

Sets or returns the length of the data string for an RS-232 trigger search if the trigger condition is RX. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe?
```

Arguments <NR1> is the length of the data string in Bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue

Sets or returns the binary data string for an RS-232 trigger search if the condition involves RX. SEARCH<x> is the search number and B<x> is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue?
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe

Sets or returns the length of the data string to be used for an RS-232 trigger search if the Trigger condition is TX. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe?
```

Arguments `<NR1>` is the length of the data string in Bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue

Sets or returns the binary data string to be used for an RS-232 trigger search if the condition involves RX. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue?
```

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition

Sets or returns the search condition for a SPI trigger search. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition
{SS|MISO|MOSI|MISOMOSI}
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:CONDition?
```

Arguments `SS` specifies a search based on the Slave Selection condition.

`MISO` specifies a search based on the Master-In Slave-Out condition.

`MOSI` specifies a search based on the Master-Out Slave-In condition.

`MISOMOSI` specifies a search based on the Master-In Slave-Out and Master-Out Slave-In conditions.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:VALue

Sets or returns the binary data string for an SPI trigger search if the search condition is MISO or MISOMOSI. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:
VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MISO|:IN}:
VALue?
```

Arguments `<bin>` is the data string in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:VALue

Sets or returns the binary data string for an SPI trigger search if search the condition is MOSI, or MISOMOSI. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:
VALue <bin>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa{:MOSI|:OUT}:
VALue?
```

Arguments

`<bin>` is the data in binary format.

SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe

Sets or returns the length of the data string for an SPI trigger search if the search condition is MISO, MOSI, or MISOMOSI. `SEARCH<x>` is the search number and `B<x>` is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe <NR1>
SEARCH:SEARCH<x>:TRIGger:A:BUS:B<x>:SPI:DATa:SIZe?
```

Arguments

`<NR1>` is the data string length in bytes.

SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce

Sets or returns a bus serial search. <x> is the search number.

Conditions

This command requires a DPO3AUTO or DPO3EMBD application module.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce {B1|B2|B3|B4}
SEARCH:SEARCH<x>:TRIGger:A:BUS:SOUrce?
```

Arguments

`B1` specifies the Bus 1 source.

`B2` specifies the Bus 2 source.

`B3` specifies the Bus 3 source.

`B4` specifies the Bus 4 source.

SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe

Sets or returns the slope for an edge trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe {RISe|FALL}
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe?
```

Arguments

`RISe` specifies a rising edge.

`FALL` specifies a falling edge.

SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce

Sets or returns the source waveform for an edge trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce
{CH1|CH2|CH3|CH4|MATH}
SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce?
```

Arguments

`CH<x>` specifies one input channel as the edge source, where <x> is the channel number.

`MATH` specifies the math waveform as the search source.

SEARCH:SEARCH<x>:TRIGger:A:LEVel

Sets or returns the level for an edge trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel {<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel?
```

Arguments

<NR3> specifies the trigger level, in volts.

TTL specifies a preset TTL high level of 1.4V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>

Sets or returns the level for an edge trigger search to determine where to place a mark. SEARCH<x> is the search number and CH<x> is the channel number. Each channel can have an independent level.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x> {<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:CH<x>?
```

Arguments

<NR3> specifies the trigger level in volts.

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH[1]

Sets or returns the math waveform level for an edge trigger search to determine where to place a mark. <x> is the search number. The value of MATH is 1 for all oscilloscopes.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:MATH?
```

Arguments

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>

Sets or returns the specified reference waveform level for an edge trigger search to determine where to place a mark. SEARCH<x> is the search number and REF<x> is the reference channel number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LEVel:REF<x>?
```

Arguments

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion

Sets or returns the logic operator for a logic trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion {AND|NANd|NOR|OR}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:FUNCtion?
```

Arguments

AND places a mark if all conditions are true.

NANd places a mark if any of the conditions are false.

NOR places a mark if all conditions are false.

OR places a mark if any of the conditions are true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>

Sets or returns the Boolean logic criteria for a logic trigger search to determine where to place a mark. SEARCH<x> is the search number and CH<x> is the channel number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CH<x>?
```

Arguments

HIGH specifies the logic high.

LOW specifies the logic low.

X specifies a "don't care" state.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE

Sets or returns whether the clock edge is a rising or falling for a logic search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE
{FALL|RISe}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:EDGE?
```

Arguments

`RISe` specifies a rising edge.

`FALL` specifies a falling edge.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce

Sets or returns the clock source definition for a logic trigger search. <x> is the search number. If a clock source is defined, then the logic search is determined by the state of the other inputs at the clock transition. If no clock source is defined, then the logic search is determined only by the state of the inputs.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF|NONe}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:CLOCk:SOUrce?
```

Arguments

`CH<x>` specifies a channel input as the clock source, where <x> = 1, 2, 3, or 4.

`MATH` specifies the math waveform as the clock source.

`REF` specifies the reference waveform as the clock source.

`NONe` specifies no clock source.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>

Sets or returns the waveform logic criteria for a trigger search. `SEARCH<x>` is the search number and `D<x>` is the digital channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:D<x>?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH

Sets or returns the Boolean logic criteria for a logic trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:MATH?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>

Sets or returns the Boolean logic criteria for a logic trigger search to determine where to place a mark. SEARCH<x> is the search number and REF<x> is the reference channel number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x> {HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:INPut:REF<x>?
```

Arguments

HIGH specifies a high logic level.

LOW specifies a low logic level.

X specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>

Sets or returns the logic criteria for a logic pattern trigger search to determine where to place a mark. `SEARCH<x>` is the search number and `CH<x>` is the channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:CH<x>?
```

Arguments `HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:D<x>

Sets or returns the logic criteria for a logic pattern search to determine where to place a mark. `SEARCH<x>` is the search number and `D<x>` is the digital channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:D<x>
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:D<x>?
```

Arguments `HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:MATH

Sets or returns the Boolean logic criteria for a logic pattern trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:MATH
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:MATH?
```

Arguments

`HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:REF<x>

Sets or returns the Boolean logic criteria for a pattern trigger search to determine where to place a mark. `SEARCH<x>` is the search number and `REF<x>` is the reference channel number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:REF<x>
{HIGH|LOW|X}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:INPut:REF<x>?
```

Arguments

`HIGH` specifies a high logic level.

`LOW` specifies a low logic level.

`X` specifies a “don't care” condition.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn

Sets or returns the condition for generating a logic pattern trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn
{TRUe|FALSe|LESSthan|MOREthan|EQual|UNEQual}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn?
```

Arguments

`TRUe` places a mark when the pattern becomes true.

`FALSe` places a mark when the pattern becomes false.

`LESSthan` places a mark if the specific pattern is true less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command.

`MOREThan` places a mark if the specific pattern is true longer than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

`EQual` places a mark if the specific pattern is true longer than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command, but less than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

`UNEQual` places a mark if the specific pattern is true less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit command, or longer than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit command.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit

Sets or returns the maximum time that the selected pattern may be true and still generate an A logic pattern search to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit?
```

Arguments `<NR3>` specifies the maximum amount of time to hold the pattern true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit

Sets or returns the minimum time that the selected pattern may be true and still generate an A logic pattern search to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:PATtern:WHEn:MORELimit?
```

Arguments <NR3> specifies the minimum amount of time to hold the pattern true.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>

Sets or returns the channel threshold level for a logic trigger search to determine where to place a mark. SEARCH<x> is the search number and CH<x> is the channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x> {<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:CH<x>?
```

Arguments <NR3> specifies the trigger level, in volts.

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH

Sets or returns the math waveform threshold level for a logic trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>

Sets or returns the reference waveform threshold level for a logic trigger search to determine where to place a mark. SEARCH<x> is the search number and REF<x> is the reference channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOGIc:THReshold:REF<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>

Sets or returns the channel waveform lower threshold to determine where to place a mark. This setting is applied to all channel searches that use a lower threshold. SEARCH<x> is the search number and CH<x> is the channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH

Sets or returns the math waveform lower threshold to determine where to place a mark. This setting is applied to all math searches that use a lower threshold. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>

Sets or returns the reference waveform lower threshold to determine where to place a mark. This setting is applied to all reference searches that use a lower threshold.
SEARCH<x> is the search number and REF<x> is the reference channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:REF<x>?
```

Arguments

TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit

This command specifies the upper limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit to specify the lower limit of the range.)

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit

Arguments

<NR3> is a floating point number that represents the higher value of a range.

Examples

To find all pulses in the waveform record with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:WHEn OUTside
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit

This command specifies the lower limit, in seconds, when searching the record for pulses whose widths are within or outside of a specified range of two values. (Use SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit, SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn

Arguments

<NR3> is a floating point number that represents the lower value of a range.

Examples

To find all pulses in the waveform record with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
```

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
```

```
SEARCH:SEARCH1:TRIGger:A:PULSEWidth:WHEn OUTside
```

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity

Sets or returns the polarity for a pulse trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity
{NEGative|POSitive}
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:POLarity?
```

Arguments

POSITIVe places a mark only when the polarity of the pulse is positive.

NEGative places a mark only when the polarity of the pulse is negative.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce

Sets or returns the source waveform for a pulse trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF}
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:SOUrce?
```

Arguments

`CH<x>` specifies one input channel as the edge source, where <x> = 1, 2, 3 or 4.

`MATH` specifies the math waveform as the search source.

`REF` specifies the reference waveform as the search source.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn

This command specifies to search the waveform record for pulses with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth), OR whose widths fall outside of or within a specified range of two values (set using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit).

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn
{LESSthan|MOREthan|EQual|UNEQual|WIThin|OUTside}
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WHEn?
```

Arguments

`LESSthan` places a mark if the pulse width is less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command.

`MOREthan` places a mark if the pulse width is true longer than the specified time set by the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command.

`EQual` places a mark if the pulse width is equal to the time set by the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command within a tolerance of ±5%.

`UNEQual` places a mark if the pulse width is unequal to the time the time set by the SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth command within a tolerance of ±5%.

`WIThin` searches for pulse widths less than the specified HIGHLimit and greater than the specified LOWLimit. The limits are specified using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit.

`OUTside` searches for pulse widths greater than the specified HIGHLimit or less than the specified LOWLimit. The limits are specified using SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:LOWLimit and SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:HIGHLimit.

SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth

Sets or returns the pulse width setting for a pulse width trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth <NR3>
SEARCH:SEARCH<x>:TRIGger:A:PULSEWidth:WIDth?
```

Arguments `<NR3>` is the pulse width.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity

Sets or returns the polarity setting for a runt trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity
{EITher|NEGative|POSitive}
SEARCH:SEARCH<x>:TRIGger:A:RUNT:POLarity?
```

Arguments

`POSitive` places a mark when the rising edge crosses the low threshold and the falling edge re-crosses the low threshold without either edge ever crossing the high threshold.

`NEGative` places a mark when the falling edge crosses the high threshold and the rising edge re-crosses the high threshold without either edge ever crossing the low threshold.

`EITher` places a mark on a runt of either polarity.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce

Sets or returns the source setting for a runt trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF}
SEARCH:SEARCH<x>:TRIGger:A:RUNT:SOUrce?
```

Arguments

`CH1–CH4` specifies an input channel as the edge source.

`MATH` specifies the math waveform as the search source.

`REF` specifies the reference waveform as the search source.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn

Sets or returns the condition setting for a runt trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn
{LESSthan|than|EQual|UNEQual|OCCURS}
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WHEn?
```

Arguments

`OCCURS` argument specifies a trigger event if a runt of any detectable width occurs.

`LESSthan` argument sets the oscilloscope to trigger if the a runt pulse is detected with width less than the time set by the SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth command.

`than` argument sets the oscilloscope to trigger if the a runt pulse is detected with width than the time set by the SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth command.

`EQual` argument sets the oscilloscope to trigger when the pattern is true for a time period equal to the time period specified in SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth within a ±5% tolerance.

`NOTEQual` argument sets the oscilloscope to trigger when the pattern is true for a time period greater than or less than (but not equal) the time period specified in SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth within a ±5% tolerance.

SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth

Sets or returns the width setting for a runt trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth <NR3>
SEARCH:SEARCH<x>:TRIGger:A:RUNT:WIDth?
```

Arguments `<NR3>` specifies the minimum width, in seconds.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE

Sets or returns the clock slope setting for a setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE {FALL|RISe}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:EDGE?
```

Arguments `FALL` specifies polarity as the clock falling edge.

`RISe` specifies polarity as the clock rising edge.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce

Sets or returns the clock source setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce?
```

Related Commands SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce

Arguments `CH1–CH4` specifies an input channel as the edge source.

`MATH` specifies the math waveform as the search source.

`REF` specifies the reference waveform as the search source.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold

Sets or returns the clock threshold setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold
{<NR3>|TTL|ECL}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:THReshold?
```

Arguments

`TTL` specifies a preset `TTL` high level of 1.4 V.

`ECL` specifies a preset `ECL` high level of -1.3V.

`<NR3>` is the clock level, in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce

Sets or returns the data source setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number. You cannot specify the same source for both clock and data.

Group

Search

Syntax

DPO Models:

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce
{CH1|CH2|CH3|CH4|MATH|REF}
```

MSO Models:

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce <wfm>[,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>]
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:SOUrce?
```

Related Commands

SEARCH:SEARCH<x>:TRIGger:A:SETHold:CLOCk:SOUrce

Arguments

DPO Models:

`CH1–CH4` specifies an input channel as the search source.

`MATH` specifies the math waveform as the search source.

`REF` specifies the reference waveform as the search source.

MSO Models:

<wfm> can be any combination of the channel, math, reference and digital waveforms.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold

Sets or returns the data threshold setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold
{<NR3>|TTL}
SEARCH:SEARCH<x>:TRIGger:A:SETHold:DATa:THReshold?
```

Arguments

`TTL` specifies a preset `TTL` high level of 1.4 V.

`<NR3>` is the clock level, in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime

Sets or returns the hold time setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:HOLDTime?
```

Arguments

`<NR3>` specifies the hold time setting in seconds. Positive values for hold time occur after the clock edge. Negative values occur before the clock edge.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime

Sets or returns the setup time setting for an setup/hold trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:SETTime?
```

Arguments `<NR3>` specifies the setup time for setup and hold violation triggering.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:CH<x>

Sets or returns the trigger search setup and hold threshold for the selected channel. This helps determine where to place search marks. Search<x> is the search number, which is always 1. CH<x> is the channel number.

Conditions MSO oscilloscopes only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:CH<x> <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:CH<x>?
```

Arguments `<NR3>` is the lower threshold in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}

Sets or returns the trigger search setup and hold threshold for the math waveform. This helps to determine where to place search marks. Search<x> is the search number, which is always 1.

Conditions MSO oscilloscopes only.

Group Search

Syntax
```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}
<NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold{:MATH|:MATH1}?
```

Arguments `<NR3>` is the lower threshold in volts.

SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>

Sets or returns the trigger search setup and hold threshold for the selected reference waveform. This helps determine where to place search marks. Search<x> is the search number, which is always 1. REF<x> is the reference waveform number.

Conditions MSO oscilloscopes only.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x> <NR3>
SEARCH:SEARCH<x>:TRIGger:A:SETHold:THReshold:REF<x>?
```

Arguments `<NR3>` is the lower threshold in volts.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime

Sets or returns the transition time setting for an transition trigger search to determine where to place a mark.<x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime
<NR3>
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:DELTatime?
```

Arguments `<NR3>` specifies the transition time, in seconds.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity

Sets or returns the polarity setting for an transition trigger search to determine where to place a mark. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity
{EIther|NEGative|POSitive}
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:POLarity?
```

Arguments

`POSitive` specifies that a pulse edge must traverse from the lower (most negative) to higher (most positive) level for transition triggering to occur.

`NEGative` specifies that a pulse edge must traverse from the upper (most positive) to lower (most negative) level for transition triggering to occur.

`EIther` specifies either positive or negative polarity.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce

Sets or returns the source setting for an transition trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce
{CH1|CH2|CH3|CH4|MATH}
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:SOUrce?
```

Arguments

`CH1–CH4` specifies one input channel as the edge source.

`MATH` specifies the math waveform as the search source.

SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn

Sets or returns the condition setting for an transition trigger search to determine where to place a mark. <x> is the search number.

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn
{SLOWer|FASTer|EQual|UNEQual}
SEARCH:SEARCH<x>:TRIGger:A{:TRANsition|:RISEFall}:WHEn?
```

Arguments

`FASTer` sets the trigger to occur when the transitioning signal is faster than the set volts/second rate.

`SLOWer` sets the trigger to occur when the transitioning signal is slower than the set volts/second rate.

`EQual` sets the trigger to occur when the transitioning signal is equal to the set volts/second rate within a ±5% tolerance.

UNEQual sets the trigger to occur when the transitioning signal is not equal to the set volts/second rate ±5%.

SEARCH:SEARCH<x>:TRIGger:A:TYPe

This command sets the type of A trigger to search on. <x> is the search number, which is always 1. The following search types can be performed: edge, setup and hold, pulse width, runt, transition (also called rise/fall time), logic, timeout and bus. (Although it is possible to trigger using a video signal, it is not possible to do a search using a video signal.)

Group

Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:TYPe
{EDGe|SETHold|PULSEWidth|RUNt|TRANsition|LOGIc|TIMEout|BUS}
SEARCH:SEARCH<x>:TRIGger:A:TYPe?
```

Arguments

EDGe is the default search. An edge search occurs when a signal passes through a specified voltage level in a specified direction and is controlled by the SEARCH:SEARCH<x>:TRIGger:A:EDGE:SOUrce and SEARCH:SEARCH<x>:TRIGger:A:EDGE:SLOpe commands.

SETHold searches for setup and hold violations between a data source and a clock source.

PULSEWidth searches for pulses that are less than, greater than, equal to, or not equal to a specified time. Additionally, you can trigger when a pulse width is within or outside a range of two different specified times. You can also trigger on positive or negative pulses.

RUNt searches for any pulse that crosses the first preset voltage threshold, but does not cross the second preset threshold before recrossing the first. The thresholds are set using the SEARCH:SEARCH<x>:TRIGger:A:LOWerthreshold:CH<x> and SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x> commands.

TRANsition searches for any pulse that a. crosses both thresholds in the same direction as the specified polarity, and b. where the transition time between the two threshold crossings is greater or less than the specified time delta.

LOGic specifies that a search occurs when specified conditions are met, and is controlled by the SEARCH:A:LOGIc commands.

TIMEout specifies that a search occurs when no pulse is detected in a specified time.

BUS specifies that a search occurs when a communications signal is found.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>

Sets or returns the channel waveform upper threshold to determine where to place a mark. This setting is applied to all channel searches that uses an upper threshold.SEARCH<x> is the search number and CH<x> is the channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:CH<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH

Sets or returns the math waveform upper threshold to determine where to place a mark. This setting is applied to all math waveform searches that uses an upper threshold. <x> is the search number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:MATH?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>

Sets or returns the reference waveform upper threshold to determine where to place a mark. This setting is applied to all reference waveform searches that uses an upper threshold. SEARCH<x> is the search number and REF<x> is the reference channel number.

Group Search

Syntax

```
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x> {TTL}
SEARCH:SEARCH<x>:TRIGger:A:UPPerthreshold:REF<x>?
```

Arguments TTL specifies a preset TTL high level of 1.4 V.

SELect

Sets or returns the selected waveform display (controlled by the front-panel) on or off.

Group Vertical

Syntax

```
SELect {ON|OFF}
```

Arguments

`ON` turns the selected waveform display on.

`OFF` turns the selected waveform display off.

Examples

`SELECT` might return the following

```
:SELECT:BUS1 0;BUS2 0;CH1 1;CH2 0;CH3 0;CH4 0;MATH 0;REF1
0;REF2 0;REF3 0;REF4 0;CONTROL CH1
```

SELect:BUS<x>

This command turns on and off the display of the waveform for <x>, where x is the bus number. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

Group Vertical

Syntax

```
SELect:BUS<x> {<NR1>|OFF|ON}
SELect:BUS<x>?
```

SELect:CH<x>

Turns the display of the channel <x> waveform on or off, where <x > is the channel number. This command also resets the acquisition. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

Group Vertical

Syntax

```
SELect:CH<x> {ON|OFF|<NR1>}
SELect:CH<x>?
```

Arguments

`ON` turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` turns off the display of the specified waveform.

`<NR1>` = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples

`SELECT:CH2 ON` turns the channel 2 waveform display on, and selects channel 2.

`SELECT:CH1?` might return `:SELECT:CH1 1` indicating that channel 1 is being displayed.

SELect:CONTROl

Sets or returns the waveform that is the recipient of future channel-related commands, for example, the cursor commands. The command form also performs the equivalent of a SELect:CH<x> ON command, as well as the Math, Reference, and Bus variations of that command.

Group

Vertical

Syntax

```
SELect:CONTROl {CH<x>|MATH|BUS<x>}
SELect:CONTROl?
```

Arguments

`CH<x>` specifies a channel waveform as the waveform affected by the front-panel controls. <x> is the channel number.

`MATH` specifies the math waveform as the waveform that is affected by the front-panel controls.

`BUS<x>` specifies a bus waveform as the waveform affected by the front-panel controls. <x> specifies the bus number.

Returns

`NONE` if all the channels are turned off. `NONE` is ignored on input.

Examples

`SELECT:CONTROL CH2` resets acquisition displays on channel 2, and causes the selected waveform to be the implied object of waveform commands.

`SELECT:CONTROL?` might return `:SELECT:CONTROL MATH` indicating that math is the implied object of waveform commands.

SELect:D<x>

Turns on the display of the digital channel <x> and resets the acquisition. <x > is the channel number. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

Group

Vertical

Syntax

```
SELect:D<x> {<NR1>|OFF|ON}
SELect:D<x>?
```

Arguments

`ON` turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` turns off the display of the specified waveform.

`<NR1>` = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples

`SELECT:D2 ON` turns the digital channel 2 waveform display on, and selects digital channel 2.

`SELECT:D2?` might return `:SELECT:D2 1` indicating that digital channel 2 is being displayed.

SELect:MATH[1]

Turns on and off the display of the math waveform. The query returns whether the math waveform is on or off but does not indicate whether it is the selected waveform.

Group

Vertical

Syntax

```
SELect:MATH[1] {ON|OFF|<NR1>}
SELect:MATH[1]?
```

Arguments

`ON` turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` turns off the display of the specified waveform.

`<NR1>` = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples `SELECT:MATH ON` turns the math waveform display on, and selects it.

`SELECT:MATH?` might return `:SELECT:MATH 1` indicating that the math waveform is being displayed.

SELect:REF<x>

Turns on and off the display of the reference waveform <x>. The <x > variable represents the reference channel number. The query returns whether the channel is on or off.

Group Vertical

Syntax

```
SELect:REF<x> {ON|OFF|<NR1>}
SELect:REF<x>?
```

Arguments `ON` turns on the display of the specified waveform. This waveform also becomes the selected waveform.

`OFF` turns off the display of the specified waveform.

`<NR1>` = 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Examples `SELECT:REF2 ON` turns the channel 2 waveform display on, and selects reference waveform 2.

`SELECT:REF2?` might return `:SELECT:REF2 1` indicating that reference waveform 2 is being displayed.

SET? (Query Only)

Returns the commands that list the oscilloscope settings except for configuration information for the calibration values, the WFMInpre? query, and the WFMOutpre? query. This query allows you to record or "learn" the current oscilloscope settings. You can use these commands to return the oscilloscope to the state it was in when you made the SET? query. The SET? query always returns command headers, regardless of the setting of the HEADer command. This is because the returned commands are intended to be sent back to the oscilloscope as a command string. The VERBose command can still be used to specify whether the returned headers should be abbreviated or full-length.

This command is identical to the *LRN? command.

Group Miscellaneous

Syntax SET?

Related Commands HEADer, *LRN?, VERBose

Examples SET? returns a long response, part of which could be as follows: :SET :ACQUIRE:STOPAFTER RUnsTOP;STATE 1;MODE SAMPLE;NUMENV INFINITE;NUMAVG 16;SAMPLINGMODE RT;:HEADER 1;:LOCK NONE;:LANGUAGE ENGLISH;:VERBOSE 1;:ALIAS:STATE 0;: DISPLAY:COLOR:PALETTE NORMAL;:DISPLAY:STYLE:DOTSONLY 0;:DISPLAY:PERSISTENCE 0.0000;CLOCK 1;GRATICULE FULL;INTEnsITY:WAVEFORM 30;GRATICULE 75;BACKLIGHT HIGH;:HARDCOPY:INKSAVER OFF;LAYOUT LANDSCAPE;PREVIEW 0; :SAVE:IMAGE:FILEFORMAT BMP;:SAVE:WAVEFORM:FILEFORMAT INTERNAL;:SAVE:ASSIGN:TYPE SETUP;:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL 20.0000E-3;LEVEL:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3 800.0000E-3;CH4 800.0000E-3;: TRIGGER:A:LOWERTHRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:HOLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;:TRIGGER:A :LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT 4.0000E-9;:TRIGGER:A :SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD 20.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;

SETUP<x>:DATE? (Query Only)

Returns the date when the oscilloscope setup was saved for the specified channel <x>.

Group Save and Recall

Syntax SETUP<x>:DATE?

Examples `SETUP4:DATE?` might return `SETUP4:DATE: 04-18-06` which is the setup date for channel 4.

SETUP<x>:LABEL

Sets or returns the setup label for the specified channel <x>.

Group Save and Recall

Syntax `SETUP<x>:LABEL <Qstring>`

Arguments `<Qstring>` is an alpha-numeric string of characters, enclosed in quotes, that defines the label text for SETUP<x>. The length of the string is limited to 30 characters.

Examples `SETUP:LABEL?` might return `SETUP1:LABEL: TEST 2` which is the label setup for channel 1.

SETUP<x>:TIME? (Query Only)

Returns the time when the oscilloscope setup was saved for the specified channel <x>.

Group Save and Recall

Syntax `SETUP<x>:TIME?`

Examples `SETUP2:TIME?` might return “`SETUP2:TIME: 15:24:07` which is the setup time for channel 2.

*SRE

The *SRE (Service Request Enable) command sets or returns the bits in the Service Request Enable Register. For information, refer to Registers.

Group Status and Error

Syntax
```
*SRE <NR1>
*SRE?
```

Related Commands *CLS, DESE, *ESE, *ESR?, EVENT?, EVMsg?, FACtory, *STB?

Arguments `<NR1>` is a value in the range from 0 through 255. The binary bits of the SRER are set according to this value. Using an out-of-range value causes an execution error. The power-on default for SRER is 0 if *PSC is 1. If *PSC is 0, the SRER maintains the previous power cycle value through the current power cycle.

Examples `*SRE 48` sets the bits in the SRER to binary 00110000.

`*SRE?` might return 32, showing that the bits in the SRER have the binary value of 00100000.

*STB? (Query Only)

*STB? (Read Status Byte) returns the contents of the Status Byte Register (SBR) using the Master Summary Status (MSS) bit. For information, refer to Registers.

Group Status and Error

Syntax
```
*STB?
```

Related Commands *CLS, DESE, *ESE, *ESR?, EVENT?, EVMsg?, FACtory, *SRE

Returns `<NR1>`

Examples `*STB?` might return 96, showing that the SBR contains the binary value 01100000.

TEKSecure (No Query Form)

This command initializes both waveform and setup memories, overwriting any previously stored data. These are the WFMInpre?, WFMOutpre?, and DATa command values after the `TEKSecure` operation.

```
:WFMOUTPRE:BYT_NR 1 :WFMOUTPRE:BIT_NR 8 :WFMOUTPRE:ENCDG
BIN :WFMOUTPRE:BN_FMT RI :WFMOUTPRE:BYT_OR MSB
:WFMOUTPRE:WFID "Ch1, DC coupling, 100.0mV/div,
4.000us/div, 10000 points, Sample mode" :WFMOUTPRE:NR_PT
```

```
10000 :WFMOUTPRE:PT_FMT Y :WFMOUTPRE:XUNIT "s"
:WFMOUTPRE:XINCR 4.0000E-9 :WFMOUTPRE:XZERO -20.0000E-6
:WFMOUTPRE:PT_OFF 0 :WFMOUTPRE:YUNIT "V" :WFMOUTPRE:YMULT
4.0000E-3 :WFMOUTPRE:YOFF 0.0000 :WFMOUTPRE:YZERO 0.0000
:WFMINPRE:BYT_NR 1 :WFMINPRE:BIT_NR 8 :WFMINPRE:ENCDG
BIN :WFMINPRE:BN_FMT RI :WFMINPRE:BYT_OR MSB
:WFMINPRE:NR_PT 10000 :WFMINPRE:PT_FMT Y :WFMINPRE:XUNIT
"s" :WFMINPRE:XINCR 4.0000E-9 :WFMINPRE:XZERO 0.0000
:WFMINPRE:PT_OFF 0 :WFMINPRE:YUNIT "V" :WFMINPRE:YMULT
4.0000E-3 :WFMINPRE:YOFF 0.0000 :WFMINPRE:YZERO 0.0000
DATA:DESTINATION REF1 DATA:ENCDG RIBINARY DATA:SOURCE CH1
DATA:START 1 DATA:STOP 10000 DATA:WIDTH 1
```

NOTE. *The TEKSecure command can take up to five minutes to complete. The oscilloscope is inoperable during this period.*

Group Miscellaneous

Syntax `TEKSecure`

Examples `TEKSECURE` initializes both waveform and setup memories.

This is a program example of how to generate an SRQ when `TEKSECURE` completes:

```
# Bit 0 of the DESE (Device Event Status Enable Register)
# enables OPC to be reported to the SESR (Standard Event
# Status Register)
DESE 255
# Bit 0 of the ESER (Event Status Enable Register)
# enables OPC to be summarized in the ESB (Event Status #
Bit) of the SBR (Status Byte Register)
*ESE 255
# Bit 5 of the SRE (Service Request Enable Register)
enables
# the generation of SRQ when the ESB bit of the SBR
becomes # TRUE
*SRE 32
TEKSECURE;*OPC
```

When the `TEKSECURE` operation has completed, the OPC bit of the SESR will be TRUE and SRQ will have been generated.

TIME

Sets or returns the time that the oscilloscope displays.

Group

Miscellaneous

Syntax

```
TIME <QString>
TIME?
```

Related Commands

DATE

Arguments

`<QString>` is a time in the form "hh:mm:ss" where hh refers to a two-digit hour number, mm refers to a two-digit minute number from 00 to 59, and ss refers to a two-digit second number from 00 to 59.

Examples

`TIME "14:00:00"` sets the time to exactly 2:00 p.m.

`TIME?` might return `:TIME "14:05:17"` indicating the current time is set to 2:05 p.m. and 17 seconds.

TOTaluptime? (Query Only)

This command returns the total number of hours that the oscilloscope has been powered on since the nonvolatile memory was last programmed (usually since the initial manufacturing process).

Group

Miscellaneous

Syntax

```
TOTaluptime?
```

*TRG (No Query Form)

Performs a group execute trigger on commands defined by *DDT.

Group

Miscellaneous

Syntax

```
*TRG
```

Related Commands *DDT

Examples `*TRG` immediately executes all commands that have been defined by *DDT.

TRIGger (No Query Form)

Forces a trigger event to occur.

Group Trigger

Syntax
```
TRIGger FORCe
TRIGger?
```

Arguments `FORCe` creates a trigger event. If TRIGger:STATE is set to READy, the acquisition will complete. Otherwise, this command will be ignored.

Examples `TRIGGER FORCE` forces a trigger event to occur.

TRIGger:A

Sets the A trigger level automatically to 50% of the range of the minimum and maximum values of the trigger input signal. The query returns current A trigger parameters. The trigger level is the voltage threshold through which the trigger source signal must pass to generate a trigger event. This command works for the following cases: Edge Trigger (when source is Not Line), Logic Trigger (when Clock Source is not Off or Logic Pattern is Don't Care), and Pulse Width Trigger.

Group Trigger

Syntax
```
TRIGger:A SETLevel
TRIGger:A?
```

Related Commands TRIGger:A:EDGE?, TRIGger:A:LOGIc?, TRIGger:A:PULse?

Arguments `SETLevel` sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

Examples

`TRIGGER:A SETLEVEL` sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

`TRIGGER:A?` might return a long response with A trigger parameters, some of which could be as follows: `:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL 20.0000E-3;LEVEL:CH1 20.0000E-3;CH2 0.0000; CH3 0.0000;CH4 0.0000;:TRIGGER:A:UPPERTHRESHOLD:CH1 1.4000;CH2 800.0000E-3;CH3 8 00.0000E-3;CH4 800.0000E-3;:TRIGGER:A:LOWERTHRESHOLD:CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:HOLDOFF:TIME 20.0000E-9;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE RISE;:TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD: CH1 20.0000E-3;CH2 0.0000;CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X; CH2 X;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;MO RELIMIT 4.0000E-9;:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD 20.000 0E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD 0.0000;:TRIGGER:A:SETHOLD:HOLD TIME 4.0000E-9;SETTIME 4.0000E-9;:TRIGGER:A:PULSE:CLASS TRANSITION;:TRIGGER:A:PULSEWIDTH:SOURCE CH1;POLARITY POSITIVE;WHEN LESSTHAN;WIDTH 4.0000E-9;:TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE;WHEN OCCURS;WIDTH 4.0000E-9;:TRIGGER:A:TRANSITION:SOURCE CH1;POLARITY POSITIVE;WHEN SLOWER;DELTATIME 4.0000E-9;:TRIGGER:A:VIDEO :POLARITY POSITIVE;SOURCE CH1;STANDARD NTSC;SYNC ALLLINES;HOLDOFF:FIELD 0.0000;: TRIGGER:A:VIDEO:CUSTOM:FORMAT PROGRESSIVE;SCAN RATE15K;:TRIGGER:A:VIDEO:LINE 1;H DTV:FORMAT HD1080I60;:TRIGGER:A:BUS:SOURCE B1;B1:I2C:CONDITION START;DATA:VALUE "XXXXXXXX";SIZE 1;START 0.0000;DIRECTION NOCARE;:TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE ADDR7;TYPE USER;VALUE "XXXXXXX";:TRIGGER:A:BUS:B1:SPI:CONDITION MOSI;DATA:OUT :VALUE "XXXXXXXX";:TRIGGER:A:BUS:B1:SPI:DATA:IN:VALUE "XXXXXXXX";:TRIGGER:A:BUS: B1:SPI:DATA:SIZE 1;START 0.0000;:`

TRIGger:A:BUS

This command specifies the bus type to be used in a trigger operation. It supports CAN, I²C, SPI, RS-232, MIL-STD-1553, LIN, audio, FlexRay and Parallel bus signals with the appropriate add-on module installed. (See page 2-13, *Bus Command Group*.) There are two serial buses, B1 and B2, which can each be set independently to one of the serial trigger types.

NOTE. *Parallel bus commands work with MSO3000 Series oscilloscopes only.*

Group

Trigger

Syntax

```
TRIGger:A:BUS
{I2C|SPI|CAN|RS232C|PARallel|LIN|FLEXRay|AUDio|MIL1553B}
TRIGger:A:BUS?
```

Arguments

`I2C` specifies the Inter-IC bus.

`SPI` specifies the Serial Peripheral Interface bus (not available on two-channel models).

`CAN` specifies the Controller Area Network bus.

`RS232C` specifies the RS-232C bus.

`PARallel` specifies the Parallel bus.

`LIN` specifies the LIN bus.

`FLEXRay` specifies the FLexRay bus.

`AUDio` specifies the audio bus.

`MIL1553B` specifies the MIL-STD-1553 bus.

TRIGger:A:BUS:B<x>:AUDio:CONDition

This command sets the condition (start of frame or matching data) to be used when triggering on audio bus data. `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AUDIO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:CONDition {SOF|DATA}
TRIGger:A:BUS:B<x>:AUDio:CONDition?
```

Arguments

`SOF` enables triggering on the start of frame.

`DATA` enables triggering on matching data.

TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue

This command sets the upper word value to be used when triggering on audio bus data. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue <String>
TRIGger:A:BUS:B<x>:AUDio:DATa:HIVALue?
```

TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet

This command sets the data offset value to be used when triggering on audio bus data. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:AUDio:DATa:OFFSet?
```

Arguments <NR1> is the data offset value.

TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier

This command sets the qualifier (<, >, =, <=, >=, not =, in range, out of range) to be used when triggering on audio bus data. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

B<x> is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|INrange|OUTrange}
TRIGger:A:BUS:B<x>:AUDio:DATa:QUALifier?
```

Arguments

`LESSthan` sets the qualifier to less than.

`MOREthan` sets the qualifier to greater than.

`EQual` sets the qualifier to equal.

`UNEQual` sets the qualifier to not equal.

`LESSEQual` sets the qualifier to less than or equal.

`MOREEQual` sets the qualifier to greater than or equal.

`INrange` sets the qualifier to in range.

`OUTrange` sets the qualifier to out of range.

TRIGger:A:BUS:B<x>:AUDio:DATa:VALue

This command sets the lower word value to be used when triggering on audio bus data. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

`B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue <String>
TRIGger:A:BUS:B<x>:AUDio:DATa:VALue?
```

Arguments

`<String>` specifies the trigger data lower word.

TRIGger:A:BUS:B<x>:AUDio:DATa:WORD

This command sets the alignment of the data (left, right or either) to be used to search on audio bus data. The trigger condition must be set to DATA using TRIGger:A:BUS:B<x>:AUDio:CONDition.

`B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUDIO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD {EITher|LEFt|RIGht}
TRIGger:A:BUS:B<x>:AUDio:DATa:WORD?
```

Arguments

`EITher` aligns the trigger data to either left or right.

`LEFt` aligns the trigger data to the left.

`RIGht` aligns the trigger data to the right.

TRIGger:A:BUS:B<x>:CAN:CONDition

This command sets the condition (start of frame, frame type, identifier, matching data, EOF, missing ACK field, bit-stuffing error) to be used when triggering on CAN bus data. `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:CONDition
{SOF|FRAMEtype|IDentifier|DATA|IDANDDATA|EOF|ACKMISS:ERROR}
TRIGger:A:BUS:B<x>:CAN:CONDition?
```

Arguments

`SOF` enables triggering on the start of frame.

`FRAMEtype` enables triggering on the type of frame.

`IDentifier` enables triggering on a matching identifier.

`DATA` enables triggering on matching data.

`IDANDDATA` enables triggering on a matching identifier and matching data.

`EOF` enables triggering on the end of frame.

`ACKMISS` enables triggering on a missing acknowledge.

`ERROR` specifies a search based on a bit stuffing error.

Examples `TRIGGER:A:BUS:B1:CAN:CONDITION?` might return :TRIGGER:A:BUS:B1:CAN:CONDITION EOF indicating an end of file condition.

`TRIGGER:A:BUS:B1:CAN:CONDITION DATA` enables triggering on matching CAN data.

TRIGger:A:BUS:B<x>:CAN:DATa:DIRection

This command sets the data direction (read, write or nocare) to be used to search on CAN bus data. The trigger condition must be set to IDentifier (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection {READ|WRITE|NOCARE}
TRIGger:A:BUS:B<x>:CAN:DATa:DIRection?
```

Arguments `READ` sets the CAN data direction to READ.

`WRITE` sets the CAN data direction to WRITE.

`NOCARE` sets the CAN data direction to either.

Examples `TRIGGER:A:BUS:B1:CAN:DATA:DIRECTION WRITE` sets the CAN data direction to Write.

TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier

This command sets the qualifier (<, >, =, not =, <=) to be used when triggering on CAN bus data. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier
{LESSthan|Than|EQual|UNEQual|LESSEQual|EQual}
TRIGger:A:BUS:B<x>:CAN:DATa:QUALifier?
```

Arguments

`LESSthan` sets the oscilloscope to trigger when the data is less than the qualifier value.

`Than` sets the oscilloscope to trigger when the data is than the qualifier value.

`EQual` sets the oscilloscope to trigger when the data is equal to the qualifier value.

`UNEQual` sets the oscilloscope to trigger when the data is not equal to the qualifier value.

`LESSEQual` sets the oscilloscope to trigger when the data is less than or equal to the qualifier value.

`EQual` sets the oscilloscope to trigger when the data is than or equal to the qualifier value.

Examples

`TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER LESSTHAN` sets the oscilloscope to trigger when the data is less than the qualifier value.

`TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER?` might return `:TRIGGER:A:BUS:B1:CAN:DATA:QUALIFIER THAN`, indicating that the oscilloscope is set to trigger when the data is than the qualifier value.

TRIGger:A:BUS:B<x>:CAN:DATa:SIZe

This command sets the length of the data string, in bytes, to be used when triggering on CAN bus data. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AUTO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:CAN:DATa:SIZe?
```

Arguments

`<NR1>` is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:CAN:DATa:VALue

This command sets the binary data value to be used when triggering on CAN bus data. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:CAN:DATa:VALue?
```

Arguments `<QString>` is the data value in binary format. The only allowed characters in the `QString` are 0, 1, and X.

Examples `TRIGGER:A:BUS:B1:CAN:DATA:VALUE 1011` sets the CAN data value to 1011.

TRIGger:A:BUS:B<x>:CAN:FRAMEtype

This command sets the frame type (data, remote, error or overload) to be used when triggering on CAN bus data. The trigger condition must be set to FRAMEtype (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module. .

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN:FRAMEtype
{DATA|REMote|ERRor|OVERLoad}
TRIGger:A:BUS:B<x>:CAN:FRAMEtype?
```

Arguments `DATA` specifies a data frame type.

`REMote` specifies a remote frame type.

`ERRor` specifies an error frame type.

`OVERLold` specifies an overload frame type.

Examples `TRIGGER:A:BUS:B1:CAN:FRAMETYPE DATA` sets the CAN trigger frame type to DATA.

TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe

This command sets the addressing mode (standard or extended format) to be used when triggering on CAN bus data. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe
{STandard|EXTended}
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:MODe?
```

Arguments `STandard` specifies the standard addressing mode.

`EXTended` specifies the extended addressing mode.

TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue

This command sets the binary address value to be used when triggering on CAN bus data. The trigger condition must be set to IDANDDATA OR DATA (using TRIGger:A:BUS:B<x>:CAN:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AUTO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue <QString>
TRIGger:A:BUS:B<x>:CAN{:IDentifier|:ADDRess}:VALue?
```

Arguments `<QString>` is up to 29 bits specifying the binary identifier value. The only allowed characters in the `QString` are 0, 1, and X.

Examples `TRIGGER:A:BUS:B1:CAN:IDENTIFIER:VALUE 1011` sets the identifier value to 1011.

TRIGger:A:BUS:B<x>:FLEXray:CONDition

This command specifies the condition to use when triggering on the FlexRay bus signal (start of frame, frame type, ID, cycle count, header, data, ID and data, EOF, error). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CONDition
{SOF|FRAMEType|IDentifier|CYCLEcount|HEADer|DATA
|IDANDDATA|EOF|ERROR}
```

```
TRIGger:A:BUS:B<x>:FLEXray:CONDition?
```

Arguments `SOF` sets the trigger condition to start of frame.

`FRAMEType` sets the trigger condition to frame type.

`IDentifier` sets the trigger condition to identifier.

`CYCLEcount` sets the trigger condition to cycle count.

`HEADer` sets the trigger condition to header.

`DATA` sets the trigger condition to data.

`IDANDDATA` sets the trigger condition to id and data.

`EOF` sets the trigger condition to end of frame.

`ERROR` sets the trigger condition to error.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:CONDITION?` might return `TRIGGER:A:BUS:B1:FLEXRAY:CONDITION SOF` indicating the FlexRay condition is start of frame.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue

This command specifies the high value when triggering on the FlexRay bus cycle count field. (Use TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue to set the low value.) The trigger condition must be set to CYCLEcount (using

TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:HIVALue?
```

Arguments `<QString>` is a quoted string that is the cycle count high value.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE “110010”` sets the cycle count high value to 110010.

`TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:HIVALUE "XXXXXX"` indicating the cycle count high value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus cycle count field. The trigger condition must be set to CYCLEcount (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:QUALifier?
```

Arguments `LESSthan` sets the cycle count qualifier to less than.

`MOREthan` sets the cycle count qualifier to more than.

`EQual` sets the cycle count qualifier to equal.

`UNEQual` sets the cycle count qualifier to not equal.

`LESSEQual` sets the cycle count qualifier to less than or equal.

`MOREEQual` sets the cycle count qualifier to greater than or equal.

`INrange` sets the cycle count qualifier to in range.

`OUTrange` sets the cycle count qualifier to out of range.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER LESSTHAN` sets the cycle count qualifier to LESSTHAN.

`TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER?` might return `TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:QUALIFIER EQUAL` indicating that the cycle count qualifier is set to EQUAL.

TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue

This command specifies the low value when triggering on the FlexRay bus cycle count field. The trigger condition must be set to CYCLEcount (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions

Requires a DPO3FLEX application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:CYCLEcount:VALue?
```

Arguments

`<QString>` is a quoted binary data string that represents the cycle count low value.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE “11001101”` sets the cycle count value to 11001101.

`TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:CYCLECOUNT:VALUE "XXXXXX"` indicating the cycle count value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue

This command specifies the high value when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:DATa:HIVALue?
```

Arguments `<QString>` is a quoted string that is the binary data high value.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "11001101xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx1"` sets the binary data string high value to `"11001101xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx1"`.

`TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:DATA:HIVALUE "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"` indicating the binary data string high value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet

This command specifies the offset of the data string, in bytes, when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet <NR1>
TRIGger:A:BUS:B<x>:FLEXray:DATa:OFFSet?
```

Arguments <NR1> is the offset of the data string in bytes. A byte offset of -1 signifies “don't care”, and no byte offset is used. The instrument will trigger on or match any byte value that fits.

Examples TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET? might return TRIGGER:A:BUS:B1:FLEXRAY:DATA:OFFSET 0 indicating that a data offset of 0.

TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier

This command specifies the qualifier (<, >, =, <=, >=, not =, in range, out of range) to use when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). B<x> is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:QUALifier?
```

Arguments LESSthan sets the data qualifier to less than.

MOREthan sets the data qualifier to greater than.

EQual sets the data qualifier to eqaual.

UNEQual sets the data qualifier to not equal.

LESSEQual sets the data qualifier to less than or equal.

MOREEQual sets the data qualifier to greater than or equal.

INrange sets the data qualifier to in range.

OUTrange sets the data qualifier to out of range.

Examples TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER LESSTHAN sets the data qualifier to LESSTHAN.

`TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER?` might return `TRIGGER:A:BUS:B1:FLEXRAY:DATA:QUALIFIER EQUAL` indicating the data qualifier is EQUAL.

TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe

This command specifies the length of the data string, in bytes, when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:FLEXray:DATa:SIZe?
```

Arguments `<NR1>` is the FlexRay data string length, in bytes.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 8` sets the data string size to 8 bytes.

`TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:DATA:SIZE 1` indicating the data size is 1 byte.

TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue

This command specifies the low value when triggering on the FlexRay bus data field. The trigger condition needs to be set to ID or IDANDDATA (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:DATa:VALue?
```

Arguments `<QString>` is a quoted string.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE “11001101”` sets the FlexRay data value for triggering to 11001101.

`TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:DATA:VALUE "XXXXXXXX"` indicating the FlexRay data value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE

This command specifies the end of file type (static, dynamic or any) when triggering on the FlexRay bus EOF field. The trigger condition needs to be set to EOF (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions

Requires a DPO3FLEX application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE {STATic|DYNAMic|ANY}
TRIGger:A:BUS:B<x>:FLEXray:EOFTYPE?
```

Arguments

`STATic` specifies triggering on the STATIC end of file type.

`DYNAMic` specifies triggering on the DYNAMIC end of file type.

`ANY` specifies triggering on a STATIC or DYNAMIC end of file type.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE ANY` sets the FlexRay end of file type to ANY.

`TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:EOFTYPE STATIC` indicating the FlexRay end of file type is STATIC

TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE

This command specifies the error type when triggering on the FlexRay bus signal. The trigger condition needs to be set to ERROR (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions

Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE
{CRCHeader|CRCTrailer|SYNCFrame|STARTupnosync|NULLFRStatic|
NULLFRDynamic}
TRIGger:A:BUS:B<x>:FLEXray:ERRTYPE?
```

Arguments

`CRCHeader` sets the error type to CRCHeader.

`CRCTrailer` sets the error type to CRCTrailer.

`SYNCFrame` sets the error type to SYNCFrame.

`STARTupnosync` sets the error type to STARTupnosync.

`NULLFRStatic` sets the error type to NULLFRStatic.

`NULLFRDynamic` sets the error type to NULLFRDynamic.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE SYNCFRAME` sets the trigger type is SYNCFRAME.

`TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:ERRTYPE CRCHEADER` indicating the FlexRay trigger type is CRCHeader.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue

This command specifies the high value when triggering on the FlexRay bus frame ID field. (Use TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue to set the low value.) The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue?
```

Arguments `<QString>` is a quoted string that is the binary frame ID high value.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE “11001100101”` sets the frame ID high value to 11001100101.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:HIVALUE "XXXXXXXXXXX"` indicating the frame ID high value is “don't care”.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier

This command specifies the qualifier to use when triggering on the FlexRay bus frame ID field. The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions

Requires a DPO3FLEX application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:QUALifier?
```

Arguments

`LESSthan` sets the frame ID qualifier to less than.

`MOREthan` sets the frame ID qualifier to greater than.

`EQual` sets the frame ID qualifier to equal.

`UNEQual` sets the frame ID qualifier to not equal.

`LESSEQual` sets the frame ID qualifier to less than or equal.

`MOREEQual` sets the frame ID qualifier to greater than or equal.

`INrange` sets the frame ID qualifier to in range.

`OUTrange` sets the frame ID qualifier to out of range.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER LESSTHAN` sets the frame ID qualifier to less than.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:QUALIFIER EQUAL` indicating the frame ID qualifier is set to equal.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue

This command specifies the low value when triggering on the FlexRay bus frame ID field. (Use TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:HIVALue to set the high value.) The trigger condition needs to be set to IDentifier (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue <QString>
TRIGger:A:BUS:B<x>:FLEXray:FRAMEID:VALue?
```

Arguments `<QString>` is a quoted string that is the FlexRay frame ID low value.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE “11001100101”` sets the frame ID value to 11001100101.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMEID:VALUE "XXXXXXXXXXX"` indicating the frame ID value is don't care.

TRIGger:A:BUS:B<x>:FLEXray:FRAMEType

This command specifies the frame type (normal, payload, null, sync or startup) when triggering on the FlexRay bus signal. The trigger condition needs to be set to FRAMEType (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:FRAMEType
{NORMal|PAYLoad|NULL|SYNC|STARTup}

TRIGger:A:BUS:B<x>:FLEXray:FRAMEType?
```

Arguments

`NORMal` specifies the normal frame type.

`PAYLoad` specifies the payload frame type.

`NULL` specifies the null frame type.

`SYNC` specifies the sync frame type.

`STARTup` specifies the startup frame type.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE PAYLOAD` sets the frame type to payload.

`TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE?` might return `TRIGGER:A:BUS:B1:FLEXRAY:FRAMETYPE NORMAL` indicating the frame type is set to normal.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC

This command specifies the CRC portion of the binary header string when triggering on the FlexRay bus signal. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions

Requires a DPO3FLEX application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CRC?
```

Arguments

`<QString>` is a quoted string that is the CRC portion of the binary header string.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC “11001100101”` sets the CRC portion of the binary header string to 11001100101.

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC?` might return `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CRC "XXXXXXXXXXX"` indicating the CRC portion of the binary header string is don't care.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount

This command specifies the cycle count portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to

HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:CYCLEcount?
```

Arguments `<QString>` is a quoted string that is the cycle count portion of the binary header string.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "110010"` sets the cycle count to 110010.

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT?` might return `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:CYCLECOUNT "XXXXXX"` indicating the cycle count is don't care.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID

This command specifies the frame ID portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:FRAMEID?
```

Arguments `<QString>` is a quoted string that represents the frame ID portion of the binary header string.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "11001100101"` sets the frame ID portion of the binary header string to 11001100101.

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID?` might return `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:FRAMEID "XXXXXXXXXXX"` indicating the frame ID portion of the binary header string is “don't care”.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits

This command specifies the indicator bits portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition). `B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:INDBits?
```

Arguments `<QString>` is a quoted string that is the indicator bits portion of the binary header string.

Examples `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS “11001”` sets the indicator bits portion of the header string to 11001.

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS?` might return `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:INDBITS "XXXXX"` indicating that the indicator bits portion of the header string are “don't cares”.

TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength

This command specifies the payload length portion of the binary header string when triggering on the FlexRay bus header. The trigger condition needs to be set to HEADer (using TRIGger:A:BUS:B<x>:FLEXray:CONDition).`B<x>` is the bus number, which is 1 or 2.

Conditions Requires a DPO3FLEX application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength <QString>
TRIGger:A:BUS:B<x>:FLEXray:HEADER:PAYLength?
```

Arguments

`<QString>` is the length of the payload portion of the Binary header string.

Examples

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH “1100101"` sets the FlexRay header paylength to 1100101.

`TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH?` might return `TRIGGER:A:BUS:B1:FLEXRAY:HEADER:PAYLENGTH "XXXXXXX"` indicating the FlexRay header paylength is don't care.

TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe

Sets or returns the I^{2}C address mode to 7 or 10-bit. Applies to bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe {ADDR7|ADDR10}
TRIGger:A:BUS:B<x>:I2C:ADDRess:MODe?
```

Arguments

`ADDR7` specifies the 7-bit I^{2}C address mode.

`ADDR10` specifies the 10-bit I^{2}C address mode.

Examples

`TRIGGER:A:BUS:B1:I2C:ADDRESS:MODE ADDR10` sets the I2C address mode to 10-bit.

TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe

Sets or returns the I^{2}C address type. The only supported address type is USER. Applies to bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe
{GENeralcall|STARtbyte|HSmode|EEPROM|USER}
TRIGger:A:BUS:B<x>:I2C:ADDRess:TYPe?
```

Arguments

GENeralcall specifies a general call address.

STARtbyte specifies a start byte address.

HSmode specifies a high-speed mode address.

EEPROM specifies an EEPROM address.

USER specifies a user address.

TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue

Sets or returns the binary address string used for the I^{2}C trigger if the trigger condition is ADDRESS or ADDRANDDATA. Applies to bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:I2C:ADDRess:VALue?
```

Arguments

<QString> is up to 7 or 10-bits depending on the address mode that specifies the address. The only allowed characters in the QString are 0, 1, and X.

Examples

TRIGGER:A:BUS:B1:I2C:ADDRESS:VALUE 1011 sets the I^{2}C address value to XXX1011.

TRIGger:A:BUS:B<x>:I2C:CONDition

Sets or returns the trigger condition for an I^{2}C trigger. Applies to bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:CONDition
{STARt|STOP|REPEATstart|ACKMISS|ADDRess|DATA|ADDRANDDATA}
TRIGger:A:BUS:B<x>:I2C:CONDition?
```

Arguments

`STARt` specifies a search based on start condition.

`STOP` specifies a search based on stop condition.

`REPEATstart` specifies a search based on repeat of start condition.

`ACKMISS` specifies a search based on missing acknowledgement condition.

`ADDRess` specifies a search based on address.

`DATA` specifies a search based on data.

`ADDRANDDATA` specifies a search based on address and data.

Examples

`TRIGGER:A:BUS:B1:I2C:CONDITION START` specifies start as the I^2C trigger condition.

TRIGger:A:BUS:B<x>:I2C:DATa:DIRection

Sets or returns the I^2C trigger type to be valid on a Read, Write, or Either condition. Read or write is indicated by the R/W bit in the I^2C protocol. Applies to bus <x>, where x is the bus number.

Conditions

This command requires a DPO3EMBD application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection {READ|WRITE|NOCARE}
TRIGger:A:BUS:B<x>:I2C:DATa:DIRection?
```

Arguments

`READ` specifies read as the data direction.

`WRITE` specifies write as the data direction.

`NOCARE` specifies either as the data direction.

Examples

`TRIGGER:A:BUS:B1:I2C:DATA:DIRECTION WRITE` specifies write as the I^2C data direction.

TRIGger:A:BUS:B<x>:I2C:DATa:SIZe

Sets or returns the length of the data string in bytes to be used for an I2C trigger if the trigger condition is DATA or ADDRANDDATA. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:I2C:DATa:SIZe?
```

Arguments `<NR1>` is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:I2C:DATa:VALue

Sets or returns the binary data string used for I2C triggering if the trigger condition is DATA or ADDRANDDATA. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:I2C:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:I2C:DATa:VALue?
```

Arguments `<QString>` is the binary data string, where the number of bits is 8 times the number of bytes specified. The only allowed characters in the string are 0, 1, and X.

TRIGger:A:BUS:B<x>:LIN:CONDition

Sets or returns the trigger condition for LIN.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:CONDition
{SYNCField|IDentifier|DATA|IDANDDATA|WAKEup|SLEEP|ERROR}
TRIGger:A:BUS:B<x>:LIN:CONDition?
```

Arguments

`SYNCField` sets the LIN trigger condition to sync field.

`IDentifier` sets the LIN trigger condition to identifier.

`DATA` sets the LIN trigger condition to data.

`IDANDDATA` sets the LIN trigger condition to id and data.

`WAKEup` sets the LIN trigger condition to wake up.

`SLEEP` sets the LIN trigger condition to sleep.

`ERROR` sets the LIN trigger condition to error.

Examples

`TRIGGER:A:BUS:B1:LIN:CONDITION ERROR` sets the LIN trigger condition to error.

`TRIGGER:A:BUS:B1:LIN:CONDITION?` might return `TRIGGER:A:BUS:B1:LIN:CONDITION SYNCFIELD` indicating the LIN trigger condition is sync field.

TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue

Sets or returns the binary data string to be used for LIN trigger if trigger condition is ID or IDANDDATA.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue <QString>
TRIGger:A:BUS:B<x>:LIN:DATa:HIVALue?
```

Arguments

`<QString>` is a quoted string that is the binary data string used for LIN trigger if the trigger condition is ID or IDANDDATA.

Examples

`TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "11001010"` sets the high value to 11001010.

`TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE?` might return `TRIGGER:A:BUS:B1:LIN:DATA:HIVALUE "XXXXXXXX"`indicating the high value is don't care.

TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier

Sets or returns the LIN data qualifier. This only applies if the trigger condition is IDANDDATA or DATA.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
TRIGger:A:BUS:B<x>:LIN:DATa:QUALifier?
```

Arguments

`LESSthan` sets the LIN data qualifier to less than.

`MOREthan` sets the LIN data qualifier to greater than.

`EQual` sets the LIN data qualifier to equal.

`UNEQual` sets the LIN data qualifier to not equal.

`LESSEQual` sets the LIN data qualifier to less than or equal.

`MOREEQual` sets the LIN data qualifier to greater than or equal.

`INrange` sets the LIN data qualifier to in range.

`OUTrange` sets the LIN data qualifier to out of range.

Examples

`TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER OUTRANGE` sets the data qualifier to out of range.

`TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER?` might return `TRIGGER:A:BUS:B1:LIN:DATA:QUALIFIER EQUAL` indicating the data qualifier is set to equal.

TRIGger:A:BUS:B<x>:LIN:DATa:SIZe

Sets or returns the length of the data string in bytes to be used for LIN trigger.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:LIN:DATa:SIZe?
```

Arguments

`<NR1>` is the size of the data string in bytes.

Examples

`TRIGGER:A:BUS:B1:LIN:DATA:SIZE 8` sets the data size to 8 bytes.

`TRIGGER:A:BUS:B1:LIN:DATA:SIZE?` might return `TRIGGER:A:BUS:B1:LIN:DATA:SIZE 1` indicating the data size is 1 byte.

TRIGger:A:BUS:B<x>:LIN:DATa:VALue

Sets or returns the binary data string to be used for LIN trigger condition if trigger condition is ID or IDANDDATA.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:LIN:DATa:VALue?
```

Arguments

`<QString>` is a quoted string that is the LIN trigger data value.

Examples

`TRIGGER:A:BUS:B1:LIN:DATA:VALUE “11001101”`sets the data value to 11001101.

`TRIGGER:A:BUS:B1:LIN:DATA:VALUE?` might return `TRIGGER:A:BUS:B1:LIN:DATA:VALUE "XXXXXXXX"` indicating the data value is don't care.

TRIGger:A:BUS:B<x>:LIN:ERRTYPE

Sets or returns the error type be used for LIN trigger.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:ERRTYPE
{SYNC|PARity|CHecksum|HEADertime|RESPtime|FRAMetime}
TRIGger:A:BUS:B<x>:LIN:ERRTYPE?
```

Arguments

`SYNC` sets the LIN error type to SYNC.

`PARity` sets the LIN error type to parity.

`CHecksum` sets the LIN error type to checksum.

`HEADertime` sets the LIN error type to header time.

`RESPtime` sets the LIN error type to response time.

FRAMetime sets the LIN error type to frame time.

Examples

TRIGGER:A:BUS:B1:LIN:ERRTYPE CHECKSUM sets the LIN error type to checksum.

TRIGGER:A:BUS:B1:LIN:ERRTYPE? might return TRIGGER:A:BUS:B1:LIN:ERRTYPE SYNC indicating the LIN error type is SYNC.

TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue

Sets or returns the binary address string used for LIN trigger if the trigger condition is ID or IDANDDATA.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue <QString>
TRIGger:A:BUS:B<x>:LIN:IDentifier:VALue?
```

Arguments

<QString> is the binary address string used for LIN trigger if the trigger condition is ID or IDANDDATA.

Examples

TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "110010" sets the identifier value to 110010.

TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE? might return TRIGGER:A:BUS:B1:LIN:IDENTIFIER:VALUE "XXXXXX" indicating the identifier value is XXXXXX.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

When the MIL-STD-1553 bus trigger condition is set to COMMAND, and the qualifier is set to INrange or OUTrange, this command specifies the upper limit of the range for the remote terminal address field. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue to specify the lower limit of the range.) The default is all X's (don't care). B<x> is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue
<QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

Arguments

QString is a quoted string of up to 5 characters where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:HIVALue` "01000" sets the upper limit of the remote terminal address range to 01000 (when the trigger condition has been set to `MIL1553B`, and the qualifier has been set to `INrange` or `OUTrange).`

`TRIGger:A:BUS:B1:MIL1553B:HIVALue?` might return "XXXXX".

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies the qualifier to be used with the remote terminal address field. `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

Arguments

`LESSthan` sets the Command Address qualifier to less than.

`MOREthan` sets the Command Address qualifier to greater than.

`EQual` sets the Command Address qualifier to equal.

`UNEQual` sets the Command Address qualifier to not equal.

`LESSEQual` sets the Command Address qualifier to less than or equal.

`MOREEQual` sets the Command Address qualifier to greater than or equal.

`INrange` sets the Command Address qualifier to in range.

`OUTrange` sets the Command Address qualifier to out of range.

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier EQual` sets the qualifier to be used with the remote terminal address to equal.

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:QUALifier?` might return INRANGE.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the value of the 5–bit remote terminal address to be used in the trigger. When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, and the qualifier is set to `INrange` or `OUTrange,` this command specifies the lower limit of the remote terminal address range. The default is all X's (don't care). `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:HIVALue

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue "01000"` sets the remote terminal address to be used in the trigger to 01000.

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:ADDRess:VALue?` might return 01000.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies the bit pattern for the 5–bit Word Count/Mode Code sub-address field that is to be used in the trigger. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress to specify Word Count or Mode Code.) In Word Count mode, this field defines the number of data words that is to be transmitted, or received, depending on the T/R bit setting. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit to set the T/R bit.) A word count value of 0 actually indicates a transfer of 32 data words. `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

Arguments

`QString` is a quoted string of up to 5 characters, where the allowable characters are 0, 1 and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt "01000"` sets the bit pattern for the Word Count/Mode Code field to 01000.

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:COUNt?` might return "XXXXX".

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies the Command word parity that is to be used in the trigger. `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X (“don’t care”) which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X (“don’t care”) which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity ZERo` sets the Command word parity bit to 0.

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:PARity?` might return 0, 1 or X.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies the 5 bit sub-address that is to be used in the trigger. When the sub-address value is set to 00000 or 11111 binary, it specifies that the command is a “Mode Code” command. Any other value specifies that it is a “Word Count” command. The default is all X’s (don’t care). `B<x>` is the bus number, which is 1 or 2.

NOTE. The sub-address field is used to direct data to different functions within the subsystem for values 1 — 30.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress <QString>
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:SUBADdress?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:COMMAND:SUBADdress "01000"` sets the sub-address to be used in the trigger to 01000.

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit

When the MIL-STD-1553 bus trigger condition is set to `COMMAND`, this command specifies that the transmit/receive bit (bit 9) is to be used in the trigger. The transmit/receive bit defines the direction of information flow, and is always from the point of view of the remote terminal. `B<x>` is the bus number, which is 1 or 2.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit {RX|TX|X}
TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:TRBit?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:COMMAND:COUNt

Arguments

RX (logic 0) directs the instrument to trigger on a TX or "transmit" from a remote terminal .

TX (logic 1) directs the instrument to trigger on an RX or "receive" from a remote terminal.

X indicates “don’t care".

Examples

TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX directs the instrument to trigger on a TX or “transmit” from a remote terminal.

TRIGger:A:BUS:B1:MIL1553B:COMMAND:TRBit TX? might return TX.

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

This command specifies a word type or condition within a MIL-STD-1553 bus word to trigger on. B<x> is the serial bus number.

NOTE. *There are three types of MIL-STD-1553 (Aircraft) bus words: Command, Status, and Data, all sharing a common structure twenty bits in length. The first three bits are used as a synchronization field. The last bit is the odd parity of the previous 16 bits.*

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:CONDition
{SYNC|COMMAND|STATus|DATA|TIMe|ERRor}

TRIGger:A:BUS:B<x>:MIL1553B:CONDition?
```

Related Commands

Most of the other TRIGger:A:BUS:B<x>:MIL1553B commands are impacted by the setting of this command.

BUS:B<x>:MIL1553B:POLarity

BUS:B<x>:MIL1553B:SOUrce

Arguments

SYNC refers to the 3–bit sync pulse that precedes each word.

COMMAND is one of 3 16–bit word types. It specifies the function that a remote terminal is to perform.

`STATus` is one of 3 16–bit word types. Remote terminals respond to valid message transmissions via status words.

`DATA` is one of 3 16–bit word types.

`TIMe` specifies to trigger on either the RT (remote terminal response time), or the IMG (Inter-message Gap). Use the commands TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier, TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit, and TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit to specify the time parameters.

`ERRor` specifies to trigger upon a signaling error. (You can specify which type of error — Parity, Sync, Manchester or Non-contiguous Data — by using the TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE command.)

NOTE.

Use the `TRIGger:A:BUS:B<x>:MIL1553B:CONDition:STATus:BIT` commands to set the following bits:

9 — message error
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

10 — instrumentation
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

11 — SRQ (service request)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

15 — BCR (broadcast command received)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

16 — busy
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

17 — subsystem flag
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

18 — DBCA (dynamic bus control acceptance)
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

19 — terminal flag
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

Examples

`:TRIGger:A:BUS:B1:MIL1553B:CONDition STATus` sets the word type to trigger on to `STATus`.

`:TRIGger:A:BUS:B1:MIL1553B:CONDition?` might return DATA.

TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

When the MIL-STD-1553 bus trigger condition is set to `DATa`, this command specifies the data parity bit to be used in the trigger. Returned values are 0, 1, or X (don't care). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

Arguments `0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples `TRIGger:A:BUS:B1:MIL1553B:DATa:PARity 1` sets the data parity bit to be used in a MIL-STD-1553 bus trigger to 1.

`TRIGger:A:BUS:B1:MIL1553B:DATa:PARity?` might return 0, indicating that the data parity bit to be used in a MIL-STD-1553 bus trigger is set to 0.

TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue

When the MIL-STD-1553 bus trigger condition is set to `DATa`, this command specifies the data binary pattern to be used in the trigger. This is a 16-bit field. The default is all X's (don't care). `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:DATa:VALue?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:DATa:PARity

Arguments QString is a quoted string of up to 16 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples `TRIGger:A:BUS:B1:MIL1553B:DATa:VALue “01000”` sets the data binary pattern to be used in a MIL-STD-1553 bus trigger to 01000.

`TRIGger:A:BUS:B1:MIL1553B:DATa:VALue?` might return XXXXXXXXXXX01000.

TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE

When the MIL-STD-1553 bus trigger condition is set to `ERRor`, this command specifies the signaling error type to be used in the trigger: Parity, Sync, Manchester or Data. `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE
{PARity|SYNC|MANCHester|DATA}

TRIGger:A:BUS:B<x>:MIL1553B:ERRTYPE?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

PARity — an incorrect parity setting.

SYNc — the high to low, or low to high transition doesn't happen in the middle of the sync time as it should.

MANCHester — no transition in a bit time.

DATA — a non-contiguous data error.

Examples

`TRIGger:A:BUS:B1:MIL1553B:ERRTYPE PARity` sets the error type to be used in the trigger to PARITY.

`TRIGger:A:BUS:B1:MIL1553B:ERRTYPE?` might return SYNC.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

When the MIL-STD-1553 bus trigger condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the upper limit for the 5 bit remote terminal address field of the Status word. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue to specify the lower limit.) The default is all X's (don't care).`B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

Arguments

QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:HIVAL` "01000" sets the upper limit of the range of the terminal address to 01000 (when the trigger condition is set to `MIL1553B`, and the qualifier is set to `INrange` or `OUTrange`).

`TRIGger:A:BUS:B1:MIL1553B:HIVAL?` might return "XXXXX".

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the qualifier to be used with the address field. The default is EQUAL. `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier
{LESSthan|MOREthan|EQual|UNEQual|LESSEQual|MOREEQual|
INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

Arguments

`LESSthan` sets the Status Address qualifier to less than.

`MOREthan` sets the Status Address qualifier to greater than.

`EQual` sets the Status Address qualifier to equal.

`UNEQual` sets the Status Address qualifier to not equal.

`LESSEQual` sets the Status Address qualifier to less than or equal.

`MOREEQual` sets the Status Address qualifier to greater than or equal.

`INrange` sets the Status Address qualifier to in range.

`OUTrange` sets the Status Address qualifier to out of range.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier MOREthan` sets the qualifier to be used with the address field to greater than.

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:QUALifier?` might return MORETHAN.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue

When the MIL-STD-1553 bus trigger condition is set to `STATus`, and the qualifier is set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`, this command specifies the value of the 5–bit remote terminal address to be used in the trigger. When the MIL-STD-1553 bus trigger condition is set to `STATus`, and the qualifier is set to `INrange` or `OUTrange`, this command specifies the lower limit of the range. (Use the command TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue to specify the upper limit of the range.) The default is all X's (don't care). `B<x>` is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue <QString>
TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:VALue?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:QUALifier

TRIGger:A:BUS:B<x>:MIL1553B:STATus:ADDRess:HIVALue

Arguments QString is a quoted string of up to 5 characters, where the allowable characters are 0, 1, and X. The bits specified in the quoted string replace the least significant bits, leaving any unspecified upper bits unchanged.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the value of the 5–bit remote terminal address to be used in the trigger, when the qualifier has been set to `LESSthan, MOREthan, EQual, UNEQual, LESSEQual` or `MOREEQual`.

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue "01000"` sets the lower limit of the range to 01000, if the qualifier has been set to `INrange` or `OUTrange.`

`TRIGger:A:BUS:B1:MIL1553B:STATus:ADDRess:VALue?` might return "01000".

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word broadcast command received (BCR) bit value (bit 15) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BCR?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR NOCARE sets the BCR bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:BCR? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word busy bit value (bit 16) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:BUSY?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:BUSY NOCARE` sets the status word busy bit value to be used in the trigger to X.

`TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:BUSY?` might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word dynamic bus control acceptance (DBCA) bit value (bit 18) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:DBCA?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA NOCARE` sets the status word dynamic bus control acceptance (DBCA) bit value to be used in the trigger to X.

`TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:DBCA?` might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word instrumentation bit value (bit 10) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:INSTR?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments 0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:INSTR ZERo sets the status word instrumentation bit value to be used in the trigger to 0.

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:INSTR? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word message error bit value (bit 9) to be used in the trigger. Returned values are 0, 1, or X (don’t care, which is the default). B<x> is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:ME?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments 0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME NOCARE sets the status word message error bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATus:BIT:ME? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word service request (SRQ) bit value (bit 11) to be used in the trigger. Returned values are 0, 1, or X (don’t care, which is the default). B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SRQ?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X (“don’t care”) which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X (“don’t care”) which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SRQ NOCARE sets the status word SRQ bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STATUS:BIT:SRQ? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF

When the MIL-STD-1553 bus trigger condition is set to STATus, this command specifies the status word subsystem flag bit value (bit 17) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). B<x> is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:SUBSF?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

0

1

X sets the value to X ("don't care") which is the default.

ZERO sets the value to 0.

ONE sets the value to 1.

NOCARE sets the value to X ("don't care") which is the default.

OFF sets the value to 0.

ON sets the value to 1.

Examples

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SUBSF NOCARE sets the status word subsystem flag bit value to be used in the trigger to X.

TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:SUBSF? might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status word terminal flag bit value (bit 19) to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). `B<x>` is the serial bus number.

Conditions

This command requires a DPO3AERO application module.

Group

Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:BIT:TF?
```

Related Commands

TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments

`0`

`1`

`X` sets the value to X ("don't care") which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X ("don't care") which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples

`TRIGger:A:BUS:B1:MIL1553B:STAT:BIT:TF NOCARE` sets the status word terminal flag bit value to be used in the trigger to X.

`TRIGger:A:BUS:B1:MIL1553B:STATUSus:BIT:TF?` might return 1.

TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity

When the MIL-STD-1553 bus trigger condition is set to `STATus`, this command specifies the status parity bit value to be used in the trigger. Returned values are 0, 1, or X (don't care, which is the default). `B<x>` is the serial bus number.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity
{0|1|X|ZERo|ONE|NOCARE|OFF|ON}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:STATus:PARity?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

Arguments `0`

`1`

`X` sets the value to X (“don’t care”) which is the default.

`ZERO` sets the value to 0.

`ONE` sets the value to 1.

`NOCARE` sets the value to X (“don’t care”) which is the default.

`OFF` sets the value to 0.

`ON` sets the value to 1.

Examples `TRIGger:A:BUS:B1:MIL1553B:STAT:PAR ONE` sets the parity bit value to be used in the trigger to 1.

`TRIGger:A:BUS:B1:MIL1553B:STATUS:PARity?` might return X, indicating that the parity doesn’t matter.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the minimum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the minimum inter-message gap (IMG). (You can specify RT or IMG using the TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) `B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax
```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit <NR3>
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit?
```

Related Commands
TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments
<NR3> is a floating point number that specifies either the minimum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples
`TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit 3.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to 3.00 µS.

`TRIGger:A:BUS:B1:MIL1553B:TIMe:LESSLimit?` might return 2.0000e-6, indicating that the RT or IMG has been set to 2.00 µS.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies either the maximum remote terminal response time (RT) limit for the amount of time the terminal has to transmit, or it specifies the maximum inter-message gap (IMG). (You can specify the RT and IMG using the TRIGger:A:BUS:B<x>:MIL1553B:CONDition TIMe command.) `B<x>` is the bus number, which is 1 or 2.

Conditions
This command requires a DPO3AERO application module.

Group
Trigger

Syntax
```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit <NR3>
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit?
```

Related Commands
TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

Arguments
<NR3> is a floating point number that specifies either the maximum remote terminal response time (RT) or the inter-message gap (IMG) in seconds.

Examples `TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit 80.0000e-6` would set either the remote terminal response time (RT) or the inter-message gap (IMG) to be used in the trigger to 80.0 µS.

`TRIGger:A:BUS:B1:MIL1553B:TIMe:MORELimit?` might return 100.0000e-6, indicating that the RT or IMG has been set to 100.00 µS.

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier

When the MIL-STD-1553 bus trigger condition is set to `TIMe`, this command specifies the trigger data time qualifier. (This includes a smaller set of arguments than other qualifier commands.)`B<x>` is the bus number, which is 1 or 2.

Conditions This command requires a DPO3AERO application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier
{LESSthan|MOREthan|INrange|OUTrange}
```

```
TRIGger:A:BUS:B<x>:MIL1553B:TIMe:QUALifier?
```

Related Commands TRIGger:A:BUS:B<x>:MIL1553B:CONDition

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:LESSLimit

TRIGger:A:BUS:B<x>:MIL1553B:TIMe:MORELimit

Arguments `LESSthan` sets the Time qualifier to less than minimum.

`MOREthan` sets the Time qualifier to greater than maximum

`INrange` sets the Time qualifier to inside range.

`OUTrange` sets the Time qualifier to out of range.

Examples `TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier LESSthan` sets the Time qualifier to less than minimum.

`TRIGger:A:BUS:B1:MIL1553B:TIMe:QUALifier?` might return OUTRANGE.

TRIGger:A:BUS:B<x>:PARallel:VALue

Sets or returns the binary data string to be used for a Parallel trigger. Applies to bus <x>, where x is the bus number.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:PARallel:VALue <QString>
TRIGger:A:BUS:B<x>:PARallel:VALue?
```

Arguments `<QString>` is the binary data string.

TRIGger:A:BUS:B<x>:RS232C:CONDition

Sets or returns the condition for an RS-232C trigger, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:CONDition
{RXSTArt|RXDATA|RXENDPacket|TXSTArt|TXDATA|TXENDPacket}
TRIGger:A:BUS:B<x>:RS232C:CONDition?
```

Arguments `RXSTArt` specifies a search based on the RX Start Bit.

`RXDATA` specifies a search based on RX Data.

`RXENDPacket` specifies a search based on the RX End of Packet condition.

`TXSTArt` specifies a search base on the TX Start Bit.

`TXDATA` specifies a search based on TX Data.

`TXENDPacket` specifies a search based on the TX End of Packet condition.

TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe

Sets or returns the length of the data string in Bytes for an RS-232 Trigger if the trigger condition is RXDATA. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:SIZe?
```

Arguments `<NR1>` is the length of the data string in bytes.

TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue

Sets or returns the binary data string for an RS-232 trigger if the trigger condition involves RX. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue
TRIGger:A:BUS:B<x>:RS232C:RX:DATa:VALue?
```

Arguments `<Qstring>` is the binary data string to be used for the trigger.

TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe

Sets or returns the length of the data string for an RS-232 trigger if the trigger condition is TXDATA. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:SIZe?
```

Arguments `<NR1>` is the length of the data string in Bytes.

TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue

Sets or returns the binary data string for an RS-232 trigger if the condition involves TX. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3COMP application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue
TRIGger:A:BUS:B<x>:RS232C:TX:DATa:VALue?
```

Arguments `<Qstring>` is the binary data string to be used for the trigger.

TRIGger:A:BUS:B<x>:SPI:CONDition

Sets or returns the trigger condition for a SPI trigger. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:CONDition {SS|MISO|MOSI|MISOMOSI}
TRIGger:A:BUS:B<x>:SPI:CONDition?
```

Arguments `SS` specifies the Slave Selection condition.

`MISO` specifies the Master-In Slave-Out condition.

`MOSI` specifies the Master-Out Slave-In condition.

`MISOMOSI` specifies the Master-In Slave-Out and Master-Out Slave-In conditions.

TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue

Sets or returns the binary data string to be used for a SPI trigger if the trigger condition is MISO or MISOMOSI. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue <QString>
TRIGger:A:BUS:B<x>:SPI:DATa{:IN|:MISO}:VALue?
```

Arguments `<QString>` is the binary data string, where the number of bits is 8 times the number of bytes specified. The only allowed characters in the string are 0, 1, and X.

TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue

Sets or returns the binary data string to be used for a SPI trigger if the trigger condition is MOSI or MISOMOSI. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue <QString>
TRIGger:A:BUS:B<x>:SPI:DATa{:OUT|:MOSI}:VALue?
```

Arguments `<QString>` is the binary data string with the number of bits specified by the TRIGger:A:BUS:B<x>:SPI:DATa:SIZe command. The only allowed characters in the `QString` are 0, 1, and X.

TRIGger:A:BUS:B<x>:SPI:DATa:SIZe

Sets or returns the length of the data string to be used for a SPI trigger if the trigger condition is MISO, MOSI, or MISOMOSI. Applies to bus <x>, where x is the bus number.

Conditions This command requires a DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe <NR1>
TRIGger:A:BUS:B<x>:SPI:DATa:SIZe?
```

Arguments <NR1> is the length of the data string in bytes.

TRIGger:A:BUS:SOUrce

Sets or returns the source for a Serial bus trigger.

Conditions This command requires a DPO3AUTO or DPO3EMBD application module.

Group Trigger

Syntax

```
TRIGger:A:BUS:SOUrce {SOF|DATA}
TRIGger:A:BUS:SOUrce?
```

TRIGger:A:EDGE? (Query Only)

Returns the trigger source, coupling, and slope for the A edge trigger.

Group Trigger

Syntax

```
TRIGger:A:EDGE?
```

Related Commands TRIGger:A:PULse?, TRIGger:A:LOGIc?

Examples `TRIGGER:A:EDGE?` might return `:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC; SLOPE RISE` indicating the trigger source, coupling, and slope for the A edge trigger.

TRIGger:A:EDGE:COUPling

Sets or returns the type of coupling for the A edge trigger.

Group Trigger

Syntax

```
TRIGger:A:EDGE:COUPling {AC|DC|HFRej|LFRej|NOISErej}
TRIGger:A:EDGE:COUPling?
```

Related Commands TRIGger:A:EDGE:SOUrce, TRIGger:A:EDGE:SLOpe

Arguments

`AC` specifies AC trigger coupling.

`DC` specifies DC trigger coupling, which passes all input signals to the trigger circuitry.

`HFRej` specifies high-frequency rejection coupling, which attenuates signals above 50 kHz before passing the signals to the trigger circuitry.

`LFRej` specifies low-frequency rejection coupling, which attenuates signals below 50 kHz before passing the signals to the trigger circuitry.

`NOISErej` specifies noise-rejection coupling, which provides stable triggering by increasing the trigger hysteresis. Increased hysteresis reduces the trigger sensitivity to noise but may require greater trigger signal amplitude.

Examples

`TRIGGER:A:EDGE:COUPLING DC` sets the A edge trigger coupling to DC.

`TRIGGER:A:EDGE:COUPLING?` might return `:TRIGGER:A:EDGE:COUPLING DC` indicating that the A edge trigger coupling is set to DC.

TRIGger:A:EDGE:SLOpe

Sets or returns the slope for the A edge trigger.

Group

Trigger

Syntax

```
TRIGger:A:EDGE:SLOpe {RISe|FALL}
TRIGger:A:EDGE:SLOpe?
```

Related Commands

TRIGger:A:EDGE:SOUrce, TRIGger:A:EDGE:COUPling

Arguments

`RISe` specifies to trigger on the rising or positive edge of a signal.

`FALL` specifies to trigger on the falling or negative edge of a signal.

Examples

`TRIGGER:A:EDGE:SLOPE RISE` sets the A edge trigger slope to positive, which triggers on the rising edge of the signal.

`TRIGGER:A:EDGE:SLOPE?` might return `:TRIGGER:A:EDGE:SLOPE FALL` indicating that the A edge trigger slope is negative.

TRIGger:A:EDGE:SOUrce

Sets or returns the source for the A edge trigger.

Group Trigger

Syntax

```
TRIGger:A:EDGE:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D
TRIGger:A:EDGE:SOUrce?
```

Related Commands TRIGger:A:EDGE:SLOpe, TRIGger:A:EDGE:COUPling

Arguments `CH1–CH4` specifies an analog input channel as the A edge trigger source.

`D0–D15` specifies a digital channel as the source (MSO models only).

`EXT` specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope.

`LINE` specifies the AC line as the trigger source.

`AUX` specifies the Auxiliary Input as the trigger source (if available on your oscilloscope).

Examples `TRIGGER:A:EDGE:SOURCE CH1` sets channel 1 as the A edge trigger source.

`TRIGGER:A:EDGE:SOURCE?` might return `:TRIGGER:A:EDGE:SOURCE CH1` indicating that channel 1 is the A edge trigger source.

TRIGger:A:HOLDoff? (Query Only)

Returns the A trigger holdoff parameters. These parameters specify the time period during which the trigger circuitry is not looking to generate a trigger event.

Group Trigger

Syntax

```
TRIGger:A:HOLDoff?
```

Related Commands TRIGger:A:HOLDoff:TIMe

Examples `TRIGGER:A:HOLDOFF?` might return `:TRIGGER:A:HOLDOFF:TIME 900.0000E-09;BY DEFAULT` indicating that the A edge trigger holdoff time (by default) is 900 ns.

TRIGger:A:HOLDoff:TIMe

Sets or returns the A trigger holdoff time.

Group

Trigger

Syntax

```
TRIGger:A:HOLDoff:TIMe <NR3>
TRIGger:A:HOLDoff:TIMe?
```

Arguments

<NR3> specifies the holdoff time in seconds. The range is from 20 ns through 8.0 s.

Examples

TRIGGER:A:HOLDOFF:TIME ? might return :TRIGGER:A:HOLDOFFTIME 1.2000E-06 indicating that the A trigger holdoff time is set to 1.2 µs.

TRIGGER:A:HOLDOFF:TIME 10 sets the A trigger holdoff time to 10 s.

TRIGger:A:LEVel

Sets or returns the trigger level for the A trigger.

Group

Trigger

Syntax

```
TRIGger:A:LEVel {ECL|TTL|<NR3>}
TRIGger:A:LEVel?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> specifies the trigger level in user units (usually volts).

Examples

TRIGGER:A:LEVEL? might return :TRIGGER:A:LEVel 1.3000E+00 indicating that the A edge trigger is set to 1.3 V.

TRIGGER:A:LEVEL TTL sets the A edge trigger to TTL high level, which is 1.4 V.

TRIGger:A:LEVel:AUXin

Sets or returns the trigger level for the AUXIN port.

Group

Trigger

Syntax

```
TRIGger:A:LEVel:AUXin {<NR3>|ECL|TTL}
TRIGger:A:LEVel:AUXin?
```

Arguments

`<NR3>` specifies the trigger level, in volts.

`ECL` specifies a preset ECL trigger level of –1.3V.

`TTL` specifies a preset TTL trigger level of 1.4V.

Examples

`TRIGGER:A:LEVEL:AUXIN ECL` sets the auxiliary input trigger level to -1.3 volts.

`TRIGGER:A:LEVEL:AUXIN?` might return `TRIGGER:A:LEVEL:AUXIN 0.0E+0` indicating the auxiliary input trigger level is 0.0 volts.

TRIGger:A:LEVel:CH<x>

Sets or returns the trigger level for the specified channel. Each channel can have an independent level.

Group

Trigger

Syntax

```
TRIGger:A:LEVel:CH<x> {<NR3>|TTL|ECL}
TRIGger:A:LEVel:CH<x>?
```

Arguments

`<NR3>` specifies the trigger level in user units (usually volts).

`TTL` specifies a preset `TTL` high level of 1.4V.

`ECL` specifies a preset `ECL` high level of –1.3V.

Examples

`TRIGGER:A:LEVEL:CH2?` might return `:TRIGGER:A:LEVEL:CH2 1.3000E+00` indicating that the A edge trigger is set to 1.3 V for channel 2.

`TRIGGER:A:LEVEL:CH3 TTL` sets the A edge trigger to TTL high level for channel 3.

TRIGger:A:LEVel:D<x>

Sets or returns the trigger level for the specified digital channel <x>, where x is the channel number. Each digital channel can have an independent level.

Group

Trigger

Syntax

```
TRIGger:A:LEVel:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LEVel:D<x>?
```

Arguments

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

`<NR3>` specifies the trigger level in volts.

TRIGger:A:LOGIc? (Query Only)

Returns all of the A logic trigger parameters.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc?
```

Related Commands

TRIGger:A:LOGIc:CLAss

Examples

`TRIGGER:A:LOGIC?` might return `:TRIGGER:A:LOGIC:CLASS SETHOLD;FUNCTION AND;THRESHOLD:CH1 20.0000E-3;CH2 0.0000; CH3 0.0000;CH4 0.0000;:TRIGGER:A:LOGIC:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;CLOCK:SOURCE NONE;EDGE RISE;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 X;CH2 X;CH3 X;CH4 X;:TRIGGER :A:LOGIC:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 4.0000E-9;LIMIT 4.0000E-9;:TRIGGER:A:LOGIC:PATTERN:DELTATIME 4.0000E-9`

TRIGger:A:LOGIc:CLAss

This command sets the class of the logic trigger (logic or setup/hold). This command is used in conjunction with the TRIGger:A:TYPe command.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:CLAss {LOGIC|SETHold}
TRIGger:A:LOGIc:CLAss?
```

Related Commands

TRIGger:A:TYPe, TRIGger:A:PULse:CLAss

Arguments

LOGIC sets the oscilloscope to trigger on logical combinations of the channels.

When the TRIGger:A:LOGIc:INPut:CLOCk:SOUrce is NONE, LOGIC sets the oscilloscope to trigger when the specified logical combinations of channels 1, 2, 3, and 4 are met on four-channel oscilloscopes. On two-channel oscilloscopes, only channel 1 and channel 2 are available.

When the TRIGger:A:LOGIc:INPut:CLOCk:SOUrce is set to one of the channels, LOGIC sets the oscilloscope to trigger when the specified logical combinations of the remaining channels is true during a transition on the clock channel.

SETHold sets the oscilloscope to trigger on setup and hold violations between a data source and a clock source. You can use one channel input as the clock signal and any one or more other channel inputs as the data inputs. The clocking and data levels are used to determine if a clock or data transition has occurred.

Examples

TRIGGER:A:LOGIC:CLASS? might return :TRIGGER:A:LOGIC:CLASS LOGIC

TRIGGER:A:LOGIC:CLASS LOGIC sets the trigger A logic class to LOGIc, which causes the oscilloscope to trigger when the specified logical combinations of channels 1, 2, 3, and 4 are met.

TRIGger:A:LOGIc:FUNCtion

Sets or returns the logical combination of the input channels for the A pattern and A state logic triggers.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:FUNCtion {AND|NANd|NOR|OR}
TRIGger:A:LOGIc:FUNCtion?
```

Related Commands

TRIGger:A:LOGIc:INPut:CH<x>

Arguments

AND specifies to trigger if all conditions are true.

NANd specifies to trigger if any of the conditions is false.

NOR specifies to trigger if all conditions are false.

OR specifies to trigger if any of the conditions is true.

Examples

TRIGGER:A:LOGIC:FUNCTION? might return :TRIGGER:A:LOGIC:FUNCTION NAND which indicates that the oscilloscope will trigger if the AND logic conditions are false.

`TRIGGER:A:LOGIC:FUNCTION AND` sets the logical combination of channels to be true when all conditions are true.

TRIGger:A:LOGIc:INPut? (Query Only)

Returns the logic input values for all channels. If a clock channel is defined, it returns the clock source and edge.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:INPut?
```

Examples

`TRIGGER:A:LOGIC:INPUT?` might return `:TRIGGER:A:LOGIC:INPUT:CH1 HIGH;CH2 X;CH3 X` indicating that a logic high is expected on channel 1 while channel 2 and channel three are “don't care.”

TRIGger:A:LOGIc:INPut:CH<x>

Sets or returns the logical input condition for the channel specified by <x>.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CH<x> {HIGH|LOW|X}
TRIGger:A:LOGIc:INPut:CH<x>?
```

Arguments

`HIGH` specifies the logic high.

`LOW` specifies the logic low.

`X` specifies a "don't care" state.

Examples

`TRIGGER:A:LOGIC:INPUT:CH1?` might return `:TRIGGER:LOGIC:INPUT:CH1 X` indicating that the setting for the A logic trigger input to channel 1 does not matter.

`TRIGGER:A:LOGIC:INPUT:CH2 HIGH` sets the A logic trigger input to logic HIGH for channel 2.

TRIGger:A:LOGIc:INPut:CLOCk:EDGE

Sets the polarity of the clock channel.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CLOCk:EDGE {FALL|RISe}
TRIGger:A:LOGIc:INPut:CLOCk:EDGE?
```

Arguments

`RISe` specifies to trigger on the rising or positive edge of a signal.

`FALL` specifies to trigger on the falling or negative edge of a signal.

TRIGger:A:LOGIc:INPut:CLOCk:SOUrce

Sets or returns the channel to use as the clock source. The clock can be selected as `NONE`. A selection of `None` implies pattern trigger. Any other selection implies state trigger.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D
TRIGger:A:LOGIc:INPut:CLOCk:SOUrce?
```

Arguments

`CH1–CH4` specifies the analog input channel source.

`D0–D15` specifies the digital input channel source.

`NONE` specifies a Pattern trigger.

TRIGger:A:LOGIc:INPut:D<x>

Sets or returns the logic pattern for a trigger on digital channel <x>, where x is the channel number.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:INPut:D<x> {HIGH|LOW|X}
TRIGger:A:LOGIc:INPut:D<x>?
```

Arguments `High` specifies the logic high state.

`Low` specifies the logic low state.

`X` specifies a "don't care" state.

TRIGger:A:LOGIc:PATtern? (Query Only)

Returns the conditions used for generating an A logic pattern trigger, with respect to the defined input pattern, and identifies the time that the selected pattern may be true and still generate the trigger.

Group Trigger

Syntax `TRIGger:A:LOGIc:PATtern?`

Examples `TRIGGER:A:LOGIC:PATTERN?` might return `:TRIGGER:A:LOGIC:PATTERN:INPUT:CH1 HIGH;CH2 LOW;CH3 X;CH4 X;:TRIGGER:A:LOGIC:PATTERN:WHEN LESSTHAN;WHEN:LESSLIMIT 16.0000E-9;LIMIT 16.0000E-9;:TRIGGER:A:LOGIC:PATTERN:DELTATIME 16.0000E-9`

TRIGger:A:LOGIc:PATtern:DELTatime

Sets or returns the pattern trigger delta time value. The time value is used as part of the pattern trigger condition to determine if the duration of a logic pattern meets the specified time constraints.

Group Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:DELTatime <NR3>
TRIGger:A:LOGIc:PATtern:DELTatime?
```

Arguments `<NR3>` is a floating point value with exponent that sets the pattern trigger time value. This argument has a range of 39.6E–9 (39.6 ns) to 10.0E0 (10 s), in increments of 13.2 ns. Values that are not an increment of 13.2 ns are rounded to the nearest correct value.

Examples `TRIGGER:A:LOGIC:PATTERN:DELTATIME 71.28E-8` sets the pattern trigger delta time value to 712.8 ns.

TRIGger:A:LOGIc:PATtern:INPut:D<x>

Sets or returns the A logic trigger input for the specified digital channel <x>, where x is the channel number. This command species the logic value used when the pattern trigger detects the threshold level.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:INPut:D<x> {HIGH|LOW|X}
TRIGger:A:LOGIc:PATtern:INPut:D<x>?
```

Arguments

`HIGH` specifies a logic high.

`LOW` specifies a logic low.

`X` specifies a “do not care” state.

TRIGger:A:LOGIc:PATtern:WHEn

Sets or returns the pattern logic condition on which to trigger the oscilloscope.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:WHEn
{TRUe|FALSe|LESSthan|MOREthan|EQual|UNEQual}
TRIGger:A:LOGIc:PATtern:WHEn?
```

Arguments

`TRUE` triggers the oscilloscope when the pattern becomes true.

`FALSE` triggers the oscilloscope when the pattern becomes false.

`LESSTHAN` triggers the oscilloscope when the input pattern is true for a time period less than the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`.

`MORETHAN` triggers the oscilloscope when the input pattern is true for a time period more (greater) than the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`.

`EQUAL` triggers the oscilloscope when the input pattern is true for a time period equal to the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`, within a ±5% tolerance.

`UNEQUAL` triggers the oscilloscope when the input pattern is true for a time period greater than or less than (not equal to) the time period specified in `TRIGGER:A:LOGIC:PATTERN:DELTATIME`, within a ±5% tolerance.

Examples

`TRIGGER:A:LOGIC:PATTERN:WHEN LESSTHAN` sets the oscilloscope to trigger when the pattern is true for a time period less than the pattern trigger delta time setting.

TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit

Sets or returns the maximum time that the selected pattern may be true and still generate an A logic pattern trigger.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit <NR3>
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit?
```

Arguments

`<NR3>` specifies the maximum amount of time to hold the pattern true.

Examples

`TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT 10.0E+00` sets the maximum time that the selected pattern may hold true (and generate an A logic pattern trigger) to 10 s.

`TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT?` might return `TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT 8.0000E-9` indicating that the selected pattern may hold true for up to 8 ns and still generate an A logic pattern trigger.

TRIGger:A:LOGIc:PATtern:WHEn:MORELimit

Sets or returns the minimum time that the selected pattern may be true and still generate an A logic pattern trigger.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit <NR3>
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit?
```

Arguments

`<NR3>` specifies the minimum amount of time to hold the pattern true.

Examples

`TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT 10.0E+00` sets the minimum time that the selected pattern may hold true (and generate an A logic pattern trigger) to 10 s.

`TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT?` might return `TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT 8.0000E-9` indicating that the selected pattern must hold true for at least 8 ns to generate an A logic pattern trigger.

TRIGger:A:LOGIc:THReshold:CH<x>

This command sets or queries the trigger A logic threshold voltage for the specified channel x.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:THReshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:LOGIc:THReshold:CH<x>?
```

Arguments

`<NR3>` specifies the threshold voltage, in volts.

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

Examples

`TRIGGER:A:LOGIC:THRESHOLD:CH2 3.0E-3` sets the A logic trigger threshold voltage for Channel 2 to 3 mV.

`TRIGGER:A:LOGIC:THRESHOLD:CH3?` might return `:TRIGGER:A:LOGIC:THRESHOLD:CH3 1.2000E+00`, indicating that the A logic trigger threshold voltage for Channel 3 is 1.2 V.

TRIGger:A:LOGIc:THReshold:D<x>

Sets or returns the trigger A logic threshold level for the specified digital channel <x>. This commands affects all trigger types using the digital channel.

Group

Trigger

Syntax

```
TRIGger:A:LOGIc:THReshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LOGIc:THReshold:D<x>?
```

Related Commands

TRIGger:A:LEVel:D<x>

Arguments

<NR3> specifies the threshold level in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

TRIGger:A:LOWerthreshold:CH<x>

Sets or returns the lower threshold for the channel selected. Each channel can have an independent level. Used in Runt and Rise/fall time triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold:CH<x> {ECL|TTL|<NR3>}
TRIGger:A:LOWerthreshold:CH<x>?
```

Related Commands

TRIGger:A:LEVel:CH<x>

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> is the clock level, in volts.

Examples

TRIGGER:A:LOWERTHRESHOLD:CH2 50E-3 sets the lower limit threshold for CH2 of the pulse runt trigger to 50 mV.

TRIGGER:A:LOWERTHRESHOLD:CH2? might return :TRIGGER:A:LOWERTHRESHOLD:CH2 1.2000E-01 indicating that the lower limit threshold for CH2 of the pulse runt trigger is set to 120 mV.

TRIGger:A:LOWerthreshold:D<x>

Sets the A trigger lower threshold for the digital channel selected. Each channel can have an independent level. Used in Runt and Rise/fall time triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:LOWerthreshold:D<x>?
```

Arguments

<NR3> specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:LOWERTHRESHOLD:D1 0.5 sets the lower threshold to 0.5 volts.

TRIGGER:A:LOWERTHRESHOLD:D1? might return TRIGGER:A:LOWERTHRESHOLD:D1 -1.3000 indicating the lower threshold is set to -1.3 volts.

TRIGger:A:LOWerthreshold{:EXT|:AUX}

Sets or returns the lower threshold for the Auxiliary Input. Used for the following trigger types: Runt, .

Group

Trigger

Syntax

```
TRIGger:A:LOWerthreshold{:EXT|:AUX} {<NR3>|ECL|TTL}
TRIGger:A:LOWerthreshold{:EXT|:AUX}?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> specifies the threshold level in volts.

TRIGger:A:MODe

Sets or returns the A trigger mode.

Group

Trigger

Syntax

```
TRIGger:A:MODe {AUTO|NORMal}
TRIGger:A:MODe?
```

Related Commands

TRIGger:A:LEVel

Arguments

AUTO generates a trigger if one is not detected within a specified time period.

NORMal waits for a valid trigger event.

Examples

`TRIGGER:A:MODE NORMAL` specifies that a valid trigger event must occur before a trigger is generated.

`TRIGGER:A:MODE ?` might return `:TRIGGER:A:MODE NORMAL` indicating that a valid trigger event must occur before a trigger is generated.

TRIGger:A:PULse? (Query Only)

Returns the A pulse trigger parameters.

Group

Trigger

Syntax

```
TRIGger:A:PULse?
```

Related Commands

TRIGger:A:EDGE?, TRIGger:A:LOGIc?

Examples

`TRIGGER:A:PULSE?` might return `:TRIGGER:A:PULSE:CLASS TRANSITION`

TRIGger:A:PULse:CLAss

This command sets the type of pulse on which to trigger (runt, width, transition or timeout). This command is used in conjunction with the TRIGger:A:TYPe command.

Group

Trigger

Syntax

```
TRIGger:A:PULse:CLAss {RUNt|WIDth|TRANsition|TIMEOut}
TRIGger:A:PULse:CLAss?
```

Related Commands

TRIGger:A:RUNT?, TRIGger:A:PULSEWIDth?, TRIGger:A{:TRANsition|:RISEFall}?, TRIGger:A:TYPe

Arguments

`RUNt` triggers when a pulse crosses the first preset voltage threshold but does not cross the second preset threshold before recrossing the first.

`WIDth` triggers on pulses that are less than, greater than, equal to, or not equal to a specified time. Additionally, you can trigger when a pulse width is within or outside a range of two different specified times. You can also trigger on positive or negative pulses. Pulse width triggers are primarily used on digital signals for pulses with a specified polarity.

`TRANsition` triggers when a pulse crosses both thresholds in the same direction as the specified polarity and the transition time between the two threshold crossings is greater or less than the specified time delta.

`TIMEout` triggers when no pulse is detected in a specified time.

Examples

`TRIGGER:A:PULSE:CLASS WIDTH` specifies a width pulse for the A trigger.

`TRIGGER:A:PULSE:CLASS?` might return `:TRIGGER:A:PULSE:CLASS WIDTH` indicating that the trigger is set to activate on a pulse of a specified polarity and width.

TRIGger:A:PULSEWIDth? (Query Only)

Returns the width parameters for the pulse width trigger.

Group

Trigger

Syntax

```
TRIGger:A:PULSEWIDth?
```

Examples

`TRIGGER:A:PULSEWIDTH?` might return `:TRIGGER:A:PULSEWIDTH:POLARITY POSITIVE;WHEN LESSTHAN;WIDTH 8.0000E-9`

TRIGger:A:PULSEWidth:HIGHLimit

This command specifies the upper limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:LOWLimit to specify the lower value of the range.)

Group

Trigger

Syntax

```
TRIGger:A:PULSEWidth:HIGHLimit <NR3>
TRIGger:A:PULSEWidth:HIGHLimit?
```

Related Commands

TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:LOWLimit

Arguments

`<NR3>` is a floating point number that represents the higher value of the range.

Examples To trigger on pulses with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
```

```
TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
```

```
TRIGger:A:PULSEWidth:WHEn OUTside
```

TRIGger:A:PULSEWidth:LOWLimit

This command specifies the lower limit to use, in seconds, when triggering on detection of a pulse whose duration is inside or outside a range of two values. (Use TRIGger:A:PULSEWidth:HIGHLimit to specify the upper limit of the range.)

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:LOWLimit <NR3>
TRIGger:A:PULSEWidth:LOWLimit?
```

Related Commands TRIGger:A:PULSEWidth:WHEn, TRIGger:A:PULSEWidth:HIGHLimit

Arguments `<NR3>` is a floating point number that represents the lower value of the range.

Examples To trigger on pulses with durations (widths) that fall outside of the range of 100 nanoseconds to 110 nanoseconds:

```
TRIGger:A:PULSEWidth:LOWLimit 100.0E-9
```

```
TRIGger:A:PULSEWidth:HIGHLimit 110.0E-9
```

```
TRIGger:A:PULSEWidth:WHEn OUTside
```

TRIGger:A:PULSEWidth:POLarity

Sets or returns the polarity for the width trigger.

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:POLarity {NEGative|POSitive}
TRIGger:A:PULSEWidth:POLarity?
```

Arguments

NEGative specifies a negative pulse.

POSitive specifies a positive pulse.

Examples

TRIGGER:A:PULSEWIDTH:POLARITY NEGATIVE sets the pulse polarity to negative.

TRIGGER:A:PULSEWIDTH:POLARITY? might return :TRIGGER:A:WIDTH:POLARITY POSITIVE indicating a positive pulse.

TRIGger:A:PULSEWidth:SOUrce

Sets or returns the source for the pulse-width trigger.

Group

Trigger

Syntax

```
TRIGger:A:PULSEWidth:SOUrce {CH1|CH2|CH3|CH4|LINE|EXT}
TRIGger:A:PULSEWidth:SOUrce?
```

Arguments

CH1–CH4 specifies an analog input channel as the A edge trigger source.

EXT specifies an external trigger using the Aux In connector located on the front panel of the oscilloscope.

LINE specifies AC line voltage.

Examples

TRIGGER:A:PULSEWIDTH:SOURCE CH1 sets channel 1 as the pulse width source.

TRIGGER:A:PULSEWIDTH:SOURCE? might return :TRIGGER:A:PULSEWIDTH:SOURCE CH1 indicating that channel 1 is the pulse width source.

TRIGger:A:PULSEWidth:WHEn

This command specifies to trigger when a pulse is detected with a width (duration) that is less than, greater than, equal to, or unequal to a specified value (set using TRIGger:A:PULSEWidth:WIDth), OR whose width falls outside of or within a specified range of two values (set using TRIGger:A:PULSEWidth:LOWLimit and TRIGger:A:PULSEWidth:HIGHLimit).

Group

Trigger

Syntax

```
TRIGger:A:PULSEWidth:WHEn
{LESSthan|MOREthan|EQual|NOTEQual|WIThin|OUTside}
```

```
TRIGger:A:PULSEWidth:WHEn?
```

Related Commands TRIGger:A:PULSEWidth:WIDth

Arguments LESSthan argument sets the oscilloscope to trigger if a pulse is detected with width less than the time set by the TRIGger:A:PULSEWidth:WIDth command.

than argument sets the oscilloscope to trigger if a pulse is detected with width than the time set by the TRIGger:A:PULSEWidth:WIDth command.

EQual argument sets the oscilloscope to trigger if a pulse is detected with width equal to the time period specified in TRIGger:A:PULSEWidth:WIDth within a ±5% tolerance.

NOTEQual argument sets the oscilloscope to trigger if a pulse is detected with width greater than or less than (but not equal) the time period specified in TRIGger:A:PULSEWidth:WIDth within a ±5% tolerance.

WIThin causes a trigger when a pulse is detected that is within a range set by two values.

OUTside causes a trigger when a pulse is detected that is outside of a range set by two values.

Examples TRIGGER:A:PULSEWIDTH:WHEN LESSTHAN specifies that the duration of the A pulse will fall within defined high and low limits.

TRIGGER:A:PULSEWIDTH:WHEN? might return :TRIGGER:A:PULSEWIDTH:WHEN THAN indicating the conditions for generating a width trigger.

TRIGger:A:PULSEWidth:WIDth

Sets or returns the width setting for the pulse width trigger.

Group Trigger

Syntax

```
TRIGger:A:PULSEWidth:WIDth <NR3>
TRIGger:A:PULSEWidth:WIDth?
```

Related Commands TRIGger:A:PULSEWidth:WHEn

Arguments <NR3> specifies the pulse width in seconds.

Examples `TRIGGER:A:PULSEWIDTH:WIDTH 5.0E-6` sets the pulse width to 5 µs.

`TRIGGER:A:PULSEWIDTH:WIDTH?` might return `:TRIGGER:A:PULSEWIDTH:WIDTH 2.0000E-9` indicating that the pulse width is set to 2 ns.

TRIGger:A:RUNT? (Query Only)

Returns the current A runt trigger parameters.

Group Trigger

Syntax

```
TRIGger:A:RUNT?
```

Examples `TRIGGER:A:RUNT?` might return `:TRIGGER:A:RUNT:SOURCE CH1;POLARITY POSITIVE;WHEN OCCURS;WIDTH 4.0000E-9`.

TRIGger:A:RUNT:POLarity

Sets or returns the polarity for the runt trigger.

Group Trigger

Syntax

```
TRIGger:A:RUNT:POLarity {EITher|NEGative|POSitive}
TRIGger:A:RUNT:POLarity?
```

Arguments `POSitive` indicates that the rising edge crosses the low threshold and the falling edge recrosses the low threshold without either edge ever crossing the high threshold.

`NEGative` indicates that the falling edge crosses the high threshold and the rising edge recrosses the high threshold without either edge ever crossing the low threshold.

`EITher` triggers on a runt of either polarity.

Examples `TRIGGER:A:RUNT:POLARITY NEGATIVE` specifies that the polarity of the A pulse runt trigger is negative.

`TRIGGER:A:RUNT:POLARITY?` might return `:TRIGGER:A:RUNT:POLARITY POSITIVE` indicating that the polarity of the A pulse runt trigger is positive.

TRIGger:A:RUNT:SOUrce

Sets or returns the source for the A runt trigger.

Group

Trigger

Syntax

```
TRIGger:A:RUNT:SOUrce {CH1|CH2|CH3|CH4}
TRIGger:A:RUNT:SOUrce?
```

Arguments

`CH1–CH4` specifies the input channel number, depending on the model of the oscilloscope.

Examples

`TRIGGER:A:RUNT:SOURCE CH4` sets channel 4 as the source for the A pulse trigger.

`TRIGGER:A:RUNT:SOURCE?` might return `:TRIGGER:A:RUNT:SOURCE CH2` indicating that channel 2 is the source for the A pulse trigger.

TRIGger:A:RUNT:WHEn

Sets or returns the type of pulse width the trigger checks for when it detects a runt.

Group

Trigger

Syntax

```
TRIGger:A:RUNT:WHEn {LESSthan|than|EQual|UNEQual|OCCURS}
TRIGger:A:RUNT:WHEn?
```

Related Commands

TRIGger:A:RUNT:WIDth

Arguments

`OCCURS` argument specifies a trigger event if a runt of any detectable width occurs.

`LESSthan` argument sets the oscilloscope to trigger if the a runt pulse is detected with width less than the time set by the TRIGger:A:RUNT:WIDth command.

`than` argument sets the oscilloscope to trigger if the a runt pulse is detected with width than the time set by the TRIGger:A:RUNT:WIDth command.

`EQual` argument sets the oscilloscope to trigger if a runt pulse is detected with width equal to the time period specified in TRIGger:A:RUNT:WIDth within a ±5% tolerance.

NOTEQual argument sets the oscilloscope to trigger if a runt pulse is detected with width greater than or less than (but not equal to) the time period specified in TRIGger:A:RUNT:WIDth within a ±5% tolerance.

Examples TRIGGER:A:RUNT:WHEN THAN sets the runt trigger to occur when the oscilloscope detects a runt in a pulse wider than the specified width.

TRIGGER:A:RUNT:WHEN? might return :TRIGGER:A:PULSE:RUNT:WHEN OCCURS indicating that a runt trigger will occur if the oscilloscope detects a runt of any detectable width.

TRIGger:A:RUNT:WIDth

Sets or returns the width for a runt trigger.

Group Trigger

Syntax

```
TRIGger:A:RUNT:WIDth <NR3>
TRIGger:A:RUNT:WIDth?
```

Related Commands TRIGger:A:RUNT:WHEn

Arguments <NR3> specifies the minimum width, in seconds.

Examples TRIGGER:A:RUNT:WIDTH 15E-6 sets the minimum width of the pulse runt trigger to 15 µs.

TRIGGER:A:RUNT:WIDTH? might return :TRIGGER:A:PULSE:RUNT:WIDTH 2.0000E-09 indicating that the minimum width of a pulse runt trigger is 2 ns.

TRIGger:A:SETHold? (Query Only)

Returns the clock edge polarity, voltage threshold and source input; data voltage threshold and source; and both setup and hold times for setup and hold violation triggering.

Group Trigger

Syntax

```
TRIGger:A:SETHold?
```

Examples
`TRIGGER:A:SETHOLD?` might return
`:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1;EDGE RISE;THRESHOLD 100.0000E-3;:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD 80.0000E-3;:TRIGGER:A:SETHOLD:HOLDTIME 20.0000E-9;SETTIME 8.0000E-9`

TRIGger:A:SETHold:CLOCk? (Query Only)

Returns the clock edge polarity, voltage threshold, and source input for setup and hold triggering.

Group
Trigger

Syntax
`TRIGger:A:SETHold:CLOCk?`

Examples
`TRIGGER:A:SETHOLD:CLOCK?` might return
`:TRIGGER:A:SETHOLD:CLOCK:SOURCE EXT;EDGE FALL;THRESHOLD 1.4000`

TRIGger:A:SETHold:CLOCk:EDGE

Sets or returns the clock edge polarity for setup and hold triggering.

Group
Trigger

Syntax
```
TRIGger:A:SETHold:CLOCk:EDGE {FALL|RISe}
TRIGger:A:SETHold:CLOCk:EDGE?
```

Arguments
`FALL` specifies polarity as the clock falling edge.

`RISe` specifies polarity as the clock rising edge.

Examples
`TRIGGER:A:SETHOLD:CLOCK:EDGE RISE` specifies the polarity as the clock rising edge.

`TRIGGER:A:SETHOLD:CLOCK:EDGE?` might return `:TRIGGER:A:SETHOLD:CLOCK:EDGE RISE` indicating that polarity is specified as the clock rising edge.

TRIGger:A:SETHold:CLOCk:SOUrce

Sets or returns the clock source for the setup and hold triggering.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:CLOCk:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11|D12|D13|D14|D
TRIGger:A:SETHold:CLOCk:SOUrce?
```

Related Commands

TRIGger:A:SETHold:DATa:SOUrce

Arguments

`CH1–CH4` or `D0–D15` specifies the input channel number. `D0–D15` is only for MSO models.

`AUX` or `EXT` specifies an external trigger using the Aux Input connector located on the front panel of the oscilloscope.

Examples

`TRIGGER:A:SETHOLD:CLOCK:SOURCE CH1` specifies channel 1 as the clock input for setup and hold input.

`TRIGGER:A:SETHOLD:CLOCK:SOURCE?` might return `:TRIGGER:A:SETHOLD:CLOCK:SOURCE CH4` indicating that channel 4 is the clock source for the setup and hold trigger input.

TRIGger:A:SETHold:CLOCk:THReshold

Sets or returns the clock voltage threshold for the setup and hold trigger.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:CLOCk:THReshold {<NR3>|TTL}
TRIGger:A:SETHold:CLOCk:THReshold?
```

Arguments

`TTL` specifies a preset `TTL` high level of 1.4 V.

`<NR3>` is the clock level, in volts.

Examples

`TRIGGER:A:SETHOLD:CLOCK:THRESHOLD TTL` specifies the preset TTL value of 1.4 V as the clock threshold for the setup and hold trigger.

`TRIGGER:A:SETHOLD:CLOCK:THRESHOLD?` might return
`:TRIGGER:A:LOGIC:SETHOLD:CLOCK:THRESHOLD 1.2000E+00`
indicating that the clock threshold for the setup and hold trigger is 1.2 V.

TRIGger:A:SETHold:DATa? (Query Only)

Returns the voltage threshold and data source for the setup and hold trigger.

Group Trigger

Syntax `TRIGger:A:SETHold:DATa?`

Related Commands TRIGger:A:SETHold:CLOCk?

Examples `TRIGGER:A:SETHOLD:DATA?` might return
`:TRIGGER:A:SETHOLD:DATA:SOURCE CH2;THRESHOLD 80.0000E-3`

TRIGger:A:SETHold:DATa:SOUrce

Sets or returns the data source for the setup and hold trigger. You cannot specify the same source for both clock and data.

For DPO models, you can specify only a single data source. Data sources for DPO models may be one of CH1-CH4 or the Auxin port (EXT or AUX).

For MSO models, you can specify any combination of CH1-CH4 and D0-D15 as the data sources.

Group Trigger

Syntax DPO Models:

```
TRIGger:A:SETHold:DATa:SOUrce
```

MSO Models:

```
TRIGger:A:SETHold:DATa:SOUrce <wfm>[,<wfm>] [,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>] [,<wfm>]
[,<wfm>] [,<wfm>] [,<wfm>]
TRIGger:A:SETHold:DATa:SOUrce?
```

Related Commands TRIGger:A:SETHold:CLOCk:SOUrce

Arguments

DPO Models:
`<wfm>` specifies the source channel number and is one of CH1-CH4, EXT or AUX. You can specify only one waveform on a DPO.

MSO Models:
`<wfm>` specifies the source channel numbers. Each <wfm> can be one of CH1-CH4 or D0-D15. Auxin (EXT or AUX) is not valid as a data source.

Examples

`TRIGGER:A:SETHOLD:DATA:SOURCE CH1` sets channel 1 as the clock source for the setup and hold trigger.

`TRIGGER:A:SETHOLD:DATA:SOURCE?` might return `:TRIGGER:A:LOGIC:SETHOLD:DATA:SOURCE CH2` indicating that channel 2 is the current clock source for the setup and hold trigger.

TRIGger:A:SETHold:DATa:THReshold

Sets or returns the data voltage threshold for setup and hold trigger.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:DATa:THReshold {<NR3>|TTL}
TRIGger:A:SETHold:DATa:THReshold?
```

Arguments

`TTL` specifies the preset TTL high level of 1.4 V.

`<NR3>` is the setup and hold data level, in V.

Examples

`TRIGGER:A:SETHOLD:DATA:THRESHOLD TTL` specifies the preset high level of 1.4 V as the current data voltage level for the setup and hold trigger.

`TRIGGER:A:SETHOLD:DATA:THRESHOLD?` might return `:TRIGGER:A:SETHOLD:DATA:THRESHOLD 1.2000E+00` indicating that 1.2 V is the current data voltage level for the setup and hold trigger.

TRIGger:A:SETHold:HOLDTime

Sets or returns the hold time for setup and hold violation triggering.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:HOLDTime <NR3>
TRIGger:A:SETHold:HOLDTime?
```

Arguments

`<NR3>` specifies the hold time setting in seconds. Positive values for hold time occur after the clock edge. Negative values occur before the clock edge.

Examples

`TRIGGER:A:SETHOLD:HOLDTIME 3.0E-3` sets the hold time for the setup and hold trigger to 3 ms.

`TRIGGER:A:SETHOLD:HOLDTIME?` might return `:TRIGGER:A:SETHOLD:HOLDTIME 2.0000E-09` indicating that the current hold time for the setup and hold trigger is 2 ns.

TRIGger:A:SETHold:SETTime

Sets or returns the setup time for setup and hold violation triggering.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:SETTime <NR3>
TRIGger:A:SETHold:SETTime?
```

Arguments

`<NR3>` specifies the setup time for setup and hold violation triggering.

Examples

`TRIGGER:A:SETHOLD:SETTIME 3.0E-6` specifies that the current setup time for setup and hold trigger is 3 µs.

`TRIGGER:A:SETHOLD:SETTIME?` might return `:TRIGGER:A:LOGIC:SETHOLD:SETTIME 2.0000E-09` indicating that the current setup time for setup and hold trigger is 2 ns.

TRIGger:A:SETHold:THReshold:CH<x>

Sets or queries the threshold for the channel specified by x. Affects all trigger types using the channel.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:THReshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:SETHold:THReshold:CH<x>?
```

Arguments

<NR3> specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:SETHOLD:THRESHOLD:CH1 1.5 sets the channel 1 threshold to 1.5 volts.

TRIGGER:A:SETHOLD:THRESHOLD:CH1? might return TRIGGER:A:SETHOLD:THRESHOLD:CH1 0.0E+0 indicating the channel 1 threshold is set to 0.0 volts.

TRIGger:A:SETHold:THReshold:D<x>

Sets the A trigger setup and hold threshold for the selected digital channel. Affects all trigger types using the digital channel.

Group

Trigger

Syntax

```
TRIGger:A:SETHold:THReshold:D<x> {<NR3>|ECL|TTL}
TRIGger:A:SETHold:THReshold:D<x>?
```

Arguments

<NR3> specifies the threshold voltage, in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:SETHOLD:THRESHOLD:D1 ECL sets the threshold to ECL levels.

TRIGGER:A:SETHOLD:THRESHOLD:D1? might return TRIGGER:A:SETHOLD:THRESHOLD:D1 -1.3000 indicating the threshold is set to -1.3 volts.

TRIGger:A{:TRANsition|:RISEFall}? (Query Only)

Returns transition time trigger parameters.

Group

Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}?
```

Related Commands TRIGger:A:UPPerthreshold:CH<x> , TRIGger:A:LOWerthreshold:CH<x>

Examples `TRIGGER:A::TRANSITION?` might return
`:TRIGGER:A:TRANSITION:POLARITY POSITIVE;WHEN SLOWER;DELTATIME 8.0000E-9`

TRIGger:A{:TRANsition|:RISEFall}:DELTatime

Sets or returns the delta time used in calculating the transition value for the transition trigger.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:DELTatime <NR3>
TRIGger:A{:TRANsition|:RISEFall}:DELTatime?
```

Arguments `<NR3>` specifies the delta time, in seconds.

Examples `TRIGGER:A:TRANSITION:DELTATIME 15E-6` sets the delta time of the transition trigger to 15 µs.

`TRIGGER:A:TRANSITION:DELTATIME?` might return `:TRIGGER:A :TRANSITION:DELTATIME 2.0000E-09` indicating that the delta time of the transition trigger is set to 2 ns.

TRIGger:A{:TRANsition|:RISEFall}:POLarity

Sets or returns the polarity for the transition trigger.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:POLarity
{EITher|NEGative|POSitive}
TRIGger:A{:TRANsition|:RISEFall}:POLarity?
```

Arguments `POSitive` indicates that a pulse edge must traverse from the lower (most negative) to higher (most positive) level for transition triggering to occur.

`NEGative` indicates that a pulse edge must traverse from the upper (most positive) to lower (most negative) level for transition triggering to occur.

`EITher` indicates either positive or negative polarity.

Examples `TRIGGER:A:TRANSITION:POLARITY NEGATIVE` sets the transition polarity to negative.

`TRIGGER:A:TRANSITION:POLARITY?` might return `:TRIGGER:A:TRANSITION:POLARITY EITHER` indicating that the polarity can be either positive or negative.

TRIGger:A{:TRANsition|:RISEFall}:SOUrce

Sets or returns the source for transition trigger.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:SOUrce {CH1|CH2|CH3|CH4}
TRIGger:A{:TRANsition|:RISEFall}:SOUrce?
```

Arguments `CH1–CH4` specifies one of the input channels.

Examples `TRIGGER:A:TRANSITION:SOURCE CH4` sets channel 4 as the source for the transition trigger.

`TRIGGER:A:TRANSITION:SOURCE?` might return `:TRIGGER:A:TRANSITION:SOURCE CH2` indicating that channel 2 is the source for the A transition trigger.

TRIGger:A{:TRANsition|:RISEFall}:WHEn

Sets or returns whether to check for a transitioning signal that is faster or slower than the specified delta time.

Group Trigger

Syntax

```
TRIGger:A{:TRANsition|:RISEFall}:WHEn:
{SLOWer|FASTer|EQual|UNEQual}
TRIGger:A{:TRANsition|:RISEFall}:WHEn?
```

Arguments `FASTer` sets the trigger to occur when the signal transition time is faster than the time set by `TRIGger:A{:TRANsition|:RISEFall}:DELTatime`.

SLOWer sets the trigger to occur when the signal transition time is slower than the time set by.TRIGger:A{:TRANsition|:RISEFall}:DELTatime.

EQual sets the trigger to occur when the signal transition time is equal to the time set by TRIGger:A{:TRANsition|:RISEFall}:DELTatime.

UNEQual sets the trigger to occur when the signal transition time is not equal to the time set by TRIGger:A{:TRANsition|:RISEFall}:DELTatime.

Examples

TRIGGER:A:TRANSITION:WHEN SLOWER sets the trigger to occur when the signal transition time is slower than the time set by the TRIGger:A{:TRANsition|:RISEFall}:DELTatime command.

TRIGGER:A:TRANSITION:WHEN? might return :TRIGGER:A:TRANSITION:WHEN FASTER

TRIGger:A:TYPe

This command sets the type of A trigger (edge, logic, pulse, bus or video). If you set the trigger type to LOGIc, you also need to set the logic trigger class (logic or setup/hold) using the command TRIGger:A:LOGIc:CLAss. If you set the trigger type to PULSe, you also need to set the pulse trigger class (runt, width, transition or timeout), using the command TRIGger:A:PULse:CLAss. If you set the trigger type to BUS, you also need to set the bus type (CAN, I2C, SPI, RS-232, MIL-STD-1553, LIN, audio, FlexRay or parallel) using the command TRIGger:A:BUS.

Group

Trigger

Syntax

```
TRIGger:A:TYPe {EDGe|LOGIc|PULSe|BUS|VIDeo}
TRIGger:A:TYPe?
```

Related Commands

TRIGger:A:EDGE?, TRIGger:A:LOGIc:CLAss, TRIGger:A:PULse:CLAss

Arguments

EDGe is the default search. An edge trigger occurs when a signal passes through a specified voltage level in a specified direction and is controlled by the TRIGger:A:EDGE:SOUrce, TRIGger:A:EDGE:COUPling, and TRIGger:A:EDGE:SLOpe commands.

LOGic specifies to use a logic or a setup and hold trigger, and is controlled by the TRIGger:A:LOGIc:CLAss commands.

PULSe specifies to use a runt, width, transition or timeout trigger, and is controlled by the TRIGger:A:PULse:CLAss commands.

BUS specifies to trigger using a bus signal. Supports CAN, I2C, SPI, RS-232, MIL-STD-1553, LIN, audio and FlexRay buses (with the appropriate add-on module installed) as well parallel signals (MSO models only).

VIDeo specifies to trigger on a video signal.

NOTE. *Although it is possible to trigger using a video signal, it is not possible to do a search using a video signal.*

Examples

TRIGGER:A:TYPE EDGE sets the A trigger type to edge.

TRIGGER:A:TYPE? might return :TRIGGER:A:TYPE PULSE indicating that the A trigger type is a pulse trigger.

TRIGger:A:UPPerthreshold:CH<x>

Sets the upper threshold for channel <x>, where x is the channel number. Each channel can have an independent level. Used only for Runt and Rise/fall time trigger types.

Group

Trigger

Syntax

```
TRIGger:A:UPPerthreshold:CH<x> {<NR3>|ECL|TTL}
TRIGger:A:UPPerthreshold:CH<x>?
```

Arguments

<NR3> is the threshold level in volts.

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

Examples

TRIGGER:A:UPPERTHRESHOLD:CH2 50E-3 sets the upper limit of the pulse runt trigger to 50 mV for channel 2.

TRIGGER:A:UPPERTHRESHOLD:CH2? might return :TRIGGER:A:UPPERTHRESHOLD:CH2 1.2000E-01 indicating that the upper limit of the pulse runt trigger is set to 120 mV.

TRIGger:A:VIDeo? (Query Only)

Returns the A trigger video parameters.

Group Trigger

Syntax `TRIGger:A:VIDeo?`

Examples `TRIGGER:A:VIDEO?` might return `:TRIGGER:A:VIDEO:STANDARD BILEVELCUSTOM;SYNC ALLLINES;LINE 4;HOLDOFF:FIELD 0.0E+0;:TRIGGER:A:VIDEO:POLARITY POSITIVE;CUSTOM:FORMAT PROGRESSIVE;LINEPERIOD 63.5600E-6;SYNCINTERVAL 4.7200E-6`

TRIGger:A:VIDeo:CUSTom:FORMat

This command sets the video trigger format (either interlaced or progressive) to use for triggering on video signals. To use this command, you must also set the video standard to `BILevelcustom` or `TRILevelcustom` (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO3VID application module.

Group Trigger

Syntax
```
TRIGger:A:VIDeo:CUSTom:FORMat {INTERLAced|PROGressive}
TRIGger:A:VIDeo:CUSTom:FORMat?
```

Arguments `INTERLAced` argument sets the format to interlaced video lines.

`PROGressive` argument sets the format to progressive video lines.

Examples `TRIGGER:A:VIDEO:CUSTOM:FORMAT PROGRESSIVE` sets the custom format for the A video trigger to progressive lines.

`TRIGGER:A:VIDEO:CUSTOM:FORMAT?` might return `:TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED` indicating that interlaced is selected as the custom format for the A video trigger.

TRIGger:A:VIDeo:CUSTom:LINEPeriod

This command sets the line period for the standard under test. To use this command, you must also set the video standard to `BILevelcustom` or `TRILevelcustom` (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO3VID application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:CUSTom:LINEPeriod <NR3>
TRIGger:A:VIDeo:CUSTom:LINEPeriod?
```

Arguments `<NR3>` is the custom video line period.

Examples `TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD 50.5E-6` sets the video line period to 50.5 μs.

`TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD?` might return `TRIGGER:A:VIDEO:CUSTOM:LINEPERIOD 63.5600E-6` indicating the video line period is set to 63.56 μs.

TRIGger:A:VIDeo:CUSTom:SYNCInterval

This command sets the sync interval for the standard under test to use for triggering on video signals. This is only required for BiLevel Custom. To use this command, you must also set the video standard to `BILevelcustom` (using TRIGger:A:VIDeo:STANdard).

Conditions This command requires a DPO3VID application module.

Group Trigger

Syntax

```
TRIGger:A:VIDeo:CUSTom:SYNCInterval <NR3>
TRIGger:A:VIDeo:CUSTom:SYNCInterval?
```

Arguments `<NR3>` is the sync interval.

Examples `TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL 4.0E-6` sets the sync interval is set to 4.0 μs.

`TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL?` might return `TRIGGER:A:VIDEO:CUSTOM:SYNCINTERVAL 4.7200E-6` indicating the sync interval is set to 4.72 μs.

TRIGger:A:VIDeo:HOLDoff:FIELD

This command sets the video trigger holdoff, in terms of video fields, to use for triggering on video signals.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:HOLDoff:FIELD <NR3>
TRIGger:A:VIDeo:HOLDoff:FIELD?
```

Arguments

`<NR3>` argument is a real number from 0.0 to 8.5 in increments of 0.5. The argument sets the number of fields that the oscilloscope waits before rearming the video trigger.

Examples

`TRIGGER:A:VIDEO:HOLDOFF:FIELD?` might return `:TRIGger:A:VIDeo:HOLdoff:FIELD 5` indicating that the oscilloscope is set to wait 5 video fields before rearming the trigger.

`TRIGGER:A:VIDEO:HOLDOFF:FIELD 4.5` sets the oscilloscope to wait 4.5 video fields before rearming the trigger.

TRIGger:A:VIDeo:LINE

This command sets the video line number to use for triggering on video signals. Use the TRIGger:A:VIDeo{:SYNC|:FIELD} command to actually trigger the oscilloscope on the line that you specify with this command.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:LINE <NR1>
TRIGger:A:VIDeo:LINE?
```

Related Commands

TRIGger:A:VIDeo{:SYNC|:FIELD}

Arguments

`<NR1>` argument is an integer that sets the video line number on which the oscilloscope triggers. The following table lists the valid choices, depending on the active video standard.

Table 2-47: Video Line Numbering Ranges

Video Standard	Line Number Range
525/NTSC	1–525
625/PAL, SECAM	1–625
SECAM	1–625

Examples

`TRIGGER:A:VIDEO:LINE 23` sets the oscilloscope to trigger on the line 23.

`TRIGGER:A:VIDEO:LINE ?` might return `:TRIGger:A:VIDeo:LINE 10` indicating that the oscilloscope is set to trigger on line 10.

TRIGger:A:VIDeo:POLarity

This command sets the polarity to use for triggering on video signals.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:POLarity {NEGative|POSitive}
TRIGger:A:VIDeo:POLarity?
```

Arguments

`POSitive` argument sets the oscilloscope to trigger on a positive video sync pulse.

`NEGative` argument sets the oscilloscope to trigger on a negative video sync pulse.

Examples

`TRIGGER:A:VIDEO:POLARITY NEGATIVE` sets the oscilloscope to trigger on a negative video pulse.

`TRIGGER:A:VIDEO:POLARITY?` might return `:TRIGger:A:VIDeo:POLARITY POSITIVE` indicating that the oscilloscope is set to trigger on a positive video sync pulse.

TRIGger:A:VIDeo:SOUrce

This command sets the source channel to use for triggering on video signals.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:SOUrce
{CH1|CH2|CH3|CH4|D0|D1|D2|D3|D4|D5|D6|D7|D8|D9|D10|D11
|D12|D13|D14|D15}
TRIGger:A:VIDeo:SOUrce?
```

Arguments

`CH1–CH4` or `D0–D15` specifies the input channel to use as the A video trigger.

Examples

`TRIGGER:A:VIDEO:SOURCE CH1` sets the source for A video trigger to Channel 1.

`TRIGGER:A:VIDEO:SOURCE?` might return `:TRIGger:A:VIDeo:SOURCE CH2` indicating that the source for the A video trigger is set to Channel 2.

TRIGger:A:VIDeo:STANdard

This command sets the standard to use for triggering on video signals.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo:STANdard {NTSc|PAL|SECAM|BILevelcustom|
TRILevelcustom|HD480P60|HD576P50|HD720P30|HD720P50
|HD720P60|HD875I60|HD1080P24|HD1080SF24|HD1080I50
|HD1080I60|HD1080P25|HD1080P30|HD1080P50|HD1080P60}

TRIGger:A:VIDeo:STANdard?
```

Related Commands

TRIGger:A:VIDeo:CUSTom:FORMat, TRIGger:A:VIDeo:CUSTom:LINEPeriod, TRIGger:A:VIDeo:CUSTom:SYNCInterval

Arguments

`NTSc` sets the oscilloscope to trigger on video signals that meet the NTSC 525/60/2:1 standard (a line rate of 525 lines per frame and a field rate of 60 Hz).

`PAL` sets the oscilloscope to trigger on video signals that meet the NTSC 625/50/2:1 standard (a line rate of 625 lines per frame and a field rate of 50 Hz).

`SECAM` sets the oscilloscope to trigger on video signals that meet the SECAM standard.

`BILevelcustom` sets the oscilloscope to trigger on video horizontal scan rate parameters defined by the TRIGger:A:VIDeo:CUSTom:FORMat, TRIGger:A:VIDeo:CUSTom:LINEPeriod and TRIGger:A:VIDeo:CUSTom:SYNCInterval commands. Requires installation of a DPO3VID application module.

`TRILevelcustom` sets the oscilloscope to trigger on video horizontal scan rate parameters defined by the TRIGger:A:VIDeo:CUSTom:FORMat, TRIGger:A:VIDeo:CUSTom:LINEPeriod command. Requires installation of a DPO3VID application module.

`HD480P60|HD576P50|HD720P30|HD720P50|HD720P60|HD875I60|HD1080P24|HD10` `|HD1080P50|HD1080P60` set the oscilloscope to trigger on an HDTV video signal that meets standards defined in the following table. Requires installation of a DPO3VID application module.

Table 2-48: Available HDTV formats

HDTV format	Description
480p60	525 lines (480 active), 640 or 704 x 480 pixel, progressive, 60 fps
576p50	EDTV with 625 lines (576 active), 1024 x 576 pixel, progressive, 50 fps
720p30	750 lines (720 active), 1280 x 720 pixel, progressive, 30 fps
720p50	750 lines (720 active), 1280 x 720 pixel, progressive, 50 fps
720p60	750 lines (720 active), 1280 x 720 pixel, progressive, 60 fps
875i60	875 active lines, interlaced, 60 fps
1080i50	1125 Lines (1080 active), 1920 x 1080 pixel, interlaced, 50 fps
1080i60	1125 lines (1080 active), 1920 x 1080 pixel, interlaced, 60 fps
1080p24	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 24 fps
1080sF24	1125 lines (1080 active), 1920 x 1080 pixel, progressive (sF), 24 fps
1080p25	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 25 fps
1080P30	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 30 fps
1080P50	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 50 fps
1080P60	1125 lines (1080 active), 1920 x 1080 pixel, progressive, 60 fps

Examples

`TRIGGER:A:VIDEO:STANDARD NTSC` sets the oscilloscope to trigger on NTSC-standard video signals.

`TRIGGER:A:VIDEO:STANDARD?` might return `:TRIGger:A:VIDeo:STANDARD NTSC` indicating that the oscilloscope is set to trigger on an NTSC format.

TRIGger:A:VIDeo{:SYNC|:FIELD}

This command sets the video field or line to use for triggering on video signals.

Group

Trigger

Syntax

```
TRIGger:A:VIDeo{:SYNC|:FIELD}
{ODD|EVEN|ALLFields|ALLLines|NUMERic}
TRIGger:A:VIDeo{:SYNC|:FIELD}?
```

Arguments

ODD argument sets the oscilloscope to trigger on interlaced video odd fields.

EVEN argument sets the oscilloscope to trigger on interlaced video even fields.

ALLFields argument sets the oscilloscope to trigger on all fields.

ALLLines argument sets the oscilloscope to trigger on all video lines.

NUMERic argument sets the oscilloscope to trigger on the video signal line specified by the TRIGger:A:VIDeo:LINE command.

Examples

TRIGGER:A:VIDEO:FIELD EVEN sets the A video trigger so that it will trigger on even fields.

TRIGGER:A:VIDEO:FIELD? might return :TRIGGER:A:VIDEO:FIELD ALLFIELDS indicating that the A video will trigger on all video fields.

TRIGger:B

Sets the B trigger level to 50% of minimum and maximum. The query form of this command returns the B trigger parameters. This command is similar to selecting B Event (Delayed) Trigger Setup from the Trig menu and then viewing the current setups.

Group

Trigger

Syntax

```
TRIGger:B SETLevel
TRIGger:B?
```

Related Commands

TRIGger:A

Arguments

SETLevel sets the B trigger level to 50% of MIN and MAX.

Examples `TRIGGER:B SETLEVEL` sets the B trigger level to 50% of MIN and MAX.

`TRIGGER:B?` might return the following B trigger parameters: `:TRIGGER:B:STATE 0;TYPE EDGE; LEVEL -220.0000E-3;BY TIME;EDGE:SOURCE CH1;SLOPE RISE;COUPLING DC; :TRIGGER:B:TIME 16.0000E-9;EVENTS:COUNT 2`

TRIGger:B:BY

Selects or returns whether the B trigger occurs after a specified number of events or a specified period of time after the A trigger.

Group Trigger

Syntax

```
TRIGger:B:BY {EVENTS|TIMe}
TRIGger:B:BY?
```

Related Commands TRIGger:B:EVENTS:COUNt, TRIGger:B:TIMe, ,

Arguments `EVENTS` sets the B trigger to take place following a set number of trigger events after the A trigger occurs. The number of events is specified by TRIGger:B:EVENTS:COUNt.

`TIMe` sets the B trigger to occur a set time after the A trigger event. The time period is specified by TRIGger:B:TIMe.

Examples `TRIGGER:B:BY TIME` sets the B trigger to occur at a set time after the A trigger event.

`TRIGGER:B:BY?` might return `:TRIGGER:B:BY EVENTS` indicating that the B trigger takes place following a set number of trigger events after the A trigger occurs.

TRIGger:B:EDGE? (Query Only)

Returns the source, slope, and coupling for B trigger.

Group Trigger

Syntax `TRIGger:B:EDGE?`

Related Commands TRIGger:B:EDGE:COUPling, TRIGger:B:EDGE:SLOpe, TRIGger:B:EDGE:SOUrce

Examples `TRIGGER:B:EDGE?` might return `:TRIGGER:B:EDGE:SOURCE CH1; SLOPE RISE;COUPLING DC`

TRIGger:B:EDGE:COUPling

Sets or returns the type of coupling for the B trigger.

Group Trigger

Syntax

```
TRIGger:B:EDGE:COUPling {DC|HFRej|LFRej|NOISErej}
TRIGger:B:EDGE:COUPling?
```

Related Commands TRIGger:B:EDGE?

Arguments `DC` selects `DC` trigger coupling.

`HFRej` selects high-frequency reject coupling.

`LFRej` selects low-frequency reject coupling.

`NOISErej` selects `DC` low sensitivity.

Examples `TRIGGER:B:EDGE:COUPLING DC` selects DC for the B trigger coupling.

`TRIGGER:B:EDGE:COUPLING?` might return `:TRIGGER:B:EDGE:COUPLING ATRIGGER` for the B trigger coupling.

TRIGger:B:EDGE:SLOpe

Sets or returns the slope for the B trigger.

Group Trigger

Syntax

```
TRIGger:B:EDGE:SLOpe {RISe|FALL}
TRIGger:B:EDGE:SLOpe?
```

Related Commands TRIGger:B:EDGE?

Arguments

`RISe` triggers on the rising or positive edge of a signal.

`FALL` triggers on the falling or negative edge of a signal.

Examples

`TRIGGER:B:EDGE:SLOPE FALL` sets the B edge trigger to occur on the falling slope.

`TRIGGER:B:EDGE:SLOPE?` might return `:TRIGGER:B:EDGE:SLOPE RISE` indicating that the B edge trigger occurs on the rising slope.

TRIGger:B:EDGE:SOUrce

Sets or returns the source for the B trigger.

Group

Trigger

Syntax

```
TRIGger:B:EDGE:SOUrce {CH<x>|EXT|LINE}
TRIGger:B:EDGE:SOUrce?
```

Related Commands

TRIGger:B:EDGE?

Arguments

`CH<x>` specifies one of the input channels as the B trigger source.

`EXT` specifies an external trigger (using the Aux In connector, located on the front panel of the oscilloscope) as the B trigger source.

`LINE` specifies the power line as the B trigger source.

Examples

`TRIGGER:B:EDGE:SOURCE CH4` sets channel 4 as the input source for the B trigger.

`TRIGGER:B:EDGE:SOURCE?` might return `:TRIGGER:B:EDGE:SOURCE CH1` indicating that the current input source for the B trigger is channel 1.

TRIGger:B:EVENTS? (Query Only)

Returns the current B trigger events parameter.

Group

Trigger

Syntax

```
TRIGger:B:EVENTS?
```

Related Commands TRIGger:B:EVENTS:COUNt

Examples `TRIGGER:B:EVENTS?` might return

`:TRIGGER:B:EVENTS:COUNT 2`

indicating that 2 events must occur before the B trigger occurs.

TRIGger:B:EVENTS:COUNt

Sets or returns the number of events that must occur before the B trigger (when TRIG:DELay:BY is set to EVENTS).

Group Trigger

Syntax

```
TRIGger:B:EVENTS:COUNt <NR1>
TRIGger:B:EVENTS:COUNt?
```

Related Commands TRIGger:B:EVENTS?

Arguments `<NR1>` is the number of B trigger events, which can range from 1 to 5,000,000.

Examples `TRIGGER:B:EVENTS:COUNT 4` specifies that the B trigger will occur four trigger events after the A trigger.

`TRIGGER:B:EVENTS:COUNT?` might return `:TRIGGER:B:EVENTS:COUNT 2` indicating that two events must occur after the A trigger before the B trigger can occur.

TRIGger:B:LEVel

Sets or returns the level for the B trigger.

Group Trigger

Syntax

```
TRIGger:B:LEVel {TTL|<NR3>}
TRIGger:B:LEVel?
```

Related Commands TRIGger:A:LEVel, TRIGger:B, TRIGger:B:EDGE:SOUrce

Arguments

TTL specifies a preset TTL high level of 1.4 V.

<NR3> is the B trigger level, in volts.

Examples

TRIGGER:B:LEVEL TTL sets the B trigger level to 1.4 V.

TRIGGER:B:LEVEL? might return :TRIGGER:B:LEVEL 173.0000E-03 indicating that the B trigger level is currently set at 173 mV.

TRIGger:B:LEVel:CH<x>

Sets or returns the B trigger level for channel <x>, where x is the channel number. Each Channel can have an independent Level.

Group

Trigger

Syntax

```
TRIGger:B:LEVel:CH<x> {ECL|TTL|<NR3>}
TRIGger:B:LEVel:CH<x>?
```

Arguments

ECL specifies a preset ECL high level of –1.3V.

TTL specifies a preset TTL high level of 1.4V.

<NR3> specifies the trigger level in user units (usually volts).

Examples

TRIGGER:B:LEVEL:CH2? might return :TRIGGER:B:LEVEL:CH2 1.3000E+00 indicating that the B edge trigger is set to 1.3 V for channel 2.

TRIGGER:B:LEVEL:CH3 TTL sets the B edge trigger to TTL high level for channel 3.

TRIGger:B:LEVel:D<x>

Sets or returns the B trigger level for digital channel <x>, where x is the channel number. Each channel can have an independent Level.

Group

Trigger

Syntax

```
TRIGger:B:LEVel:D<x> {ECL|TTL|<NR3>}
TRIGger:B:LEVel:D<x>?
```

Arguments

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

`<NR3>` specifies the trigger level in user units (usually volts).

TRIGger:B:LOWerthreshold:CH<x>

Sets or returns the B trigger lower threshold for the channel <x>, where x is the channel number. Each channel can have an independent level. Used in Runt and Rise/fall time triggers as the lower threshold. Used for all other Trigger Types as the single level/threshold.

Group

Trigger

Syntax

```
TRIGger:B:LOWerthreshold:CH<x> {ECL|TTL|<NR3>}
TRIGger:B:LOWerthreshold:CH<x>?
```

Arguments

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

`<NR3>` is the threshold level, in volts.

TRIGger:B:LOWerthreshold:D<x>

Sets or queries the B trigger lower threshold for the digital channel selected. Each channel can have an independent level. Used in Runt and Rise/fall time triggers as the lower threshold. Used for all other trigger types as the single level/threshold.

Group

Trigger

Syntax

```
TRIGger:B:LOWerthreshold:D<x> {<NR3>|ECL|TTL}
TRIGger:B:LOWerthreshold:D<x>?
```

Arguments

`<NR3>` specifies the threshold in volts.

`ECL` specifies a preset ECL high level of –1.3V.

`TTL` specifies a preset TTL high level of 1.4V.

Examples `TRIGGER:B:LOWERTHRESHOLD:D1?` might return `TRIGGER:B:LOWERTHRESHOLD:D1 1.4000` indicating the threshold is set to 1.4 volts.

TRIGger:B:STATE

Sets or returns the state of B trigger activity. If the B trigger state is on, the B trigger is part of the triggering sequence. If the B trigger state is off, then only the A trigger causes the trigger event.

Group Trigger

Syntax

```
TRIGger:B:STATE {ON|OFF|<NR1>}
TRIGger:B:STATE?
```

Related Commands TRIGger:A:MODe

Arguments `ON` specifies that the B trigger is active and in causes trigger events conjunction with the A trigger.

`OFF` specifies that only the A trigger causes trigger events.

`<NR1>` a 0 turns off the B trigger; any other value activates the B trigger.

Examples `TRIGGER:B:STATE ON` sets the B trigger to active, making it capable of causing trigger events.

`TRIGGER:B:STATE?` might return `:TRIGGER:B:STATE 0`indicating that the B trigger is inactive and that only the A trigger causes trigger events.

TRIGger:B:TIMe

Sets or returns B trigger delay time. The B Trigger time applies only if TRIGger:B:BY is set to TIMe.

Group Trigger

Syntax

```
TRIGger:B:TIMe <NR3>
TRIGger:B:TIMe?
```

Related Commands TRIGger:B:BY, TRIGger:B:EVENTS:COUNt

Arguments <NR3> is the B trigger delay time in seconds.

Examples `TRIGGER:B:TIME 4E-6` sets the B trigger delay time to 4 µs.

`TRIGGER:B:TIME?` might return `:TRIGGER:B:TIME 16.0000E-9` indicating that the B trigger time is set to 16 ns.

TRIGger:B:TYPe

Sets or returns the type of B trigger. The only supported B trigger type is EDGE.

Group Trigger

Syntax

```
TRIGger:B:TYPe EDGE
TRIGger:B:TYPe?
```

Related Commands TRIGger:A:TYPe

Arguments `EDGE` sets the B trigger type to edge.

Examples `TRIGGER:B:TYPE EDGE` sets the B trigger type to edge.

`TRIGGER:B:TYPE?` might return `:TRIGGER:B:TYPE EDGE`.

TRIGger:B:UPPerthreshold:CH<x>

Sets the upper threshold for the channel selected. Each channel can have an independent level.

Group Trigger

Syntax

```
TRIGger:B:UPPerthreshold:CH<x> {<NR3>|TTL}
TRIGger:B:UPPerthreshold:CH<x>?
```

Arguments `TTL` specifies a preset `TTL` high level of 1.4 V.

<NR3> is the clock level, in volts.

TRIGger:EXTernal? (Query Only)

Returns all external trigger parameters.

Group Trigger

Syntax `TRIGger:EXTernal?`

TRIGger:EXTernal:PRObe

Sets or returns the attenuation factor value of the external probe connector.

Group Trigger

Syntax

```
TRIGger:EXTernal:PRObe <NR3>
TRIGger:EXTernal:PRObe?
```

Arguments `<NR3>` is the attenuation factor of the probe.

Examples `TRIGGER:EXTERNAL:PROBE?` might return `:TRIGGER:EXTERNAL:PROBE 1.0E1` for a 10X probe.

TRIGger:EXTernal:YUNIts? (Query Only)

Returns the external trigger vertical (Y) units value.

Group Trigger

Syntax `TRIGger:EXTernal:YUNIts?`

Examples `TRIGGER:EXTERNAL:YUNITS?` might return `TRIGGER:EXTERNAL:YUNITS “V”` if the vertical unit is volts.

TRIGger:FREQuency? (Query Only)

Returns the trigger frequency in hertz if available. If the trigger frequency is not currently available, the IEEE Not A Number (NaN = 99.10E+36) value is returned. The maximum precision of the returned frequency is 12 digits.

Group Trigger

Syntax `TRIGger:FREQuency?`

Examples `TRIGGER:FREQUENCY?` might return `TRIGGER:FREQUENCY 99.10+36` indicating that the trigger frequency is not available.

TRIGger:STATE? (Query Only)

Returns the current state of the triggering system.

Group Trigger

Syntax `TRIGger:STATE?`

Related Commands TRIGger:A:MODe

Returns `ARMED` indicates that the oscilloscope is acquiring pretrigger information.

`AUTO` indicates that the oscilloscope is in the automatic mode and acquires data even in the absence of a trigger.

`READY` indicates that all pretrigger information has been acquired and that the oscilloscope is ready to accept a trigger.

`SAVE` indicates that the oscilloscope is in save mode and is not acquiring data.

`TRIGGER` indicates that the oscilloscope triggered and is acquiring the post trigger information.

Examples `TRIGGER:STATE?` might return `:TRIGGER:STATE ARMED` indicating that the pretrigger data is being acquired.

*TST? (Query Only)

Tests (self-test) the interface and returns a 0.

Group Miscellaneous

Syntax `*TST?`

Examples `*TST?` always returns 0.

UNLock (No Query Form)

Unlocks the front panel. The command is equivalent to LOCk NONe.

Group Miscellaneous

Syntax `UNLock ALL`

Related Commands LOCk

Arguments `ALL` specifies that all front-panel buttons and knobs are unlocked.

Examples `UNLOCK ALL` unlocks all front-panel buttons and knobs.

USBTMC? (Query Only)

Returns the USBTMC information used by the USB hosts to determine the instrument interfaces.

Group Miscellaneous

Syntax `USBTMC?`

USBDevice:CONFigure

Enables or disables the rear USB port for use with Pictbridge printers.

Group PictBridge

Syntax

```
USBDevice:CONFigure {DISabled|IMAge|USBTmc}
USBDevice:CONFigure?
```

Arguments `DISabled` disables the rear USB port.

`IMAge` enables the rear USB port as an SIC device.

`USBTmc` enables the rear USB port as a USBTMC device.

Examples `USBDEVICE:CONFIGURE IMAGE` enables the rear USB port as an SIC device

`USBDEVICE:CONFIGURE ?` might return `USBDEVICE:CONFIGURE USBT` indicating a USBTMC device.

USBTMC:PRODUCTID:DECimal? (Query Only)

Returns the product ID of the USBTMC device in decimal format.

Group Miscellaneous

Syntax `USBTMC:PRODUCTID:DECimal?`

Examples `USBTMC:PRODUCTID:DECIMAL?` might return `USBTMC:PRODUCTID:DECIMAL 1025` indicating the product ID is 1025 in decimal format.

USBTMC:PRODUCTID:HEXadecimal? (Query Only)

Returns the product ID of the USBTMC device in hexadecimal format.

Group Miscellaneous

Syntax `USBTMC:PRODUCTID:HEXadecimal?`

Examples `USBTMC:PRODUCTID:HEXADECIMAL?` might return `USBTMC:PRODUCTID:HEXADECIMAL 0x0401` indicating the product ID is 0x0401 in hexadecimal format.

USBTMC:SERIALnumber? (Query Only)

Returns the serial number of the USBTMC device.

Group Miscellaneous

Syntax `USBTMC:SERIALnumber?`

Examples `USBTMC:SERIALNUMBER?` might return `USBTMC:SERIALNUMBER PQ3N060` indicating that the instrument serial number is PQ3N060.

USBTMC:VENDORID:DECimal? (Query Only)

Returns the vendor ID of the USBTMC device in decimal format.

Group Miscellaneous

Syntax `USBTMC:VENDORID:DECimal?`

Examples `USBTMC:VENDORID:DECIMAL?` might return `USBTMC:VENDORID:DECIMAL 1689` indicating that the Vendor ID is 1680 in decimal format.

USBTMC:VENDORID:HEXadecimal? (Query Only)

Returns the vendor ID of the USBTMC device in hexadecimal format.

Group Miscellaneous

Syntax `USBTMC:VENDORID:HEXadecimal?`

Examples `USBTMC:VENDORID:HEXADECIMAL?` might return `USBTMC:VENDORID:HEXADECIMAL 0x0699` indicating that the Vendor ID is 0x0699 in hexadecimal format.

VERBose

Sets or returns the Verbose state that controls the length of keywords on query responses. Keywords can be both headers and arguments.

NOTE. *This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk). This command does affects the verbose state of both the USBTMC and VXI-11 interfaces. Refer to the Introduction for information.*

Group Miscellaneous

Syntax `VERBose {OFF|ON|<NR1>}`

Related Commands HEADer, *LRN?, SET?

Arguments `OFF` sets the Verbose state to false, which returns minimum-length keywords for applicable setting queries.

`ON` sets the Verbose state to true, which returns full-length keywords for applicable setting queries.

`<NR1>` a 0 returns minimum-length keywords for applicable setting queries; any other value returns full-length keywords.

Examples `VERBOSE ON` enables the Verbose state.

`VERBOSE ?` might return `:VERB 0` indicating that the Verbose state is disabled.

*WAI (No Query Form)

Prevents the oscilloscope from executing further commands or queries until all pending commands that generate an OPC message are complete. This command allows you to synchronize the operation of the oscilloscope with your application program.(See page 3-7, *Synchronization Methods*.)

Group Status and Error

Syntax `*WAI`

Related Commands BUSY?, *OPC

Examples `*WAI` prevents the oscilloscope from executing any further commands or queries until all pending commands that generate an OPC message are complete.

WAVFrm? (Query Only)

This query returns the waveform preamble and the waveform data for the source waveform specified by the `DATa:SOUrce` command. This command is equivalent to sending both `WFMOutpre?` and `CURVe?`, with the additional provision that the response to `WAVFrm?` is guaranteed to provide a synchronized preamble and curve. The source waveform, as specified by `DATA:SOURCE,` must be active or the query will not return any data and will generate an error event.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WAVFrm?`

Related Commands CURVe,

DATa:SOUrce,

WFMOutpre?

Examples `WAVFRM?` might return the waveform data as: `:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID “Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode”;NR_PT 20;PT_FMT Y;XUNIT “s”;XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT “V”;YMULT 4.0000E-3;YOFF 0.0000;YZERO 0.0000;:CURVe 2,1,4,2,4,3,0,3,3,3,3,3,3,4,3,5,6,6,7,3`

For binary encodings, `WAVFRM?` might return the waveform data as: `:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR MSB;WFID “Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode”;NR_PT 10000;PT_FMT Y;XUNIT “s”;XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT “V”;YMULT 4.0000E-3;YOFF 0.0000;YZERO 0.0000;:CURVe #510000<10,000 binary data bytes>`

WFMInpre? (Query Only)

Returns the waveform formatting and scaling specifications to be applied to the next incoming `CURVe` command data.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax `WFMInpre?`

Related Commands WFMOutpre?

Examples

`WFMINPRE?` might return the waveform formatting as `:WFMINPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR MSB;NR_PT 10000;PT_FMT Y;XUNIT "s";XINCR 4.0000E-9;XZERO 0.0E+0;PT_OFF 0;YUNIT "V";YMULT 4.0000E-3;YOFF 0.0E+0;YZERO 0.0E+0;DOMAIN TIME;WFMTYPE ANALOG;CENTERFREQUENCY 0.0E+0;SPAN 0.0E+0;REFLEVEL 0.0E+0`

WFMInpre:BIT_Nr

This command specifies the number of bits per data point in the waveform data to be sent to the oscilloscope using the `CURVe` command. Changing this value also changes the value of WFMInpre:BYT_Nr.

(See page 2-78, *Waveform Transfer Command Group*.)

***NOTE.** The `WFMInpre:BYT_Nr` and `WFMInpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMInpre:BYT_Nr 2` causes `WFMInpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMInpre:BIT_Nr` to 16 causes `WFMInpre:BYT_Nr` to be set to 2.*

Group

Waveform Transfer

Syntax

```
WFMInpre:BIT_Nr <NR1>
WFMInpre:BIT_Nr?
```

Related Commands

WFMInpre:BYT_Nr

Arguments

`<NR1>` number of bits per data point can be 8 or 16.

Examples

`WFMINPRE:BIT_NR 16` sets the number of bits per waveform point to 16, for incoming data.

`WFMINPRE:BIT_NR?` might return `:WFMINPRE:BIT_NR 8` indicating that incoming waveform data uses 8 bits per waveform point.

WFMInpre:BN_Fmt

This command specifies the format of the data for outgoing waveforms when `WFMInpre:ENCdg` is set to `BINary`. The format can either be RI (signed integer) or RP (positive integer).

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax
```
WFMInpre:BN_Fmt {RI|RP}
WFMInpre:BN_Fmt?
```

Related Commands WFMOutpre:BN_Fmt

WFMInpre:ENCdg

Arguments `RI` specifies signed integer data point representation.

`RP` specifies positive integer data point representation.

Examples `WFMINPRE:BN_FMT RP` specifies positive integer data point representation.

`WFMINPRE:BN_FMT?` might return `:WFMINPRE:BN_FMT RI` indicating that the incoming data is currently interpreted as signed integers.

WFMInpre:BYT_Nr

This command specifies the number of bytes per data point in the waveform data to be sent to the oscilloscope using the `CURVe` command. Changing this value also changes the value of WFMInpre:BIT_Nr.

(See page 2-78, *Waveform Transfer Command Group*.)

NOTE. *The `WFMInpre:BYT_Nr` and `WFMInpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMInpre:BYT_Nr 2` causes `WFMInpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMInpre:BIT_Nr` to 16 causes `WFMInpre:BYT_Nr` to be set to 2.*

Group Waveform Transfer

Syntax
```
WFMInpre:BYT_Nr <NR1>
WFMInpre:BYT_Nr?
```

Related Commands WFMInpre:BIT_Nr

Arguments `<NR1>` is the number of bytes per data point. The number of bytes can be 1 or 2 for Analog, Math or the digital channels D0 – D15. It can be 4 or 8 for DIGital collection data.

Examples

`WFMINPRE:BYT_NR 1` sets the number of bytes per incoming waveform data point to 1, which is the default setting.

`WFMINPRE:BYT_NR?` might return `:WFMINPRE:BYT_NR 2` indicating that there are 2 bytes per incoming waveform data point.

WFMInpre:BYT_Or

This command specifies which byte of incoming binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMInpre:ENCdg is set to BINary and WFMInpre:BYT_Nr is 2.

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
WFMInpre:BYT_Or {LSB|MSB}
WFMInpre:BYT_Or?
```

Related Commands

WFMInpre:ENCdg,

WFMInpre:BYT_Nr,

WFMOutpre:BYT_Or

Arguments

`LSB` specifies that the least significant byte will be expected first.

`MSB` specifies that the most significant byte will be expected first.

Examples

`WFMINPRE:BYT_OR MSB` sets the most significant incoming byte of incoming waveform data to be expected first.

`WFMINPRE:BYT_OR?` might return `:WFMINPRE:BYT_OR LSB` indicating that the least significant incoming `CURVe` data byte will be expected first.

WFMInpre:CENTERFREQuency

This command specifies the center frequency of the incoming RF trace (waveform), in Hertz. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns 0.0000.

Group Waveform Transfer

Syntax
```
WFMInpre:CENTERFREQuency <NR3>
WFMInpre:CENTERFREQuency?
```

WFMInpre:DOMain

This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns TIMe.

Group Waveform Transfer

Syntax
```
WFMInpre:DOMain {TIMe|FREQuency}
WFMInpre:DOMain?
```

WFMInpre:ENCdg

This command specifies the type of encoding of the incoming waveform data to be sent to the oscilloscope using the `CURVe` command. Supported types are BINary and ASCii.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax
```
WFMInpre:ENCdg {ASCii|BINary}
WFMInpre:ENCdg?
```

Related Commands WFMOutpre:ENCdg

Arguments `ASCii` specifies that the incoming data is in ASCII format.

`BINary` specifies that the incoming data is in a binary format whose further interpretation requires knowledge of BYT_NR, BIT_NR, BN_FMT, and BYT_OR.

Examples `WFMINPRE:ENCDG ASC` sets the format of incoming waveform data to ASCII format.

`WFMINPRE:ENCDG` ? might return `:WFMINPRE:ENCDG BIN` indicating that the incoming waveform data is in binary format.

WFMInpre:NR_Pt

This command specifies the number of data points that are in the incoming waveform record to be sent to the oscilloscope using the `CURVe` command.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:NR_Pt <NR1>
WFMInpre:NR_Pt?
```

Related Commands CURVe,

DATa,

DATa:STARt,

DATa:STOP,

SAVe:WAVEform,

SAVe:WAVEform:FILEFormat,

WFMOutpre:NR_Pt?

Arguments `<NR1>` is the number of data points if WFMInpre:PT_Fmt is set to Y. It is the number of min-max pairs if WFMInpre:PT_Fmt is set to ENV.

Examples `WFMINPRE:NR_PT 10000` specifies that 10000 data points will be expected.

`WFMINPRE:NR_PT` ? might return `:WFMINPRE:NR_PT 10000` indicating that there are 10000 data points in the expected incoming waveform record.

WFMInpre:PT_Fmt

This command specifies the acquisition format of the data points to be sent to the oscilloscope using the `CURVE` command. This can be Y for YT format, or ENV for envelope mode (min/max pairs). For YT format, each data value represents a single waveform data point. For envelope format, each data point represents a min/max pair, where the minimum value precedes the maximum value.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:PT_Fmt {ENV|Y}
WFMInpre:PT_Fmt?
```

Related Commands WFMOutpre:PT_Fmt?

Arguments ENV specifies that the waveform is to be transmitted in envelope mode as minimum and maximum point pairs. Only Y values are explicitly transmitted. Absolute coordinates are given by:

Xn = XZEro + XINcr (n - PT_Off)

Ynmax = YZEro + YMUlt (ynmax - YOFf)

Ynmin = YZEro + YMUlt (ynmin - YOFf)

Y specifies a normal waveform where one ASCII or binary data point is transmitted for each point in the waveform record. Only Y values are explicitly transmitted. Absolute coordinates are given by:

Xn = XZEro + XINcr (n - PT_Off)

Yn = YZEro + YMUlt (yn - YOFf)

Examples WFMINPRE:PT_FMT ENV sets the incoming waveform data point format to enveloped.

WFMINPRE:PT_FMT? might return :WFMINPRE:PT_FMT ENV indicating that the waveform is transmitted as minimum and maximum point pairs.

WFMInpre:PT_Off

The set form of this command is ignored. The query form always returns a 0. (This command is listed for compatibility with other Tektronix oscilloscopes.)

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:PT_Off <NR1>
WFMInpre:PT_Off?
```

Arguments Arguments are ignored.

WFMInpre:REFLevel

This command specifies the Reference Level of the incoming waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns 0.0000.

Group Waveform Transfer

Syntax
```
WFMInpre:REFLevel <NR3>
WFMInpre:REFLevel?
```

WFMInpre:SPAN

This command specifies the frequency span of an incoming RF trace. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns 0.0000.

Group Waveform Transfer

Syntax
```
WFMInpre:SPAN <NR3>
WFMInpre:SPAN?
```

WFMInpre:WFMTYPe

This command specifies the type of waveform that is being transferred to the oscilloscope for storage in one of the REF1 — REF4 memory locations. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored and the query always returns ANALOG.

Group Waveform Transfer

Syntax
```
WFMInpre:WFMTYPe {ANALOG|RF_TD|RF_FD}
WFMInpre:WFMTYPe?
```

WFMInpre:XINcr

This command specifies the horizontal interval between incoming waveform points sent to the oscilloscope using the `CURVE` command. The units are time, in seconds, or frequency, in hertz, and can be specified or queried using the `WFMInpre:XUNit` command.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:XINcr <NR3>
WFMInpre:XINcr?
```

Related Commands WFMInpre:XUNit,

WFMOutpre:XINcr?

Arguments `<NR3>` is a floating point number that specifies the horizontal interval representation.

Examples `WFMINPRE:XINCR 3E-3` sets the interval between incoming waveform points to 3 ms.

`WFMINPRE:XINCR ?` might return `:WFMINPRE:XINCR 1.0000E-3` indicating that if WFMInpre:XUNit is set to "s", there is a 1 ms interval between incoming waveform points.

WFMInpre:XUNit

This command specifies the horizontal units of the x-axis of the data points being sent to the oscilloscope using the `CURVE` command. This value can be in “s” for seconds, or “Hz”.

(See page 2-78, *Waveform Transfer Command Group*.)

Group Waveform Transfer

Syntax

```
WFMInpre:XUNit <QString>
WFMInpre:XUNit?
```

Related Commands WFMOutpre:XUNit?

Arguments

<QString> contains the characters that represent the horizontal units for the incoming waveform.

Examples

WFMINPRE:XUNIT "HZ" specifies that the horizontal units for the incoming waveform are hertz.

WFMINPRE:XUNIT? might return :WFMINPRE:XUNIT "s" indicating that the horizontal units for the incoming waveform are seconds.

WFMInpre:XZEro

This command specifies the position value of the first data point in the incoming waveform record being sent to the oscilloscope using the CURVE command. The units are determined or queried using the WFMInpre:XUNit command and are typically time, in seconds, or frequency, in hertz. This time or frequency is relative to the time or frequency of the trigger, which is always 0. Thus, the XZEro value can be negative.

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

```
WFMInpre:XZEro <NR3>
WFMInpre:XZEro?
```

Related Commands

WFMInpre:XINcr,

WFMInpre:XUNit,

WFMOutpre:XZEro?

Arguments

<NR3> is the floating point value of the position, in XUNits, of the first sample in the incoming waveform. If XUNits is “s”, <NR3> is the time of the first sample in the incoming waveform.

Examples

WFMINPRE:XZERO 5.7E-6, which indicates the trigger occurred 5.7 µs before the first sample in the waveform.

WFMINPRE:XZERO? might return :WFMINPRE:XZEro -7.5000E-6 indicating that the trigger occurs 7.5 µs after the first sample in the waveform.

WFMInpre:YMUlt

This command specifies the vertical scale multiplying factor to be used to convert the incoming data point values being sent to the oscilloscope, from digitizing levels into the units specified by the `WFMInpre:YUNit` command. For one byte waveform data, there are 256 digitizing levels. For two byte waveform data there are 65,536 digitizing levels.

The `WFMInpre:YMUlt`, `WFMInpre:YOFf`, and `WFMInpre:YZEro` values are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing level; curve_in_dl is a data point value in the `CURVe` data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

(See page 2-78, *Waveform Transfer Command Group*.)

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

Group

Waveform Transfer

Syntax

```
WFMInpre:YMUlt <NR3>
WFMInpre:YMUlt?
```

Related Commands

DATa:DESTination,

WFMInpre:BYT_Nr,

WFMInpre:YUNit

Arguments

`<NR3>` is a floating point number that specifies the vertical scale factor per digitizing level of the incoming waveform points.

Examples

`WFMINPRE:YMULT?` might return `:WFMINPRE:YMULT 40.0000E-3`, which (if YUNit is “V”) indicates that the vertical scale is 40 mV/digitizing level (1V/div for 8-bit data).

`WFMINPRE:YMULT 20E-3` specifies that (if `WFMInpre:YUNit` is "V" and `WFMInpre:BYT_Nr` is 1), the vertical scale is 20 mV/digitizing level (500 mV/div).

WFMInpre:YOFf

This command specifies the vertical position of the destination reference waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and 6400 digitizing levels per vertical division for 2-byte data. Variations in this number are analogous to changing the vertical position of the waveform.

The `WFMInpre:YMUlt`, `WFMInpre:YOFf,` and `WFMInpre:YZEro` commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing levels, and curve_in_dl is a data point value in the `CURVe` data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

---

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

(See page 2-78, Waveform Transfer Command Group.)

Group

Waveform Transfer

Syntax

```
WFMInpre:YOFf <NR3>
WFMInpre:YOFf?
```

Related Commands

WFMInpre:BYT_Nr

WFMInpre:YMUlt

WFMOutpre:YOFf?

Arguments

`<NR3>` is a floating point number that specifies the vertical offset in digitizing levels.

Examples

`WFMINPRE:YOFF 50` specifies that the zero reference point for the incoming waveform is 50 digitizing levels (2 divisions, for 8-bit data; 0.0078125 division for 16-bit data) above the center of the graticule.

`WFMINPRE:YOFF?` might return `:WFMINPRE:YOFF 25` indicating the vertical position of the incoming waveform is 25 digitizing levels.

WFMInpre:YUNit

This command specifies the vertical units of data points in the incoming waveform record sent to the oscilloscope using the `CURVE` command. This can be any of several string values, depending upon the vertical units of the waveform being sent.

Supported units are: %, /Hz, A, A/A, A/V, A/W, A/dB, A/s, AA, AW, AdB, As, B, Hz, IRE, S/s, V, V/A, V/V, V/W, V/dB, V/s, VV, VW, VdB, volts, Vs, W, W/A, W/V, W/W, W/dB, W/s, WA, WV, WW, WdB, Ws, dB, dB/A, dB/V, dB/W, dB/dB, dBA, dBV, dBW, dBdB, day, degrees, div, hr, min, ohms, percent, s

NOTE. *(See page 2-78, Waveform Transfer Command Group.)*

Group

Waveform Transfer

Syntax

```
WFMInpre:YUNit <QString>
WFMInpre:YUNit?
```

Related Commands

WFMOutpre:YUNit?

Arguments

`<QString>` contains the characters that represent the vertical units for the incoming waveform.

Examples

`WFMINPRE:YUNIT?` might return `:WFMINPRE:YUNIT "V"` indicating the vertical units for the incoming waveform are volts.

`WFMINPRE:YUNIT "A"` specifies that the vertical units for the incoming waveform are Amperes.

WFMInpre:YZEro

This command specifies the vertical offset of the destination reference waveform in units specified by the `WFMInpre:YUNit` command. Variations in this number are analogous to changing the vertical offset of the waveform.

The `WFMInpre:YMUlt`, `WFMInpre:YOFf,` and `WFMInpre:YZEro` commands are used to convert waveform record values to units specified using the WFMInpre:YUNit command (YUNit units). It uses the following formula (where dl means digitizing levels; curve_in_dl is a data point value in the `CURVe` data):

Value in YUNit units = ((curve_in_dl - YOFf) * YMUlt) + YZEro

NOTE. *For a given waveform record, YMUlt, YOFf, and YZEro have to be a consistent set, otherwise vertical cursor readouts and vertical measurements may give incorrect results.*

(See page 2-78, Waveform Transfer Command Group.)

Group Waveform Transfer

Syntax

```
WFMInpre:YZEro <NR3>
WFMInpre:YZEro?
```

Related Commands WFMInpre:YUNit

WFMInpre:YZEro

Arguments `<NR3>` is a floating point number that specifies the offset in in units specified by the `WFMInpre:YUNit` command (YUNits).

Examples `WFMINPRE:YZERO 1.5E+0` specifies that the zero reference point for the incoming waveform is 1.5 V below the center of the data range (given that WFMInpre:YUNit is set to V).

`WFMINPRE:YZERO?` might return `:WFMINPRE:YZEro 7.5000E-6` indicating that the zero reference for the incoming waveform is 7.5 µV below the center of the data range (given that WFMInpre:YUNit is set to V).

WFMOutpre? (Query Only)

This query returns the information needed to interpret the waveform data points returned by the `CURVe?` query. It returns the waveform transmission and formatting parameters for the waveform specified by the DATa:SOUrce command. If the waveform specified by the DATa:SOUrce command is not displayed, the oscilloscope returns only the waveform transmission parameters (BYT_Nr, BIT_Nr, ENCdg, BN_Fmt, BYT_Or) and sets an error event indicating that the source waveform is not turned on.

The Waveform Transfer command group text contains more comprehensive information. (See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *For command sequence examples, see Appendix D. (See page D-1, Waveform Transfer (WFMOutpre and CURVe Query) Examples.)*

Example 1: Analog Waveform (channel 1 - 4)

Example 2: Digital Waveform (channel DO-D15)

Example 3: The Digital Collection with 4 Bytes Per Point with MagniVu Off

Example 4: The Digital Collection with 8 Bytes Per Point with MagniVu Off

Example 5: The Digital Collection with 4 Bytes Per Point with MagniVu On

Example 6: The Digital Collection with 8 Bytes Per Point with MagniVu On

Group Waveform Transfer

Syntax `WFMOutpre?`

Examples `WFMOUTPRE?` might return the waveform formatting data as:

```
:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR
MSB;WFID "Ch1, DC coupling, 100.0mV/div, 4.000us/div,
10000 points, Sample mode";NR_PT 10000;PT_FMT Y;PT_ORDER
LINEAR;XUNIT "s";XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF
0;YUNIT "V";YMULT 4.0000E-3;YOFF 0.0E+0;YZERO 0.0E+0;DOMAIN
TIME;WFMTYPE ANALOG;CENTERFREQUENCY 0.0E+0;SPAN
0.0E+0;REFLEVEL 0.0E+0
```

WFMOutpre:BIT_Nr

This command specifies the number of bits per data point in the outgoing waveform being transferred using the `CURVe?` query. Changing the value of WFMOutpre:BIT_Nr also changes the values of WFMOutpre:BYT_Nr and DATa:WIDth. The waveform is specified by the DATa:SOUrce command.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *The `WFMOutpre:BYT_Nr` and `WFMOutpre:BIT_Nr` settings are directly related; setting one causes the other to be set accordingly. For example, `WFMOutpre:BYT_Nr 2` causes `WFMOutpre_BIT_Nr` to be set to 16 (2 * 8 bits/byte). Similarly, setting `WFMOutpre:BIT_Nr` to 16 causes `WFMOutpre:BYT_Nr` to be set to 2.*

Group Waveform Transfer

Syntax

```
WFMOutpre:BIT_Nr <NR1>
WFMOutpre:BIT_Nr?
```

Related Commands

DATa:SOUrce,

DATa:WIDth,

WFMOutpre:BYT_Nr

Arguments

`<NR1>` is the number of bits per data point and can be 8 or 16.

Examples

`WFMOUTPRE:BIT_NR 16` sets the number of bits per waveform point to 16 for outgoing waveforms.

`WFMOUTPRE:BIT_NR?` might return `:WFMOUTPRE:BIT_NR 8` indicating that outgoing waveforms use 8 bits per waveform point.

WFMOutpre:BN_Fmt

This command specifies the format of the binary data for outgoing waveforms when `WFMOutpre:ENCdg` is set to `BINary`. The format can be RI (signed integer) or RP (positive integer) for analog channels. Changing the value of WFMOutpre:BN_Fmt also changes the value of DATa:ENCdg. The waveform is specified by the DATa:SOUrce command.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group

Waveform Transfer

Syntax

```
WFMOutpre:BN_Fmt {RI|RP}
WFMOutpre:BN_Fmt?
```

Related Commands

DATa:ENCdg,

DATa:SOUrce

Arguments

`RI` specifies signed integer data point representation.

`RP` specifies positive integer data point representation.

Examples

`WFMOUTPRE:BN_FMT RP` specifies that outgoing waveform data will be in positive integer format.

WFMOUTPRE:BN_FMT? might return :WFMOUTPRE:BN_FMT RI indicating that the outgoing waveform data is currently in signed integer format.

WFMOutpre:BYT_Nr

This command specifies the data width for the outgoing waveform specified by the DATa:SOUrce command. (This command is synonymous with :DATa:WIDTH.) Note that changing WFMOutpre:BYT_Nr also changes WFMOutpre:BIT_Nr and DATa:WIDth.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

NOTE. *The WFMOutpre:BYT_Nr and WFMOutpre:BIT_Nr settings are directly related; setting one causes the other to be set accordingly. For example, WFMOutpre:BYT_Nr 2 causes WFMOutpre_BIT_Nr to be set to 16 (2 * 8 bits/byte). Similarly, setting WFMOutpre:BIT_Nr to 16 causes WFMOutpre:BYT_Nr to be set to 2.*

Group

Waveform Transfer

Syntax

```
WFMOutpre:BYT_Nr <NR1>
WFMOutpre:BYT_Nr?
```

Related Commands

DATa:SOUrce,

DATa:WIDth,

WFMOutpre:BIT_Nr

Arguments

<NR1> is the number of bytes per data point. The number of bytes can be 1 or 2 for Analog, Math or the digital channels D0 – D15. It can be 4 or 8 for DIGital collection data.

Examples

WFMOUTPRE:BYT_NR 1 sets the number of bytes per outgoing waveform data point to 1, which is the default setting.

WFMOUTPRE:BYT_NR? might return :WFMOUTPRE:BYT_NR 2 indicating that there are 2 bytes per outgoing waveform data point.

WFMOutpre:BYT_Or

This command specifies which byte of outgoing binary waveform data is transmitted first (the byte order). The byte order can either be MSB (most significant byte first) or LSB (least significant byte first, also known as IBM format). This specification only has meaning when WFMOutpre:ENCdg is set to BINary and WFMOutpre:BYT_Nr is 2. Changing WFMOutpre:BYT_Or also changes DATa:ENCdg (if DATa:ENCdg is not ASCIi).

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group

Waveform Transfer

Syntax

```
WFMOutpre:BYT_Or {LSB|MSB}
WFMOutpre:BYT_Or?
```

Related Commands

WFMOutpre:ENCdg,

WFMOutpre:BYT_Nr

Arguments

`LSB` specifies that the least significant byte will be transmitted first.

`MSB` specifies that the most significant byte will be transmitted first.

Examples

`WFMOUTPRE:BYT_OR MSB` sets the most significant outgoing byte of waveform data to be transmitted first.

`WFMOUTPRE:BYT_OR?` might return `:WFMOUTPRE:BYT_OR LSB` indicating that the least significant data byte will be transmitted first.

WFMOutpre:CENTERFREQuency? (Query Only)

This query returns the center frequency of an incoming waveform. This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns 0.0000.

Group

Waveform Transfer

Syntax

```
WFMOutpre:CENTERFREQuency?
```

WFMOutpre:DOMain? (Query Only)

This query returns the domain of the outgoing waveform, either TIMe or FREQuency. This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns TIMe.

Group Waveform Transfer

Syntax

```
WFMOutpre:DOMain?
```

WFMOutpre:ENCdg

This command specifies the type of encoding (BINary or ASCii) of the outgoing waveform data queried using the `CURVe?` query. (This can also be set using the DATa:ENCdg command, which provides the ability to set `WFMOutpre:ENCdg`, `WFMOutpre:BN_Fmt`, and `WFMOutpre:BYT_Or` using a single command.)

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax

```
WFMOutpre:ENCdg {ASCii|BINary}
WFMOutpre:ENCdg?
```

Related Commands DATa:ENCdg,

WFMOutpre:BYT_Nr,

WFMOutpre:BYT_Or,

WFMOutpre:BIT_Nr,

WFMOutpre:BN_Fmt

Arguments `ASCii` specifies that the outgoing data is to be in ASCII format. Waveforms will be sent as `<NR1>` numbers.

`BINary` specifies that outgoing data is to be in a binary format whose further specification is determined by WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr, WFMOutpre:BN_Fmt and WFMOutpre:BYT_Or.

Examples

`WFMOUTPRE:ENCDG?` might return `:WFMOUTPRE:ENCDG BIN` indicating that outgoing waveform data will be sent in binary format.

`WFMOUTPRE:ENCDG ASC` specifies that the outgoing waveform data will be sent in ASCII format.

WFMOutpre:NR_Pt? (Query Only)

This query returns the number of data points in the waveform record that will be transmitted in response to a `CURVe?` query. This value is the adjusted range specified by `DATA:START` and `DATA:STOP` commands. Note that the oscilloscope automatically adjusts the `DATA:START` and `DATA:STOP` values when the `DATA:STOP` value is less than the `DATA:START` value, and when the `DATA:START` and/or `DATA:STOP` value is greater than the record length of the source waveform. The adjusted `DATA:START` and `DATA:STOP` values determine `WFMOUTPRE:NR_PT`. (You can use `DATa:STARt` and `DATa:STOP` to transfer partial waveforms.) If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-78, *Waveform Transfer Command Group*.)

Group

Waveform Transfer

Syntax

`WFMOutpre:NR_Pt?`

Related Commands

CURVe,

DATa,

DATa:STARt,

DATa:STOP,

SAVe:WAVEform,

SAVe:WAVEform:FILEFormat,

WFMInpre:NR_Pt

Examples

`WFMOUTPRE:NR_PT?` might return `:WFMOUTPRE:NR_PT 10000` indicating that there are 10000 data points to be sent.

WFMOutpre:PT_Fmt? (Query Only)

This query returns the point format of the data points in the outgoing waveform record transferred using the `CURVe?` query. The returned values can be Y, which indicates normal waveform points for YT format, or ENV, which indicates envelope mode format in which the data is returned as a series of min/max pairs. The minimum value precedes the maximum.

The outgoing waveform is specified by the DATa:SOUrce command. The query command will time out and an error will be generated if the waveform specified by DATa:SOUrce is not turned on.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_Fmt?`

Related Commands CURVe, DATa:SOUrce

Examples `WFMOUTPRE:PT_FMT?` might return `:WFMOutpre:PT_Fmt ENV` indicating that the waveform data is a series of min-max pairs.

WFMOutpre:PT_Off? (Query Only)

This query always returns 0 if the waveform specified by `DATA:SOUrce` is on or displayed. If the waveform is not displayed, the query form generates an error. (It is provided for compatibility with other Tektronix oscilloscopes).

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_Off?`

Related Commands DATa:SOUrce

Arguments Arguments are ignored.

Examples `WFMOUTPRE:PT_OFF?` might return `WFMOUTPRE:PT_OFF 0`.

WFMOutpre:PT_ORder? (Query Only)

This query returns the point ordering, which is always linear (included for compatibility with other Tektronix oscilloscopes).

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:PT_ORder?`

Related Commands DATa:SOUrce

Examples `WFMOUTPRE:PT_ORDER?` returns `:WFMOUTPRE:PT_ORDER LINEAR`.

WFMOutpre:REFLEvel? (Query Only)

This query returns the Reference Level of an outgoing waveform. This command is provided for waveform transfer compatibility with mixed domain oscilloscopes only. The command form is ignored, and the query always returns 0.0000.

Group Waveform Transfer

Syntax `WFMOutpre:REFLEvel?`

WFMOutpre:SPAN? (Query Only)

This query returns the frequency span of the outgoing waveform. This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns 0.0000.

Group Waveform Transfer

Syntax `WFMOutpre:SPAN?`

WFMOutpre:WFId? (Query Only)

This query returns a string that describes several aspects of the acquisition parameters for the source waveform, including Source, Coupling, Vertical Scale, Horizontal Scale, Record Length and Acquisition Mode. If the waveform specified by DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group

Waveform Transfer

Syntax

```
WFMOutpre:WFId?
```

Related Commands

DATa:SOUrce

Returns

`<QString>` comprises the following comma-separated fields documented in the tables below:

Table 2-49: Waveform Suffixes

Field	Description	Examples
Source	The source identification string as it appears in the front-panel scale factor readouts.	"CH1–4" "Math1 "Ref1–4"
Coupling	A string describing the vertical coupling of the waveform (the Source1 waveform in the case of Dual Waveform Math).	"AC coupling" "DC couplng" "GND coupling"
Vert Scale	A string containing the vertical scale factor of the unzoomed waveform. The numeric portion will always be four digits. The examples cover all supported units.	"100.0 mV/div" "20.00 dB/div" "45.00 deg/div" "785.4 mrad/div" "500.0 μVs/div" "10.00 kV/s/div" "200.0 mV/div" "50.00 unk/div"
Horiz Scale	A string containing the horizontal scale factor of the unzoomed waveform. The numeric portion will always be four digits. The examples cover all supported units.	"100 ms/div" "10.00 kHz/div"

Table 2-49: Waveform Suffixes (cont.)

Field	Description	Examples
Record Length	A string containing the number of waveform points available in the entire record. The numeric portion is given as an integer.	"1000 points"
Acquisition Mode	A string describing the mode used to acquire the waveform.	"Sample mode" "Pk Detect mode" "Envelope mode" "Average mode"

Examples `WFMOUTPRE:WFID?` might return `:WFMOUTPRE:WFID "Ch1, DC coupling,100.0mvolts/div,500.0µs/div, 1000 points, Sample mode"`

WFMOutpre:WFMTYPe? (Query Only)

This query returns the type of an outgoing waveform. This query is provided for waveform transfer compatibility with mixed domain oscilloscopes only and always returns ANALOG.

Group Waveform Transfer

Syntax `WFMOutpre:WFMTYPe?`

WFMOutpre:XINcr? (Query Only)

This query returns the horizontal point spacing in units of time (seconds), or frequency (hertz) between data points in the waveform record transferred using the`:CURVe?` query. This value corresponds to the sampling interval.

If the waveform specified by the DATa:SOUrce command is not turned on, an error will be generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:XINcr?`

Related Commands DATa:SOUrce,

WFMOutpre:XUNit?

Examples `WFMOUTPRE:XINCR?` might return `:WFMOUTPRE:XINCR 10.0000E-6` indicating that the horizontal sampling interval is 10 µs/point.

WFMOutpre:XUNit? (Query Only)

This query indicates the horizontal units of the x-axis of the waveform record transferred using the `CURVe?` query. Typically, this value is "s" when the waveform source is displayed in the time domain, and "Hz" when the waveform source is displayed in the frequency domain. When the waveform source is Math or a reference waveform, the value can be "s" or "Hz".

If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:XUNit?`

Related Commands DATa:SOUrce

Examples `WFMOUTPRE:XUNIT?` might return `:WFMOUTPRE:XUNIT "HZ"` indicating that the horizontal units for the waveform are in Hertz.

WFMOutpre:XZEro? (Query Only)

This query returns the time coordinate, in seconds, or frequency, in hertz, of the first data point in the outgoing waveform record transferred using the `CURVe?` query. This time or frequency is relative to the time of the trigger, which is always 0. Thus, the XZEro time or frequency can be negative. You can query the units using the WFMOutpre:XUNit? command. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:XZEro?`

Related Commands DATa:SOUrce, WFMOutpre:XUNit?

Examples `WFMOUTPRE:XZERO?` might return `:WFMOUTPRE:XZERO 5.6300E-9` indicating that the trigger occurred 5.63 ns before the first sample in the waveform record.

WFMOutpre:YMUlt? (Query Only)

This query returns the vertical scale multiplying factor used to convert the waveform data point values in the outgoing waveform record from digitizing levels to the YUNit units. You can determine the units by using the `WFMOutpre:YUNit` query.

See the description of the WFMInpre:YMUlt command to see how this scale factor is used to convert waveform sample values to volts.

If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YMUlt?`

Related Commands DATa:SOUrce,

WFMInpre:YMUlt

Examples `WFMOUTPRE:YMULT?` might return `:WFMOUTPRE:YMULT 4.0000E-3` indicating that the vertical scale for the corresponding waveform is 100 mV/div (for 8-bit waveform data or 0.390625 V/div for 16–bit data).

WFMOutpre:YOFf? (Query Only)

This query returns the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division for 1-byte data, and

6400 digitizing levels per vertical division for 2-byte data. See the description of WFMInpre:YOFf to see how this position is used to convert waveform sample values to volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YOFf?`

Related Commands DATa:SOUrce,

WFMOutpre:BYT_Nr

Examples `WFMOUTPRE:YOFF?` might return `:WFMOUTPRE:YOFF -50.0000E+0` indicating that the position indicator for the waveform was 50 digitizing levels (2 divisions) below center screen (for 8-bit waveform data).

WFMOutpre:YUNit? (Query Only)

This query returns the units of data points in the outgoing waveform record transferred using the `CURVe?` query. This can be any of several string values, depending upon the vertical units of the source waveform (specified by the DATa:SOUrce command). Typically, this is “V” for volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YUNit?`

Related Commands DATa:SOUrce

Examples `WFMOUTPRE:YUNIT?` might return `:WFMOUTPRE:YUNIT "dB"` indicating that the vertical units for the waveform are measured in decibels.

WFMOutpre:YZEro? (Query Only)

This query returns the vertical offset of the source waveform. You can determine the units using the WFMOutpre:YUNit? query. See the description of WFMInpre:YZEro to see how this offset is used to convert waveform sample values to volts. If the waveform specified by DATa:SOUrce is not turned on, nothing is returned and an error event is generated.

(See page 2-78, *Waveform Transfer Command Group*.)

(See page D-1, *Waveform Transfer (WFMOutpre and CURVe Query) Examples*.)

Group Waveform Transfer

Syntax `WFMOutpre:YZEro?`

Related Commands DATa:SOUrce,

WFMOutpre:YUNit?

Examples `WFMOUTPRE:YZERO?` might return `:WFMOUTPRE:YZERO -100.0000E-3` indicating that vertical offset is set to -100 mV.

ZOOm? (Query Only)

Returns the current vertical and horizontal positioning and scaling of the display.

Group Zoom

Syntax `ZOOm?`

Examples `ZOOM?` might return `:ZOOM:MODE 1;GRATICULE:SIZE 80;SPLIT EIGHTYTWENTY;:ZOOM:ZOOM1:STATE 1;SCALE 400.  0000E-12;POSITION 46.8986;FACTOR 50.0000E+3;HORIZONTAL:POSITION 46.8986;SCALE 40 0.0000E-12`

ZOOm:MODe

Turns Zoom mode on or off. The Zoom query returns the current state of Zoom mode. This command is equivalent to pressing the zoom button located on the front panel.

Group
Zoom

Syntax
```
ZOOm:MODe {ON|OFF|<NR1>}
ZOOm:MODe
```

Arguments
`ON` turns on Zoom mode.

`OFF` turns off Zoom mode.

`<NR1>` = 0 turns off Zoom mode; any other value turns on Zoom mode.

Examples
`ZOOM:MODE OFF` turns off Zoom mode.

`ZOOM:MODE?` might return `:ZOOM:MODE 1` indicating that Zoom mode is currently turned on.

ZOOm:ZOOM<x>? (Query Only)

Returns the current vertical and horizontal positioning and scaling of the display. <x> can only be 1.

Group
Zoom

Syntax
```
ZOOm:ZOOM<x>?
```

Examples
`ZOOM:ZOOM1?` might return `:ZOOM:ZOOM1:STATE 1;SCALE 400.0000E-12;POSITION 46.8986;FACTOR 50.0000E+3;HORIZONTAL:POSITION 46.8986;SCALE 400.0000E-12`.

ZOOm:ZOOM<x>:FACtor? (Query Only)

Returns the zoom factor of a particular zoom box. <x> can only be 1.

Group
Zoom

Syntax
```
ZOOm:ZOOM<x>:FACtor?
```

Returns
`<NR1>` is the zoom factor of a zoom box.

ZOOm:ZOOM<x>:POSition

Sets the horizontal position of the zoom box, in terms of 0 to 100.0% of upper window. <x> can only be 1.

Group Zoom

Syntax

```
ZOOm:ZOOM<x>:POSition <NR3>
ZOOm:ZOOM<x>:POSition?
```

Arguments `<NR3>` is the horizontal position as a percent of the upper window.

ZOOm:ZOOM<x>:SCAle

Sets or returns the horizontal scale of the zoom box. <x> can only be 1.

Group Zoom

Syntax

```
ZOOm:ZOOM<x>:SCAle <NR3>
ZOOm:ZOOM<x>:SCAle?
```

Arguments `<NR3>` is the horizontal scale of the zoom box.

ZOOm:ZOOM<x>:STATE

Sets or returns the specified zoom on or off, where x is the integer 1 representing the single zoom window. <x> can only be 1.

Group Zoom

Syntax

```
ZOOm:ZOOM<x>:STATE {ON|OFF|<NR1>}
ZOOm:ZOOM<x>:STATE?
```

Arguments `ON` turns Zoom 1 on.

`OFF` turns Zoom 1 off.

`<NR1>` = 0 disables the specified zoom; any other value enables the specified zoom.

Examples

`ZOOM:ZOOM1:STATE ON` turns Zoom1 on.

`ZOOM:ZOOM1:STATE?` might return `:ZOOM:ZOOM1:STATE 1` indicating that Zoom1 is on.

Status and Events

The oscilloscope provides a status and event reporting system for the Ethernet, GPIB (with the TEK-USB-488 Adapter), and USB interfaces. This system informs you of certain significant events that occur within the oscilloscope.

The oscilloscope status handling system consists of five 8-bit registers and two queues for each interface. The remaining Status subtopics describe these registers and components. They also explain how the event handling system operates.

Registers

Overview

The registers in the event handling system fall into two functional groups:

- Status Registers contain information about the status of the oscilloscope. They include the Standard Event Status Register (SESR).
- Enable Registers determine whether selected types of events are reported to the Status Registers and the Event Queue. They include the Device Event Status Enable Register (DESER), the Event Status Enable Register (ESER), and the Service Request Enable Register (SRER).

Status Registers

The Standard Event Status Register (SESR) and the Status Byte Register (SBR) record certain types of events that may occur while the oscilloscope is in use. IEEE Std 488.2-1987 defines these registers.

Each bit in a Status Register records a particular type of event, such as an execution error or message available. When an event of a given type occurs, the oscilloscope sets the bit that represents that type of event to a value of one. (You can disable bits so that they ignore events and remain at zero. See Enable Registers). Reading the status registers tells you what types of events have occurred.

The Standard Event Status Register (SESR). The SESR records eight types of events that can occur within the oscilloscope. Use the *ESR? query to read the SESR register. Reading the register clears the bits of the register so that the register can accumulate information about new events.

NOTE. *TekVISA applications use SESR bit 6 to respond to any of several events, including some front panel actions.*

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-1: The Standard Event Status Register (SESR)

Table 3-1: SESR Bit Functions

Bit	Function	
7 (MSB)	PON	`Power On.` Shows that the oscilloscope was powered on. On completion, the diagnostic self tests also set this bit.
6	URQ	`User Request.` Indicates that an application event has occurred. *See note.
5	CME	`Command Error.` Shows that an error occurred while the oscilloscope was parsing a command or query.
4	EXE	`Execution Error.` Shows that an error executing a command or query.
3	DDE	`Device Error.` Shows that a device error occurred.
2	QYE	`Query Error.` Either an attempt was made to read the Output Queue when no data was present or pending, or that data in the Output Queue was lost.
1	RQC	`Request Control.` This is not used.
0 (LSB)	OPC	`Operation Complete.` Shows that the operation is complete. This bit is set when all pending operations complete following an *OPC command.

The Status Byte Register (SBR). Records whether output is available in the Output Queue, whether the oscilloscope requests service, and whether the SESR has recorded any events.

Use a Serial Poll or the *STB? query to read the contents of the SBR. The bits in the SBR are set and cleared depending on the contents of the SESR, the Event Status Enable Register (ESER), and the Output Queue. When you use a Serial Poll to obtain the SBR, bit 6 is the RQS bit. When you use the *STB? query to obtain the SBR, bit 6 is the MSS bit. Reading the SBR does not clear the bits.

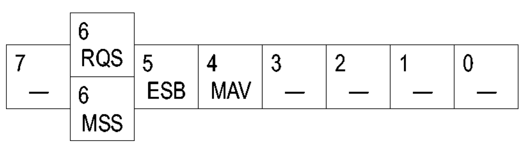


Figure 3-2: The Status Byte Register (SBR)

Table 3-2: SBR Bit Functions

Bit	Function	
7 (MSB)	———	Not used.
6	RQS	`Request Service.` Obtained from a serial poll. Shows that the oscilloscope requests service from the GPIB controller.
6	MSS	`Master Status Summary.` Obtained from *STB? query. Summarizes the ESB and MAV bits in the SBR.
5	ESB	`Event Status Bit.` Shows that status is enabled and present in the SESR.

Table 3-2: SBR Bit Functions (cont.)

Bit	Function	
4	MAV	`Message Available.` Shows that output is available in the Output Queue.
3	———	Not used.
2	———	Not used.
1–0	———	Not used.

Enable Registers

DESER, ESER, and SRER allow you to select which events are reported to the Status Registers and the Event Queue. Each Enable Register acts as a filter to a Status Register (the DESER also acts as a filter to the Event Queue) and can prevent information from being recorded in the register or queue.

Each bit in an Enable Register corresponds to a bit in the Status Register it controls. In order for an event to be reported to a bit in the Status Register, the corresponding bit in the Enable Register must be set to one. If the bit in the Enable Register is set to zero, the event is not recorded.

Various commands set the bits in the Enable Registers. The Enable Registers and the commands used to set them are described below.

The Device Event Status Enable Register (DESER). This register controls which types of events are reported to the SESR and the Event Queue. The bits in the DESER correspond to those in the SESR.

Use the DESE command to enable and disable the bits in the DESER. Use the DESE? query to read the DESER.

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-3: The Device Event Status Enable Register (DESER)

The Event Status Enable Register (ESER). This register controls which types of events are summarized by the Event Status Bit (ESB) in the SBR. Use the *ESE command to set the bits in the ESER. Use the *ESE? query to read it.

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Figure 3-4: The Event Status Enable Register (ESER)

The Service Request Enable Register (SRER). This register controls which bits in the SBR generate a Service Request and are summarized by the Master Status Summary (MSS) bit.

Use the *SRE command to set the SRER. Use the *SRE? query to read the register. The RQS bit remains set to one until either the Status Byte Register is read with a Serial Poll or the MSS bit changes back to a zero.

7	6	5	4	3	2	1	0
—	—	ESB	MAV	—	—	—	—

Figure 3-5: The Service Request Enable Register (SRER)

*PSC Command

The *PSC command controls the Enable Registers contents at power-on. Sending *PSC 1 sets the Enable Registers at power on as follows:

- DESER 255 (equivalent to a DESe 255 command)
- ESER 0 (equivalent to an *ESE 0 command)
- SRER 0 (equivalent to an *SRE 0 command)

Sending *PSC 0 lets the Enable Registers maintain their values in nonvolatile memory through a power cycle.

***NOTE.** To enable the PON (Power On) event to generate a Service Request, send *PSC 0, use the DESe and *ESE commands to enable PON in the DESER and ESER, and use the *SRE command to enable bit 5 in the SRER. Subsequent power-on cycles will generate a Service Request.*

Queues

The *PSC command controls the Enable Registers contents at power-on. Sending *PSC 1 sets the Enable Registers at power on as follows:

Output Queue

The oscilloscope stores query responses in the Output Queue and empties this queue each time it receives a new command or query message after an <EOM>. The controller must read a query response before it sends the next command (or query) or it will lose responses to earlier queries.

***CAUTION.** When a controller sends a query, an <EOM>, and a second query, the oscilloscope normally clears the first response and outputs the second while reporting a Query Error (QYE bit in the ESER) to indicate the lost response. A fast controller, however, may receive a part or all of the first response as well. To avoid this situation, the controller should always read the response immediately after sending any terminated query message or send a DCL (Device Clear) before sending the second query.*

Event Queue

The Event Queue stores detailed information on up to 33 events. If than 32 events stack up in the Event Queue, the 32nd event is replaced by event code 350, "Queue Overflow."

Read the Event Queue with the EVENT? query (which returns only the event number), with the EVMSG? query (which returns the event number and a text description of the event), or with the ALLEV? query (which returns all the event numbers along with a description of the event). Reading an event removes it from the queue.

Before reading an event from the Event Queue, you must use the *ESR? query to read the summary of the event from the SESR. This makes the events summarized by the *ESR? read available to the EVENT? and EVMSG? queries, and empties the SESR.

Reading the SESR erases any events that were summarized by previous *ESR? reads but not read from the Event Queue. Events that follow an *ESR? read are put in the Event Queue but are not available until *ESR? is used again.

Event Handling Sequence

The figure below shows how to use the status and event handling system. In the explanation that follows, numbers in parentheses refer to numbers in the figure.

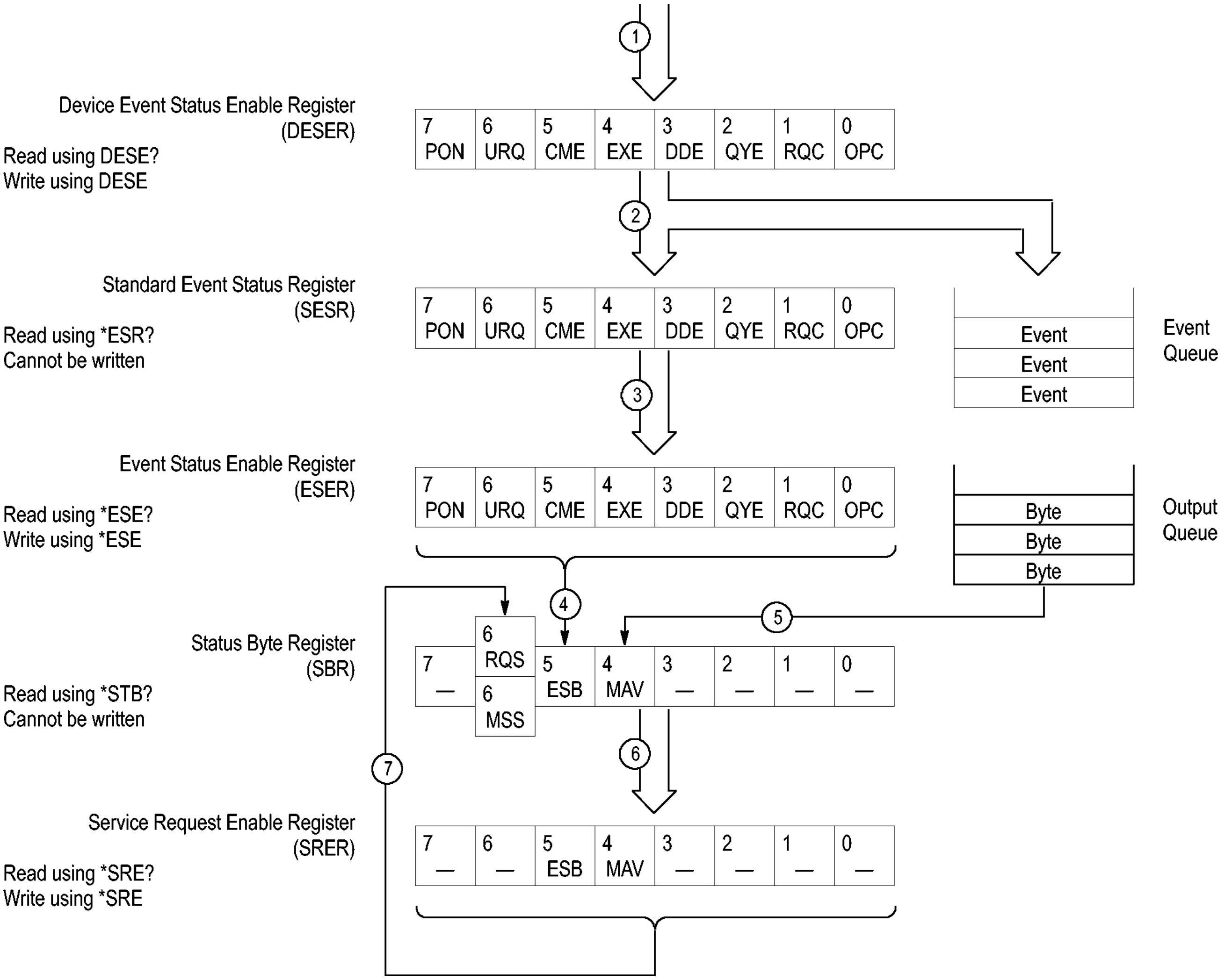


Figure 3-6: Status and Event Handling Process

When an event occurs, a signal is sent to the DESER (1). If that type of event is enabled in the DESER (that is, if the bit for that event type is set to 1), the appropriate bit in the SESR is set to one, and the event is recorded in the Event Queue (2). If the corresponding bit in the ESER is also enabled (3), then the ESB bit in the SBR is set to one (4).

When output is sent to the Output Queue, the MAV bit in the SBR is set to one (5).

When a bit in the SBR is set to one and the corresponding bit in the SRER is enabled (6), the MSS bit in the SBR is set to one and a service request is generated (7).

Synchronization Methods

Overview

Although most commands are completed almost immediately after being received by the oscilloscope, some commands start a process that requires time. For example, once a single sequence acquisition command is executed, depending upon the applied signals and trigger settings, it may take an extended period of time before the acquisition is complete. Rather than remain idle while the operation is in process, the oscilloscope will continue processing other commands. This means that some operations will not be completed in the order that they were sent. Furthermore, sometimes the result of an operation depends upon the result of an earlier operation. A first operation must complete before the next one is processed.

In order to handle these situations, the oscilloscope status and event reporting system allows you to synchronize the operation of the oscilloscope with your application program, using the Operation Complete function. Note, however, that only some operations are able to take advantage of this function; a table is provided below of commands that support this.

The following commands are used to synchronize the oscilloscope functions using Operation Complete. See examples of how to use these commands later on in this section:

*OPC — sending the *OPC command will set bit 0 of the SESR (Standard Events Status Register). The bit will only be set high when all pending operations that generate an OPC message have finished execution. (The SESR is queried using *ESR?) The `*OPC?` query form returns 1 only when all operations have completed, or a device clear is received.

*WAI — prevents the oscilloscope from executing further commands or queries until all pending commands that generate an OPC message are complete.

BUSY? — returns the status of operations: 1 means there are pending operations, 0 means that all pending operations are complete.

NOTE. *Some OPC operations may require an extended period of time to complete or may never complete. For example, a single sequence acquisition may never complete when no trigger event occurs. You should be aware of these conditions and tailor your program accordingly by:*

— setting the timeout sufficiently for the anticipated maximum time for the operation and

*— handle a timeout appropriately by querying the SESR (*ESR?) and event queue (EVMsg? or ALLEv?).*

NOTE. *The *OPC command form can also be used to cause an SRQ to be generated upon completion of all pending operations. This requires that the ESB (Event Status Bit, bit 5) of the SRER (Service Request Enable Regiser) is set, and the OPC bit (bit 0) of the DESR (Device Event Status Enable Register) and the ESER (Event Status Enable Register) are set. (The SRER is set/queried using *SRE. The DESR is set/queried using DESE. The ESER is set/queried using *ESE.)*

Only a subset of oscilloscope operations support the Operation Complete function (OPC):

Table 3-3: Oscilloscope operations that can generate OPC

Command	Conditions
ACQuire:STATE <non-zero NR1> | ON |RUN	Only when in single sequence acquisition mode
CALibrate:INTERNal	
CALibrate:INTERNal:STARt	
CALibrate:FACtory STARt	
CALibrate:FACtory CONTinue	
CALibrate:FACtory PREVious	
CH<x>:PRObe:AUTOZero EXECute	
CH<x>:PRObe:DEGAUss EXECute	
DIAg:STATE EXECute	
FACtory	
HARDCopy	
HARDCopy START	
MASK:TESt:SRQ:COMPLetion (1|ON)	upon completion of test
MASK:TESt:SRQ:FAILure (1|ON)	upon failure of test
RECAll:MASK <file>	
RECAll:SETUp (<file as quoted string>|FACtory)	
RECAll:WAVEform <.ISF or .CSV file>,<REF1|REF2|REF3|REF4>	
*RST	
SAVe:IMAGe <file as quoted string>	
SAVe:SETUp <file as quoted string>	
SAVe:WAVEform <source wfm>, (<REF1|REF2|REF3|REF4>|<file>)	
TEKSecure	

Example of Acquiring and Measuring a Single-Sequence Waveform

For example, a typical application might involve acquiring a single-sequence waveform and then taking a measurement on the acquired waveform. You could use the following command sequence to do this:

```
/** Set up conditional acquisition **/
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/** Acquire waveform data **/
ACQUIRE:STATE ON
/** Set up the measurement parameters **/
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/** Take amplitude measurement **/
MEASUREMENT:MEAS1:VALUE?
```

The acquisition of the waveform requires extended processing time. It may not finish before the oscilloscope takes an amplitude measurement (see the following figure). This can result in an incorrect amplitude value.

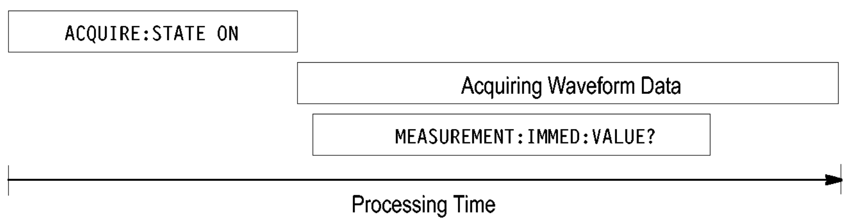


Figure 3-7: Command Processing Without Using Synchronization

To ensure the oscilloscope completes waveform acquisition before taking the measurement on the acquired data, you can synchronize the program using *WAI, BUSY, *OPC, and *OPC?.

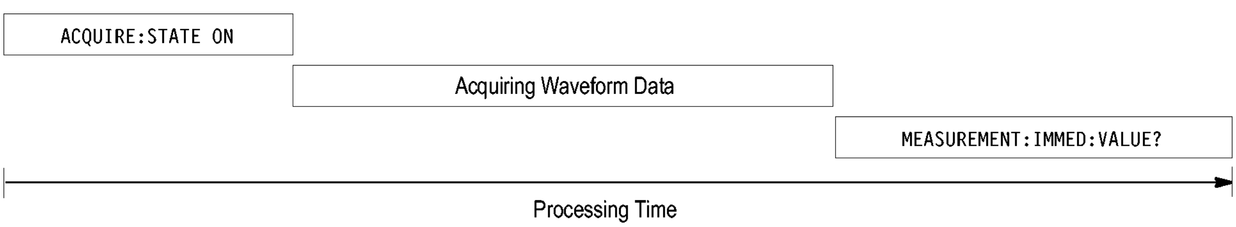


Figure 3-8: Processing Sequence With Synchronization

Example of Using the *OPC Command

If the corresponding status registers are enabled, the *OPC command sets the OPC bit in the Standard Event Status Register (SESR) when an operation is complete. You achieve synchronization by using this command with either a serial poll or service request handler.

Serial Poll Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

When the operation is complete, the OPC bit in the Standard Event Status Register (SESR) will be enabled and the Event Status Bit (ESB) in the Status Byte Register will be enabled.

The same command sequence using the *OPC command for synchronization with serial polling looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Enable the status registers */
DESE 1
*ESE 1
*SRE 0
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement.*/
*OPC
While serial poll = 0, keep looping
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This technique requires less bus traffic than did looping on BUSY.

Service Request Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

You can also enable service requests by setting the ESB bit in the Service Request Enable Register (SRER) using the *SRE command. When the operation is complete, the oscilloscope will generate a Service Request.

The same command sequence using the *OPC command for synchronization looks like this

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
```

```
ACQUIRE:STOPAFTER SEQUENCE
/* Enable the status registers */
DESE 1
*ESE 1
*SRE 32
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement*/
*OPC
```

The program can now do different tasks such as talk to other devices. The SRQ, when it comes, interrupts those tasks and returns control to this task.

```
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

Example of Using the *OPC? Query

The *OPC? query places a 1 in the Output Queue once an operation that generates an OPC message is complete. The *OPC? query does not return until all pending OPC operations have completed. Therefore, your time-out must be set to a time at least as long as the longest expected time for the operations to complete.

The same command sequence using the *OPC? query for synchronization looks like this:

```
/* Set up single sequence acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking the
measurement*/
*OPC?
```

Wait for read from Output Queue.

```
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This is the simplest approach. It requires no status handling or loops. However, you must set the controller time-out for longer than the acquisition operation.

Example of Using the *WAI Command

The *WAI command forces completion of previous commands that generate an OPC message. No commands after the *WAI are processed before the OPC message(s) are generated

The same command sequence using the *WAI command for synchronization looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
/* Wait until the acquisition is complete before taking
the measurement*/
*/
*WAI
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

The controller can continue to write commands to the input buffer of the oscilloscope, but the commands will not be processed by the oscilloscope until all in-process OPC operations are complete. If the input buffer becomes full, the controller will be unable to write commands to the buffer. This can cause a time-out.

Example of Using the BUSY Query

The BUSY? query allows you to find out whether the oscilloscope is busy processing a command that has an extended processing time such as single-sequence acquisition.

The same command sequence, using the BUSY? query for synchronization, looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 1000
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
/* Acquire waveform data */
ACQUIRE:STATE ON
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
```

```
/* Wait until the acquisition is complete before taking
the measurement */
While BUSY? keep looping
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This sequence lets you create your own wait loop rather than using the *WAI command. The BUSY? query helps you avoid time-outs caused by writing too many commands to the input buffer. The controller is still tied up though, and the repeated BUSY? query will result in bus traffic.

Messages

The information contained in the topics above covers all the programming interface messages the oscilloscope generates in response to commands and queries.

For most messages, a secondary message from the oscilloscope gives detail about the cause of the error or the meaning of the message. This message is part of the message string and is separated from the main message by a semicolon.

Each message is the result of an event. Each type of event sets a specific bit in the SESR and is controlled by the equivalent bit in the DESER. Thus, each message is associated with a specific SESR bit. In the message tables, the associated SESR bit is specified in the table title, with exceptions noted with the error message text.

No Event

The following table shows the messages when the system has no events or status to report. These have no associated SESR bit.

Table 3-4: No Event Messages

Code	Message
0	No events to report; queue empty
1	No events to report; new events pending *ESR?

Command Error

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

Table 3-5: Command Error Messages (CME Bit 5)

Code	Message
100	Command error
101	Invalid character
102	Syntax error
103	Invalid separator
104	Data type error

Table 3-5: Command Error Messages (CME Bit 5) (cont.)

Code	Message
105	GET not allowed
108	Parameter not allowed
109	Missing parameter
110	Command header error
112	Program mnemonic too long
113	Undefined header
120	Numeric data error
121	Invalid character in numeric
123	Exponent too large
124	Too many digits
130	Suffix error
131	Invalid suffix
134	Suffix too long
140	Character data error
141	Invalid character data
144	Character data too long
150	String data error
151	Invalid string data
152	String data too long
160	Block data error
161	Invalid block data
170	Command expression error
171	Invalid expression

Execution Error

The following table lists the execution errors that are detected during execution of a command.

Table 3-6: Execution Error Messages (EXE Bit 4)

Code	Message
200	Execution error
221	Settings conflict
222	Data out of range
224	Illegal parameter value
241	Hardware missing
250	Mass storage error
251	Missing mass storage

Table 3-6: Execution Error Messages (EXE Bit 4) (cont.)

Code	Message
252	Missing media
253	Corrupt media
254	Media full
255	Directory full
256	File name not found
257	File name error
258	Media protected
259	File name too long
270	Hardcopy error
271	Hardcopy device not responding
272	Hardcopy is busy
273	Hardcopy aborted
274	Hardcopy configuration error
280	Program error
282	Insufficient network printer information
283	Network printer not responding
284	Network printer server not responding
286	Program runtime error
287	Print server not found
2200	Measurement error, Measurement system error
2201	Measurement error, Zero period
2202	Measurement error, No period, second waveform
2203	Measurement error, No period, second waveform
2204	Measurement error, Low amplitude, second waveform
2205	Measurement error, Low amplitude, second waveform
2206	Measurement error, Invalid gate
2207	Measurement error, Measurement overflow
2208	Measurement error, No backwards Mid Ref crossing
2209	Measurement error, No second Mid Ref crossing
2210	Measurement error, No Mid Ref crossing, second waveform
2211	Measurement error, No backwards Mid Ref crossing
2212	Measurement error, No negative crossing
2213	Measurement error, No positive crossing
2214	Measurement error, No crossing, target waveform
2215	Measurement error, No crossing, second waveform
2216	Measurement error, No crossing, target waveform
2217	Measurement error, Constant waveform

Table 3-6: Execution Error Messages (EXE Bit 4) (cont.)

Code	Message
2219	Measurement error, No valid edge - No arm sample
2220	Measurement error, No valid edge - No arm cross
2221	Measurement error, No valid edge - No trigger cross
2222	Measurement error, No valid edge - No second cross
2223	Measurement error, Waveform mismatch
2224	Measurement error, WAIT calculating
2225	Measurement error, No waveform to measure
2226	Measurement error, Null Waveform
2227	Measurement error, Positive and Negative Clipping
2228	Measurement error, Positive Clipping
2229	Measurement error, Negative Clipping
2230	Measurement error, High Ref < Low Ref
2231	Measurement error, No statistics available
2233	Requested waveform is temporarily unavailable
2235	Math error, invalid math description
2240	Invalid password
2241	Waveform requested is invalid
2244	Source waveform is not active
2245	Saveref error, selected channel is turned off
2250	Reference error, the reference waveform file is invalid
2253	Reference error, too many points received
2254	Reference error, too few points received
2259	File too big
2270	Alias error
2271	Alias syntax error
2273	Illegal alias label
2276	Alias expansion error
2277	Alias redefinition not allowed
2278	Alias header not found
2285	TekSecure(R) Pass
2286	TekSecure(R) Fail
2500	Setup error, file does not look like a setup file
2501	Setup warning, could not recall all values from external setup
2620	Mask error, too few points received
2760	Mark limit reached
2761	No mark present
2762	Search copy failed

Device Error

The following table lists the device errors that can occur during oscilloscope operation. These errors may indicate that the oscilloscope needs repair.

Table 3-7: Device Error Messages (DDE Bit 3)

Code	Message
310	System error
311	Memory error
312	PUD memory lost
314	Save/recall memory lost

System Event

The following table lists the system event messages. These messages are generated whenever certain system conditions occur.

Table 3-8: System Event Messages

Code	Message
400	Query event
401	Power on (PON bit 7 set)
402	Operation complete (OPC bit 0 set)
403	User request (URQ bit 6 set)
404	Power fail (DDE bit 3 set)
405	Request control
410	Query INTERRUPTED (QYE bit 2 set)
420	Query UNTERMINATED (QYE bit 2 set)
430	Query DEADLOCKED (QYE bit 2 set)
440	Query UNTERMINATED after indefinite response (QYE bit 2 set)
468	Knob/Keypad value changed
472	Application variable changed

Execution Warning

The following table lists warning messages that do not interrupt the flow of command execution. They also notify you of possible unexpected results.

Table 3-9: Execution Warning Messages (EXE Bit 4)

Code	Message
528	Parameter out of range
532	Curve data too long, Curve truncated
533	Curve error, Preamble values are inconsistent
540	Measurement warning, Uncertain edge
541	Measurement warning, Low signal amplitude
542	Measurement warning, Unstable histogram

Table 3-9: Execution Warning Messages (EXE Bit 4) (cont.)

Code	Message
543	Measurement warning, Low resolution
544	Measurement warning, Uncertain edge
545	Measurement warning, Invalid in minmax
546	Measurement warning, Need 3 edges
547	Measurement warning, Clipping positive/negative
548	Measurement warning, Clipping positive
549	Measurement warning, Clipping negative

Table 3-10: Execution Warning Messages (EXE Bit 4)

Code	Message
540	Measurement warning
541	Measurement warning, Low signal amplitude
542	Measurement warning, Unstable histogram
543	Measurement warning, Low resolution
544	Measurement warning, Uncertain edge
545	Measurement warning, Invalid min max
546	Measurement warning, Need 3 edges
547	Measurement warning, Clipping positive/negative
548	Measurement warning, Clipping positive
549	Measurement warning, Clipping negative

Internal Warning

The following table shows internal errors that indicate an internal fault in the oscilloscope.

Table 3-11: Internal Warning Messages

Code	Message
630	Internal warning, 50Ω overload

Appendix A: Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
0 0 0 0	0 NUL 0 0	20 DLE 10 16	40 LA0 SP 20 32	60 LA16 0 30 48	100 TA0 @ 40 64	120 TA16 P 50 80	140 SA0 ‛ 60 96	160 SA16 p 70 112
0 0 0 1	1 GTL SOH 1 1	21 LL0 DC1 11 17	41 LA1 ! 21 33	61 LA17 1 31 49	101 TA1 A 41 65	121 TA17 Q 51 81	141 SA1 a 61 97	161 SA17 q 71 113
0 0 1 0	2 STX 2 2	22 DC2 12 18	42 LA2 " 22 34	62 LA18 2 32 50	102 TA2 B 42 66	122 TA18 R 52 82	142 SA2 b 62 98	162 SA18 r 72 114
0 0 1 1	3 ETX 3 3	23 DC3 13 19	43 LA3 # 23 35	63 LA19 3 33 51	103 TA3 C 43 67	123 TA19 S 53 83	143 SA3 c 63 99	163 SA19 s 73 115
0 1 0 0	4 SDC EOT 4 4	24 DCL DC4 14 20	44 LA4 $ 24 36	64 LA20 4 34 52	104 TA4 D 44 68	124 TA20 T 54 84	144 SA4 d 64 100	164 SA20 t 74 116
0 1 0 1	5 PPC ENQ 5 5	25 PPU NAK 15 21	45 LA5 % 25 37	65 LA21 5 35 53	105 TA5 E 45 69	125 TA21 U 55 85	145 SA5 e 65 101	165 SA21 u 75 117
0 1 1 0	6 ACK 6 6	26 SYN 16 22	46 LA6 & 26 38	66 LA22 6 36 54	106 TA6 F 46 70	126 TA22 V 56 86	146 SA6 f 66 102	166 SA22 v 76 118
0 1 1 1	7 BEL 7 7	27 ETB 17 23	47 LA7 ' 27 39	67 LA23 7 37 55	107 TA7 G 47 71	127 TA23 W 57 87	147 SA7 g 67 103	167 SA23 w 77 119
1 0 0 0	10 GET BS 8 8	30 SPE CAN 18 24	50 LA8 (28 40	70 LA24 8 38 56	110 TA8 H 48 72	130 TA24 X 58 88	150 SA8 h 68 104	170 SA24 x 78 120
1 0 0 1	11 TCT HT 9 9	31 SPD EM 19 25	51 LA9) 29 41	71 LA25 9 39 57	111 TA9 I 49 73	131 TA25 Y 59 89	151 SA9 i 69 105	171 SA25 y 79 121
1 0 1 0	12 LF A 10	32 SUB 1A 26	52 LA10 * 2A 42	72 LA26 : 3A 58	112 TA10 J 4A 74	132 TA26 Z 5A 90	152 SA10 j 6A 106	172 SA26 z 7A 122
1 0 1 1	13 VT B 11	33 ESC 1B 27	53 LA11 + 2B 43	73 LA27 ; 3B 59	113 TA11 K 4B 75	133 TA27 [5B 91	153 SA11 k 6B 107	173 SA27 { 7B 123
1 1 0 0	14 FF C 12	34 FS 1C 28	54 LA12 , 2C 44	74 LA28 < 3C 60	114 TA12 L 4C 76	134 TA28 \ 5C 92	154 SA12 l 6C 108	174 SA28 ¦ 7C 124
1 1 0 1	15 CR D 13	35 GS 1D 29	55 LA13 – 2D 45	75 LA29 = 3D 61	115 TA13 M 4D 77	135 TA29] 5D 93	155 SA13 m 6D 109	175 SA29 } 7D 125
1 1 1 0	16 SO E 14	36 RS 1E 30	56 LA14 . 2E 46	76 LA30 > 3E 62	116 TA14 N 4E 78	136 TA30 ^ 5E 94	156 SA14 n 6E 110	176 SA30 ~ 7E 126
1 1 1 1	17 SI F 15	37 US 1F 31	57 LA15 / 2F 47	77 UNL ? 3F 63	117 TA15 O 4F 79	137 UNT – 5F 95	157 SA15 o 6F 111	177 RUBOUT (DEL) 7F 127
	ADDRESSED COMMANDS	UNIVERSAL COMMANDS	LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS	

KEY

octal → 5	PPC	← GPIB code (with ATN asserted)
	ENQ	← ASCII character
hex → 5	5	← decimal

Tektronix
REF: ANSI STD X3.4-1977
IEEE STD 488.1-1987
ISO STD 646-2973

Appendix B: Reserved Words

This is a list of reserved words for your instrument. Capital letters identify the required minimum spelling.

*CAL
*CLS
*DDT
*ESE
*ESR
*IDN
*LRN
*OPC
*PSC
*PUD
*RCL
*RST
*SAV
*SRE
*STB
*TRG
*TST
*WAI
0
1
1NR3
7
8
9
A
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
ABORt
ABOrt
ABSolute
AC
ACKMISS
ACKMISSERROR
ACQ
ACQLENGTH
ACQuire
ACTIVeprinter
ADD
ADDR10
ADDR7
ADDRANDDATA
ADDRess
ADDress
ADVanced
ALIas
ALIas[
ALL
ALLEv
ALLFields
ALLLines
ALLQString
ALTERNATE
ALWAYS
AMPLitude
AMPlitude
AND
APPKey
APPpwr
AREa
ASCII
ASSIgn
ATRIGger
AUDio
AUTO
AUTOSet
AUTOZero
AUX
AUXOut
AUXin
AVErage
Auto
B
B0
B1
B2
B3
B4
B5
B6
B7
B8
B9
BACKLight
BACKWards
BANdwidth
BASE
BDIFFBP
BINary
BITDelay
BITOrder
BITRate
BIT_Nr
BIT
BLAckmanharris
BM
BMP
BN_Fmt
BOTh
BOX
BTRIGger
BURst
BUS
BUSY
BYPass
BYT_Nr
BYT_Or
Block
C1
C2
C3
CALCmethod
CALibrate
CAN
CANH
CANL
CARD
CATalog
CH1
CH2
CH3
CH4
CHANnel
CHecksum
CLASSALIMit
CLAss
CLEAR
CLEARMenu
CLEARSNapshot
CLEar
CLOCK
CLOCk
CM10BY15
CM13BY18
CM15BY21
CM18BY24
CM6BY8
CM7BY10
CM9BY13
CMEan
COLUMN
COMMAND
CONDCALCmethod
CONDition
CONDuction
CONFigure
CONTROl
CONTinue
COPy
COUNt
COUPling
CPU
CR
CRC
CRCHeader
CRCTrailer
CREATE
CRMs
CROSSHair
CURRENTSOurce
CURRent
CURSor
CURSors
CURVe
CURrent
CUSTom
CWD
CYCLEcount
D
D0
D1
D10
D11
D12
D13
D14
D15

D2
D3
D4
D5
D6
D7
D8
D9
DATA
DATABits
DATE
DATEPrint
DATa
DAll
DB
DC
DDT
DECimal
DEFLT
DEFault
DEFine
DEGAUss
DEGrees
DELEte
DELIMiter
DELTa
DELTatime
DELay
DELayed
DESE
DESKew
DESTination
DHCPbootp
DIAg
DIFFerential
DIGital
DIRection
DISabled
DISplay
DISplaymode
DNS
DOMAINname
DOTsonly
DPOModels
DRAFT
DUAL
DYNAMic
ECL
EDGE
EEPROM
EIther
ENAble
ENCdg
END
ENERGY
ENERGYLoss
ENET
ENGLish
ENV
ENVelope
EOF
EOFTYPE
EQual
EQual
ERROR
ERRTYPE
ERRlog
ETHERnet
EVEN
EVENT
EVENTS
EVENTtable
EVMsg
EVQty
EXECute
EXT
EXTended
EXTernal
FACtor
FACtory
FAIL
FAILures
FALL
FALSe
FALling
FASTPHOTO
FASTer
FAStest
FFT
FIELD
FIFty
FILEFormat
FILESystem
FILter
FINE
FIRst
FIVEdivs
FIXEDFREQValue
FIXEDFREQuency
FLAg
FLEXray
FOCUS
FOLder
FORCEDRange
FORCe
FORMat
FORWards
FPAnel
FRACTional
FRAME
FRAMEID
FRAMESync
FRAMEType
FRAMETypeid
FRAMEtype
FRAMetime
FRAMing
FRAme
FREE
FREESpace
FRENch
FREQREFerence
FREQRef
FREQuency
FULl
FUNCtion
FUNDamental
GAIN
GATEMid
GATESOurce
GATEWay
GATIng
GATe
GATing
GENeralcall
GERMan
GND
GPIBUsb
GRAph
GRAticule
GRId
GROUPing
HAGAKIPCARD
HAMming
HANning
HARDCopy
HARM3ALTernate
HARM5ALTernate
HARMSOURce
HARMonics
HBArs
HD1080I50
HD1080I60
HD1080P24
HD1080P25
HD1080PSF24
HD480P60
HD720P60
HDtv
HEADER
HEADer
HEADertime
HEIght
HERtz
HEXadecimal
HIGH
HIGHLimit
HIRes
HIStogram
HIVALue
HOLDTime
HOLDoff
HORizontal
HTTPPort
HYSTeresis
I2C
I2S
ICRESTfactor
ID
IDANDDATA
IDFORmat
IDLEtime
IDPrint
IDentifier
IEC
IECMAX
IMAGESize
IMAGe
IMAge
IMMed
IMPedance
IN
IN11BY17
IN2P5BY3P25
IN4BY6
IN8BY10
INDBits
INDICators
INDIvidual
INDependent
INFInite
INIT
INKSaver
INPUTPOWer
INPut
INTENSITy
INTERLAced
INTERNal
INVERTed
INVert
INVerted
INrange

IO
IPADDress
IRMS
ITALian
JAPAnese
KOREan
L
L2
L4
LABEL
LABel
LANGuage
LANdscape
LARge
LAYout
LEFt
LESSEQual
LESSLimit
LESSthan
LESSthan
LETTER
LEVel
LF
LIMITS
LIMit
LIN
LINE
LINEAr
LINEFREQuency
LINEPeriod
LINear
LIST
LJ
LOCk
LOG
LOGIC
LOOP
LOW
LOWCurrent
LOWLimit
LOWVoltage
LOWerthreshold
LSB
MAG
MAGnivu
MAIN
MAIn
MARK
MARKSINCOLumn
MASK
MATH
MATH1
MATHVAR
MATH[1]
MAX
MAXAmps
MAXSamplerate
MAXVolts
MAXWatts
MAXimum
MEAN
MEAS
MEASUrement
MEDium
MEG
MESSage
METHod
MID
MID2
MID<1-3>
MID<x>
MIL
MIN
MINImum
MINMax
MISO
MISOMOSI
MIXed
MKDir
MM100BY150
MM54BY86
MODE
MODULationanalysis
MODe
MODel
MODulation
MOREEQual
MORELimit
MOREthan
MOREthan
MOSI
MSB
NAME
NAMe]
NANd
NDUty
NEGative
NEWpass
NEXT
NOCARE
NONE
NOPARity
NOR
NORMal
NR1
NR3
NRMAL
NR_HARMonics
NR_PT
NTIMES
NTSc
NULL
NULLFRDynamic
NULLFRStatic
NULl
NUMACq
NUMAVg
NUMCYCles
NUMENTries
NUMERic
NUMEnv
NUMHORZ
NUMVERT
NWIdth
OBSPERiod
ODD
OFF
OFFSet
ON
ONCE
ONFAIL
OPTion
OR
OUT
OUTrange
OVERLoad
OWNer
PACKET
PAL
PAPERSize
PAPERType
PARallel
PARity
PASS
PASSFail
PASSWord
PATtern
PAYLength
PAYLoad
PDUty
PEAKdetect
PERCent
PERIod
PERSistence
PHASEangle
PHASe
PHOTO
PICTBridge
PK2Pk
PLAIN
PLOTTYPe
PNG
POHC
POHCLIMit
POHL
POINTS
POLARCord
POLARity
POLar
POLarity
PORTRait
PORTUguese
POSition
POSitive
POWER
POWERFACtor
POWERFactor
POWERLEVel
POWERLoss
POWer
POWerupstatus
PPULSECount
PRESS
PREVIEW
PREViewstate
PREVious
PRINTQual
PRINTer
PRODDELta
PRODUCT
PRODUCTID
PRODuct
PROGressive
PROPDELay
PRObe
PT_Fmt
PT_ORder
PT_Off
PULSEWIDth
PULSEWidth
PULSe
PULse
PWIdth
QString
QStringQString
QTY
QUALifier
QUALity
Qstring
RADIUS
RATDELta
RATE15K

RATE1M
RATE20K
RATE25K
RATE35K
RATE50K
RATE800K
RATIO
RATio
RDELta
RDSon
REACTpwr
READ
READFile
READOUT
RECAll
RECDESkew
RECOrdlength
RECTangular
REF
REF1
REF2
REF3
REF4
REFLevel
REM
REMote
REName
REPEATstart
RESET
RESOlution
RESPtime
RESUlt
RESistance
RESults
RI
RIBinary
RIGht
RIPPle
RISEFall
RISe
RISing
RJ
RMDir
RMS
ROLL100MM
ROLL127MM
ROLL210MM
ROLL89MM
ROM
RPBinary
RS232
RS232C
RUN
RUNSTop
RUNT
RUSSian
RWINClude
RX
RXDATA
RXENDPacket
RXSTArt
SAMPLERate
SAMPLEpoint
SAMple
SAVe
SCAN
SCAle
SCLK
SCREEN
SDATA
SEARCH
SECAM
SEConds
SELect
SELected
SEQuence
SERIALnumber
SERnumber
SET
SETALLtorec
SETHold
SETLevel
SETTODEFaults
SETTime
SETUp
SEVENTYFive
SHOW
SIGNEDDECimal
SIGnal
SIMPlifiedchinese
SIZe
SLEEP
SLEWRate
SLOWer
SLOpe
SMAll
SNAPShot
SNAp
SOA
SOF
SOURCE
SOURCE2
SOURCE[1]
SPANish
SPC
SPECTral
SPI
SPREADSheet
SPace
SRIbinary
SRPbinary
STANDard
START
STARTup
STARTupnosync
STARtbyte
STATE
STATIstics
STATus
STATe
STATic
STATus
STDdev
STOP
STOPAfter
STOPOnviol
STRing
STYle
STandard
SUBNETMask
SWITCHingloss
SWLoss
SYNC
SYNCField
SYNCFrame
SYNCInterval
String
TABle
TDM
TEKSecure
TEMPerature
TERmination
TEST
TESTnumber
THDELta
THDF
THDR
THETA
THREshold
TIFf
TIME
TOFF
TON
TOTAL
TOTaluptime
TRACk
TRADitionalchinese
TRANsition
TRIGger
TRIGgertosearch
TRUEpwr
TRUe
TTL
TURN
TURNON
TWEnty
TWOfifty
TX
TXDATA
TXENDPacket
TXRX
TXSTArt
TYPE
Than
UNDo
UNEQual
UNIts
UNLock
UPPerthreshold
USBDevice
USBTMC
USER
V1X
V2X
VALue
VBArs
VCEsat
VCRESTfactor
VDELTa
VENDORID
VERBose
VERTAUTOset
VERTDEFault
VERTical
VIDeo
VOLTAGESOurce
VOLTage
VOLts
VRMS
WAKEup
WAVEform
WAVFrm
WEIghting
WFId
WFMInpre
WFMOutpre
WIDth
WINdow
WORD
WORDSel
WRITE
WRITEFile

X
X1Y1X2Y2
XDELta
XFF
XINcr
XMAX
XMIN
XUNit
XY
XZEro
Y
YDELta
YES
YMAX
YMIN
YMUlt
YOFf
YT
YUNit
YUNits
YZEro
ZOOm

Appendix C: Programming Example

The following series of commands and queries illustrate many of the most common commands and techniques. In this example, data sent from the controller computer to the oscilloscope is prefaced with the > symbol. Replies from the oscilloscope have no preface.

> rem “Check for any messages, and clear them from the queue.”

> *esr?

128

> allev?

:ALLEV 401,”Power on; “

> rem “Set the scope to the default state.”

> factory

> rem “Set the scope parameters that differ from the defaults.”

> ch1:scale 2.0

> hor:scale 100e-6

> trig:a:level 2.4

> rem “Start a single sequence acquisition.”

> acquire:stopafter sequence

> acquire:state on

> rem “Wait for the acquisition to complete.”

> rem “Note: your controller program time-out must be set long enough to handle the wait.”

> *opc?

1

> rem “Use the oscilloscope built-in measurements to measure the waveform you acquired.”

> measu:immed:type mean

> measu:immed:value?

:MEASUREMENT:IMMED:VALUE 1.2767

> rem “Be sure to use the *esr? query to check for measurement errors.”

> measu:immed:type freq

> measu:immed:value

:MEASUREMENT:IMMED:VALUE 9.9100E+37

> *esr?

16

> allev?

:ALLEV 2202,”Measurement error, No period found “

> rem “Query out the waveform points, for later analysis on your controller computer.”

> data:encdg ascii

> curve?

:CURVE 7,6,5,5,5,6,6,6,8 [...}

> rem “Query out the parameters used for calculated the times and voltages of the waveform points.”

> wfmpre?

:WFMPRE:BYT_NR 1;BIT_NR 8;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;NR_PT 1000; [...]

Appendix D: Waveform Transfer (WFMOutpre and CURVe Query) Examples

Here are several examples of command sequences using the `WFMOutpre?` and `CURVe?` queries to transfer data from the oscilloscope to a PC, with different data sources, including Analog, Digital, and Digital Collection waveforms. Each command sequence example is followed by an explanation of the returned `WFMOutpre?` results. The `WFMOutpre?` values act as settings that apply to the `CURVe` query data being transferred.

NOTE. *In order to guarantee that the waveform data returned from `CURVE?` queries of multiple waveforms are correlated to the same acquisition, you should use single sequence acquisition mode to acquire the waveform data from a single acquisition. Single sequence acquisition mode is enabled using ACQuire:STOPAfter `SEQuence`.*

Example 1: Analog Waveform (Channels 1–4)

Goal: Transfer 10,000 points of analog channel waveform data from the oscilloscope to a PC.

Command	Comment
:DATa:SOUrce CH1	
:DATa:START 1	
:DATa:STOP 10000	
:WFMOutpre:ENCdg BINARY	
:WFMOutpre:BYT_Nr 1	
:HEADer 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a `CURVe?` query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): `:WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG BINARY;BN_FMT RI;BYT_OR MSB;WFID "Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode";NR_PT 10000;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 4.0000E-9;XZERO -20.0000E-6;PT_OFF 0;YUNIT "V";YMULT 4.0000E-3;YOFF 0.0E+0;YZERO 0.0E+0`
:CURVE?	Returns 10,000 data points: :CURVe #510000<10,000 binary bytes of waveform data.>

NOTE. *You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.*

WFMOutpre? Query results	Explanation
BYT_NR 1	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 8	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG BINARY	This value specifies the encoding of the waveform data. To change this value (the other possibility is ASCii), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "Ch1, DC coupling, 100.0mV/div, 4.000us/div, 10000 points, Sample mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query.
NR_PT 10000	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT "s"	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 4.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -20.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)

WFMOutpre? Query results	Explanation
YUNIT “V”	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, volts. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
YMULT 4.0000E-3	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
YOFF 0.0E+0	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
YZERO 0.0E+0	This value indicates the vertical offset of the source waveform in units specified by the WFMOUTpre:YUNit command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 2: Digital Waveform (Channels DO-D15)

Goal: Transfer 25 points of digital channel waveform data from the oscilloscope to a PC.

Command	Comment
:DATa:SOUrce D5	
:DATa:START 1	
:DATa:STOP 25	
:WFMOutpre:ENCdg ASCii	
:WFMOutpre:BYT_Nr 1	
:HEADer 1	
:VERBose 1	
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 1;BIT_NR 8;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "D5, unknown coupling, 100.0us/div, 10000 points, Digitalmode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe 0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 1	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 8	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
WFID "D5, unknown coupling, 100.0us/div, 10000 points, Digital mode"	This quoted string represents information about the source waveform that would be returned by a. WFMOutpre:WFId? query. It cannot be changed.
NR_PT 25	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
PT_FMT Y	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only. (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
PT_ORDER LINEAR	This value is always LINear.
XUNIT “s”	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is “s”, representing seconds. When using the math waveform as a source, the value can be “s” or “Hz”. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
XINCR 100.0000E-9	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
XZERO -500.0000E-6	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
PT_OFF 0	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)

WFMOutpre? Query results	Explanation
`YUNIT "State"`	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
`YMULT 1.0000`	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
`YOFF 0.0E+0`	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
`YZERO 0.0E+0`	This value indicates the vertical offset of the source waveform in units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 3: The Digital Collection with 4 Bytes Per Point and MagniVu Off

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 4 bytes per point and MagniVu off.

Command	Comment
`:DATa:SOUrce DIGital`	
`:ACQuire:MAGnivu 0`	
`:DATa:START 1`	
`:DATa:STOP 25`	
`:WFMOutpre:ENCdg ASCii`	
`:WFMOutpre:BYT_Nr 4`	
`:HEADer 1`	
`:VERBose 1`	
`:WFMOutpre?`	Returns the following values. Each value represents the current settings that a `CURVe?` query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): `:WFMOUTPRE:BYT_NR 4;BIT_NR 32;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0`
`:CURVe?`	Returns the following values. Each value represents a data point: `:CURVe FB386,FB366,FB3E6,FB366,FB3E6,FB32E,FB3A2,FB32E,FB3AA,FB366, FB3EA,FB366,FB3E2,FB36,FB3E6,FB366,FB3E6,FB346,FB3C6,FB346,FB3C6, FB34E,FB3C2,FB34E,FB3CA`

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes. For example, a 4-byte digital collection value of FB386 should be interpreted as 000FB386.*

NOTE. *You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.*

WFMOutpre? Query results	Explanation
`WFMOUTPRE:BYT_NR 4`	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the `BIT_NR` value accordingly. (This value can also be set using the DATa:WIDth command.)
`BIT_NR 32`	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the `BYT_NR` value accordingly.
`ENCDG ASCII`	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the `WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,`: and `WFMOutpre:BYT_Or` values using a single command.)
`BN_FMT RI`	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
`BYT_OR MSB`	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
`WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"`	This quoted string represents information about the source waveform that would be returned by a. `WFMOutpre:WFId?` query. It cannot be changed.
`NR_PT 25`	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
`PT_FMT Y`	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
`PT_ORDER LINEAR`	This value is always `LINear`.
`XUNIT “s”`	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. For live channels, this value is “s”, representing seconds. When using the math waveform as a source, the value can be “s” or “Hz”. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)

WFMOutpre? Query results	Explanation
`XINCR 100.0000E-9`	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
`XZERO -500.0000E-6`	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
`PT_OFF 0`	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
`YUNIT "State"`	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
`YMULT 1.0000`	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
`YOFF 0.0E+0`	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
`YZERO 0.0E+0`	This value indicates the vertical offset of the source waveform in units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 4: The Digital Collection with 8 Bytes Per Point and MagniVu Off

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 8 bytes per point and MagniVu off.

Command	Comment
`:DATa:SOUrce DIGital`	
`:ACQuire:MAGnivu 0`	
`:DATa:START 1`	
`:DATa:STOP 25`	
`:WFMOutpre:ENCdg ASCii`	
`:WFMOutpre:BYT_Nr 8`	
`:HEADer 1`	
`:VERBose 1`	

Command	Comment
:WFMOutpre?	Returns the following values. Each value represents the current settings that a CURVe? query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): :WFMOUTPRE:BYT_NR 8;BIT_NR 64;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 100.0000E-9;XZERO -500.0000E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0
:CURVe?	Returns the following values. Each value represents a data point: :CURVe 80000FB386,E0000FB386,80000FB3E6,80000FB3E6,80000FB3E6, C8000FB3A6,8C000FB3A6, 8C000FB3A6,84000FB3AE,CC000FB3A6, 8C000FB3E6,8C000FB3E6,84000FB3E6,80000FB3E6,80000FB3E6, 80000FB3E6,80000FB3E6,A0000FB3C6,80000FB3C6,80000FB3C6, 80000FB3C6,88000FB3C6,8C000FB3C6, 8C000FB3C6,84000FB3CE

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the WAVFrm? query, which concatenates the WFMOutpre? and CURVe? queries.*

WFMOutpre? Query results	Explanation
WFMOUTPRE:BYT_NR 8	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the BIT_NR value accordingly. (This value can also be set using the DATa:WIDth command.)
BIT_NR 64	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the BYT_NR value accordingly.
ENCDG ASCII	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,: and WFMOutpre:BYT_Or values using a single command.)
BN_FMT RI	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
BYT_OR MSB	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.

WFMOutpre? Query results	Explanation
`WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"`	This quoted string represents information about the source waveform that would be returned by a. `WFMOutpre:WFId?` query. It cannot be changed.
`NR_PT 25`	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
`PT_FMT Y`	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
`PT_ORDER LINEAR`	This value is always `LINear`.
`XUNIT "s"`	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is "s", representing seconds. When using the math waveform as a source, the value can be "s" or "Hz". This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
`XINCR 100.0000E-9`	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
`XZERO -500.0000E-6`	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
`PT_OFF 0`	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
`YUNIT "State"`	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
`YMULT 1.0000`	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
`YOFF 0.0E+0`	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
`YZERO 0.0E+0`	This value indicates the vertical offset of the source waveform in units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 5: The Digital Collection with 4 Bytes Per Point and MagniVu On

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 4 bytes per point and MagniVu on.

Command	Comment
`:DATa:SOUrce DIGital`	
`:ACQuire:MAGnivu 1`	
`:DATa:START  1`	
`:DATa:STOP  25`	
`:WFMOutpre:ENCdg  ASCii`	
`:WFMOutpre:BYT_Nr 4`	
`:HEADer 1`	
`:VERBose 1`	
`:WFMOutpre?`	Returns the following values. Each value represents the current settings that a `CURVe?` query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): `:WFMOUTPRE:BYT_NR 4;BIT_NR 32;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 1.2121E-9;XZERO -6.0606E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0`
`:CURVe?`	Returns the following values. Each value represents a data point: `:CURVe FB6E6,FB666,FB6E6,FB666,FB666,FB6E6,FB666,FB6E6,FB666, FB666, FB6E6,FB666,FB6E6,FB6E6,FB666,FB6E6,FB666,FB666, FB6E6,FB666,FB6E6,FB6E6,FB666,FB6E6,FB666`

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.*

WFMOutpre? Query results	Explanation
`WFMOUTPRE:BYT_NR 4`	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the `BIT_NR` value accordingly. (This value can also be set using the DATa:WIDth command.)
`BIT_NR 32`	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nrcommand. Note that changing this value automatically changes the `BYT_NR` value accordingly.

WFMOutpre? Query results	Explanation
`ENCDG ASCII`	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the `WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,:` and `WFMOutpre:BYT_Or` values using a single command.)
`BN_FMT RI`	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
`BYT_OR MSB`	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
`WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"`	This quoted string represents information about the source waveform that would be returned by a. `WFMOutpre:WFId?` query. It cannot be changed.
`NR_PT 25`	This value indicates the number of data points in the waveform record to be transferred using the CURVE? query. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
`PT_FMT Y`	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
`PT_ORDER LINEAR`	This value is always `LINear`.
`XUNIT “s”`	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is “s”, representing seconds. When using the math waveform as a source, the value can be “s” or “Hz”. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
`XINCR 1.2121E-9`	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
`XZERO -6.0606E-6`	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)
`PT_OFF 0`	This is a query provided only for compatibility with performance oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
`YUNIT “State”`	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
`YMULT 1.0000`	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)

WFMOutpre? Query results	Explanation
`YOFF 0.0E+0`	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
`YZERO 0.0E+0`	This value indicates the vertical offset of the source waveform in units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Example 6: The Digital Collection with 8 Bytes Per Point and MagniVu On

Goal: Transfer 25 points of Digital Collection data from the oscilloscope to a PC using 8 bytes per point and MagniVu on.

Command	Comment
`:DATa:SOUrce DIGital`	
`:ACQuire:MAGnivu 1`	
`:DATa:START 1`	
`:DATa:STOP 25`	
`:WFMOutpre:ENCdg ASCii`	
`:WFMOutpre:BYT_Nr 8`	
`:HEADer 1`	
`:VERBose 1`	
`:WFMOutpre?`	Returns the following values. Each value represents the current settings that a `CURVe?` query will use to format the data that will be transferred from the oscilloscope to a PC or other device (see next table for explanations): `:WFMOUTPRE:BYT_NR 8;BIT_NR 64;ENCDG ASCII;BN_FMT RI;BYT_OR MSB;WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode";NR_PT 25;PT_FMT Y;PT_ORDER LINEAR;XUNIT "s";XINCR 1.2121E-9;XZERO -6.0606E-6;PT_OFF 0;YUNIT "State";YMULT 1.0000;YOFF 0.0E+0;YZERO 0.0E+0`
`:CURVe?`	Returns the following values. Each value represents a data point: `:CURVe 80000FB787,80000FB787,E8000FB787,8C000FB7E7,8C000FB7E7, 84000FB7EF,CC000FB7A7,8C000FB7A7,8C000FB7A7,84000FB7A7, 84000FB7A7,80000FB7A7,80000FB7A7,80000FB7A7,80000FB7A7, 80000FB7A7,80000FB7A7,80000FB7A7,C8000FB7A7,8C000FB7E7, 8C000FB7E7,84000FB7EF,CC000FB7A7,8C000FB7A7,8C000FB7A7`

NOTE. *The returned hexadecimal data values for the Digital Collection are formatted without leading zeroes.*

NOTE. *You can also use the `WAVFrm?` query, which concatenates the `WFMOutpre?` and `CURVe?` queries.*

WFMOutpre? Query results	Explanation
`WFMOUTPRE:BYT_NR 8`	This value specifies the number of bytes per data point in the waveform data. To change this value automatically, use the WFMOutpre:BYT_Nr command. Note that changing this value automatically changes the `BIT_NR` value accordingly. (This value can also be set using the DATa:WIDth command.)
`BIT_NR 64`	This value specifies the number of bits per data point in the waveform data. To change this value, use the WFMOutpre:BIT_Nr command. Note that changing this value automatically changes the `BYT_NR` value accordingly.
`ENCDG ASCII`	This value specifies the encoding of the waveform data. To change this value (the other possibility is BINARY), use the WFMOutpre:ENCdg command. (This value can also be set using the DATa:ENCdg command, which provides the ability to set the `WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,`: and `WFMOutpre:BYT_Or` values using a single command.)
`BN_FMT RI`	This value specifies the binary format, which in this case is RI (signed integer). To change this value (the other possibility is RP or positive integer), use the WFMOutpre:BN_Fmt command. Note: this field is not applicable for ASCii encoding.
`BYT_OR MSB`	This value specifies the byte order for the BINARY encoding, which in this case is MSB (most significant byte first, also known as IBM format). To change this value to LSB, use the WFMOutpre:BYT_Or command. Note: this field is not applicable for ASCii encoding.
`WFID "Digital, unknown coupling, 100.0us/div, 10000 points, Digital mode"`	This quoted string represents information about the source waveform that would be returned by a. `WFMOutpre:WFId?` query. It cannot be changed.
`NR_PT 25`	This value indicates the number of data points in the waveform record. (If you would like to determine only this value, use the WFMOutpre:NR_Pt? query.) Note: this value is typically equal to the full record length, but you also have the option to transfer only a portion of the record length by using the DATa:STARt and DATa:STOP commands.
`PT_FMT Y`	This value indicates the format of the data points in the waveform record. In this case, the value represents YT format. This is query only – the returned values can be Y for YT format or ENV for envelope format (min/max pairs). (If you would like to determine only this value, use the WFMOutpre:PT_Fmt? query.)
`PT_ORDER LINEAR`	This value is always `LINear`.
`XUNIT “s”`	This value indicates the units of the x-axis of the waveform record. This is determined by the horizontal settings for the waveform source. Typically, this value is “s”, representing seconds. When using the math waveform as a source, the value can be “s” or “Hz”. This is query only. (If you would like to determine only this value, use the WFMOutpre:XUNit? query.)
`XINCR 1.2121E-9`	This value indicates the time, in seconds, or frequency, in hertz, between data points in the waveform record. This is query only. (If you would like to determine only this value, use the WFMOutpre:XINcr? query.)
`XZERO -6.0606E-6`	This value indicates the time, in seconds, or frequency, in hertz, of the first data point in the waveform record. This time or frequency is relative to the time of the trigger, which is always 0. So, this XZEro time or frequency can be negative. This is query only. (If you would like to determine only this value, use the WFMOutpre:XZEro? query.)

WFMOutpre? Query results	Explanation
`PT_OFF 0`	This is a query provided only for compatibility with other Tektronix oscilloscopes. The returned value is always 0. (If you would like to determine only this value, use the WFMOutpre:PT_Off? query.)
`YUNIT “State”`	This value indicates the vertical units of data points in the waveform record. This can be any of several string values, depending upon the vertical units of the source waveform – in this case, State. This is query only. (If you would like to determine only this value, use the WFMOutpre:YUNit? query.)
`YMULT 1.0000`	This value indicates the multiplying factor to convert the data point values from digitizing levels to the units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YMUlt? query.)
`YOFF 0.0E+0`	This value indicates the vertical position of the source waveform in digitizing levels. There are 25 digitizing levels per vertical division. This is query only. (If you would like to determine only this value, use the WFMOutpre:YOFf? query.)
`YZERO 0.0E+0`	This value indicates the vertical offset of the source waveform in units specified by the `WFMOUTpre:YUNit` command. This is query only. (If you would like to determine only this value, use the WFMOutpre:YZEro? query.)

Appendix E: Search and Trigger Command Sequence Examples

The following are some example command sequences that show a variety of different searches and triggers. The commands in these sequences are not order-dependent.

To use these examples, connect channel 1, channel 2, channel 3 and channel 4 to the probe compensation signal located on the right hand side of the front panel.

The search and trigger command group sections contain more information on general search and trigger concepts. (See page 2-45, *Search Command Group*.) (See page 2-57, *Trigger Command Group*.)

Example 1: Single Threshold Edge Search

Goal: Search the channel 2 waveform and place a mark at each instance where it crosses below a threshold of 1.4 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH2 1	Turns the CH2 waveform on.
:AUTOSet EXECute	Autosets the displayed waveform CH2. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe EDGE	Specifies that this will be an edge search (a mark will be placed when the source waveform passes through a specified threshold level in the specified direction).
:SEARCH:SEARCH1:TRIGger:A:EDGE:SOUrce CH2	Specifies the CH2 waveform as the source waveform.
:SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:CH2 1.4	Specifies 1.4 volts as the threshold level.
:SEARCH:SEARCH1:TRIGger:A:EDGE:SLOpe FALL	Specifies the falling edge as the direction.
:SEARCH:SEARCH1:STATE 1	Turns the search on.
:SEARCH:SEARCH1:TOTal?	Returns 4, indicating that CH2 fell below the 1.4 volt threshold 4 times.
:SEARCH:SEARCH1:LIST?	Returns a list of the 4 marks: **CH2**,11.2411,11.2411,11.2411,-1.5504E-3, 0.0E+0,0.0E+0,0.0E+0;**CH2**,37.0737,37.0737,37.0737, -517.0517E-6,0.0E+0,0.0E+0,0.0E+0;**CH2**,62.9163,62.9163,62.9163, 516.6517E-6,0.0E+0,0.0E+0, 0.0E+0;**CH2**,88.7489,88.7489,88.7489, 1.5500E-3,0.0E+0,0.0E+0,0.0E+0

Example 2: Single Threshold Edge Trigger

Goal: Trigger on the channel 2 waveform when the waveform crosses below a threshold of 1.4 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH2 1	Turns the CH2 waveform on.
:TRIGger:A:TYPe EDGE	Specifies that this will be an edge trigger (trigger will occur when the source waveform passes through a specified threshold level in the specified direction).
:TRIGger:A:EDGE:SOUrce CH2	Specifies the CH2 waveform as the source waveform.
:TRIGger:A:LOWerthreshold:CH2 1.4	Specifies 1.4 volts as the threshold level.
:TRIGger:A:EDGE:SLOpe FALL	Specifies as falling edge as the direction.
:TRIGger:STATE?	Should return TRIGGER, not AUTO.

Example 3: Dual Threshold Runt Search

Goal: Search the channel 3 waveform for negative runt pulses and place a mark at each instance when the waveform drops below an upper threshold of 1.4 volts, but does not cross a lower threshold of -2 volts before re-crossing the upper threshold. The pulse width must be less than 600 microseconds.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH3 1	Turns the CH3 waveform on.
:AUTOSet EXECute	Autosets the displayed waveform CH3. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe RUNT	Specifies that this will be a runt search (a mark will be placed on a pulse amplitude that crosses one threshold but fails to cross a second threshold before re-crossing the first).
:SEARCH:SEARCH1:TRIGger:A:EDGE:SOUrce CH3	Specifies to use channel 3 as the source waveform.
:SEARCH:SEARCH1:TRIGger:A:LOWerthreshold:CH3 -2	Specifies to use -2 volts as the lower threshold.
:SEARCH:SEARCH1:TRIGger:A:UPPerthreshold: CH3 1.4	Specifies to use 1.4 volts as the upper threshold.
:SEARCH:SEARCH1:TRIGger:A:RUNT:POLarity NEGative	Specifies to search for when the runt polarity is negative.
:SEARCH:SEARCH1:TRIGger:A:RUNT:WIDth 600E-6	Specifies a pulse width of 600E-6 seconds.
:SEARCH:SEARCH1:TRIGger:A:RUNT:WHEn LESSthan	Specifies to search for when the pulse width is less than 600E-6 seconds.
:SEARCH:SEARCH1:STATE 1	Turns the search on.

Command	Comment
:SEARCH:SEARCH1:TOTal?	Returns 3, indicating that 3 total negative runt pulses were less than 600E-6 seconds wide
:SEARCH:SEARCH1:LIST?	Returns a list of 3 marks: **CH3**,11.2311,24.1624,24.1624,1.0335E3,0.0E+0,0.0E+0,0.0E+0;**CH3**,37.0837, 50.0150,50.0150,600.0600E9,0.0E+0,0.0E+0,0.0E+0;**CH3**,62.9263,75.8576, 75.8576,1.0343E-3,0.0E+0,0.0E+0,0.0E+0

NOTE. *You could use a similar command sequence with a transition type search.*

Example 4: Single Threshold Logic Search on Three Waveforms

Goal: Search the channel 1, 2 and 3 waveforms and place a mark at each instance when either channel 1 is above 1.4 volts, channel 2 is above 1.5 volts, or channel 3 is above 1.3 volts.

Command	Comment
*RST	Resets the oscilloscope. Wait for the reset to complete (approximately 3 seconds).
:SELect:CH1 1	Turns the CH1 waveform on.
:SELect:CH2 1	Turns the CH2 waveform on.
:SELect:CH3 1	Turns the CH3 waveform on.
:AUTOSet EXECute	Autosets the displayed waveforms CH1, CH2 and CH3. Wait for the autoset to complete (approximately 3 seconds).
:SEARCH:SEARCH1:TRIGger:A:TYPe LOGIc	Specifies that this will be a logic search (a mark will be placed when all channels transition to the specified state).
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH1 HIGH	Specifies the Boolean logic criteria for channel 1; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH2 HIGH	Specifies the Boolean logic criteria for channel 2; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:INPut:CH3 HIGH	Specifies the Boolean logic criteria for channel 3; in this case, high.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH1 1.4	Specifies to use 1.4 volts as the threshold for CH1.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH2 1.5	Specifies to use 1.5 volts as the threshold for CH2.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:THReshold:CH3 1.3	Specifies to use 1.3 volts as the threshold for CH3.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:PATtern:WHEn TRUE	Specifies the condition for generating a logic pattern search; in this case, true.
:SEARCH:SEARCH1:TRIGger:A:LOGIc:FUNCtion OR	Specifies the logic operator for the logic search; in this case, OR.
:SEARCH:SEARCH1:STATE 1	Turns the search on.

Command	Comment
:SEARCH:SEARCH1:TOTal?	Returns 3 or 4, indicating 3 or 4 times when one of channels 1, 2 or 3 became high. Note: Depending upon the number of transitions displayed, you may get 3 or 4 search marks for this example. If you get 3 search marks, try adjusting the horizontal position until you see 4 search marks.
:SEARCH:SEARCH1:LIST?	Returns a list of 3 marks on 3 waveforms: **CH1**,24.1600,24.1600,24.1600,1.0336E3,0.0E+0,0.0E+0, 0.0E+0;**CH2**,24.1600,24.1600,24.1600,1.0336E3,0.0E+0, 0.0E+0,0.0E+0;**CH3**,24.1600,24.1600,24.1600,1.0336E3, 0.0E+0,0.0E+0,0.0E+0;**CH1**,50.0000,50.0000,50.0000,0.0E+0, 0.0E+0,0.0E+0,0.0E+0;**CH2**,50.0000,50.0000,50.0000, 0.0E+0,0.0E+0,0.0E+0,0.0E+0;**CH3**,50.0000,50.0000,50.0000,0.0E+0, 0.0E+0,0.0E+0,0.0E+0;**CH1**,75.8300,75.8300,75.8300, 1.0332E3,0.0E+0,0.0E+0,0.0E+0;**CH2**,75.8300,75.8300,75.8300,1.0332E3, 0.0E+0,0.0E+0,0.0E+0;**CH3**,75.8300,75.8300,75.8300,1.0332E-3 ,0.0E+0,0.0E+0,0.0E+0

Index

Symbols and Numbers

A

B

C

D

N

O

P

R

T

U

V

W

Z