Tektronix®

TekExpress® 100G-TXE Compliance Solution

Printable Application Help

077-1298-00

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Printable Application Help

www.tek.com
077-1298-00

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

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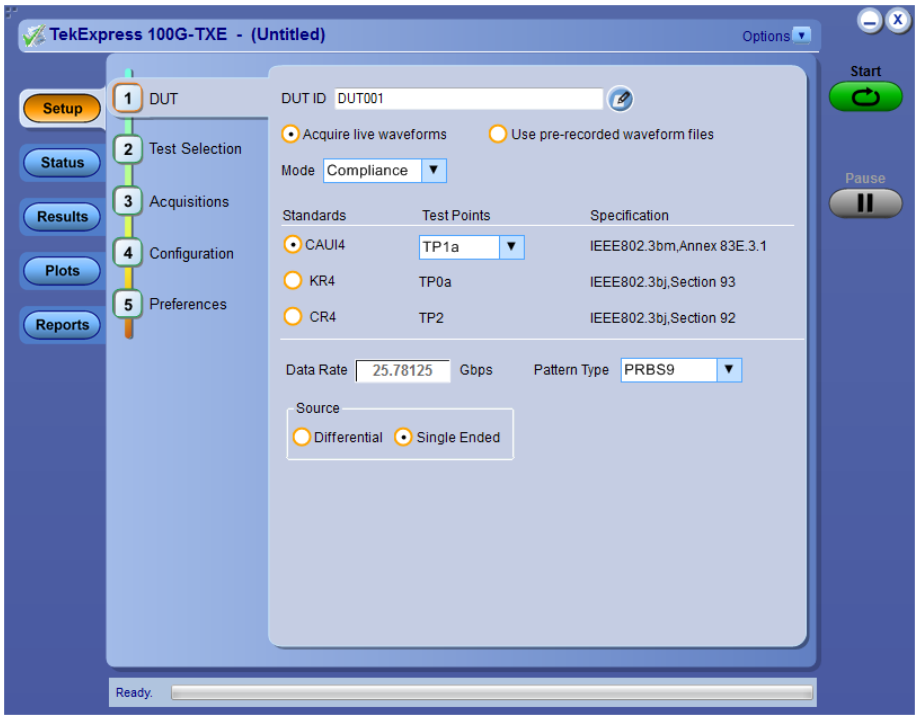


Welcome to the Tektronix 100G-TXE, an Tektronix oscilloscope application software that addresses 100GBASE-CR4, 100GBASE-KR4, and CAUI-4 standards of IEEE. These three electrical standards make up the backbone of the current 100G Ethernet industry, and the TekExpress 100G-TXE automation test solution facilitates turnkey electrical transmitter validation of most 100G Ethernet systems today.

The 100G-TXE solution specifically targets sections 83 of the IEEE 802.3bm standard as well as sections 92 and 93 of the IEEE 802.3bj specification. These tools allow quick verification to these IEEE electrical standards, while offering comprehensive test automation, results margining, data logging, and results reporting in an advanced testing framework.

Key features of TekExpress 100G-TXE include:

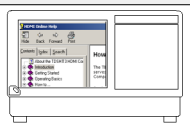
- 100G-TXE offers Transmitter 100GBASE-CR4 time domain transmitter characterization, tracking Table 92-6 Transmitter characteristics at TP2 from the IEEE 802.3bj cabled I/O specification. This offers a checklist approach to performing all jitter, Linear impulse response pulse peak and Signal to Noise and Distortion Ratio measurements, as well as basic AC parametric and timing operations.
- 100G-TXE also incorporates 100GBASE-KR4 time domain transmitter characterization, tracking Table 93-4 Transmitter characteristics at TP0a from the IEEE 802.3bj backplane specification. While the measurements are identical to 100GBASE-CR4, the electrical limits for 100GBASE-KR4 are more stringent.
- 100G-TXE includes a third electrical test suite, for Annex 83 of IEEE 802.3bm, tracking Chip-to-module 100 Gb/s four-lane Attachment Unit Interface (CAUI-4), Table 83E-1 at TP1a and TP4. The user defined test point selection allows unique test limits relevant to host channel or module validation. The CAUI-4 support offers advance CTLE scanning provisions to find optimal eye opening/width.

Getting help and support

Related documentation

The following documentation is available as part of the TekExpress® 100G-TXE Solution application.

Table 1: Product documentation

Item	Purpose	Location
Help	Application operation and User Interface help	
PDF of the help	Printable version of the compiled help	 PDF file that ships with 100G-TXE Solution software distribution (*TekExpress 100G-TXE-Automated-Test-Solution-Software-Printable-Help-EN-US.pdf*).

See also *Technical support*

Conventions

Help uses the following conventions:

- The term "Application," and "Software" refers to the TekExpress 100G-TXE Solution application.
- The term "CAUI4" refers to CAUI-4, IEEE 802.3bm standard.
- The term "KR4 / CR4" refers to 100GBASE-KR4 or 100GBASE-CR4, IEEE 802.3bj standard.
- 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.

Table 2: Icon descriptions

Icon	Meaning
	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

Minimum system requirements

The following table shows the minimum system requirements to install and run the TekExpress 100G-TXE solution.

Table 3: System requirements

Component	Description
Oscilloscope	■ Tektronix DPO70K series scope ■ Opt DJA and DJAN
Processor	Same as the oscilloscope
Operating System	Same as the oscilloscope:
Memory	Same as the oscilloscope
Hard Disk	Same as the oscilloscope
Display	Super VGA resolution or higher video adapter (800 x 600 minimum video resolution for small fonts or 1024 x 768 minimum video resolution for large fonts). The application is best viewed at 96 dpi display settings [1]
Firmware	■ Frimware Version: 10.3.0 or above
Software	■ IronPython 2.7.3 installed ■ PyVisa 1.0.0.25 installed ■ Microsoft .NET 4.0 Framework ■ Microsoft Internet Explorer 7.0 SP1 or greater, or other Web browser for viewing reports ■ Adobe Reader software 7.0 or greater for viewing portable document format (PDF) files

[1] If TekExpress is running on an instrument that has a video resolution less than 800x600, connect and configure a second monitor to the instrument.

Instruments and accessories required

TekExpress100G-TXE application is launched on DPO70K series scope. The following table lists the instruments and accessories required for this application.

Table 4: Instruments and accessories required for 100G-TXE application

Instrument/Accessory	Model number	Quantity
Oscilloscope	DPO72304SX, DPO72304DX, MSO72304DX, DPO72504DX, MSO72504DX, DPO73304SX, DPO73304DX, MSO73304DX, DPO75002SX, DPO75902SX, DPO77002SX, DPS75004SX, DPS75904SX, DPS77004SX	1
Adapter [2]	Broadband Balun with bandwidth >= 40 GHz	1
Cables	Compatible SMA cables with bandwidth greater than 40 GHz for connecting single ended sources ATI channel.	1
Fixtures	■ Host compliance board for CAUI4 at TP1a and CR4 at TP2 ■ Module compliance board for CAUI4 at TP4 ■ Transmitter test fixture for KR4 at TP0a [3]	1
DC Blocks	Compatible DC block with bandwidth range 50 KHz to 65 GHz	2
Attenuator	3, 6, or 10 dB attenuators	2
Probes [4]	Tektronix P7600 or P7700 series	1

[2] Required to operate in differential mode for single stack ATI scopes.
[3] If required, De-Embed the fixtures using filter files.
[4] Required to acquire signal at TP0a test point for KR4 suite.

Installing the software

Follow the steps to download and install the latest TekExpress 100G-TXE Solution. See *Minimum system requirements* for compatibility.

1. Type the URL *www.tek.com* in the address bar of web browser and click Software Downloads
2. Enter **TekExpress 100G-TXE Solution** in the *Enter your keywords* field, and click **Search**
3. Select the latest version of software and follow the instructions to download. 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 100G-TXE\
5. Select **Analyze** > **TekExpress 100G-TXE** from the TekScope menu to *launch the application*

View software version

Use the following instructions to view version information for the application and for the application modules such as the Programmatic Interface and the Programmatic Interface Client.

To view version information for 100G-TXE, click button in the TekExpress application and select **About TekExpress**.

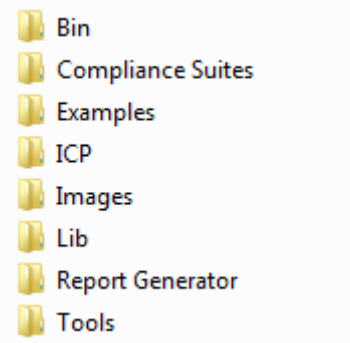
NOTE. *This example shows a typical Version Details dialog box, and may not reflect the actual values as shown when you open this item in the application.*

Application directories

TekExpress 100G-TXE application

The TekExpress 100G-TXE application files are installed at the following location:

C:\Program Files\Tektronix\TekExpress\TekExpress 100G-TXE



The following table lists the application directory names and their purpose.

Table 5: Application directories and usage

Directory names	Usage
Bin	Contains TekExpress 100G-TXE application libraries
Compliance Suites	Contains compliance-specific files
Examples	Contains various support files
ICP	Contains instrument and TekExpress 100G-TXE application-specific interface libraries
Images	Contains images of the TekExpress 100G-TXE application
Lib	Contains utility files specific to the TekExpress 100G-TXE application
Report Generator	Contains style sheets for report generation
Tools	Contains instrument and TekExpress 100G-TXE application-specific files

See also *View test-related files*

File name extensions

File name extensions

The TekExpress 100G-TXE application uses the following file name extensions:

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

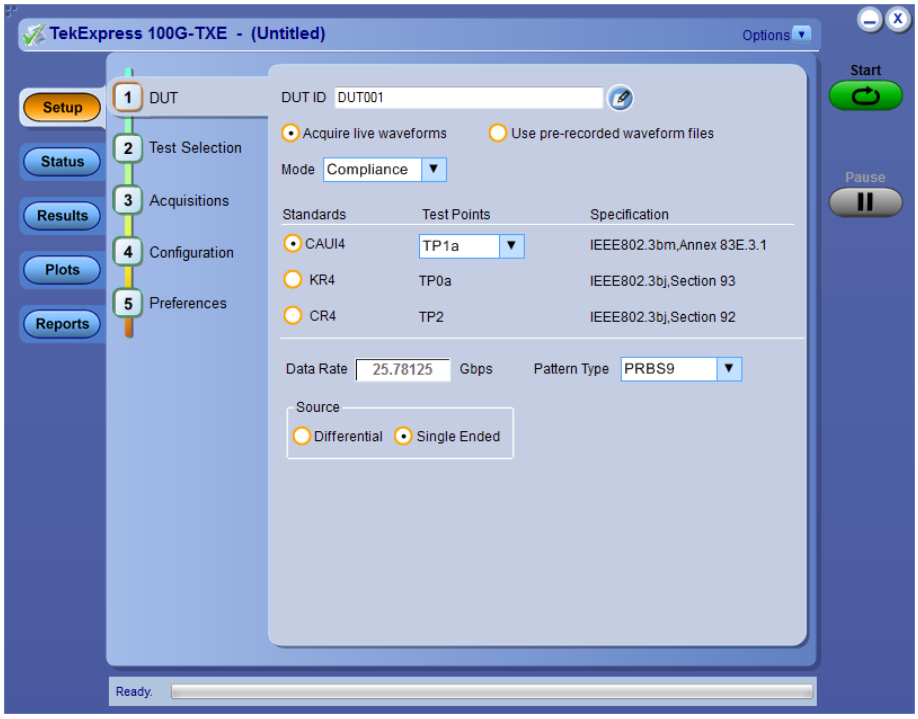
See also *View test-related files*

Application directories

Operating basics

Launch the application

To launch the TekExpress 100G-TXE solution, select **Analyze > TekExpress 100G-TXE** from the TekScope menu.



When you launch the application for the first time, the file C:\Users\<username>\My Documents\My TekExpress\100G-TXE\Resources.xml is mapped to drive X:. This file contains information about available network-connected instruments. The session files are stored in X:\100G-TXE\. If this file is not found, then the application runs Instrument Discovery Program to detect the network-connected instruments before launching 100G-TXE solution.

If the application is behind the oscilloscope application, click **Analyze > TekExpress 100G-TXE** to bring it to the front. To keep the 100G-TXE application window on top, select **Keep On Top** from the 100G-TXE *Options menu*.

See also *Application controls*

Application panel overview

Application panels overview

TekExpress 100G-TXE solution uses panels to group Configuration, Results, and Reports settings. Click any button to open the associated panel. A panel may have one or more tabs that list the selections available in that panel. Controls in a tab can change depending on settings made in the same tab or another tab.

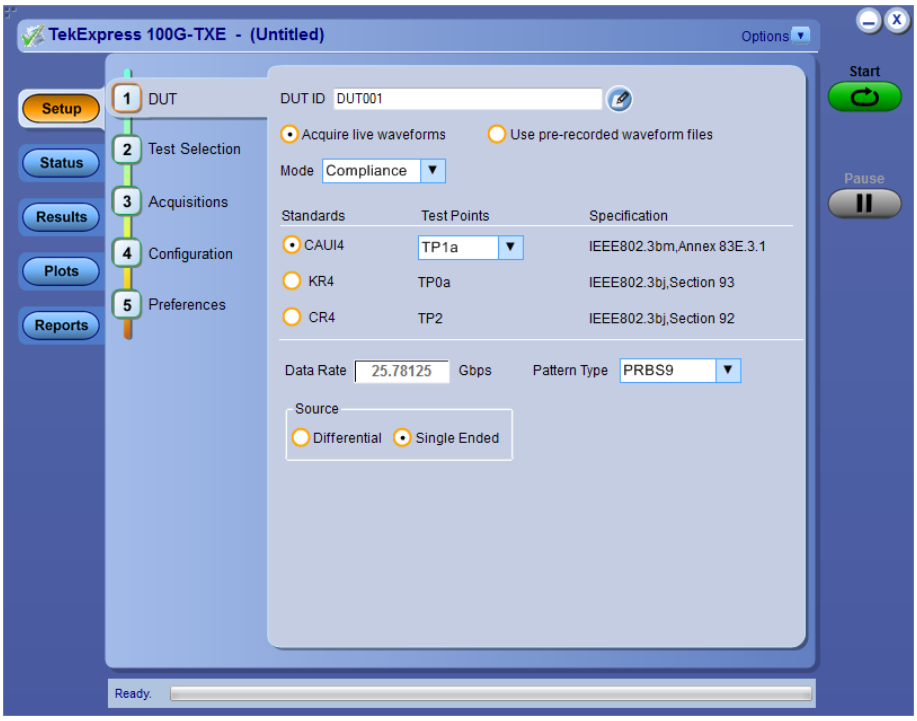


Table 6: Application panels overview

Panel Name	Purpose
Setup panel	The Setup panel shows the test setup controls. Click the **Setup** button to open this panel. Use this panel to: ■ *Set DUT tab parameters* ■ *Select tests* ■ *Set acquisition tab parameters* ■ *Set configuration tab parameters* ■ *Set preferences tab parameters*
Status panel	View the progress and analysis status of the selected tests, and view test logs.
Results panel	View the summary of test results and select result viewing preferences.
Reports panel	Browse for reports, save reports as specific file types, specify report naming conventions, select report content to include (summary information, detailed information, user comments, setup configuration, application configuration), and select report viewing options.

See also *Application controls*

Global application controls

Application controls

This section describes the application controls.

Table 7: Application controls description

Item	Description
Options menu 	To select global application controls.
Test Panel buttons 	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*.

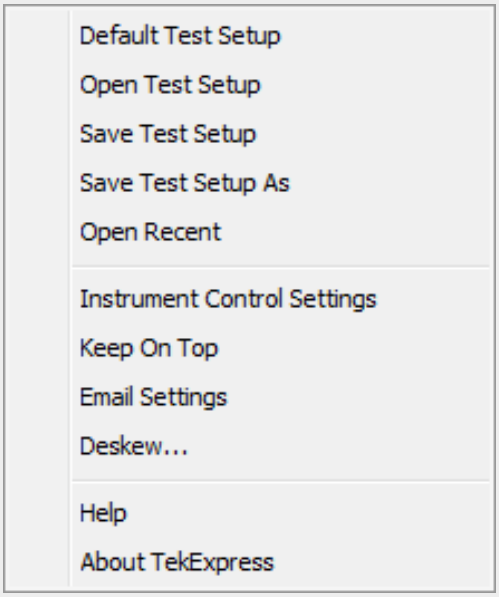
Item	Description
Application window move icon 	Place the cursor over the three-dot pattern in the upper left corner of the application window. When the cursor changes to a hand, drag the window to the desired location.
Minimize icon 	Click to minimize the application.
Close icon 	Click to close the application.

See also. *Application panel overview*

Options menu overview

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

Options menu



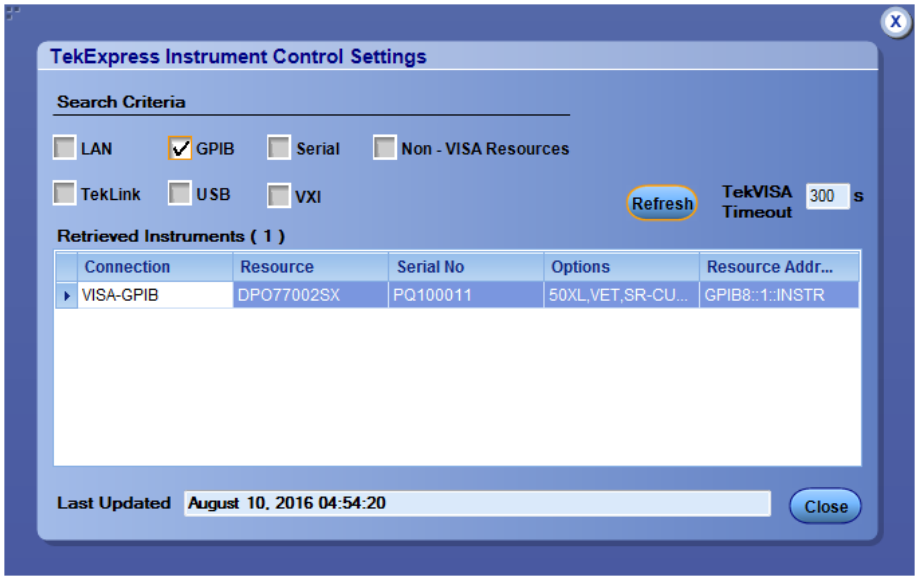
Menu	Function
Default Test Setup	Opens an untitled test setup with defaults selected Acquire Live Waveforms **Mode**: User Defined **Standards**: CAUI4 **Specification**: IEEE802.3bm, Annex 83E.3.1 **Data rate**: 25.78125 **Pattern Type**: PRBS9 **Source**: Single ended
Open Test Setup	Opens a saved test setup
Save Test Setup	Saves the current test setup
Save Test Setup As	Saves the current test setup with a different file name or file type
Open Recent	Displays the recently opened test setups to open
Instrument Control Settings	Detects, lists, and refreshes the connected instruments found on specified connections (LAN, GPIB, USB, and so on)
Keep On Top	Keeps the TekExpress 100G-TXE application on top of all the application
Email Settings	Use to configure email options for test run and results notifications
Deskew	Allows to read the skew and attenuation values from the TekScope application. Before using this option, manually compensate for skew and attenuations in Tekscope application.
Help	Displays the TekExpress 100G-TXE help
About TekExpress	■ Displays application details such as software name, version number, and copyright ■ Provides a link to the end-user license agreement ■ Provides a link to the Tektronix Web site

See also. *Application controls*

TekExpress instrument control settings

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

You can access this dialog box from the **Options** menu.



The connected instruments displayed here can be selected for use under Global Settings in the test configuration section.

NOTE. *Select GPIB (Default) when using TekExpress 100G-TXE application.*

See also. *Options menu overview*

View connected instruments

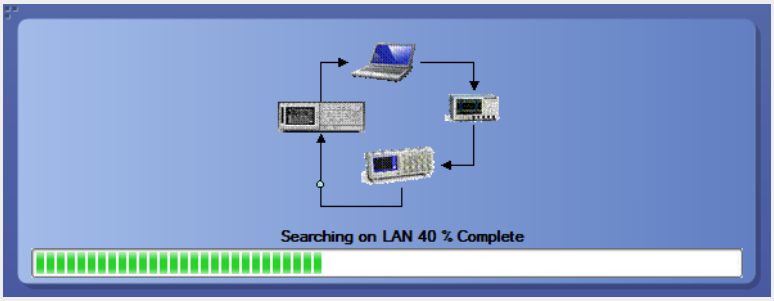
Use TekExpress Instrument Control Settings dialog box to search the instruments (resources) connected to the application. The application uses TekVISA to discover the connected instruments.

NOTE. *The instruments required for the test setup must be connected and it must be recognized by the application before running the test.*

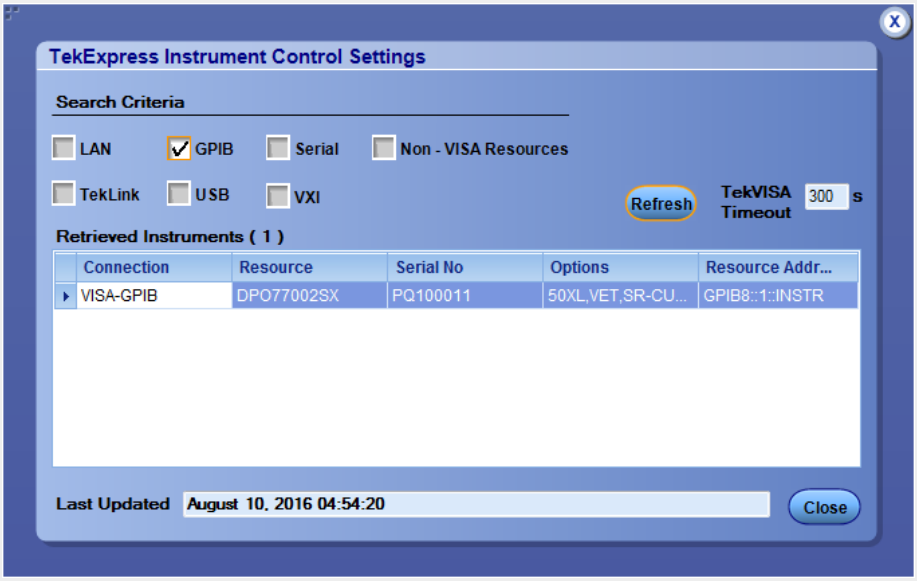
To refresh the list of connected instruments:

1. From the Options menu, select **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 TekExpress that are communicating over the LAN.
3. Click **Refresh**. TekExpress searches for connected instruments.



4. After searching, the dialog box lists the instrument-related details based on the search criteria. For example, For the Search Criteria as LAN and GPIB, the application displays all LAN and GPIB instruments connected to the application.



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.

See also. *Equipment connection setup*

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:

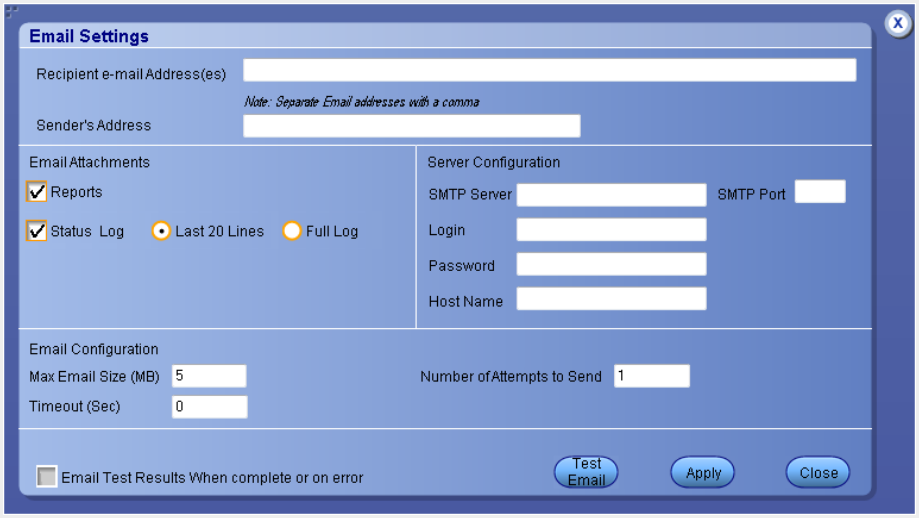
1. Select **Options > Email Settings** to open the *Email Settings* dialog box.
2. (Required) For Recipient email Address(es), enter one or more recipient email addresses. To include multiple addresses, separate the addresses with commas.
3. (Required) For Sender's Address, enter the email address used 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 5 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.

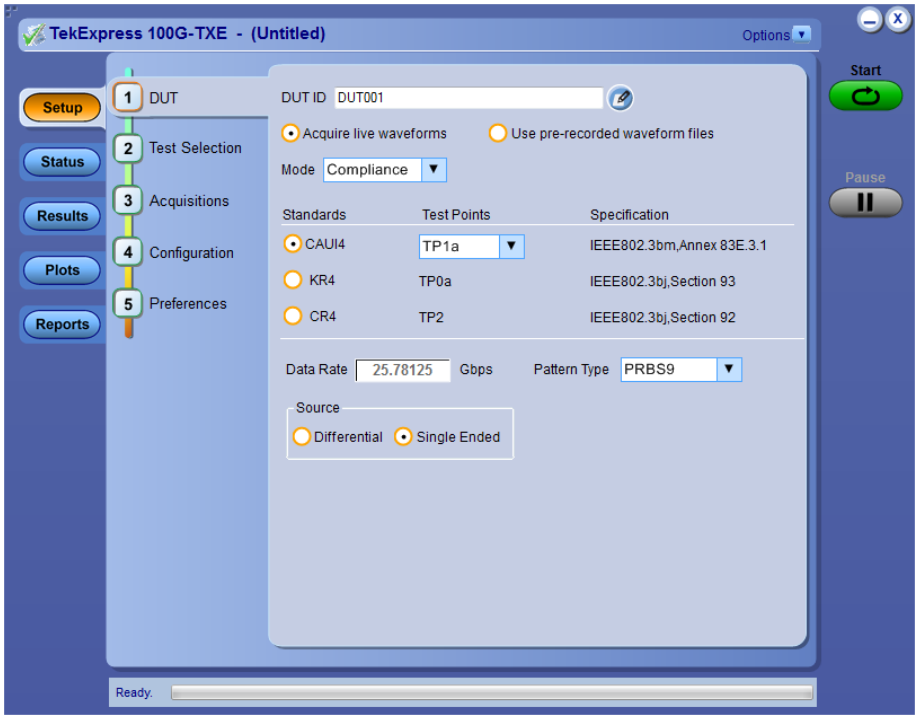
Email Settings



Setup panel

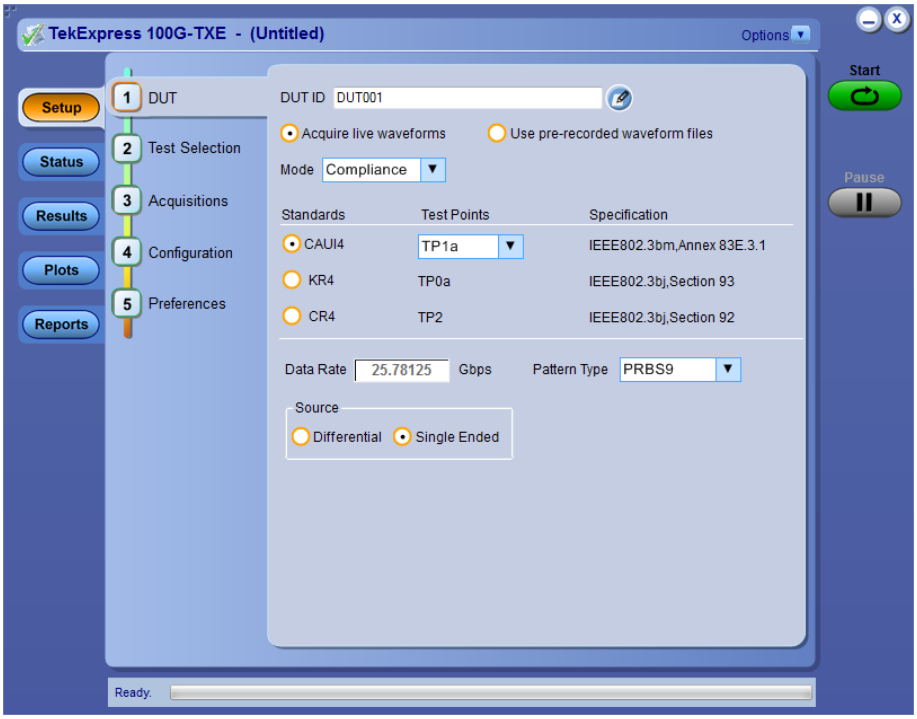
Setup panel overview

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



Set DUT parameters

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.



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

Table 8: DUT tab settings

Setting	Description	
DUT ID	Adds an optional text label for the DUT to reports. The default value is DUT001. The maximum number of characters is 32. You cannot use the following characters in an ID name: (.,..,..., \,/:?"<>|*)	
 Comments icon (to the right of the DUT ID field)	Opens Comments dialog box to enter text to add to the report. Maximum size is 256 characters. To enable or disable comments appearing on the test report, see *Select report options*.	
Acquire live waveforms	Perform analysis on live waveforms.	
Use pre-recorded waveform files	Perform analysis on pre-recorded waveforms.	
Mode	■ Compliance ■ User Defined	
Standards	**Test Points**	**Specification**
CAUI4 [1]	TP1a	IEEE802.3bm, Annex 83E.3.1
	TP4	IEEE802.3bm, Annex 83E.3.2

[1] CAUI4 (CAUI-4) is 100G chip-to-module IEEE 802.3bm interface, operating on four 25 Gb/s lanes.

Setting	Description	
KR4 [2]	TP0a	IEEE802.3bj, Section 93
CR4 [3]	TP2	IEEE802.3bj, Section 92
Data Rate	Set the data rate to be tested within the range 18 to 28.05. The default value is 25.78125	
Pattern Type	Select the pattern type. The available options are PRBS7, 9, 11, and 15. By default, it is PRBS9.	
Source	■ **Differential** - Source as differential signal ■ **Single Ended** -Source as single-ended signals	

See also. *Select tests*

Select tests

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

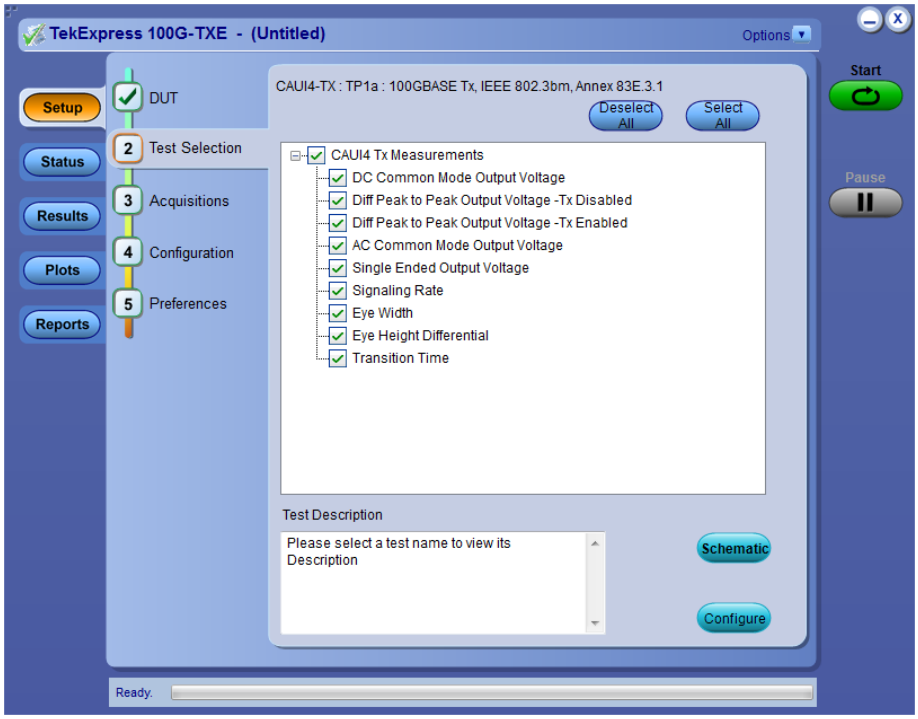


Figure 1: CAUI4 TX measurements

[2] KR4 (100GBASE-KR4) is an Ethernet IEEE 802.3bj standard for 100G backplanes.
[3] CR4 (100GBASE-CR4) is an Ethernet IEEE802.3bj standard for 100G over twin-axial cables.

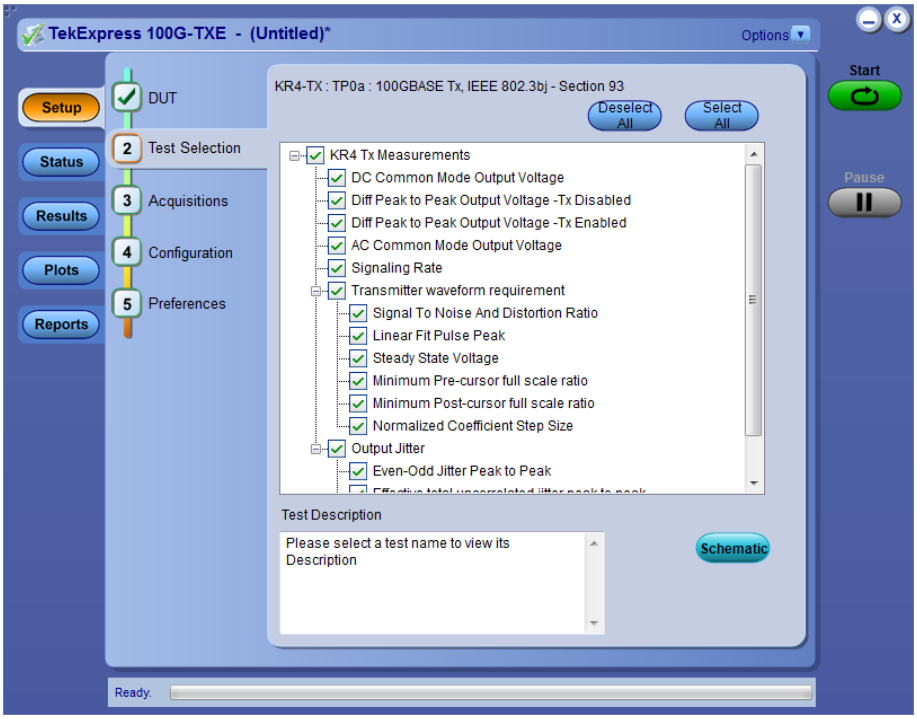


Figure 2: KR4 TX measurements

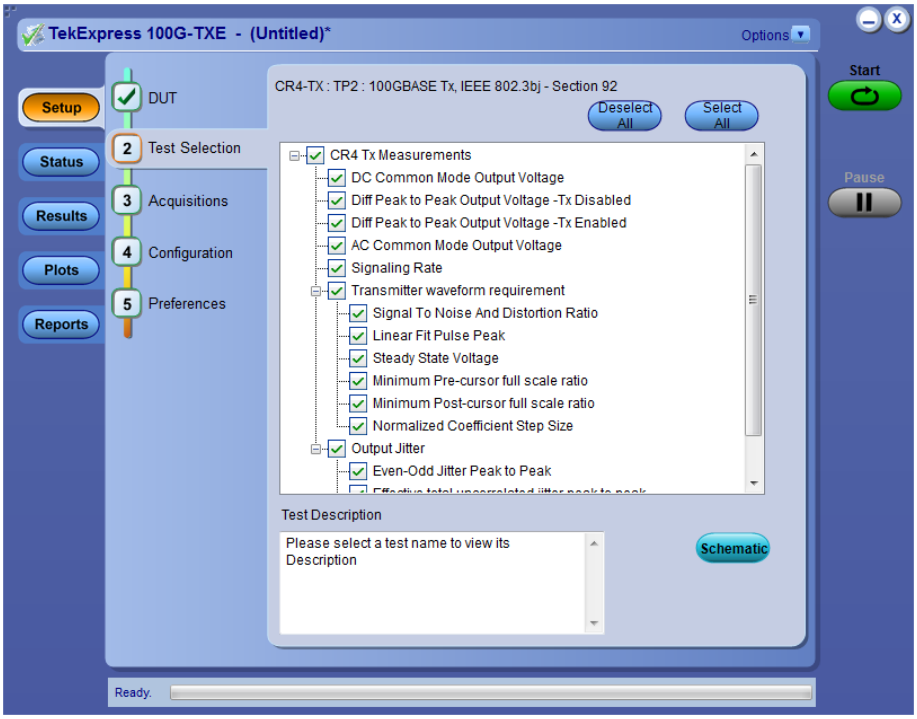


Figure 3: CR4 TX measurements

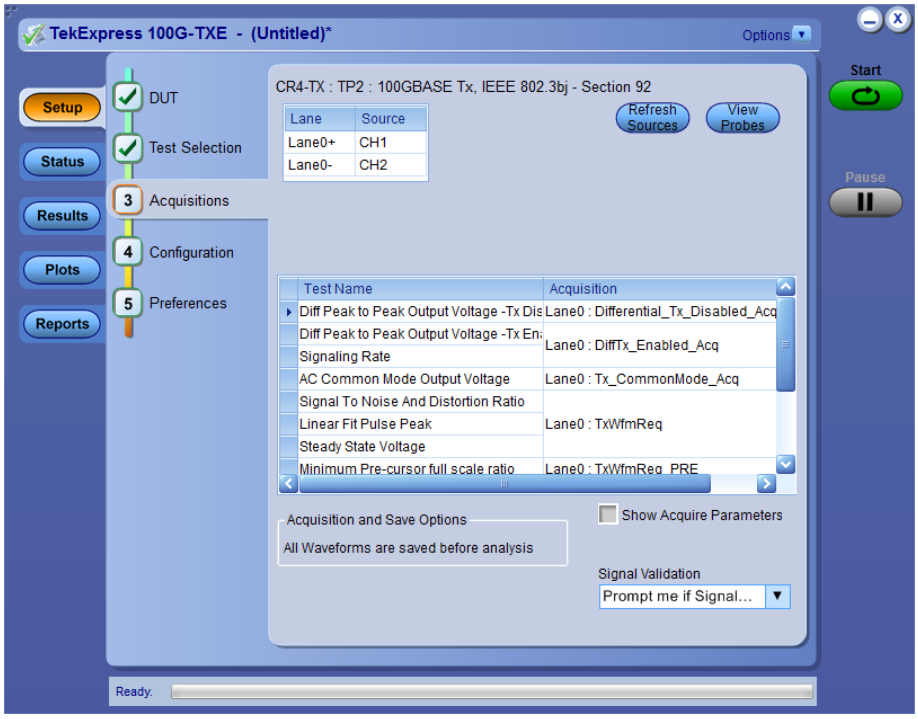
Table 9: Test Selection tab settings

Setting	Description
Tests	Click on a test to select or unselect. Highlight a test to show details in the Test Description pane.
Test Description	Shows brief description of the highlighted test in the Test field.

See also. *Set acquisition tab parameters*

Set acquisition tab parameters

Use Acquisitions tab to view the test acquisition parameters. The contents displayed on this tab depends on the DUT type and the tests selected.



NOTE. *100G-TXE application acquires all waveforms needed by each test group before performing analysis.*

Table 10: Acquisitions tab settings

Setting	Description
Show Acquire Parameters	Select to view the acquisition parameters.
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.

TekExpress 100G-TXE saves all acquisition waveforms to files by default. Waveforms are saved in a unique folder for each session (a session is started when you click the Start button). The folder path is X:\100G-TXE\Untitled Session\<dutid>\<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.

Saving a session moves the session file contents from the Untitled Session folder to the specified folder name, and changes the session name to the specified name.

Set configuration tab parameters

Use Configuration tab to view and configure the Global Settings and the measurement configurations. The Global Settings and the measurements with configurations available in this tab depends on the Standards selected in the DUT tab.

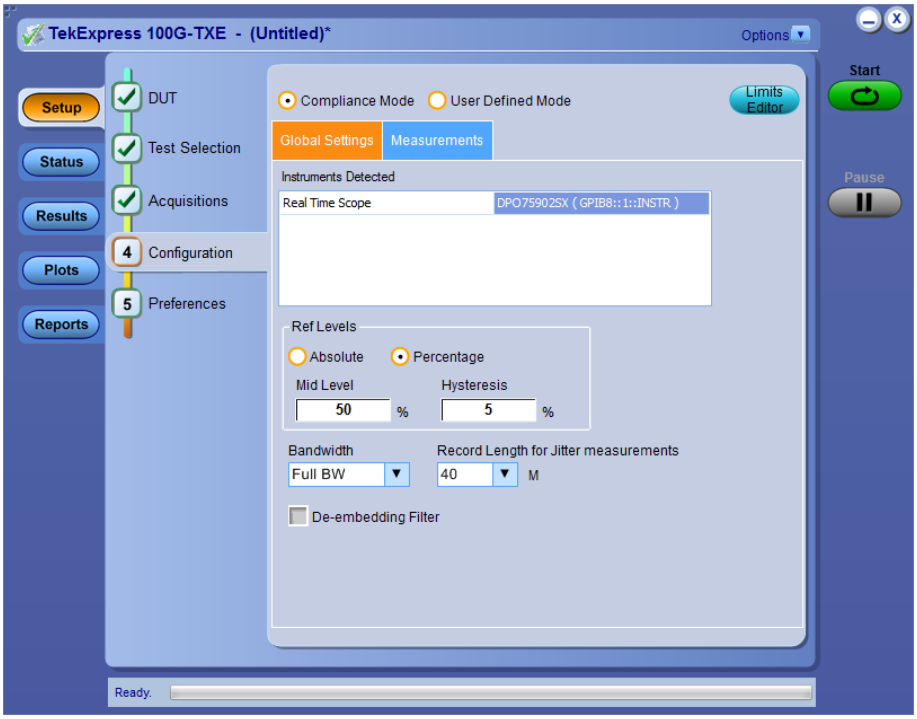


Figure 4: Configuration tab: Global Settings

Table 11: Configuration tab settings

Setting	Description
Compliance Mode	Select compliance mode. By default Compliance Mode is selected.
User Defined Mode	Select user defined mode
Global Settings	
Instruments Detected	Displays the instruments connected to this application. Click on the instrument name to open a list of available (detected) instruments. Select **Options > Instrument Control Settings** and click Refresh to update the instrument list. ***NOTE.*** *Verify that the **GPIB** search criteria (default setting) in the Instrument Control Settings is selected when using TekExpress 100G-TXE application.*
Ref Levels	
Absolute	Select to set the Ref Levels in Absolute
Percentage	Select to set the Ref Levels in Percentage
Mid Level	Select the mid level in absolute or percentage
Hysteresis	Select the hysteresis in absolute or percentage
Bandwidth	Select the bandwidth as Full BW or 50 GHz. By default Full BW is selected.
Record Length for Jitter measurements	Select the record length for jitter measurements. The available values are 20 M, 30 M, 40 M. By default 40 M is selected. ***NOTE.*** *This configuration is applicable for jitter measurements only.*
Record Length for Eye measurements	Select the record length for jitter measurements. The available values are 20 M, 30 M, 40 M. By default 40 M is selected. ***NOTE.*** *This configuration is applicable for eye measurements only.*

Setting	Description
De-Embedding Filter	Select to apply the de-embed filter file. Click Browse and select the folder containing de-embedding filter files (.flt). For single ended mode, save two de-embedding filter files in a folder, in the below specified format. ■ Source file name for data Positive : DataPositiveSourceDeEmbeddingfilter.flt ■ Source file name for data negative : DataNegativeSourceDeEmbeddingfilter.flt For Differential mode, save one filter file in a folder, in the below specified format. ■ Differential source filter file name: DifferentialDeEmbeddingfilter.flt ***NOTE. Browse** option is enabled only when you select **Use filter file for de-embedding**.*
CTLE Filter File	Select the CTLE Filter File. **Compliance mode** ■ All: Application will run through all CTLE filters from 1 dB - 9 dB (at TP1a) and 1 dB - 2 dB (at TP4) ■ Best CTLE: After the first run, Best CTLE filter option gets enabled. User can run the measurement with Best CLTE instead of looping through all CTLE filters in the specification. **User Defined mode** ■ User can run the measurement with any specified CTLE filter. The application provides CTLE filters from 1 dB - 9 dB for data rate of 25.78125 Gbps. It is recommended to create custom CTLE filter files for any other data rates. Select the CTLE filters from the drop-down list or Custom to browse and select the custom CTLE filter files. ***NOTE.** Custom CTLE filter files is to be named in the format <user defined name>_ndB.flt, where n is the gain of the filter.*
Measurements - CAUI4 TXE	
Analyze	Measurement Range - 20%-80%

De-embedding filter. You can de-embed the signal path from fixture output to the scope channel input. Manual filter files can also be created using SDLA or any other method.

Mid Level. Use to prevent small amounts of noise in a waveform from producing multiple threshold crossings. Use when the rising and falling thresholds for a given reference voltage level are set to the same value.

Hysteresis. A reference voltage level that defines when the waveform state transition occurs at a given threshold.

Set preferences tab parameters

Use Preferences tab to set the application action on completion of a measurement.

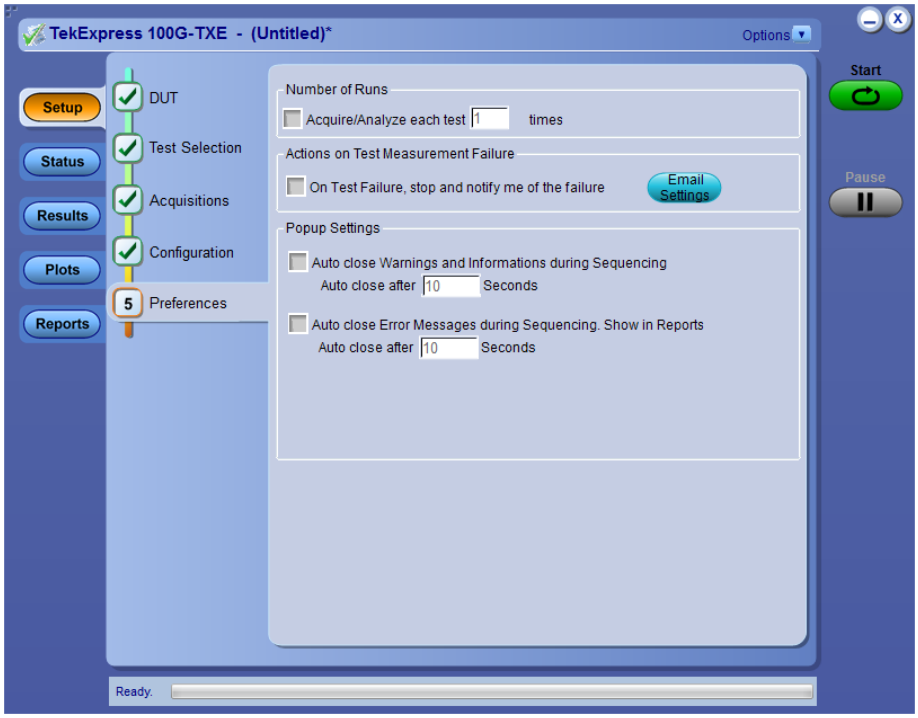


Table 12: Preferences tab settings

Setting	Description
Number of Runs	
Acquire/Analyze each test <no> times (not applicable to Custom Tests)	Select to repeat the test run by setting the number of times. By default, it is selected with 1 run.
Actions on Test Measurement Failure	
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.

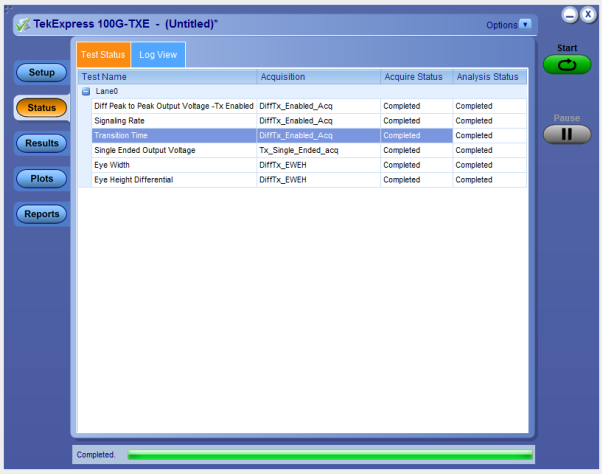
Setting	Description
Popup Settings	
Auto close Warnings and Informations during Sequencing Auto close after <no> Seconds	Select to auto close warnings/informations during sequencing. Set the Auto close time. By default it is unselected.
Auto close Error Messages during Sequencing. Show in Reports Auto close after <no> Seconds	Select to auto close Error Messages during Sequencing. Set the Auto close time. By default it is unselected.

Status panel

Status panel overview

The Status panel accesses the Test Status and Log View tabs, which provide status on test acquisition and analysis (Test Status tab) and a listing of test tasks performed (Log View tab). The application opens the Test Status tab when you start a test run. You can select the Test Status or the Log View tab to view these items while tests are running.

Test status view



Log view

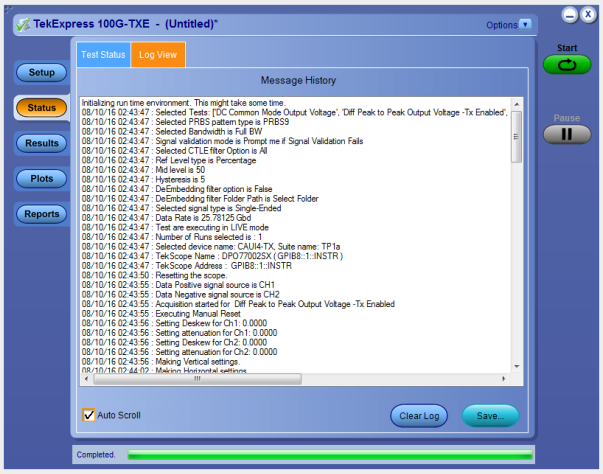


Table 13: Status panel Log View controls

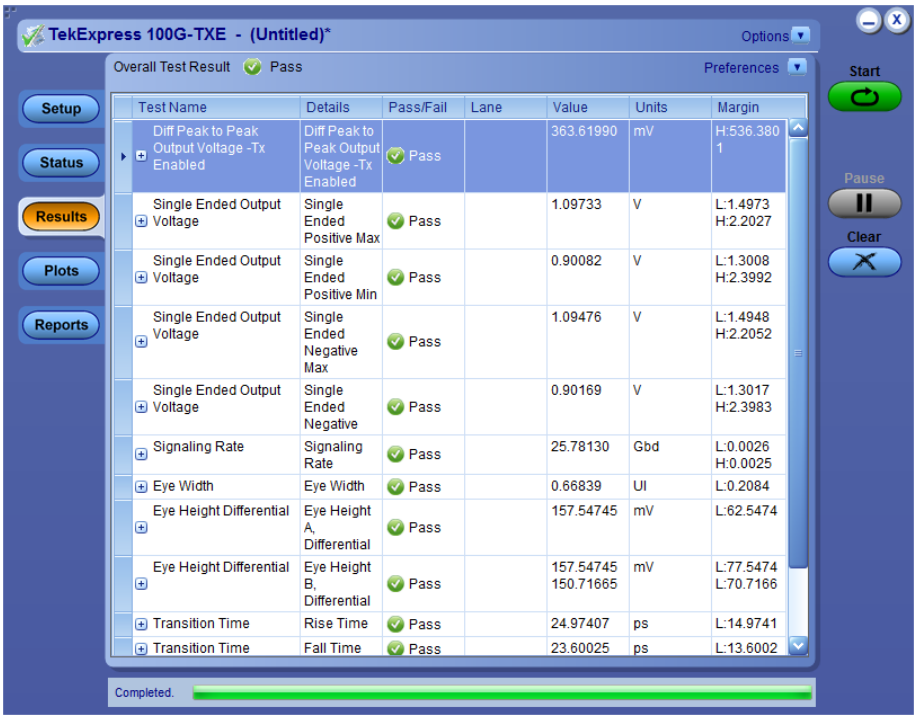
Control	Description
Message History	Lists all executed test operations and timestamp information.
Auto Scroll	Enables automatic scrolling of the log view as information is added to the log during the test.
Clear Log	Clears all messages from the log view.
Save	Saves the log file to a text file. Use the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

See also. *Application panel overview*

Results panel

Results panel overview

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



See also. *View a report*

Application panels overview

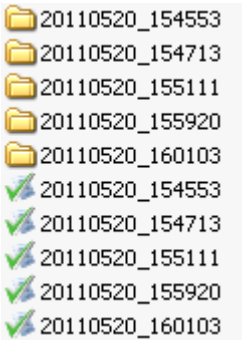
View test-related files

Files related to tests are stored in My TekExpress\100G-TXE\ . 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 and usually has no visible file name extension.

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:



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.

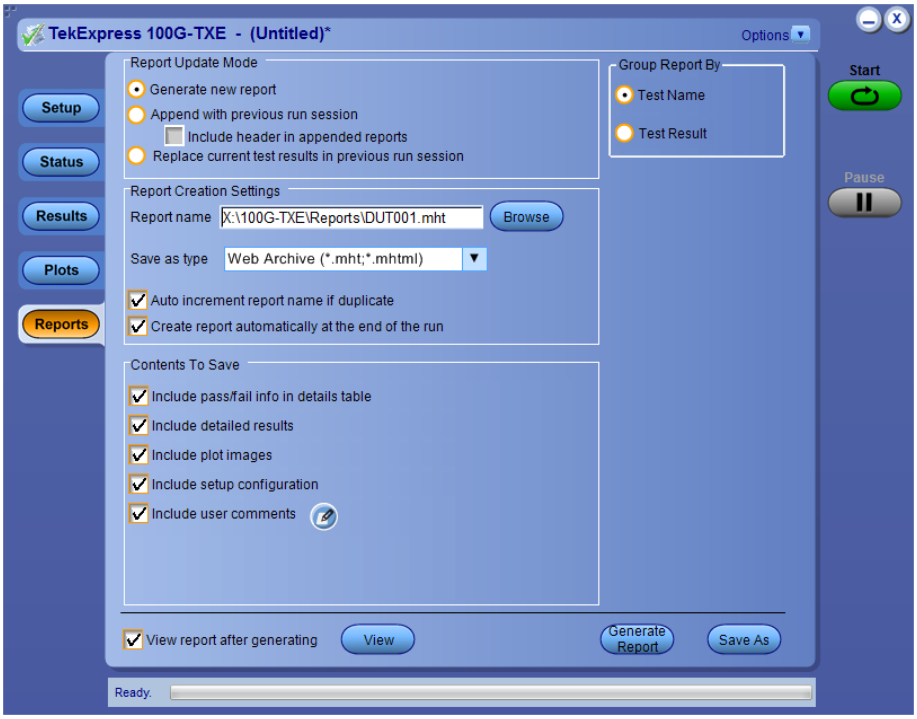
The first time you run a new, unsaved session, the session files are stored in the Untitled Session folder located at ..\My TekExpress\100G-TXE\. When you name and save the session, the files are placed in a folder with the name that you specify. A copy of the test files stay in the Untitled Session folder until you run a new test or until you close the 100G-TXE application.

See also. *File name extensions*

Reports panel

Reports panel overview

Use Reports panel to browse for reports, name and save reports, select test content to include in reports, and select report viewing options.



For information on setting up reports, see *Select report options*. For information on viewing reports, see *View a report*.

See also. *Applications panel overview*

Select report options

Click Reports panel and use the Reports panel controls to select which test result information to include in the report, and the naming conventions to use for the report. For example, always give the report a unique name or select to have the same name increment each time you run a particular test.

Select report options before running a test or when creating and saving test setups. Report settings are included in saved test setups.

In the Reports panel, select from the following report options:

Table 14: Report options

Setting	Description
Report Update Mode	
Generate new report	Creates a new report. The report can be in either .mht or .pdf file formats.
Append with previous run session	Appends the latest test results to the end of the current test results report.
Include header in appended reports	Select to include header in appended reports
Replace current test in previous run session	Replaces the previous test results with the latest test results. Results from newly added tests are appended to the end of the report.
Report Creation Settings	

Setting	Description
Report name	Displays the name and location from which to open a 100G-TXE report. The default location is at *\My TekExpress\100G-TXE\Untitled Session*. 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. Change the report name or location. Do one of the following: ■ In the Report Path field, type over the current folder path and name. ■ Double-click in the Report Path field and then make selections from the popup keyboard and click the **Enter** button. 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\100G-TXE \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. ***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.
Create report automatically at the end of the run	Creates report at the end of the run.
Contents To Save	
Include pass/fail info in details table	Includes pass/fail info in the details table of the report.
Include detailed results	Includes detailed results in the report.
Include plot images	Includes 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 added in the DUT tab of the Setup panel. Comments appear in the Comments section, under the summary box at the beginning of each report.
Group Report By	
Test Name	Select to group the tests in the report by test name.
Test Result	Select to group the tests in the report by test results
View report after generating	Automatically opens the report in a Web browser when the test completes. This option is selected by default.

Setting	Description
View	Click to view the most current report.
Generate Report	Generates a new report based on the current analysis results.
Save As	Specify a name for the report.

View a report

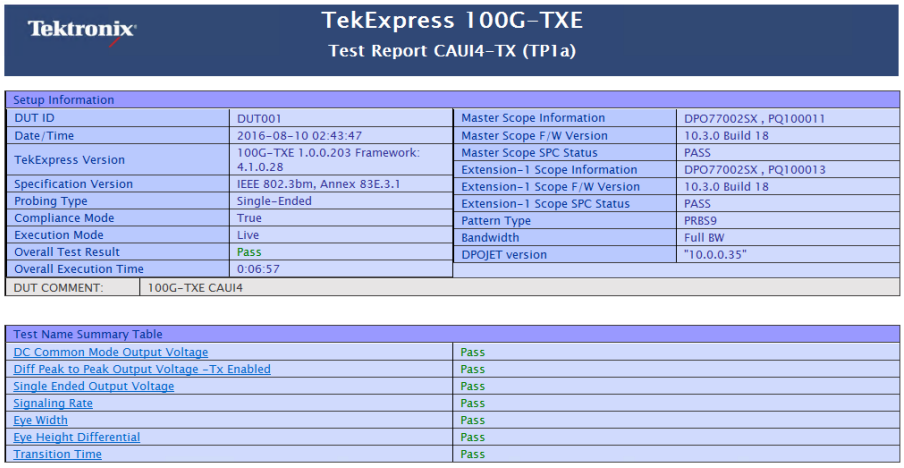
The application automatically generates a report when test execution is complete and displays the report in your default Web browser (unless you cleared the **View Report After Generating** check box in the Reports panel before running the test). If you cleared this check box, or to view a different test report, do the following:

1. Click the **Reports** button.
2. Click the **Browse** button and locate and select the report file to view.
3. In the Reports panel, click **View**.

For information on changing the file type, file name, and other report options, see *Select report options*.

Report contents

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



Tektronix

TekExpress 100G-TXE

Test Report CAUI4-TX (TP1a)

Setup Information			
DUT ID	DUT001	Master Scope Information	DPO77002SX , PQ100011
Date/Time	2016-08-10 02:43:47	Master Scope F/W Version	10.3.0 Build 18
TekExpress Version	100G-TXE 1.0.0.203 Framework: 4.1.0.28	Master Scope SPC Status	PASS
Specification Version	IEEE 802.3bm, Annex 83E.3.1	Extension-1 Scope Information	DPO77002SX , PQ100013
Probing Type	Single-Ended	Extension-1 Scope F/W Version	10.3.0 Build 18
Compliance Mode	True	Extension-1 Scope SPC Status	PASS
Execution Mode	Live	Pattern Type	PRBS9
Overall Test Result	Pass	Bandwidth	Full BW
Overall Execution Time	0:06:57	DPOJET version	"10.0.0.35"
DUT COMMENT:	100G-TXE CAUI4		

Test Name Summary Table	
DC Common Mode Output Voltage	Pass
Diff Peak to Peak Output Voltage -Tx Enabled	Pass
Single Ended Output Voltage	Pass
Signaling Rate	Pass
Eye Width	Pass
Eye Height Differential	Pass
Transition Time	Pass

Setup configuration 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.

To exclude this information from a report, clear the **Include Setup Configuration** check box in the Reports panel before running the test.

User comments

If you selected to include comments in the test report, any comments you added in the DUT tab are shown at the top of the report.

See also. *Results panel overview*

View test-related files

Running tests

Equipment connection diagram

Click **Setup** > **Test Selection** > **Schematic** to view the equipment setup diagram(s).

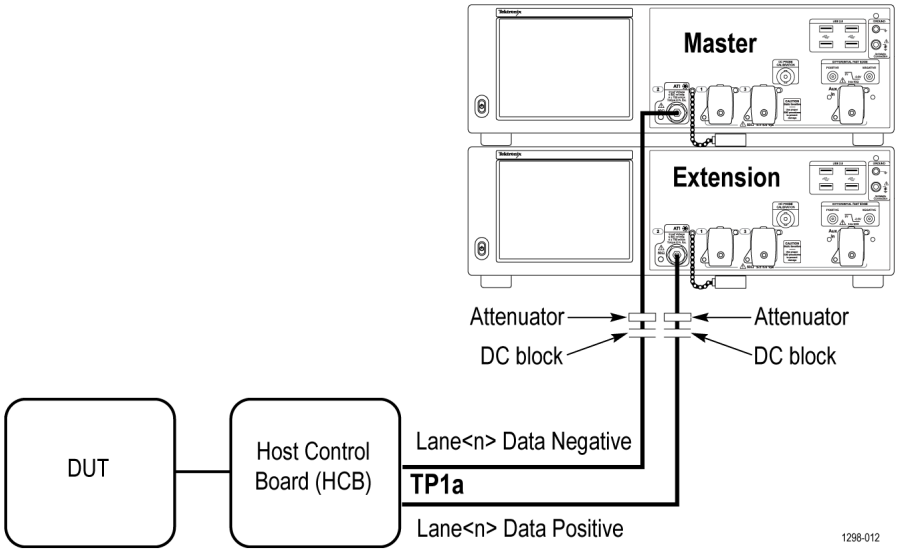


Figure 5: CAUI4 TP1a (Single ended)

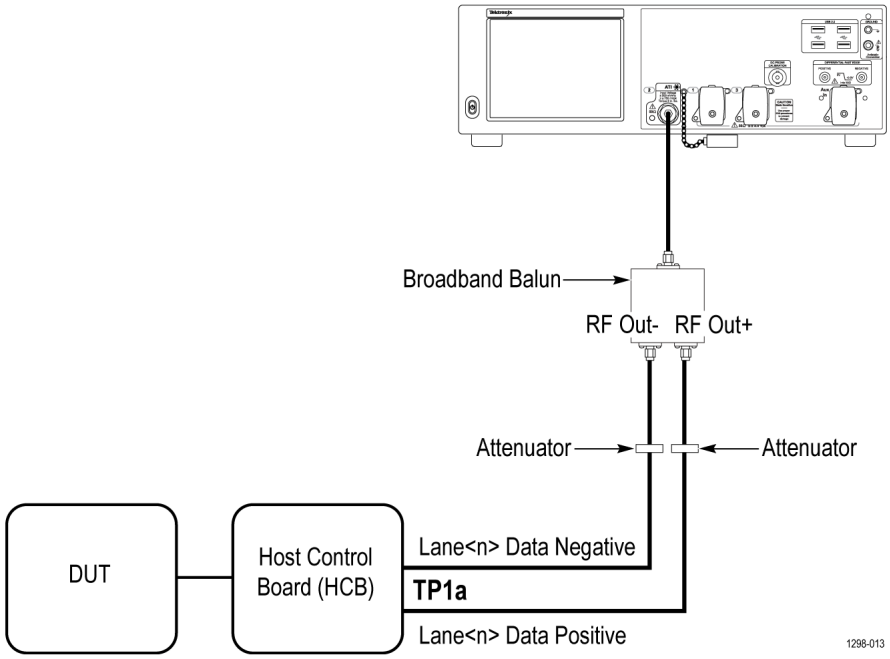


Figure 6: CAUI4 TP1a (Differential)

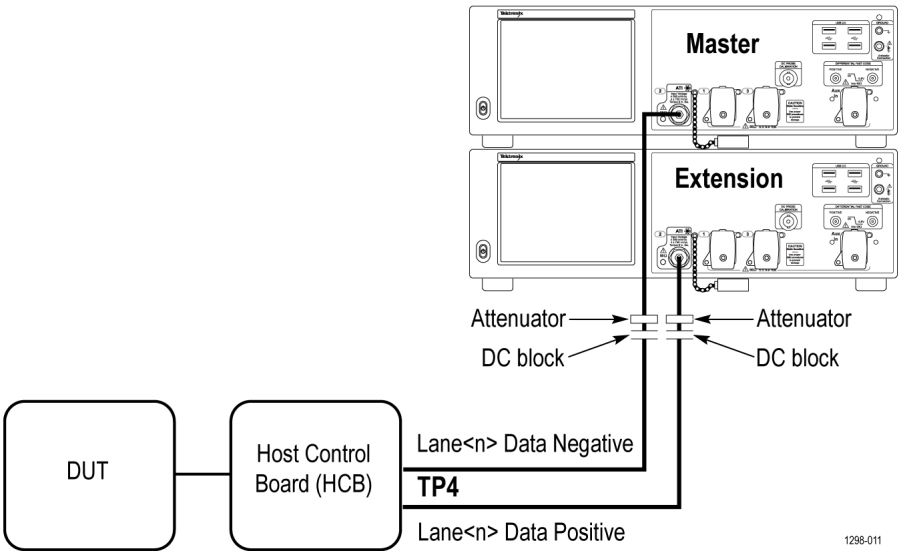


Figure 7: CAUI4 TP4 (Single ended)

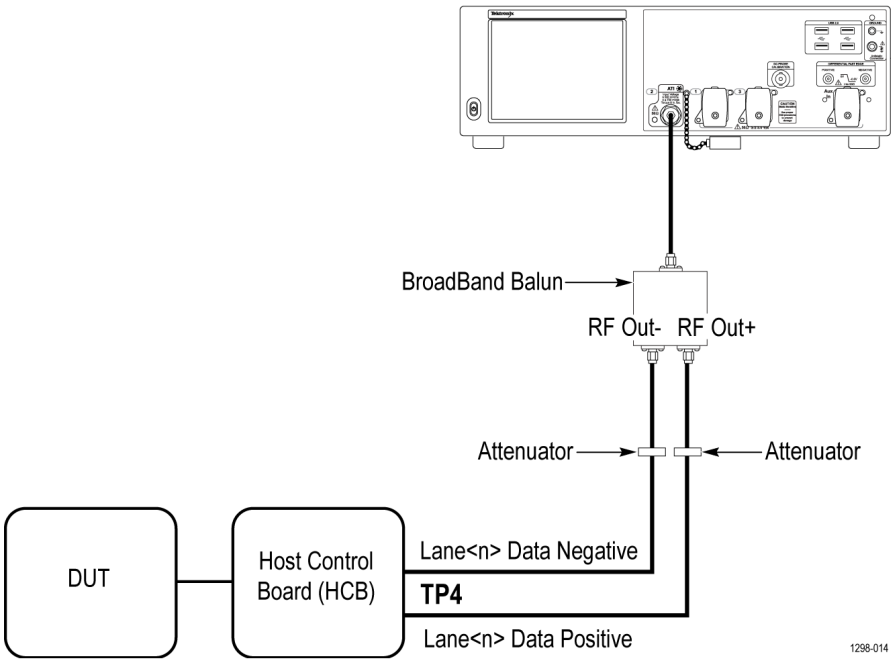


Figure 8: CAUI4 TP4 (Differential)

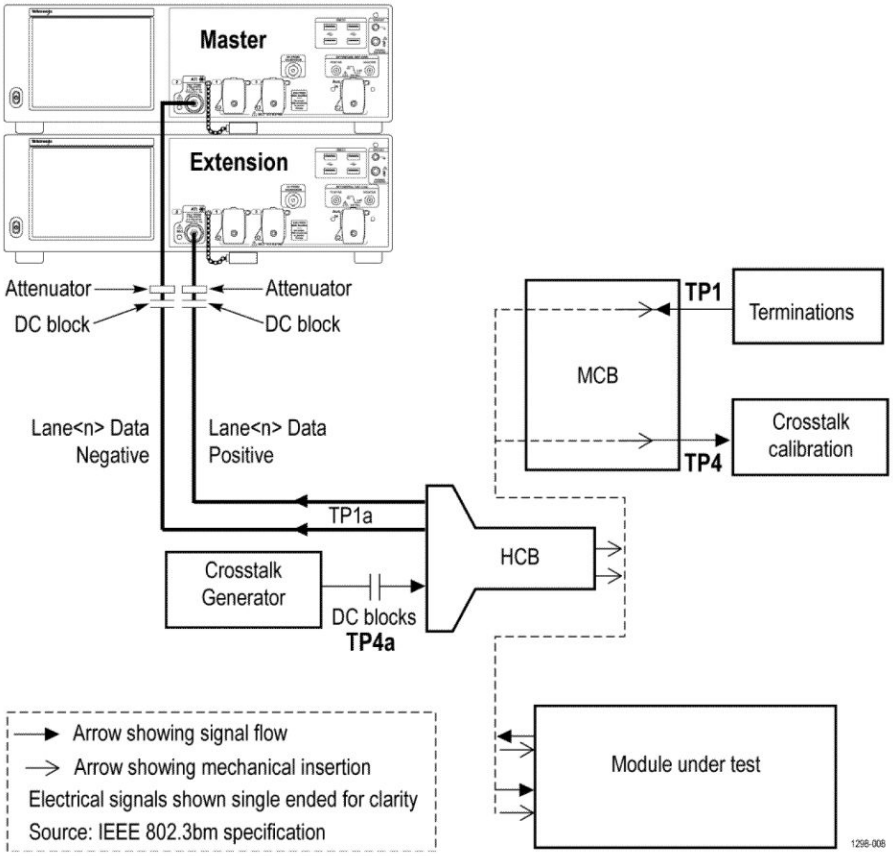


Figure 9: CAUI4 Eye Width / Eye Height TP1a (Single ended)

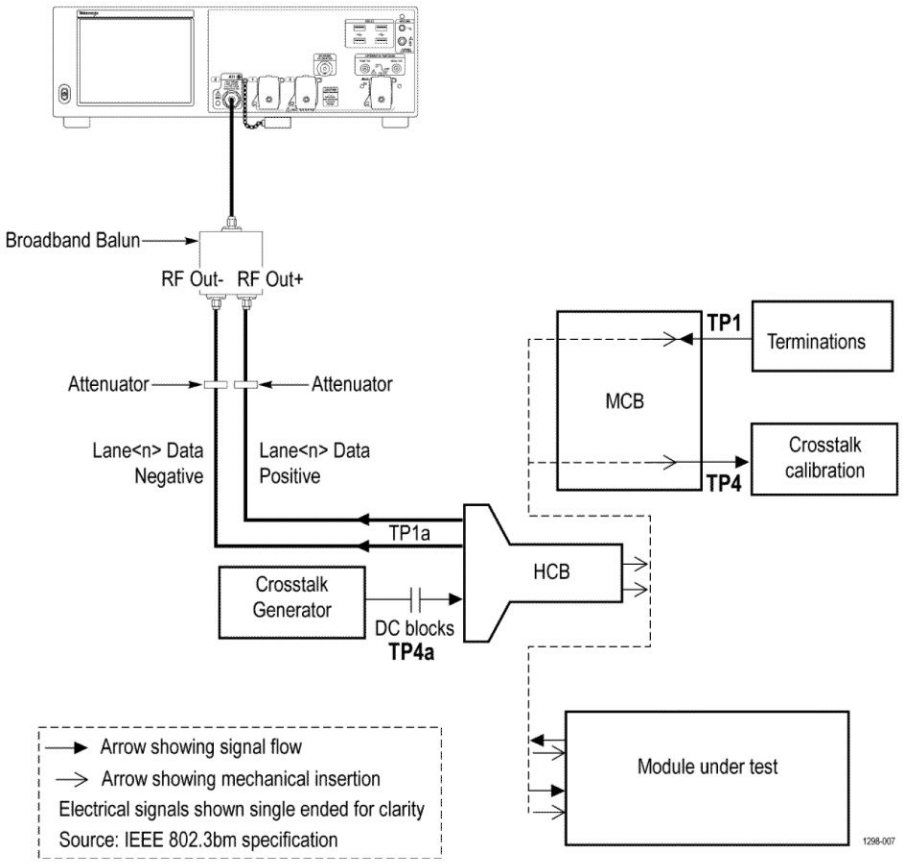


Figure 10: CAUI4 Eye Width / Eye Height TP1a (Differential)

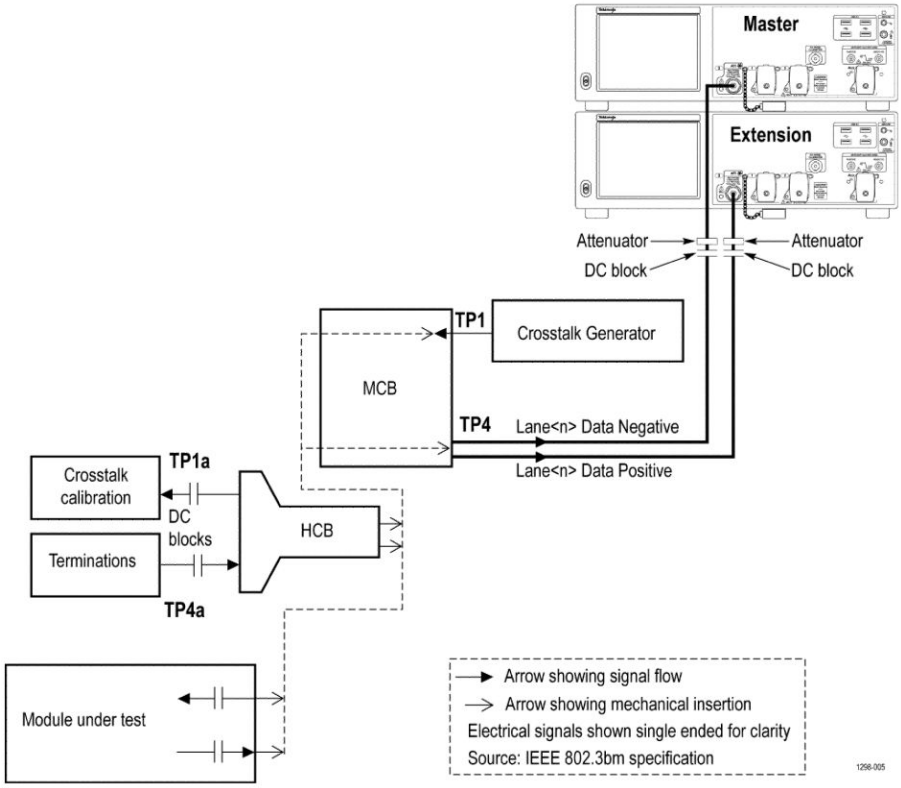


Figure 11: CAUI4 Eye Width / Eye Height TP4 (Single ended)

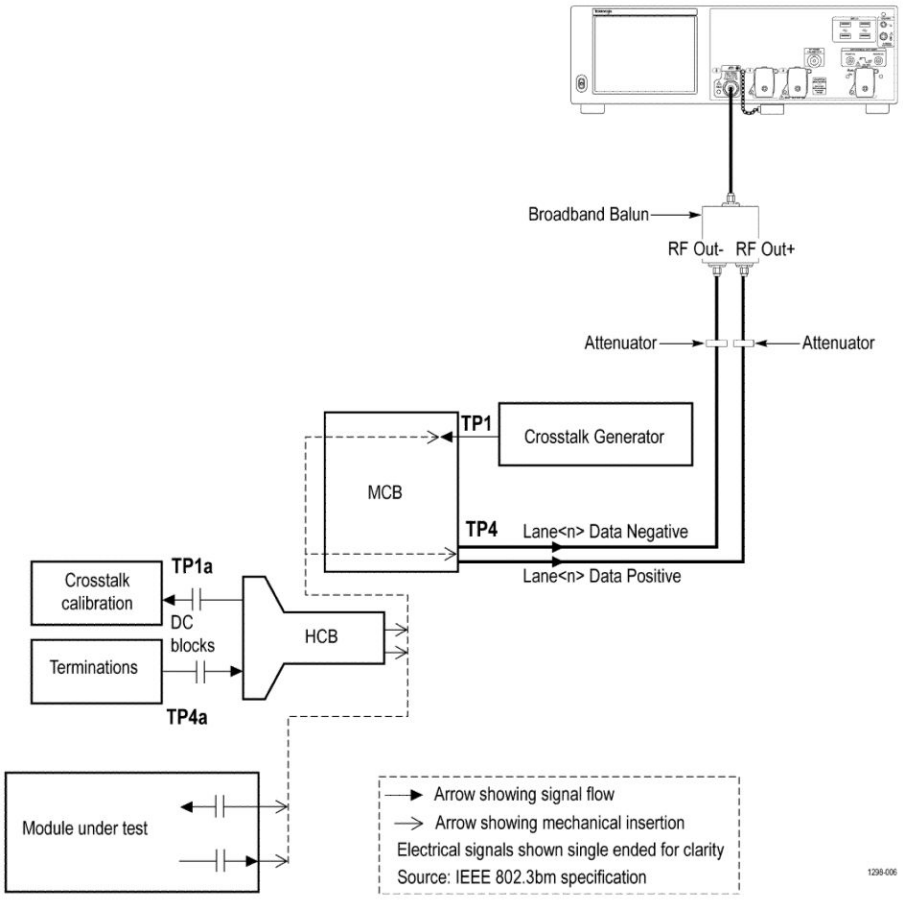


Figure 12: CAUI4 Eye Width / Eye Height TP4 (Differential)

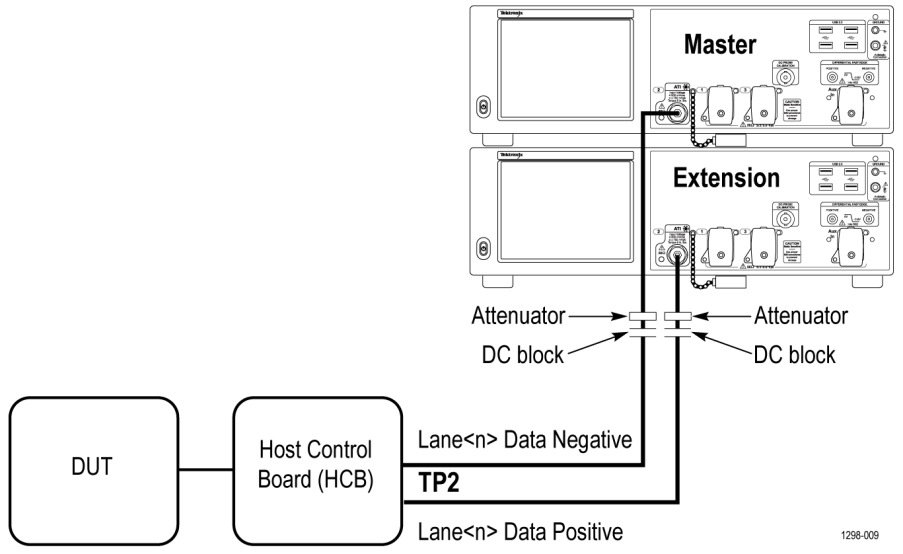


Figure 13: CR4 TP2 (Single ended)

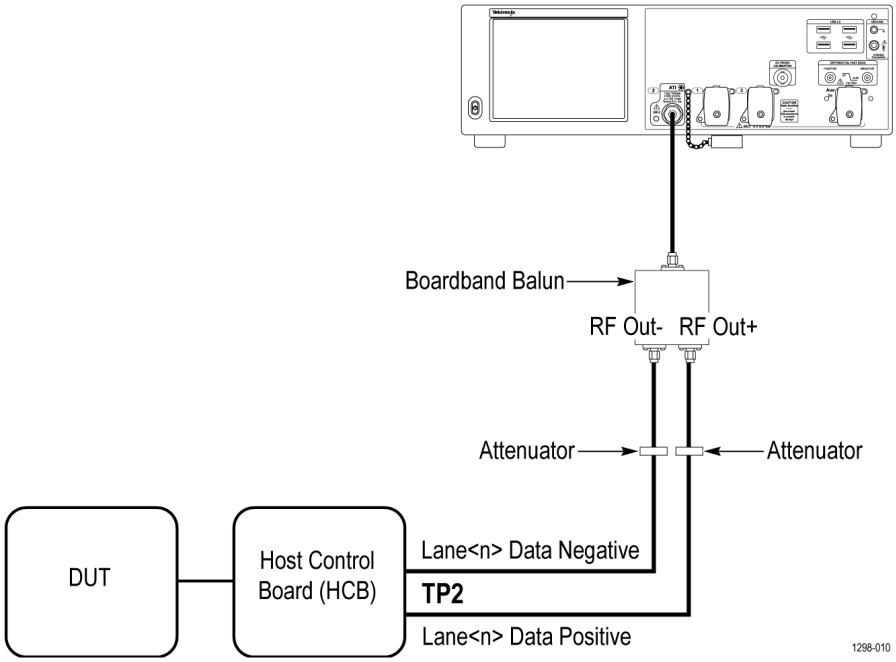


Figure 14: CR4 TP2 (Differential)

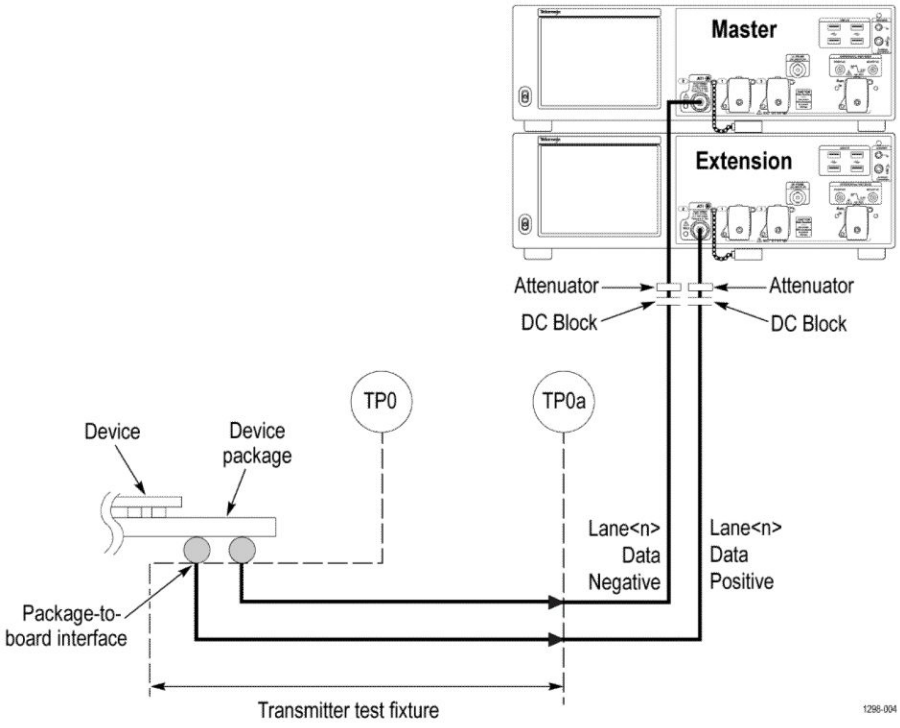


Figure 15: KR4 TP0a (Single ended)

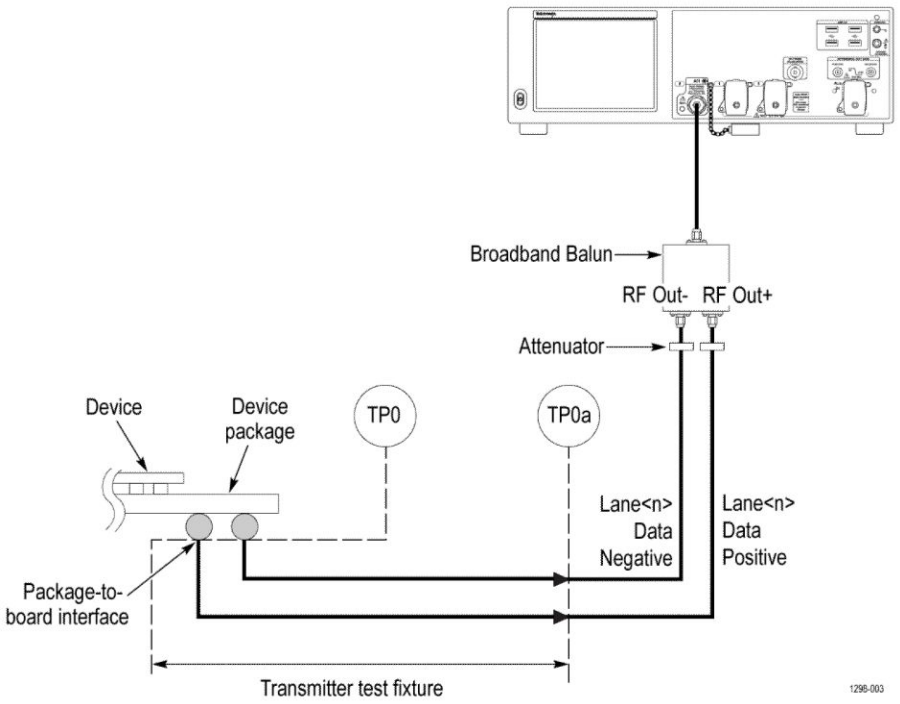


Figure 16: KR4 TP0a (Differential)

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

If skew is present between positive and negative channels, then the channels need to be deskewed before being used for waveform measurements. TekExpress 100G-TXE provides support for channel deskew and attenuation using the following method:

1. Determine what the skew is for each channel.
2. From the TekScope menu, select Vertical > Deskew.
3. In the Deskew/Attenuation window, click the channel (1 – 4) button for the first channel to be deskewed.
4. Click in the Ch(x) Deskew Time entry field and enter the skew. The skew can be +ve or –ve.
5. Click the channel button for the next channel and repeat step 4.
6. After entering the skew for all the channels that require it, from the Options menu in TekExpress 100G-TXE, select Deskew.

7. In the Deskew dialog box, select the desired level:
   - Less than 100 mV signal amplitude: Select this if the signal amplitude is such that the oscilloscope's vertical setting is less than 100 mV/division.
   - 100 mV or greater signal amplitude: Select this if the signal amplitude is such that the oscilloscope's vertical setting is greater than 100 mV/division.

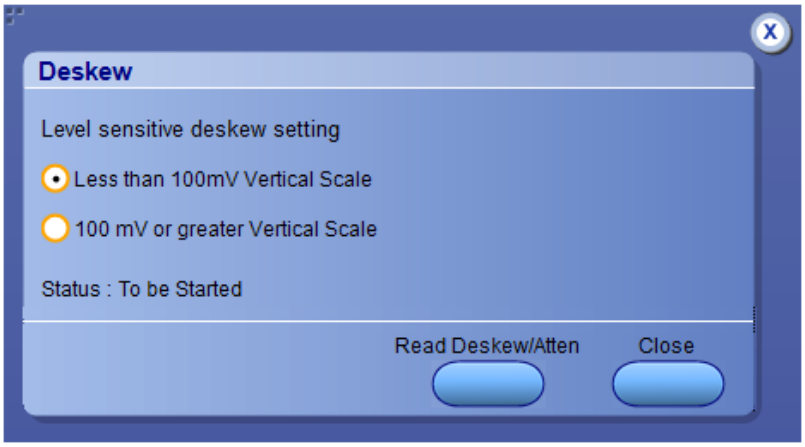


Figure 17: Deskew

8. Click Read Deskew/Attn.
9. When the status in the dialog box indicates the deskew is finished, click Close.

Each input channel has its own deskew settings. Deskew compensates individual channels for probes or cables of different lengths. The instrument applies the delay values after each completed acquisition. The deskew values are saved as part of the instrument setup. The deskew values for the selected channel are retained until you change the probe, you restore a saved setup, or you recall the factory setup.

Running tests

Select tests, *set acquisition parameters*, *set configuration parameters*, *set preferences parameters*, and click **Start** to run the tests. While tests are running, you cannot access the Setup or Reports panels. To monitor the test progress, switch between the Status panel and the Results panel.

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 **Alt + Tab** key combination. To keep the TekExpress 100G-TXE application on top, select **Keep On Top** from the TekExpress Options menu.

The application displays report when the tests execution is complete.

Prerun checklist

1. Make sure that the instruments are warmed up (approximately 20 minutes) and stabilized.
2. Perform compensation: In the oscilloscope main menu, select **Utilities** > **Instrument Compensation**. Click **Help** in the compensation window for steps to perform instrument compensation.

Saving and recalling test setup

Test setup files overview

Saved test setup information (such as the selected oscilloscope, general parameters, acquisition parameters, measurement limits, waveforms (if applicable), and other configuration settings) are saved under the setup name at **X:\100G-TXE**.

Use test setups to:

- Run a new session, acquiring live waveforms, using a saved test configuration.
- 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.

See also *Save a test setup*

Open (load) a saved test setup

Save a 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 *default test setup*. 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.

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

Open (load) a saved test setup

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

1. Select **Options > Open Test Setup**.
2. Select the setup from the list and click **Open**. Setup files are located at **X:\100G-TXE**.

See also *About test setups*

Create a test setup using an existing one

Create a test setup from default settings

Create a test setup from default settings

To create a test setup using default settings, follow the steps:

1. Select **Options > Default Test Setup**. For default test setup, the parameters are set to the application's default value.
2. Click application *Setup* and set the parameters
3. Click application *Reports* and set the report options
4. Optional: Click **Start** to run the test and verify that it runs correctly and captures the specified test information and reports. If it does not, then edit the parameters and repeat this step until the test runs to your satisfaction
5. Select **Options > Save Test Setup**. Enter the file name and click Save. The application saves the file to X:\100G-TXE\<*session_name*>

Create a test setup using an existing one

To create a test setup using an existing one, follow the steps:

1. Select **Options > Open Test Setup**
2. Select a setup from the list and then click **Open**
3. Click application *Setup* and modify the parameters
4. Click application *Reports* and modify the report options
5. Select **Options > Save Test Setup As**
6. Enter test setup name, and click **Save**

CAUI4 TXE compliance measurements

DC common mode output voltage

This section verifies that the mean of the common mode signal is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-3

Measurement procedure

The supported voltage range of ATI channel of the scope is ±0.3 V and the DC voltage of the DUT can be beyond the supported voltage limits. Hence, use external digital multimeter to measure the voltage and enter it in the application.

Limits

At TP1a: -0.3 V to 2.8 V

At TP4: -0.35 V to 2.85 V

Diff peak to peak output voltage - Tx disabled

This section verifies that the peak to peak differential output voltage when the transmitter is disabled is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-1

Inputs

- Differential signal created using two single ended sources (Positive and Negative) without any filtering.

Measurement procedure

1. Add Peak to Peak measurement.
2. The value of the pk-pk voltage is the differential output voltage (pk-pk).

Limits

At TP1a:

- Lower limit: NA
- Higher limit: 35 mV

Diff peak to peak output voltage - Tx enabled

This section verifies that the peak to peak differential output voltage is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Add Peak to Peak measurement.
2. The value of the pk-pk voltage is the differential output voltage (pk-pk).

Limits

At TP1a and TP4:

- Lower limit: NA
- Higher limit: 900 mV

AC common mode output voltage

This section verifies that the RMS value of the common mode signal is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Create a common mode signal using Math = (Data Positive + Data Negative)/2.
2. Create Vertical histogram on the common mode signal.
3. Add Standard deviation measurement.
4. Standard deviation of the signal is measured as AC common mode voltage.

Limits

At TP1a and TP4:

- Lower limit: NA
- Higher limit: 17.5 mV

Single ended output voltage

This section verifies that the max and min of data positive and negative signals are within conformable limits as per the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.2, Table 83E-1

Inputs

- Two single ended sources (Positive and Negative) filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Find the max and min of the signal using base scope measurement option (select **Measure** > **Amplitude**. Select Maximum and Minimum).
2. Single Ended output voltage (max) = *DC Common mode voltage* + Max of Single Ended signal (without DC).
3. Single Ended output voltage (min) = *DC Common mode voltage* + Min of Single Ended signal (without DC).
4. Perform Step 2 and 3 on single ended data positive and data negative signals.

Limits

At TP1a:

- Lower limit: -0.4 V
- Higher limit: 3.3 V

Signaling rate

This section verifies that the signaling rate (data rate) of the DUT per lane is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.1, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.1.1, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. This measurement is performed using DPOJET Period measurement as prerequisite.
2. Period is found edge to edge which gives the Unit interval (UI) of the signal.
3. The result of the period measurement (UI) is used to find the data rate of the signal. Data Rate = 1/Unit interval.

Limits

At TP1a and TP4:

- Lower limit: Configured Date Rate - 100 ppm
- Higher limit: Configured Date Rate + 100 ppm

Eye width and Eye height

This section verifies that the eye width and eye height are within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.6, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.2.1, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Calibration:

Before running the Eye width / Eye height measurement, the below setup has to be calibrated with a crosstalk generator, as mentioned in the following settings:

- For Host (TP1a): Calibrate the crosstalk generator at TP4 with target differential peak-to-peak amplitude of 900 mV and target transition time of 12 ps (section 83E.3.1.6).
- For Module (TP4): Calibrate the crosstalk generator at TP1a with target differential peak-to-peak amplitude of 900 mV and target transition time of 19 ps (section 83E.3.2.1).

Measurement procedure

Eye width and Eye height calculation

Signal is captured such that it has more than 1e6 edges. Measurements are done using Dual-Dirac jitter model as specified in section 83E.4.

EW15 = EW6 - 3.19*(RJR + RJL)

Where,

EW15 is the eye width extrapolated to 10-15 probability

EW6 is the eye width at 10-6 probability

RJL is the RMS value of the jitter estimated from CDFL

RJR is the RMS value of the jitter estimated from CDFR

EW15 = EW6 - 3.19*(RN0 - RN1)

Where,

EW15 is the eye width extrapolated to 10-15 probability

EW6 is the eye width at 10-6 probability

RJL is the RMS value of the jitter estimated from CDF1

RJR is the RMS value of the jitter estimated from CDF0

Compliance method to find Eye width and Eye height results

The signal filtered through Bessel Thomson filter is equalized using different CTLE filters (1 dB - 9 dB for Host) and (1 dB - 2 dB for Module). CTLE filter result which has the maximum Eye area (Eye width * Eye height) and passing both Eye height and Eye width results is chosen as reference CTLE filter.

Host (TP1a): The CTLE peaking in the reference receiver shall be set to three values:

1. The recommended CTLE peaking value provided by the host (CTLE 1 dB to 9 dB)
2. The value 1 dB higher if present
3. The value 1 dB lower if present

A compliant host should pass both the eye width and eye height A limit using at least one of the settings and passes eye height B in two or three settings.

Module (TP4): A compliant module has to pass both eye width and eye height at least one of the CTLE settings (CTLE 1 dB to 2 dB).

Limits

At TP1a:

- Eye Width: LL: 0.46 UI and UL: NA
- Eye Height A: LL: 95 mV and UL: NA
- Eye Height B: LL: 80 mV and UL: NA

At TP4:

- Eye Width: LL: 0.57 UI and UL: NA
- Eye Height: LL: 228 mV and UL: NA

Vertical eye closure

This section verifies that the vertical eye closure of the signal is within the conformable limits according to the specification IEEE 802.3bm, and Section 83E.4.2.1.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP4	IEEE 802.3bm, Section 83E.4.2.1, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. The filtered signal is equalized using reference or best CTLE filter. If reference CTLE filter is not present, the application will loop through required CTLE filters to find the reference CTLE filter.
2. Eye height@BER of 1e-15 and Eye amplitude are calculated for the equalized signal using Dual-Dirac jitter separation model as explained section 83E.3.2.1.
3. Vertical eye closure is calculated using the following formula:

   VEC = 20log(AV/EH15)

   Where,

   VEC is vertical eye closure in dB

   AV is the eye amplitude of the equalized waveform. Eye amplitude is defined as the mean value of logic one minus the mean value of logic zero in the central 5% of the eye

   EH15 is the eye height at BER of 1e-15

Limits

At TP4:

- Lower limit: NA
- Higher limit: 5.5 dB

Transition time

This section verifies that the transition time of the DUT is within the conformable limits according to the specification.

Required test equipment

Minimum system requirements

Equipment connection diagram

Standards	Test points	Specification
CAUI4	TP1a	IEEE 802.3bm, Section 83E.3.1.5, Table 83E-1
	TP4	IEEE 802.3bm, Section 83E.3.1.5, Table 83E-3

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Measure the nominal Unit interval of the filtered signal.
2. For PRBS9, measure Voltage High in region 000001111 for Rise Time and Voltage Low in region 11111111100000 for fall time. Within these regions, take average amplitude in -3 UI to -2 UI range from edge for finding voltage low. Also take average amplitude in 2 UI to 3 UI range from edge for finding voltage high.
3. Find the transition time in search patterns (000001111 for Rise and 11111111100000 for Fall) by taking difference in time from 20% to 80% of the signal amplitude.

Limits

At TP1a:

- Lower limit: 10 ps
- Higher limit: NA

At TP4:

- Lower limit: 12 ps
- Higher limit: NA

CR4 / KR4 TXE compliance measurements

DC common mode output voltage

This section verifies that the mean of the common mode signal is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.1, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.3, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Measurement procedure

The supported voltage range of the scope is ±0.3 V and the DC voltage of the DUT can be beyond the supported voltage limits. Hence, use external digital multimeter to measure the voltage and enter it in the application.

Limits

CR4	0 V to 1.9 V
KR4	0 V to 1.9 V

Diff peak to peak output voltage - Tx disabled

This section verifies that the peak to peak differential output voltage when transmitter is disabled is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.1, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.3, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) without any filtering.

Measurement procedure

1. Add Peak to Peak measurement.
2. The value of the pk-pk voltage is measured as differential output voltage (pk-pk).

Limits

CR4	Peak-to-Peak Differential output (Tx Disabled) <= 35 mV
KR4	Peak-to-Peak Differential output (Tx Disabled) <= 30 mV

Diff peak to peak output voltage - Tx enabled

This section verifies that the peak to peak differential output voltage is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.1, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.3, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Add Peak to Peak measurement.
2. The value of the pk-pk voltage is measured as differential output voltage (pk-pk).

Limits

CR4	Peak-to-Peak Differential output <= 1200 mV
KR4	Peak-to-Peak Differential output <= 1200 mV

AC common mode output voltage

This section verifies that the RMS value of the common mode signal is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.1, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.3, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Create a common mode signal using Math = (Data Positive + Data Negative)/2.
2. Create Vertical histogram on the common mode signal.
3. Add Standard deviation measurement.
4. Standard deviation of the signal is measured as AC common mode voltage.

Limits

CR4	AC Common mode output voltage <= 30 mV RMS with respect to ground
KR4	AC Common mode output voltage <= 12 mV RMS with respect to ground

Signaling rate

This section verifies that the signaling rate (data rate) of the DUT per lane is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.9, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.2, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. This measurement is performed using DPOJET Period measurement as prerequisite.
2. Period is found edge to edge which gives the Unit interval (UI) of the signal.
3. The result of the period measurement (UI) is used to find the data rate of the signal. Data Rate = 1/Unit interval.

Limits

CR4	At TP1a and TP4: ■ Lower limit: Configured Date Rate - 100 ppm ■ Higher limit: Configured Date Rate + 100 ppm
KR4	At TP1a and TP4: ■ Lower limit: Configured Date Rate - 100 ppm ■ Higher limit: Configured Date Rate + 100 ppm

Transmitter waveform requirements

Common procedure for transmitter waveform requirements

This section describes the general procedure to be performed for Transmitter output waveform measurements. Perform the general procedure and the measurement specific procedure for each sub-measurements.

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Common procedure for transmitter waveform requirements

1. Configure the DUT to transmit the PRBS 7, 9, 11, or 15 signal continuously at the specified data rate.
2. Acquire the signal at a sampling rate of 200 Gbps and record length of 5M samples.
3. Oversample the signal to get more than 32 samples per bit and average the signal across the PRBS patterns.
4. Process the signal using steps as per specification section 92.8.3.5 to measure the various Transmitter waveform parameters.

Linear fit pulse peak

This section verifies that the linear fit pulse peak value is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.5.2, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.5.2, Table 93-4

Measurement procedure

1. Set the DUT in PRESET mode by setting the coefficients C(-1), C(0) and C(1) to zero.
2. Capture the signal and calculate linear fit filter coefficients of the signal. The peak value of the linear fit curve is measured as Linear Fit pulse peak.

Limits

CR4	Linear Fit Pulse Peak > 0.45 * Steady state voltage
KR4	Linear Fit Pulse Peak > 0.71 * Steady state voltage

Steady state voltage

This section verifies that the steady state voltage is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.5.2, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.5.2, Table 93-4

Measurement procedure

1. Set the DUT in PRESET mode by setting coefficients C(-1), C(0) and C(1) to zero.
2. Capture the signal and calculate linear fit pulse of the signal. The average value of the linear fit curve is measured as Steady state output voltage (DC voltage) of the signal.

Limits

CR4	■ Min: 0.34 V ■ Max: 0.6 V
KR4	■ Min: 0.4 V ■ Max: 0.6 V

Minimum pre-cursor full scale ratio

This section verifies that the minimum pre-cursor equalization ratio is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.5.5, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.5.5, Table 93-4

Measurement procedure

1. Set the DUT in PRESET mode and compute the filter coefficients.
2. Calculate equalizer coefficients C(-1), C(0) and C(1). Minimum pre-cursor equalization ratio is calculated as below:

   Min Pre-Cursor Eq Ratio = [C(0) – C(-1)] / [C(0) + C(-1)]

Limits

CR4	Minimum pre cursor equalization ratio >= 1.54
KR4	Minimum pre cursor equalization ratio >= 1.54

Minimum post-cursor full scale ratio

This section verifies that the minimum pre-cursor equalization ratio is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.5.5, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.5.5, Table 93-4

Measurement procedure

1. Set the DUT in PRESET mode and compute the filter coefficients.
2. Calculate equalizer coefficients C(-1), C(0) and C(1). Minimum Post cursor equalization ratio is calculated as below:

   Min Post-Cursor Eq Ratio = [C(0) – C(1)] / [C(0) + C(1)]

Limits

CR4	Minimum post cursor equalization ratio >= 4
KR4	Minimum post cursor equalization ratio >= 4

Normalized coefficient step size

This section verifies that the increment and decrement step size of transmitter equalizer coefficients (C(-1), C(0) and C(1)) of the DUT are in conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.5.4, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.5.4, Table 93-4

Measurement procedure

C(-1) Increment step size and C(-1) Decrement step size:

1. Set the DUT in PRESET state; acquire the signal and calculate the filter coefficients.
2. Configure all the DUT's transmitter equalizer coefficients to INITIALIZE state.
3. Measure the C(-1) coefficient value and denote as C(-1)_Initilaize
4. Configure the DUT's transmitter equalizer coefficient C(-1) to INCREMENT, C(0) and C(1) to HOLD state.
5. Measure the C(-1) coefficient value and denote as C(-1)_Increment
6. C(-1) Increment step size is calculated as: Δc = C(-1)_Increment – C(-1)_Initialize
7. Configure the DUT's transmitter equalizer coefficient C(-1) to DECREMENT, C(0) and C(1) to HOLD state.

8. Measure the C(-1) coefficient value and denote as C(-1)_Decrement
9. C(-1) Increment step size is calculated as: Δc = C(-1)_Decrement – C(-1)_Increment

C(0) Increment step size and C(0) Decrement step size:

1. Set the DUT in PRESET state; acquire the signal and calculate the filter coefficients.
2. Configure all the DUT's transmitter equalizer coefficients to INITIALIZE state.
3. Measure the C(0) coefficient value and denote as C(0)_Initilaize
4. Configure the DUT's transmitter equalizer coefficient C(0) to INCREMENT, C(-1) and C(1) to HOLD state.
5. Measure the C(0) coefficient value and denote as C(0)_Increment
6. C(0) Increment step size is calculated as: Δc = C(0)_Increment – C(0)_Initialize
7. Configure the DUT's transmitter equalizer coefficient C(0) to DECREMENT, C(-1) and C(1) to HOLD state.
8. Measure the C(0) coefficient value and denote as C(0)_Decrement
9. C(0) Increment step size is calculated as: Δc = C(0)_Decrement – C(0)_Increment

C(1) Increment step size and C(1) Decrement step size:

1. Set the DUT in PRESET state; acquire the signal and calculate the filter coefficients.
2. Configure all the DUT's transmitter equalizer coefficients to INITIALIZE state.
3. Measure the C(1) coefficient value and denote as C(1)_Initilaize
4. Configure the DUT's transmitter equalizer coefficient C(1) to INCREMENT, C(-1) and C(0) to HOLD state.
5. Measure the C(1) coefficient value and denote as C(1)_Increment
6. C(1) Increment step size is calculated as: Δc = C(1)_Increment – C(1)_Initialize
7. Configure the DUT's transmitter equalizer coefficient C(1) to DECREMENT, C(-1) and C(0) to HOLD state.
8. Measure the C(1) coefficient value and denote as C(1)_Decrement
9. C(1) Increment step size is calculated as: Δc = C(1)_Decrement – C(1)_Increment

Limits

CR4	■ Min: 0.0083 ■ Max: 0.05
KR4	■ Min: 0.0083 ■ Max: 0.05

Signal to noise and distortion ratio

This section verifies that the signal to noise and distortion ratio of the DUT is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.7, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.6, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Configure the DUT in OPTIMAL state and capture the signal for measurement.
2. Compute the Linear fit pulse response (Pmax) and the RMS value of the linear fit error σ(e) from the signal.
3. Measure the RMS deviation of voltage from the mean and denote it as (σ(n). This has to be measured at the flat portion of the waveform where the slope is close to zero.
4. Signal to Noise an Distortion ratio is measured using below equation:

$$SNDR = 10\log_{10}\left(\frac{p_{max}^2}{\sigma_e^2 + \sigma_n^2}\right)\ dB$$

Limits

CR4	SNDR > 26 dB
KR4	SNDR > 27 dB

Output Jitter

Even-odd jitter peak to peak

This section verifies that the value of the even odd jitter is within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.8, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.7, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Capture a long sequence of PRBS pattern.
2. Even Odd Jitter is measured as the magnitude of the difference between the average deviation of all even numbered transitions and the average deviation of all odd numbered transitions, where even odd transitions are not possible transitions, but actual transitions.
3. The Even Odd Jitter is carried out by DPOJET using F/n measurement with n being set to 2.

Limits

CR4	Even Odd Jitter <= 0.035 UI
KR4	Even Odd Jitter <= 0.035 UI

Effective bounded and total uncorrelated jitter peak to peak

This section verifies that the jitter components are within the conformable limits according to the specification.

Standards	Test points	Specification
CR4	TP2	IEEE 802.3bj, Section 92.8.3.8, Table 92-6
KR4	TP0a	IEEE 802.3bj, Section 93.8.1.7, Table 93-4

Required test equipment

Minimum system requirements

Equipment connection diagram

Inputs

- Differential signal created using two single ended sources (Positive and Negative) and filtered through fourth order 33 GHz Bessel Thomson filter.

Measurement procedure

1. Capture PRBS signal with minimum of 2e3 edges present in the signal.
2. For calculating jitter application, consider the edges attached with long sequence of ones and zeros. This makes sure that the only uncorrelated jitter is measured. Application performs this measurement with longer record length to get more accurate results.
3. EBUJ (Effective bounded uncorrelated jitter) and ERJ (Effective random jitter) are calculated from the signal using dual-dirac jitter analysis as given in specification section 92.8.3.8.2.

   Effective total uncorrelated jitter is calculated using the equation Effective total uncorrelated jitter = 7.9 * ERJ + EBUJ.

Limits

CR4 and KR4	Effective bounded uncorrelated jitter <= 0.1 UI peak-to-peak
	Effective total uncorrelated jitter <= 0.18 UI peak-to-peak

SCPI commands

About SCPI command

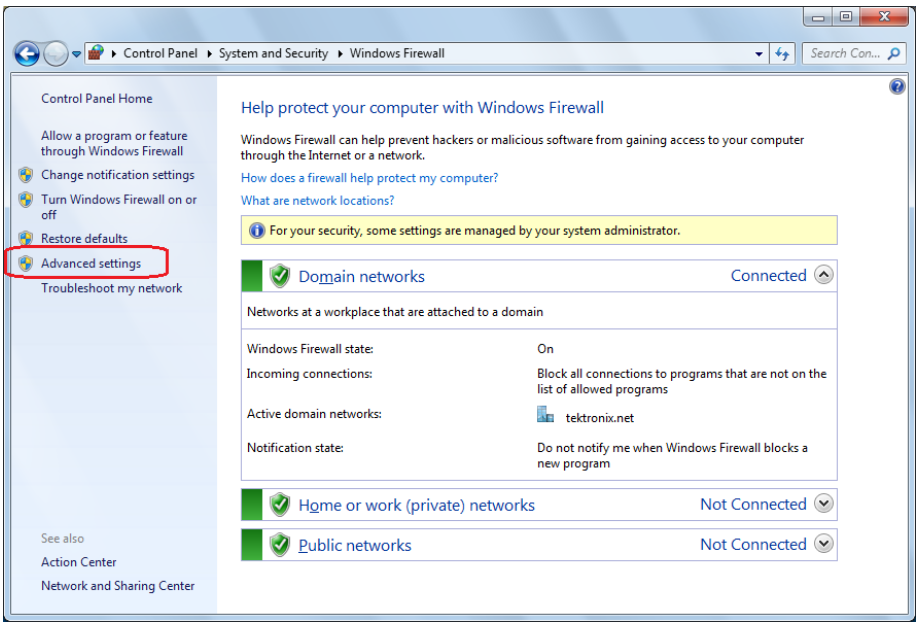
You can use Standard Commands for Programmable Instruments (SCPI) to communicate with the TekExpress application.

Socket configuration for SCPI commands

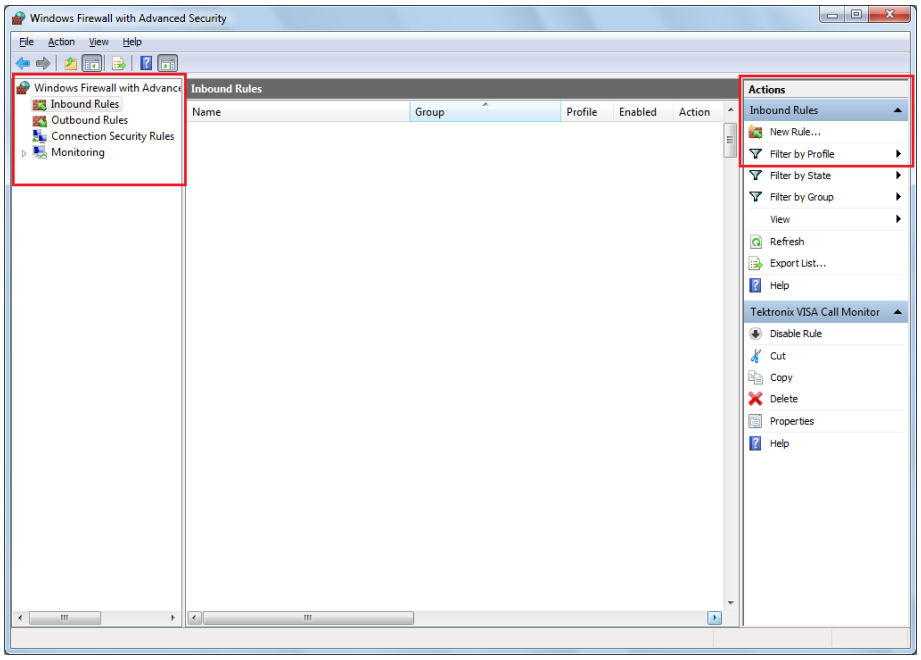
This section describes the steps for TCPIP socket configuration and TekVISA configuration to execute the SCPI commands.

TCPIP socket configuration

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

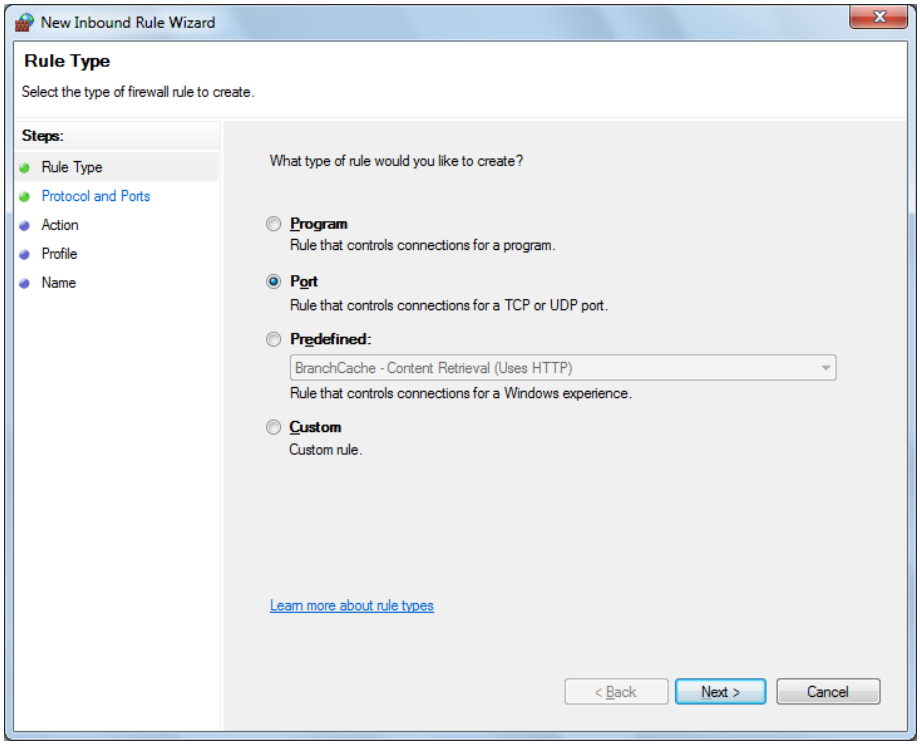


2. In Windows Firewall with Advanced Security menu, select **Windows Firewall with Advanced Security on Local Computer** > **Inbound Rules** and click New Rule…

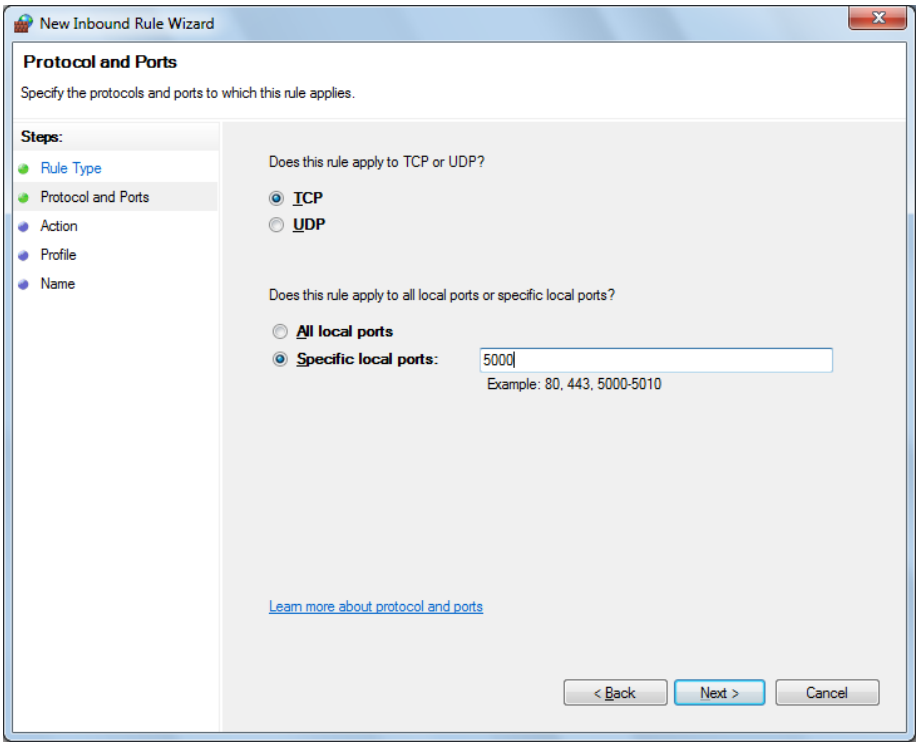


3. In New Inbound Rule Wizard menu

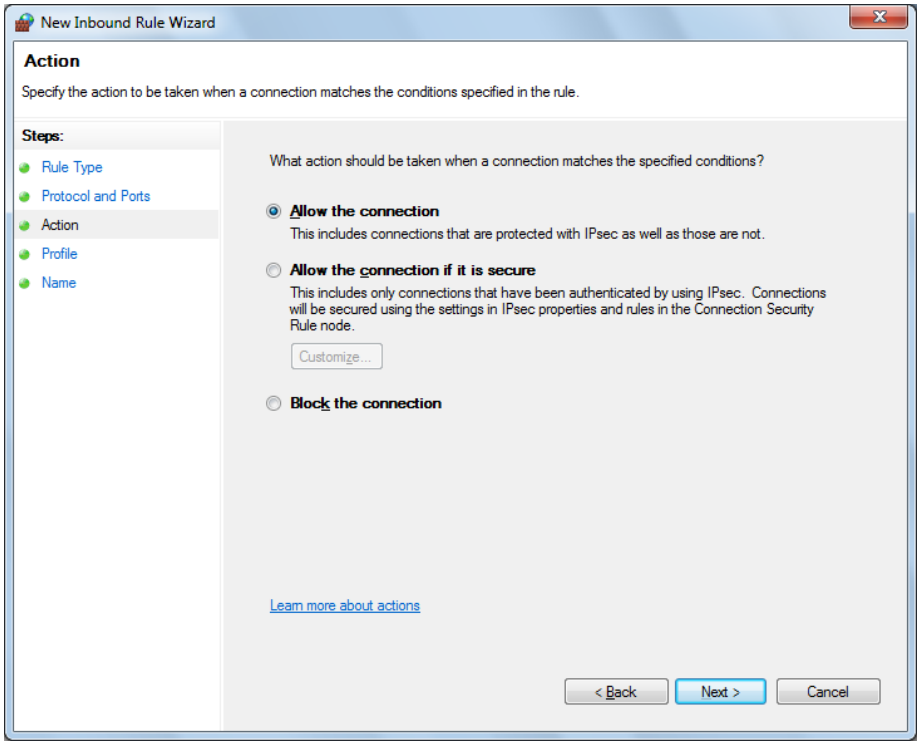
a. Select **Port** and click **Next**



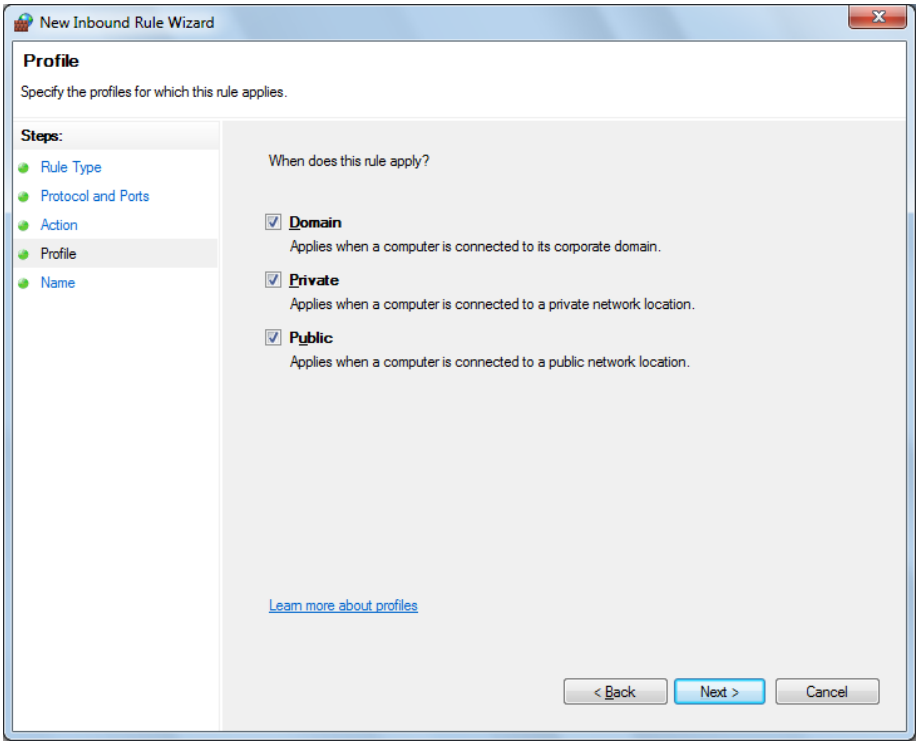
b. Select **TCP** as rule apply and enter 5000 for **Specific local ports** and click **Next**



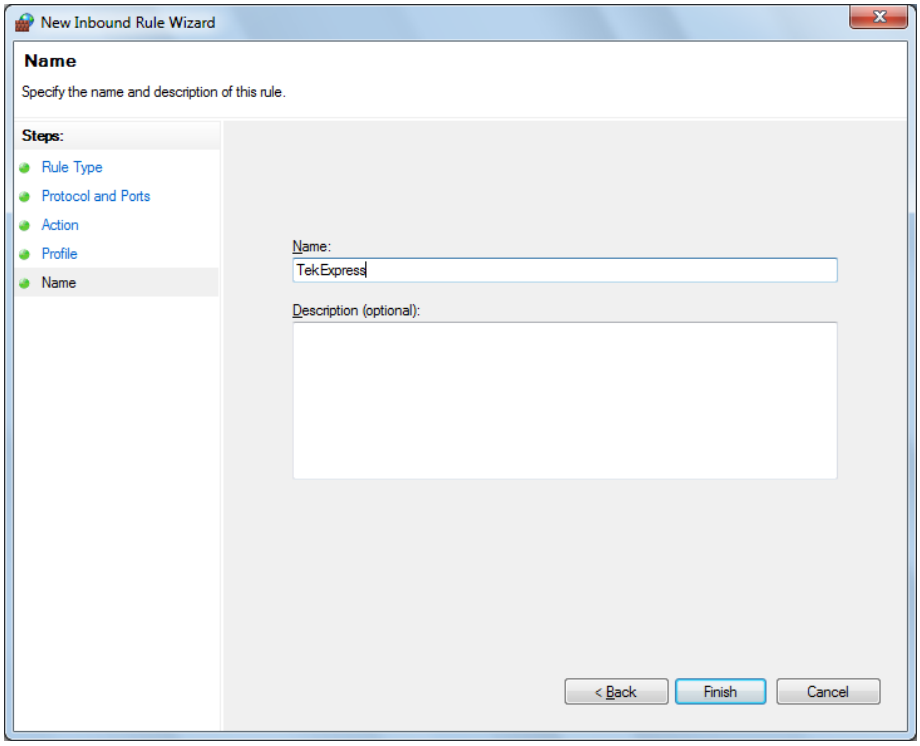
c. Select **Allow the connection** and click **Next**



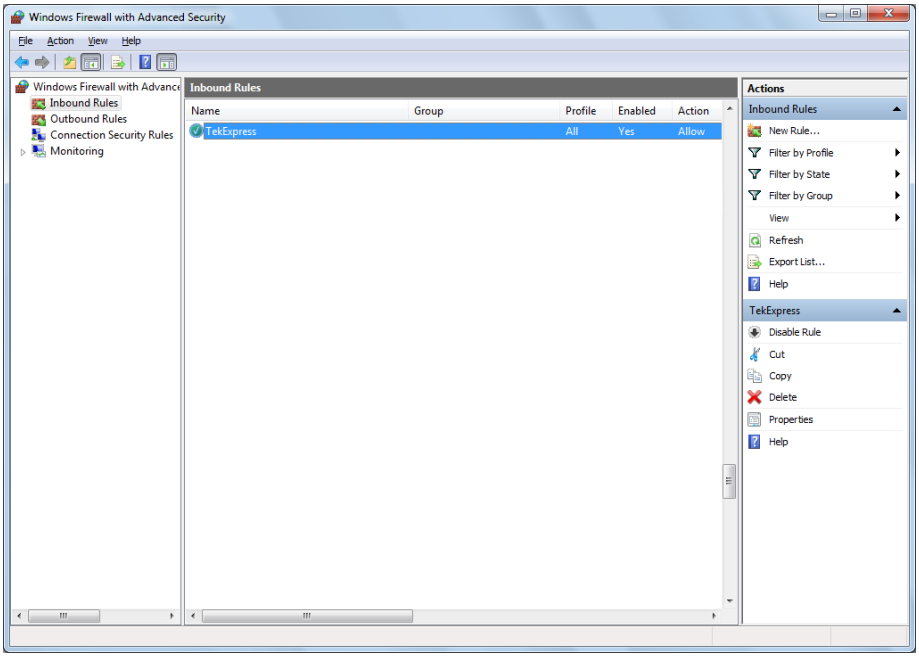
d. Select **Domain, Private, Public** and click **Next**



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

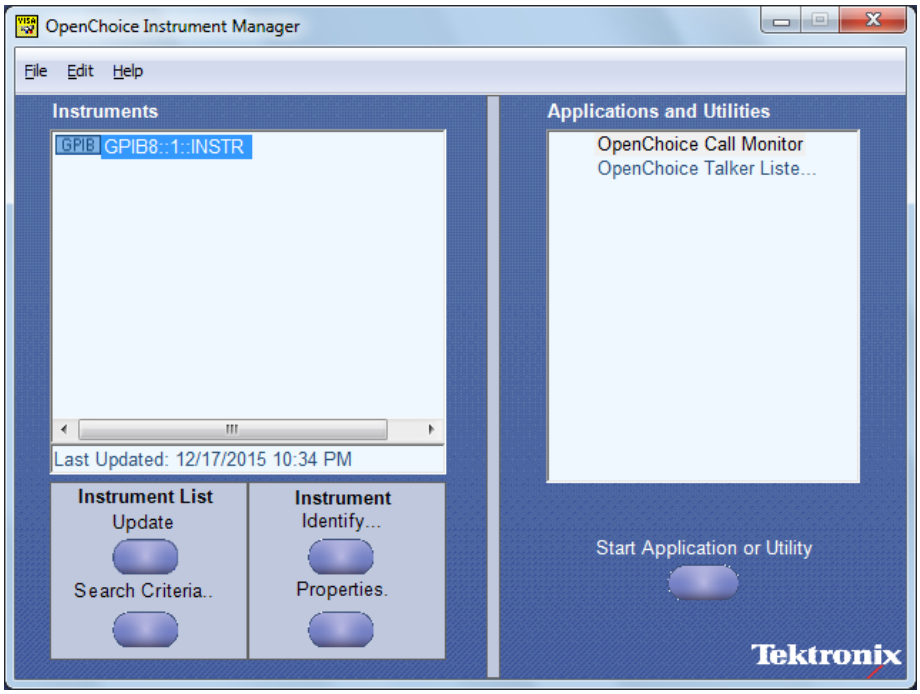


4. Check whether the Rule name is displayed in **Windows Firewall with Advanced Security menu** > **Inbound Rules**



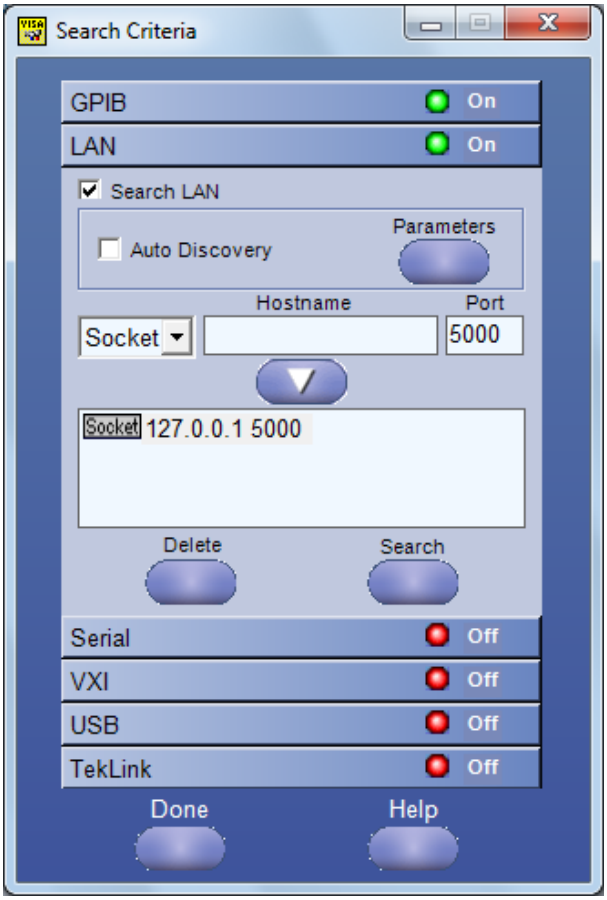
TekVISA configuration

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

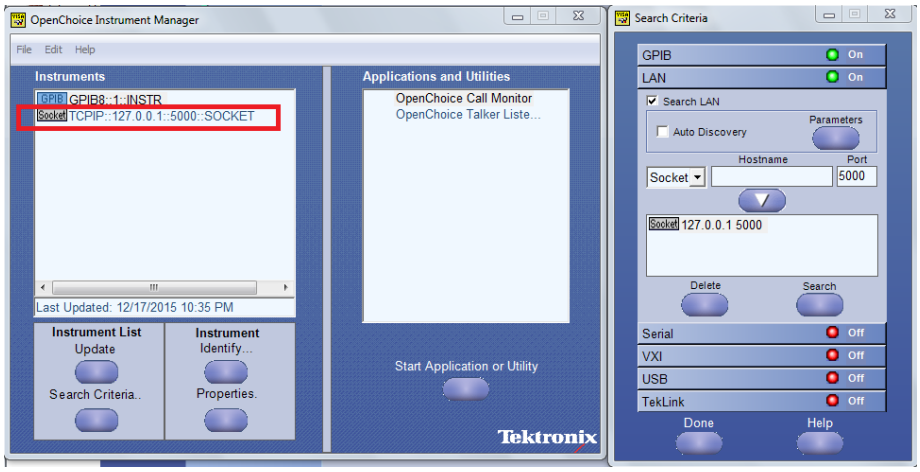


2. Click **Search Criteria**. In Search Criteria menu, click **LAN** to Turn-on. Select **Socket** from the drop-down list, enter the IP address of the TekExpress device in **Hostname** and type **Port** as 5000. Click  to configure the IP address with Port.

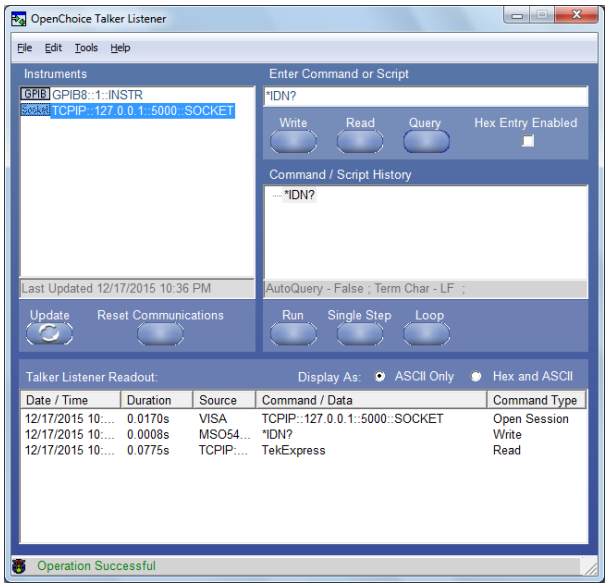
   Enter the Hostname as 127.0.0.1 if the TekVISA and TekExpress application are in the same system, else enter the IP address of the TekExpress application system.



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



4. Double-click **OpenChoice Takler 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.



TEKEXP:*IDN?

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

Syntax TEKEXP:*IDN?\n

Inputs NA

Outputs Returns active TekExpress application name running on the scope

TIP. *Click here for examples.*

TEKEXP:*OPC?

This command queries the execution status of the last executed command.

Syntax TEKEXP:*OPC?\n

Inputs NA

Outputs 0 - last command execution is not complete

1 - last command execution is complete

TIP. *Click here for examples.*

TEKEXP:ACQUIRE_MODE

This command sets the acquire mode as live or pre-recorded.

Syntax TEKEXP:ACQUIRE_MODE {LIVE | PRE-RECORDED}\n

Inputs {LIVE | PRE-RECORDED}

Outputs NA

TIP. *Click here for examples.*

TEKEXP:ACQUIRE_MODE?

This command queries the acquire mode type.

Syntax TEKEXP:ACQUIRE_MODE?\n

Inputs NA

Outputs {LIVE | PRE-RECORDED}

TIP. *Click here for examples.*

TEKEXP:EXPORT

This command returns all the bytes of data to the specified file.

Syntax	Outputs
TEKEXP:EXPORT REPORT\n	Returns the report file in bytes
TEKEXP:EXPORT WFM,"<FileName>"\n	Returns the specified waveform file in bytes
TEKEXP:EXPORT IMAGE,"<FileName>"\n	Returns the specified image file in bytes

Inputs FileName - Specifies the file name

TIP. *Click here for examples.*

TEKEXP:INFO?

This command queries the information about the file(s).

Syntax	Outputs
TEKEXP:INFO? REPORT\n	<ReportFileSize>,"<ReportFileName.mht>"
TEKEXP:INFO? WFM\n	<WfmFile1Size>,"<WfmFileName1.wfm>";<WfmFile2Size>,"<WfmFileName2.wfm>";...
TEKEXP:INFO? IMAGE\n	<Image1FileSize>,"<Image1FileName>";<Image2FileSize>,"<Image2FileName>" ;...

TIP. *Click here for examples.*

TEKEXP:INSTRUMENT

This command sets the value for the selected instrument type.

Syntax TEKEXP:INSTRUMENT "<InstrumentType>",<Value>"\n

Inputs InstrumentType

Value

TIP. *Check Command parameters list for InstrumentType and Value parameters.*

Outputs NA

TIP. *Click here for examples.*

TEKEXP:INSTRUMENT?

This command queries the instrument selected for the specified instrument type.

Syntax TEKEXP:INSTRUMENT? "<InstrumentType>"\n

Inputs InstrumentType

TIP. *Check Command parameters list for InstrumentType parameters.*

Outputs Returns the instrument selected for the specified instrument type

TIP. *Click here for examples.*

TEKEXP:LASTERROR?

This command queries the last error string occurred for the current TCP session. If there are no errors since startup, or since the last call to TEKEXP:LASTERROR?\n, this command returns an empty string.

Syntax TEKEXP:LASTERROR?\n

Inputs NA

Outputs <string>

TIP. *Click here for examples.*

TEKEXP:LIST?

This command queries the list of available device, suite, test, version or instrument.

Syntax	Outputs
TEKEXP:LIST? DEVICE\n	Returns the list of available device(s) as comma separated values.
TEKEXP:LIST? SUITE\n	Returns the list of available suite(s) as comma separated values.
TEKEXP:LIST? TEST\n	Returns the list of available test(s) as comma separated values.
TEKEXP:LIST? VERSION\n	Returns the list of available version(s) as comma separated values.
TEKEXP:LIST? INSTRUMENT,"<InstrumentType>"\n	Returns the list of available instruments' for the given Instrument type as comma separated values.

NOTE. *This command returns the list of items within double quotes (""). Iterate the receive procedure until the list ends with double quotes otherwise the next query commands won't work as expected.*

Inputs InstrumentType

TIP. *Check Command parameters list for InstrumentType parameters.*

TIP. *Click here for examples.*

TEKEXP:MODE

This command sets the execution mode as compliance or user defined.

Syntax TEKEXP:MODE {COMPLIANCE | USER-DEFINED}\n

Inputs {COMPLIANCE | USER-DEFINED}

Outputs NA

TIP. *Click here for examples.*

TEKEXP:MODE?

This command queries the execution mode type.

Syntax TEKEXP:MODE?\n

Inputs NA

Outputs {COMPLIANCE | USER-DEFINED}

TIP. *Click here for examples.*

TEKEXP:POPUP

This command sets the response to the active popup shown in the application.

Syntax TEKEXP:POPUP "<PopupResponse>"\n

Inputs PopupResponse

Outputs NA

TIP. *Click here for examples.*

TEKEXP:POPUP?

This command queries the active popup information shown in the application.

Syntax TEKEXP:POPUP?\n

Inputs NA

Outputs Returns the active popup information in the application.

TIP. *Click here for examples.*

TEKEXP:REPORT

This command generates the report for the current session.

Syntax TEKEXP:REPORT GENERATE\n

Inputs GENERATE

Outputs NA

TIP. *Click here for examples.*

TEKEXP:REPORT?

This command queries the queried header field value in the report.

Syntax TEKEXP:REPORT? “<HeaderField>”\n

Inputs HeaderField - Specifies to return the measured value for the indicated test.

TIP. *Check* ***Report*** *for HeaderField parameters.*

Outputs Returns the queried header field value in the report

TIP. *Click here for examples.*

TEKEXP:RESULT?

This command queries the result available in report summary/details table.

Syntax	Outputs
TEKEXP:RESULT? "<TestName>"\n	Return Pass/Fail status of the test.
TEKEXP:RESULT? "<TestName>","<ColumnName>"\n	Returns all the row values of the specified column for the test.
TEKEXP:RESULT? "<TestName>","<ColumnName>",<RowNumber>\n	Returns the column value for the specified row number [1].

[1] Row number starts from zero.

Inputs

TestName - Specifies the name of the test for which to obtain the test result value.

ColumnName - Specifies the column name for the measurement

RowNumber - Specifies the row number of the measurement

TIP. *Check* ***Report*** *for TestName, ColumnName, and RowNumber parameters.*

TIP. *Click here for examples.*

TEKEXP:SELECT

This command selects the device, suite, version, or test.

Syntax

TEKEXP:SELECT <string1>,<string2>,<string4>\n

TEKEXP:SELECT TEST,<string3>,<string4>\n

Inputs

<string1> = {DEVICE | SUITE | VERSION}

<string2> = {DeviceName | SuiteName | VersionName}

<string3> = {"<TestName>"| ALL| REQUIRED }

<string4> = {TRUE | FALSE}

TIP. *Check Command parameters list for DeviceName, SuiteName, VersionName, and TestName parameters.*

TIP. *Click here for examples.*

Outputs NA

TEKEXP:SELECT?

This command queries the name of the selected device, suite, version, or test.

Syntax TEKEXP:SELECT? {DEVICE | SUITE | TEST | VERSION}\n

Inputs {DEVICE | SUITE | TEST | VERSION}

Outputs Returns the name of the selected device, suite, version, or test.

TIP. *Click here for examples.*

TEKEXP:SETUP

This command sets the value of the current setup.

Syntax	Outputs
TEKEXP:SETUP DEFAULT\n	Restore to default Setup
TEKEXP:SETUP OPEN,"<SessionName>"\n	Open the session
TEKEXP:SETUP SAVE\n	Save the session
TEKEXP:SETUP SAVE,"<SessionName>"\n	Save the session

Inputs SessionName - The name of the session

TIP. *Click here for examples.*

TEKEXP:STATE

This command sets the execution state of the application.

Syntax TEKEXP:STATE {RUN | STOP | PAUSE | RESUME}\n

Inputs {RUN | STOP | PAUSE | RESUME}

Outputs NA

TIP. *Click here for examples.*

TEKEXP:STATE?

This command queries the current setup state.

Syntax	Outputs
TEKEXP:STATE?	RUNNING | PAUSED | WAIT | ERROR | READY | STOPPED
TEKEXP:STATE? SETUP	SAVED | NOT_SAVED

TIP. *Click here for examples.*

TEKEXP:VALUE

This command sets the value of parameters of type General, Acquire, Analyze, or DUTID.

Syntax

TEKEXP:VALUE GENERAL,"<ParameterName>",“<Value>”\n

TEKEXP:VALUE ACQUIRE,"<AcquireType>", "<ParameterName>", “<Value>”\n

TEKEXP:VALUE ANALYZE,"<ParameterName>".“<Value>”\n

TEKEXP:VALUE DUTID,“<Value>”\n

Inputs

ParameterName - Specifies the parameter name

AcquireType - Specifies the acquire type

Value - Specifes the value to set

TIP. *Check Command parameters list for ParameterName, AcquireType, and Value parameters.*

Outputs

NA

TIP. *Click here for examples.*

TEKEXP:VALUE?

This command queries the value of the parameter for type General, Acquire, Analyze, or DUTID.

Syntax	Outputs
TEKEXP:VALUE? GENERAL,"<ParameterName>"\n	Returns the value of Parameter for type GENERAL
TEKEXP:VALUE? ACQUIRE,"<AcquireType>","<ParameterName>"\n	Returns the value of Parameter for type ACQUIRE
TEKEXP:VALUE? ANALYZE,"<ParameterName>"\n	Returns the value of Parameter for type ANALYZE
TEKEXP:VALUE? DUTID\n	Returns the DUTID value

Inputs

ParameterName - Specifies the parameter name

AcquireType - Specifies the acquire type

TIP. *Check Command parameters list for ParameterName and AcquireType parameters.*

Outputs

Returns the value of Parameter for type GENERAL | ACQUIRE | ANALYZE | DUTID.

TIP. *Click here for examples.*

Command parameters list

This section provides the parameters list for the SCPI commands.

Parameters	Description
InstrumentType	Specifies the instrument type. Valid values are: ■ AWG ■ Real Time Scope
Value	Specifies the value parameters. ■ For InstrumentType, valid values are: ■ Do not use ■ GPIB8::1::INSTR ■ For DUTID, valid value is: ■ Comment
DeviceName	Specifies the device name. Valid values are: ■ CAUI4-TX ■ KR4-TX ■ CR4-TX
SuiteName	Specifies the suite name. Valid values are: ■ TP1a, TP4 for CAUI4 ■ TP0a for CR4 ■ TP2 for KR4
VersionName	Specifies the version name. Valid values are ■ 100GBASE Tx, IEEE 802.3bm, Annex 83E.3.1 ■ 100GBASE Tx, IEEE 802.3bm, Annex 83E.3.2 ■ 100GBASE Tx, IEEE 802.3bj - Section 93 ■ 100GBASE Tx, IEEE 802.3bj - Section 92

Parameters	Description
TestName for **CAUI4**	■ DC Common Mode Output Voltage ■ Diff Peak to Peak Output Voltage -Tx Disabled ■ Diff Peak to Peak Output Voltage -Tx Enabled ■ AC Common Mode Output Voltage ■ Single Ended Output Voltage ■ Signaling Rate ■ Eye Width ■ Eye Height Differential ■ Transition Time ■ Vertical Eye closure

Parameters	Description
TestName for **KR4**	■ DC Common Mode Output Voltage ■ Diff Peak to Peak Output Voltage -Tx Disabled ■ Diff Peak to Peak Output Voltage -Tx Enabled ■ AC Common Mode Output Voltage ■ Single Ended Output Voltage ■ Signaling Rate ■ Linear Fit Pulse Peak ■ Minimum Pre-cursor full scale ratio ■ Minimum Post-cursor full scale ratio ■ Normalized Coefficient Step Size ■ Signal To Noise And Distortion Ratio ■ Steady State Voltage ■ Even-Odd Jitter Peak to Peak ■ Effective total uncorrelated jitter peak to peak ■ Effective bounded uncorrelated jitter peak to peak
TestName for **CR4**	■ DC Common Mode Output Voltage ■ Diff Peak to Peak Output Voltage -Tx Disabled ■ Diff Peak to Peak Output Voltage -Tx Enabled ■ AC Common Mode Output Voltage ■ Single Ended Output Voltage ■ Signaling Rate ■ Linear Fit Pulse Peak ■ Minimum Pre-cursor full scale ratio ■ Minimum Post-cursor full scale ratio ■ Normalized Coefficient Step Size ■ Signal To Noise And Distortion Ratio ■ Steady State Voltage ■ Even-Odd Jitter Peak to Peak ■ Effective total uncorrelated jitter peak to peak ■ Effective bounded uncorrelated jitter peak to peak

ParameterName and Value for General, Acquire and Analyze

Specifies the ParameterName and Value for General, Acquire and Analyze. The configuration parameters available are not same for measurements.

Table 15: ParameterName and Value for General

ParameterName	Value
Report Update Mode	■ New ■ Append ■ Replace
Auto increment report name if duplicate	TRUE or FALSE
Include Pass/Fail Results Summary	TRUE or FALSE
Include Detailed Results	TRUE or FALSE
Include Plot Images	TRUE or FALSE
Include Setup Configuration	TRUE or FALSE
Include User Comments	TRUE or FALSE
Save As Type	■ Web Archive (*.mht;*.mhtml) ■ PDF (*.pdf;) ■ CSV (*.csv;)
View Report After Generating	TRUE or FALSE
Report Group Mode	■ Test Name ■ Test Result
Create report at the end	■ Included ■ Excluded
DUTID Comment	User comment
Run Test More than Once	TRUE or FALSE
Number of Runs	1 to 200
On Failure Stop and Notify	TRUE or FALSE
Timer Warning Info Message Popup	■ "True" ■ "FALSE"
Timer Warning Info Message Popup Duration	1 to 300
Timer Error Message Popup	■ "True" ■ "False"
Timer Error Message Popup Duration	1 to 300
Probing Type	■ SINGLE ENDED ■ Differential

ParameterName	Value
Signal Validation	■ Prompt me if Signal Validation Fails ■ Skip Test if Signal Validation Fails ■ Use signal as is - Don't Validate
Pattern Type	■ PRBS7 ■ PRBS9 ■ PRBS11 ■ PRBS15
Data Rate	valid value is 18 to 28.05
MODE	■ COMPLIANCE ■ USER-DEFINED
ACQUIRE_MODE	■ LIVE ■ PRE-RECORDED
Bandwidth	■ Full BW ■ 50GHz
RL for JItter	■ 20 ■ 30 ■ 40
RL for Eye	■ 20 ■ 30 ■ 40
Apply Filter	True or False
De-Embedding filter	Filter path Example: TEKEXP:VALUE GENERAL,"De-Embedding filter","C:\Users\sqetest\Desktop"
Ref levels	■ Absolute ■ Percentage
Hysteresis	■ For Percentage, valid value is 0 to 10 ■ For Absolute, valid value is -2 to 2
Mid level	■ For Percentage, valid value is 45 to 55 ■ For Absolute, valid value is -10 to 10

ParameterName	Value
CTLE FilterFIle	■ All ■ CTLE_1dB.flt ■ CTLE_2dB.flt ■ CTLE_3dB.flt ■ CTLE_4dB.flt ■ CTLE_5dB.flt ■ CTLE_6dB.flt ■ CTLE_7dB.flt ■ CTLE_8dB.flt ■ CTLE_9dB.flt ■ Custom ■ BestCTLE
Custom Filter Path (when CTLE FilterFIle is Custom)	CTLE filter file path Example: TEKEXP:VALUE GENERAL,"Custom Filter Path","C:\Program Files\Tektronix\TekExpress \TekExpress 100G-TXE\Compliance Suites\CAUI4-TX\TP1a\CTLE Filters\25.78125"
Custom Filter File (to select multiple custom CTLE filter file)	Names of CTLE filter files to select Example: TEKEXP:VALUE GENERAL,"Custom Filter File","CTLE_5dB.flt;CTLE_2dB.flt"

Table 16: ParameterName and Value for Analyze

Test Name	ParameterName	Value
Transition Time	Measurement Range	■ 10% - 90%

Examples

This section provides the examples for the SCPI commands.

Example	Description
TEKEXP:*IDN?\n	It returns the active TekExpress application name running on the scope.
TEKEXP:*OPC?\n	It returns the last command execution status.
TEKEXP:ACQUIRE_MODE PRE-RECORDED\n	It sets the acquire mode as pre-recorded.
TEKEXP:ACQUIRE_MODE?\n	It returns LIVE when acquire mode is set to live.
TEKEXP:EXPORT REPORT\n	It returns the report file in bytes. This can be written into another file for further analysis.
TEKEXP:INFO? REPORT\n	It returns “100,”ReportFileName.mht”", when 100 is the filesize in bytes for the filename ReportFileName.
TEKEXP:INFO? WFM\n	It returns “100,“WfmFileName1.wfm”";“200,“WfmFileName2.wfm”" when 100 is the filesize in bytes for the filename WfmFileName1.wfm and 200 is the filesize in bytes for the filename WfmFileName2.wfm.
TEKEXP:INSTRUMENT "Real Time Scope",DPO72504D (GPIB8::1::INSTR)\n	It sets the instrument value as DPO72504D (GPIB8::1::INSTR) for the selected instrument type Real Time Scope.
TEKEXP:INSTRUMENT? “Real Time Scope”\n	It returns "IDPO72504D (GPIB8::1::INSTR), when DPO72504D (GPIB8::1::INSTR)" is the selected instrument for the instrument type Real Time Scope.
TEKEXP:LASTERROR?\n	It returns ERROR: INSTRUMENT_NOT_FOUND, when no instrument is found.
TEKEXP:LIST? DEVICE\n	It returns "TX-Device,RX-Device" when TX-Device, RX-Device are the available device.
TEKEXP:LIST? INSTRUMENT,"Real Time Scope"\n	It returns "DPO72504D (GPIB8::1::INSTR),MSO72504 (TCPIP::134.64.248.91::INSTR)" when DPO72504D (GPIB8::1::INSTR), MSO72504 (TCPIP::134.64.248.91::INSTR) are the list of available instruments.
TEKEXP:MODE COMPLIANCE\n	It sets the execution mode as compliance.
TEKEXP:MODE?\n	It returns COMPLIANCE when the execution mode is compliance.
TEKEXP:POPUP “OK”\n	It sets OK as the response to active popup in the application.
TEKEXP:POPUP?\n	It returns "OK", when OK is the active popup information shown in the application.
TEKEXP:REPORT GENERATE\n	It generates report for the current session.
TEKEXP:REPORT? “Scope Model”\n	It returns "DPO73304SX" when DPO73304SX is the scope model.
TEKEXP:REPORT? “DUT ID”\n	It returns "DUT001" when DNI_DUT001 is the DUT ID.
TEKEXP:RESULT? "Period using SCOPE (Acquire-Analyze Combined)"\n	It returns Pass when the test result is Pass.
TEKEXP:RESULT? "Period using SCOPE (Acquire-Analyze Combined)","Margin",1\n	It returns "L:-50.000ps H:2000.000ps" when L:-50.000ps H:2000.000ps is the value.
TEKEXP:SELECT DEVICE, TX_Device, TRUE\n	It selects TX_Device
TEKEXP:SELECT? DEVICE\n	It returns "TX-Device" when TX-Device is the selected device type.

Example	Description
TEKEP:SETUP DEFAULT\n	It restores the application to default setup.
TEKEXP:STATE STOP\n	It stops the test execution.
TEKEXP:STATE?\n	It returns as READY when the application is ready to run next measurement.
TEKEXP:STATE? SETUP\n	It returns as NOT_SAVED when the current setup is not saved.
TEKEXP:VALUE GENERAL,"Signal Type", "N1N0"\n	It sets the signal type parameter value to N1N0.
TEKEXP:VALUE? GENERAL,"Signal Type"\n	It returns "N1N0" when N1N0 is the Signal Type value.

References

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