TekExpress® PCI Express Transmitter Compliance and Validation Software

Application Help

077-1762-02

TekExpress® PCI Express Transmitter Compliance and Validation Software

Application Help

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www.tek.com/register

077-1762-02

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USA

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

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

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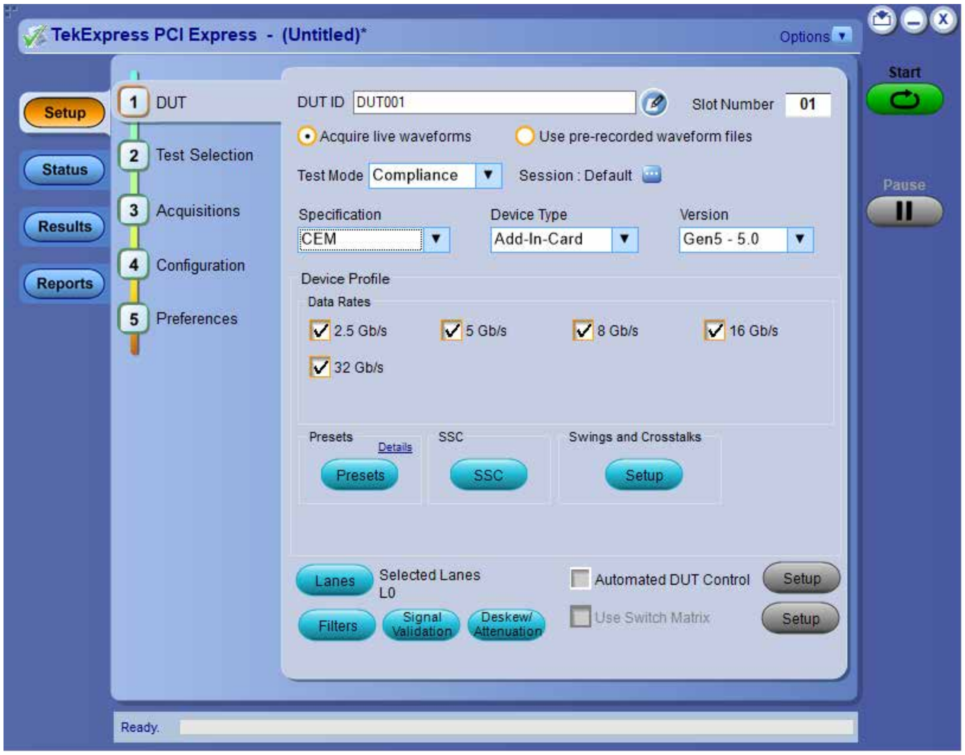
Welcome

The TekExpress® PCI Express Automated Test Solution Software application (referred to as TekExpress PCIe or PCIe in the rest of the document) provides an automated, simple, and efficient way to test PCI Express interfaces and devices consistent to the requirements of the PCI Express specifications.


TekExpress PCI Express - (Untitled)*
Options
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Device Profile
Presets
Details
SSC
Swings and Crosstalks
Lanes
Filters
Signal Validation
Deskew/ Attenuation

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Test Mode Compliance

Session : Default

Specification CEM

Device Type Add-In-Card

Version Gen5 - 5.0

Data Rates

☑ 2.5 Gb/s ☑ 5 Gb/s ☑ 8 Gb/s ☑ 16 Gb/s

☑ 32 Gb/s

Selected Lanes L0

☐ Automated DUT Control

☐ Use Switch Matrix

Ready.

TekExpress PCIe key features and benefits

- **New features from current release:**
  - Support for Gen6 PWJ measurements using PAMJET tool.
  - Integration of Automated Scope noise characterization and compensation for Gen6.
  - Integration of CTLE optimization for Gen6 jitter measurements.
  - Support for Mini-Circuits RF Switch for Gen1-5 testing.
  - Improvement in Gen6 Preset Test feature.
  - Updated Gen6 Preset tests limits as per latest spec.
  - Support for Intel Clock Jitter Tool (CJT) for Ref Clock testing.
  - Support for Sigtest Phoenix v5.1.04 for Gen5 CEM Signal and preset tests.
- **Existing Features:**
  - PCIe CEM TX Testing
    - Supports Add-In-Card and System Board device types
    - Supports Gen1, Gen2, Gen3, Gen4, and Gen5 versions
    - Supports Signal Quality Test for all generations
    - Supports Preset Test for Gen3, Gen4, and Gen5 generations
    - Supports Pulse Width Jitter Test for Gen4 and Gen5 Add-In-Card device type
  - PCIe Base TX testing

  - Supports both PCIe Gen5 Base Tx Common Clock & SRIS architecture
  - Supports Gen3, Gen4, and Gen5 versions
  - Supports Jitter & Voltage Signal Quality Test and Preset Test for all generations
- U.2 (SFF-8639) TX Testing
  - Supports Gen3 Host and Module device types
- M.2 TX Testing
  - Supports Gen3 M.2 Add-In-Card and Host device types
- PCIe Ref Clock TX Testing
  - Supports Gen3, Gen4, and Gen5 versions of CXL Base, CEM Card and CEM Host type device testing.
- PCIe CXL Testing
  - Supports Gen1 to Gen5 Ref Clock Jitter and Signal Integrity measurements
- Tektronix ATI (200GS/s) channel support for CEM, Base Spec, U.2, M.2 and Ref clock testing for all generations (Not applicable for CEM System Board Gen1-4 and U.2 Host Gen3)
- Supports channel embed and de-embed filter files
- Supports de-embedding on each ATI channel using separate filter files
- Supports Intel CJT, Skyworks Clock Jitter tool or DPOJet for ref clock analysis
- Supports traditional break-out channel de-embedding & SigTest CTLE (for uncorrelated jitter measurements only)
- Automated De-skew and attenuation for ATI Channels
- Supports single and multiple acquisition for CEM Gen4 and Gen5
- Trigger type support for Gen3, Gen4, and Gen5 (Auto/Width/Edge)
- Automated toggling of the DUT to switch presets for CEM, U.2, and M.2 device types using AWG/AFG/GRL PHY Test Controller/NI USB 6501 DUT Controller.
- Simple push button, enabling the users to manually toggle PCIe presets from AWG/AFG
- Support for Gen4 and Gen5 dataclock pattern custom toggle index in non standard devices.
- RF Switch support to test the x12 and x16 lanes using Keithley and Gigatronics switches respectively
- Fully automated General, Jitter, Composite Eye, Transition Eye, and Non Transition Eye measurements
- Provides individual or group test selection by using a tree-structure menu
- Supports preset test selection for all device types
- Integrated Intel Sigtest for fully automated waveform analysis
  - Supports parallel execution of measurements using multiple instances of SigTest to accelerate the test analysis speed
  - Deploys recommended versions of SigTests for analysis
    - Sigtest Phoenix v5.1.03: PCIe Gen5 CEM Spec
    - Sigtest v4.0.52: PCIe Gen4 CEM Spec, Gen4 and Gen5 Base Spec
    - Sigtest v4.0.42: PCIe Gen3 Base spec
    - Sigtest v3.2.0.3: PCIe Gen3 CEM Spec
  - Option to browse and select different Sigtest versions and templates for debug
  - Support Sigtest run in silent mode (Not applicable for Sigtest v3.2.0.3)
- Built-in reporting features:
  - Provides a Pass/Fail summary table
  - Provides generation specific pass/fail status summary table
  - Provides margin details on each test
  - Provides a consolidated report for all tests

  - Supports .pdf, .mht and .csv formats
- Provides Tektronix Method of Implementation (MOI) for PCIe testing Run-time setup instructions with image pop-ups and reference illustrations for each test execution
- Provides both an automation solution (for compliance) and DPOJET (for debug)
- TekExpress setup files in-line with PCI-SIG Compliance Workshop
- Supports SCPI commands to remotely communicate with the TekExpress application
- 33 GHz Oscilloscope supports CEM Gen5 TX testing using Tekconnect channels.
- Supports Eye Diagram plots for Base Spec through DPOJET
- Support for PCIe Gen6 Base Spec TX signal quality test using PAMJet and DPOJet analysis tools.
- Support for PCIe Gen6 Base Spec TX preset test.
- Support for Base Spec Gen6 signal validation using PAMJet tool.
- Improved UI look and feel.

Getting help and support

Product documents

Use the product documents for more information on the application functions, understand the theory of operation, how to remotely program or operate the application, and do other tasks.

Table 1: TekExpress Application documents

To learn about	Use this document
How to use the application How to remotely control the instrument	TekExpress PCI Express Help PDF version of this document can be downloaded from *www.tek.com/downloads* Compiled HTML (CHM) version is integrated with the application. Press **F1** key from the keyboard to start the help. Tektronix Part Number: 077-xxxx-xx

Conventions

This application help uses the following conventions:

- The term "Application," and "Software" refers to the TekExpress PCI Express application.
- The term “DUT” is an abbreviation for Device Under Test.
- The term “select” is a generic term that applies to the two methods of choosing a screen item (button control, list item): using a mouse or using the touch screen.
- A **Note** identifies important information.

Table 2: Icons used in the help

Icon	Description
🗒	This icon identifies important information
⚠	This icon identifies conditions or practices that could result in loss of data.
💡	This icon identifies additional information that will help you use the application more efficiently.

Technical support

Tektronix values your feedback on our products. To help us serve you better, please send us your suggestions, ideas, or comments on your application or oscilloscope. Contact Tektronix through mail, telephone, or the Web site. See *Contacting Tektronix* at the front of this document for contact information.

When you contact Tektronix Technical Support, please include the following information (be as specific as possible):

General information

- All instrument model numbers
- Hardware options, if any
- Modules used
- Your name, company, mailing address, phone number, FAX number
- Please indicate if you would like to be contacted by Tektronix about your suggestion or comments.

Application specific information

- Software version number
- Description of the problem such that technical support can duplicate the problem
- If possible, save the setup files for all the instruments used and the application
- If possible, save the TekExpress setup files, log.xml, *.TekX (session files and folders), and status messages text file

Getting started

Hardware requirements

Minimum system requirements

The following table shows the minimum system requirements needed for an oscilloscope to run TekExpress PCI Express.

Table 3: System requirements

Component	Requirement
Oscilloscope	See *Instruments and accessories required*
Processor	Same as the oscilloscope
Operating system	Microsoft Windows 10 (64-bit only) *Required Windows 10 user account settings*
Memory	Same as the oscilloscope
Hard disk	Same as the oscilloscope
Display	Same as the oscilloscope [1]
Firmware	Tekscope for MSO/DSA/DPO70000C, D, DX, SX [2]
Software	- DPOJET, Jitter and Eye Diagram Analysis Tool[2] - PAMJet Analysis Tool [2] [3] - Microsoft .NET 4.0 Framework - Microsoft Internet Explorer 8.0 SP1 or later - PyVisa version 1.0.0 - IronPython version 2.7.3 - Microsoft Photo Editor 3.0 or equivalent software for viewing image files - Adobe Reader 7.0 or equivalent software for viewing portable document format (PDF) files

---

[1] If TekExpress is running on an instrument having a video resolution lower than 800x600 (for example, a sampling oscilloscope), it is recommended that you connect a secondary monitor, which must be enabled before starting the application.

[2] For software version, refer to `Readme TekExpress PCI Express.txt` file at `C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express`

[3] The TekExpress PCIe Installer does not install PAMJet application. User needs to install the right PAMJet software and ensure that the option key is enabled.

Instruments and accessories required

The following table lists the instruments and accessories required for TekExpress PCI Express application.

Table 4: Instruments and accessories required for PCI Express application

Instrument/Accessory	Model number
Oscilloscope	MSO70604 [4], DPO/MSO70604C (Gen1 testing only) MSO70804[4], DPO/MSO70804C (Gen1 and Gen2 testing) MSO71254[4], DPO/MSO71254C (Gen1, Gen2, and Gen3 testing only) MSO71604[4], DPO/MSO71604C (Gen1, Gen2, and Gen3 testing) MSO72004[4], DPO/MSO72004C (Gen1, Gen2, and Gen3 testing) DPO/MSO72304DX (Gen1, Gen2, and Gen3 testing) DPO/DSA72504D (Gen1, Gen2, Gen3, and Gen4 testing) DPO/DSA73304D (all generation testing) DPO/MSO72304DX (Gen1, Gen2, and Gen3 testing) DPO/MSO72504DX (all generation testing) DPO/MSO73304DX (Gen1, Gen2, Gen3, and Gen4 testing) DPO71304SX (Gen1, Gen2, and Gen3 testing) DPO71604SX (Gen1, Gen2, and Gen3 testing) DPO72304SX (Gen1, Gen2, and Gen3 testing) DPO73304SX All Generation Testing DPO75002SX [Standalone or 2 Stack] All Generation Testing DPO75902SX [Standalone or 2 Stack] All Generation Testing DPO77002SX [Standalone or 2 Stack] All Generation Testing
Arbitrary Function Generator (AFG) [5] (for automatic test pattern toggling)	Tektronix AFG3252, AFG3252C, AFG31252
Arbitrary Waveform Generator (AWG) (for automatic test pattern toggling)	• Tektronix AWG5002B/C, AWG5012B/C, AWG5014B/C • Tektronix AWG7082B/C, AWG7122B/C • Tektronix AWG70001A, AWG70002A
RF Switch [6] [7]	• Keithley System S46T RF Microwave Switch Systems for x12 PCIe • Gigatronics RF Switch 26GHz (8902-L-48TS26) for x16 PCIe • MiniCircuit ZTM6SP4T40 for x12 PCIe • MiniCircuit ZTM28SP6T40 for x16 PCIe

Table continued…

---

[4] Requires Microsoft Windows 10 (64-bit) operating system. Contact your local Tektronix Customer Service representative for upgrade information.

[5] The listed AFG/AWG instruments support both differential inputs (requires 2 channels) and 100 MHz burst mode.

[6] Use GPIB cable or USB-to-GPIB or USB cable to connect the oscilloscope to switch.

[7] The GPIB address of the RF Switch and toggle instrument (AWG/AFG) must be different.

Instrument/Accessory	Model number
GRL PCIE34 Controller for automatic test pattern toggling and DUT power cycle [8]	Part number : GRL-PCIE34-P1 Contact GRL at *support@graniteriverlabs.com* for support and *quote@graniteriverlabs.com* to request for a quote.
NIUSB-6501 for automatic toggling of Gen4 DUTs	Part Number: 779205-01 Discuss product recommendations, quote products, and place an order. • Contact : + 91 80-4119 0000 • Visit : *www.ni.com/en-in/support/model.usb-6501.html*
Other devices	• SMP-SMA cables • TCA-SMA connectors • Matched pair cables

Differential probes

P7513, P7513A, P7516, P7520A, P7625, P7630, P7633, P7713, P7716, P7720 with respective tips

PCI Express						
Speed	**Minimum oscilloscope bandwidth**	TCA-SMA (Max 18 GHz)	TCA-292D (Max 33 GHz)	P7500 (Max 20 GHz)	P7700 (Max 20 GHz)	P7600 (Max 33 GHz)
2.5 GT/s	6 GHz	√	√	√	√	√
5.0 GT/s	12.5 GHz	√	√	√	√	√
8.0 GT/s	13 GHz	√	√	√	√	√
16.0 GT/s	25 GHz		√			√
32.0 GT/s	50 GHz		√			
100 MHz RefClk	5 GHz	√	√	√	√	√

Software requirements

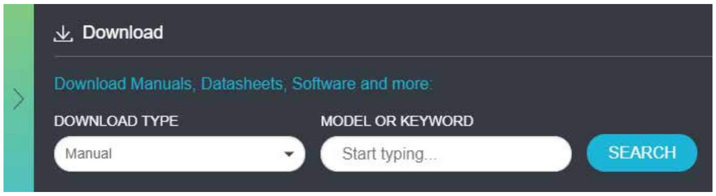
Downloading and installing the software

Complete the following steps to download and install the latest TekExpress PCI Express application.

1. Go to *www.tek.com*.
2. Click **Downloads**. In the Downloads menu, select DOWNLOAD TYPE as Software and enter the application name in the MODEL OR KEYWORD field and click **SEARCH**.

---

[8] DUT power cycle is supported for Add-In-Card DUT type only



Download Manuals, Datasheets, Software and more:

DOWNLOAD TYPE: Manual

MODEL OR KEYWORD: Start typing...

3. Select the latest version of software and follow the instructions to download the software. Copy the executable file into the oscilloscope.
4. Double-click the executable and follow the on-screen instructions.

   The software is installed at `C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express`.
5. Select **Application** > **TekExpress PCI Express** from the Oscilloscope menu, to open the application.

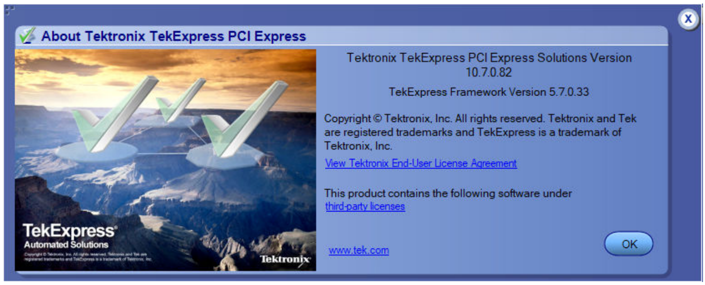
Activate the license

Activate the license using the **Option Installation** wizard in the TekScope application:

1. In the **TekScope** application menu bar, click **Utilities** > **Option Installation**. The TekScope Option Installation wizard opens.
2. Push the **F1** key on the oscilloscope keyboard to open the Option Installation help topic.
3. Follow the directions in the help topic to activate the license.

View software version and license key details

To view version information of the application, click **Options > About TekExpress**.



Tektronix TekExpress PCI Express Solutions Version 10.7.0.82

TekExpress Framework Version 5.7.0.33

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View Tektronix End-User License Agreement

This product contains the following software under third-party licenses

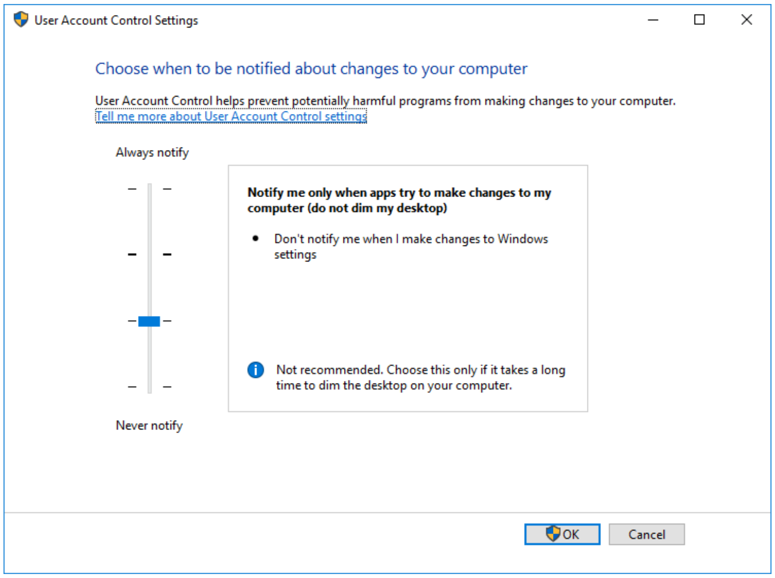
www.tek.com

Setting up the test environment

Windows 10 user account settings

Windows 10 instruments need to have the User Account Control Settings set to **Never Notify**. To set User Account Control Settings:

1. Go to **Control Panel > User Accounts > Change User Account Control settings**.
2. Set the sliding control to **Always notify** as shown in the image, and click **OK**.



Choose when to be notified about changes to your computer

User Account Control helps prevent potentially harmful programs from making changes to your computer.

Tell me more about User Account Control settings

Notify me only when apps try to make changes to my computer (do not dim my desktop)

- Don't notify me when I make changes to Windows settings

Not recommended. Choose this only if it takes a long time to dim the desktop on your computer.

See also

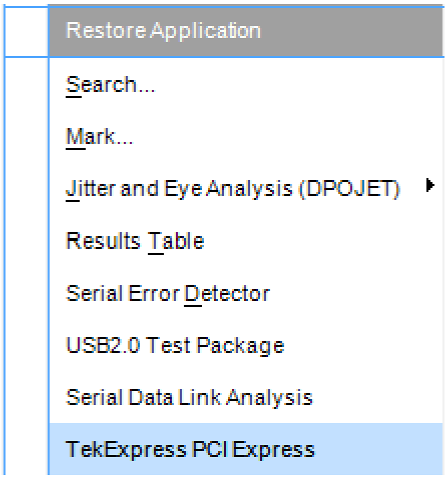
Instruments and accessories required on page 14

Install the software

Use the following steps to install PCI Express software on any compatible instrument running Microsoft Windows 10 (64-bit). See *Minimum System Requirements* for details.

1. Close all applications (including the TekScope application).
2. Go to the www.tek.com Web site and search for TekExpress PCI Express to locate the installation file. Download the file `TekExpress_PCIe_Deployment_Package.exe`.
3. Copy or download the PCIe installer file to the oscilloscope.
4. Double-click the installer .exe file to extract the installation files and start the InstallShield Wizard. Follow the on-screen instructions. The software installs in the following location:

   C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express
5. The installer updates the TekScope Analyze menu to include the installed options.



See also

Minimum system requirements

Instruments and accessories required on page 14

Set application file permissions

Before you run tests for the first time, do the following:

1. Understand where your test files are stored on the instrument.

   After you install and start TekExpress PCIe, it creates the following folders on the oscilloscope:

   - `\My Documents\My TekExpress\PCI Express`
   - `\My Documents\My TekExpress\PCI Express\Untitled Session`

   Every time you start TekExpress PCIe, an `Untitled Session` folder is created in the `PCIe` folder. The `Untitled Session` folder is automatically deleted when you exit the `PCIe` application. To preserve your test session files, save the test setup before exiting the TekExpress application.

   CAUTION:

   ⚠ Do not modify any of the session files or folders because this may result in loss of data or corrupted session files. Each session has multiple files associated with it. When you save a session, a .TekX file, and a folder named for the session that contains associated files, is created on the oscilloscope X: drive.

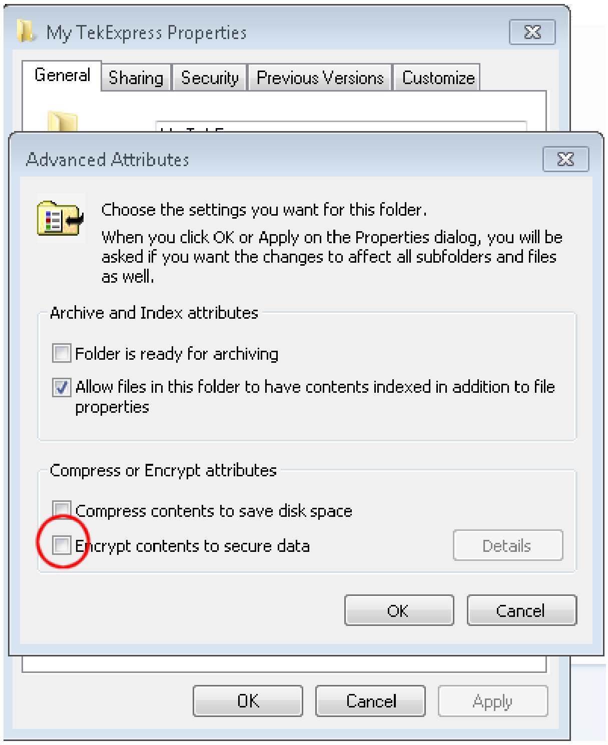
2. Map the shared My TekExpress folder as **X:** (X drive) on the instruments used in test setups running Microsoft Windows Operating System.

   The My TekExpress folder has the share name format `<domain><user ID>My TekExpress`. Or, if the instrument is not connected to a domain, the share name format is `<instrument name><user ID>My TekExpress`. This shared folder is used to save the waveform files and is used during other file transfer operations.

   ⚠ **Note:** If the X: drive is mapped to any other shared folder, the application will display a warning message asking you to disconnect the X: drive manually.

3. Make sure that the My TekExpress folder (Drive X:) has read and write access:

   a. Right-click the folder and select **Properties**.
   b. Select the **General** tab and then click **Advanced**.
   c. In the Advanced Attributes dialog box, make sure that the option **Encrypt contents to secure data** is NOT selected (not checked).



Advanced Attributes

Choose the settings you want for this folder.

When you click OK or Apply on the Properties dialog, you will be asked if you want the changes to affect all subfolders and files as well.

Archive and Index attributes

☐ Folder is ready for archiving

☑ Allow files in this folder to have contents indexed in addition to file properties

Compress or Encrypt attributes

☐ Compress contents to save disk space

☐ Encrypt contents to secure data

4. See the *prerun checklist* before you run a test.

See also

Configuration: Set measurement limits for tests

Application directories

File name extensions

About setting up tests

Set up tests using the tabs in the *Setup panel*. Settings in the DUT tab use a top-down, left-to-right logic flow, so that any parameter that affects or acts as a filter for other parameters appears either to the top of or to the left of the affected parameters.

Tests are saved when you save a test setup. To avoid overwriting test results, remember to assign a unique name to the test either before running it or immediately after.

See also

Test setup overview on page 23

Before you click start

About running tests

Equipment connection setup

Click the **Setup > Test Selection > Schematic** button to open a PDF file that shows the compliance test setup diagrams (instrument, DUT, and cabling) for supported testing configurations.

See also

Minimum system requirements

About setting up tests

Equipment connection setup through switch system

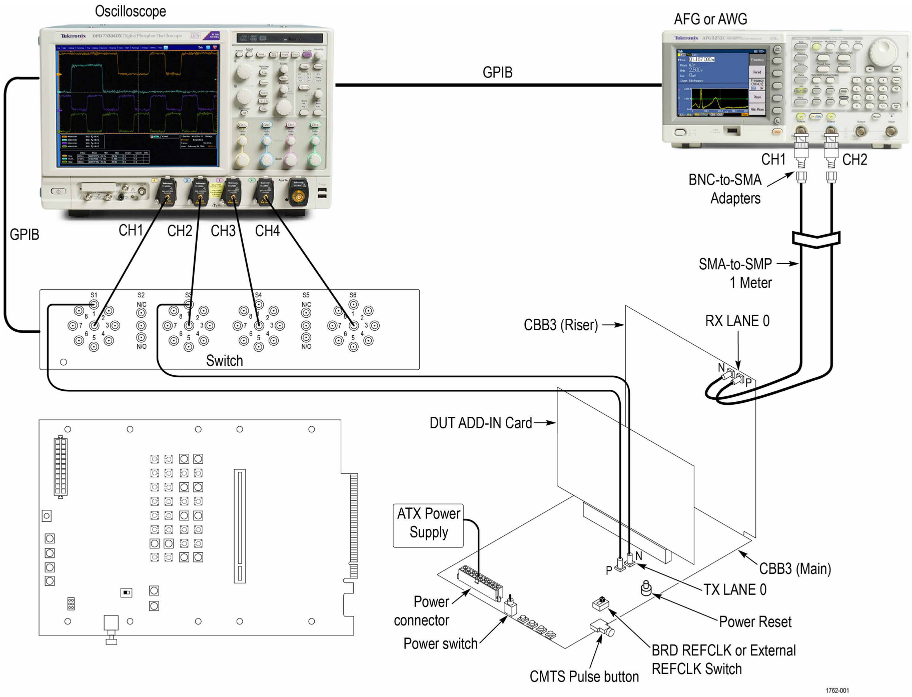

Oscilloscope
AFG or AWG
GPIB
CH1
CH2
BNC-to-SMA Adapters
SMA-to-SMP 1 Meter
GPIB
CH1
CH2
CH3
CH4
S1
S2
S3
S4
S5
S6
N/C
N/O
Switch
CBB3 (Riser)
RX LANE 0
N
P
DUT ADD-IN Card
ATX Power Supply
Power connector
Power switch
P
N
CBB3 (Main)
TX LANE 0
Power Reset
BRD REFCLK or External REFCLK Switch
CMTS Pulse button
1762-001

Figure 1: Add-In card connection setup through switch system

Switch: DUT Lane to Signal connection mapping			
TX LANE 0 P	S1 (relay) > Signal 1	TX LANE 0 N	S3 > Signal 1
TX LANE 1 P	S1 > Signal 2	TX LANE 1 N	S3 > Signal 2
TX LANE 2 P	S1 > Signal 3	TX LANE 2 N	S3 > Signal 3
TX LANE 3 P	S1 > Signal 4	TX LANE 3 N	S3 > Signal 4
TX LANE 4 P	S1 > Signal 5	TX LANE 4 N	S3 > Signal 5
TX LANE 5 P	S1 > Signal 6	TX LANE 5 N	S3 > Signal 6
TX LANE 6 P	S1 > Signal 7	TX LANE 6 N	S3 > Signal 7
TX LANE 7 P	S1 > Signal 8	TX LANE 7 N	S3 > Signal 8
TX LANE 8 P	S4 > Signal 1	TX LANE 8 N	S6 > Signal 1
TX LANE 9 P	S4 > Signal 2	TX LANE 9 N	S6 > Signal 2

Table continued…

Switch: DUT Lane to Signal connection mapping			
TX LANE 10 P	S4 > Signal 3	TX LANE 10 N	S6 > Signal 3
TX LANE 11 P	S4 > Signal 4	TX LANE 11 N	S6 > Signal 4
TX LANE 12 P	S4 > Signal 5	TX LANE 12 N	S6 > Signal 5
TX LANE 13 P	S4 > Signal 6	TX LANE 13 N	S6 > Signal 6
TX LANE 14 P	S4 > Signal 7	TX LANE 14 N	S6 > Signal 7
TX LANE 15 P	S4 > Signal 8	TX LANE 15 N	S6 > Signal 8

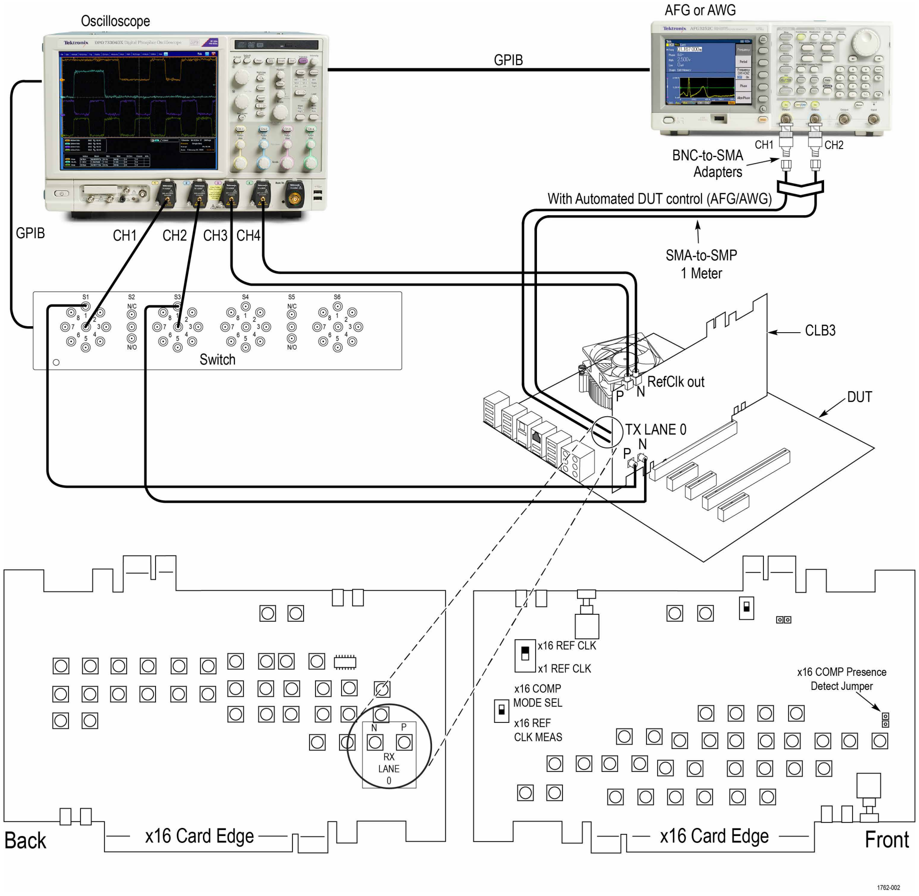

Oscilloscope
AFG or AWG
GPIB
GPIB
CH1
CH2
CH3
CH4
BNC-to-SMA Adapters
CH1
CH2
With Automated DUT control (AFG/AWG)
SMA-to-SMP 1 Meter
CLB3
RefClk out
P
N
DUT
TX LANE 0
P
N
S1
S2
S3
S4
S5
S6
N/C
N/O
Switch
x16 REF CLK
x1 REF CLK
x16 COMP MODE SEL
x16 REF CLK MEAS
x16 COMP Presence Detect Jumper
N
P
RX LANE 0
Back
x16 Card Edge
x16 Card Edge
Front
1762-002

Figure 2: System board (normal) connection setup through switch system

Switch: DUT Lane to Signal connection mapping			
TX LANE 0 P	S1 (relay) > Signal 1	TX LANE 0 N	S3 > Signal 1
TX LANE 1 P	S1 > Signal 2	TX LANE 1 N	S3 > Signal 2
TX LANE 2 P	S1 > Signal 3	TX LANE 2 N	S3 > Signal 3

Table continued…

Switch: DUT Lane to Signal connection mapping			
TX LANE 3 P	S1 > Signal 4	TX LANE 3 N	S3 > Signal 4
TX LANE 4 P	S1 > Signal 5	TX LANE 4 N	S3 > Signal 5
TX LANE 5 P	S1 > Signal 6	TX LANE 5 N	S3 > Signal 6
TX LANE 6 P	S1 > Signal 7	TX LANE 6 N	S3 > Signal 7
TX LANE 7 P	S1 > Signal 8	TX LANE 7 N	S3 > Signal 8

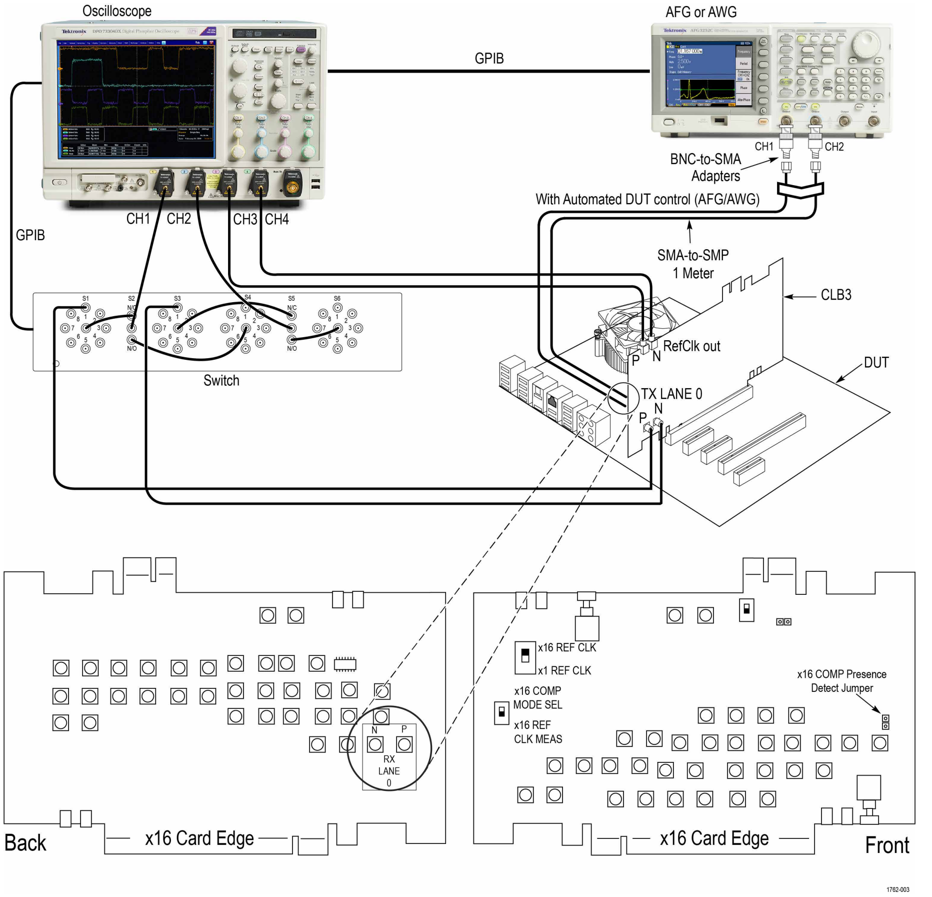

Oscilloscope
AFG or AWG
GPIB
GPIB
CH1
CH2
CH3
CH4
CH1
CH2
BNC-to-SMA Adapters
With Automated DUT control (AFG/AWG)
SMA-to-SMP 1 Meter
CLB3
DUT
RefClk out
P
N
TX LANE 0
N
P
S1
S2
S3
S4
S5
S6
N/C
N/O
N/C
N/O
Switch
x16 REF CLK
x1 REF CLK
x16 COMP MODE SEL
x16 REF CLK MEAS
x16 COMP Presence Detect Jumper
N
P
RX LANE 0
Back
x16 Card Edge
x16 Card Edge
Front
1762-003

Figure 3: System board (cascade) connection setup through switch system

Switch: DUT Lane to Signal connection mapping			
TX LANE 0 P	S1 (relay) > Signal 1	TX LANE 0 N	S3 > Signal 1
TX LANE 1 P	S1 > Signal 2	TX LANE 1 N	S3 > Signal 2
TX LANE 2 P	S1 > Signal 3	TX LANE 2 N	S3 > Signal 3
TX LANE 3 P	S1 > Signal 4	TX LANE 3 N	S3 > Signal 4

Table continued…

Switch: DUT Lane to Signal connection mapping			
TX LANE 4 P	S1 > Signal 5	TX LANE 4 N	S3 > Signal 5
TX LANE 5 P	S1 > Signal 6	TX LANE 5 N	S3 > Signal 6
TX LANE 6 P	S1 > Signal 7	TX LANE 6 N	S3 > Signal 7
TX LANE 7 P	S1 > Signal 8	TX LANE 7 N	S3 > Signal 8
TX LANE 8 P	S4 > Signal 1	TX LANE 8 N	S6 > Signal 1
TX LANE 9 P	S4 > Signal 2	TX LANE 9 N	S6 > Signal 2
TX LANE 10 P	S4 > Signal 3	TX LANE 10 N	S6 > Signal 3
TX LANE 11 P	S4 > Signal 4	TX LANE 11 N	S6 > Signal 4
TX LANE 12 P	S4 > Signal 5	TX LANE 12 N	S6 > Signal 5
TX LANE 13 P	S4 > Signal 6	TX LANE 13 N	S6 > Signal 6
TX LANE 14 P	S4 > Signal 7	TX LANE 14 N	S6 > Signal 7
TX LANE 15 P	S4 > Signal 8	TX LANE 15 N	S6 > Signal 8

⚠ **Note:** GPIB is the recommended interface to execute the switch matrix commands.

Test setup overview

Test setup includes acquisition and configuration parameters. You can also select report options when setting up tests. Use the options in the *Setup panel* and *Reports panel* to select and configure tests.

1. *Set up equipment*.
2. *Do the prerun checklist*.
3. *Set DUT parameters*.
4. *Select one or more tests*.
5. *Select acquisitions*.
6. *Configuration test parameters*.
7. *Set test measurement notification options*.
8. *Select report options*.

See also

About test setups

Before you click start

About running tests

Prerequisite

Compensate the signal path

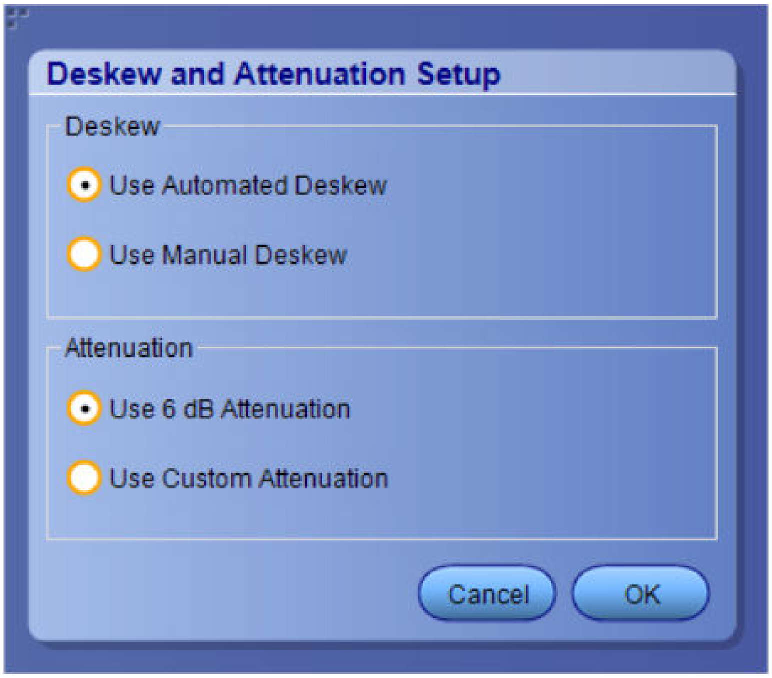
Use the following procedure to compensate the internal signal acquisition path. Perform this procedure if the ambient temperature has changed more than 5 °C (9 °F) since you performed the last signal path compensation. Perform the signal path compensation once a week. Failure to do so may result in the instrument not meeting warranted performance levels.

1. Power on and wait for the instrument to complete its warm up period before continuing with this procedure.
2. Disconnect any probes you have connected to the input channels.
3. Set the instrument to Menu mode.
4. Select Instrument Calibration from the Utilities menu.
5. Note any instructions that appear in the resulting control window.
6. Click Run SPC to begin the procedure. The procedure may take several minutes to complete.
7. Verify that the Status changes to Compensated after the procedure is complete. If the Calibration Status field indicates anything other than Compensated, see Signal Path Compensation Status for information on the readout and recommended action.

⚠ **Note:** When making measurements at vertical scale settings less than or equal to 5 mV, you should perform the signal path compensation at least once a week. Failure to do so may result in the instrument not meeting warranted performance levels at those volts/div settings.

Deskew and Attenuation

By clicking on the button opens up the Deskew and Attenuation Setup window which has the following options.



Deskew and Attenuation Setup

Deskew

● Use Automated Deskew

○ Use Manual Deskew

Attenuation

● Use 6 dB Attenuation

○ Use Custom Attenuation

Deskew:

1. **Use Automated Deskew** (Which is selected by default) automated deskew works in the following way:
    - By selecting the automated deskew, the application runs the deskew operation before acquiring the DUT signal.
    - Deskew will be performed to remove the skew of the setup which is primarily the cable set and oscilloscope channel. Deskew requires a low-frequency signal with a small rise/fall time. Both these requirements are fulfilled by the fast edge on the oscilloscope.

- During deskew the other end of the cable connected to the fixture/ISI board is connected to the fast edge. Fast edge has a skew of less than 1 ps. If the +ve and -ve channels of fast edge are phase-matched, the user can ensure that the setup (cable+oscilloscope channel) has a skew of less than 1 ps.

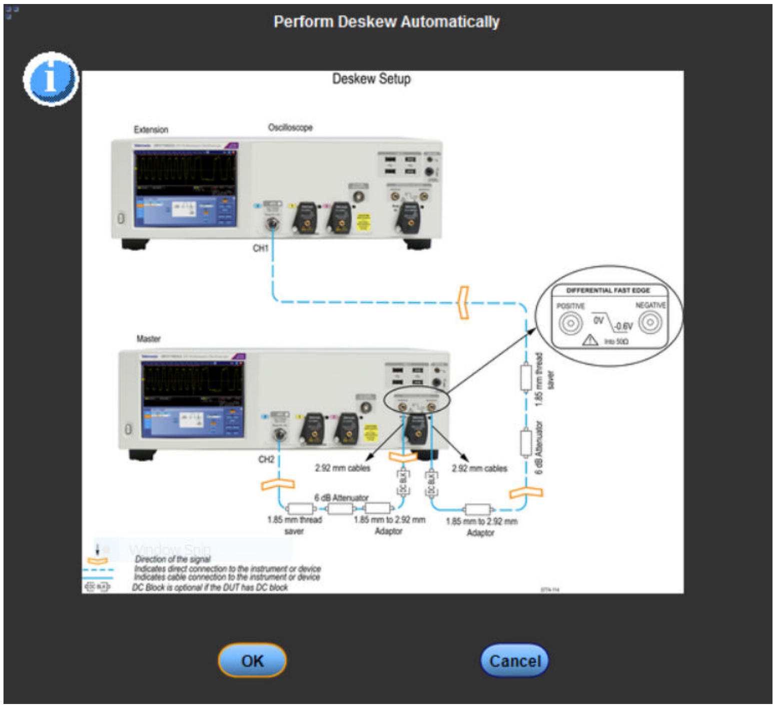
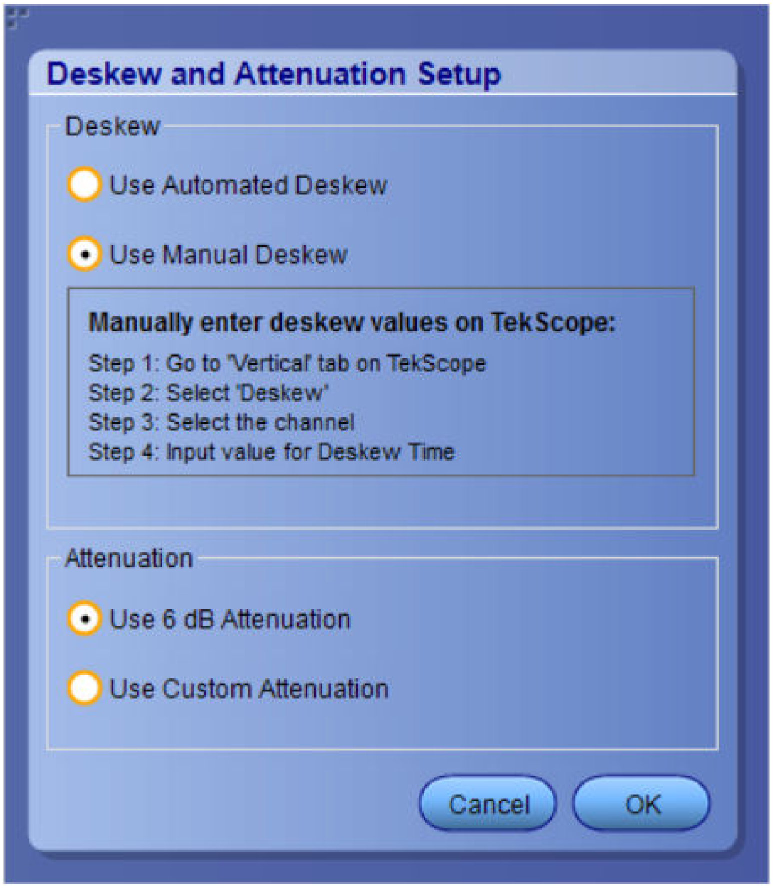

Perform Deskew Automatically
Deskew Setup
Extension
Oscilloscope
CH1
DIFFERENTIAL FAST EDGE
POSITIVE
NEGATIVE
0V
-0.6V
Into 50Ω
Master
1.85 mm thread saver
6 dB Attenuator
CH2
2.92 mm cables
DC BLK
2.92 mm cables
6 dB Attenuator
1.85 mm thread saver
1.85 mm to 2.92 mm Adaptor
1.85 mm to 2.92 mm Adaptor
Direction of the signal
Indicates direct connection to the instrument or device
Indicates cable connection to the instrument or device
DC Block is optional if the DUT has DC block
OK
Cancel

Figure 4: Deskew popup window

2. Use Manual Deskew Manual



Deskew and Attenuation Setup

Deskew

○ Use Automated Deskew

● Use Manual Deskew

Manually enter deskew values on TekScope:
Step 1: Go to 'Vertical' tab on TekScope
Step 2: Select 'Deskew'
Step 3: Select the channel
Step 4: Input value for Deskew Time

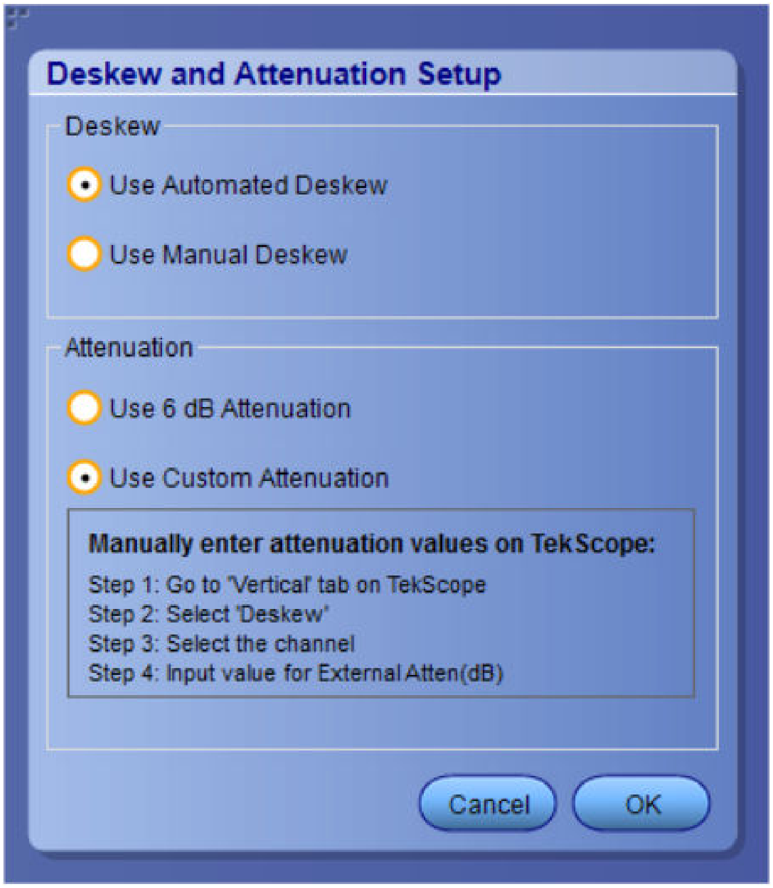
Attenuation

● Use 6 dB Attenuation

○ Use Custom Attenuation

Attenuation:

1. **Use 6 dB Attenuation** (Which is selected by default).
2. **Use Custom Attenuation.**



Manually enter attenuation values on TekScope:

Step 1: Go to 'Vertical' tab on TekScope
Step 2: Select 'Deskew'
Step 3: Select the channel
Step 4: Input value for External Atten(dB)

Running tests

After selecting and configuring tests, review the *Prerun checklist* and then click **Start** to run the tests. While tests are running, you cannot access the Setup or Reports panels. To monitor the test progress, switch back and forth between the Status panel and the Results panel.

The application displays a report when the tests are complete. While the tests are running, other applications may display windows in the background. The TekScope application takes precedence over other applications, but you can switch to other applications by using the **Alt + Tab** key combination. To keep the TekExpress PCIe application on top, select **Keep On Top** from the TekExpress Options menu.

See also

Before you click start

About configuring tests

About setting up tests

Prerun checklist

Do the following before you click Start to run a test. If this is the first time you are running a test on a setup, refer to the information in *Before you click start*.

1. Make sure that all the required instruments are properly warmed up (approximately 20 minutes).
2. Perform Signal Path Compensation (SPC):
   a. On the oscilloscope main menu, select the **Utilities** menu.
   b. Select **Instrument Calibration**.

3. Verify that the application is able to find the DUT. If it cannot, perform a search for connected instruments:
    a. In PCIe, select the **Setup** panel and then click the **Test Selection** tab.
    b. Select any test and then click **Configure**.
    c. In the Configuration section, click **Global Settings**.
    d. In the **Instruments Detected** section, click the drop-down arrow to the right of **Real Time Scope** and make sure that the oscilloscope with the (GPIB8::1::INSTR) designation is in the list.

See also

Equipment connection setup

Search instruments connected to the application

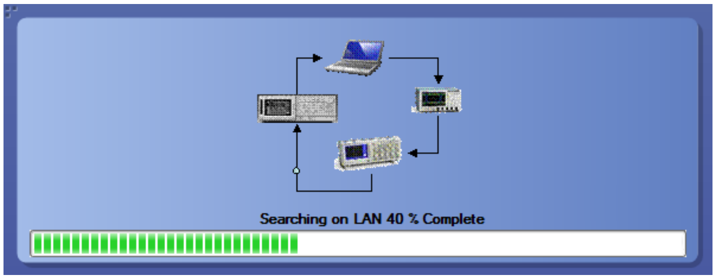
Use the TekExpress Instrument Control Settings dialog box to search the instruments (resources) connected to the application. The application uses TekVISA to discover the connected instruments.

Note: The instruments required for the test setup must be connected and detected by the application, before running the test.

To refresh the list of connected instruments:

1. Select **Options > Instrument Control Settings**.
2. In the **Search Criteria** section of the **Instrument Control Settings** dialog box, select the connection types of the instruments to search. Instrument search is based on the VISA layer, but different connections determine the resource type, such as LAN, GPIB, and USB. For example, if you choose LAN, the search will include all the instruments supported by the TekExpress that are communicating over the LAN.
3. Click **Refresh**. The TekExpress application searches for the connected instruments.

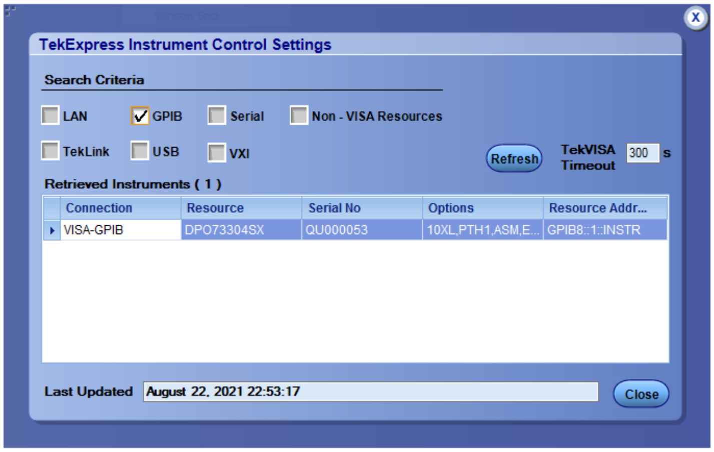
    Search status of the instruments connected to LAN

    Searching on LAN 40 % Complete

4. When the search is complete, a dialog box lists the instrument-related details based on the search criteria. For example, for the Search Criteria as GPIB, the application displays all the GPIB instruments connected to the application.

    TekExpress Instrument Control Settings window.


X
TekExpress Instrument Control Settings
Search Criteria
Refresh
Close

☐ LAN ☑ GPIB ☐ Serial ☐ Non - VISA Resources

☐ TekLink ☐ USB ☐ VXI

TekVISA Timeout 300 s

Retrieved Instruments (1)

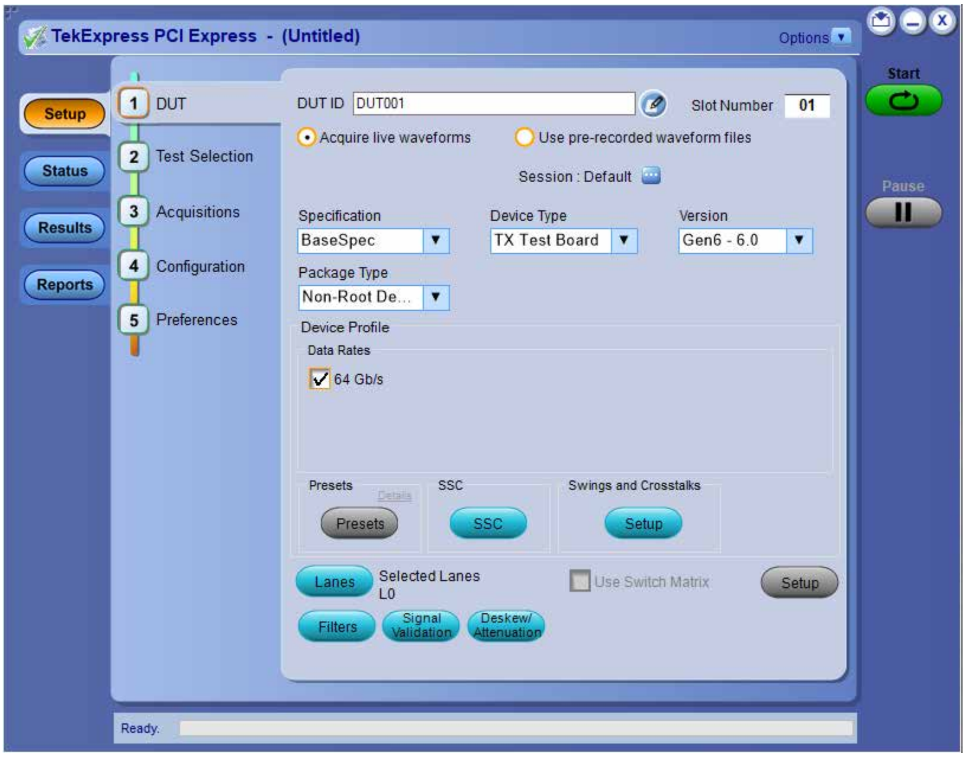
Connection	Resource	Serial No	Options	Resource Addr...
VISA-GPIB	DPO73304SX	QU000053	10XL,PTH1,ASM,E...	GPIB8::1::INSTR

Last Updated August 22, 2021 22:53:17

The details of the instruments are displayed in the Retrieved Instruments table. The time and date of instrument refresh is displayed in the Last Updated field.

Starting the application

To start the TekExpress PCI Express, select from the oscilloscope menu bar. **Applications > TekExpress PCI Express**


TekExpress PCI Express - (Untitled)
Options
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Device Profile
Presets
Details
SSC
Swings and Crosstalks
Presets
SSC
Setup
Lanes
Setup
Filters
Signal Validation
Deskew/ Attenuation

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Session : Default

Specification BaseSpec

Device Type TX Test Board

Version Gen6 - 6.0

Package Type Non-Root De...

Data Rates

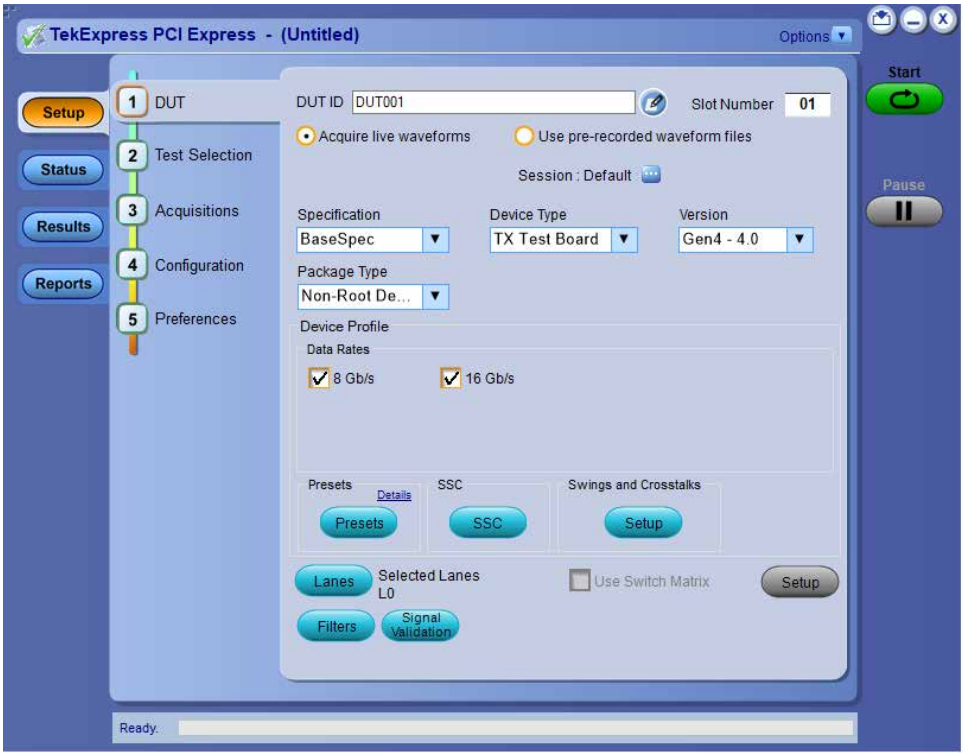
☑ 64 Gb/s

Selected Lanes L0

☐ Use Switch Matrix

Ready.

Figure 5: TekExpress PCI Express application start screen (with ATI Mode)


TekExpress PCI Express - (Untitled)
Options
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Device Profile
Presets
Details
SSC
Swings and Crosstalks
Presets
SSC
Setup
Lanes
Setup
Filters
Signal Validation

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Session : Default

Specification BaseSpec

Device Type TX Test Board

Version Gen4 - 4.0

Package Type Non-Root De...

Data Rates ☑ 8 Gb/s ☑ 16 Gb/s

Selected Lanes L0

☐ Use Switch Matrix

Ready.

Figure 6: TekExpress PCI Express application start screen (Non-ATI Mode)

During start, a "My TekExpress" folder is created in the Documents folder of the current user and gets mapped to "X" drive. When the application is closed properly, the "X" drive gets unmapped. Session files are then stored inside the `X:\PCI Express` folder. If this file is not found, the application runs an instrument discovery program to detect connected instruments before starting TekExpress PCI Express.

To keep the TekExpress PCI Express application on top of any application, select **Keep On Top** from the *options menu*. If the application goes behind the oscilloscope application, select **Applications >TekExpress PCI Express** to bring the application to the front.

Application controls

This section describes the application controls with functionality and its details.

Table 5: Application control description

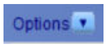
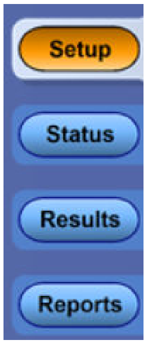
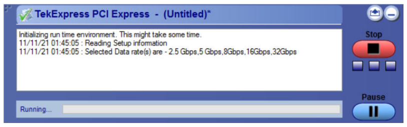
Item	Description
Options menu 	Menu to display global application controls.
Test panel 	Controls that open tabs for configuring test settings and options.
Start / Stop button 	Use the **Start** button to start the test run of the measurements in the selected order. If prior acquired measurements are not cleared, then new measurements are added to the existing set. The button toggles to the Stop mode while tests are running. Use the **Stop** button to abort the test.
Pause / Continue button 	Use the **Pause** button to pause the acquisition. When a test is paused, this button changes as **Continue**.
Clear button 	Use the **Clear** button to clear all existing measurement results. Adding or deleting a measurement, or changing a configuration parameter of an existing measurement, also clears measurements. This is to prevent the accumulation of measurement statistics or sets of statistics that are not coherent. This button is available only on *Results panel*. ⚠ **Note:** This button is visible only when there are results data on the panel.
Application window move icon 	Place the cursor over the top of the application window to move the application window to the desired location
Minimize icon 	Minimizes the application.
Close icon 	Close the application.

Table continued…

Item	**Description**
Mini view / Normal view	Mini view displays the run messages with the time stamp, progress bar, Start / Stop button, and Pause / Continue button. The application moves to mini view when you click the **Start** button.  TekExpress PCI Express - (Untitled)* Stop Pause Running... Initializing run time environment. This might take some time. 11/11/21 01:45:05 : Reading Setup information 11/11/21 01:45:05 : Selected Data rate(s) are - 2.5 Gbps,5 Gbps,8Gbps,16Gbps,32Gbps

Options menu functions

To access the **Options** menu, click ▼ in the upper-right corner of the application. It has the following selections:

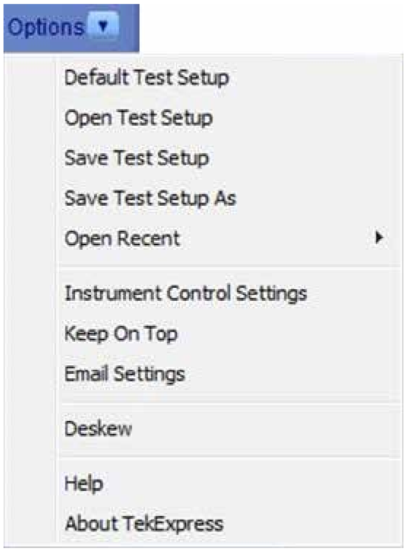

Options
Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Help
About TekExpress

Table 6: Options menu settings

Menu	**Function**
Default Test Setup	Opens a new test setup with default configurations.
Open Test Setup	Opens a previously saved test setup. Displays the list of previously saved test setup file names. Make the selection and click **OK** to open the test setup.
Save Test Setup	Saves the current test configurations with the specified file name.
Save Test Setup As	Saves the current test setup with a different file name or file type.
Open Recent	Displays the recently opened test setup file names. Make the selection and click **OK** to open the test setup.
Instrument Control Settings	Detects, lists, and refreshes the connected instruments found on the specified connections (LAN, GPIB, USB, Serial, Non-VISA Resources, TekLink, and VXI).
Keep On Top	Always keeps the TekExpress PCI Express application on top of all the applications.
Email Settings	Configures email options for test run and result notifications.
Deskew	Loads oscilloscope channel deskew settings into the application.
Help	Displays the TekExpress PCI Express help.

Table continued…

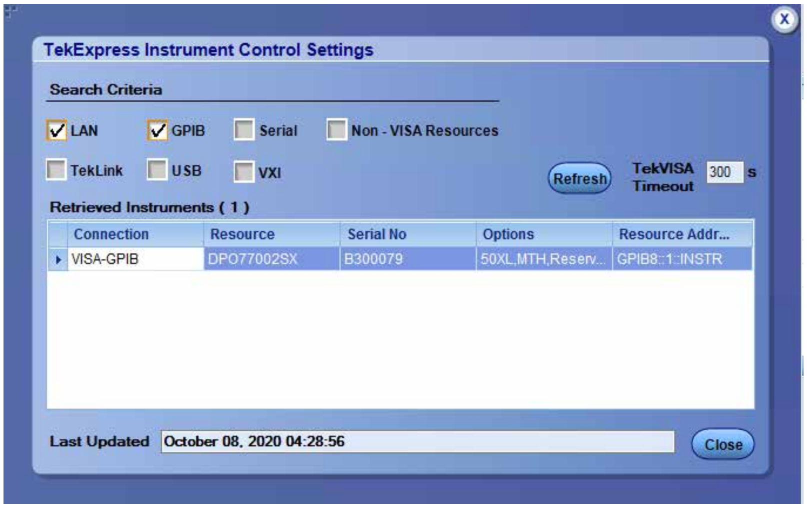
Menu	Function
About TekExpress	Displays the application name, version, and hyperlink to end the user license agreement.

TekExpress instrument control settings

Use the **TekExpress Instrument Control Settings** dialog box to search the instruments (resources) connected to the application. You can use the **Search Criteria** options to search the connected instruments depending on the connection type. The details of the connected instrument is displayed in the Retrieved Instruments window.

To access, click **Options** > **Instrument Control Settings**. Select **USB** and **LAN** as search criteria for TekExpress application and click **Refresh**. The connected instruments displayed in the Retrieved Instruments window and can be selected for use under Global Settings in the test configuration section.

Figure 7: TekExpress Instrument Control Settings window



TekExpress Instrument Control Settings

Search Criteria

☑ LAN ☑ GPIB ☐ Serial ☐ Non - VISA Resources

☐ TekLink ☐ USB ☐ VXI

TekVISA Timeout 300 s

Retrieved Instruments (1)

Connection	Resource	Serial No	Options	Resource Addr...
VISA-GPIB	DPO77002SX	B300079	50XL,MTH,Reserv...	GPIB8::1::INSTR

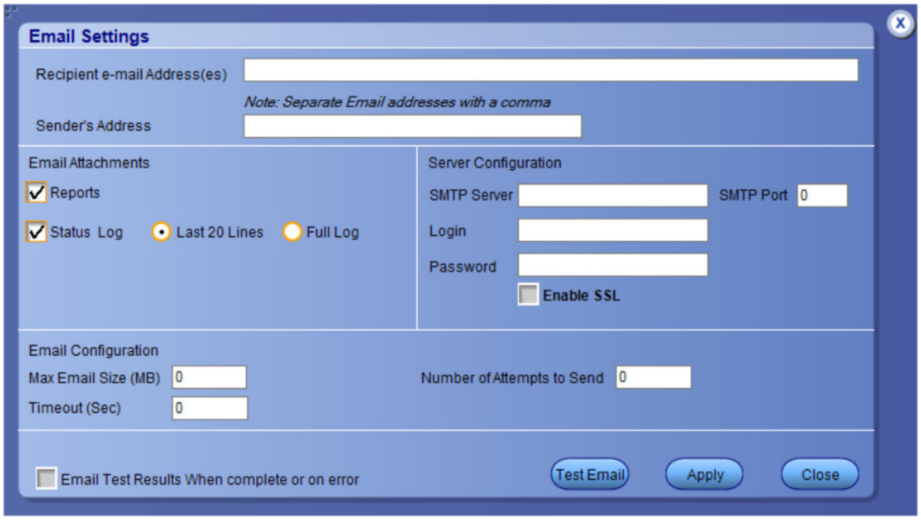
Last Updated October 08, 2020 04:28:56

See also

Options menu functions on page 33

Configure email settings

Use the **Email Settings** utility to get notified by email when a measurement completes or produces any error condition. Follow the steps to configure email settings:



Recipient e-mail Address(es)

Note: Separate Email addresses with a comma

Sender's Address

☑ Reports

☑ Status Log ● Last 20 Lines ○ Full Log

SMTP Server

SMTP Port 0

Login

Password

☐ Enable SSL

Max Email Size (MB) 0

Timeout (Sec) 0

Number of Attempts to Send 0

☐ Email Test Results When complete or on error

Figure 8: Email settings window

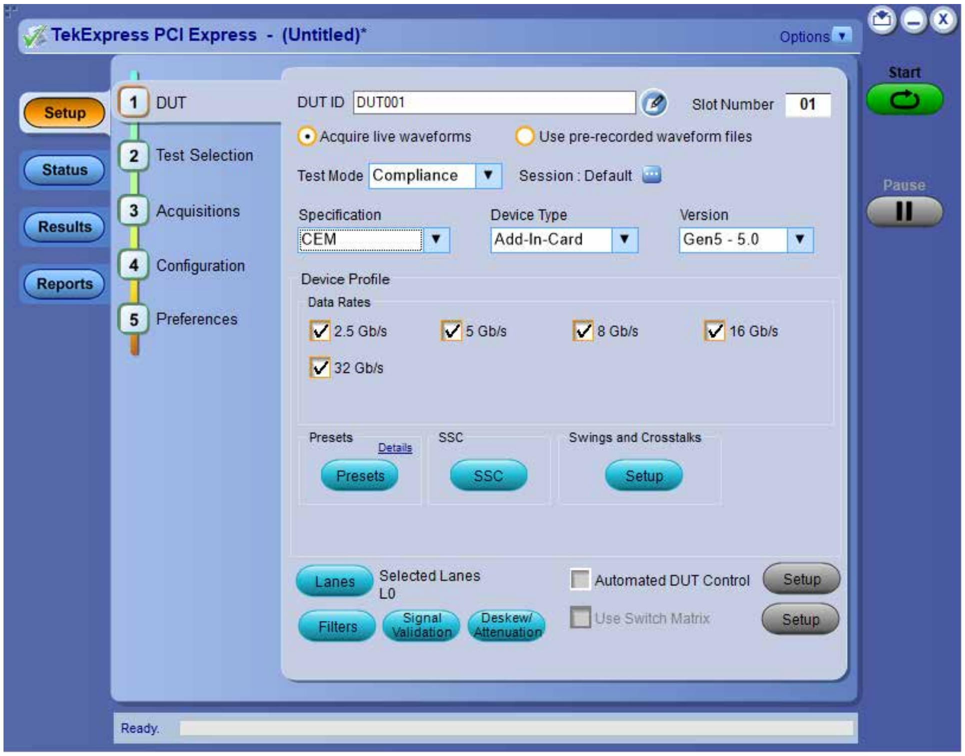
1. Select **Options > Email Settings** to open the Email Settings dialog box.
2. (Required) For **Recipient email Address(es)**, enter one or more recipient email addresses. To include multiple addresses, separate the addresses with commas.
3. (Required) For **Sender's Address**, enter the email address used by the instrument. This address consists of the instrument name, followed by an underscore, followed by the instrument serial number, then the @ symbol, and the email server ID. For example: user@yourcompany.com.
4. (Required) In the **Server Configuration** section, type the SMTP Server address of the Mail server configured at the client location, and the SMTP Port number, in the corresponding fields.

   If this server requires password authentication, enter a valid login name, password, and host name in the corresponding fields.

   Note: If any of the above required fields are left blank, the settings will not be saved, and email notifications will not be sent.
5. In the **Email Attachments** section, select from the following options:
   - **Reports**: Select to receive the test report with the notification email.
   - **Status Log**: Select to receive the test status log with the notification email. If you select this option, then also select whether you want to receive the full log or just the last 20 lines.
6. In the **Email Configuration** section:
   - Enter a maximum file size for the email message. Messages with attachments larger than this limit will not be sent. The default is 0 MB.
   - Enter the number in the Number of Attempts to Send field, to limit the number of attempts that the system makes to send a notification. The default is 1. You can also specify a timeout period.
7. Select the **Email Test Results When complete or on error** check box. Use this check box to quickly enable or disable email notifications.
8. To test your email settings, click **Test Email**.
9. To apply your settings, click **Apply**.
10. Click **Close** when finished.

Setup panel: Configure the test setup

The Setup panel contains sequentially ordered tabs that help you guide through the test setup and execution process.


TekExpress PCI Express - (Untitled)*
Options
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Device Profile
Data Rates
Presets
Details
SSC
Swings and Crosstalks
Presets
SSC
Setup
Lanes
Filters
Signal Validation
Deskew/ Attenuation
Setup
Setup

DUT ID: DUT001

Slot Number: 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Test Mode: Compliance

Session : Default

Specification: CEM

Device Type: Add-In-Card

Version: Gen5 - 5.0

☑ 2.5 Gb/s ☑ 5 Gb/s ☑ 8 Gb/s ☑ 16 Gb/s ☑ 32 Gb/s

Selected Lanes
L0

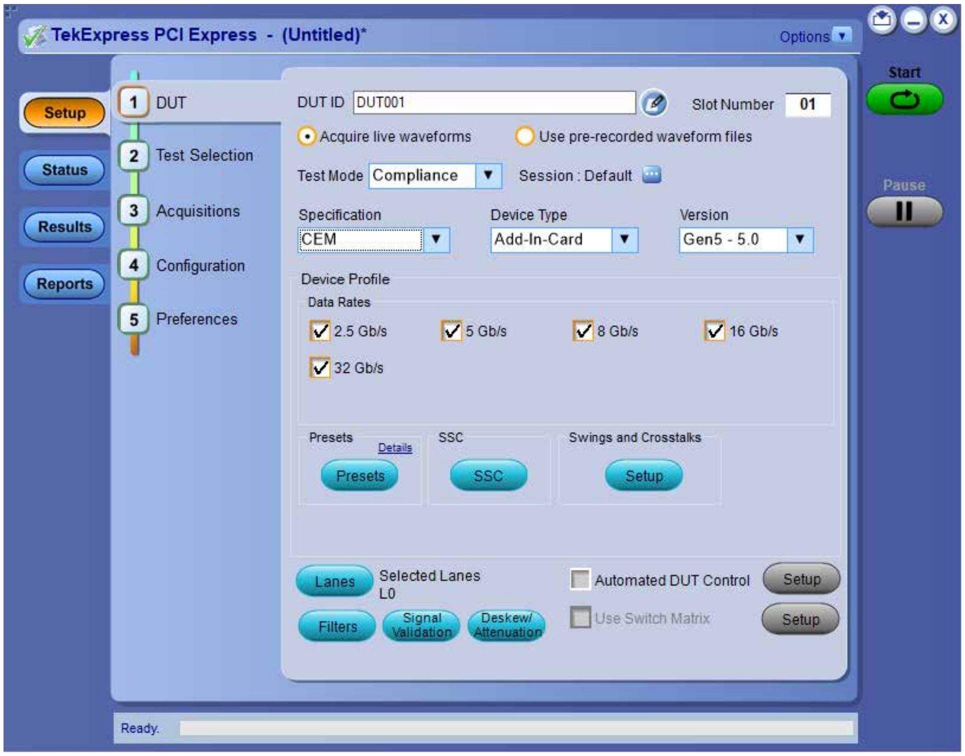
☐ Automated DUT Control

☐ Use Switch Matrix

Ready.

DUT: Set DUT settings

Use the DUT tab to select parameters for the device under test. These settings are global and apply to all tests of current session. DUT settings also affect the list of available tests in the Test Selection tab.


TekExpress PCI Express - (Untitled)*
Options ▼
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Presets
Details
SSC
Swings and Crosstalks
Setup
Lanes
Filters
Signal Validation
Deskew/ Attenuation
Setup
Setup

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Test Mode Compliance ▼

Session : Default

Specification CEM ▼

Device Type Add-In-Card ▼

Version Gen5 - 5.0 ▼

Device Profile

Data Rates

☑ 2.5 Gb/s ☑ 5 Gb/s ☑ 8 Gb/s ☑ 16 Gb/s

☑ 32 Gb/s

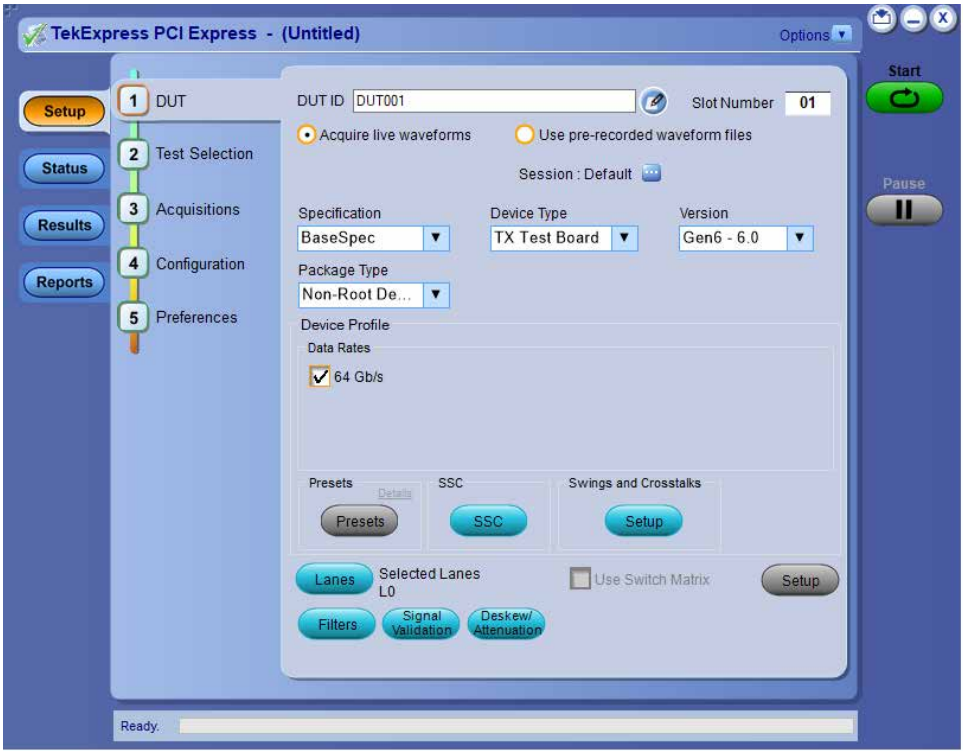
Selected Lanes
L0

☐ Automated DUT Control

☐ Use Switch Matrix

Ready.

Figure 9: TekExpress PCI Express: DUT tab


TekExpress PCI Express - (Untitled)
Options
Start
Pause
Setup
Status
Results
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Device Profile
Presets
Details
SSC
Swings and Crosstalks
Setup
Lanes
Filters
Signal Validation
Deskew/ Attenuation
Setup
Ready.

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Session : Default

Specification BaseSpec

Device Type TX Test Board

Version Gen6 - 6.0

Package Type Non-Root De...

Data Rates ☑ 64 Gb/s

Selected Lanes L0

☐ Use Switch Matrix

Figure 10: TekExpress PCI Express: DUT Tab - Base Gen6

Click **Setup** > **DUT** to access the DUT parameters:

Table 7: DUT tab configuration

Setting	Description
DUT ID	Adds an optional text label for the DUT to reports. The default value is DUT001[9].
Slot Number	The slot parameter (1, 2, 4, 8,16, or 32) of the DUT.
Comments icon (to the right of the DUT ID field)	Opens a Comments dialog box in which to enter optional text to add to a report. The maximum number of characters is 256. To enable or disable comments appearing on the test report, refer *View a generated report*.
Acquire live waveforms	Acquire active signals from the DUT for testing.
Use prerecorded waveform files	Run tests on a saved waveform. *Load a saved test setup*
Test Mode	Sets the overall testing mode. Select Compliance or User Defined: • Compliance: Preselects tests and parameters to meet compliance specifications for the selected version, specification, and device type. • User Defined: Enables the user to select specific tests and set custom parameters for tests. ⚠ **Note:** Not applicable for the *Device* type / *Specification* type BaseSpec
Session	Allows you to save multiple config sessions and run multiple config/run sessions together.
Specification	PCIe supports the CEM, BaseSpec, RefClockSpec, U.2 (SFF-8639), and M.2 specification.

Table continued…

---

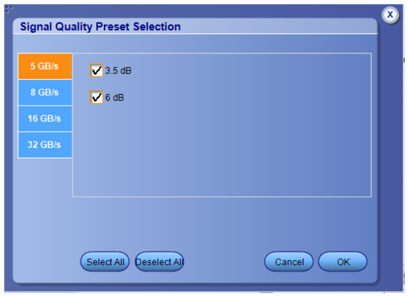
[9] In pre-recorded mode, waveform recall will not be successful if the session name is lengthy, i.e. more than 10 characters.

Setting	Description

Device Type	Sets the DUT device type. The device type available depends on the selected specification.
	Following are the device types for each specifications
	• CEM:
	  • Add-In-Card
	  • System-Board
	• BaseSpec:
	  • TX Test Board
	  • SRIS TX Test Board
	• RefClockSpec:
	  • Ref Clock
	• U.2 (SFF-8639):
	  • Module
	  • Host
	• M.2
	  • M2_Add-In-Card
	  • M2_Host
	⚠ **Note:** CXL device type support is newly added to the TekExpress PCIe TX application. Refer *CXL Support* for more details.

Version	Sets the DUT generation version. Available versions are: • CEM: Gen 1 (1.0a and 1.1), Gen2 (2.0), Gen3 (3.0), Gen4 (4.0) and Gen5 (5.0) • Base Spec: Gen3 (3.0), Gen4 (4.0), Gen5 (5.0), and Gen6 (6.0) • RefClockSpec: Gen5(5.0) Supports all Gen1-5 Versions • U.2: Gen3 (3.0) • M.2: Gen3 (3.0) • CXL: Gen3 (3.0), Gen4 (4.0) and Gen5 (5.0)
Device Profile	
Data Rates	Sets the data rates to test (2.5 Gb/s, 5 Gb/s, 8 Gb/s, 16 Gb/s, 32 Gb/s, and 64 Gb/s). The data rates available depend on the selected DUT version.
Filters	Opens the *Filter Setup dialog box* to select custom filter files with which to perform link analysis on the source waveforms.
Presets	⚠ **Note:** This settings is only available for Gen2, Gen3, Gen4, and Gen5 DUT versions. Opens the Presets dialog box. User can select Gen2 preemphasis and Gen3 to Gen5 presets(P0 to P10) for signal quality tests in respective tabs. All preemphasis and presets are selected by default. At least one preemphasis level/preset must be selected for each generation.

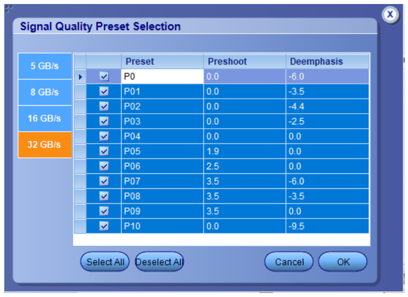
Table continued…

<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td colspan="2"></td><td>


Signal Quality Preset Selection

☑ 3.5 dB

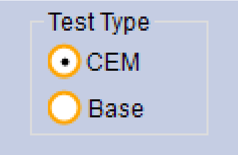
☑ 6 dB



Signal Quality Preset Selection

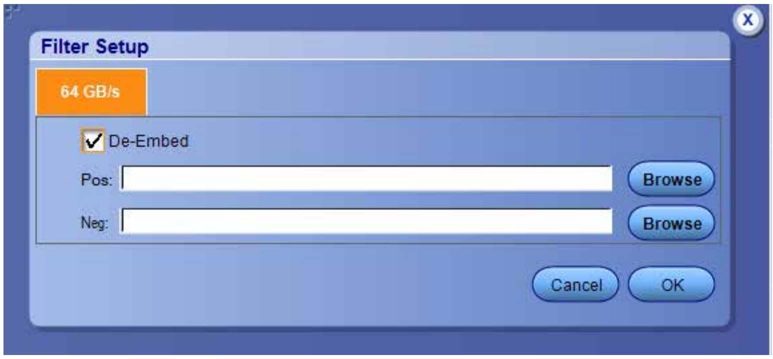
<table>
<tr><th></th><th></th><th>Preset</th><th>Preshoot</th><th>Deemphasis</th></tr>
<tr><td>▸</td><td>☑</td><td>P0</td><td>0.0</td><td>-6.0</td></tr>
<tr><td></td><td>☑</td><td>P01</td><td>0.0</td><td>-3.5</td></tr>
<tr><td></td><td>☑</td><td>P02</td><td>0.0</td><td>-4.4</td></tr>
<tr><td></td><td>☑</td><td>P03</td><td>0.0</td><td>-2.5</td></tr>
<tr><td></td><td>☑</td><td>P04</td><td>0.0</td><td>0.0</td></tr>
<tr><td></td><td>☑</td><td>P05</td><td>1.9</td><td>0.0</td></tr>
<tr><td></td><td>☑</td><td>P06</td><td>2.5</td><td>0.0</td></tr>
<tr><td></td><td>☑</td><td>P07</td><td>3.5</td><td>-6.0</td></tr>
<tr><td></td><td>☑</td><td>P08</td><td>3.5</td><td>-3.5</td></tr>
<tr><td></td><td>☑</td><td>P09</td><td>3.5</td><td>0.0</td></tr>
<tr><td></td><td>☑</td><td>P10</td><td>0.0</td><td>-9.5</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">Swings and Crosstalks</td><td>Voltage Swing Limits</td><td>Sets the lane/link transmitter p-p voltage swing.
This affects the limits applied to certain measurements based on the settings and does not change anything on the DUT tab.</td></tr>
<tr><td>Crosstalk Limits</td><td>Sets specific eye test limits depending on if the DUT design uses interleaved or non interleaved routing.
This affects the limits applied to certain measurements based on the settings and does not change anything on the DUT tab. This is applicable for Gen2.
• When the DUT uses noninterleaved routing, select **Crosstalk (noninterleaved routing)**.
• When the DUT uses interleaved routing, select **No Crosstalk (interleaved routing)**.</td></tr>
<tr><td colspan="2">SSC (Spread Spectrum Clocking)</td><td>Enables or disables SSC clocking.
This affects the limits applied to certain measurements based on the settings and does not change anything on the DUT tab.</td></tr>
<tr><td colspan="2">Lanes</td><td>Opens the Test Lane Setup dialog box to select the lanes to test. Lanes required for compliance testing are colored orange. At least one lane must be selected.
The Link Width setting determines the number of lanes that can be tested.</td></tr>
<tr><td colspan="2">Automated DUT Control</td><td>Enables automatic toggling of the DUT into different test modes (generation/equalization). Requires the use of an AFG or AWG or NI USB toggle tool. Click **Setup** to access the *Automated DUT control setup*</td></tr>
<tr><td colspan="2">Use Switch Matrix</td><td>Select to use the switch matrix. This solution allows you to map each of the several transmitter signals and forward the selected input either to another relay or to the oscilloscope channel.</td></tr>
</table>

Table continued…

Setting		Description
		Click **Setup** to configure the switch matrix. Refer *Switch Matrix application* for more details on configurations. **Note:** - Keithley supports maximum of 12 lanes and Gigatronics supports maximum of 16 lanes. - Switch Matrix is applicable for Gen1, 2, 3 only.
Signal validation	Signal validation	Sets the application to validate acquisition signals and perform the specified action to take when acquired signals do not meet requirements. Select the action from the list.
	Perform Pattern Decoding	Select to validate the pattern according to the respective lane and preset for Gen3.
Deskew/Attenuation		Provides the option of setting deskew and attenuation values on the scope either in an automated way or manual way. Refer *Deskew and Attenuation* for more details.
Test Type		Use this procedure to choose between CEM or Base type of Ref Clock testing.  Test Type ● CEM ○ Base **Note:** This is only available for Ref Clock testing and the measurement limits will be changed based on this setting.

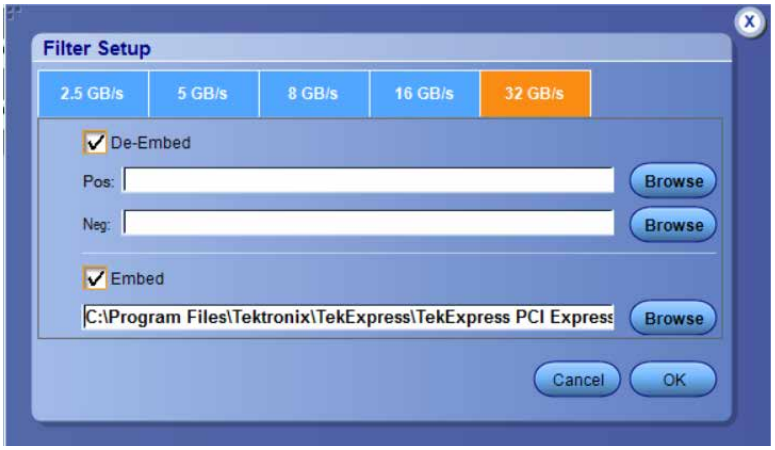
Filter setup dialog box

The filter setup dialog box lets you select custom filter files for performing link analysis on the source waveforms. The options available depends on the Specification selected.



☑ De-Embed

Figure 11: Filter Setup for Gen6 BaseSpec



☑ De-Embed

Pos:

Neg:

☑ Embed

C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express

Figure 12: Filter Setup for Gen1-5 CEM

De-Embed

Select de-embed for the data rate; click **Browse** and select the de-embed filter file.

Note:

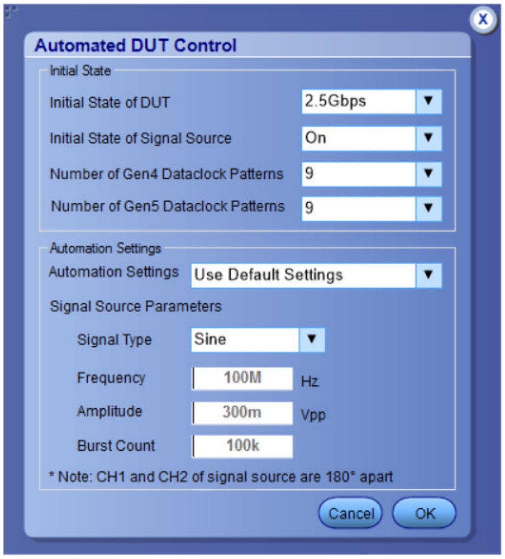
- For 32 GB/s single ended probe in ATI Mode, select 2 de-embed filter files for positive and negative data respectively. For differential probe, select same filter file for both positive and negative data.
- 32 GB/S filter files should be created with 200 GS/s sample rate and 33 GHz bandwidth.

Embed

Select Embed for the data rate; click **Browse** and select the embed filter file.

Automated DUT control setup

The Automated DUT Control dialog box sets the parameters needed for automatic toggling of the DUT into different test modes (generation/equalization). DUT automation requires the use of a signal source AFG or AWG or NI USB toggle.



Initial State

Initial State of DUT: 2.5Gbps

Initial State of Signal Source: On

Number of Gen4 Dataclock Patterns: 9

Number of Gen5 Dataclock Patterns: 9

Automation Settings

Automation Settings: Use Default Settings

Signal Source Parameters

Signal Type: Sine

Frequency: 100M Hz

Amplitude: 300m Vpp

Burst Count: 100k

* Note: CH1 and CH2 of signal source are 180° apart

Parameter	Description
Initial State	
Initial State of DUT	Sets the starting state of the DUT.
Initial State of Signal Source	Sets the AFG/AWG state to **On** (default) or **Off**. The On state enables the AFG/AWG output before the application starts signal acquisition. Some DUTs will toggle to the next signal state when the AFG/AWG initial state is On. Set the initial state to Off for these types of DUTs before running automated tests.
Number of Gen4 Dataclock patterns	Allows to select the number of Gen4 dataclock patterns the DUT supports, between 0 to 15. **Note:** The dataclock pattern is selected as 9 by default.
Number of Gen5 Dataclock patterns	Allows to select the number of Gen5 dataclock patterns the DUT supports, between 0 to 15. **Note:** The dataclock pattern is selected as 9 by default.
Automation Settings	
Automation Settings (for AFG only)	The Automation Settings values are as follows : • **Use Default Settings**: The signal source parameters are set to predefined values as recommended by the test specification. The signal source parameter fields are disabled and cannot be edited. • **Manually Configure Settings**: The signal source parameters are set directly at the AFG. The signal source parameter fields are disabled and cannot be edited. The PCIe application turns on or off the signal source without changing the settings. • **Use Custom Settings**: The signal source parameters are set to the values specified in the Signal Source Parameters area. The signal source parameter fields are enabled.
Signal Source Parameters	
Signal Type	Valid signal types are **Sine** and **Square**.
Frequency	Sets the AFG to output the specified frequency and amplitude values.
Amplitude	
Burst Count	Sets the AFG to output the specified signal burst count. **Note:** Ch 1 and Ch 2 on the AFG source are set to 180° phase difference in all modes except Manually Configure Settings. **Note:** Using DC Caps or Manual toggle, you can eliminate the automatic toggling issues that is due to DC offset.

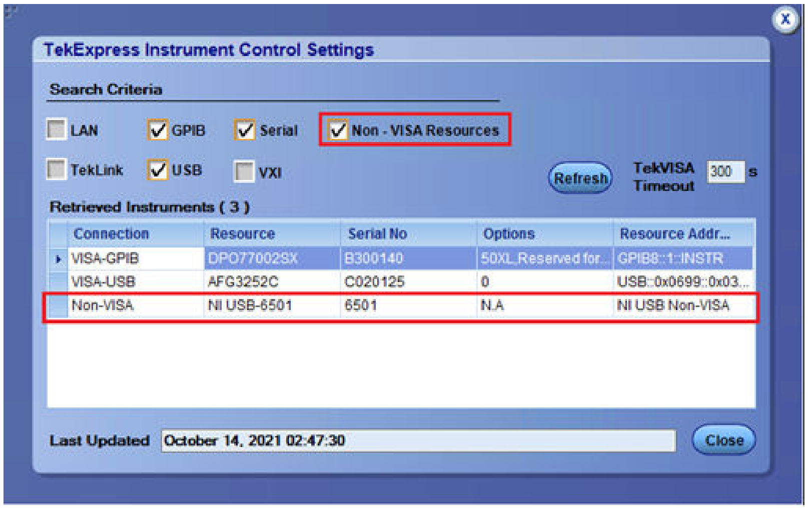
NI USB 6501 DUT Controller Support

The following information provides how to use NI USB 6501 DUT Controller Support.

- TekExpress PCIe TX application added support for National Instrument USB-6501 CBB controller device in TekExpress PCIE Express TX application. This device can be used to toggle the DUT.
- In order to detect the hardware and access it, the user will have to install the NI-DAQMX v20.7.1 software package in the Tekscope.

Steps to setup NI USB 6501 device in TekExpress:

1. Go to Configuration Panel.
2. Click on the **Instrument Control Settings** button.
3. In the **TekExpress Instrument Control Settings** pop-up window, check **Non-VISA Resources** and then click the **Refresh** button.
4. If the NI device is connected to the scope, it will be shown in the **Retrieved Instruments**.


TekExpress Instrument Control Settings
Search Criteria
Refresh
Close

☐ LAN ☑ GPIB ☑ Serial ☑ Non - VISA Resources

☐ TekLink ☑ USB ☐ VXI

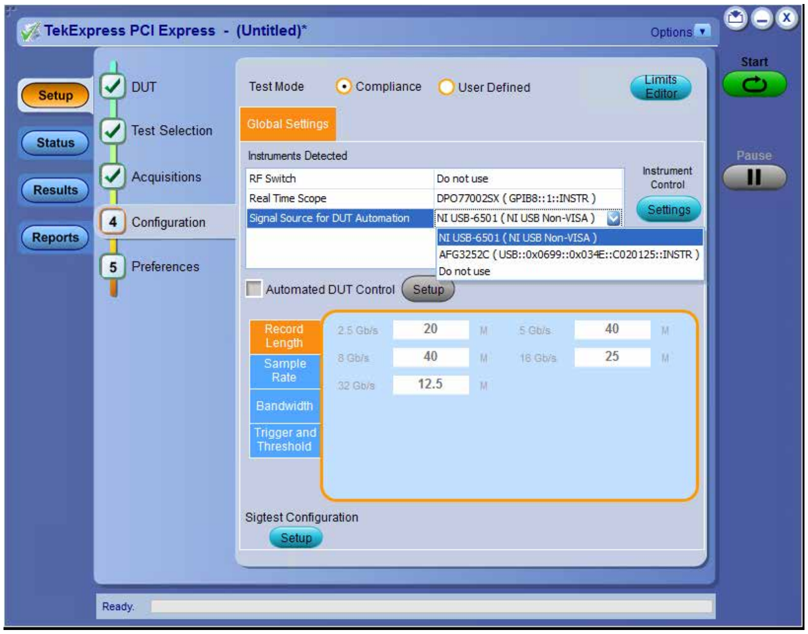
TekVISA Timeout 300 s

Retrieved Instruments (3)

Connection	Resource	Serial No	Options	Resource Addr...
VISA-GPIB	DPO77002SX	B300140	50XL,Reserved for...	GPIB8::1::INSTR
VISA-USB	AFG3252C	C020125	0	USB::0x0699::0x03...
Non-VISA	NI USB-6501	6501	N.A	NI USB Non-VISA

Last Updated October 14, 2021 02:47:30

5. Close the pop-up window.
6. The device now can be selected under **Signal Source for DUT Automation**.


TekExpress PCI Express - (Untitled)*
Options
Start
Pause
Setup
Status
Results
Reports
DUT
Test Selection
Acquisitions
4 Configuration
5 Preferences
Limits Editor
Global Settings
Instrument Control
Settings
Setup
Record Length
Sample Rate
Bandwidth
Trigger and Threshold
Sigtest Configuration
Setup
Ready.

Test Mode ● Compliance ○ User Defined

Instruments Detected

RF Switch	Do not use
Real Time Scope	DPO77002SX (GPIB8::1::INSTR)
Signal Source for DUT Automation	NI USB-6501 (NI USB Non-VISA)

NI USB-6501 (NI USB Non-VISA)
AFG3252C (USB::0x0699::0x034E::C020125::INSTR)
Do not use

☐ Automated DUT Control

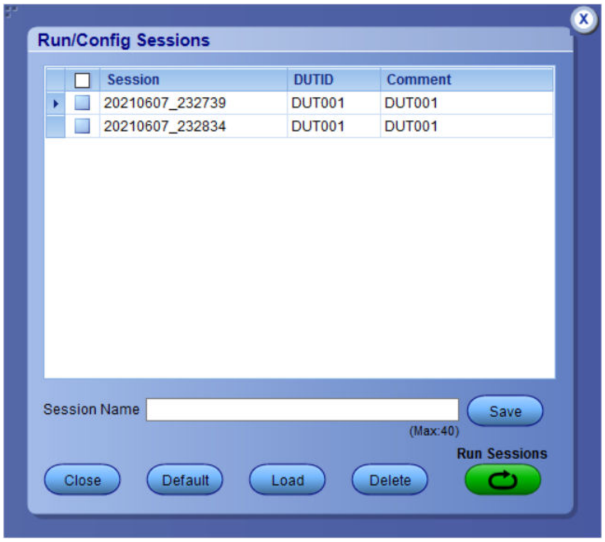
2.5 Gb/s	20	M	5 Gb/s	40	M
8 Gb/s	40	M	16 Gb/s	25	M
32 Gb/s	12.5	M			

Multiple-session run

Multiple-sessions run feature allows you to save multiple config sessions and run multiple config/run sessions together.

Click (...) button in the DUT panel, displays the Run/Config Session window. The Run/Config session window provides the list of saved sessions and the ability to run selected sessions.

- Config session – Session saved by user manually from Run/Config Sessions window.
- Run session – Session created automatically after the test is executed.



	☐	Session	DUTID	Comment
▸	☐	20210607_232739	DUT001	DUT001
	☐	20210607_232834	DUT001	DUT001

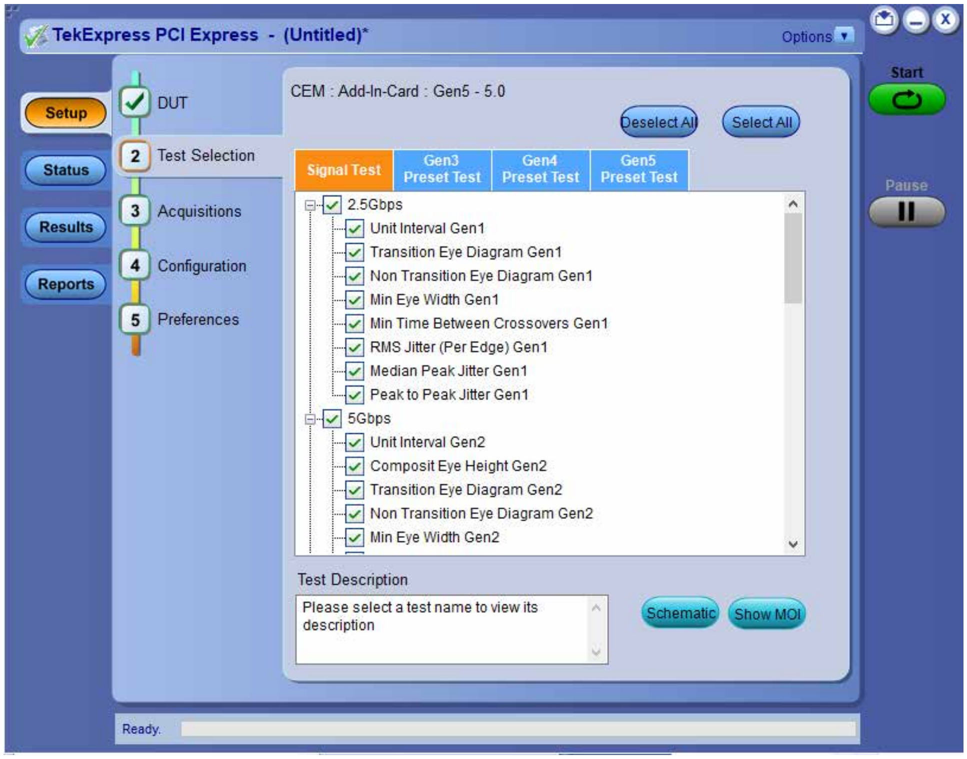
- **Session Name**: Enter the name to save the config session. The maximum number of character supported is 40 and special characters (.,..,...,\,/:?”<>|*) are not supported.
- **Save**: Save current configuration as a session with the given session name.
- **Close**: Close the Run/Config Session window.
- **Default**: Sets the application configurations to default values.
- **Load**: Load the selected config/run session.
- **Delete**: Delete the selected config/run session.
- **Run Sessions**: Run the selected config/run session.

Enable/ Disable the Multi Run session

By default the **Multi Run Session** is enabled in the application. Set the IsMultiSessionRunEnabled value to false to disable the **Multi Run Session** feature in the TekExpress.exe.Config file, which is downloaded along the application.

Test Selection: Select the tests

Use the Test Selection tab to select the tests. The test measurements available depends on the settings selected in the DUT tab.


TekExpress PCI Express - (Untitled)*
Options
Start
Pause
Setup
Status
Results
Reports
DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Deselect All
Select All
Signal Test
Gen3 Preset Test
Gen4 Preset Test
Gen5 Preset Test
Test Description
Schematic
Show MOI
Ready.

CEM : Add-In-Card : Gen5 - 5.0

- ☑ 2.5Gbps
  - ☑ Unit Interval Gen1
  - ☑ Transition Eye Diagram Gen1
  - ☑ Non Transition Eye Diagram Gen1
  - ☑ Min Eye Width Gen1
  - ☑ Min Time Between Crossovers Gen1
  - ☑ RMS Jitter (Per Edge) Gen1
  - ☑ Median Peak Jitter Gen1
  - ☑ Peak to Peak Jitter Gen1
- ☑ 5Gbps
  - ☑ Unit Interval Gen2
  - ☑ Composit Eye Height Gen2
  - ☑ Transition Eye Diagram Gen2
  - ☑ Non Transition Eye Diagram Gen2
  - ☑ Min Eye Width Gen2

Please select a test name to view its description

Figure 13: Test selection tab

Table 8: Test Selection tab configuration

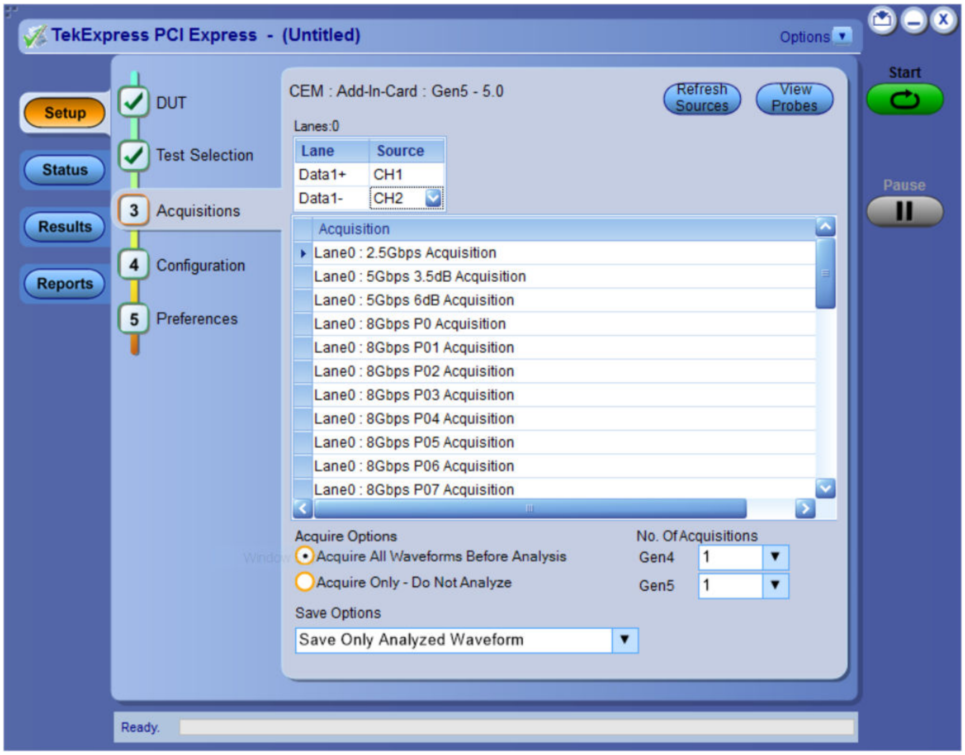
Setting	Description
Signal Tests	Click **+** to expand a group of commands. Click the check box adjacent to a test group to select all tests in that group. Click check boxes adjacent to individual tests to select those tests.
Deselect All	Click **Deselect All** button to deselect all tests.
Select All	Click **Select All** button to select all tests.
Show MOI	Click **Show MOI** button to open the MOI (Methods of Implementation) document for all measurements.
Schematic	Click **Schematic button** to view a diagram that shows the correct DUT and equipment setup for the selected test. Use to verify your test equipment setup before running the test.
Gen3, Gen4, and Gen5 testing	Click the required **Preset Test** tab and select the presets tests.
Lanes	Click the **Lanes** button in the Preset Test tab to view and select which lanes to use for preset testing. At least one lane must be selected.

Acquisitions: Set waveform acquisition settings

Use the **Acquisition** tab in the Setup panel to view and select test acquisition parameters, including the signal source channels, acquisition options, and waveform save options. This panel also shows the signal inputs required for the selected DUT parameters.

Contents displayed on this tab depend on whether you acquire active waveforms or use prerecorded waveform files (as set in the **DUT** tab. Contents displayed on this tab also depend on detected probes and the specified DUT type.

Active waveforms


TekExpress PCI Express - (Untitled)
Options
Setup
Status
Results
Reports
DUT
Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Refresh Sources
View Probes
Start
Pause
Ready.

CEM : Add-In-Card : Gen5 - 5.0

Lanes:0

Lane	Source
Data1+	CH1
Data1-	CH2

Acquisition
Lane0 : 2.5Gbps Acquisition
Lane0 : 5Gbps 3.5dB Acquisition
Lane0 : 5Gbps 6dB Acquisition
Lane0 : 8Gbps P0 Acquisition
Lane0 : 8Gbps P01 Acquisition
Lane0 : 8Gbps P02 Acquisition
Lane0 : 8Gbps P03 Acquisition
Lane0 : 8Gbps P04 Acquisition
Lane0 : 8Gbps P05 Acquisition
Lane0 : 8Gbps P06 Acquisition
Lane0 : 8Gbps P07 Acquisition

Acquire Options

● Acquire All Waveforms Before Analysis

○ Acquire Only - Do Not Analyze

No. Of Acquisitions

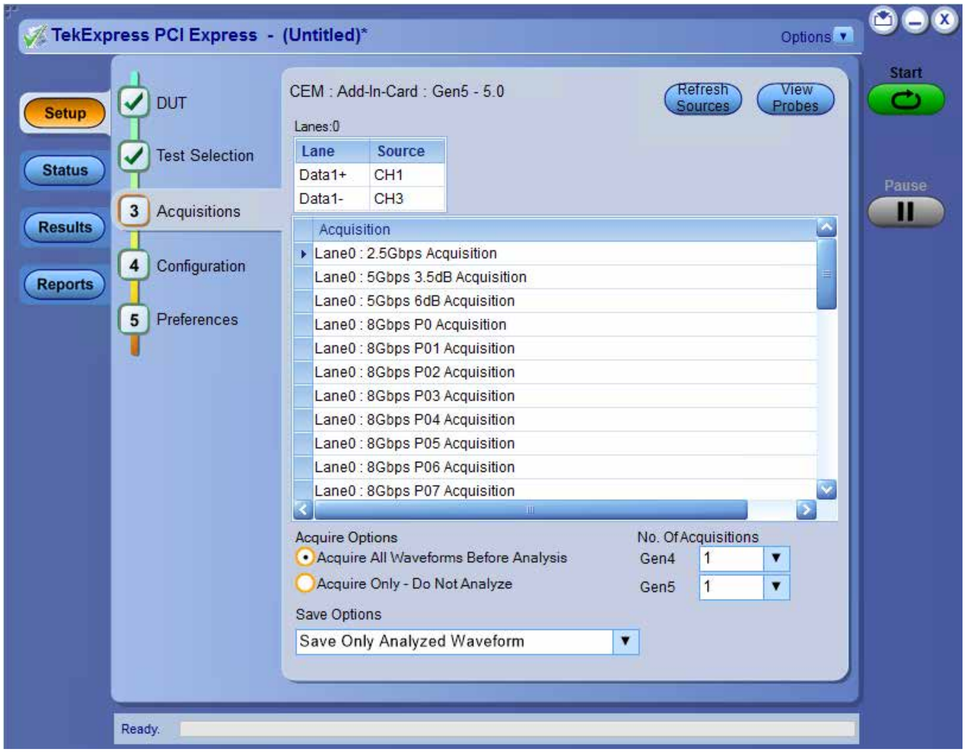
Gen4 1

Gen5 1

Save Options

Save Only Analyzed Waveform

Figure 14: Acquisitions tab: using active waveforms (with ATI channels)


TekExpress PCI Express - (Untitled)*
Options
Start
Pause
Setup
Status
Results
Reports
DUT
Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Refresh Sources
View Probes
Ready.

CEM : Add-In-Card : Gen5 - 5.0

Lanes:0

Lane	Source
Data1+	CH1
Data1-	CH3

Acquisition
Lane0 : 2.5Gbps Acquisition
Lane0 : 5Gbps 3.5dB Acquisition
Lane0 : 5Gbps 6dB Acquisition
Lane0 : 8Gbps P0 Acquisition
Lane0 : 8Gbps P01 Acquisition
Lane0 : 8Gbps P02 Acquisition
Lane0 : 8Gbps P03 Acquisition
Lane0 : 8Gbps P04 Acquisition
Lane0 : 8Gbps P05 Acquisition
Lane0 : 8Gbps P06 Acquisition
Lane0 : 8Gbps P07 Acquisition

Acquire Options

● Acquire All Waveforms Before Analysis

○ Acquire Only - Do Not Analyze

No. Of Acquisitions

Gen4 1

Gen5 1

Save Options

Save Only Analyzed Waveform

Figure 15: Acquisitions tab : using active waveforms (with Non-ATI channels)

Table 9: Acquisitions tab configuration

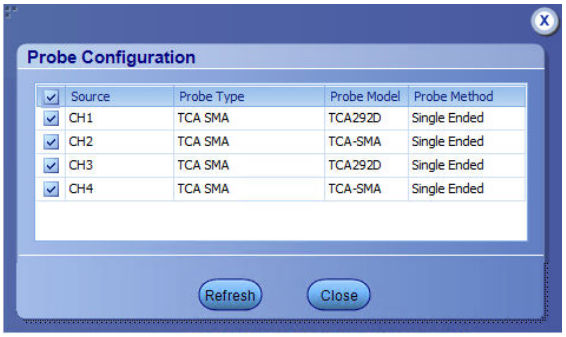
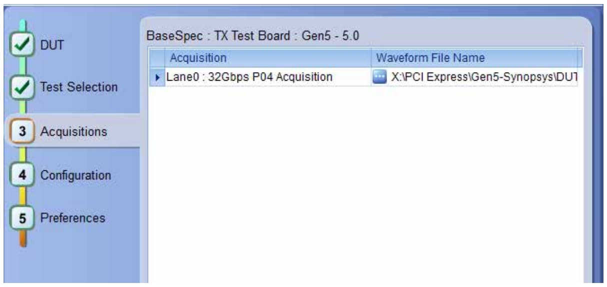
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Source Selection</td><td>Click the Source fields to select signal sources for the listed lanes. The number of lanes shown depends on the parameters set in the DUT tab.</td></tr>
<tr><td>Refresh Sources</td><td>Click Refresh Sources to refresh the probe configuration after changing any probes. (This button performs the same function as the Refresh button in the Probe Configuration dialog box.)</td></tr>
<tr><td>View Probes</td><td>Click View Probes to view the detected probe configuration. Use the View Probes dialog box to enable or disable probe signal source access in the application.

Probe Configuration
Refresh
Close
<table>
<tr><th>☑</th><th>Source</th><th>Probe Type</th><th>Probe Model</th><th>Probe Method</th></tr>
<tr><td>☑</td><td>CH1</td><td>TCA SMA</td><td>TCA292D</td><td>Single Ended</td></tr>
<tr><td>☑</td><td>CH2</td><td>TCA SMA</td><td>TCA-SMA</td><td>Single Ended</td></tr>
<tr><td>☑</td><td>CH3</td><td>TCA SMA</td><td>TCA292D</td><td>Single Ended</td></tr>
<tr><td>☑</td><td>CH4</td><td>TCA SMA</td><td>TCA-SMA</td><td>Single Ended</td></tr>
</table>
⚠ Note: Only Differential option is available under Probe Method for Trimode probes.</td></tr>
</table>

Table continued…

Setting	Description
Acquire Options	Click the **Acquire Options** controls to set how the application acquires and analyzes signals.
Save Options	Click the **Save Options** field to set how the application saves acquired waveforms (save all waveforms, save all waveforms after applying filters, or discard all waveforms after running analysis).
No. of Acquisitions	Select the **No. of acquisition** for Gen4 from the drop-down.

Prerecorded waveforms



BaseSpec : TX Test Board : Gen5 - 5.0

Acquisition	Waveform File Name
Lane0 : 32Gbps P04 Acquisition	X:\PCI Express\Gen5-Synopsys\DUT

Figure 16: Acquisitions tab: using prerecorded waveforms

When using prerecorded waveform files, this panel lists available prerecorded waveform files. You can only select the source of the prerecorded waveform file for each test. See *Set acquisition waveform source for prerecorded waveform files*.

Set acquisition options

Select an **Acquire Option** to set the order in which waveforms are acquired and analyzed:

- **Acquire All Waveforms Before Analysis**: Acquire all waveforms required by tests before performing analysis. All required user interventions (such as connecting to different lanes) are completed, and waveforms acquired, before the analysis is run. You can turn off the DUT after the acquisitions are completed.
- **Acquire Only – Do Not Analyze**: Acquire all waveforms required by tests, and then stop (do not use waveforms to perform test analysis). Use this setting for testing multiple DUTs once the test and application settings are correct. Acquire all required waveforms and save the session for each DUT, and then recall the waveforms at a later point to analyze in *Prerecorded* mode.

See also

Set acquisitions signal source

Set acquisition waveform save options

Set acquisition waveform save options

Select a **Save Option** to set how to save acquired test waveforms:

- **Save All the Waveforms**: Save all waveforms that were acquired for tests.
- **Save Only Analyzed Wfms**: Save waveforms that was used for analysis.
- **No Waveforms Saved – Discard after analysis**: Delete all acquired waveform data after analysis is complete.

Waveforms are saved to a folder that is unique to each session (a session starts when you click the Start button). The folder path is `X:\PCI Express\Untitled Session\<DUT ID>\<date>_<time>`. Images created for each analysis, CSV files with result values, reports, and other information specific to that particular execution are also saved in this folder. When the session is saved, content is moved to that session folder and the “Untitled Session” gets replaced by the session name.

Waveform file names

This application uses file name conventions to access the waveforms. It is recommended to save the waveforms with following file names.

- Differential data waveform: *Tek_PCIe_Slot_DataRate_LaneNumber_PresetNumber_Data_Differential.wfm*

  Example: *Tek_PCIe_01_8Gbps_Ln00_P0_d_Diff.wfm*
- Differential clock waveform: *Tek_PCIe_Slot_DataRate_LaneNumberClk_PresetNumber_Data_Differential.wfm*

  Example: *Tek_PCIe_01_8Gbps_Ln00Clk_P0_d_Diff.wfm*
- Single ended data positive waveform: *Tek_PCIe_Slot_DataRate_LaneNumber_PresetNumber_Data_Pos.wfm*

  Example: *Tek_PCIe_01_8Gbps_Ln00_P0_d_Pos.wfm*
- Single ended data negative waveform: *Tek_PCIe_Slot_DataRate_LaneNumber_PresetNumber_Data_Neg.wfm*

  Example: *Tek_PCIe_01_8Gbps_Ln00_P0_d_Neg.wfm*

See also

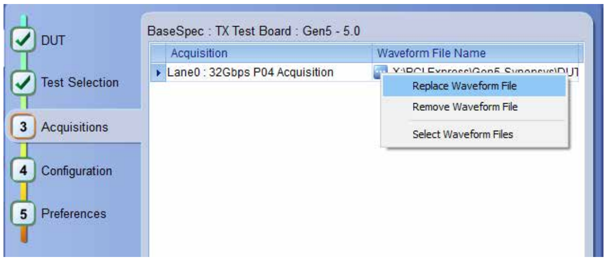
Set acquisitions signal source

Set acquisition waveform source for prerecorded waveform files

Set acquisition Acquire options

Set acquisition waveform source for prerecorded waveform files

When using prerecorded waveform files, there are no acquisition source selections to make. You can only select the source of the prerecorded waveform files for each test.



BaseSpec : TX Test Board : Gen5 - 5.0

Acquisition	Waveform File Name
Lane0 : 32Gbps P04 Acquisition	X:\PCI Express\Gen5_Synopsys\DUT

If you selected to use a prerecorded waveform file (in the DUT tab), the lane and source fields are not applicable and are not shown. The Acquisition tab instead shows a table of the waveforms used for the required test acquisitions.

You can load a different waveform file for each table item. To load a different waveform file:

1. Click the ellipsis button (...) of the waveform file to change.
2. Select the waveform task to perform (replace, remove, or select the waveform file).
3. Use the dialog box to navigate to and select the waveform file with which to replace the current file. You need to select all required differential waveforms for analysis. For example, select one data waveform and one clock waveform for each acquisition (except 2.5 Gbps) for testing a system board.

⚠ **Note:** Clock signals are not required for Gen1 (2.5 Gbps data rate) testing.

See also

Set acquisition signal source

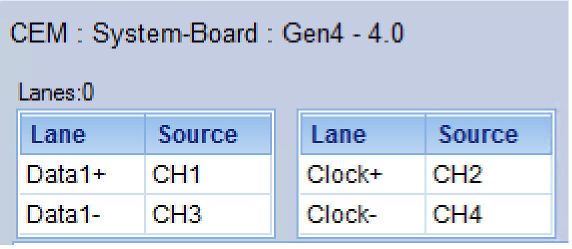
Set acquisition options

Set acquisition waveform save options

Set acquisition signal source

Use this procedure to set the channel sources for live waveform acquisitions. The number of Lane and Source fields shown depends on the number of lanes selected for testing in the **DUT** tab.

1. Click **Setup > Acquisitions**.
2. Click in the Source column of the field to change.
3. Click the arrow button to list available sources from which to select.



CEM : System-Board : Gen4 - 4.0

Lanes:0

Lane	Source
Data1+	CH1
Data1-	CH3

Lane	Source
Clock+	CH2
Clock-	CH4

See also

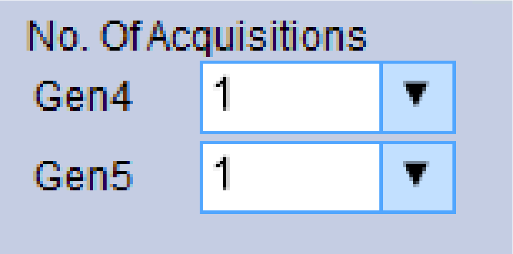
Set acquisition options

Set acquisition waveform save options

Set acquisition waveform source for prerecorded waveform files

No. of Acquisitions

Use this procedure to set the number of acquisitions for each signal in the dropdown. This procedure is applicable for CEM Gen4 and Gen5. Minimum number of acquisition is 1 and the maximum is 10. Default selected is 1.



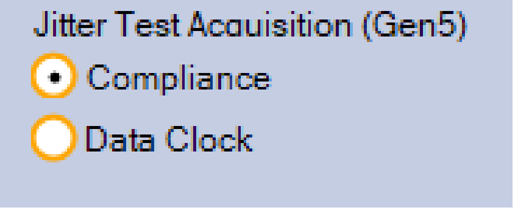
No. Of Acquisitions

Gen4 1

Gen5 1

Jitter Test Acquisition

Use this procedure to choose the signal pattern to acquire the Gen5 Base jitter measurements. This procedure is applicable for Basespec Gen5 Jitter measurements only. The available options are Complaince and Data Clock. Compliance is seleceted as default option.



Jitter Test Acquisition (Gen5)

● Compliance

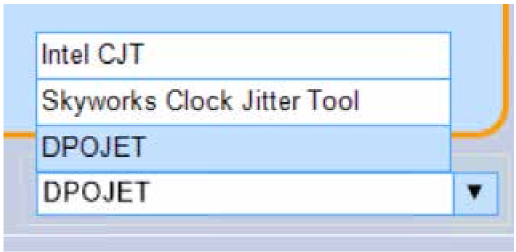
○ Data Clock

Analysis Tool

Use this procedure to choose the analysis tool to be used for the Ref Clock testing.

Available options are:

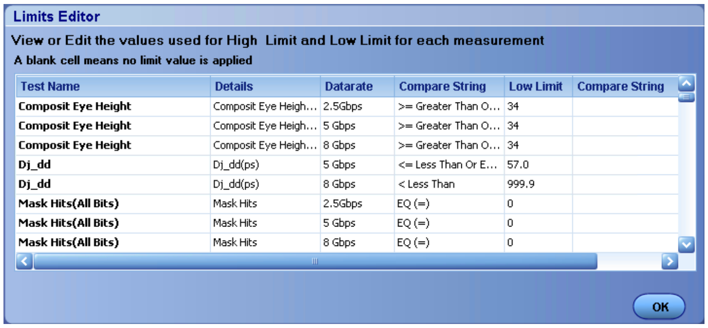
- Intel CJT
- Skyworks Clock Jitter Tool
- DPOJET


Intel CJT
Skyworks Clock Jitter Tool
DPOJET
DPOJET

Configuration: Set measurement limits for tests

Use Configuration tab to view and configure the Global Settings and the measurement configurations. The measurement specific configurations available in this tab depends on the selections made in the DUT panel and Test Selection panel.

Table 10: Configuration tab: Common parameters

Settings	Description
Limit Editor	Displays the upper and lower limits for the applicable measurement using different types of comparisons. 

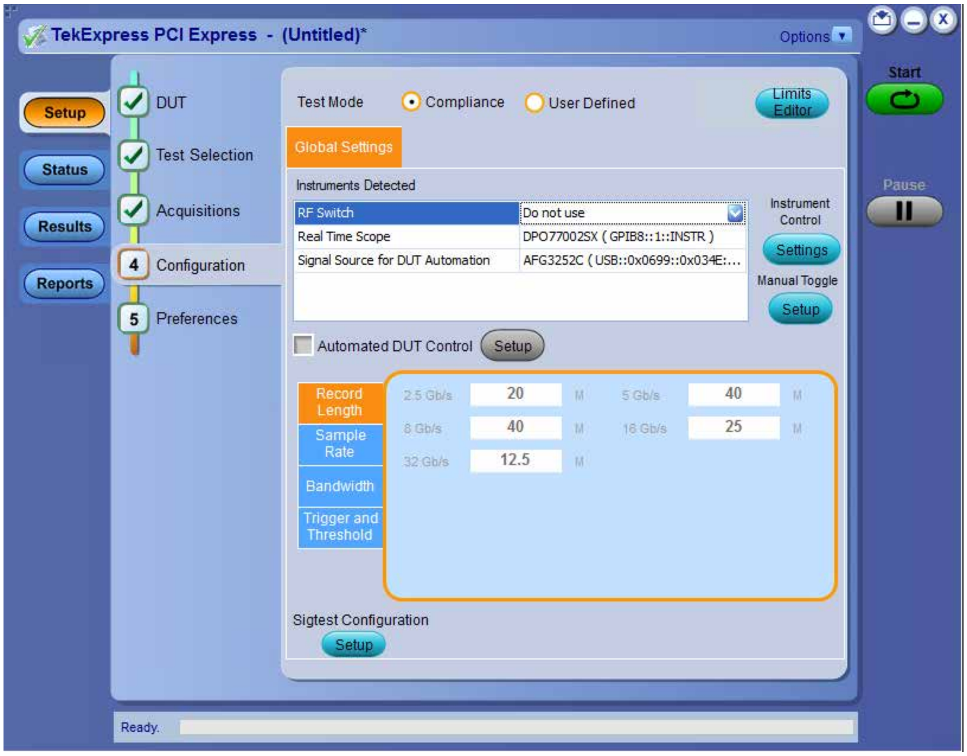
Limits Editor

View or Edit the values used for High Limit and Low Limit for each measurement

A blank cell means no limit value is applied

Test Name	Details	Datarate	Compare String	Low Limit	Compare String
Composit Eye Height	Composit Eye Heigh…	2.5Gbps	>= Greater Than O…	34	
Composit Eye Height	Composit Eye Heigh…	5 Gbps	>= Greater Than O…	34	
Composit Eye Height	Composit Eye Heigh…	8 Gbps	>= Greater Than O…	34	
Dj_dd	Dj_dd(ps)	5 Gbps	<= Less Than Or E…	57.0	
Dj_dd	Dj_dd(ps)	8 Gbps	< Less Than	999.9	
Mask Hits(All Bits)	Mask Hits	2.5Gbps	EQ (=)	0	
Mask Hits(All Bits)	Mask Hits	5 Gbps	EQ (=)	0	
Mask Hits(All Bits)	Mask Hits	8 Gbps	EQ (=)	0	

OK



TekExpress PCI Express - (Untitled)*

Test Mode ● Compliance ○ User Defined

Instruments Detected

RF Switch	Do not use
Real Time Scope	DPO77002SX (GPIB8::1::INSTR)
Signal Source for DUT Automation	AFG3252C (USB::0x0699::0x034E:…

☐ Automated DUT Control

2.5 Gb/s	20	M	5 Gb/s	40	M
8 Gb/s	40	M	16 Gb/s	25	M
32 Gb/s	12.5	M			

Ready.

Options
Start
Pause
Setup
Status
Results
Reports
DUT
Test Selection
Acquisitions
4 Configuration
5 Preferences
Limits Editor
Global Settings
Instrument Control
Settings
Manual Toggle
Setup
Setup
Record Length
Sample Rate
Bandwidth
Trigger and Threshold
Sigtest Configuration
Setup

Figure 17: Configuration tab: Global Settings

Table 11: Configuration tab: Global Settings configuration

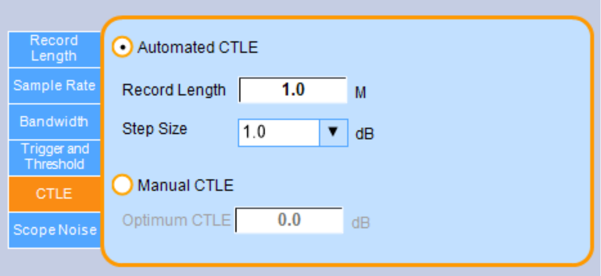
Setting	Description
Test Mode	Determines whether test parameters are in compliance or can be edited (User Defined Mode).

Table continued…

Setting	Description
	• Compliance: Most test parameter values cannot be edited. • User Defined: Enables editing of most test parameters. ⚠ **Note:** Not applicable for the Device type / Specification type BaseSpec
Instruments Detected	Displays a list of the connected instruments found during the instrument discovery. Instrument types include equipment such as oscilloscopes and signal generators.
Instrument Control	Click **Settings** to search for connected instruments and view instrument connection details. Connected instruments displayed in *TekExpress instrument control settings* and can be selected for use under **Global Settings** in the test configuration section.
Manual Toggle	Click **Setup** to manually toggle AWG or AFG. This is enabled when the Signal Source for DUT Automation in Instruments Detected is selected.
Automated DUT Control	Enables automatic toggling of test patterns for DUT tests. Requires an AWG or AFG as part of the test setup. Click **Setup** to configure the DUT automation settings.
Record Length, Sample Rate, Bandwidth	These settings apply to all tests selected for the indicated data rate. • Record Length: Specifies the waveform record length. • Sample Rate: Specifies the oscilloscope sample rate to use for all tests. • Bandwidth: Specifies the oscilloscope bandwidth to use for all tests.
Sig Validation Threshold	Sets the threshold voltage to use for signal validation.
Trigger Type (Gen3/Gen4/Gen5)	• Edge • Width • Auto ⚠ **Note:** When auto is selected, width trigger type is applied. If it fails, edge trigger type is applied.
CTLE	This configuration setting allows the user to configure for CTLE optimization for Gen6 jitter measurements. Refer *CTLE optimization feature* for more details.
Scope Noise	This configuration setting allows the user to apply scope noise compensation for CTLE optimization and measurement analysis for Gen6 data rate test. Refer *Scope Noise Characterization* for more details.
SigTest Configuration	Click **Setup**; select the executable (.exe) for Gen1, 2, 3, 4, and 5 and template configuration for signal quality and preset tests for the data rates selected. Check/Un-check Silent mode to run sigtest in Silent mode/non-silent mode.
Analysis tool (For RfClockSpec Only)	• Intel CJT • Skyworks Clock Jitter Tool • DPOJET

CTLE optimization feature

This configuration setting allows the user to configure for CTLE optimization for Gen6 jitter measurements.



● Automated CTLE

Record Length 1.0 M

Step Size 1.0 ▼ dB

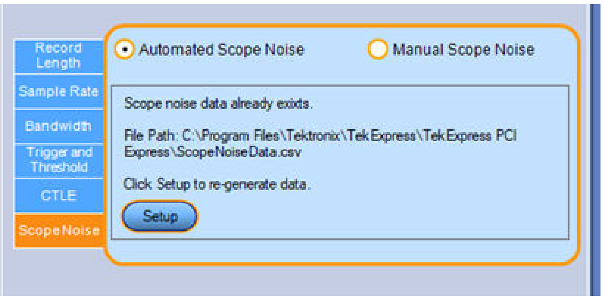
○ Manual CTLE

Optimum CTLE 0.0 dB

- Record Length:
  - The Record Length of the waveform to be acquired for CTLE optimization.
  - Range 1M to 20M. Default value is 1M
- Step Size:
  - Sets up the step size for the CTLE optimization iteration.
  - Values: 1, 0.5, 0.25
- Optimum CTLE:
  - User defined CTLE value.
  - Default value 0.0 dB

Scope Noise Characterization

This configuration setting allows the user to apply scope noise compensation for CTLE optimization and measurement analysis for Gen6 data rate test.



● Automated Scope Noise ○ Manual Scope Noise

Scope noise data already exists.

File Path: C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express\ScopeNoiseData.csv

Click Setup to re-generate data.

There are two modes to apply the scope noise.

- Automated Scope Noise
- Manual Scope Noise

Automated Scope Noise calculates the Scope Noise for various Vertical settings, Filter files, and CTLE. During execution it will select the Scope Noise which is closest in Vertical Scale to the Vertical Scale decided.

Manual Mode will use the same Noise Compensation irrespective of Vertical Scale and CTLE applied.

Use the radio buttons to switch between these modes.

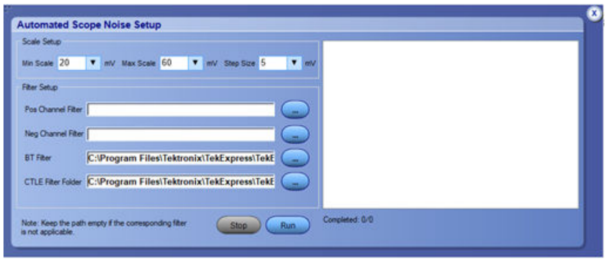
Automated Scope Noise

This functionality works in two steps:

1. Creating the Scope Noise Data.

⚠ **Note:** This step is to be done before running the TekExpress test session.

- In Automated Mode, click on the **Setup** button. This pops up the '**Automated Scope Noise Setup**' window.



Min Scale 20 mV Max Scale 60 mV Step Size 5 mV

Pos Channel Filter

Neg Channel Filter

BT Filter C:\Program Files\Tektronix\TekExpress\TekE

CTLE Filter Folder C:\Program Files\Tektronix\TekExpress\TekE

Note: Keep the path empty if the corresponding filter is not applicable.

Completed: 0/0

- Select Min, Max Scale, Step Size and applicable filters and then click **Run**.

  It will calculate the scope noise value for the selected scales and for different Filter combinations. For example: Live_BT, Live_BT_CTLE0, Live_BT_CTLE1…. Live_BT_CTLE15, and store them in a csv file. The file path is `C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express\ScopeNoiseData.`

2. Using the scope noise data during test run.

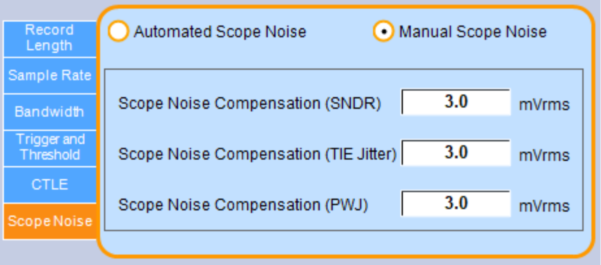
- When we run the test session, the appropriate value will be picked up from the file based on the scale of the waveform acquired and the filters applied. TekExpress searches this scope noise value during the CTLE optimization (to run RJ measurement) and during the measurement analysis.

  ⚠ **Note:** If the waveform scale value falls in between the available values in the file, then nearest scale value would be picked up.

- If the file is not present or the searched combination is not present in the table then TekExpress uses the default values selected under manual mode.

Manual Scope Noise

In the manual mode the user can directly input the scope noise compensation value for corresponding measurement types.



○ Automated Scope Noise ● Manual Scope Noise

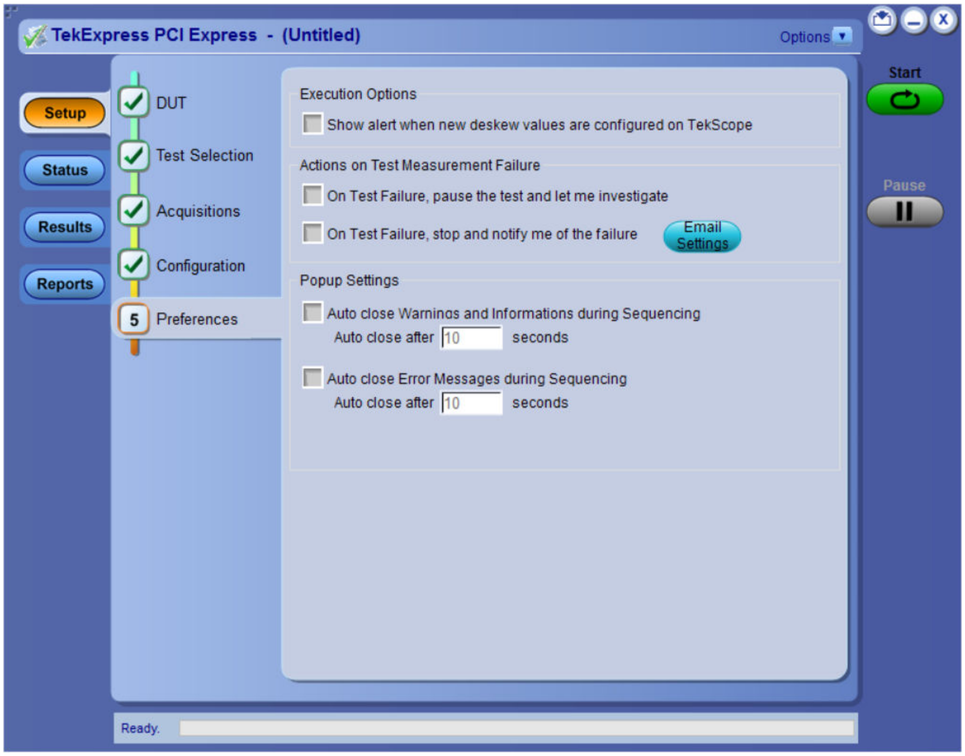
Scope Noise Compensation (SNDR) 3.0 mVrms

Scope Noise Compensation (TIE Jitter) 3.0 mVrms

Scope Noise Compensation (PWJ) 3.0 mVrms

Preferences: Set the test run preferences

Use **Preferences** tab to set the application action on completion of a measurement. The **Preferences** tab has the feature to enable or disable certain options related to the measurement execution.



Execution Options

☐ Show alert when new deskew values are configured on TekScope

Actions on Test Measurement Failure

☐ On Test Failure, pause the test and let me investigate

☐ On Test Failure, stop and notify me of the failure

Popup Settings

☐ Auto close Warnings and Informations during Sequencing

Auto close after 10 seconds

☐ Auto close Error Messages during Sequencing

Auto close after 10 seconds

Figure 18: Preferences tab

Refer the below table for the options available in the **Preferences** tab:

Table 12: Preferences tab settings

Setting	Description
Execution Options	
Show alert when new deskew values are configured on TekScope	
Actions on Test Measurement Failure	
On Test Failure, pause the test and let me investigate	Select to pause the test run and allow you to investigate when the test execution is failed.
On Test Failure, stop and notify me of the failure	Select to stop the test run on Test Failure, and to get notified via email. By default, it is unselected. Click **Email Settings** to configure the email settings to receive notifications.
Popup Settings	
Auto close Warnings and informations during Sequencing Auto close after <no> seconds	Select to close the warnings and information window automatically after the specified amount of time. Specify the time in seconds using the edit box.

Table continued…

Setting	Description
Auto close Error Messages during Sequencing. Show in Reports Auto close after <no> seconds	Select to close the error message window automatically after the specified amount of time. Specify the time in seconds using the edit box.

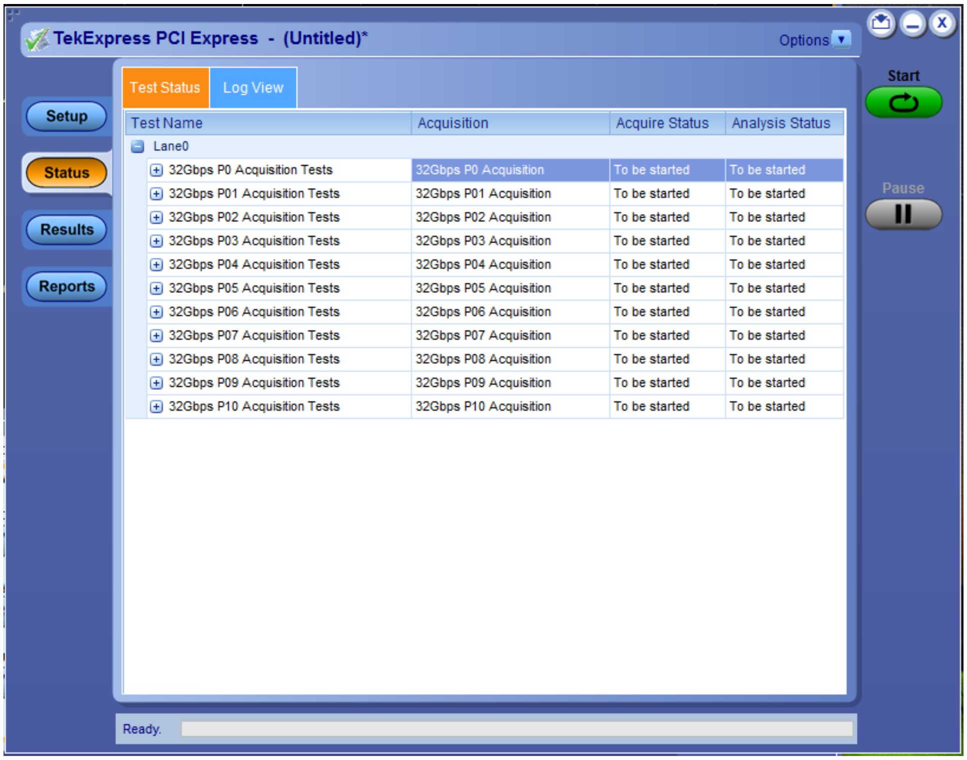
Status panel: View the test execution status

The Status panel contains the **Test Status** and **Log View** tabs, which provides status on the test acquisition and analysis (Test Status) and listing of test tasks performed (Log View tab). The application opens the **Test Status** tab when you start to execute the test. Select the **Test Status** or the **Log View** tab to view these items while the test execution is in progress.

View test execution status

The tests are grouped and displayed based on the Clock and Data lane. It displays the tests along with the acquisition type, acquire, and analysis status of the tests. In pre-recorded mode, **Acquire Status** is not valid.

The **Test Status** tab presents a collapsible table with information about each test as it is running. Use the symbols to expand (+) and collapse (−) the table rows.



Test Name	Acquisition	Acquire Status	Analysis Status
Lane0			
32Gbps P0 Acquisition Tests	32Gbps P0 Acquisition	To be started	To be started
32Gbps P01 Acquisition Tests	32Gbps P01 Acquisition	To be started	To be started
32Gbps P02 Acquisition Tests	32Gbps P02 Acquisition	To be started	To be started
32Gbps P03 Acquisition Tests	32Gbps P03 Acquisition	To be started	To be started
32Gbps P04 Acquisition Tests	32Gbps P04 Acquisition	To be started	To be started
32Gbps P05 Acquisition Tests	32Gbps P05 Acquisition	To be started	To be started
32Gbps P06 Acquisition Tests	32Gbps P06 Acquisition	To be started	To be started
32Gbps P07 Acquisition Tests	32Gbps P07 Acquisition	To be started	To be started
32Gbps P08 Acquisition Tests	32Gbps P08 Acquisition	To be started	To be started
32Gbps P09 Acquisition Tests	32Gbps P09 Acquisition	To be started	To be started
32Gbps P10 Acquisition Tests	32Gbps P10 Acquisition	To be started	To be started

Figure 19: Test execution status view in Status panel

Table 13: Test execution status table headers

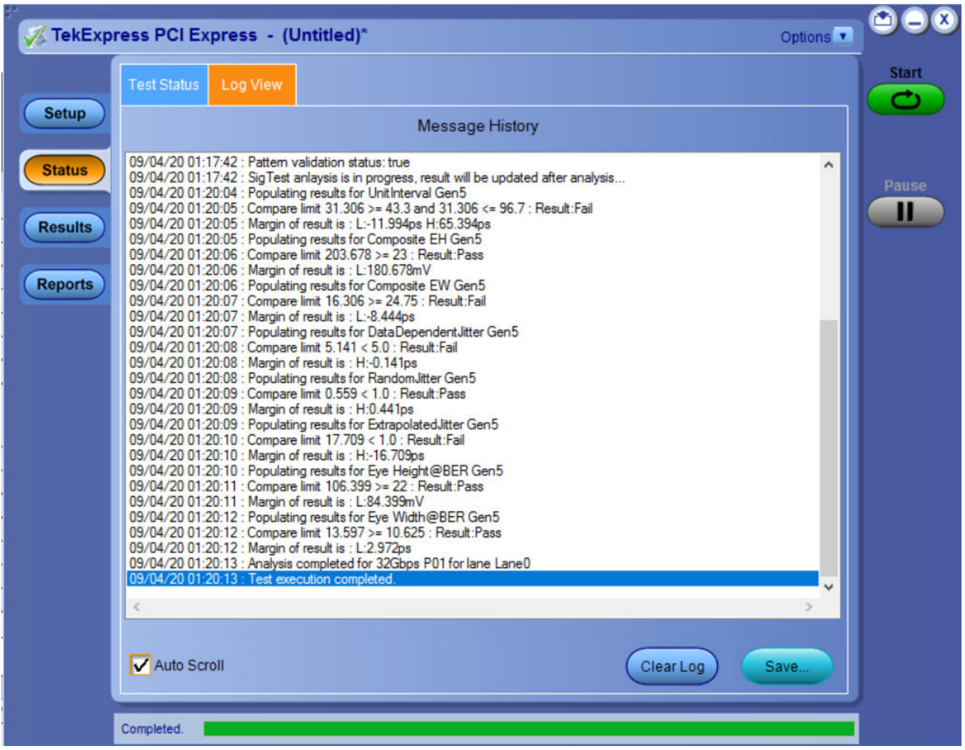
Control	Description
Test Name	Displays the measurement name.
Acquisition	Describes the type of data being acquired.
Acquire Status	Displays the progress state of the acquisition: • To be started • Started Acquisition • Completed Acquisition

Table continued…

Control	Description
Analysis Status	Displays the progress state of the analysis: • To be started • In Progress • Completed

View test execution logs

The Test Status tab displays the detailed execution status of the tests. Also, displays each and every execution step in detail with its timestamp information. The log details can be used to troubleshoot and resolve any issue/bug which is blocking the test execution process.



```
09/04/20 01:17:42 : Pattern validation status: true
09/04/20 01:17:42 : SigTest anlaysis is in progress, result will be updated after analysis...
09/04/20 01:20:04 : Populating results for UnitInterval Gen5
09/04/20 01:20:05 : Compare limit 31.306 >= 43.3 and 31.306 <= 96.7 : Result:Fail
09/04/20 01:20:05 : Margin of result is : L:-11.994ps H:65.394ps
09/04/20 01:20:05 : Populating results for Composite EH Gen5
09/04/20 01:20:06 : Compare limit 203.678 >= 23 : Result:Pass
09/04/20 01:20:06 : Margin of result is : L:180.678mV
09/04/20 01:20:06 : Populating results for Composite EW Gen5
09/04/20 01:20:07 : Compare limit 16.306 >= 24.75 : Result:Fail
09/04/20 01:20:07 : Margin of result is : L:-8.444ps
09/04/20 01:20:07 : Populating results for DataDependentJitter Gen5
09/04/20 01:20:08 : Compare limit 5.141 < 5.0 : Result:Fail
09/04/20 01:20:08 : Margin of result is : H:-0.141ps
09/04/20 01:20:08 : Populating results for RandomJitter Gen5
09/04/20 01:20:09 : Compare limit 0.559 < 1.0 : Result:Pass
09/04/20 01:20:09 : Margin of result is : H:0.441ps
09/04/20 01:20:09 : Populating results for ExtrapolatedJitter Gen5
09/04/20 01:20:10 : Compare limit 17.709 < 1.0 : Result:Fail
09/04/20 01:20:10 : Margin of result is : H:-16.709ps
09/04/20 01:20:10 : Populating results for Eye Height@BER Gen5
09/04/20 01:20:11 : Compare limit 106.399 >= 22 : Result:Pass
09/04/20 01:20:11 : Margin of result is : L:84.399mV
09/04/20 01:20:12 : Populating results for Eye Width@BER Gen5
09/04/20 01:20:12 : Compare limit 13.597 >= 10.625 : Result:Pass
09/04/20 01:20:12 : Margin of result is : L:2.972ps
09/04/20 01:20:13 : Analysis completed for 32Gbps P01 for lane Lane0
09/04/20 01:20:13 : Test execution completed.
```

Figure 20: Log view in Status panel

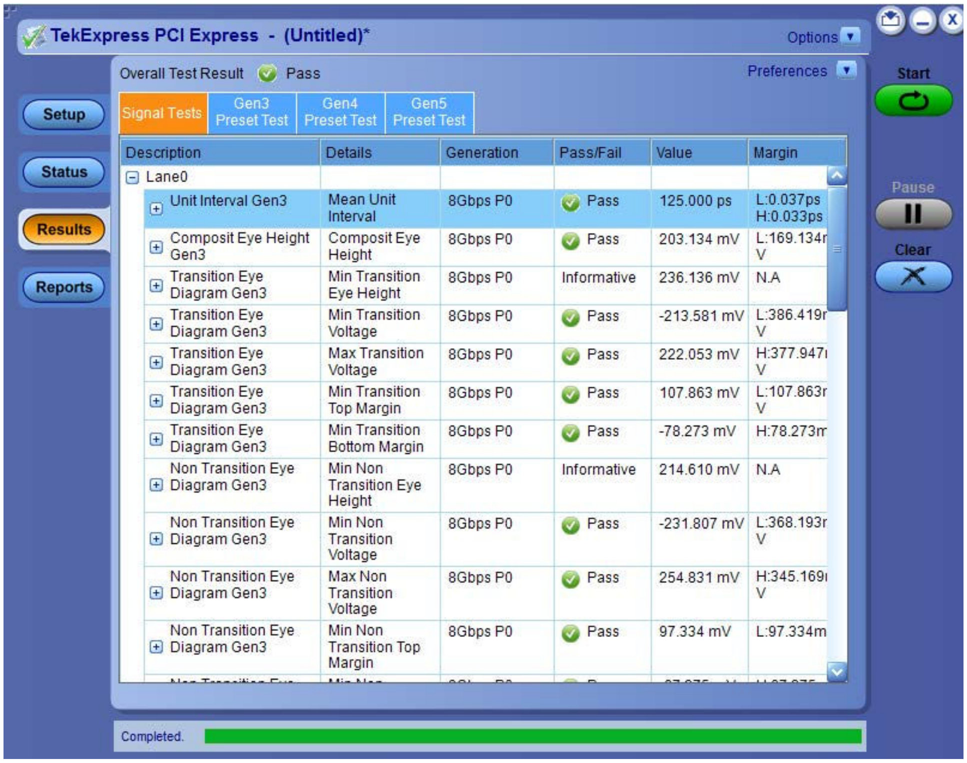
Table 14: Status panel settings

Control	Description
Message History	Lists all the executed test operations and timestamp information.
Auto Scroll	Enables automatic scrolling of the log view as information is added to the log during the test execution.
Clear Log	Clears all the messages from the log view.
Save	Saves the log file into a text file format. Use the standard Save File window to navigate to and specify the folder and file name to save the log text.

Results panel: View summary of test results

When a test execution is complete, the application automatically opens the **Results** panel to display a summary of test results.

In the Results table, each test result occupies a row. By default, results are displayed in summary format with the measurement details collapsed and with the Pass/Fail column visible.



Overall Test Result ✓ Pass

Description	Details	Generation	Pass/Fail	Value	Margin
⊟ Lane0					
⊞ Unit Interval Gen3	Mean Unit Interval	8Gbps P0	✓ Pass	125.000 ps	L:0.037ps H:0.033ps
⊞ Composit Eye Height Gen3	Composit Eye Height	8Gbps P0	✓ Pass	203.134 mV	L:169.134r V
⊞ Transition Eye Diagram Gen3	Min Transition Eye Height	8Gbps P0	Informative	236.136 mV	N.A
⊞ Transition Eye Diagram Gen3	Min Transition Voltage	8Gbps P0	✓ Pass	-213.581 mV	L:386.419r V
⊞ Transition Eye Diagram Gen3	Max Transition Voltage	8Gbps P0	✓ Pass	222.053 mV	H:377.947 V
⊞ Transition Eye Diagram Gen3	Min Transition Top Margin	8Gbps P0	✓ Pass	107.863 mV	L:107.863r V
⊞ Transition Eye Diagram Gen3	Min Transition Bottom Margin	8Gbps P0	✓ Pass	-78.273 mV	H:78.273m
⊞ Non Transition Eye Diagram Gen3	Min Non Transition Eye Height	8Gbps P0	Informative	214.610 mV	N.A
⊞ Non Transition Eye Diagram Gen3	Min Non Transition Voltage	8Gbps P0	✓ Pass	-231.807 mV	L:368.193r V
⊞ Non Transition Eye Diagram Gen3	Max Non Transition Voltage	8Gbps P0	✓ Pass	254.831 mV	H:345.169 V
⊞ Non Transition Eye Diagram Gen3	Min Non Transition Top Margin	8Gbps P0	✓ Pass	97.334 mV	L:97.334m

Completed.

Figure 21: Results panel with measurement results

Click ⊞ icon on each measurement in the row to expand and to display the minimum and maximum parameter values of the measurement.

Filter the test results

Each column in the result table can be customized and displayed by enabling or disabling any column as per your requirement. You can change the view in the following ways:

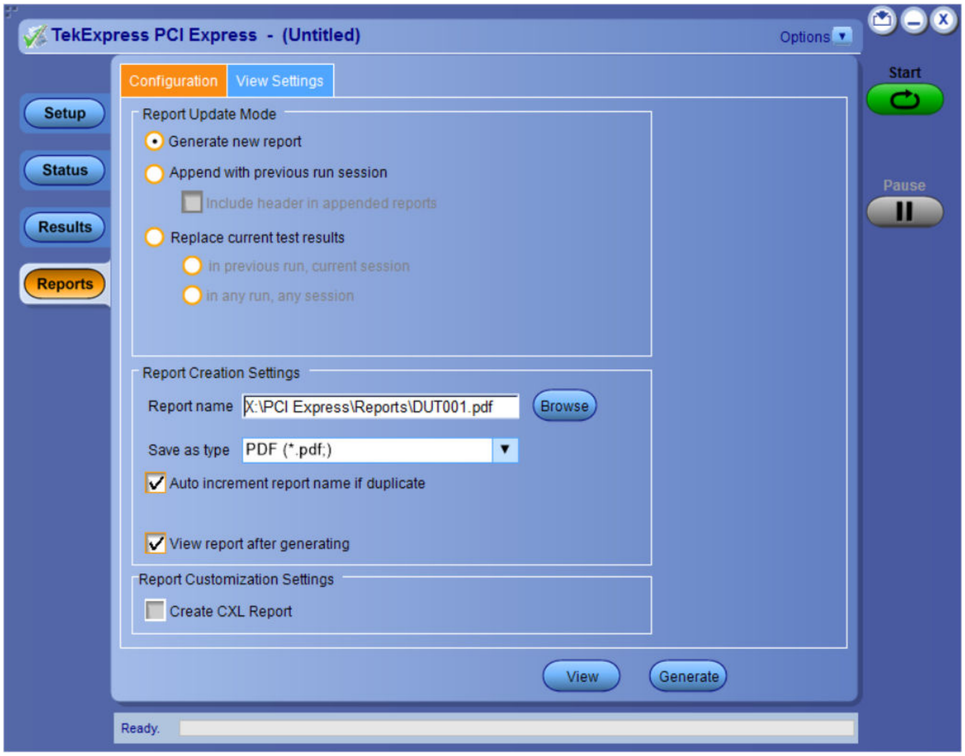
- To remove or restore the Pass/Fail column, select **Preferences** > **Show Pass/Fail**.
- To collapse all expanded tests, select **Preferences** > **View Results Summary**.
- To expand all the listed tests, select **View Results Details** from the **Preferences menu** in the upper right corner.
- To enable or disable the wordwrap feature, select **Preferences** > **Enable Wordwrap**.
- To view the results grouped by lane or test, select the corresponding item from the **Preferences** menu.
- To expand the width of a column, place the cursor over the vertical line that separates the column from the column to the right. When the cursor changes to a double-ended arrow, hold down the mouse button and drag the column to the desired width.
- To clear all test results displayed, click **Clear**.

Reports panel: Configure report generation settings

Click **Reports** panel to configure the report generation settings and select the test result information to include in the report. You can use the Reports panel to configure report generation settings, select test content to include in reports, generate the report, view the report, browse for reports, name and save reports, and select report viewing options.

Report configuration settings

The Configuration tab describes the report generation settings to configure the Reports panel. Select report settings before running a test or when creating and saving test setups. Report settings configured are included in saved test setups.



Report Update Mode
● Generate new report
○ Append with previous run session
☐ Include header in appended reports
○ Replace current test results
○ in previous run, current session
○ in any run, any session

Report Creation Settings
Report name X:\PCI Express\Reports\DUT001.pdf
Save as type PDF (*.pdf;)
☑ Auto increment report name if duplicate
☑ View report after generating

Report Customization Settings
☐ Create CXL Report

Figure 22: Report panel- Configuration tab

Table 15: Report configuration panel settings

Control	Description
View	Click to view the most current report.
Generate	Generates a new report based on the current analysis results.
Report Update Mode Settings	
Generate new report	Each time when you click **Run** and when the test execution is complete, it will create a new report. The report can be in either .mht, .pdf, or .csv file formats.
Append with previous run session	Appends the latest test results to the end of the current test results report. Each time when you click this option and run the tests, it will run the previously failed tests and replace the failed test result with the new pass test result in the same report.
Include header in appended reports	Select to include header in appended reports.

Table continued…

Control	Description
Replace current test results	Replaces the previous test results with the latest test results. Results from newly added tests are appended to the end of the report.
In previous run, current session	Select to replace current test results in the report with the test result(s) of previous run in the current session.
In any run, any session	Select to replace current test results in the report with the test result(s) in the selected run session's report. Click and select test result of any other run session.
Report Creation Settings	
Report name	Displays the name and path of the <Application Name> report. The default location is at `\My Documents>\My TekExpress\<Application Name>\Reports`. The report file in this folder gets overwritten each time you run a test unless you specify a unique name or select to auto increment the report name. **To change the report name or location, do one of the following:** • In the Report Path field, type the current folder path and name. • Double-click in the Report Path field and then make selections from the popup keyboard and click **Enter**. Be sure to include the entire folder path, the file name, and the file extension. For example: `C:\Documents and Settings\your user name\My Documents\My TekExpress\<Application Name> \DUT001.mht`. ⚠ **Note:** You cannot set the file location using the Browse button. **Open an existing report** Click **Browse**, locate and select the report file and then click **View** at the bottom of the panel.
Save as type	Saves a report in the specified file type, selected from the drop-down list. The report is saved in .csv, .pdf, or .mht. ⚠ **Note:** If you select a file type different from the default, be sure to change the report file name extension in the Report Name field to match.
Auto increment report name if duplicate	Sets the application to automatically increment the name of the report file if the application finds a file with the same name as the one being generated. For example: DUT001, DUT002, DUT003. This option is enabled by default.
View report after generating	Automatically opens the report in a Web browser when the test execution is complete. This option is selected by default.
Report Customization Settings	
Create CXL Report	Creates CXL device type for AIC/SYB of CEM Spec and Tx Test Board/SRIS Test Board of BaseSpec. ⚠ **Note:** This option is unselected by default.

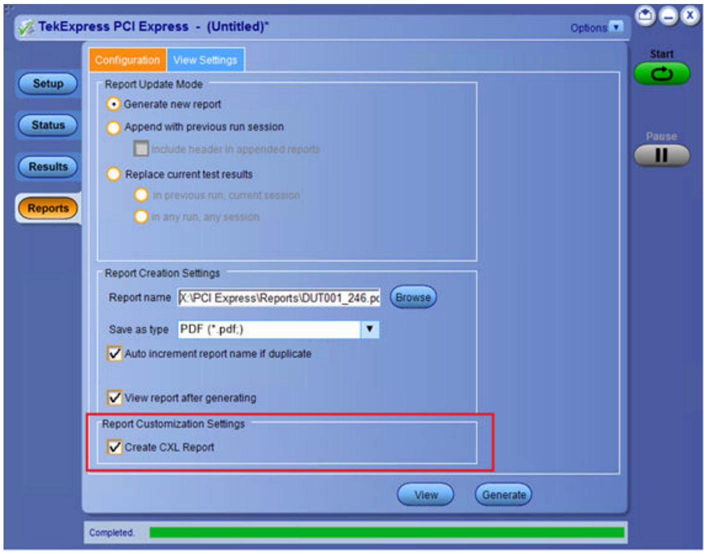
CXL Support

Note: CXL device type support is newly added to the TekExpress PCIe TX application.

- **Supported Device Type and Data Rates**:

Device Types	Data Rates
CXL Add-In Card	• 8 GB/s • 16 GB/s • 32 GB/s
CXL System Board	• 8 GB/s • 16 GB/s • 32 GB/s
CXL TX Test Board	• 8 GB/s • 16 GB/s • 32 GB/s
CXL SRIS TX Test Board	• 16 GB/s • 32 GB/s

- **Specification Reference**: PCI Express Card Electromechanical Specification Revision 4.0 v1.0 and PCI Express Base Specification Revision 4.0 v1.0
- **Test Setup**: The test setup for CXL is same as CEM or Base specification device types. Additionally, user needs to select **Create CXL Report** checkbox in the report panel to run the test in CXL mode.


TekExpress PCI Express - (Untitled)*
Options
Configuration
View Settings
Setup
Status
Results
Reports
Start
Pause
View
Generate

Report Update Mode

● Generate new report

○ Append with previous run session

☐ Include header in appended reports

○ Replace current test results

○ in previous run, current session

○ in any run, any session

Report Creation Settings

Report name X:\PCI Express\Reports\DUT001_246.pc

Browse

Save as type PDF (*.pdf;)

☑ Auto increment report name if duplicate

☑ View report after generating

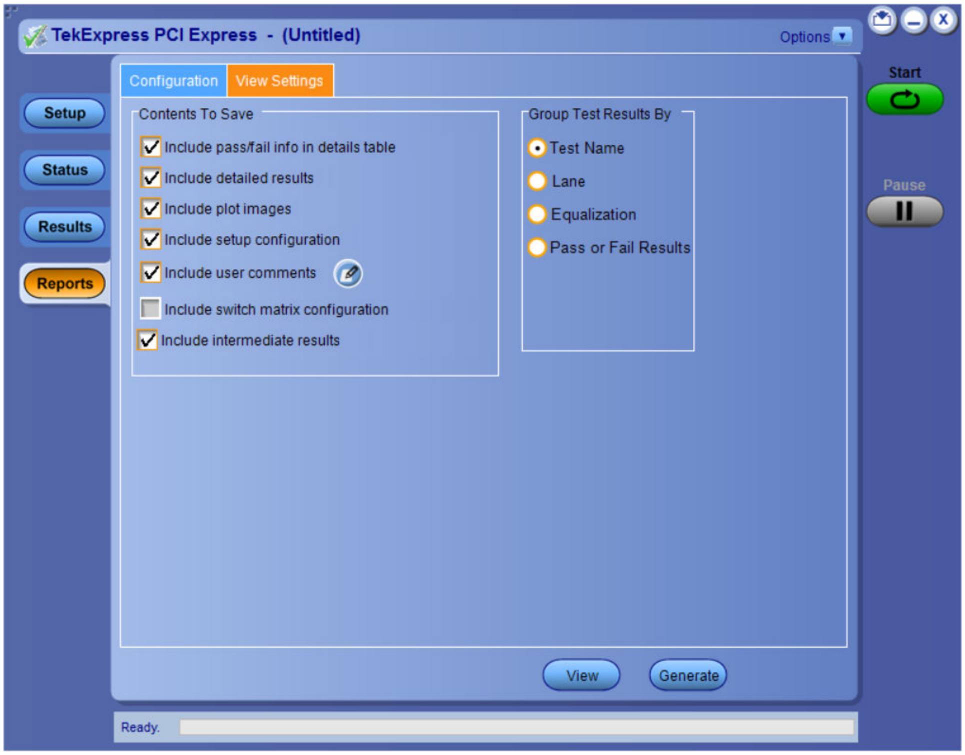
Report Customization Settings

☑ Create CXL Report

Completed.

Configure report view settings

The **View Settings** tab describes the report view settings to configure the Reports panel. Select report view settings before running a test or when creating and saving test setups. Report settings configured are included in saved test setups.



Contents To Save

- ☑ Include pass/fail info in details table
- ☑ Include detailed results
- ☑ Include plot images
- ☑ Include setup configuration
- ☑ Include user comments
- ☐ Include switch matrix configuration
- ☑ Include intermediate results

Group Test Results By

- ● Test Name
- ○ Lane
- ○ Equalization
- ○ Pass or Fail Results

Figure 23: Report panel-View settings tab

Table 16: Report panel view settings

Control	Description
Contents To Save Settings	
Include pass/fail info in details table	Select to include pass/fail information in the details table of the report.
Include detailed results	Select to include detailed results in the report.
Include plot images	Select to include the plot images in the report.
Include setup configuration	Sets the application to include hardware and software information in the summary box at the top of the report. Information includes: the oscilloscope model and serial number, the oscilloscope firmware version, and software versions for applications used in the measurements.
Include user comments	Select to include any comments about the test that you or another user have added in the DUT tab of the Setup panel. Comments appear in the Comments section, below the summary box at the beginning of each report.
Include switch matrix configuration	Select to include the switch matrix configuration in the report.
Include Intermediate Results	Select to include intermediate test results for Gen4 and Gen5.
Group Test Result By	
Test Name	Select to group the test results based on the test name in the report..

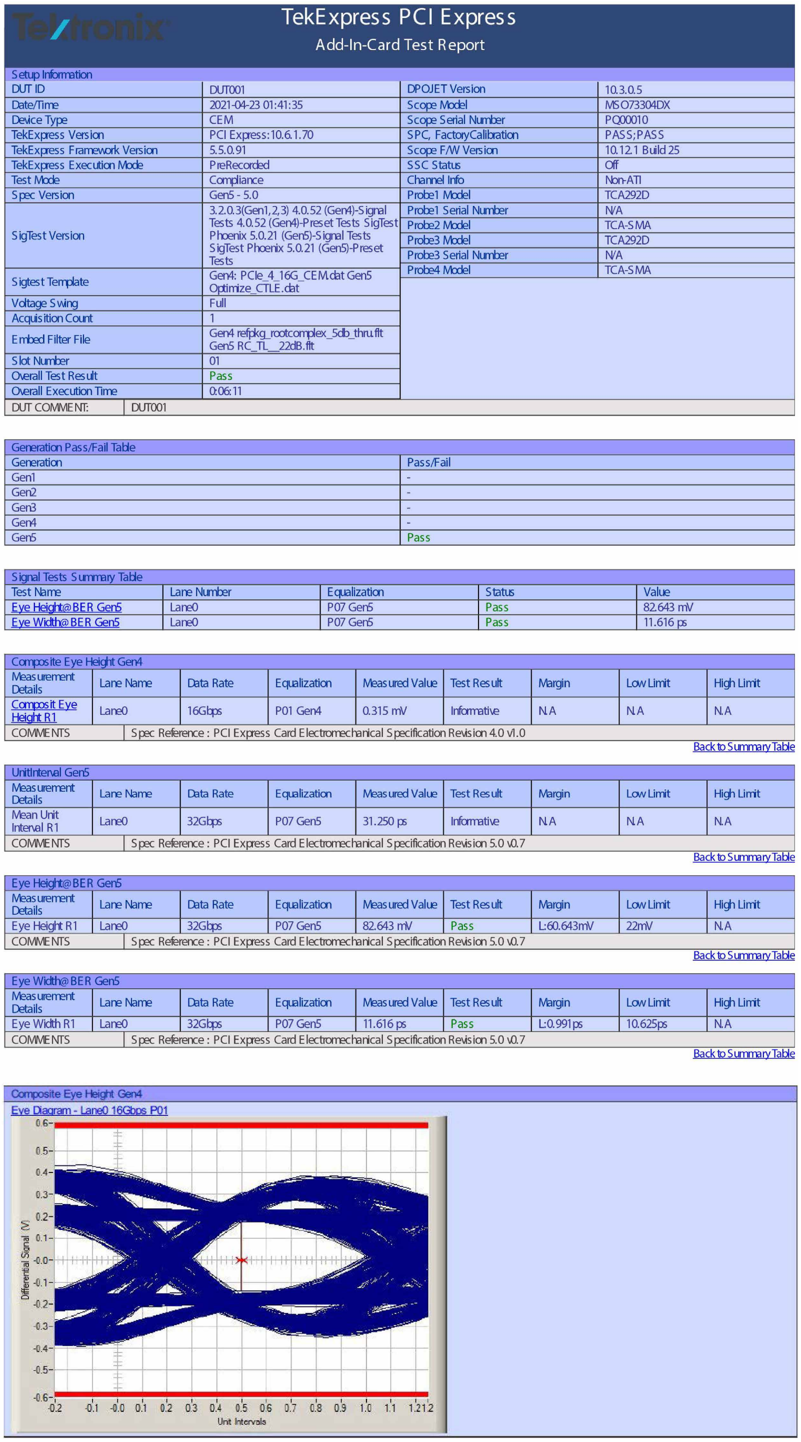
Table continued…

Control	Description
Lane	Select to display the test results by lane.
Equalization	Select to display the test results by equalization.
Pass/Fail Results	Select to display the test results by pass or fail results.

View a generated report

Sample report and its contents

A report shows detailed results and plots, as set in the Reports panel.



TekExpress PCI Express

Add-In-Card Test Report

Setup Information

DUT ID	DUT001
Date/Time	2021-04-23 01:41:35
Device Type	CEM
TekExpress Version	PCI Express:10.6.1.70
TekExpress Framework Version	5.5.0.91
TekExpress Execution Mode	PreRecorded
Test Mode	Compliance
Spec Version	Gen5 - 5.0
SigTest Version	3.2.0.3(Gen1,2,3) 4.0.52 (Gen4)-Signal Tests 4.0.52 (Gen4)-Preset Tests SigTest Phoenix 5.0.21 (Gen5)-Signal Tests SigTest Phoenix 5.0.21 (Gen5)-Preset Tests
Sigtest Template	Gen4: PCIe_4_16G_CEM.dat Gen5 Optimize_CTLE.dat
Voltage Swing	Full
Acquisition Count	1
Embed Filter File	Gen4 refpkg_rootcomplex_5db_thru.flt Gen5 RC_TL__22dB.flt
Slot Number	01
Overall Test Result	Pass
Overall Execution Time	0:06:11

DPOJET Version	10.3.0.5
Scope Model	MSO73304DX
Scope Serial Number	PQ00010
SPC, FactoryCalibration	PASS;PASS
Scope F/W Version	10.12.1 Build 25
SSC Status	Off
Channel Info	Non-ATI
Probe1 Model	TCA292D
Probe1 Serial Number	N/A
Probe2 Model	TCA-SMA
Probe3 Model	TCA292D
Probe3 Serial Number	N/A
Probe4 Model	TCA-SMA

DUT COMMENT:	DUT001

Generation Pass/Fail Table

Generation	Pass/Fail
Gen1	-
Gen2	-
Gen3	-
Gen4	-
Gen5	Pass

Signal Tests Summary Table

Test Name	Lane Number	Equalization	Status	Value
Eye Height@BER Gen5	Lane0	P07 Gen5	Pass	82.643 mV
Eye Width@BER Gen5	Lane0	P07 Gen5	Pass	11.616 ps

Composite Eye Height Gen4

Measurement Details	Lane Name	Data Rate	Equalization	Measured Value	Test Result	Margin	Low Limit	High Limit
Composit Eye Height R1	Lane0	16Gbps	P01 Gen4	0.315 mV	Informative	N.A	N.A	N.A
COMMENTS	Spec Reference : PCI Express Card Electromechanical Specification Revision 4.0 v1.0							

Back to Summary Table

UnitInterval Gen5

Measurement Details	Lane Name	Data Rate	Equalization	Measured Value	Test Result	Margin	Low Limit	High Limit
Mean Unit Interval R1	Lane0	32Gbps	P07 Gen5	31.250 ps	Informative	N.A	N.A	N.A
COMMENTS	Spec Reference : PCI Express Card Electromechanical Specification Revision 5.0 v0.7							

Back to Summary Table

Eye Height@BER Gen5

Measurement Details	Lane Name	Data Rate	Equalization	Measured Value	Test Result	Margin	Low Limit	High Limit
Eye Height R1	Lane0	32Gbps	P07 Gen5	82.643 mV	Pass	L:60.643mV	22mV	N.A
COMMENTS	Spec Reference : PCI Express Card Electromechanical Specification Revision 5.0 v0.7							

Back to Summary Table

Eye Width@BER Gen5

Measurement Details	Lane Name	Data Rate	Equalization	Measured Value	Test Result	Margin	Low Limit	High Limit
Eye Width R1	Lane0	32Gbps	P07 Gen5	11.616 ps	Pass	L:0.991ps	10.625ps	N.A
COMMENTS	Spec Reference : PCI Express Card Electromechanical Specification Revision 5.0 v0.7							

Back to Summary Table

Composite Eye Height Gen4

Eye Diagram - Lane0 16Gbps P01

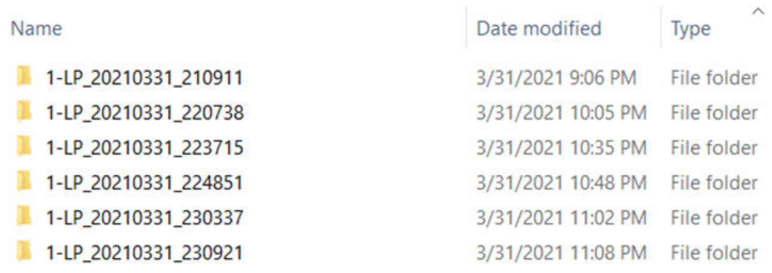
Figure 24: Report

Setup Information	The summary box at the beginning of the report lists setup configuration information. This information includes the oscilloscope model and serial number, optical module model and serial number, and software version numbers of all associated applications.
Test Name Summary Table	The test summary table lists all the tests which are executed with its result status.
Measurement	The measurement table displays the measurement related details with its parameter value.
User comments	If you had selected to include comments in the test report, any comments you added in the DUT tab are shown at the top of the report.
Generation Pass/Fail Table	The Generation Pass/Fail Table shows the pass/fail result of each individual generation. This table is shown only when the results are grouped by Test Name.

Saving and recalling test setup

Overview

You can save the test setup and recall it later for further analysis. Saved setup includes the selected oscilloscope, general parameters, acquisition parameters, measurement limits, waveforms (if applicable), and other configuration settings. The setup files are saved under the setup name at **X:\TekExpress PCI Express**



Name	Date modified	Type
1-LP_20210331_210911	3/31/2021 9:06 PM	File folder
1-LP_20210331_220738	3/31/2021 10:05 PM	File folder
1-LP_20210331_223715	3/31/2021 10:35 PM	File folder
1-LP_20210331_224851	3/31/2021 10:48 PM	File folder
1-LP_20210331_230337	3/31/2021 11:02 PM	File folder
1-LP_20210331_230921	3/31/2021 11:08 PM	File folder

Figure 25: Example of Test Setup File

Use test setups to:

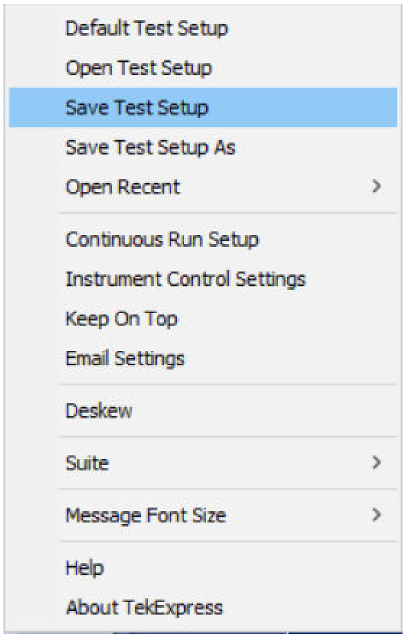
- Recall a saved configuration.
- Run a new session or acquire live waveforms.
- Create a new test setup using an existing one.
- View all the information associated with a saved test, including the log file, the history of the test status as it executed, and the results summary.
- Run a saved test using saved waveforms.

⚠ **Note:** Images that are shown in this Saving and recalling test setup chapter are for illustration purpose only and it may vary depending on the TekExpress application.

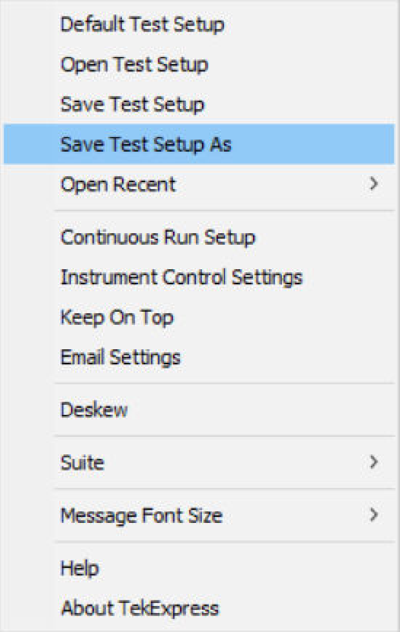
Save the configured test setup

You can save a test setup before or after running a test. You can create a test setup from already created test setup or using a default test setup. When you save a setup, all the parameters, measurement limits, waveform files (if applicable), test selections, and other configuration settings are saved under the setup name. When you select the default test setup, the parameters are set to the application’s default value.

- Select **Options > Save Test Setup** to save the opened setup.


Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Continuous Run Setup
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Suite
Message Font Size
Help
About TekExpress

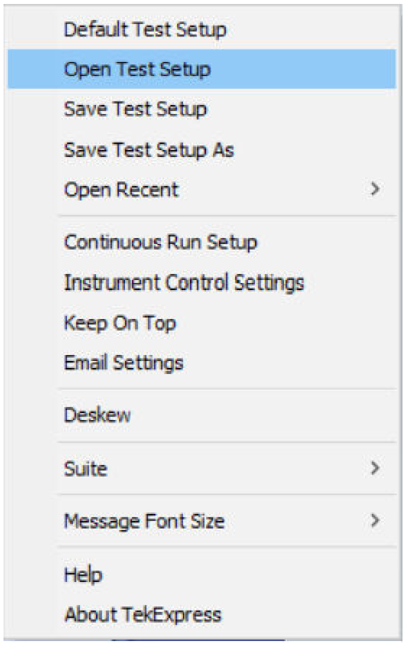
- Select **Options > Save Test Setup As** to save the setup with different name.


Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Continuous Run Setup
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Suite
Message Font Size
Help
About TekExpress

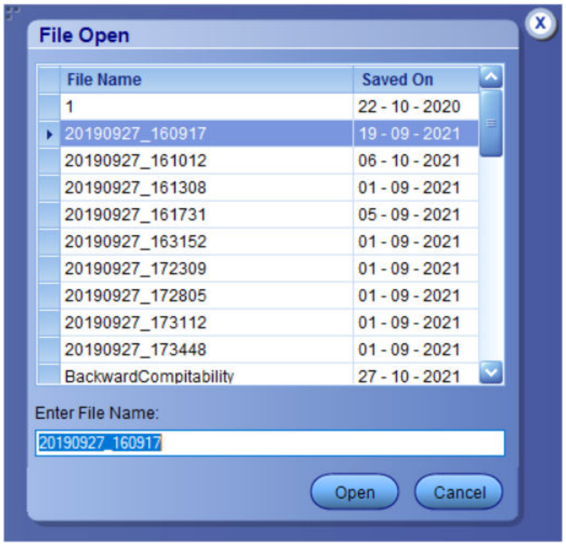
Load a saved test setup

To open (load) a saved test setup, do the following:

- Select **Options > Open Test Setup**.


Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Continuous Run Setup
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Suite
Message Font Size
Help
About TekExpress

- From the **File Open** menu, select the setup file name from the list and click **Open**.


File Open
Open
Cancel

File Name	Saved On
1	22 - 10 - 2020
20190927_160917	19 - 09 - 2021
20190927_161012	06 - 10 - 2021
20190927_161308	01 - 09 - 2021
20190927_161731	05 - 09 - 2021
20190927_163152	01 - 09 - 2021
20190927_172309	01 - 09 - 2021
20190927_172805	01 - 09 - 2021
20190927_173112	01 - 09 - 2021
20190927_173448	01 - 09 - 2021
BackwardCompitability	27 - 10 - 2021

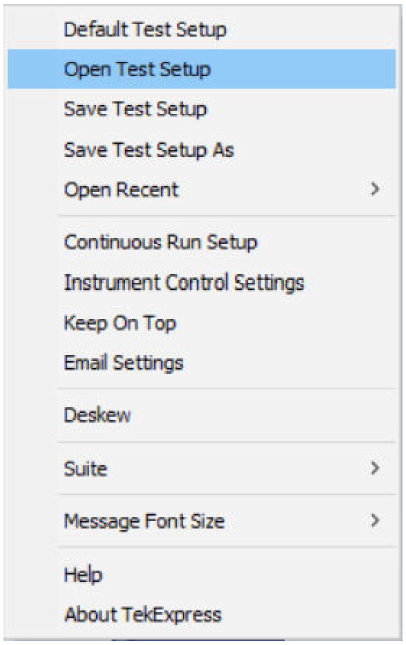
Enter File Name: 20190927_160917

Note: Parameters that are set for the respective test setup will enable after opening the file.

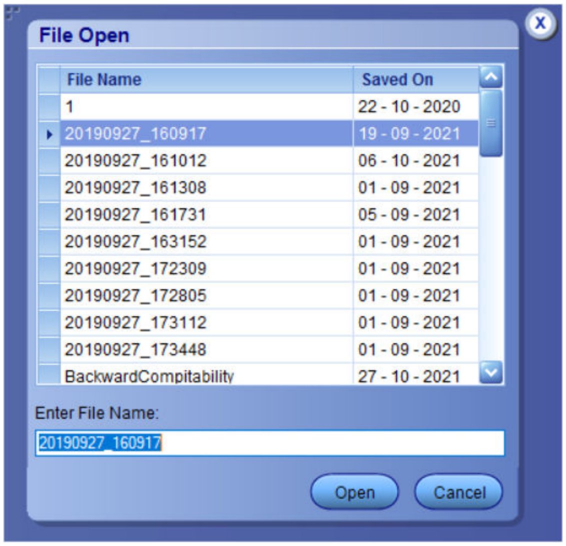
Perform a test using pre-run session files

Complete the following steps to load a test setup from a pre-run session:

1. Select **Options > Open Test Setup**.


Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Continuous Run Setup
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Suite
Message Font Size
Help
About TekExpress

2. From the **File Open** menu, select a setup from the list and then click **Open**.

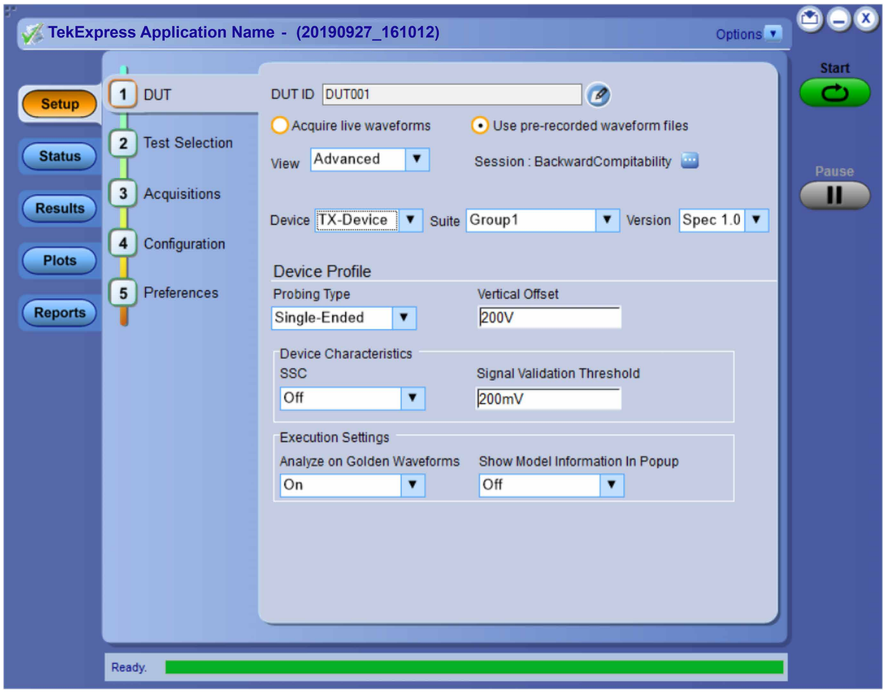

File Open
Open
Cancel

File Name	Saved On
1	22 - 10 - 2020
20190927_160917	19 - 09 - 2021
20190927_161012	06 - 10 - 2021
20190927_161308	01 - 09 - 2021
20190927_161731	05 - 09 - 2021
20190927_163152	01 - 09 - 2021
20190927_172309	01 - 09 - 2021
20190927_172805	01 - 09 - 2021
20190927_173112	01 - 09 - 2021
20190927_173448	01 - 09 - 2021
BackwardCompitability	27 - 10 - 2021

Enter File Name: 20190927_160917

Note: Parameters that are set for the respective test setup will enable after opening the file.

3. Switch the mode to **Use Pre-recorded waveform files** in the DUT panel.


TekExpress Application Name - (20190927_161012)
Options
Start
Pause
Setup
Status
Results
Plots
Reports
1 DUT
2 Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Ready.

DUT ID DUT001

○ Acquire live waveforms ● Use pre-recorded waveform files

View Advanced

Session : BackwardCompatibility

Device TX-Device Suite Group1 Version Spec 1.0

Device Profile

Probing Type Single-Ended

Vertical Offset 200V

Device Characteristics

SSC Off

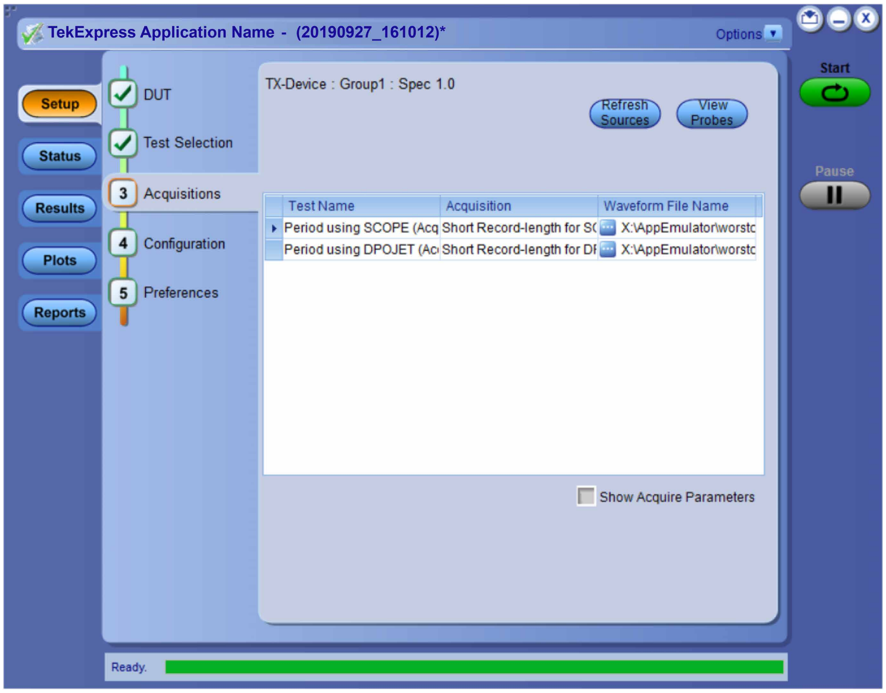
Signal Validation Threshold 200mV

Execution Settings

Analyze on Golden Waveforms On

Show Model Information In Popup Off

4. Select the required waveforms from the selected setup in the **Acquisitions** tab and click **Start**.

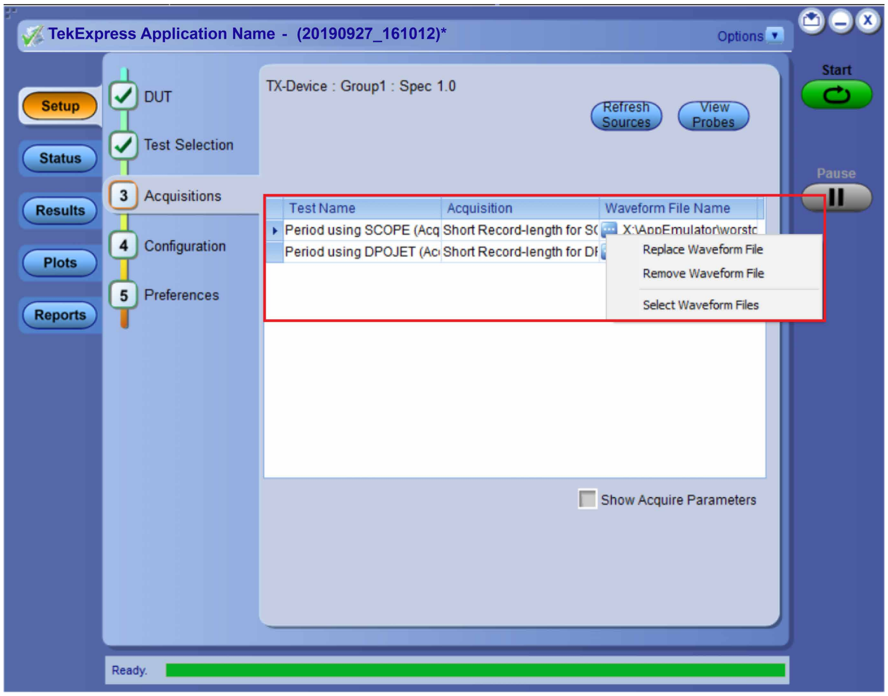

TekExpress Application Name - (20190927_161012)*
Options
Start
Pause
Setup
Status
Results
Plots
Reports
DUT
Test Selection
3 Acquisitions
4 Configuration
5 Preferences
Refresh Sources
View Probes
Ready.

TX-Device : Group1 : Spec 1.0

Test Name	Acquisition	Waveform File Name
Period using SCOPE (Acq	Short Record-length for SC	X:\AppEmulator\worstc
Period using DPOJET (Ac	Short Record-length for DF	X:\AppEmulator\worstc

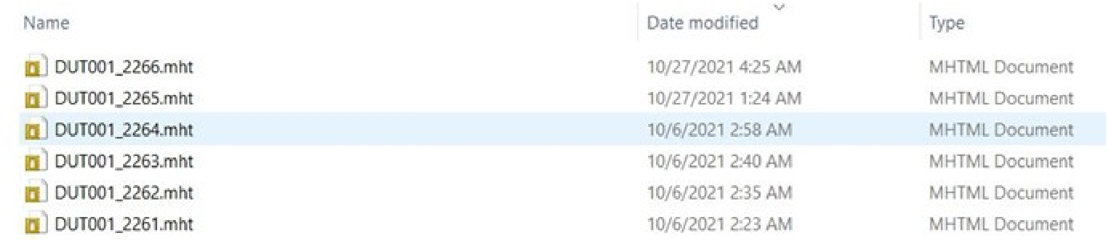
☐ Show Acquire Parameters

5. The selected waveform file can be removed/replaced by clicking on the (…) icon.


TekExpress Application Name - (20190927_161012)*
Options
Setup
Status
Results
Plots
Reports
DUT
Test Selection
3 Acquisitions
4 Configuration
5 Preferences
TX-Device : Group1 : Spec 1.0
Refresh Sources
View Probes
Start
Pause
Replace Waveform File
Remove Waveform File
Select Waveform Files
☐ Show Acquire Parameters
Ready.

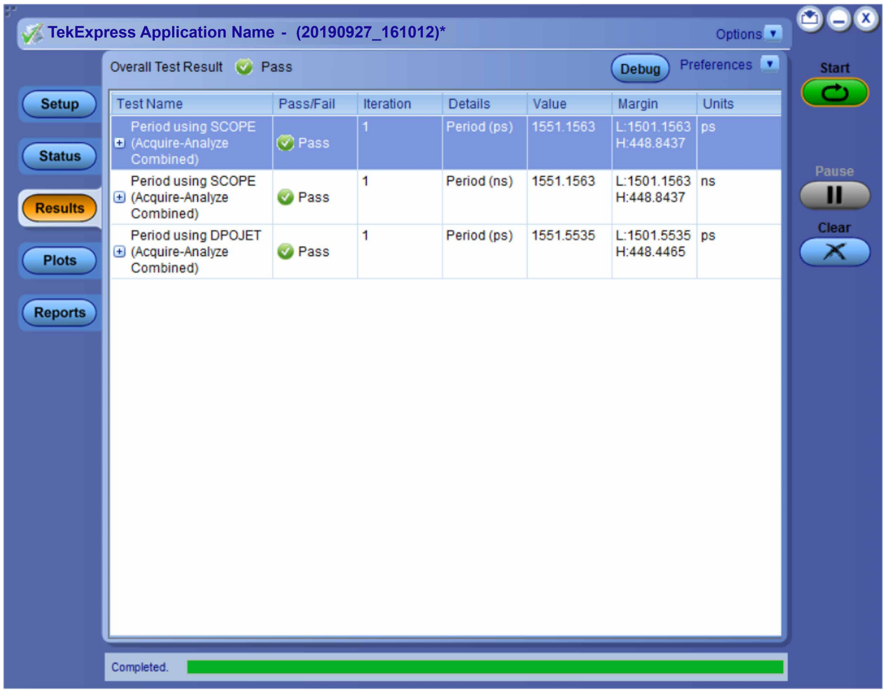
Test Name	Acquisition	Waveform File Name
Period using SCOPE (Acq	Short Record-length for S(	X:\AppEmulator\worstc
Period using DPOJET (Ac	Short Record-length for Df	

6. After successful completion of the test, the waveform report files are stored at `X:\<Application Name>\Reports`.



Name	Date modified	Type
DUT001_2266.mht	10/27/2021 4:25 AM	MHTML Document
DUT001_2265.mht	10/27/2021 1:24 AM	MHTML Document
DUT001_2264.mht	10/6/2021 2:58 AM	MHTML Document
DUT001_2263.mht	10/6/2021 2:40 AM	MHTML Document
DUT001_2262.mht	10/6/2021 2:35 AM	MHTML Document
DUT001_2261.mht	10/6/2021 2:23 AM	MHTML Document

7. The overall test result status after completion of the test execution is displayed in the Results Panel.


TekExpress Application Name - (20190927_161012)*
Options
Debug
Preferences
Setup
Status
Results
Plots
Reports
Start
Pause
Clear

Overall Test Result ✓ Pass

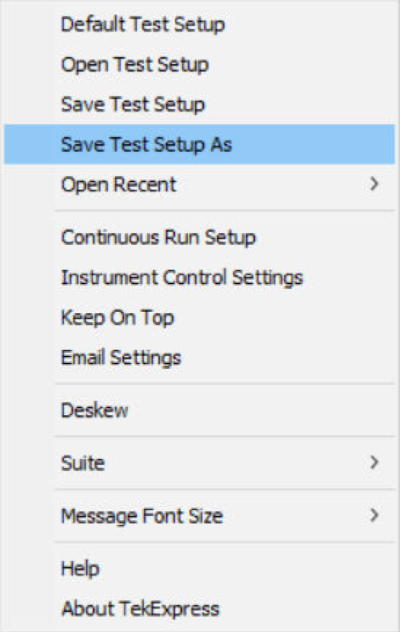
Test Name	Pass/Fail	Iteration	Details	Value	Margin	Units
Period using SCOPE (Acquire-Analyze Combined)	✓ Pass	1	Period (ps)	1551.1563	L:1501.1563 H:448.8437	ps
Period using SCOPE (Acquire-Analyze Combined)	✓ Pass	1	Period (ns)	1551.1563	L:1501.1563 H:448.8437	ns
Period using DPOJET (Acquire-Analyze Combined)	✓ Pass	1	Period (ps)	1551.5535	L:1501.5535 H:448.4465	ps

Completed.

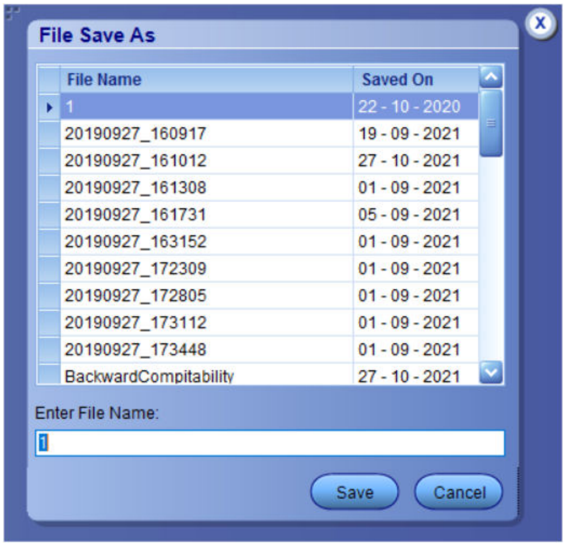
Save the test setup with a different name

To save a test setup with a different name, follow the steps:

1. Select **Options > Save Test Setup As**.


Default Test Setup
Open Test Setup
Save Test Setup
Save Test Setup As
Open Recent
Continuous Run Setup
Instrument Control Settings
Keep On Top
Email Settings
Deskew
Suite
Message Font Size
Help
About TekExpress

2. Enter the new test setup name and click **Save**.


File Save As
Save
Cancel

File Name	Saved On
1	22 - 10 - 2020
20190927_160917	19 - 09 - 2021
20190927_161012	27 - 10 - 2021
20190927_161308	01 - 09 - 2021
20190927_161731	05 - 09 - 2021
20190927_163152	01 - 09 - 2021
20190927_172309	01 - 09 - 2021
20190927_172805	01 - 09 - 2021
20190927_173112	01 - 09 - 2021
20190927_173448	01 - 09 - 2021
BackwardCompitability	27 - 10 - 2021

Enter File Name: 1

Switch Matrix application

Product description

Switch Matrix application allows to configure and setup automated multi-lane testing using RF switch. The solution allows you to map each of the several transmitter signals and forward the selected input either to another relay or to the oscilloscope channel.

Application overview

This section describes the Switch Matrix application settings.

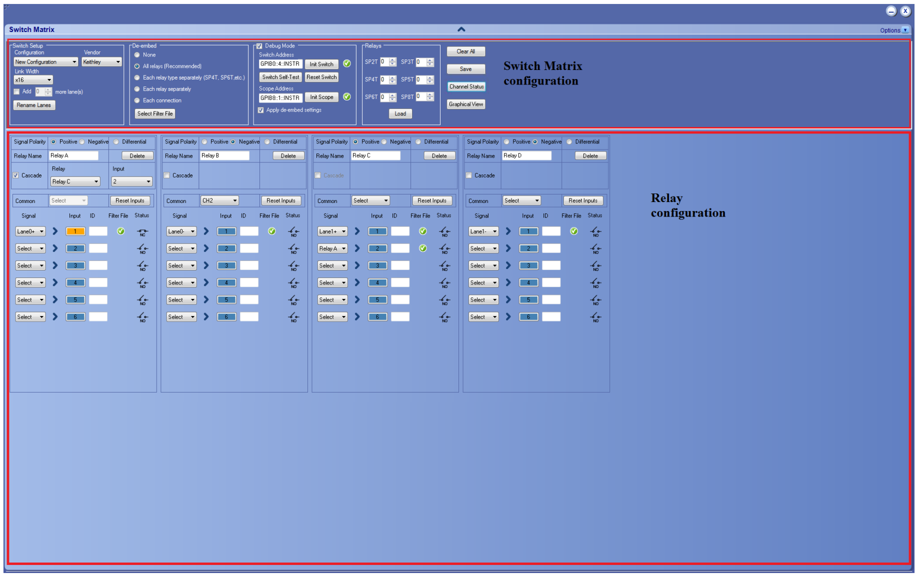

Switch Matrix
Options
Switch Matrix configuration
Relay configuration

Table 17: Switch Matrix configuration settings

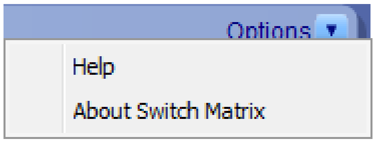
Item	Description
⌃	Click to expand/collapse the switch matrix configuration.
Options  Options Help About Switch Matrix	Click **Help** to view the software help document and **About Switch Matrix** for software version.
Switch Matrix configuration	

Table continued…

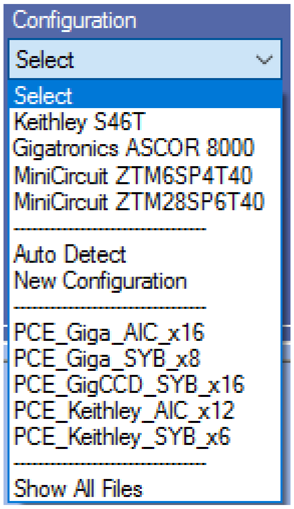
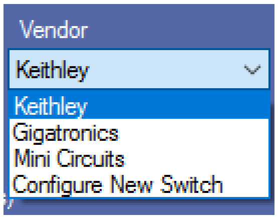
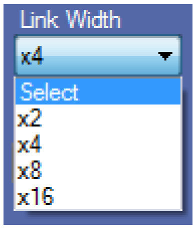
Item	Description
Configuration  Configuration Select Select Keithley S46T Gigatronics ASCOR 8000 MiniCircuit ZTM6SP4T40 MiniCircuit ZTM28SP6T40 Auto Detect New Configuration PCE_Giga_AIC_x16 PCE_Giga_SYB_x8 PCE_GigCCD_SYB_x16 PCE_Keithley_AIC_x12 PCE_Keithley_SYB_x6 Show All Files	Select the configuration option: • **Keithley S46T**: 6-input-to-1-output switch configuration • **Gigatronics ASCOR 8000**: 8-input-to-1-output switch configuration • **MiniCircuit ZTM6SP4T40**: 4-input-to-1-output switch configuration • **MiniCircuit ZTM28SP6T40**: 6-input-to-1-output switch configuration • **Auto Detect**: Select to autodetect the switch. • **New Configuration**: Select to manually configure the switch. • **Saved file names**: Saved configuration file name(s) are displayed in the drop-down list. Select to recall the configuration. Below are the list of saved files available for Keithley and Gigatronics configurations. • **PCE_Giga_AIC_x16** • **PCE_Giga_SYB_x8** • **PCE_GigaCCD_SYB_x16** • **PCE_Keithley_AIC_x12** • **PCE_Keithley_SYB_x6** • *Show All Files* : Select to view the list of all saved files.
Vendor  Vendor Keithley Keithley Gigatronics Mini Circuits Configure New Switch	Select the vendor from the drop-down list. This field is displayed: • When you select **Configuration** > **New Configuration** to create a fresh configuration. • When you open a saved configuration. The displayed vendor name is not editable. • When Auto Detect is selected. The displayed vendor name is not editable.
Link Width  Link Width x4 Select x2 x4 x8 x16	Select the Link Width from the drop-down list. This determines the maximum number of lanes supported by the DUT.

Table continued…

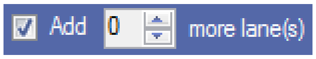
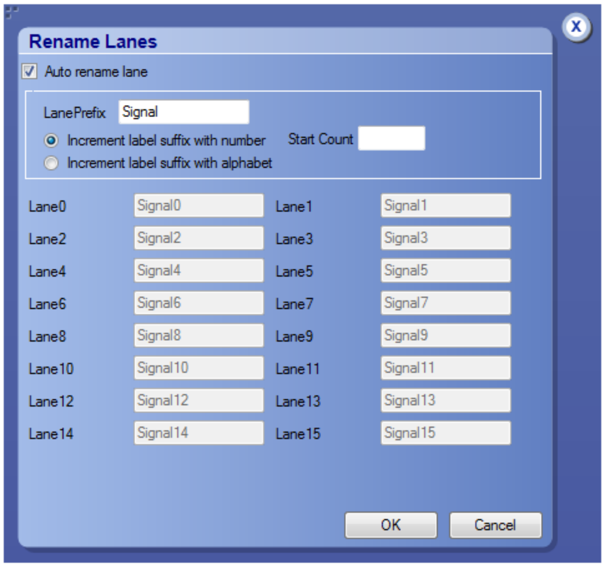
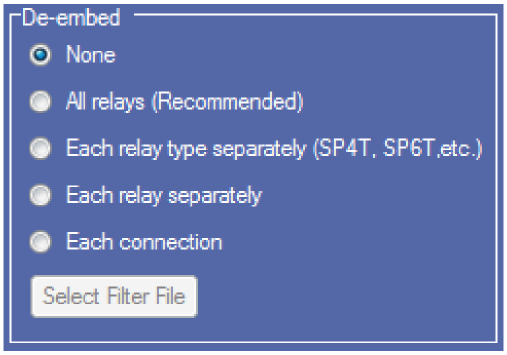
Item	Description
Add <X> more lane(s)  ☑ Add 0 more lane(s)	Select to add extra lanes (Additional1, Additional2,....) to the lanes list. The extra lanes added are displayed in the relay signals. You can add a maximum of 10 lanes.
Rename Lanes Rename Lanes	Click to rename the lanes. Enter the LanePrefix and select the increment label type to suffix by either number or alphabet. The number of lanes depends on the Link Width selected. Clear the Auto rename lane check box to set unique names for the lanes.  Rename Lanes ☑ Auto rename lane LanePrefix Signal ● Increment label suffix with number Start Count ○ Increment label suffix with alphabet Lane0 Signal0 Lane1 Signal1 Lane2 Signal2 Lane3 Signal3 Lane4 Signal4 Lane5 Signal5 Lane6 Signal6 Lane7 Signal7 Lane8 Signal8 Lane9 Signal9 Lane10 Signal10 Lane11 Signal11 Lane12 Signal12 Lane13 Signal13 Lane14 Signal14 Lane15 Signal15
De-embed	
De-embed [10]  De-embed ● None ○ All relays (Recommended) ○ Each relay type separately (SP4T, SP6T,etc.) ○ Each relay separately ○ Each connection 	Select the De-embed option: - None - *All relays (Recommended)* - *Each relay type separately (SP4T, SP6T, etc.)* - *Each relay separately* - *Each connection* Select the de-embed option and click **Select Filter File** to browse and select the filter file(s).
Debug Mode	

Table continued…

---

[10] Configure at least one relay before configuring the de-embed settings.

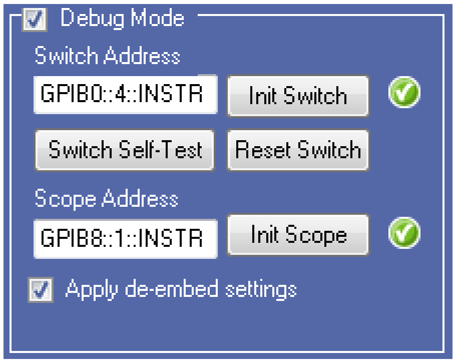
Item	Description
Debug Mode  ☑ Debug Mode Switch Address: GPIB0::4::INSTR ✓ Scope Address: GPIB8::1::INSTR ✓ ☑ Apply de-embed settings Init Switch Switch Self-Test Reset Switch Init Scope	Select Debug Mode to manually configure the switch. **Switch Address** Enter the Switch Address in the GPIB or TCPIP format. GPIB format: `GPIB0:X:INSTR` TCPIP format: `TCPIP::IPADDR::INSTR` **Init Switch** This will synchronize the configuration of relay(s) in the application with the relay(s) in the switch. Synchronization will be successful only for the relays whose configuration matches with the physical switch. Pass/Fail status is displayed next to the button. ⚠ **Note:** Relay configurations (number of relays, number of relay inputs, and name of relays) in the application should match the physical switch, for successful synchronization. **Switch Self-Test** This will close and open all switch channels one-by-one and displays the pass/fail status of the channel next to the ID. A self-test report (CSV) is generated at the end of the process. You cannot abort this process. ⚠ **Note:** Initialize the switch before performing the self-test. **Reset Switch** Click **Reset Switch** to reset the switch. This will open all channels. **Scope Address** Enter the oscilloscope address in the GPIB or TCPIP format. GPIB format: `GPIB0:X:INSTR` TCPIP format: `TCPIP::IPADDR::INSTR` **Init Scope** Enter the oscilloscope address in the Scope Address field and click **Init Scope** to initialize the oscilloscope. This will establish the connection with the oscilloscope. The pass/fail status is displayed next to the button. **Apply De-embed settings** Select to apply de-embed settings to the channels. When the oscilloscope is initialized and de-embed settings are configured, closing a connection will apply the de-embed settings and then close the connection.
Relays	

Table continued…

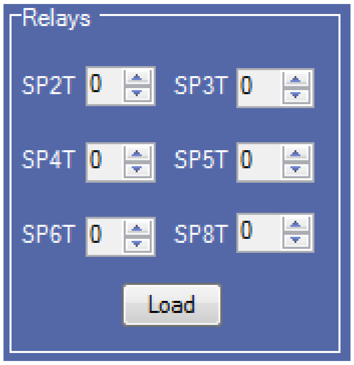
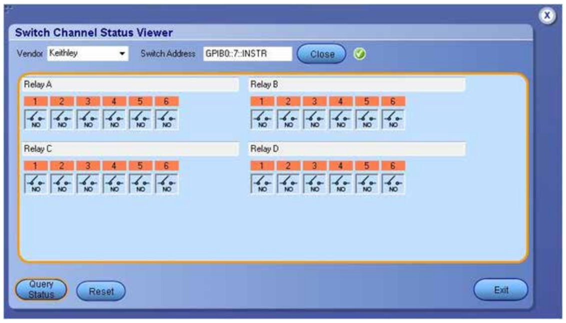
Item	Description
Relays  SP2T 0 SP3T 0 SP4T 0 SP5T 0 SP6T 0 SP8T 0	Select the relay(s). In SPnT, *n* represents the number of connection signals for the relay. For example, SP4T is a four signal connection relay. This field displays only for a new configuration. By default, zero relays are selected. Enter the total number of relays to be loaded in their respective input box and click **Load**. You can also click ▲ or ▼ to increase or decrease the number.
Save 	Click to save the configuration at *C:\ProgramData\Tektronix\Switch Matrix Configurations*.xml*. This operation checks whether all the required configurations are done. If any of the required configurations are not selected, then error popup is displayed, which prompts you to complete the configuration(s).
Clear All 	Click to clear all configurations. The application will be loaded with Configuration drop-down (default).
Channel Status Channel Status	Click to view the relays and status of channels of Keithley or Gigatronics switch. This updates the channel status dynamically. In Switch Channel Status Viewer, select the Vendor type, enter the Switch Address and click **Init** to initialize the switch. This will establish the connection with the switch. Click **Query Status** to get the details of the relays of the switch and the status of the channels. Click **Reset** to reset the status viewer.  Switch Channel Status Viewer Close Relay A Relay B Relay C Relay D 1 2 3 4 5 6 NO Query Status Reset Exit Vendor Keithley Switch Address GPIB0::7::INSTR

Table continued…

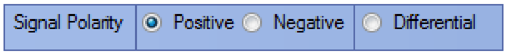
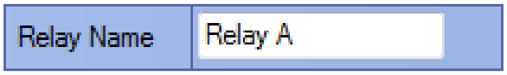
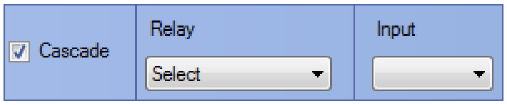
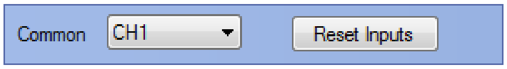
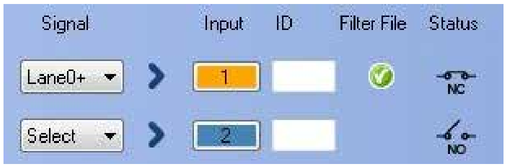
Item	Description
Graphical View Graphical View	Click to view the graphical representation of the configured relays. If the relays are cascaded, then they are also displayed in the graphical representation.
Relay configuration	
Signal Polarity  Signal Polarity ● Positive ○ Negative ○ Differential	Select the signal polarity of DUT: - **Positive**: populates Lane0+, Lane1+, …. connection signals. - **Negative**: populates Lane0-, Lane1-, …. connection signals. - **Differential**: populates Lane0, Lane1, …. connection signals.
Relay Name  Relay Name: Relay A	Enter the relay name. This name should match the relay name of the connected switch.
Delete 	Click to delete the relay. This configuration is only available for the configured (loaded) relays, when Configuration > New Configuration is selected.
Cascade  ☑ Cascade Relay: Select Input:	Select to cascade the relay by connecting the common channel as the input signal for another relay. Select the Relay and the Input of the relay. Check that the selected relay signal displays the appropriate relay name. The cascade settings is also displayed in the graphical view. *Click here* to get details about Cascade. **Note:** Select the cascade settings before you save the configuration.
Common  Common: CH1 	Select the oscilloscope channel for Common. If cascaded, it displays the name of the relay. Click **Reset Inputs** to clear all connection signal settings. **Note:** Select the common settings for all the relays, before you save the configuration.

Table continued…

Item	Description
 Signal Input ID Filter File Status Lane0+ 1 NC Select 2 NO	**Signal** Select the DUT connection signal. This drop-down list shows the lanes based on *Link Width* and *Signal Polarity* settings. If the link width is x8 and signal polarity is Positive, then the Signal drop-down list will have Lane0+ to Lane7+ options. **Input** This button is enabled only in debug mode and if a valid signal is configured for the channel. Click to close or open the channel. **ID** Enter the three character alias name for the channel. This is shown in the *graphical view of switch matrix configuration*. **Filter File** This column shows ✓ or ✗ indicating the status of the filter file configuration for the channel. If no de-embed option is selected, then this column remains blank. **Status** This column displays the status of the channel. Channel closed (normally closed) : NC Channel opened (normally opened) : NO

File name extensions

This application uses the following file name extensions:

File name extension	Description
.html	Saved configuration and Graphical view file formats
.xml	Switch Matrix configuration files

Status indicators

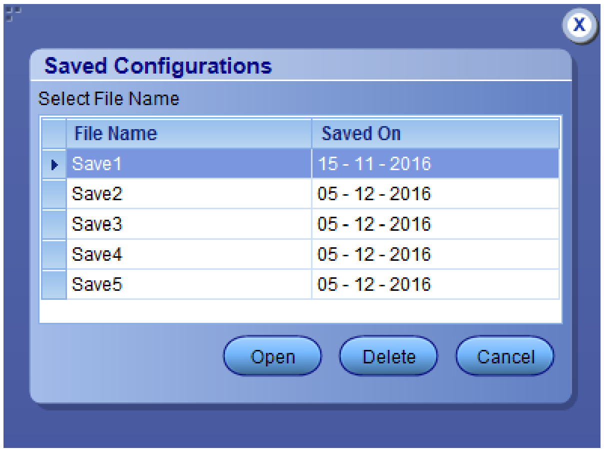
Status indicators	Description
✓	Success indicator
✗	Failure indicator
NC	Closed channel indicator (NC = Normally Closed)

Table continued…

Status indicators	Description
NO	Opened channel indicator (NO = Normally Opened)

Saved configurations

Click **Configuration** > **Show All Files** to view the list of all saved files.



Saved Configurations

Select File Name

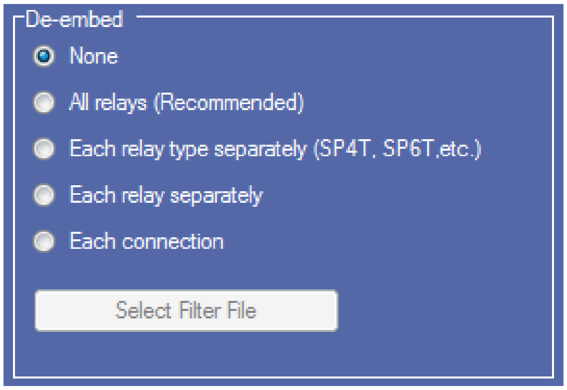
File Name	Saved On
Save1	15 - 11 - 2016
Save2	05 - 12 - 2016
Save3	05 - 12 - 2016
Save4	05 - 12 - 2016
Save5	05 - 12 - 2016

Table 18: Saved configurations

Item	Description
Open	Opens the selected file.
Delete	Deletes the selected file.
Cancel	Closes the Saved Configurations window.

De-embed settings

De-embed allows you to apply filter file(s) for relay(s). Select the De-embed option and click **Select Filter File** to browse and select the filter file(s).



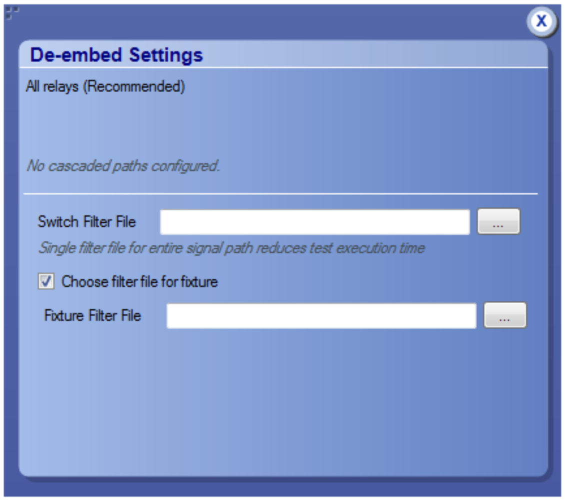
De-embed

- ● None
- ○ All relays (Recommended)
- ○ Each relay type separately (SP4T, SP6T,etc.)
- ○ Each relay separately
- ○ Each connection

Figure 26: De-embed options

Apply a filter file for all relays

Select to apply a single filter file for all relays.



De-embed Settings

All relays (Recommended)

No cascaded paths configured.

Switch Filter File

Single filter file for entire signal path reduces test execution time

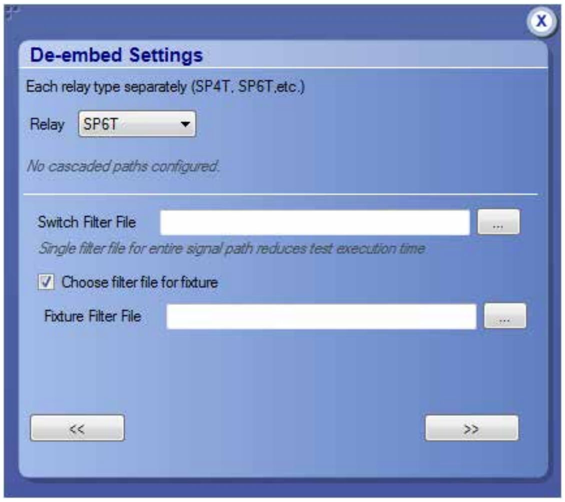
☑ Choose filter file for fixture

Fixture Filter File

Click [...] to browse and select the filter file for the switch. To apply the filter file for the fixture, select **Choose filter file for fixture** and browse the filter file.

Apply a filter file for each relay type separately

Select to separately apply a single filter file for each relay type.



De-embed Settings

Each relay type separately (SP4T, SP6T,etc.)

Relay: SP6T

No cascaded paths configured.

Switch Filter File

Single filter file for entire signal path reduces test execution time

☑ Choose filter file for fixture

Fixture Filter File

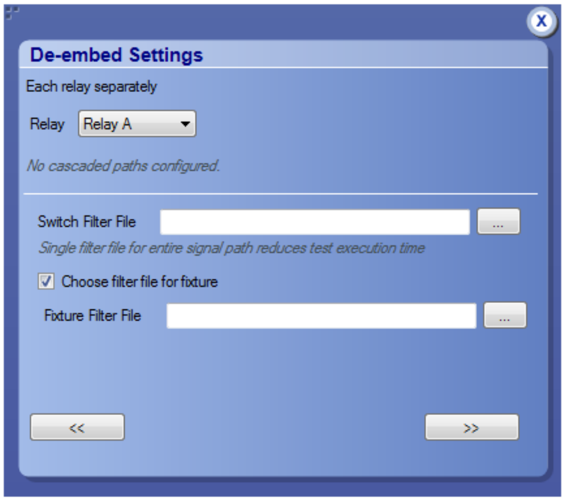
Select the Relay type from the drop-down list; click [...] to browse and select the filter file for the switch. To apply the filter file for the fixture, select **Choose filter file for fixture** and browse the filter file.

Tip: Click [<<] or [>>] to select the previous or next relay type.

Tip: The selected relay types are highlighted in dark blue in the application.

Apply a filter file for each relay separately

Select to separately apply a filter file for each relay.



De-embed Settings

Each relay separately

Relay: Relay A

No cascaded paths configured.

Switch Filter File

Single filter file for entire signal path reduces test execution time

☑ Choose filter file for fixture

Fixture Filter File

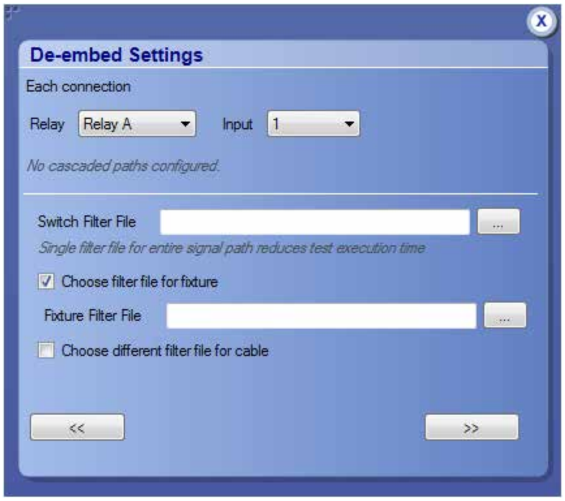
Select the Relay from the drop-down list; click ... to browse and select the filter file for the switch. To apply the filter file for the fixture, select **Choose filter file for fixture** and browse the filter file.

Tip: Click << or >> to select the previous or next relay.

Tip: The selected relay is highlighted in dark blue in the application.

Apply a filter file for each connection separately

Select to apply a filter file for each connection.



De-embed Settings

Each connection

Relay: Relay A Input: 1

No cascaded paths configured.

Switch Filter File

Single filter file for entire signal path reduces test execution time

☑ Choose filter file for fixture

Fixture Filter File

☐ Choose different filter file for cable

Select the Relay and the Input from the drop-down list; click ... to browse and select the filter file for the switch. To apply the filter file for the fixture, select **Choose filter file for fixture** and browse the filter file. Select Choose different filter file for cable to browse and select the filter file for cable.

Tip: Click << or >> to select the previous or next channel.

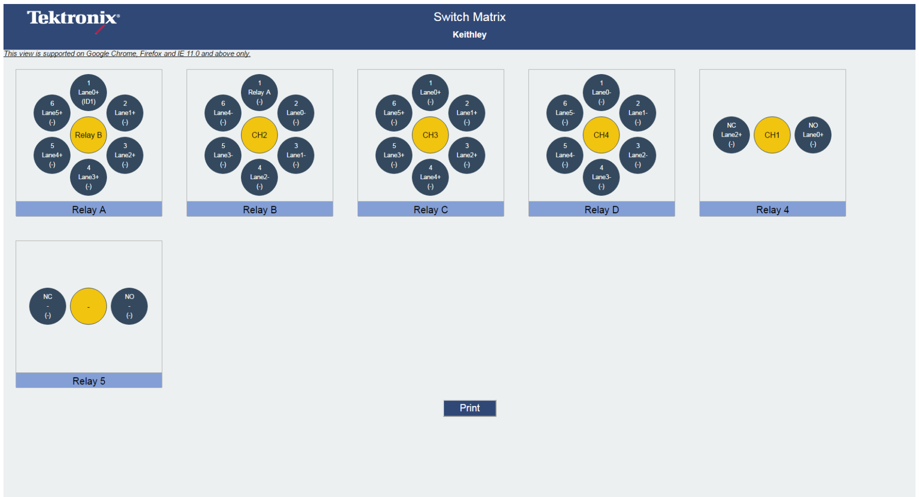
Tip: The selected relay signal is highlighted in dark blue in the application.

Note: Clicking >> on the last input of a relay selects the first input of the next relay; clicking << on the first input of a relay selects the last input of the previous relay.

Graphical view of switch matrix configuration

The Graphical view displays the pictorial representation of the switch configuration.

The following figure displays the graphical view of a Keithley switch configuration.

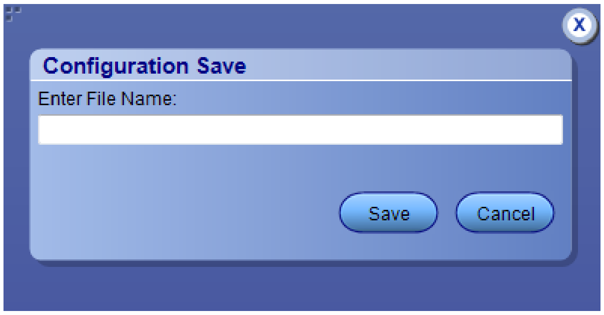


This view is supported on Google Chrome, Firefox and IE 11.0 and above only.

Tektronix
Switch Matrix
Keithley
1 Lane0+ (ID1)
2 Lane1+ (-)
3 Lane2+ (-)
4 Lane3+ (-)
5 Lane4+ (-)
6 Lane5+ (-)
Relay B
Relay A
1 Relay A (-)
2 Lane0- (-)
3 Lane1- (-)
4 Lane2- (-)
5 Lane3- (-)
6 Lane4- (-)
CH2
Relay B
1 Lane0+ (-)
2 Lane1+ (-)
3 Lane2+ (-)
4 Lane4+ (-)
5 Lane3+ (-)
6 Lane5+ (-)
CH3
Relay C
1 Lane0- (-)
2 Lane1- (-)
3 Lane2- (-)
4 Lane3- (-)
5 Lane4- (-)
6 Lane5- (-)
CH4
Relay D
NC Lane2+ (-)
CH1
NO Lane0+ (-)
Relay 4
NC - (-)
-
NO - (-)
Relay 5
Print

Saving the configuration

Click **Save** in the configuration panel; in the Configuration Save dialog box, enter the file name and click **Save**. The default save path is *C:\ProgramData\Tektronix\Switch Matrix Configurations*.



X
Configuration Save
Enter File Name:
Save
Cancel

Note: Save configuration checks whether all the required configurations are done. If any of the required configurations are not selected, then error message is displayed, which prompts you to complete the configuration(s).

Feature description

Link width

Link width determines the number of DUT signals. For example, x8 represents an eight lane DUT.

This works in conjunction with the signal polarity selected for each relay. For example, if the link width is x8, and:

- If the signal polarity is **Positive**, then the signal drop-down list will have selections from Lane0+ to Lane7+.
- If the signal polarity is **Negative**, then the signal drop-down list will have selections from Lane0- to Lane7-.
- If the signal polarity is **Differential**, then the signal drop-down list will have selections from Lane0 to Lane7.

Debug mode

Init Switch

Enter the Switch Address and click **Init Switch** to initialize the switch. This will synchronize the configuration of relay(s) in the application with the relay(s) in the switch. Synchronization will only be successful for those relays that match the physical switch. Pass/Fail status is displayed next to the button.

The factory default GPIB address for Keithley (GPIB0::7::INSTR) and Gigatronics (GPIB0::4::INSTR) is populated in the switch address based on the configured vendor. You can enter the address in GPIB (GPIB0:X:INSTR) or TCPIP (TCPIP::IPADDR::INSTR) format.

Note: Relay configurations (number of relays, number of relay inputs, and name of relays) in the application should match the physical switch, for successful synchronization.

Switch Self-Test

This will close and open all switch channels one-by-one. A selftest report (CSV) is generated at the end of the process. You cannot abort this process.

Note: Initialize the switch before performing the Switch Self-Test.

Reset Switch

Click **Reset Switch** to reset the switch. This will open all channels.

Init Scope

Enter the oscilloscope address in the Scope Address field and click **Init Scope** to initialize the oscilloscope. This will establish the connection with the oscilloscope. The pass/fail status is displayed next to the button.

You can enter the address in GPIB (GPIB0:X:INSTR) or TCPIP (TCPIP::IPADDR::INSTR) format.

When the oscilloscope is initialized and de-embed settings are configured, closing a connection will apply the de-embed settings and then close the connection.

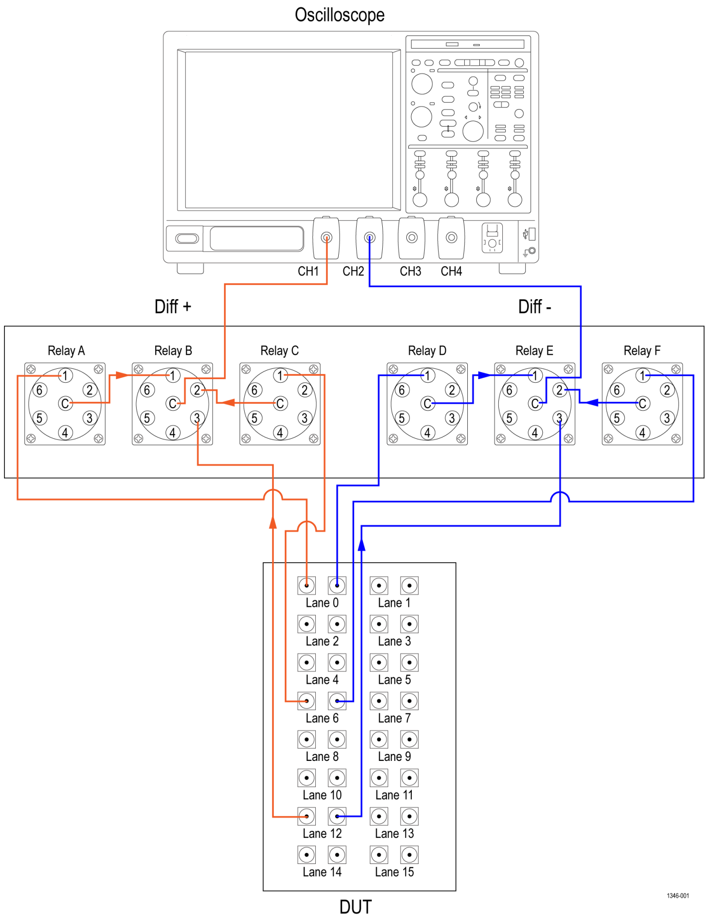
Note: The virtual GPIB address of the oscilloscope is GPIB8::1::INSTR.

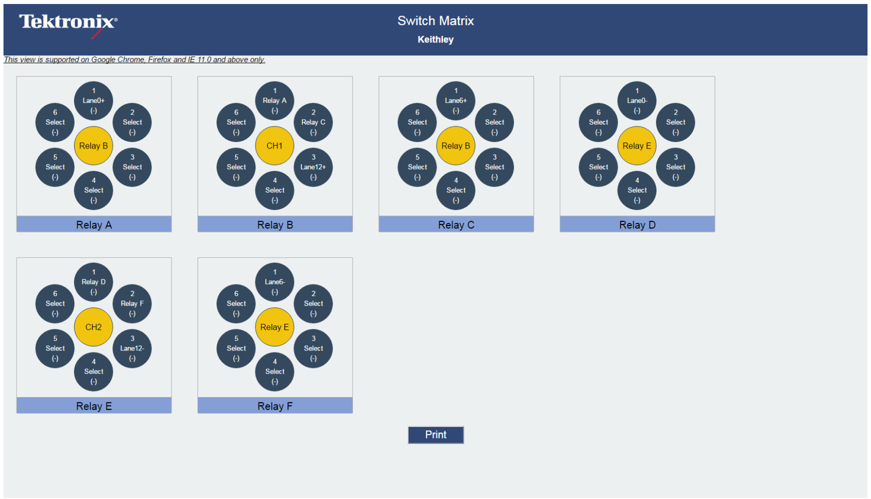
Note: If oscilloscope fails to respond to the *IDN? query during initialization, then the connection attempt is considered a failure.

Cascade (Relay cascade)

This feature allows you to cascade the relay by connecting the common channel as an input signal for another relay.

To cascade, select **Cascade** in the relay and select the Relay and Input of the relay. Check that the selected relay signal displays the relay name, specifying that the lane input signal is the output from that relay.


Oscilloscope
CH1
CH2
CH3
CH4
Diff +
Diff -
Relay A
Relay B
Relay C
Relay D
Relay E
Relay F
1
2
3
4
5
6
C
Lane 0
Lane 1
Lane 2
Lane 3
Lane 4
Lane 5
Lane 6
Lane 7
Lane 8
Lane 9
Lane 10
Lane 11
Lane 12
Lane 13
Lane 14
Lane 15
DUT
1346-001


Tektronix
Switch Matrix
Keithley
Relay A
1 Lane0+ (-)
2 Select (-)
3 Select (-)
4 Select (-)
5 Select (-)
6 Select (-)
Relay B
Relay B
1 Relay A (-)
2 Relay C (-)
3 Lane12+ (-)
4 Select (-)
5 Select (-)
6 Select (-)
CH1
Relay C
1 Lane6+ (-)
2 Select (-)
3 Select (-)
4 Select (-)
5 Select (-)
6 Select (-)
Relay B
Relay D
1 Lane0- (-)
2 Select (-)
3 Select (-)
4 Select (-)
5 Select (-)
6 Select (-)
Relay E
Relay E
1 Relay D (-)
2 Relay F (-)
3 Lane12- (-)
4 Select (-)
5 Select (-)
6 Select (-)
CH2
Relay F
1 Lane6- (-)
2 Select (-)
3 Select (-)
4 Select (-)
5 Select (-)
6 Select (-)
Relay E
Print

This view is supported on Google Chrome, Firefox and IE 11.0 and above only.

Figure 27: Graphical view of relay cascade configuration

⚠ **Tip:** Switch Matrix application supports only single-level cascading of the relays. For example, if the Relay A output is cascaded to Relay B, then the Relay B output cannot be cascaded.

Error messages

Error message	Possible solution
"A filename cannot be empty and it cannot contain any of the following characters:\n\t. .. \\ / : ? \" < > | * ! @ # $ % ^ & * ( ) - + ., / \\ \' < > Also, the file name cannot be \"Keithley S46T\",\"Gigatronics ASCOR 8000\",\"MiniCircuit ZTM6SP4T40\",\"MiniCircuit ZTM28SP6T40\", \"Select\", \"New Configuration\", \"Custom\" , \"Auto Detect\" or \"Show All Files\""	
Configure appropriate signals before the de-embed settings.	Select at least one signal for a relay before configuring the de-embed settings.
Either the instrument address is invalid or instrument is not connected.	Check the GPIB connection from oscilloscope to switch and verify the instrument address.
Error occurred while trying to recall the configuration settings. Try re-creating configuration or recalling a different configuration file.	Re-create the configuration file or recall a different configuration file.
Error occurred while trying to access the connection for open/close operation.	
Filter file <FilterFileName> not found.	Reselect the de-embed filter file and try again.
Graphical view is not generated or does not exist.	
Initialize the switch	Initialize the switch and then perform the switch operations.
Instrument address doesn't belong to any supported switch.	Verify the switch address.
Instrument address is empty.	Instrument address cannot be empty. Enter a valid instrument address in the GPIB (*GPIB0:X:INSTR*) or TCPIP (*TCPIP::IPADDR::INSTR*) format.
No switch detected. Connect a Keithley or Mini Circuit switch and try auto detection by selecting Configuration > Auto Detect.	Check the GPIB connection from the oscilloscope to switch and whether the instrument is detected in TekVisa.
Number of relays cannot be more than 26	
Please ensure that the name(s) of the configured relay(s) match the ones present on the physical switch.	
Relay name cannot be empty	
Scope initialization failed. Check if the address is valid and ensure that the instrument is switched on and try again.	Validate the oscilloscope address try again.
Switch communication failed...	Ensure that the switch is on. Reset the switch and try again.
Switch initialization failed. Check if the address is valid and ensure that the instrument is switched on and try again.	Validate the switch address and ensure that the instrument is switched on. Try again.
The start count cannot be more than 74	
Timeout Error. Either the command is invalid or instrument is not active.	Check the command syntax and the connection of the instrument by SWITCH:*IDN command.
Two or more lanes have same name. The lane names should be unique.	

Table continued…

Error message	Possible solution
Two or more relays have same name.	

SCPI Commands

About SCPI command

You can use the Standard Commands for Programmable Instruments (SCPI) to communicate remotely with the TekExpress application. Complete the TCPIP socket configuration and the TekVISA configuration in the oscilloscope or in the device where you are executing the script.

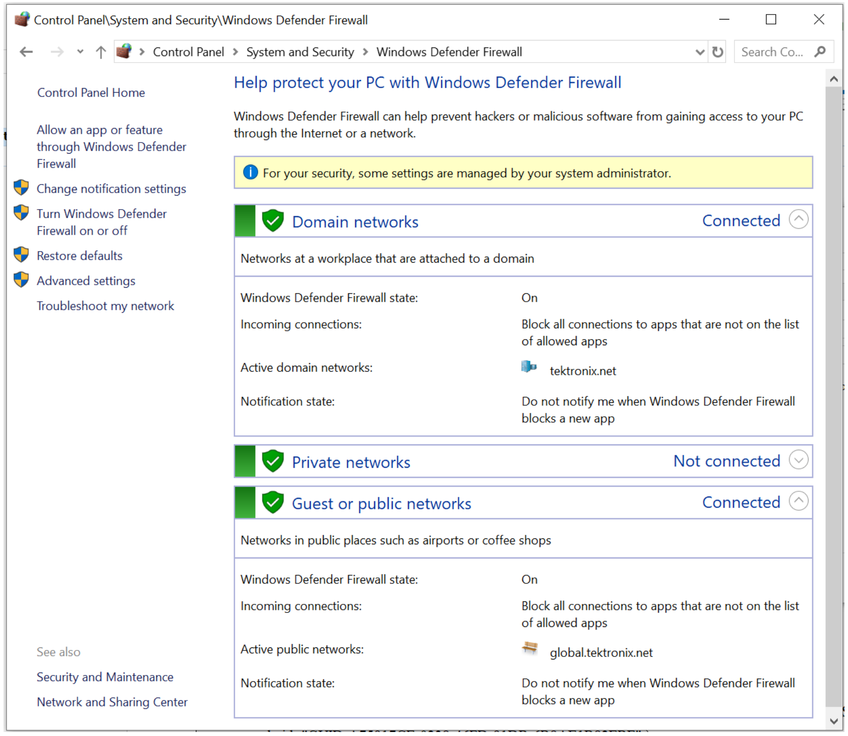
Note: If you are using an external PC to execute the remote interface commands, then install TekVISA in the PC to make the configurations.

Socket configuration for SCPI commands

This section describes the steps to configure the TCPIP socket configuration in your script execution device and the steps to configure the TekVISA configuration in the oscilloscope to execute the SCPI commands.

TCPIP socket configuration

1. Click **Start** > **Control Panel** > **System and Security** > **Windows Firewall** > **Advanced settings**.


Control Panel\System and Security\Windows Defender Firewall
Control Panel > System and Security > Windows Defender Firewall
Search Co...
Control Panel Home
Allow an app or feature through Windows Defender Firewall
Change notification settings
Turn Windows Defender Firewall on or off
Restore defaults
Advanced settings
Troubleshoot my network
See also
Security and Maintenance
Network and Sharing Center

Help protect your PC with Windows Defender Firewall

Windows Defender Firewall can help prevent hackers or malicious software from gaining access to your PC through the Internet or a network.

For your security, some settings are managed by your system administrator.

Domain networks — Connected

Networks at a workplace that are attached to a domain

Windows Defender Firewall state: On
Incoming connections: Block all connections to apps that are not on the list of allowed apps
Active domain networks: tektronix.net
Notification state: Do not notify me when Windows Defender Firewall blocks a new app

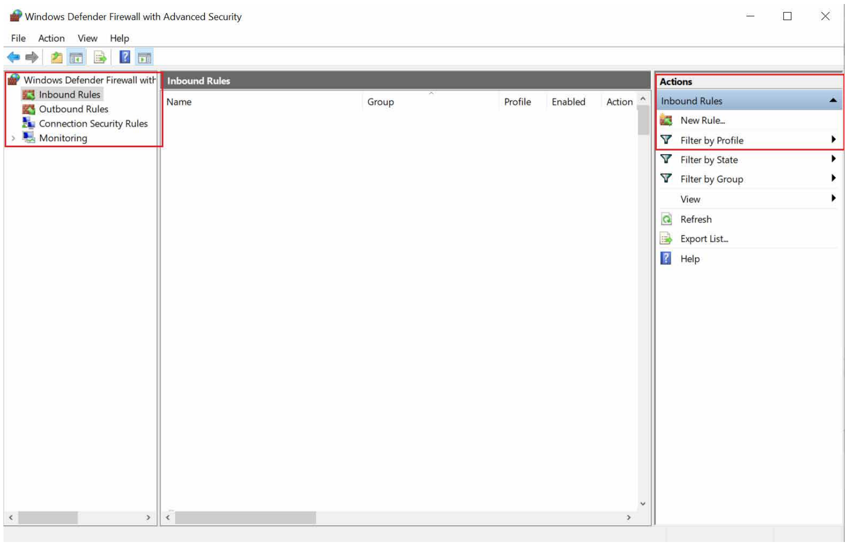
Private networks — Not connected

Guest or public networks — Connected

Networks in public places such as airports or coffee shops

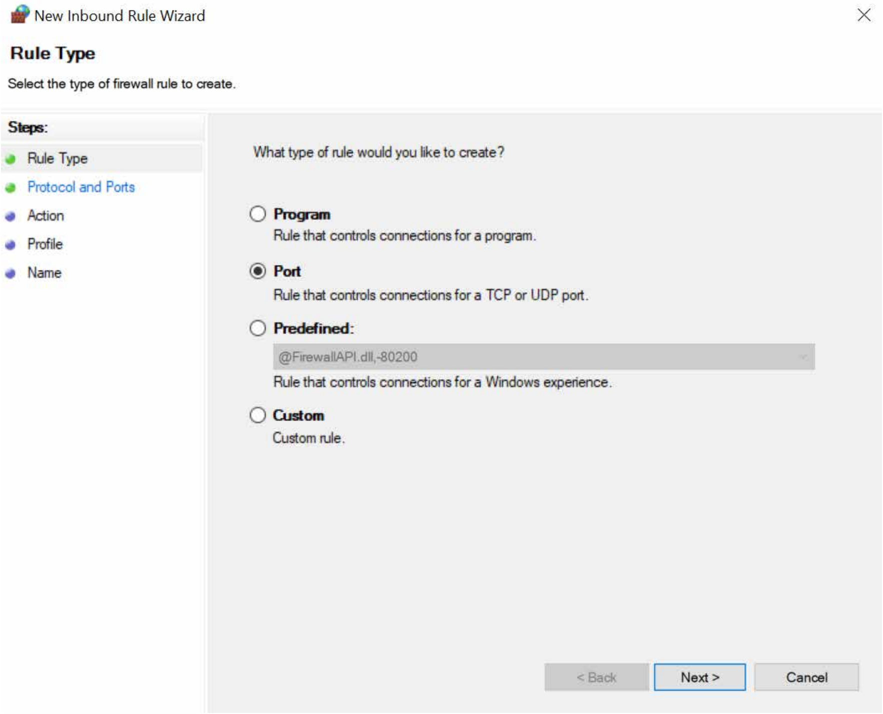
Windows Defender Firewall state: On
Incoming connections: Block all connections to apps that are not on the list of allowed apps
Active public networks: global.tektronix.net
Notification state: Do not notify me when Windows Defender Firewall blocks a new app

2. In Windows Firewall with Advanced Security menu, select **Windows Firewall with Advanced Security on Local Computer** > **Inbound Rules** and click **New Rule...**


Windows Defender Firewall with Advanced Security
File
Action
View
Help
Windows Defender Firewall with
Inbound Rules
Outbound Rules
Connection Security Rules
Monitoring
Inbound Rules
Name
Group
Profile
Enabled
Action
Actions
Inbound Rules
New Rule...
Filter by Profile
Filter by State
Filter by Group
View
Refresh
Export List...
Help

3. In **New Inbound Rule Wizard** menu

   a. Select **Port** and click **Next**.


New Inbound Rule Wizard
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Next >
Cancel

Rule Type

Select the type of firewall rule to create.

What type of rule would you like to create?

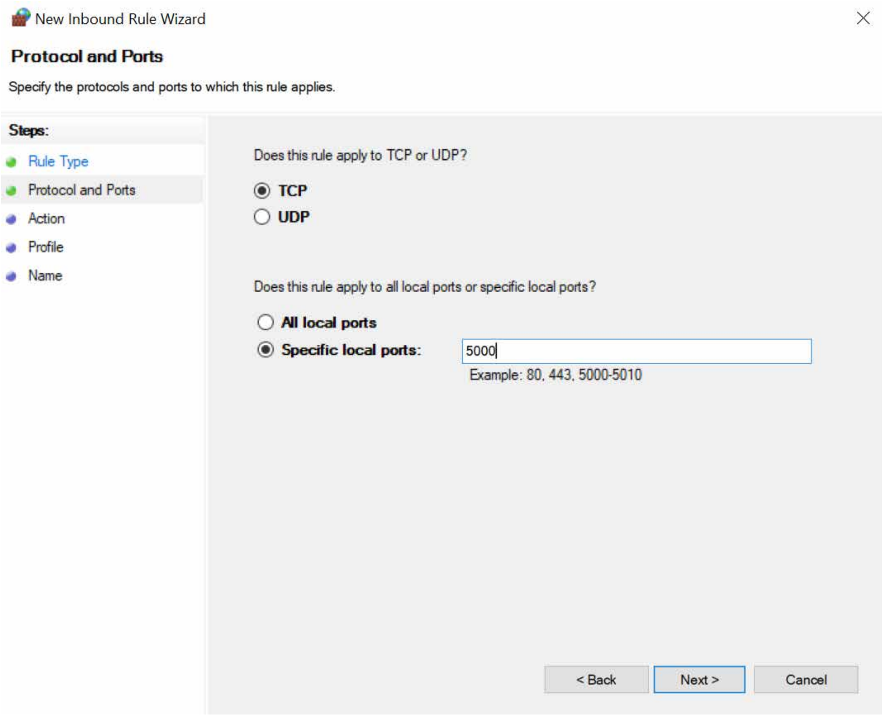
○ **Program**
Rule that controls connections for a program.

● **Port**
Rule that controls connections for a TCP or UDP port.

○ **Predefined:**
@FirewallAPI.dll,-80200
Rule that controls connections for a Windows experience.

○ **Custom**
Custom rule.

   b. Select **TCP** as rule apply, enter 5000 for **Specific local ports** and click **Next**.


New Inbound Rule Wizard
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Next >
Cancel

Protocol and Ports

Specify the protocols and ports to which this rule applies.

Does this rule apply to TCP or UDP?

● **TCP**

○ **UDP**

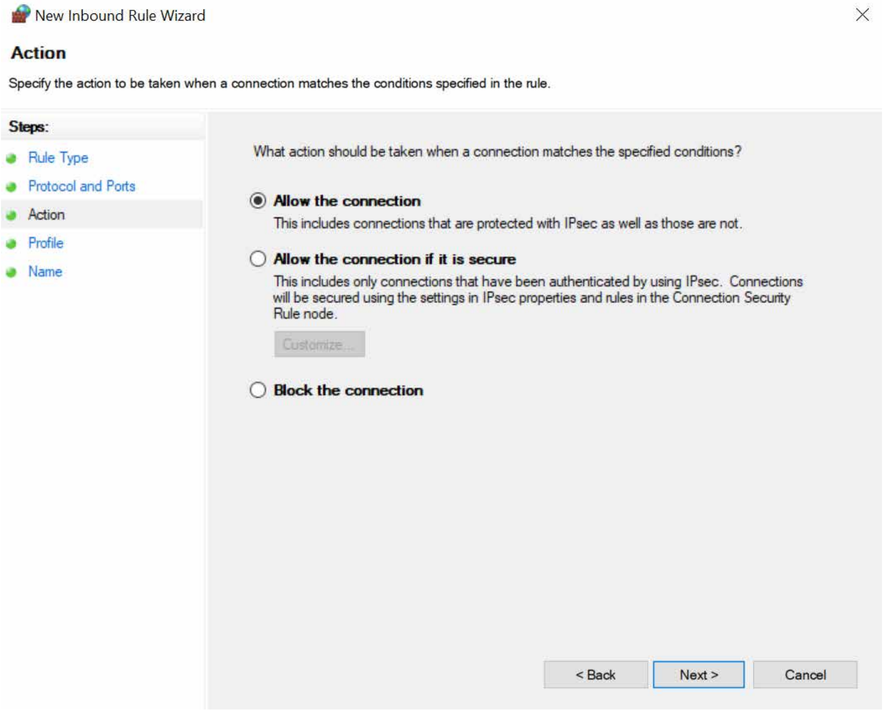
Does this rule apply to all local ports or specific local ports?

○ **All local ports**

● **Specific local ports:** 5000

Example: 80, 443, 5000-5010

c. Select **Allow the connection** and click **Next**.


New Inbound Rule Wizard
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
Customize...
< Back
Next >
Cancel

Action

Specify the action to be taken when a connection matches the conditions specified in the rule.

What action should be taken when a connection matches the specified conditions?

● **Allow the connection**

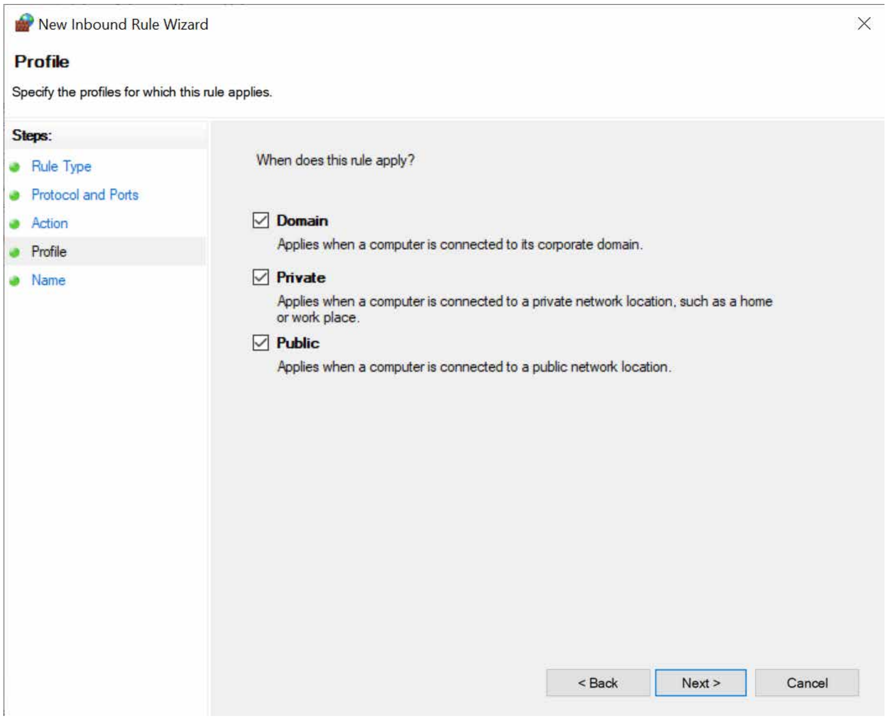
This includes connections that are protected with IPsec as well as those are not.

○ **Allow the connection if it is secure**

This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node.

○ **Block the connection**

d. Select **Domain, Private, Public** checkbox and click **Next**.


New Inbound Rule Wizard
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Next >
Cancel

Profile

Specify the profiles for which this rule applies.

When does this rule apply?

☑ **Domain**

Applies when a computer is connected to its corporate domain.

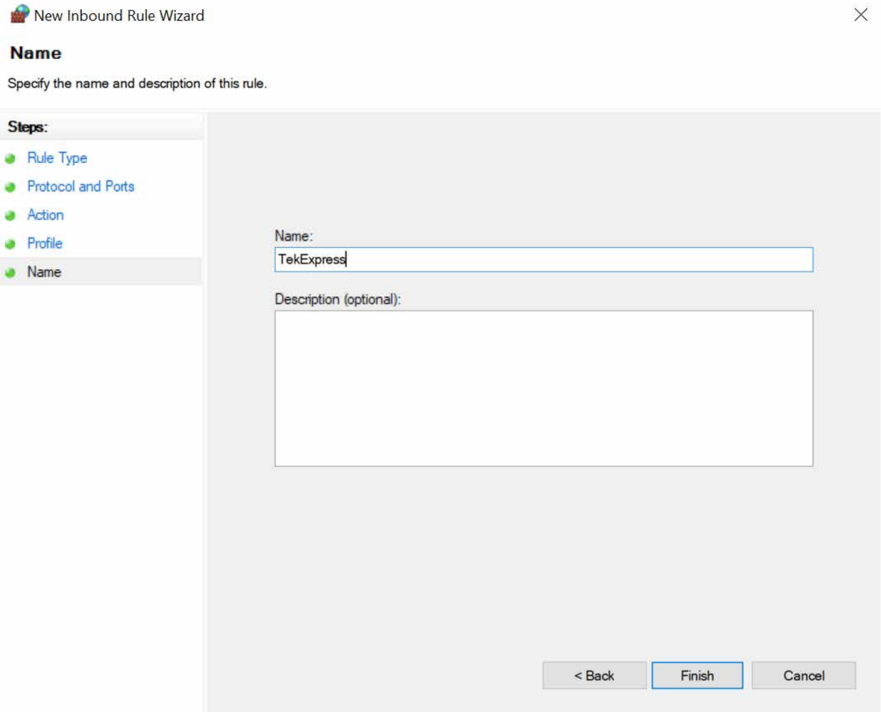
☑ **Private**

Applies when a computer is connected to a private network location, such as a home or work place.

☑ **Public**

Applies when a computer is connected to a public network location.

e. Enter **Name**, Description (optional), and click **Finish**.


New Inbound Rule Wizard
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Finish
Cancel

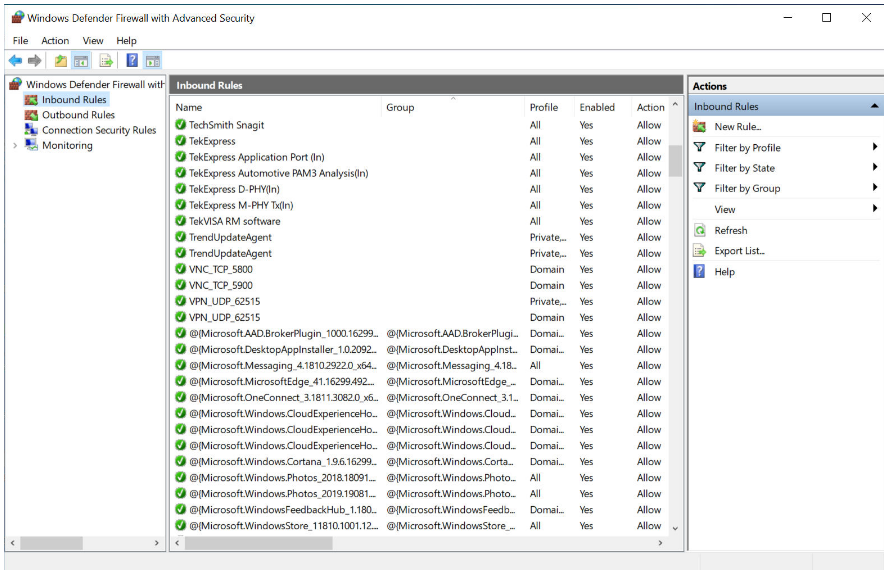
Name

Specify the name and description of this rule.

Name: TekExpress

Description (optional):

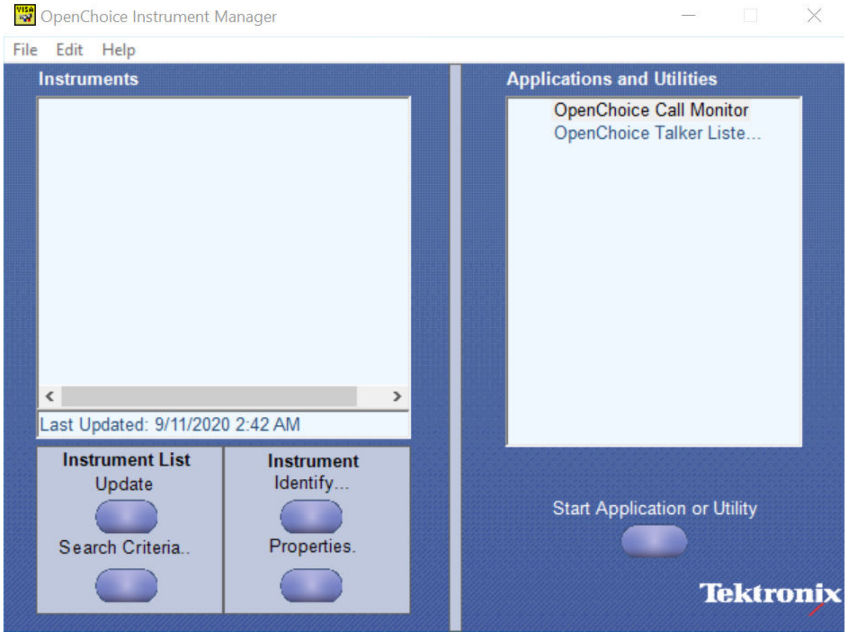
4. Check whether the Rule name is displayed in **Windows Firewall with Advanced Security menu** > **Inbound Rules**.


Windows Defender Firewall with Advanced Security
File
Action
View
Help
Windows Defender Firewall with
Inbound Rules
Outbound Rules
Connection Security Rules
Monitoring
Inbound Rules
Actions
Inbound Rules
New Rule...
Filter by Profile
Filter by State
Filter by Group
View
Refresh
Export List...
Help

Name	Group	Profile	Enabled	Action
TechSmith Snagit		All	Yes	Allow
TekExpress		All	Yes	Allow
TekExpress Application Port (In)		All	Yes	Allow
TekExpress Automotive PAM3 Analysis(In)		All	Yes	Allow
TekExpress D-PHY(In)		All	Yes	Allow
TekExpress M-PHY Tx(In)		All	Yes	Allow
TekVISA RM software		All	Yes	Allow
TrendUpdateAgent		Private,...	Yes	Allow
TrendUpdateAgent		Private,...	Yes	Allow
VNC_TCP_5800		Domain	Yes	Allow
VNC_TCP_5900		Domain	Yes	Allow
VPN_UDP_62515		Private,...	Yes	Allow
VPN_UDP_62515		Domain	Yes	Allow
@{Microsoft.AAD.BrokerPlugin_1000.16299...	@{Microsoft.AAD.BrokerPlugi...	Domai...	Yes	Allow
@{Microsoft.DesktopAppInstaller_1.0.2092...	@{Microsoft.DesktopAppInst...	Domai...	Yes	Allow
@{Microsoft.Messaging_4.1810.2922.0_x64...	@{Microsoft.Messaging_4.18...	All	Yes	Allow
@{Microsoft.MicrosoftEdge_41.16299.492....	@{Microsoft.MicrosoftEdge_...	Domai...	Yes	Allow
@{Microsoft.OneConnect_3.1811.3082.0_x6...	@{Microsoft.OneConnect_3.1...	Domai...	Yes	Allow
@{Microsoft.Windows.CloudExperienceHo...	@{Microsoft.Windows.Cloud...	Domai...	Yes	Allow
@{Microsoft.Windows.CloudExperienceHo...	@{Microsoft.Windows.Cloud...	Domai...	Yes	Allow
@{Microsoft.Windows.CloudExperienceHo...	@{Microsoft.Windows.Cloud...	Domai...	Yes	Allow
@{Microsoft.Windows.Cortana_1.9.6.16299...	@{Microsoft.Windows.Corta...	Domai...	Yes	Allow
@{Microsoft.Windows.Photos_2018.18091....	@{Microsoft.Windows.Photo...	All	Yes	Allow
@{Microsoft.Windows.Photos_2019.19081....	@{Microsoft.Windows.Photo...	All	Yes	Allow
@{Microsoft.WindowsFeedbackHub_1.180...	@{Microsoft.WindowsFeedb...	Domai...	Yes	Allow
@{Microsoft.WindowsStore_11810.1001.12....	@{Microsoft.WindowsStore_...	All	Yes	Allow

TekVISA configuration

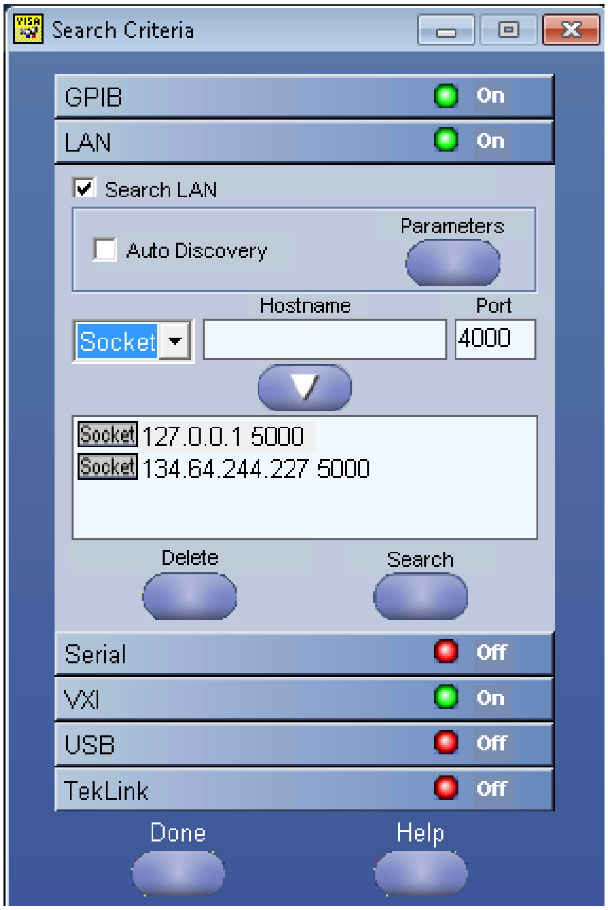
1. Click **Start** > **All Programs** > **TekVISA** > **OpenChoice Instrument Manager**.


OpenChoice Instrument Manager
File
Edit
Help
Instruments
Applications and Utilities
OpenChoice Call Monitor
OpenChoice Talker Liste...
Instrument List
Update
Search Criteria..
Instrument
Identify...
Properties.
Start Application or Utility
Tektronix

Last Updated: 9/11/2020 2:42 AM

2. Click **Search Criteria**. In **Search Criteria** menu, click **LAN** to Turn-on. Select **Socket** from the drop-down list, enter the IP address of the TekExpress device in **Hostname** and type **Port** as 5000. Click ✓ to configure the IP address with Port.

   Enter the Hostname as 127.0.0.1 if the TekVISA and TekExpress application are in the same system, else enter the IP address of the oscilloscope where the TekExpress application is running.


Search Criteria
GPIB On
LAN On
☑ Search LAN
☐ Auto Discovery
Parameters
Hostname
Port
Delete
Search
Serial Off
VXI On
USB Off
TekLink Off
Done
Help

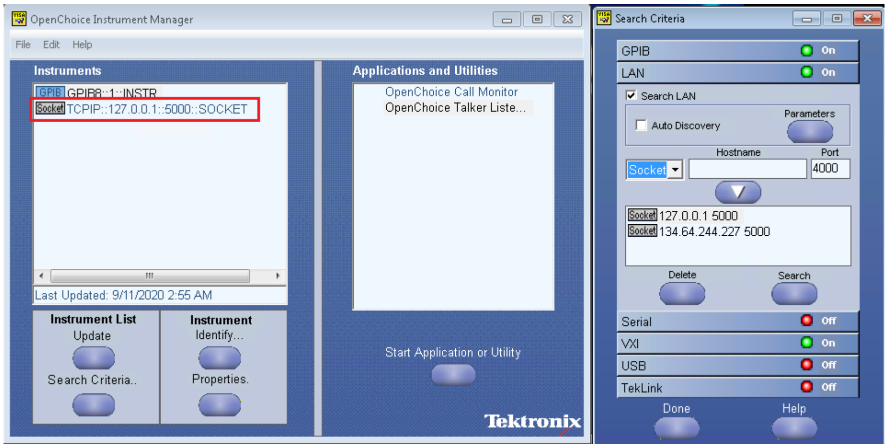
Socket

Port: 4000

Socket 127.0.0.1 5000

Socket 134.64.244.227 5000

3. Click **Search** to setup the TCPIP connection with the host. Check whether the TCPIP host name is displayed in **OpenChoice Instrument Manager** > **Instruments**.


OpenChoice Instrument Manager
File Edit Help
Instruments
Applications and Utilities
Instrument List
Update
Search Criteria..
Instrument
Identify...
Properties.
Start Application or Utility
Tektronix
Search Criteria
GPIB On
LAN On
☑ Search LAN
☐ Auto Discovery
Parameters
Hostname
Port
Delete
Search
Serial Off
VXI On
USB Off
TekLink Off
Done
Help

GPIB GPIB8::1::INSTR

Socket TCPIP::127.0.0.1::5000::SOCKET

Last Updated: 9/11/2020 2:55 AM

OpenChoice Call Monitor

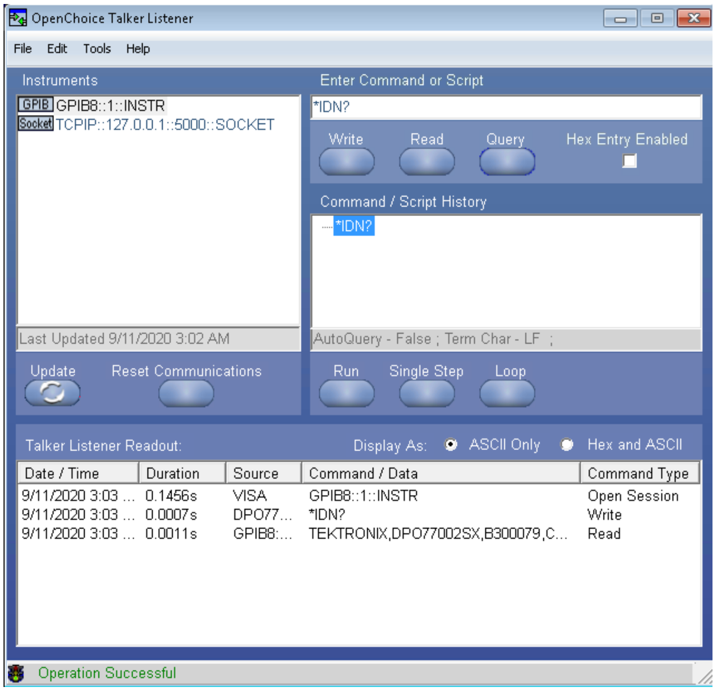
OpenChoice Talker Liste...

Socket 4000

Socket 127.0.0.1 5000

Socket 134.64.244.227 5000

4. Double-click **OpenChoice Talker Listener** and enter the Command *IDN? in command entry field and click **Query**. Check that the Operation is successful and Talker Listener Readout displays the Command / Data.


OpenChoice Talker Listener
File
Edit
Tools
Help
Instruments
Enter Command or Script
Write
Read
Query
Hex Entry Enabled
Command / Script History
Update
Reset Communications
Run
Single Step
Loop
Talker Listener Readout:
Display As:
● ASCII Only
○ Hex and ASCII

GPIB GPIB8::1::INSTR

Socket TCPIP::127.0.0.1::5000::SOCKET

*IDN?

*IDN?

Last Updated 9/11/2020 3:02 AM

AutoQuery - False ; Term Char - LF ;

Date / Time	Duration	Source	Command / Data	Command Type
9/11/2020 3:03 ...	0.1456s	VISA	GPIB8::1::INSTR	Open Session
9/11/2020 3:03 ...	0.0007s	DPO77...	*IDN?	Write
9/11/2020 3:03 ...	0.0011s	GPIB8:...	TEKTRONIX,DPO77002SX,B300079,C...	Read

Operation Successful

Set or query the device name of application

This command sets or queries the device name of the application.

Syntax

`TEKEXP:SELECT DEVICE,"<DeviceName>"` (Set)

`TEKEXP:SELECT? DEVICE` (Query)

Command arguments

Argument Name	Argument Type
<DeviceName>	<String>

Returns

<String>

Examples

`TEKEXP:SELECT DEVICE,"<DeviceName>"` command sets the device name of the application.

`TEKEXP:SELECT? DEVICE` command returns the selected device name of the application.

Set or query the suite name of the application

This command sets or queries the suite name of the application.

Syntax

`TEKEXP:SELECT SUITE,"<SuiteName>"` (Set)

`TEKEXP:SELECT? SUITE` (Query)

Command arguments

SuiteName
For CEM, valid values are System-Board, Add-In-Card For U.2(SFF-8639), valid values are Host, Module For BaseSpec, valid value is TX Test Board and SRIS TX Test Board For M.2, valid values are M2_Add-In-Card and M2_Host For RefClockSpec valid value is Ref Clock

Returns

<String>

Examples

`TEKEXP:SELECT SUITE,"<SuiteName>"` command sets the suite name of the application.

`TEKEXP:SELECT? SUITE` command returns the selected suite of the application.

Set or query the test name of the application

This command selects or deselects the specified test name of the application.

Syntax

`TEKEXP:SELECT TEST,"<TestName>",<Value>` (Set)

`TEKEXP:SELECT TEST,"<ALL>"` (Set)

`TEKEXP:SELECT? TEST` (Query)

Command arguments

TestName	Value
Tests for CEM Median Peak Jitter Gen1 Min Eye Width Gen1 Min Time Between Crossovers Gen1 Non Transition Eye Diagram Gen1 Peak to Peak Jitter Gen1 RMS Jitter (Per Edge) Gen1 Transition Eye Diagram Gen1 Unit Interval Gen1 Composit Eye Height Gen2 Dj_dd Gen2 Min Eye Width Gen2 Min Time Between Crossovers Gen2 Non Transition Eye Diagram Gen2 Peak to Peak Jitter Gen2	{True | False} or {1 | 0} It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected

Table continued…

TestName	Value
• RJ(RMS) Gen2 • TJ @ E-12 Gen2 • Transition Eye Diagram Gen2 • Unit Interval Gen2 • Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3 • Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3 • Composite Eye Height Gen4 • Dj_dd Gen4 • Extrapolated Eye Height Gen4 • Min Eye Width Gen4 • Min Time Between Crossovers Gen4 • Non Transition Eye Diagram Gen4 • Peak to Peak Jitter Gen4 • RJ(RMS) Gen4 • TJ @ E-12 Gen4 • Transition Eye Diagram Gen4 • Uncorrelated PWJ TJ@E-12 Gen4 • Unit Interval Gen4 • Composite EH Gen5 • Composite EW Gen5	
• Deterministic DD Jitter Gen5 • ExtrapolatedJitter Gen5 • Eye Height@BER Gen5 • Eye Width@Ber Gen5 • RandomJitter Gen5 • UnitInterval Gen5 • TIE RJ(RMS) Gen5 • Uncorrelated TIE TJ @E-12 Gen5 (Add-In Card Only) • Uncorrelated TIE DJ dd@E-12 Gen5 (Add-In Card Only) • Uncorrelated PWJ TJ @E-12 Gen5 (Add-In Card Only) • Uncorrelated PWJ DJ dd@E-12 Gen5 (Add-In Card Only)	{True | False} or {1 | 0} It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected

Table continued…

TestName	Value
Tests for BaseSpec • Average UI Gen3 • AC CM 4GHz Gen3 • AC CM 30KHz-500MHz Gen3 • DDj Gen3 • EIEOS Min Voltage Gen3 • F/2 Jitter Gen3 • PS21 Ratio Gen3 • PWJ RJ (RMS) Gen3 • TIE RJ (RMS) Gen3 • Uncorrelated PWJ DJ dd@E-12 Gen3 • Uncorrelated PWJ TJ@E-12 Gen3 • Uncorrelated TIE DJ dd@E-12 Gen3 • Uncorrelated TIE TJ @ E-12 Gen3 • V Tx_no_eq Gen3 • Average UI Gen4 • AC CM 8Ghz Gen4 • AC CM 30KHz-500MHz Gen4 • DDj Gen4 • EIEOS Min Voltage Gen4 • F/2 Jitter Gen4 • PS21 Ratio Gen4 • PWJ RJ (RMS) Gen4 • TIE RJ (RMS) Gen4 • Uncorrelated PWJ DJ dd@E-12 Gen4 • Uncorrelated PWJ TJ@E-12 Gen4 • Uncorrelated TIE DJ dd@E-12 Gen4 • Uncorrelated TIE TJ @ E-12 Gen4 • V Tx_no_eq Gen4 • Average UI Gen5 • AC CM 4GHz Gen5 • AC CM 16GHz Gen5 • DDj Gen5 • EIEOS Min Voltage Gen5 • F/2 Jitter Gen5 • PS21 Ratio Gen5 • PWJ RJ (RMS) Gen5 • TIE RJ (RMS) Gen5 • Uncorrelated PWJ DJ dd@E-12 Gen5	{True | False} or {1 | 0} It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected

Table continued…

TestName	Value
• Uncorrelated PWJ TJ@E-12 Gen5 • Uncorrelated TIE DJ dd@E-12 Gen5 • Uncorrelated TIE TJ @ E-12 Gen5 • V Tx_no_eq Gen5 • RLM_Gen6 • SNDR_Gen6 • Uncorrelated Tie Tj@ E-12 Gen6 • Uncorrelated TIE DJ dd@E-12 Gen6 • TIE RJ(RMS) Gen6 • Uncorrelated PWJ TJ @E-12 Gen6 • Uncorrelated PWJ DJ dd@E-12 Gen6 • PS21Ratio Gen6 • V Tx_Boost Gen6 • AC CM 16Ghz Gen6 • AC CM 30KHz-500MHz Gen6 • V Tx_Diff_Pk_To_Pk Gen6 • V Tx_EIEOS Gen6	
Tests for U.2 • Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3 • Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3	{True | False} or {1 | 0} It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected
Tests for M.2 • Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3 • Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3	{True | False} or {1 | 0} It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected
Test for RefClockSpec	{True | False} or {1 | 0}

TestName	Value
• HF RMS Jitter Gen5 • AC-REFCLK Gen5	It represents selected or unselected. Where, True or 1 - Selected False or 0 - Unselected

Returns

{True | False} or {1 | 0}

Examples

`TEKEXP:SELECT TEST,"<TestName>",1` command selects the specified test in the Test Panel.

`TEKEXP:SELECT TEST,"<ALL>"` command select all the tests in the Test Panel.

`TEKEXP:SELECT? TEST` command returns the list of selected tests.

Set or query the version name of the application

This command sets or queries the version name of the application.

Syntax

`TEKEXP:SELECT VERSION,”<VersionName>”` (Set)

`TEKEXP:SELECT? VERSION` (Query)

Command arguments

Argument Name	Argument Type	Valid Values
<VersionName>	<String>	It is the name of the version on the DUT panel of the application.

VersionName
• Gen1-1.0a (Applicable for DeviceName = CEM) • Gen1-1.1 (Applicable for DeviceName = CEM) • Gen2-2.0 (Applicable only DeviceName = CEM) • Gen3-3.0 (Applicable only DeviceName = CEM, BaseSpec, U.2(SFF-8639 and M.2) • Gen4-4.0 (Applicable only DeviceName = CEM and BaseSpec) • Gen5-5.0 (Applicable only DeviceName = CEM, BaseSpec and RefClockSpec) • Gen6-6.0 (Applicable only DeviceName = BaseSpec)

Returns

<String>

Examples

`TEKEXP:SELECT VERSION,”<VersionName>”` command sets the version name of application.

`TEKEXP:SELECT? VERSION` command returns the version name of application.

Set or query the general parameter values

This command sets or queries the general parameter values of the application.

Syntax

`TEKEXP:VALUE GENERAL,"<ParameterName>","<Value>"` (Set)

`TEKEXP:VALUE? GENERAL,"<ParameterName>"` (Query)

Command arguments

Table 19: Command arguments for general settings

ParameterName	Value

Value	Specifies the value parameters.
	- For InstrumentType, valid values are:
	  - Comment
	- For DUTID, valid values are:
	  - Comment

InstrumentType	Specifies the instrument type. Valid values are: - Alternate Real Time Scope - Real Time Scope
DataRate2Gb	- Included - Excluded
DataRate5Gb	- Included - Excluded
DataRate8Gb	- Included - Excluded
DataRate16Gb	- Included - Excluded
DataRate32Gb	- Included - Excluded
DataRate64Gb	- Included - Excluded
PreEmphasis3dB	- Included - Excluded

Table continued…

ParameterName	Value
PreEmphasis6dB	• Included • Excluded
SSC	• On • Off
VoltageSwing	• Full • Reduced
Link Widths	• 1 Lane • 2 Lanes • 4 Lanes • 8 Lanes • 16 Lanes
SignalPreset8Gb	Signal quality preset selection values are P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, P10. To select multiple signal quality preset, specify as P0_P1_P2
SignalPreset16Gb	
SignalPreset32Gb	
Preset8Gb	Preset selection values are P0_, P1_, P2_, P3_, P4_, P5_, P6_, P7_, P8_, P9_, P10_. To select multiple signal quality preset, specify as P0_P1_P2
Preset16Gb	
Preset32Gb	
Preset64Gb	Preset selection values are Q0_, Q1_, Q2_, Q3_, Q4_, Q5_, Q6_,Q7_, Q8_, Q9_, Q10_. To select multiple signal quality preset, specify as Q0_Q1_Q2
Acquisition	• BeforeAnalysis • AcquireOnly
AcquisitionCountGen4	1 to 10
AcquisitionCountGen5	
SaveOptions	• Save All the Waveforms • Save Only Analyzed Waveform • No Waveforms saved - Discard after analysis
DeEmbed2Gb	• Included • Excluded
DeEmbed5Gb	• Included • Excluded
DeEmbed8Gb	• Included • Excluded

Table continued…

ParameterName	Value
DeEmbed16Gb	- Included - Excluded
DeEmbed32Gb	- Included - Excluded
DeEmbed64Gb	- Included - Excluded
Embed8Gb	- Included - Excluded
Embed16Gb	- Included - Excluded
Embed32Gb	- Included - Excluded
Filterfile2Gb	Filterfile2Gb.flt
Filterfile5Gb	Filterfile5Gb.flt
FilterfileDeEmbed8Gb	FilterfileDeEmbed8Gb.flt
FilterfileEmbed8Gb	FilterfileEmbed8Gb.flt
FilterfileDeEmbed16Gb	FilterfileDeEmbed16Gb.flt
FilterfileEmbed16Gb	FilterfileEmbed16Gb.flt
FilterfileDeEmbed32GbPos	FilterfileDeEmbed32GbPos.flt
FilterfileDeEmbed32GbNeg	FilterfileDeEmbed32GbNeg.flt
FilterfileDeEmbed64GbPos	FilterfileDeEmbed64GbPos.flt
FilterfileDeEmbed64GbNeg	FilterfileDeEmbed64GbNeg.flt
FilterfileEmbed32Gb	FilterfileEmbed32Gb.flt
FilterfileDeEmbed32Gb	FilterfileDeEmbed32Gb.flt
EnableDUTAutomation	- Included - Excluded
DeskewAutomation	- Included - Excluded
Automation Settings	- Use Default Settings - Manually Configure Settings - Use Custom Settings
Signal Type	- Square - Sine

Table continued…

ParameterName	Value
Gen4DataClockPatternCount	0 to 9
Gen5DataClockPatternCount	0 to 9
RecordLength2Gb	2.5e6
RecordLength5Gb	10e6
RecordLength8Gb	10e6
RecordLength16Gb	20e6
RecordLength32Gb	12.5e6
RecordLength64Gb	12.5e6
SampleRate2Gb	50e9
SampleRate5Gb	50e9
SampleRate8Gb	50e9
SampleRate16Gb	100e9
SampleRate32Gb	200e6
SampleRate64Gb	200e6
Bandwidth2Gb	6e9
Bandwidth5Gb	12.5e9
Bandwidth8Gb	13e9
Bandwidth16Gb	16e9
Bandwidth32Gb	• 33e9 (CEM) • 50e9 (Base)
Bandwidth64Gb	50e9
Signal Validation	• Prompt me if Signal Check Fails • Skip Test if Signal Check Fails • Turn Off Signal Check

Table continued…

ParameterName	**Value**
SqSigtestPathGen3	Sigtest file path. Example: *C:\Program Files (x86)\SigTest 4.0.51\SigTest.exe*
PresetSigtestPathGen3	
SqtestPathGen4	
PresetSigtestPathGen4	
SqtestPathGen5	
PresetSigtestPathGen5	
PHYSigtestPathGen5	
SigtestTemplate2Gbps	
SigtestTemplate5Gbps3Db	
SigtestTemplate5Gbps6Db	
SigtestTemplate8Gbps	
SigtestTemplate16Gbps	
SigtestTemplate32GbpsJitterMeas	
SigtestTemplate32GbpsVoltageMeas	
SigtestTemplate16GbpsPwjTest	
SigtestTemplate32GbpsPHYTest	
SigtestTemplate32GbpsSignalTest	
Include Intermediate Results	• Included • Excluded
Awg Clock Setup	• Included • Excluded
SRIS SSC	• On • Off
SlotNumber	05
Scope Noise Auto Mode	• Included • Excluded
CTLE Auto Mode	• Included • Excluded
CTLERecordLength	Value: 1.0 to 20.0
OptimalCTLEValue	Value: 0.0 to 15.0
CTLEStepSize	• 0.25 • 0.5 • 1.0
Scope Noise Compensation (SNDR)	Value: 0.0 to 20.0
Scope Noise Compensation (TIE Jitter)	Value: 0.0 to 20.0

Table continued…

ParameterName	**Value**
Scope Noise Compensation (PWJ)	Value: 0.0 to 20.0
Signal Validation Threshold(mV)	200
Report Update Mode	• New • Append • Replace
Trigger Type	• Edge • Width • Auto
DUTID Comment	User comment
Timer Warning Info Message Popup	• "True" • "False"
Timer Warning Info Message Popup Duration	0 to 20
Timer Error Message Popup	• "True" • "False"
Timer Error Message Popup Duration	0 to 20
On Failure Stop and Notify	True or False
Automate with Switch	True or False
DeskewAlertEnabled	True or False
On Failure Stop and Notify	True or False
On Failure Pause	True or False
JitterTestAcquireType (For Basespec Only)	• CompliancePattern • DataClockPattern
SigtestSilentMode	True or False
Gen5RefClockData (For RefClockSpecOnly)	True or False
SiliconLabTool (For RefClockSpecOnly)	True or False
Probing Type (For All)	• Differential • Single Ended
RecordLengthRefGen5 (For RefClockSpec Only)	80e6
SampleRateRefGen5 (For RefClockSpec Only)	50e9
BandwidthRefGen5 (For RefClockSpec Only)	5e9

Table 20: Command arguments for report settings

ParameterName	Value
Report Update Mode	• New • Append • Replace
Report Path	X:\<application name>\Reports\DUT001.mht
Save As Type	• Web Archive (*.mht;*.mhtml) • PDF (*.pdf;) • CSV (*.csv;)
Auto increment report name if duplicate	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
Create report at the end	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
Include Pass/Fail Results Summary	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
Include Detailed Results	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
Include Plot Images	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected

Table continued…

ParameterName	Value
Include Setup Configuration	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
CXL Report Selection	• Included • Excluded
Include Complete Application Configuration	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected
Include User Comments	{True | False} or {1 | 0} It represents selected or unselected. Where, • True or 1 - Selected • False or 0 - Unselected

Returns

<NRf> or <String>

Examples

`TEKEXP:VALUE GENERAL,"<ParameterName>","<Value>"` command set the value for the specified general parameter.

`TEKEXP:VALUE? GENERAL,"<ParameterName>"` command returns the value for the specified general parameter.

Query the available devices in the DUT panel of the application

This command queries the list of available devices on the DUT panel as comma separated values.

Syntax

`TEKEXP:LIST? DEVICE` (Query)

Command arguments

Device	Device Type and value	Description
<Device>	CEM BaseSpec RefClockSpec U.2(SFF-8639) M.2	It is the name of the device on the DUT panel of the application.

Returns

<String>

Examples

`TEKEXP:LIST? DEVICE` command returns the list of available devices.

Query the available suites for the selected device

This command queries the list of available suites for the selected device as comma separated values.

Syntax

`TEKEXP:LIST? SUITE` (Query)

Returns

<String>

Examples

`TEKEXP:LIST? SUITE` command returns the list of available suites for the selected device.

Query the list of available tests of the application

This command queries the list of available tests of the application for the selected device as comma separated values.

Syntax

`TEKEXP:LIST? TEST` (Query)

Command arguments

TestName	String
Tests for CEM	Median Peak Jitter Gen1 Min Eye Width Gen1 Min Time Between Crossovers Gen1 Non Transition Eye Diagram Gen1 Peak to Peak Jitter Gen1 RMS Jitter (Per Edge) Gen1 Transition Eye Diagram Gen1

Table continued…

TestName	String
	• Unit Interval Gen1 • Composit Eye Height Gen2 • Dj_dd Gen2 • Min Eye Width Gen2 • Min Time Between Crossovers Gen2 • Non Transition Eye Diagram Gen2 • Peak to Peak Jitter Gen2 • RJ(RMS) Gen2 • TJ @ E-12 Gen2 • Transition Eye Diagram Gen2 • Unit Interval Gen2 • Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3 • Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3 • Composite Eye Height Gen4 • Dj_dd Gen4 • Extrapolated Eye Height Gen4 • Min Eye Width Gen4 • Min Time Between Crossovers Gen4 • Non Transition Eye Diagram Gen4 • Peak to Peak Jitter Gen4 • RJ(RMS) Gen4 • TJ @ E-12 Gen4 • Transition Eye Diagram Gen4 • Uncorrelated PWJ TJ@E-12 Gen4 • Unit Interval Gen4 • Composite EH Gen5 • Composite EW Gen5 • Deterministic DD Jitter Gen5 • ExtrapolatedJitter Gen5 • Eye Height@BER Gen5 • Eye Width@Ber Gen5

Table continued…

TestName	String
	• RandomJitter Gen5 • UnitInterval Gen5 • TIE RJ (RMS) Gen5 • Uncorrelated PWJ DJ dd@E-12 Gen5 (Add-In Card Only) • Uncorrelated PWJ TJ@E-12 Gen5 (Add-In Card Only) • Uncorrelated TIE DJ dd@E-12 Gen5 (Add-In Card Only) • Uncorrelated TIE TJ @ E-12 Gen5 (Add-In Card Only)
Tests for BaseSpec	• Average UI Gen3 • AC CM 4GHz Gen3 • AC CM 30KHz-500MHz Gen3 • DDj Gen3 • EIEOS Min Voltage Gen3 • F/2 Jitter Gen3 • PS21 Ratio Gen3 • PWJ RJ (RMS) Gen3 • TIE RJ (RMS) Gen3 • Uncorrelated PWJ DJ dd@E-12 Gen3 • Uncorrelated PWJ TJ@E-12 Gen3 • Uncorrelated TIE DJ dd@E-12 Gen3 • Uncorrelated TIE TJ @ E-12 Gen3 • V Tx_no_eq Gen3 • Average UI Gen4 • AC CM 8Ghz Gen4 • AC CM 30KHz-500MHz Gen4 • DDj Gen4 • EIEOS Min Voltage Gen4 • F/2 Jitter Gen4 • PS21 Ratio Gen4 • PWJ RJ (RMS) Gen4 • TIE RJ (RMS) Gen4 • Uncorrelated PWJ DJ dd@E-12 Gen4 • Uncorrelated PWJ TJ@E-12 Gen4 • Uncorrelated TIE DJ dd@E-12 Gen4 • Uncorrelated TIE TJ @ E-12 Gen4 • V Tx_no_eq Gen4 • Average UI Gen5 • AC CM 4GHz Gen5 • AC CM 16GHz Gen5 • DDj Gen5

Table continued…

TestName	String
	• EIEOS Min Voltage Gen5 • F/2 Jitter Gen5 • PS21 Ratio Gen5 • PWJ RJ (RMS) Gen5 • TIE RJ (RMS) Gen5 • Uncorrelated PWJ DJ dd@E-12 Gen5 • Uncorrelated PWJ TJ@E-12 Gen5 • Uncorrelated TIE DJ dd@E-12 Gen5 • Uncorrelated TIE TJ @ E-12 Gen5 • V Tx_no_eq Gen5 • UnitInterval Gen6 • RLM Gen6 • SNDR Gen6 • Uncorrelated Tie Tj@ E-06 Gen6 • Uncorrelated TIE DJ dd@E-06 Gen6 • TIE RJ(RMS) Gen6 • Uncorrelated PWJ TJ @E-06 Gen6 • Uncorrelated PWJ DJ dd@E-06 Gen6 • PS21Ratio Gen6 • V Tx_Boost Gen6 • AC CM 16Ghz Gen6 • AC CM 30KHz-500MHz Gen6 • V Tx_Diff_Pk_To_Pk Gen6 • V Tx_EIEOS Gen6
Tests for U.2	• Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3 • Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3
Tests for M.2	• Composit Eye Height Gen3 • Dj_dd Gen3 • Min Eye Width Gen3 • Min Time Between Crossovers Gen3

Table continued…

TestName	String
	• Non Transition Eye Diagram Gen3 • Peak to Peak Jitter Gen3 • RJ(RMS) Gen3 • TJ @ E-12 Gen3 • Transition Eye Diagram Gen3 • Unit Interval Gen3
Test for RefClockSpec	• RMS Jitter Gen5 • AC-REFCLK Gen5 [11]

Returns

<String>

Examples

`TEKEXP:LIST? TEST` command returns the list of available tests for the selected device.

Query the available version names of the application

This command queries the list of available version names of the application for the selected device as comma separated values.

Syntax

`TEKEXP:LIST? VERSION` (Query)

Returns

<String>

Examples

`TEKEXP:LIST? VERSION` command returns the list of version names for the selected device.

Query the list of available instruments based on the specified instrument type

This command queries the list of available instruments based on the specified instrument type.

Syntax

`TEKEXP:LIST? INSTRUMENT,"<InstrumentType>"` (Query)

Command argument

Argument Name	Argument value
<InstrumentType>	<String>

Returns

<String>

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[11] Supported in Skyworks Clock Jitter Tool.

Examples

`TEKEXP:LIST? INSTRUMENT,"Real Time Scope"` command returns the list of available instruments based on the real time scope type.

Set or query the IP address of the instrument based on the specified instrument type

This command sets or queries the IP address of the instrument based on the specified instrument type.

Syntax

`TEKEXP:INSTRUMENT? "<InstrumentType>"` (Query)

`TEKEXP:INSTRUMENT, "<InstrumentType>","<Value>"` (Set)

Command argument

Argument Name	Argument Type
<InstrumentType>	<String>
<Value>	<String> TCPIP::XXX.XX.XXX.XXX::INSTR

Returns

<String>

Examples

`TEKEXP:INSTRUMENT? "<InstrumentType>"` command returns the IP address of the oscilloscope.

`TEKEXP:INSTRUMENT, "<InstrumentType>","<value>"` command sets the oscilloscope to the specified IP address.

Query the information of the generated report file

This command queries the information of the generated report file in the format "<FileSize>","<FileName>".

Pre-requisite

A session should be run earlier and the report should be generated to get the information of the report.

Syntax

`TEKEXP:INFO? REPORT` (Query)

Returns

<FileSize>:: <String>

<FileName>:: <String>

Examples

`TEKEXP:INFO? REPORT` command returns the information of the generated report in the format ("1215”,"DUT001.mht”).

Query the information of the generated waveform files

This command queries the information of the generated waveform files in the format.

<File1Size,"File1Name”>.

If there are more than one waveform, the waveform file names are displayed with the comma separated values in the format

<File1Size,"File1Name">,<File2Size,"File2Name">.

Syntax

`TEKEXP:INFO? WFM` (Query)

Returns

<FileSize>:: <String>

<FileName>:: <String>

Examples

`TEKEXP:INFO? WFM` command returns the information of the generated waveform in the format (20000858,"X:\PCI Express\Untitled Session\DUT001\20200916_041609\Iter1_Short Record-length for SCOPE Period_NoSSC_DIFF.wfm”).

Query the information of the generated image files

This command queries the information of the generated image files in the format.

<File1Size,"File1Name”>.

If there are more than one image, the image file names are displayed with the comma separated values in the format

<File1Size,"File1Name">,<File2Size,"File2Name">.

Syntax

`TEKEXP:INFO? IMAGE` (Query)

Returns

<FileSize>:: <String>

<FileName>:: <String>

Examples

`TEKEXP:INFO? IMAGE` command returns the information of the generated image in the format (109058, "X:\PCI Express\Untitled Session\DUT001\20200916_041609\Iter1_Short Record-length for SCOPE Period_NoSSC_DIFF.png";22794,"X:\PCI Express\UntitledSession\DUT001\20 200916_041609\ScopePeriodPlot_Iteration1WithCursor.png").

Query the active TekExpress application name

This command queries the active TekExpress application name running on the oscilloscope.

Syntax

`TEKEXP:*IDN?` (Query)

Returns

<String>

Examples

`TEKEXP:*IDN?` command returns the active TekExpress application name running on the oscilloscope.

Set or query the DUTID of application

This command sets or queries the DUTID of the application.

Syntax

`TEKEXP:VALUE DUTID,"<Value>"` (Set)

`TEKEXP:VALUE? DUTID` (Query)

Command arguments

Argument Name	Argument Type
<Value>	<String>

Returns

<String>

Examples

`TEKEXP:VALUE DUTID,"DUT001"` command sets the DUTID of the application to DUT001.

`TEKEXP:VALUE? DUTID` command returns the DUTID of the application.

Sets or query the acquire mode status

This command sets or queries the acquire mode status.

Syntax

`TEKEXP:ACQUIRE_MODE <Mode>` (Set)

`TEKEXP:ACQUIRE_MODE?` (Query)

Command arguments

Argument Name	Argument value
<Mode>	• LIVE • PRE-RECORDED

Returns

LIVE | PRE-RECORDED

Examples

`TEKEXP:ACQUIRE_MODE LIVE` command sets the acquire mode to the Live mode.

`TEKEXP:ACQUIRE_MODE?` command returns the current acquire mode.

Set or query the execution mode status

This command sets or queries the execution mode status.

Syntax

`TEKEXP:MODE <Mode>` (Set)

`TEKEXP:MODE?` (Query)

Command arguments

Argument Name	Argument value
<Mode>	• COMPLIANCE • USER-DEFINED

Returns

COMPLIANCE | USER-DEFINED

Examples

`TEKEXP:MODE COMPLIANCE` command sets the execution mode to the compliance mode.

`TEKEXP:MODE?` command returns the current execution mode.

Generate the report for the current session

This command generates the report for the current session.

Syntax

`TEKEXP:REPORT GENERATE`(Set)

Arguments

N/A

Examples

`TEKEXP:REPORT GENERATE` command generates the report for the current session.

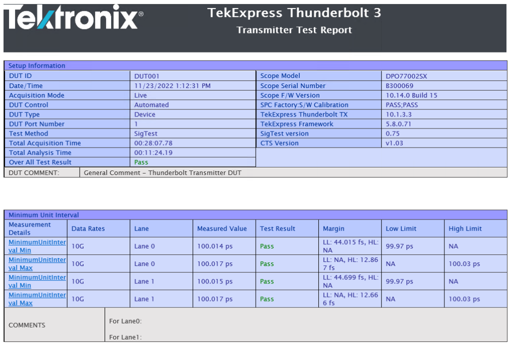
Query the value of specified report header field in the report

This command queries the value of specified report header field in the report.

Syntax

`TEKEXP:REPORT? ”<Device Field>”` (Query)

Command arguments

Argument Name	Argument Type
<Device Field> Device field is the header name of each field in the setup information section of the report. 	<String>

Tektronix® TekExpress Thunderbolt 3
Transmitter Test Report

Setup Information			
DUT ID	DUT001	Scope Model	DPO77002SX
Date/Time	11/23/2022 1:12:31 PM	Scope Serial Number	B300069
Acquisition Mode	Live	Scope F/W Version	10.14.0 Build 15
DUT Control	Automated	SPC Factory:S/W Calibration	PASS;PASS
DUT Type	Device	TekExpress Thunderbolt TX	10.1.3.3
DUT Port Number	1	TekExpress Framework	5.8.0.71
Test Method	SigTest	SigTest version	0.75
Total Acquisition Time	00:28:07.78	CTS Version	v1.03
Total Analysis Time	00:11:24.19		
Over All Test Result	Pass		
DUT COMMENT:	General Comment – Thunderbolt Transmitter DUT		

Minimum Unit Interval

Measurement Details	Data Rates	Lane	Measured Value	Test Result	Margin	Low Limit	High Limit
MinimumUnitInterval Min	10G	Lane 0	100.014 ps	Pass	LL: 44.015 fs, HL: NA	99.97 ps	NA
MinimumUnitInterval Max	10G	Lane 0	100.017 ps	Pass	LL: NA, HL: 12.867 fs	NA	100.03 ps
MinimumUnitInterval Min	10G	Lane 1	100.015 ps	Pass	LL: 44.699 fs, HL: NA	99.97 ps	NA
MinimumUnitInterval Max	10G	Lane 1	100.017 ps	Pass	LL: NA, HL: 12.666 fs	NA	100.03 ps
COMMENTS	For Lane0: For Lane1:						

Returns

<String>

Examples

`TEKEXP:REPORT? "DUT ID"` command returns the value of DUT ID field in the report.

Query the value of specified result detail available in report summary/details table

This command queries the value of specified result detail available in report summary/details table.

Syntax

`TEKEXP:RESULT? "<TestName>"` (Query)

`TEKEXP:RESULT? "<TestName>","<ColumnName>"` (Query)

`TEKEXP:RESULT? "<TestName>","<ColumnName>",<RowNumber>` (Query)

Command arguments

Argument Name	Argument Type
<TestName> It is the test name of which the details are required in the report.	<String>
<ColumnName> It is the column header name of which the details are required in the report.	<String>
<RowNumber> It is the row number of which the details are required in the report.	<String>

Returns

<String>

Examples

`TEKEXP:RESULT? "<TestName>"` will return the pass fail status of test.

`TEKEXP:RESULT? "<TestName>","<ColumnName>"` will return all the row values of specific column for the test with comma separated values.

`TEKEXP:RESULT? "<TestName>","<ColumnName>",<RowNumber>` will return the column value of specified row number.

Restore the setup to default settings

This command restores the setup to default settings.

Syntax

`TEKEXP:SETUP Default`(Set)

Arguments

N/A

Examples

`TEKEXP:SETUP Default` command restores the setup to default settings.

Save the setup

This command saves the setup.

Syntax

`TEKEXP:SETUP Save`(Set)

Examples

`TEKEXP:SETUP Save` command saves the setup.

Save the settings to a specified session

This command saves the settings to a specified session.

Syntax

`TEKEXP:SETUP Save,"<SessionName>"`

Command arguments

Argument Name	Argument value
<SessionName>	<String>

Examples

`TEKEXP:SETUP Save,"<SessionName>"` command saves the settings to a specified session.

Open the setup from a specified session

This command opens the setup from a specified session.

Syntax

`TEKEXP:SETUP Open,"<SessionName>"`(Set)

Command arguments

Argument Name	Argument value
<SessionName>	<String>

Examples

`TEKEXP:SETUP Open,"<SessionName>"` command opens the setup from a specified session.

Query the current setup file name

This command queries the current setup file name.

Syntax

`TEKEXP:SETUP? CURRENT` (Query)

Returns

<String>

Examples

`TEKEXP:SETUP? CURRENT` command returns the current setup file name.

Run/stop/pause/resume the selected measurements execution in the application

This command run/stop/pause/resume the selected measurements execution in the application.

Syntax

`TEKEXP:STATE <operation mode>` (Set)

Command arguments

Argument Name	Argument value
<operation mode>	• RUN • STOP • PAUSE • RESUME

Returns

RUN | STOP | PAUSE | RESUME

Examples

`TEKEXP:STATE RUN` command runs the execution for the selected measurements.

Query the current measurement execution status

This command queries the current measurement execution status.

Syntax

`TEKEXP:STATE?` (Query)

Returns

RUNNING | PAUSED | WAIT | ERROR | READY

Examples

`TEKEXP:STATE?` command returns the current measurement execution status.

Query whether the current setup is saved or not saved

This command queries whether the current setup is saved or not saved.

Syntax

`TEKEXP:STATE? SETUP` (Query)

Returns

Saved or Not-Saved

Examples

`TEKEXP:STATE? SETUP` command returns whether the current setup is saved or not saved.

Query the status of the previous command execution

This command queries whether the previous command execution is completed successfully.

Syntax

`TEKEXP:*OPC?` (Query)

Returns

{0 | 1} or {True | False}

1 or True indicates that command execution is successful.

0 or False indicates that command execution is failed.

Examples

`TEKEXP:*OPC?` command returns whether the previous command operation is completed successfully.

Query the last error occurred

This command queries the last error occurred.

Syntax

`TEKEXP:LASTERROR?` (Query)

Returns

<String>

Examples

`TEKEXP:LASTERROR?` command returns the last error occurred.

Set or query the popup details

This command sets or queries the popup details.

Syntax

`TEKEXP:POPUP?` (Query)

`TEKEXP:POPUP "<PopupResponse>"` (Set)

Command arguments

Argument Name	Argument value
<PopupResponse>	• Yes • No

Returns

The pop-up details return in the following format:

"<Tittle>","<message>","<response1>,<response2>".

Where,

<Tittle> :: <String>

<message> :: <String>

<response1>,<response2> :: <String>

Examples

`TEKEXP:POPUP?` command returns the popup details in following format ": "Do you really want to exit TekExpress?";Responses: "Yes, No".

`TEKEXP:POPUP "Yes"` command sets the popup response to Yes.

Sets or query the limit values in the limits editor window

This command sets or queries the limit values in the limits editor window.

Syntax

`TEKEXP:VALUE LIMIT,<TestName>,<LimitHeader>,<Value1>,<CompareString>,<Value2>`(Set)

`TEKEXP:VALUE? LIMIT,<TestName>,<LimitHeader>` (Query)

Returns

<String> or <NRf>

Examples

`TEKEXP:VALUE LIMIT,<TestName>,<LimitHeader>,<Value1>,<CompareString>,<Value2>` command sets the limits value for the specified testname and limit header.

`TEKEXP:VALUE? LIMIT,<TestName>,<LimitHeader>` command returns the limits value for the specified testname and limit header.

Set or query the waveform file recalled for the specified test name and acquire type

This command set or queries the waveform file recalled for the specified test name and acquire type.

If there are more than one waveform, the waveform file names are displayed with the symbol "$" separated values in the format

<WaveformFileName1$ WaveformFileName2>.

Syntax

`TEKEXP:VALUE WFMFILE,<TestName>,<AcquireType>,<WaveformFileName>` (Set)

`TEKEXP:VALUE? WFMFILE,<TestName>,<AquireType>` (Query)

Returns

<String>

Examples

`TEKEXP:VALUE WFMFILE,<TestName>,<AquireType>,<WaveformFileName>` command recalls the sepcified waveform file for the specified testname and acquire type.

`TEKEXP:VALUE? WFMFILE,<TestName>,<AquireType>` command returns the waveform file name recalled for the specified testname and acquire type.

Set or query the enable/disable status of Verbose function

This command sets or queries the enable/disable status of Verbose function.

Syntax

`TEKEXP:VALUE VERBOSE,"<Value>"` (Set)

`TEKEXP:VALUE? VERBOSE` (Query)

Arguments

Argument Name	Argument value
<Value>	{True | False} or {1 | 0} It represents enabled or disabled. Where, • True or 1 - enabled • False or 0 - disabled

Returns

{True | False} or {0 | 1}

Examples

`TEKEXP:VALUE VERBOSE,"<Value>"` command enable or disable the Verbose function.

`TEKEXP:VALUE? VERBOSE` command returns the enable or disable status of Verbose function.

Set or query the View report after generating option status

This command sets or queries the enable/disable status of the View report after generating function.

Syntax

`TEKEXP:VALUE? GENERAL,"View Report After Generating"` (Query)

`TEKEXP:VALUE GENERAL,"View Report After Generating",<value>` (Set)

Arguments

Argument Name	Argument value
<Value>	{True | False} or {1 | 0} It represents enabled or disabled. Where, • True or 1 - enabled • False or 0 - disabled

Returns

{True | False} or {0 | 1}

Examples

`TEKEXP:VALUE? GENERAL,"View Report After Generating"` command returns the enable or disable status of view report after generating option.

`TEKEXP:VALUE GENERAL,"View Report After Generating",<value>` command enable or disable the view report after generating option.

Returns the report as XML string

This command returns the report as XML string.

Syntax

`TEKEXP:REPORTASXML?` (Query)

Returns

<String>

Examples

`TEKEXP:REPORTASXML?` command returns the report XML string.

Copies all the images from current run session to the given destination location

This command copies all the images from current run session to the given destination location.

Syntax

`TEKEXP:COPYIMAGES <DestinationPath>` (Set)

Command argument

<DestinationPath> :: <String>

Returns

NA

Examples

`TEKEXP:COPYIMAGES C:\Temp` command copies all the images from current run session to the mentioned location.

Selects the specified test(s) and deselect all other tests

This command selects the specified test(s) and deselect all other tests.

Syntax

`TEKEXP:SELECTID <”TestID”>` (Set)

Command argument

Argument Name	Argument value
TestID	String

Returns

NA

Examples

`TEKEXP:SELECTID "11101"`This command select the test associated with the ID and deselects all other tests in the application.

`TEKEXP:SELECTID “11101,11102”`This command selects the tests associated with the IDs and other tests will be deselected.

Returns the complete information about the selected test

This command returns the complete information about the selected test.

The information includes application name, TestID, Device selected, Suite selected, version, Test name, Test description.

Syntax

`TEKEXP:TESTINFO?` (Query)

Returns

<String>

Examples

`TEKEXP:TESTINFO?` This command returns the following details:

<TekExpress> <Test Id="11101" Device="TX-Device" Suite="Group1" Version="Spec 1.0" Name="Algorithm Library Measurement" Description="This is Algorithm Library measurement test. Refer Section-B of TekExpress SampleApp Development Guide for more details.

Set the default session

Sets the application configurations to default value.

Syntax

`TEKEXP:SESSION DEFAULT` (set)

Examples

`TEKEXP:SESSION DEFAULT`, sets the application configurations to default value.

Save the run/config sessions

Enter the name to save/config the session.

Syntax

`TEKEXP:SESSION SAVE,“Session Name”` (set)

Command arguments

Argument Name	Argument value
<Session Name>	<String>

Examples

`TEKEXP:SESSION SAVE,“Session Name”` saves the session.

Load the run/config session

Load the selected config/run session.

Syntax

`TEKEXP:SESSION LOAD, “Session Name”` (set)

Command arguments

Argument Name	Argument value
<Session Name>	<String>

Examples

`TEKEXP:SESSION LOAD, “Session Name”`, load the selected config/run session.

Delete the run/config session

Deletes the selected config/run session.

Syntax

`TEKEXP:SESSION DELETE, "Session1, Session2"` (set)

Command arguments

Argument Name	Argument value
<Session Name>	<String>

Examples

`TEKEXP:SESSION DELETE, "Session1, Session2"`, deletes the selected config/run session.

Run the run/config saved session

Run the selected config/run session.

Syntax

`TEKEXP:SESSION RUN, “Session Name’s separated by comma”` (set)

Command arguments

Argument Name	Argument value
<Session Name>	<String>
Session Name’s separated by comma (to run the multiple run sessions)	<String>

Examples

`TEKEXP:SESSION RUN, “Session Name’s separated by comma”`, runs the selected config/run session.

Query the available list in the run/config session

Returns the list of available config/run session.

Syntax

`TEKEXP:SESSION? LIST`

Returns

Returns the list of available config/run session.

Examples

`TEKEXP:SESSION? LIST`, returns the list of available config/run session.

Query the current run/config session

Returns the selected config/run session.

Syntax

`TEKEXP:SESSION? CURRENT`

Returns

Returns the selected config/run session.

Examples

`TEKEXP:SESSION? CURRENT`, returns the selected config/run session.

Override the run/config session

Overrides the selected config/run session.

Syntax

`TEKEXP:SESSION SAVE,"SessionName", "True"` (set)

Command arguments

Argument Name	Argument Type	Argument Value
<Session Name>	<String>	{True | False} or {1 | 0} It represents enabled or disabled. Where, • True or 1 - enabled • False or 0 - disabled

Returns

{True | False} or {0 | 1}

Examples

`TEKEXP:SESSION SAVE,"SessionName", "True"`, overrides the selected config/run session.

Exit or close the application

The command exits or close the application

Syntax

`TEKEXP:EXIT`(Set)

Examples

`TEKEXP:EXIT` command close the application.

Examples

import sys

from time import sleep

import platform

import os

import traceback

import socket_instrument

import csv

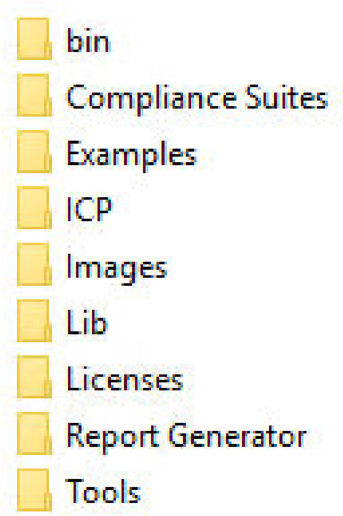
```
_dutId = 'Test DUTID'
_deviceName = "CEM"
_suiteName = "Add-In-Card"
_versionName = "Gen1 - 1.1"
[_param, _value] = ['Signal Validation', 'Turn Off Signal Check']
_measList = ['Unit Interval Gen1']
#No need to change the IP address as it is running on same machine
ipAddress = "localhost"
si = socket_instrument.SocketInstrument(ipAddress, 5000)
print si.instId
# Set DUTID
si.write('TEKEXP:VALUE DUTID,"{0!s}"'.format(_dutId))
print si.query('TEKEXP:VALUE? DUTID')
# Set device
si.write('TEKEXP:SELECT DEVICE,"{0!s}"'.format(_deviceName))
while si.query('TEKEXP:SELECT? DEVICE') != '"{}"'.format(_deviceName):
sleep(1)
print si.query('TEKEXP:SELECT? DEVICE')
# Set test suite
si.write('TEKEXP:SELECT SUITE,"{0!s}"'.format(_suiteName))
while si.query('TEKEXP:SELECT? SUITE') != '"{}"'.format(_suiteName):
sleep(1)
print si.query('TEKEXP:SELECT? SUITE')
# Set test version
si.write('TEKEXP:SELECT VERSION,"{0!s}"'.format(_versionName))
while si.query('TEKEXP:SELECT? VERSION') != '"{}"'.format(_versionName):
sleep(1)
print si.query('TEKEXP:SELECT? VERSION')
# Set Signal Validation to 'Turn Off'
si.write('TEKEXP:VALUE GENERAL,"{0!s}","{1!s}"'.format(_param, _value))
print si.query('TEKEXP:VALUE? GENERAL,"{0!s}"'.format(_param))
# Assign Test name
si.write('TEKEXP:SELECT TEST,ALL,FALSE')
sleep(2)
for _meas in _measList:
si.write('TEKEXP:SELECT TEST,"{0!s}",TRUE'.format(_meas))
```

```
sleep(2)
selectedMeasurements = si.query('TEKEXP:SELECT? TEST')
selectedMeasurements = selectedMeasurements.replace('"','').split(',')
#print 'Selected Measurements'
#for meas in selectedMeasurements:
#print meas
# if any General Parameters User want to modify can be done here
# Execution Starts
"""Execution function with popup handling"""
appStatus = si.query('TEKEXP:STATE?')
if appStatus == 'READY':
si.write('TEKEXP:STATE RUN')
while str(si.query('TEKEXP:STATE?')) != 'RUNNING':
sleep(1)
appStatus = si.query('TEKEXP:STATE?')
try:
while str(appStatus) != 'READY':
appStatus = si.query('TEKEXP:STATE?')
if appStatus in ['RUNNING']:
sleep(2)
print('Application Status: ..{}..'.format(appStatus))
if appStatus in ['WAIT','ERROR']:
print('\n----------------------------------------')
print('Application Status: {} Message'.format(appStatus))
info = str(si.query('TEKEXP:POPUP?'))
[Title, Message, Responses] = info.split(';')
ResponseOptions = str(Responses[12:-1]).strip('"')
ResponseOptions = ResponseOptions.split(',')
print('\n\n'+Title+'\n\n'+Message+'\n')
print("----------------------------------------")
for res in ResponseOptions:
print str(ResponseOptions.index(res)) + ' > ' + res
userResponse = int(input('Choose your option: '))
si.write('TEKEXP:POPUP "{0!s}"'.format(ResponseOptions[userResponse]))
print('\nResponse Sent: "{0!s}"'.format(ResponseOptions[userResponse]))
print("----------------------------------------")
print("***** EXECUTION COMPLETED *****")
except Exception:
print("Exception Occured")
# Get the Measurement Results
allDetailsList = list()
allValuesList = list()
allMarginList = list()
for meas in _measList:#selectedMeasurements:
allDetailsList = (si.query('TEKEXP:RESULT? "{0!s}","{1!s}"'.format(meas,'Details'))).replace('"','').split(',')
allValuesList = (si.query('TEKEXP:RESULT? "{0!s}","{1!s}"'.format(meas,'Value'))).replace('"','').split(',')
allMarginList = (si.query('TEKEXP:RESULT? "{0!s}","{1!s}"'.format(meas,'Margin'))).replace('"','').split(',')
results = zip(allDetailsList, allValuesList, allMarginList)
# Define local variables
testResultList = list()
details = list()
values = list()
margines = list()
# Header Info for the CSV file
header1CSV=["Detail"]
header2CSV=["Value"]
header3CSV=["Margin"]
header=zip(header1CSV,header2CSV,header3CSV)
testResultList.append(header)
# Convertion to suitable for CSV formatting
testResultList.append(results)
# Open a CSV file object
csvFilePath = "C:\\Test_PCI_Results.csv"
csvFilObj = open(csvFilePath,"wb")
# writing CSV file with the statistical values
mywritter=csv.writer(csvFilObj)
for rowVal in testResultList:
mywritter.writerows(rowVal)
# Closing the CSV file object
csvFilObj.close()
si.disconnect()
```

References

Application directories

You can find the application files at *C:\Program Files\Tektronix\TekExpress PCI Express*. The application directory and associated files are organized as follows:



bin
Compliance Suites
Examples
ICP
Images
Lib
Licenses
Report Generator
Tools

The following table lists the default directory names and their usage:

Table 21: Application directories and usage

Directory names	Usage
Bin	Contains application libraries
Compliance Suites	Contains test suite specific files
Examples	Contains various support files
ICP	Contains instrument and application specific interface libraries
Images	Contains images of the application
Lib	Contains utility files specific to the application
Licenses	Contains all the license files
Report Generator	Contains style sheets for report generation
Tools	Contains instrument and application specific files

File name extensions

The TekExpress PCI Express software uses the following file name extensions:

Table 22: File name extension

File name extension	Description
*.TekX	Application session files (the extensions may not be displayed)
*.py	Python sequence file.

Table continued…

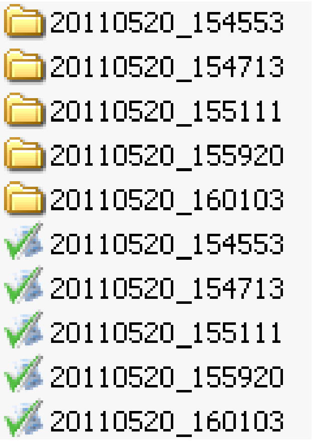
File name extension	Description
*.xml	Test-specific configuration information (encrypted) files. Application log files
*.csv	Test result reports Plot data
*.mht	Test result reports (default) Test reports can also be saved in HTML format
*.pdf	Test result reports Application help document
*.xslt	Style sheet used to generate reports
*.png	Captured images
.wfm	Test waveform file

View test-related files

Files related to tests are stored in My Documents\TekExpress PCI Express\Untitled session folder. Each test setup in this folder has both a test setup file and a test setup folder, both with the test setup name. The test setup file is preceded by the TekExpress icon.

Inside the test setup folder is another folder named for the DUT ID used in the test sessions. The default is DUT001.

Inside the DUT001 folder are the session folders and files. Each session also has a folder and file pair, both named for the test session using the naming convention (date)_(time). Each session file is stored outside its matching session folder:



20110520_154553
20110520_154713
20110520_155111
20110520_155920
20110520_160103
20110520_154553
20110520_154713
20110520_155111
20110520_155920
20110520_160103

Each session folder contains image files of any plots generated from running the test session. If you selected to save all waveforms or ran tests using prerecorded waveform files, these are included here.

The first time you run a new, unsaved session, the session files are stored in the Untitled Session folder located at X:\TekExpress PCI Express. When you name and save the session, the files are placed in a folder with the name that you specify. A copy of the test files stay in the Untitled Session folder until you run a new test or until you close the application.

De-embed using filter files

TekExpress PCIe provides an option to de-embed the signal path using filter files. You create the filter files. The filter files are .flt files composed of de-embed filter coefficients for a particular sampling rate. A filter file created for one sampling rate might not work for other sampling rates, so it is important to understand at what sampling rate the measurements are being performed.

Also, the de-embedding filters might differ based on the type of input. For example, if a single ended input is made using a matched SMA cable pair, a filter file for de-embedding a single SMA cable must be provided, since matched SMA cables mostly have similar s-parameters. So in this case, the same filter file is used to de-embed the SMA cable pair.

The maximum sampling rate provided on any channel combination on MSO/DPO/DSA70000/C/D/DX series oscilloscopes is 50 GS/s in realtime mode. The maximum sampling rate provided on Ch1-Ch3 and Ch2-Ch4 channel combinations on MSO/DPO/DSA70000C/D/DX/SX series oscilloscopes is 100 GS/s, provided only 2 channels are on at a given time.

See also

Common test parameters and values

Configuration test parameters

Setup files

TekExpress PCI Express package contains setup files (*.TekX) which can be used at PCI-SIG workshop for compliance tests.

Table 23: Setup files configuration details

Setup files (*.TekX)	Configuration details (exclusively used in Gen1/2/3 Gold Suite of PCI-SIG Work Shop (WS))
Compliance_CEM_AIC _x1	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 1 Lane (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_AIC_x2	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 2 Lanes (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding

Table continued…

Setup files (*.TekX)	Configuration details (exclusively used in Gen1/2/3 Gold Suite of PCI-SIG Work Shop (WS))
Compliance_CEM_AIC _x4	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 4 Lanes (Selected test lane: L0, L03) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_AIC_x8	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 8 Lanes (Selected test lane: L0, L03, L07) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_AIC _x16	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 16 Lanes (Selected test lane: L0, L07, L15) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_SYB_x1	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 1 Lane (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding

Table continued…

Setup files (*.TekX)	Configuration details (exclusively used in Gen1/2/3 Gold Suite of PCI-SIG Work Shop (WS))
Compliance_CEM_SYB_x2	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 2 Lanes (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_SYB_x4	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 4 Lanes (Selected test lane: L0, L03) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_SYB_x8	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 8 Lanes (Selected test lane: L0,L03,L07) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_CEM_SYB_x16	• Specification - CEM • Device Type - Add-In-Card • Version - Gen3 - 3.0 • Data Rates - 2.5 Gbps, 5 Gbps (Tx equalization 3.5dB, 6 dB) and 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 16 Lanes (Selected test lane: L0,L07,L15) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding

Table continued…

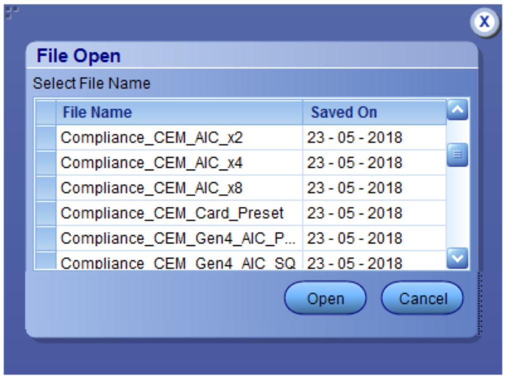
Setup files (*.TekX)	**Configuration details (exclusively used in Gen1/2/3 Gold Suite of PCI-SIG Work Shop (WS))**
Compliance_U2_Module_x1	• Specification - U.2 (SFF8639) • Device Type - Module • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 1 Lane (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_U2_Module_x2	• Specification - U.2 (SFF8639) • Device Type - Module • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 2 Lanes (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_U2_Module_x4	• Specification - U.2 (SFF8639) • Device Type - Module • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 4 Lanes (Selected test lane: L0,L03) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_U2_Host_x1	• Specification - U.2 (SFF8639) • Device Type - Host • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 1 Lane (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding

Table continued…

Setup files (*.TekX)	**Configuration details (exclusively used in Gen1/2/3 Gold Suite of PCI-SIG Work Shop (WS))**
Compliance_U2_ Host _x2	• Specification - U.2 (SFF8639) • Device Type - Host • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 2 Lanes (Selected test lane: L0) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding
Compliance_U2_ Host _x4	• Specification - U.2 (SFF8639) • Device Type - Host • Version - Gen3 - 3.0 • Data Rates - 8 Gbps • Signal Quality Preset Selection - P0, P7 and P8 for L0 and All Presets from P0 to P10 for Lane0 • Link Width - 4 Lanes (Selected test lane: L0, L03) • Automated DUT Control - unchecked • Signal Validation - Pattern Decoding

How to open a setup file

1. Click **Options** > **Open Test Setup**
2. Select the TekExpress Setup File as per your required configuration. Check Setup files configuration details table for configuration details.



File Name	Saved On
Compliance_CEM_AIC_x2	23 - 05 - 2018
Compliance_CEM_AIC_x4	23 - 05 - 2018
Compliance_CEM_AIC_x8	23 - 05 - 2018
Compliance_CEM_Card_Preset	23 - 05 - 2018
Compliance_CEM_Gen4_AIC_P...	23 - 05 - 2018
Compliance_CEM_Gen4_AIC_SQ	23 - 05 - 2018

3. Make the configuration details and start the test execution.
4. Click **Save Test Setup As** and save the setup.

Note: You cannot edit the TekExpress Test Setup files as they are in **Read Only** mode.

Note: The setup files path is *C:\Program Files\Tektronix\TekExpress\TekExpress PCI Express\Setup Files*

RF Switch configuration files

TekExpress PCI Express package contains RF Switch configuration files.

File name	Configuration details
PCE_Keithley_SYB_x6	Recall this file for Keithley S46T RF Switch and System-Board device type. The below are the configuration details: • Lane0 Positive to Lane05 Positive connected as Signal Inputs to Relay S1. • Lane0 Negative to Lane05 Negative connected as Signal Inputs to Relay S3. • Common output of relay A, B is connected to CH1, CH3 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3 respectively. • Connect the Ref Clock Positive and Negative from CLB to CH3, CH4 of oscilloscope. For 2-Unit, SX box >=59GHz, set the Ref Clock Positive and Negative to CH2 and CH4 respectively.
PCE_KthCCD_SYB_x12	Recall this file for Keithley S46T RF Switch and System-Board device type. The below are the configuration details: • Lane0 Positive to Lane05 Positive connected as Signal Inputs to Relay A which is Cascade to Relay 4 and Input to NO. • Lane0 Negative to Lane05 Negative connected as Signal Inputs to Relay B which is Cascade to Relay 5 and Input to NO. • Lane06 Positive to Lane11 Positive connected as Signal Inputs to Relay C which is Cascade to Relay 4and Input to NC. • Lane06 Negative to Lane11 Negative connected as Signal Inputs to Relay D which is Cascade to Relay 5 and Input to NC. • Relay 4 is selected as Positive and Relay 5 as Negative; common output of 4 and 5 is connected to CH1, CH2 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3 respectively. • Connect the Ref Clock Positive and Negative from CLB to CH3, CH4 of oscilloscope. For 2-Unit, SX box >=59GHz, set the Ref Clock Positive and Negative to CH2 and CH4 respectively.
PCE_Giga_SYB_x8	Recall this file for Gigatronics ASCOR 8000 Series RF Switch and System-Board device type. The below are the configuration details: • Lane0 Positive to Lane07 Positive connected as Signal Inputs to Relay S1. • Lane0 Negative to Lane07 Negative connected as Signal Inputs to Relay S3. • Common output of relay S1, S3 is connected to CH1, CH3 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3 respectively. • Connect the Ref Clock Positive and Negative from CLB to CH3, CH4 of oscilloscope. For 2-Unit, SX box >=59GHz, set the Ref Clock Positive and Negative to CH2 and CH4 respectively.

Table continued…

File name	Configuration details
PCE_GigCCD_SYB_x16	Recall this file for Gigatronics ASCOR 8000 Series RF Switch and System-Board device type. The below are the configuration details: • Lane0 Positive to Lane07 Positive connected as Signal Inputs to Relay S1 which is Cascade to Relay S2 and Input to NO. • Lane0 Negative to Lane07 Negative connected as Signal Inputs to Relay S3 which is Cascade to Relay S5 and Input to NO. • Lane08 Positive to Lane15 Positive connected as Signal Inputs to Relay S4 which is Cascade to Relay S2 and Input to NC. • Lane08 Negative to Lane15 Negative connected as Signal Inputs to Relay S6 which is Cascade to Relay s5 and Input to NC. • Relay S2 is selected as Positive and Relay S5 as Negative; common output of S2 and S5 is connected to CH1, CH2 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3 respectively. • Connect the Ref Clock Positive and Negative from CLB to CH3, CH4 of oscilloscope. For 2-Unit, SX box >=59GHz, set the Ref Clock Positive and Negative to CH2 and CH4 respectively.
PCE_Keithley_AIC_x12	Recall this file for Keithley S46T RF Switch and Add-In-Card device type. The below are the configuration details: • Lane0 Positive to Lane05 Positive connected as Signal Inputs to Relay A. • Lane0 Negative to Lane05 Negative connected as Signal Inputs to Relay B. • Lane08 Positive to Lane11 Positive connected as Signal Inputs to Relay C. • Lane08 Negative to Lane11 Negative connected as Signal Inputs to Relay D. • Common output of relay A, B, C ,D is connected to CH1, CH2, CH3, CH4 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3, CH2 and CH4 respectively.
PCE_Giga_AIC_x16	Recall this file for Gigatronics ASCOR 8000 Series RF Switch and Add-In-Card device type. The below are the configuration details: • Lane0 Positive to Lane07 Positive connected as Signal Inputs to Relay S1. • Lane0 Negative to Lane07 Negative connected as Signal Inputs to Relay S3. • Lane08 Positive to Lane15 Positive connected as Signal Inputs to Relay S4. • Lane08 Negative to Lane15 Negative connected as Signal Inputs to Relay S6. • Common output of relay S1, S2, S3 , S4 is connected to CH1, CH2 , CH3, CH4 of the oscilloscope respectively. For 2-Unit, SX box >= 59 GHz, set the common outputs to CH1, CH3, CH2 and CH4 respectively.

How to run Base SRIS Tx Test Board tests

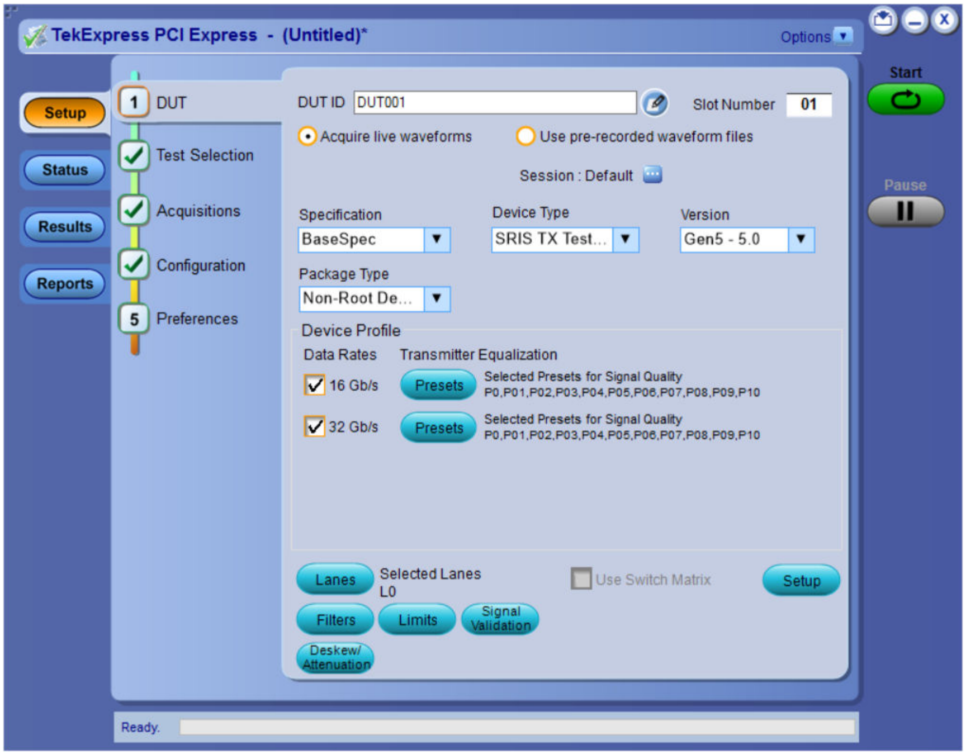
This document describes the procedure to run PCIe Base Spec Gen4/Gen5 SRIS Tx Test Board tests using TekExpress PCI Express.

Accessories required

- Gen4/Gen5 Base specification fixture
- SMA-SMP cables
- TCA-SMA 292D / TriMode probes
- AWG7002A or AWG7001A

Capture data signals at sampling rate of 100Gsps/200Gsps with 12.5 M record length. Ensure the PCIE_TX_Toggle_Patterns_v10.0.0.2.exe is installed on AWG-70K series and the recommended probes and real time oscilloscopes are used.

1. In DUT panel, select Specification as BaseSpec and Device Type as SRIS Tx Test Board.


TekExpress PCI Express - (Untitled)*
Options
Setup
Status
Results
Reports
1 DUT
Test Selection
Acquisitions
Configuration
5 Preferences
Start
Pause
Presets
Presets
Lanes
Filters
Limits
Signal Validation
Deskew/ Attenuation
Setup

DUT ID DUT001

Slot Number 01

● Acquire live waveforms ○ Use pre-recorded waveform files

Session : Default

Specification: BaseSpec

Device Type: SRIS TX Test...

Version: Gen5 - 5.0

Package Type: Non-Root De...

Device Profile

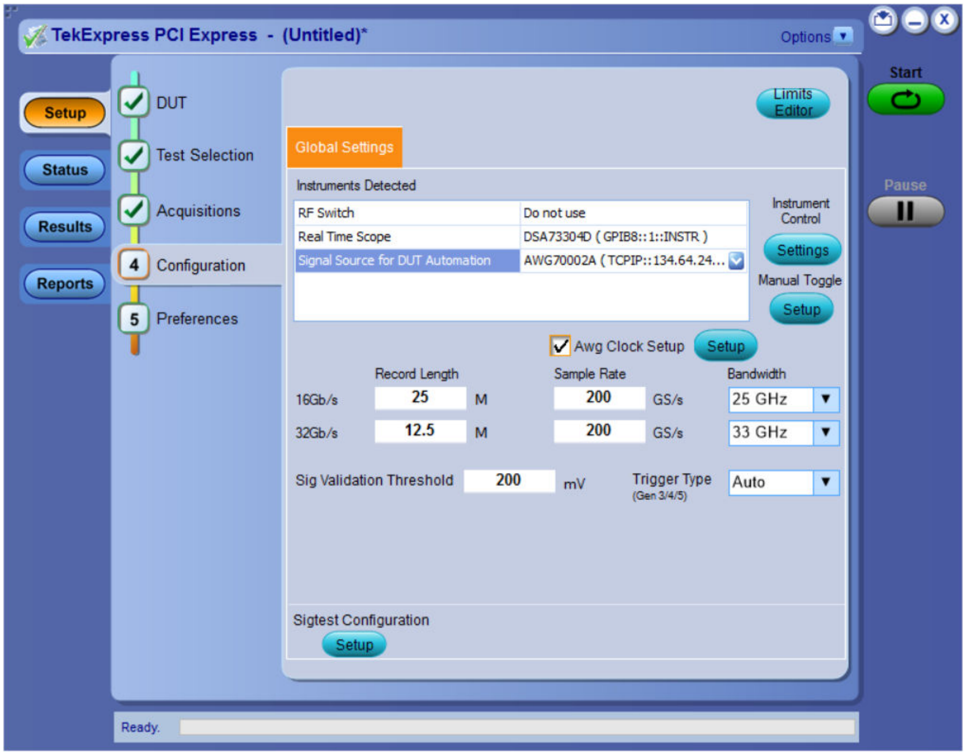
Data Rates	Transmitter Equalization
☑ 16 Gb/s	Selected Presets for Signal Quality P0,P01,P02,P03,P04,P05,P06,P07,P08,P09,P10
☑ 32 Gb/s	Selected Presets for Signal Quality P0,P01,P02,P03,P04,P05,P06,P07,P08,P09,P10

Selected Lanes
L0

☐ Use Switch Matrix

Ready.

2. If AWG70K is detected then the AWG Clock Setup check box will be enabled in the configuration panel. Click the **Setup** button next to AWG Clock Setup check box. This will bring up the SRIS configuration, with a selection to choose SSC on/Off.



Instruments Detected

RF Switch	Do not use
Real Time Scope	DSA73304D (GPIB8::1::INSTR)
Signal Source for DUT Automation	AWG70002A (TCPIP::134.64.24...

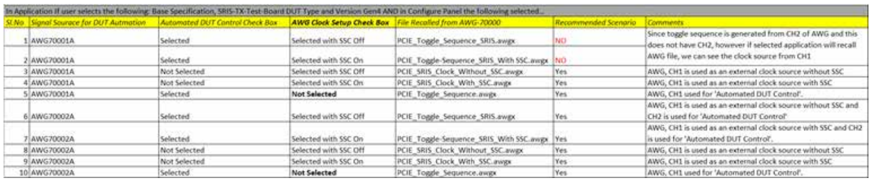
☑ Awg Clock Setup

	Record Length		Sample Rate		Bandwidth
16Gb/s	25	M	200	GS/s	25 GHz
32Gb/s	12.5	M	200	GS/s	33 GHz

Sig Validation Threshold 200 mV

Trigger Type (Gen 3/4/5) Auto

3. Based on the selections of the AWG Clock Setup check box, SSC on/Off selection and different combinations of AWG setup files will be loaded on the AWG. These combinations dictate if an external 100 MHz reference clock (with SSC on/Off) on Ch1 of the AWG will be transmitted. The following AWG files loaded as per configuration for Base specification (Device) and DUT Type SRIS Tx Test Board (Suite) for Gen4 and Gen5.



In Application if user selects the following: Base Specification, SRIS-TX-Test-Board DUT Type and Version Gen4 AND in Configure Panel the following selected...

Sl.No	Signal Sourace for DUT Autmation	Automated DUT Control Check Box	AWG Clock Setup Check Box	File Recalled from AWG-70000	Recommended Scenario	Comments
1	AWG70001A	Selected	Selected with SSC Off	PCIE_Toggle_Sequence_SRIS.awgx	NO	Since toggle sequence is generated from CH2 of AWG and this does not have CH2, however if selected application will recall AWG file, we can see the clock source from CH1
2	AWG70001A	Selected	Selected with SSC On	PCIE_Toggle-Sequence_SRIS_With SSC.awgx	NO	
3	AWG70001A	Not Selected	Selected with SSC Off	PCIE_SRIS_Clock_Without_SSC.awgx	Yes	AWG, CH1 is used as an external clock source without SSC
4	AWG70001A	Not Selected	Selected with SSC On	PCIE_SRIS_Clock_With_SSC.awgx	Yes	AWG, CH1 is used as an external clock source with SSC
5	AWG70001A	Selected	**Not Selected**	PCIE_Toggle_Sequence.awgx	Yes	AWG, CH1 used for 'Automated DUT Control'.
6	AWG70002A	Selected	Selected with SSC Off	PCIE_Toggle_Sequence_SRIS.awgx	Yes	AWG, CH1 is used as an external clock source without SSC and CH2 is used for 'Automated DUT Control'
7	AWG70002A	Selected	Selected with SSC On	PCIE_Toggle-Sequence_SRIS_With SSC.awgx	Yes	AWG, CH1 is used as an external clock source with SSC and CH2 is used for 'Automated DUT Control'.
8	AWG70002A	Not Selected	Selected with SSC Off	PCIE_SRIS_Clock_Without_SSC.awgx	Yes	AWG, CH1 is used as an external clock source without SSC
9	AWG70002A	Not Selected	Selected with SSC On	PCIE_SRIS_Clock_With_SSC.awgx	Yes	AWG, CH1 is used as an external clock source with SSC
10	AWG70002A	Selected	**Not Selected**	PCIE_Toggle_Sequence.awgx	Yes	AWG, CH1 used for 'Automated DUT Control'.

4. Click **Start** and when the application prompts, power on the Gen4/Gen5 DUT. Ensure that the DUT transmits Gen4/Gen5 selected presets. Analysis will be done with SigTest.

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