Tektronix®

TekExpress® USB4
Automated Test Solution Software

Application Help

077-1702-02

TekExpress® USB4
Automated Test Solution Software

Application Help

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Contacting Tektronix

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

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

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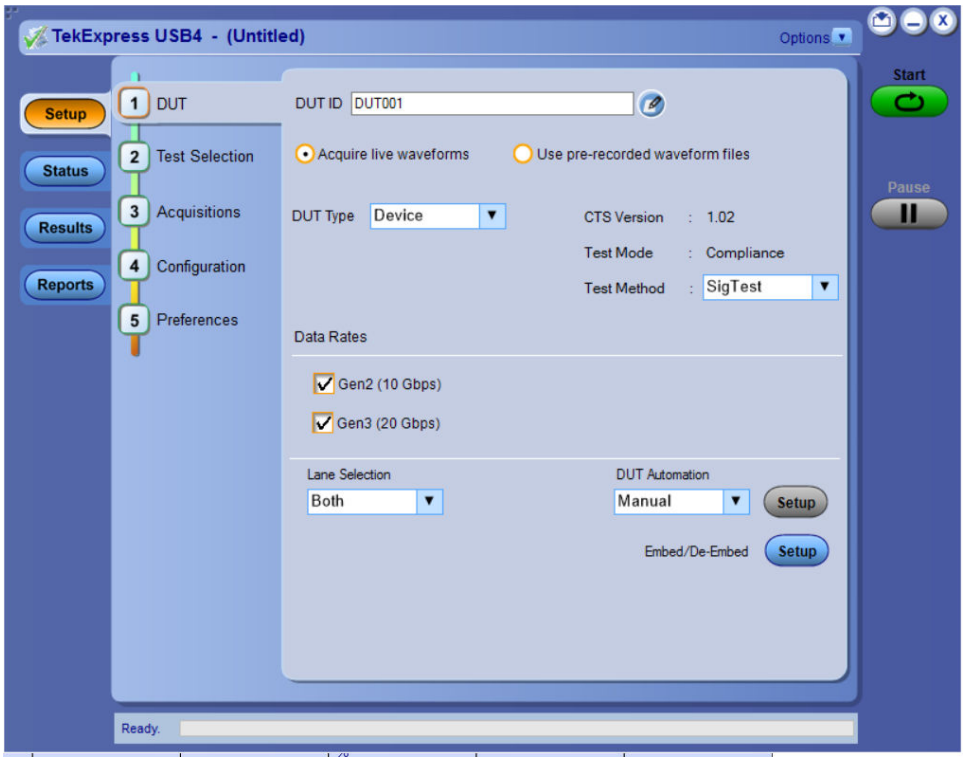
Welcome

Welcome to the TekExpress® USB4 Automated Test Solution Software application (referred to as USB4 in the rest of the document). TekExpress USB4 provides an automated, simple, and efficient way to test USB4 transmitter interfaces and devices for USB-IF compliance through DPOJET for better margin, debugging, and analysis.



Key features and benefits

- Automated solution for USB4 connectors which support USB4 specification and CTS (Gen2 and Gen3).
- DPOJET plug-in for connectors which support USB4 specification and CTS (Gen2 and Gen3) with setup files and MOI.
- Support embedding Channels (2 m and 0.8 m) and their respective filter files for connectors.
- Manual support for compliance to debug with DPOJET USB4 and CIO plug-ins.
- SigTest (USB-IF Compliance Tool) integration for USB4 Gen2 and Gen3 device and host.

Getting help and support

Product documents

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

Table 1: TekExpress Application documents

To learn about	Use this document
How to use the application How to remotely control the instrument	TekExpress USB4 Help PDF version of this document can be downloaded from *www.tek.com/downloads* Compiled HTML (CHM) version is integrated with the application. Press **F1** key from the keyboard to start the help. Tektronix Part Number: 077-xxxx-xx

Conventions

This application help uses the following conventions:

- The term "Application," and "Software" refers to the TekExpress USB4 application.
- The term “DUT” is an abbreviation for Device Under Test.
- The term “select” is a generic term that applies to the two methods of choosing a screen item (button control, list item): using a mouse or using the touch screen.
- A **Note** identifies important information.

Table 2: Icons used in the help

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

Technical support

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

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

General information

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

Application specific information

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

Getting started

Hardware requirements

Minimum system requirements

The following table shows the minimum system requirements needed for an oscilloscope to run TekExpress USB4.

Table 3: TekExpress USB4 system requirements

Component	Requirement
Oscilloscope	See *Supported instruments*
Processor	Same as the oscilloscope
Operating System	Same as the oscilloscope: • Windows 10 (64-bit only) SP1 *Windows 10 user account settings*
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	TekScope 10.12.0 and above (for Windows 10)

Software	• Microsoft .NET 4.0 Framework
	• DPOJET Jitter and Eye Analysis Tool (version 10.3.0 or higher) with Advanced Jitter and Eye analysis (DJA option) installed.
	• Microsoft Internet Explorer 7.0 SP1 or later, or other Web browser for viewing reports.
	• Adobe Reader software 7.0 or later for viewing portable document format (PDF) files.
	• Serial Data Link Analysis (SDLA) software, version 3.0.11 or later, for Channel De-Embed, for custom filter development.
	• SigTest pre-requisites:
	  • MATLAB runtime compiler MCR 9.11
	  • Set the environment variable after installing MATLAB Runtime 9.11
	  • Variable: Path
	  • Value: C:\Program Files\MATLAB\MATLAB Runtime\v911\runtime\win64
	  • Copy *USB4_SigTest.exe* app in the `C:\USB4_SigTest` location

[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.

Supported instruments

Table 4: Required equipment

Resource	Model supported	
Real-time oscilloscope	• Tektronix DPO, DX, and SX series oscilloscopes (Windows 10 OS): 21 GHz bandwidth is suitable for Gen2 (10 Gbps) and Gen3 (20 Gbps) measurements. • For Dual stack: SX series oscilloscopes of bandwidth 50, 59, and 70 GHz suitable for Gen2 and Gen3 measurements.	
Probes	Two TCA-SMA cables Two SMP-SMA cables	
USB4 fixtures	• USB-IF approved Wilder-Tech fixtures for USB4 compliance testing. • The fixture set includes Tx Host and Device testing.	
Connector Type	Type C	Symmetrical connector on both side
Ultra sync cable	Supports DPO SX series oscilloscope with bandwidth of 50, 59, and 70 GHz and is only applicable for dual-stack.	

See also

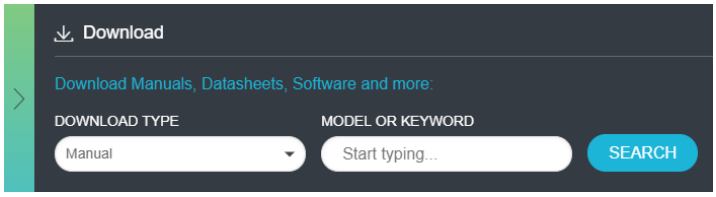
Minimum system requirements

Software requirements

Downloading and installing the software

Complete the following steps to download and install the latest TekExpress USB4 application.

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



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

   The software is installed at `C:\Program Files\Tektronix\TekExpress\TekExpress USB4`.
5. Select **Application** > **TekExpress USB4** from the Oscilloscope menu, to open the application.

Activate the license

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

1. In the **TekScope** application menu bar, click **Utilities** > **Option Installation**. The TekScope Option Installation wizard opens.

2. Push the **F1** key on the oscilloscope keyboard to open the Option Installation help topic.
3. Follow the directions in the help topic to activate the license.

View software version and license key details

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

Required windows 10 user account setting

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

1. Go to **Control Panel > User Accounts > Change User Account Control settings**.
2. Set the sliding control to **Never Notify** as shown in the image, and click **OK**.

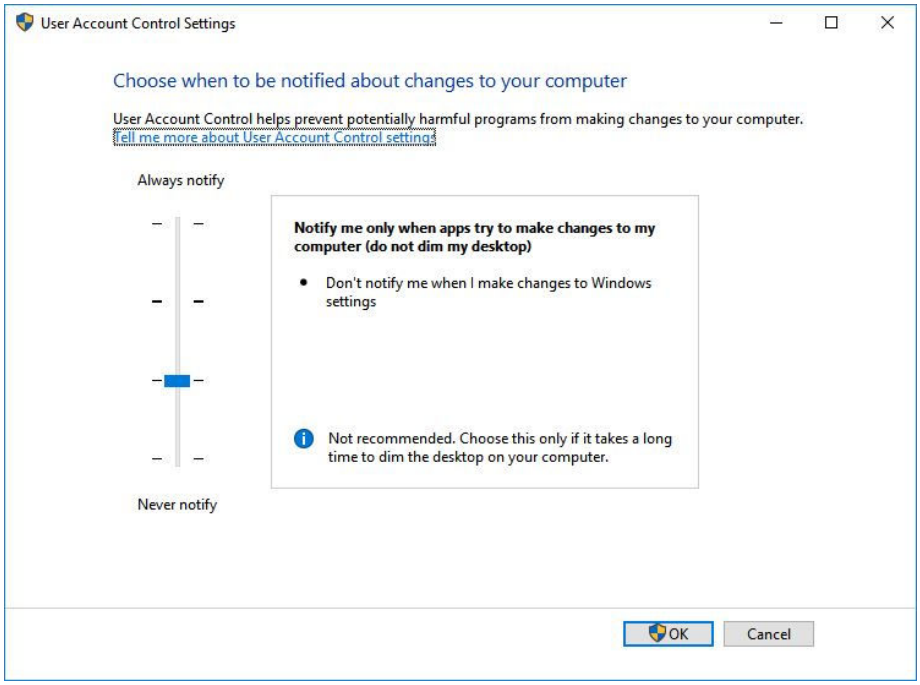


Figure 1: Windows 10 User Account Control Settings

See also

Supported oscilloscopes

Verify application installation

To verify the installation was successful:

1. Open the TekScope application.
2. Click the **Analyze** menu.
3. Verify that TekExpress USB4 is listed in the Analyze menu.
4. Click **TekExpress USB4** to open the application.

   Verify that the application opens successfully.

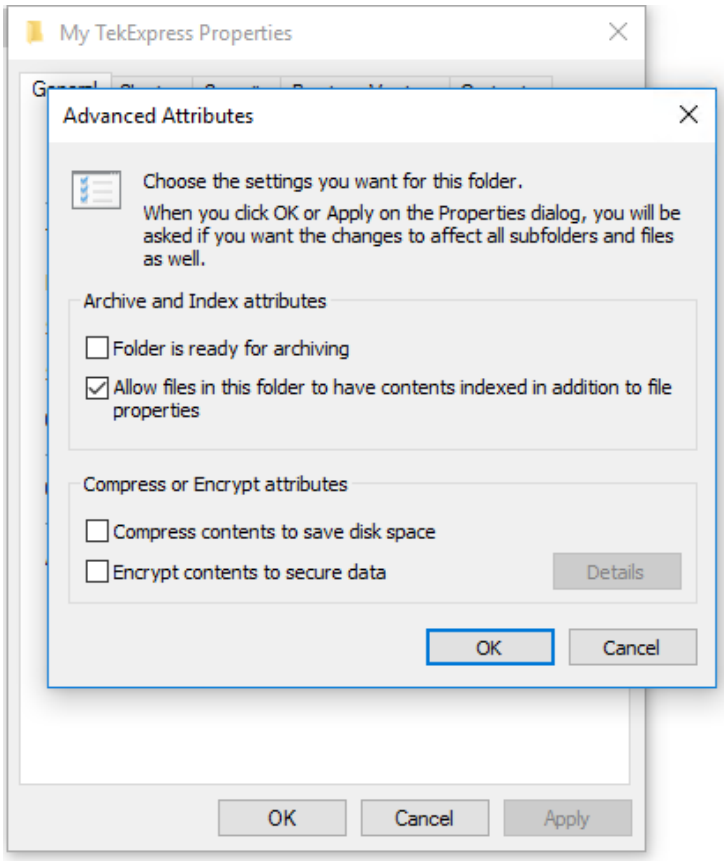
Required my TekExpress folder settings

Before you run tests for the first time, you need to *Set the My TekExpress folder permissions*.

Set my TekExpress folder permissions

Ensure that the My TekExpress folder has read and write access. Also verify that the folder is not set to be encrypted:

1. Right-click the folder and select **Properties**.
2. Select the **General** tab, and then click **Advanced**.
3. In the Advance Attributes dialog box, ensure that the option Encrypt contents to secure data is NOT selected.



4. Click the **Security** tab and verify that the correct read and write permissions are set.

Test files storage location

When you launch TekExpress USB4 for the first time, it creates the following folders on the oscilloscope:

- `\My Documents\My TekExpress\USB4`
- `\My Documents\My TekExpress\USB4\Untitled Session`

Every time you launch TekExpress USB4, an `Untitled Session` folder is created in the `USB4` folder. The `Untitled Session` folder is automatically deleted when you exit the `USB4` application. To preserve your test session files, save the test setup before exiting the TekExpress application.

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

See also

Set the My TekExpress folder permissions

Application directories on page 76

File name extensions on page 77

Setting up the test environment

Test process flow

Use the following list to set up and performing USB4 tests.

1. Allow test instruments to warm up (~20 minutes).
2. *Deskew the real-time oscilloscope*.
3. *Set up test equipment*.
4. *Verify that required instruments are connected to USB4*.
5. *Set DUT settings*.
6. *Select the tests*.
7. *View acquisition settings*.
8. Set global signal-related parameters.
9. *Select test notification preferences*.
10. *Select report options*.
11. *Check the prerun checklist*
12. Click **Start** to *Run tests*.

Deskew real-time oscilloscopes

Use the following procedure to deskew direct input SMA channels on a real time oscilloscope.

Note: DPOJET has an automatic deskew option under. Refer to your DPOJET online help for information on how to deskew the channels.

1. Run Signal Path Compensation (SPC) on the oscilloscope.
2. Connect a SMA Power Splitter (preferred) or SMA 50 Ω coaxial “T” connector to the Fast Edge output of the oscilloscope.
3. Connect SMA cables from each of the two channels to be deskewed to the power splitter (or SMA coaxial “T” connector). It is best to use matched cables when making high speed serial measurements. **It is important to use the same cables during deskew that you will use for subsequent measurements**.
4. Select **Default Setup**, and then select **Autoset** on the oscilloscope front panel.
5. Set the oscilloscope for 70% to 90% full screen amplitude on both channels. Center both traces so that they overlap.
6. Make sure that volts/div, position, and offset are identical for the two channels being deskewed.
7. Set the time/div to approximately 100 ps/div or less, with sample rate at 1 ps/pt. These settings are not critical, but should be close.
8. Set the horizontal acquisition mode to average, which provides a more stable display.
9. Select **Deskew** from the **Vertical** menu.
10. Verify that the reference channel (typically CH1 or CH2) is set to 0 ps deskew.
11. In the deskew control window, select the channel to deskew (typically CH3 or CH4). Adjust the deskew to overlay the rising edge as best as possible.

Note: Typical values are in the 10’s of ps or less with cables connected directly from Fast Edge to SMA inputs. If you are using a switch box (for example, Keithley), deskew the complete path from where the test fixture connects, through the switch, and into the oscilloscope. Deskew values in these cases may be as much as 30 ps or more.

Note: There can be significant differences in the skew between two TCA-SMA adapters. If you find that a system requires a very large correction, obtain a pair of TCA-SMA adapters that closely match each other to reduce the amount of correction.

Note: TekExpress retains the user configured Deskew values, and does not override the values during test runs.

Instrument and DUT connection setup

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

See also

Minimum system requirements

Search instruments connected to the application on page 16

Running tests

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

The application displays a report when the tests are complete. While the tests are running, other applications may display windows in the background. The TekScope application takes precedence over other applications, but you can switch to other applications by using the **Alt + Tab** key combination. To keep the TekExpress USB4 application on top, select **Keep On Top** from the TekExpress Options menu.

See also

Configuration tab parameters

Prerun checklist

Do the following before you click Start to run a test:

Note: If this is the first time you are running a test on the application, make sure that you have done the steps in *Required My TekExpress folder settings* before continuing.

1. Make sure that all the required instruments are properly warmed up (approximately 20 minutes).
2. Perform Signal Path Compensation (SPC)
   a. On the oscilloscope main menu, select the **Utilities** menu.
   b. Select **Instrument Calibration**.
   c. Follow the on-screen instructions.
3. Verify that the correct instruments are connected (oscilloscope and signal sources):
   a. In TekExpress USB4, click **Setup > Configuration**.
   b. Click **Global Settings**.
   c. In the **Instruments Detected** list, verify that the test setup instruments are shown. If they are not, click the arrow button to list and select from all detected instruments. If the required instrument is still not listed, use the TekExpress Instrument Control Settings dialog box to scan for and detect instruments (See *Search instruments connected to the application* on page 16).

Search instruments connected to the application

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

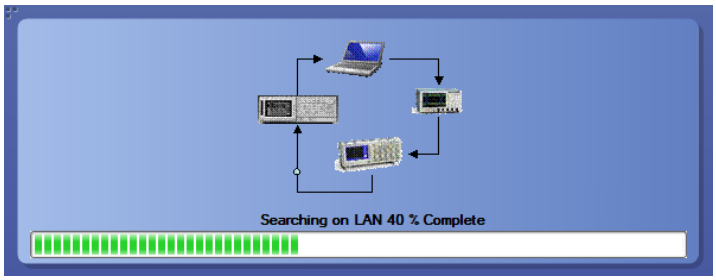
Note: The instruments required for the test setup must be connected and detected by the application, before running the test.

To refresh the list of connected instruments:

1. Select **Options > Instrument Control Settings**.

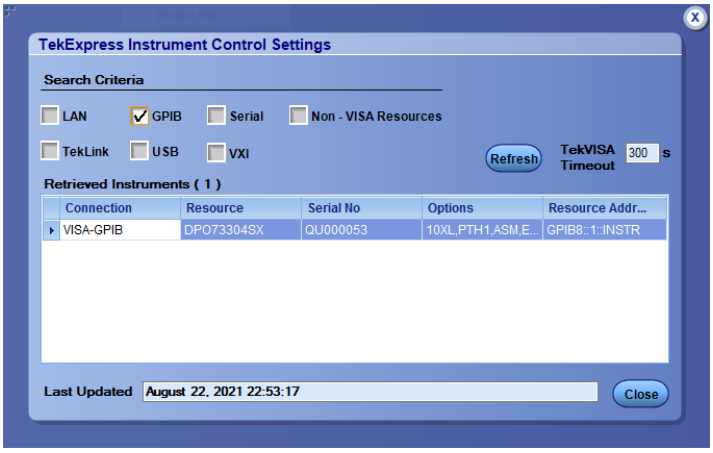
2. In the **Search Criteria** section of the **Instrument Control Settings** dialog box, select the connection types of the instruments to search. Instrument search is based on the VISA layer, but different connections determine the resource type, such as LAN, GPIB, and USB. For example, if you choose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

Search status of the instruments connected to LAN



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

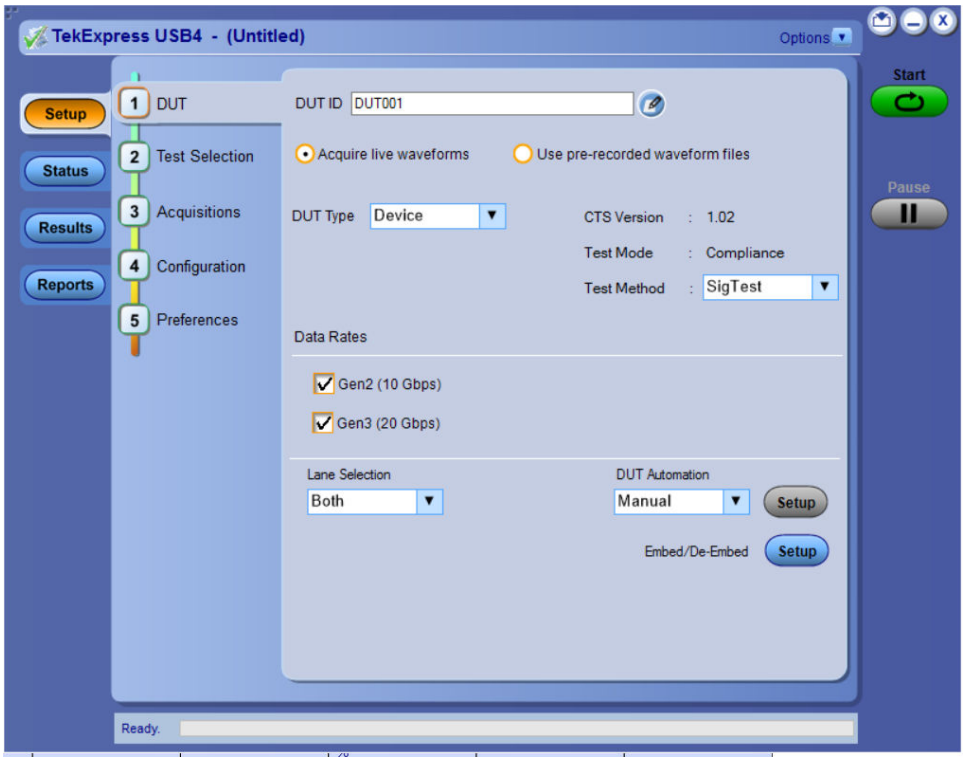
TekExpress Instrument Control Settings window.



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

Starting the application

To start the TekExpress USB4, select from the oscilloscope menu bar **Applications > TekExpress USB4**.



During start, a "My TekExpress" folder is created in the Documents folder of the current user and gets mapped to "X" drive. When the application is closed properly, the "X" drive gets unmapped. Session files are then stored inside the `X:\USB4` folder. If this file is not found, the application runs an instrument discovery program to detect connected instruments before starting TekExpress USB4.

To keep the TekExpress USB4 application on top of any application, select **Keep On Top** from the *options menu*. If the application goes behind the oscilloscope application, select **Applications >TekExpress USB4** to bring the application to the front.

Application panels overview

TekExpress USB4 uses panels to group related configuration, test, and results settings. Click a 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 panel can change depending on settings made in that panel or another panel.

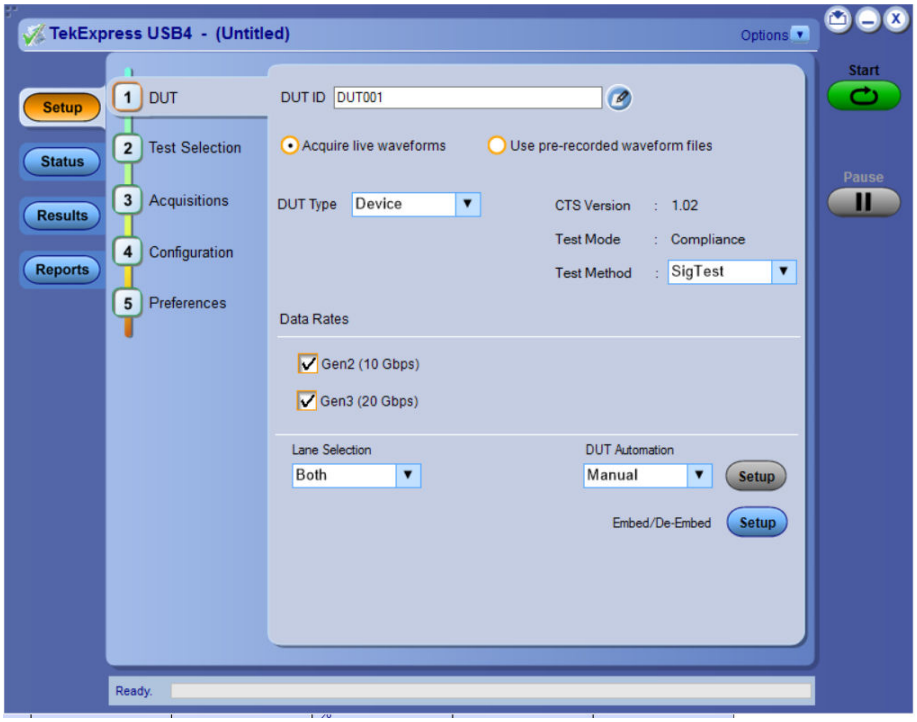


Table 5: Application panels overview

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

See also

Application controls

Application controls

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

Table 6: Application control description

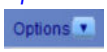
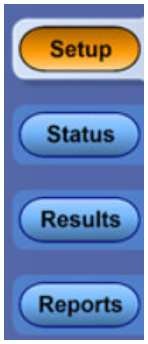
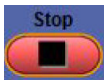
Item	Description
Options menu 	Menu to display global application controls.
Test panel 	Controls that open tabs for configuring test settings and options.
Start / Stop button  	Use the **Start** button to start the test run of the measurements in the selected order. If prior acquired measurements are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

Table continued…

Item	Description
Mini view / Normal view  	Mini view displays the run messages with the time stamp, progress bar, Start / Stop button, and Pause / Continue button. The application moves to mini view when you click the **Start** button.

Options menu functions

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

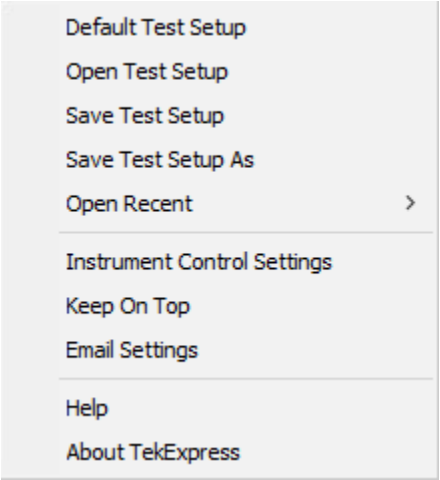


Table 7: Options menu settings

Menu	Function
Default Test Setup	Opens a new test setup with default configurations.
Open Test Setup	Opens a previously saved test setup. Displays the list of previously saved test setup file names. Make the selection and click **OK** to open the test setup.
Save Test Setup	Saves the current test configurations with the specified file name.
Save Test Setup As	Saves the current test setup with a different file name or file type.
Open Recent	Displays the recently opened test setup file names. Make the selection and click **OK** to open the test setup.
Instrument Control Settings	Detects, lists, and refreshes the connected instruments found on the specified connections (LAN, GPIB, USB, Serial, Non-VISA Resources, TekLink, and VXI).
Keep On Top	Always keeps the TekExpress USB4 application on top of all the applications.
Email Settings	Configures email options for test run and result notifications.
Help	Displays the TekExpress USB4 help.
About TekExpress	Displays the application name, version, and hyperlink to end the user license agreement.

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:

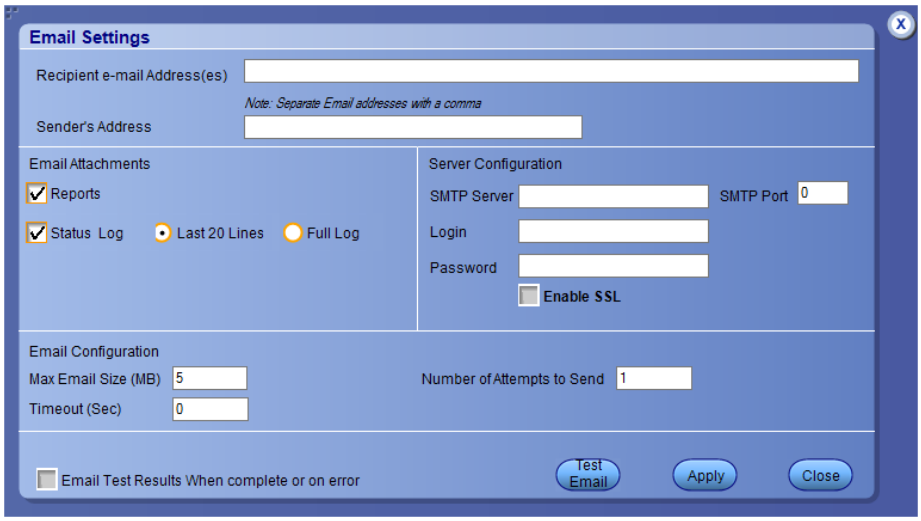


Figure 2: Email settings window

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

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

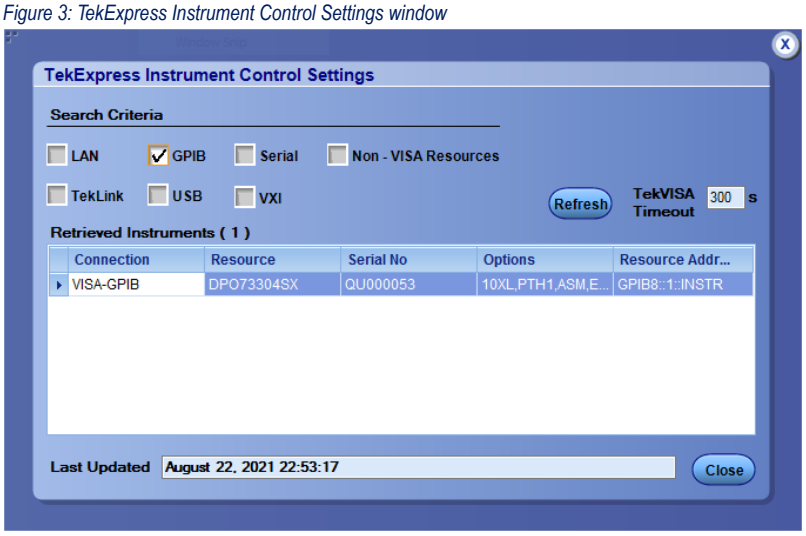
   Note: If any of the above required fields are left blank, the settings will not be saved, and email notifications will not be sent.
5. In the **Email Attachments** section, select from the following options:
   - **Reports**: Select to receive the test report with the notification email.
   - **Status Log**: Select to receive the test status log with the notification email. If you select this option, then also select whether you want to receive the full log or just the last 20 lines.
6. In the **Email Configuration** section:
   - Enter a maximum file size for the email message. Messages with attachments larger than this limit will not be sent. The default is 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.

TekExpress instrument control settings

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

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

Figure 3: TekExpress Instrument Control Settings window

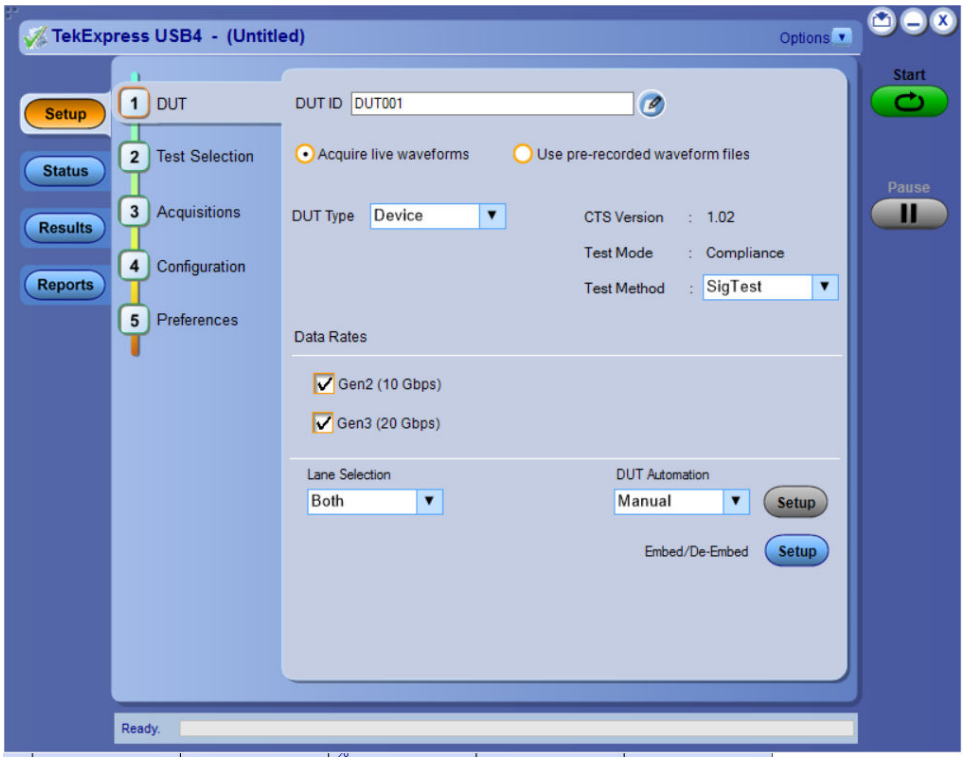


See also

Options menu functions on page 21

Setup panel: Configure the test setup

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



DUT: Set DUT settings

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

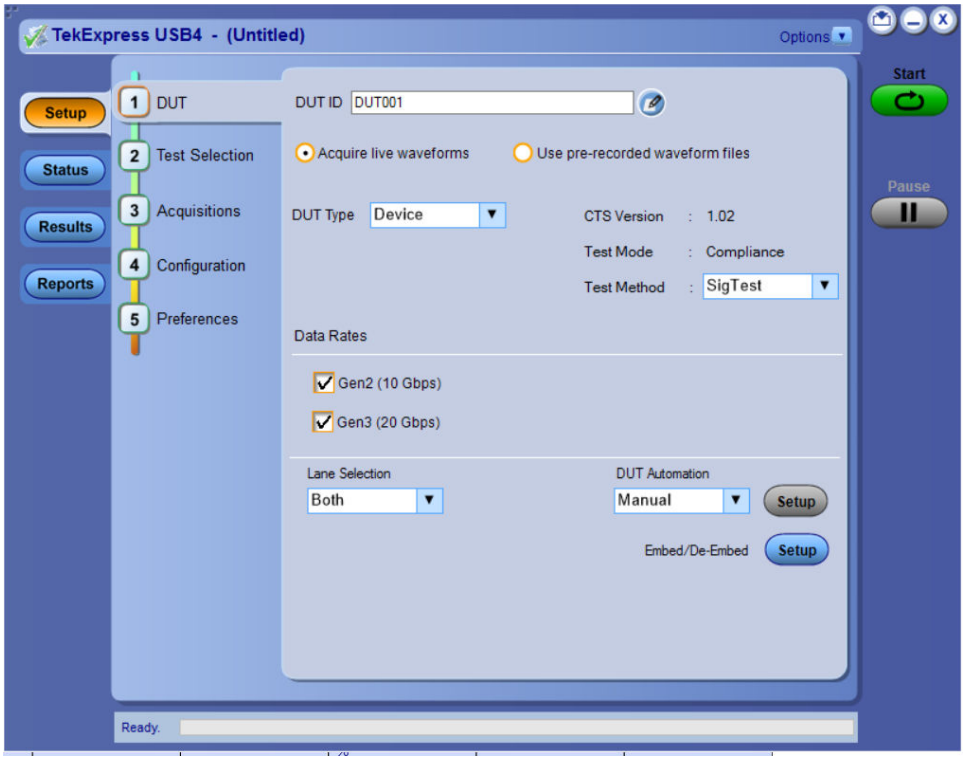


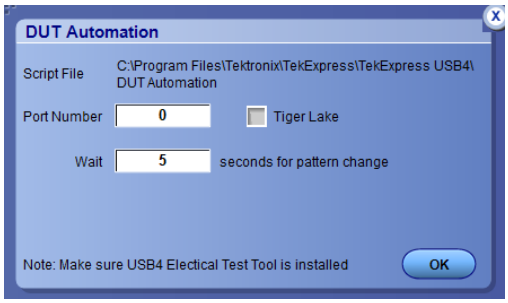
Figure 4: DUT tab

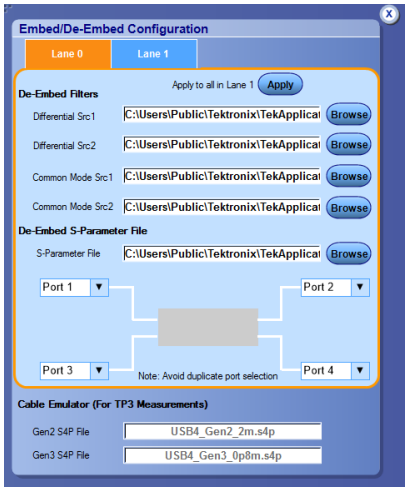
Click **Setup** > **DUT** to access the DUT parameters:

Table 8: DUT tab configuration

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 a Comments dialog box in which to enter optional text to add to a report. Maximum number of characters is 256. To enable or disable comments appearing on the test report, see (*Select report options*).
Acquire live waveforms	Acquire active signals from the DUT for measurement and analysis.
Use prerecorded waveform files	Run tests on a saved waveform. Refer *Load a saved test setup* on page 45.
DUT Type	• Device: Select the DUT type as Device. • Host: Select the DUT type as Host.
Version	Displays the CTS version.

Table continued…

Setting	Description
Test Mode	Displays the selected test mode. Preselects tests and parameters needed to meet compliance specifications for the selected device type. Disables the compliance filter controls.
Test Method	Displays the selected test method. The selected test method, sets the algorithms used to measure and analyze the signal. • DPOJET: Select to perform measurements implemented in DPOJET. • SigTest: Select to perform measurements implemented in SigTest.
Data Rates	Sets the test data rate (10 Gbps or 20 Gbps). • Gen2: Select to include the data rate for Gen2. • Gen3: Select to include the data rate for Gen3.
Lane Selection	Select the Lane Selection from the drop-down: • Lane 0 • Lane 1 • Both
DUT Automation	DUT Automation. • Manual • Automated Enable the Setup button by selecting **DUT Automation** to **Automated**.  Click Setup, that displays DUT Automation pop-up, select the TGL (Tiger Lake) to setup the DUT automation. Set the DUT Port Number (0 -63) and the waiting time after automated pattern change. Default value for port number is 0 and wait time is 5 seconds. Refer *DUT automation setup* on page 27, which provides you the details of version for DUT automation.
Filter Selection	You can change the Differential de-embed filter files, change the common mode deembed filter files. The test mode is fixed to compliance, therefore, cable emulator (for TP3 measurements) files are fixed. The de-embed S parameter file (.s4p) is loaded into the SDLA Equalizer to de-embed the cables connected to the fixture. The 4 port index configuration for the chosen file is displayed. Assign the valid port depending on the loaded .s4p file. The two ports on the left are input ports and the two ports on the right are the output ports. *Figure 5: Filter Selection*

Setting	Description
	

DUT automation setup

Refer to the manuals provided by Wider and USB-IF to configure the micro-controller and Electrical Test Tool respectively.

Prerequisites for running USBETT tool

- Download the USBETT tool from USB-IF forum.
- Copy the Electrical Test Tool in the file path `C:\USB4ETT`

Install Wilder software

- Copy the contents of the included flash drive in the Wilder hardware kit to the oscilloscope.
- Copy Wilder Controller executable in `C:\USB4ETT`.
- Ensure that the Wilder Controller executable and `C:\USB4ETT` are associated appropriately in the system environment variable.

Test Selection: Select the tests

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

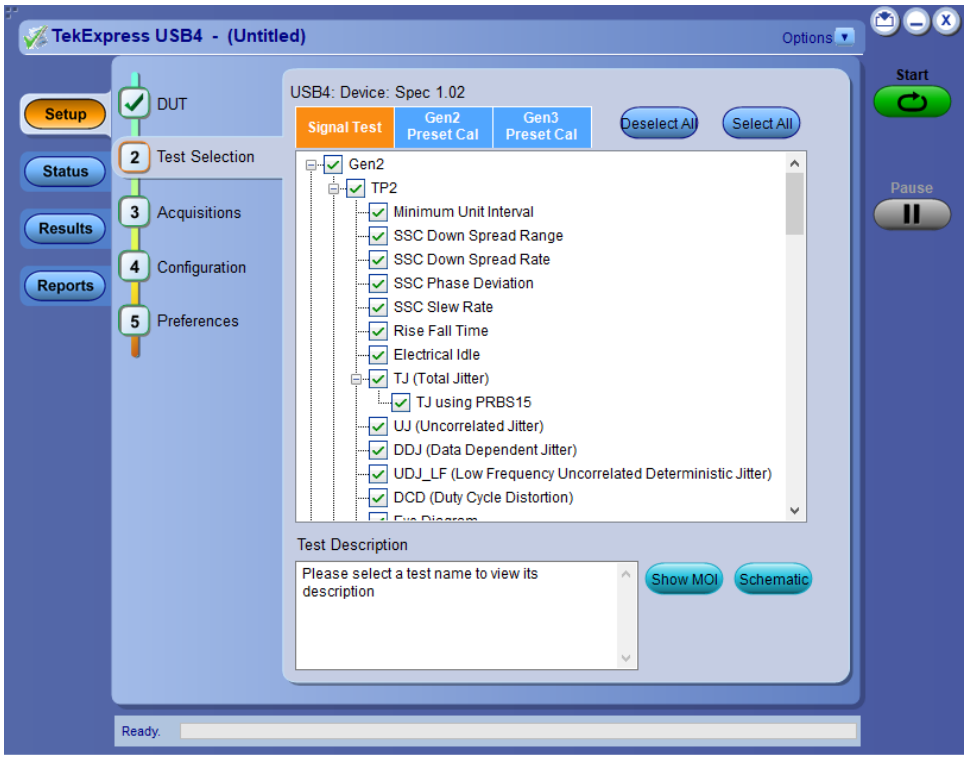


Figure 6: Test selection tab

Table 9: Test Selection tab configuration

Setting	Description
Deselect All, Select All	Deselect or select all tests in the list.
Tests	Click a test to select or deselect. Selecting a test also show details about that test in the Test Description pane. All required tests are selected when in Compliance test mode.
Schematic	Displays equipment connection setup for the selected measurements. You need to select at least a measurement before you click the Schematic.
Show MOI	Displays the MOI (USB4 DPOJET MOI)
Gen2 Preset Test	Select to change the preset values. By selecting or deselecting Legacy or Rounded column header, you can select or deselect all the presets at a single time for the selected data rate, when the Preset calibration in the DUT panel is selected.
Gen3 Preset Test	

Note: All tests are selected by default (except TJ using SQ2 when Test method is set to DPOJET).

Note: The application does not show the oscilloscope cursor1 and 2 for each burst. The application runs an analysis on the first five bursts of an acquisition and displays the result statistics.

Note: TJ using SQ2 measurement is not available when Test Method is set to SigTest in the DUT panel.

Acquisitions: Set waveform acquisition settings

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

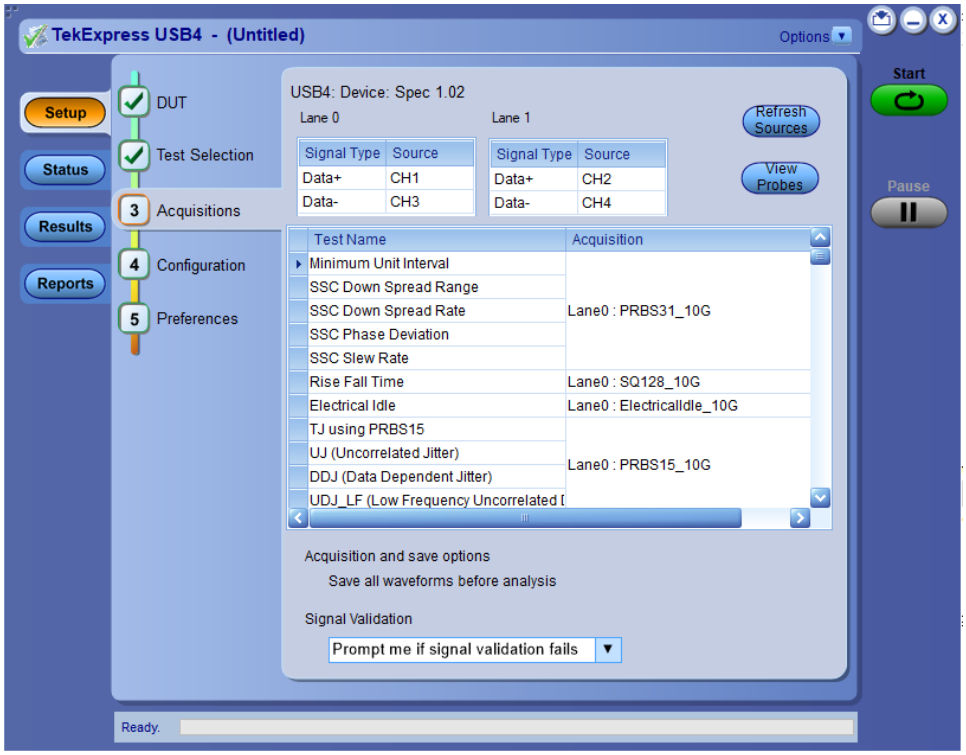


Figure 7: Acquisition tab

Note: USB4 acquires all waveforms required by each test group and generation being tested (Gen1, Gen2) before performing analysis.

Table 10: Acquisitions tab configuration

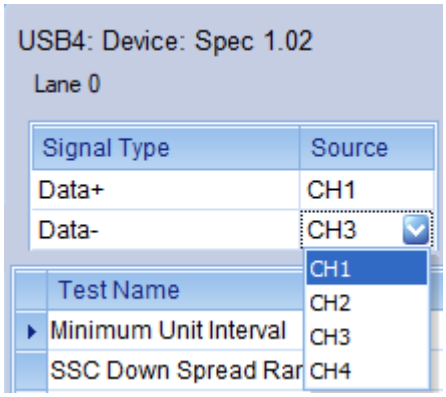
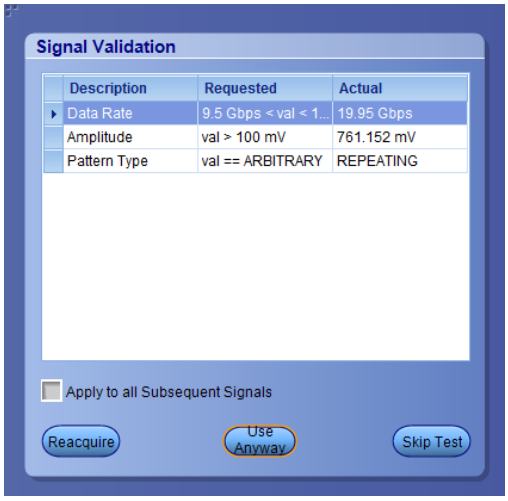
Setting	Description
Source Selection	Lists the signal type and input channel assigned to that type. Click on Source fields to assign a channel source to a signal type.  The (Source) channels are auto selected, based on the probe type used and Lane selected on the DUT tab. **Note:** When the **Test Method** is set to **SigTest** in the DUT panel, the application will not allow you to select the source channels.
Refresh sources	Updates the list of available channel sources as used by the Source fields in the Device list. Click this button if you want to change the channel connections in the test setup.
View Probes	Displays the Source, Probe Type, and Probe models.
Acquisition and save options	Saves all waveforms before the analysis.

Table continued…

Setting	Description
Signal Validation	Sets the signal validation actions. Select from the available list items. • Prompt me if signal fails • Skip test if signal validation fails • Use signal as is - Don't Check When the signal validation option is set to "Prompt me if signal validation fails", the application validates whether the signal is PRBS31, PRBS15, SQ128, or SQ2 pattern. Additionally, it also validates if the signal is Electrical idle. If the signal is valid, the measurement continues normally. If the signal is invalid, the following window displays:  **Note:** If Pattern type validation is selected as **No**, then the measurement continues with the acquired waveform. • Click **Reacquire** to start the acquisition again. • Click **Use Anyway** to continue with the currently acquired waveform. • Click **Skip Test** to skip all pattern type tests. The rest of the selected measurements continue.

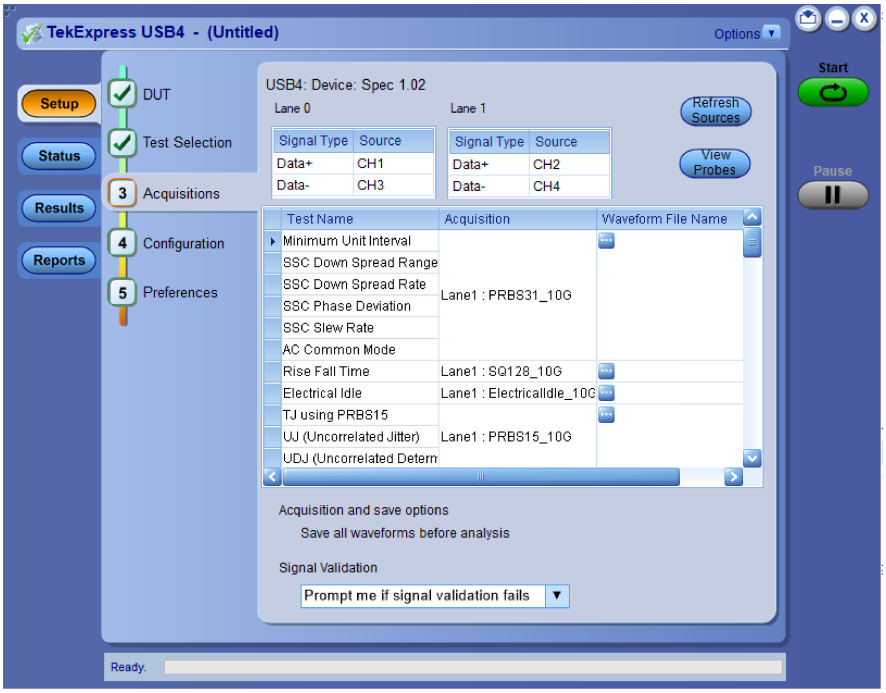
TekExpress USB4 application saves all acquisition waveforms to files by default. Waveforms are saved in a unique folder for each session (a session is started when you click the Start button). The folder path is `X:\TekExpress USB4\Untitled Session\<dutid>\<date>_<time>`. Images created for each analysis, XML 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.

Running tests on prerecorded (saved) waveforms

To load a saved waveform file:

1. Click **DUT**.
2. Click **Use pre-recorded waveform files**.
3. Click **Acquisitions**. The Waveform File Name column now shows browse buttons.



4. Click the browse button ( ) for each test acquisition type PRBS15, PRBS31, SQ128, and SQ2.
5. Navigate to and select the appropriate waveform file(s). You must select all waveforms required for the acquisition type.
6. To change, remove, or add a file to the list, click the browse button next to the file name to change, and use the menu items to replace, remove (delete) or add a file in the list.
7. Click **Start**.

Configuration: Set measurement limits for tests

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

Note: You cannot change test parameters that are grayed out.

Table 11: Configuration tab: Common parameters

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

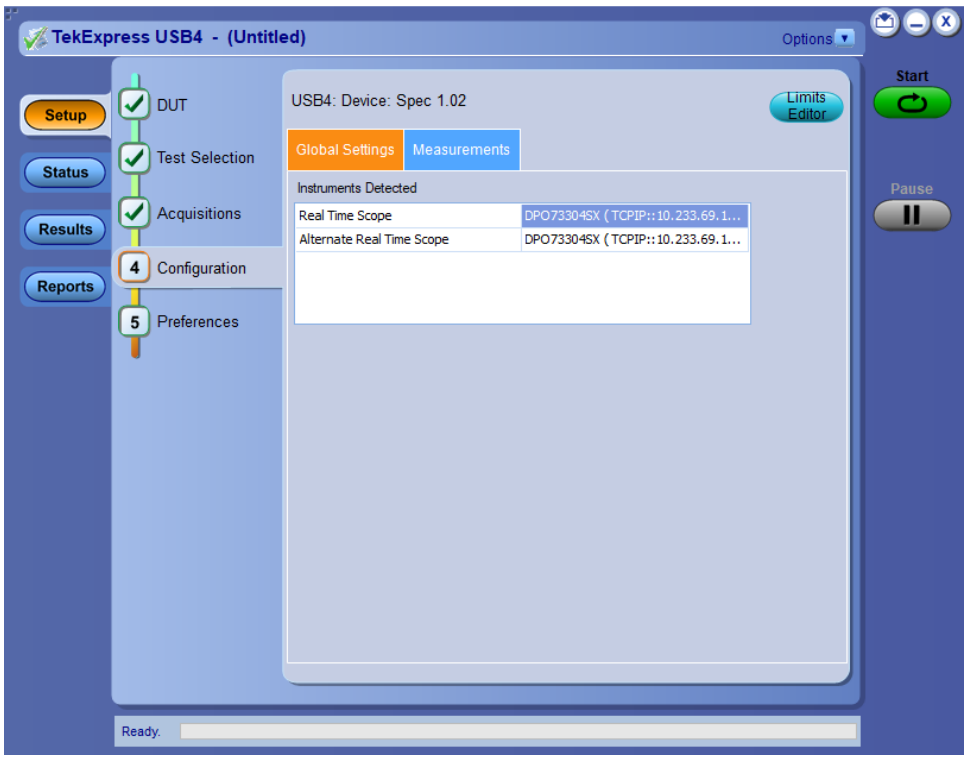


Figure 8: Configuration tab: Global Settings

Table 12: Configuration tab: Global Settings configuration

Setting	Description
Instruments Detected	Displays a list of the connected instruments found during the instrument discovery. Instrument types includes oscilloscopes. Select **Options > Instrument Control Settings** to refresh the connected instrument list. Refer *TekExpress Instrument control settings.*

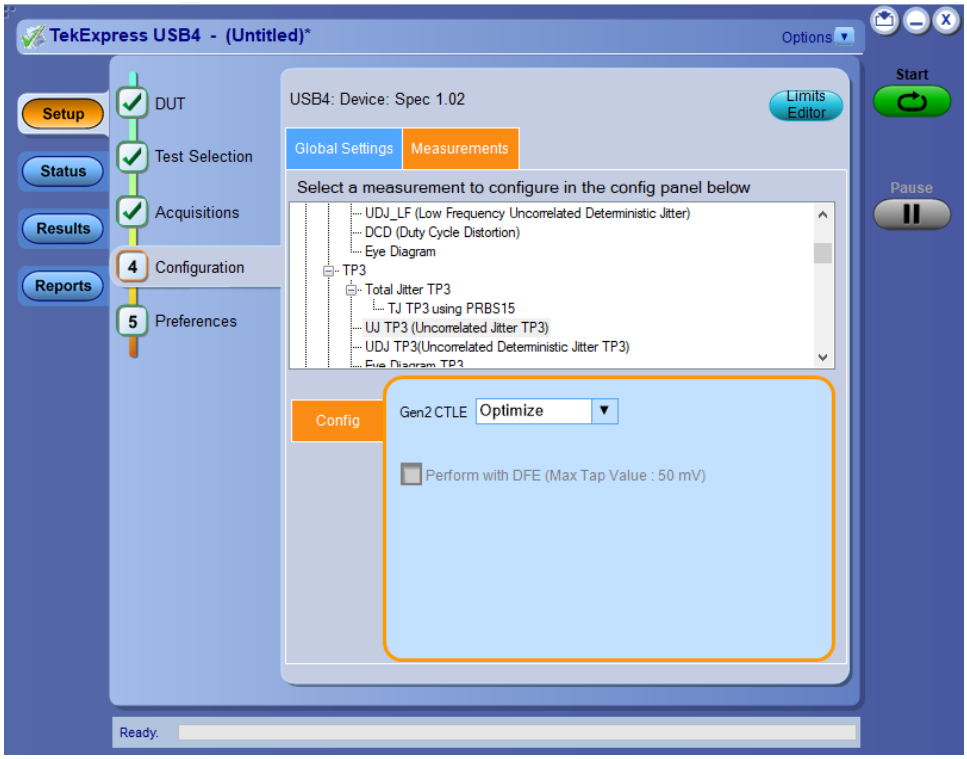


Figure 9: Configuration tab: Measurement

Table 13: Configuration tab: Measurements configuration

Setting	Description
Measurements	
Measurements	Displays the list of measurements.
Config	Select the configuration for the measurements with TP3.
Gen2 and Gen3 CTLE	Select the CTLE filter file for Gen2 and Gen3 from the drop-down: • Optimize • Fixed **Note:** The option **Fixed** is not available when the **Test Method** is set to **SigTest** in the DUT panel.
CTLE Index	Set the CTLE index value.
Perform with DFE (Max Tap Value: 50 mV)	Select to perform the DFE.

Preferences: Set the test run preferences

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

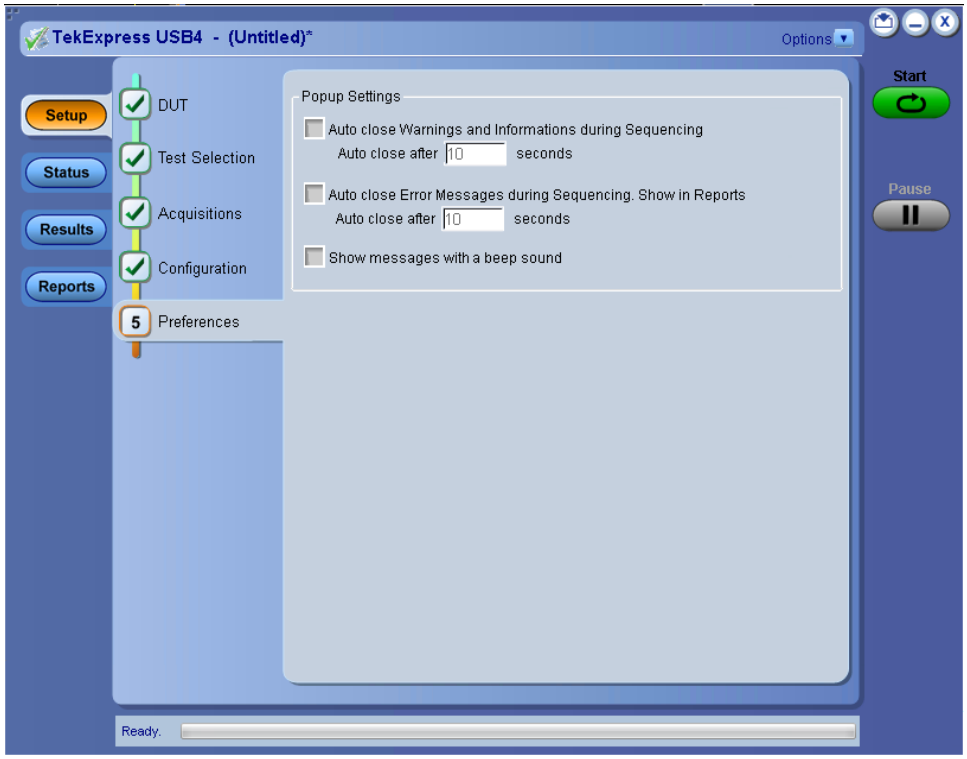


Figure 10: Preferences tab

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

Table 14: Preferences tab settings

Setting	Description
Popup Settings	
Auto close Warnings and informations during Sequencing Auto close after <no> seconds	Select to close the warnings and information window automatically after the specified amount of time. Specify the time in seconds using the edit box.
Auto close Error Messages during Sequencing. Show in Reports Auto close after <no> seconds	Select to close the error message window automatically after the specified amount of time. Specify the time in seconds using the edit box.
Show messages with a beep sound	Select to display the messages with the beep sound.

Status panel: View the test execution status

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

View test execution status

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

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

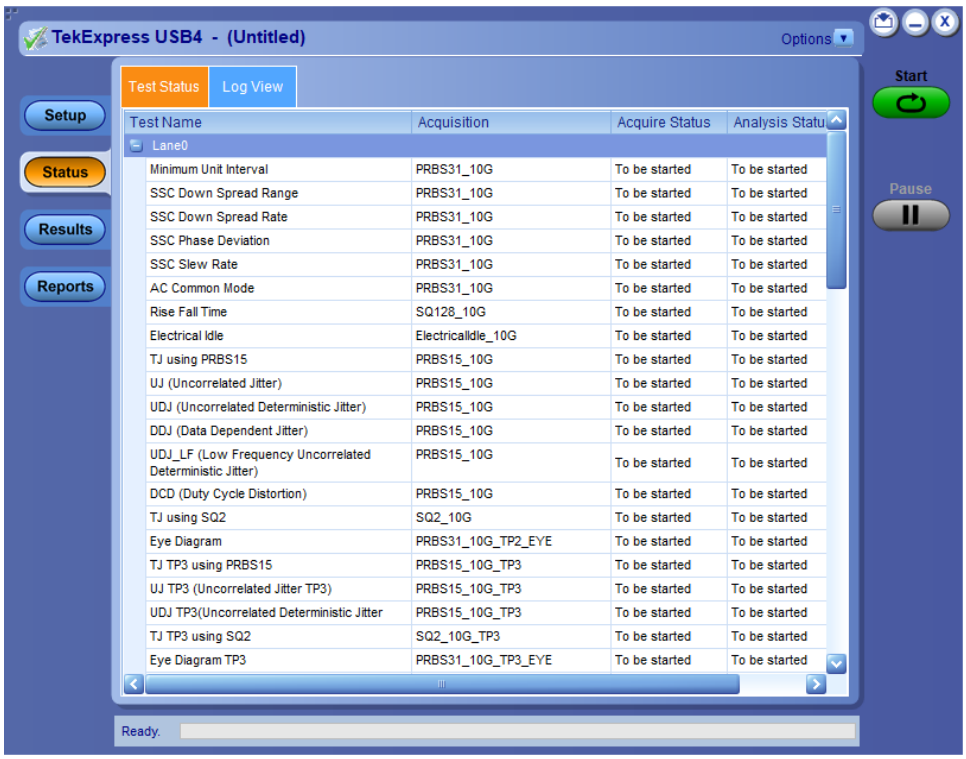


Figure 11: Test execution status view in Status panel

Table 15: Test execution status table headers

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

Table continued…

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

View test execution logs

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

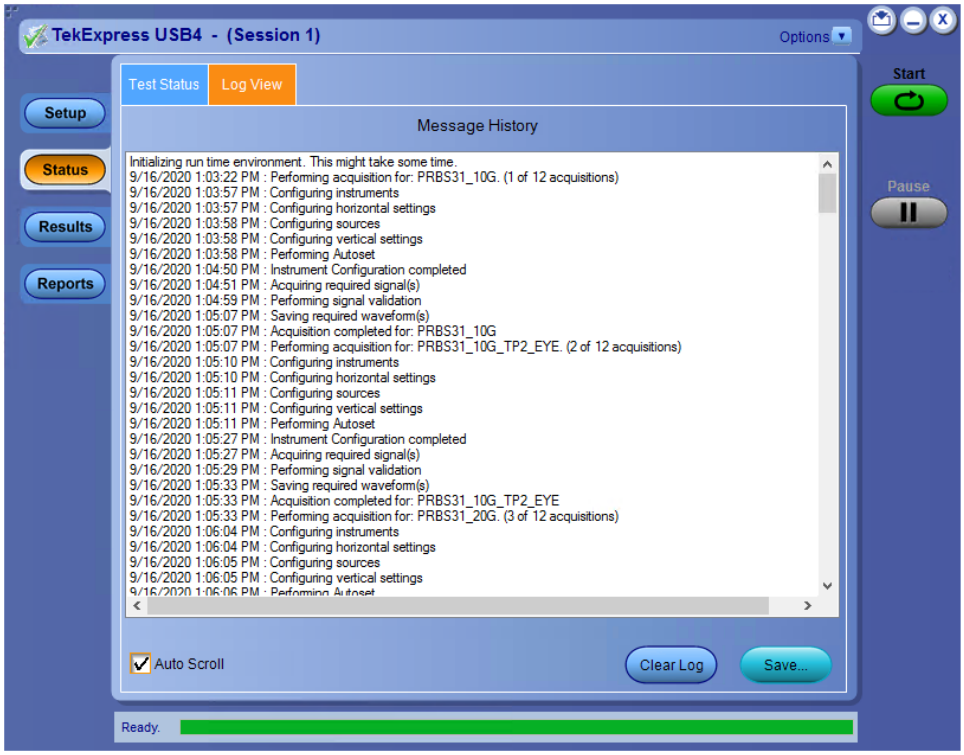


Figure 12: Log view in Status panel

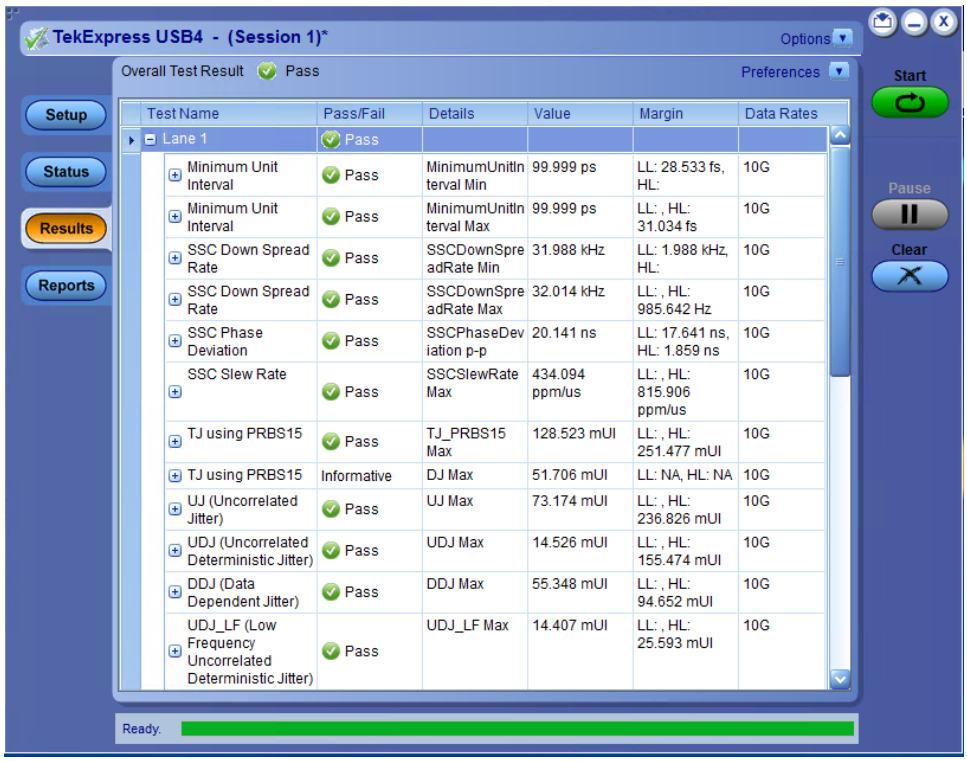
Table 16: Status panel settings

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

Results panel: View summary of test results

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

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



Test Name	Pass/Fail	Details	Value	Margin	Data Rates
Lane 1	Pass				
Minimum Unit Interval	Pass	MinimumUnitInterval Min	99.999 ps	LL: 28.533 fs, HL:	10G
Minimum Unit Interval	Pass	MinimumUnitInterval Max	99.999 ps	LL: , HL: 31.034 fs	10G
SSC Down Spread Rate	Pass	SSCDownSpreadRate Min	31.988 kHz	LL: 1.988 kHz, HL:	10G
SSC Down Spread Rate	Pass	SSCDownSpreadRate Max	32.014 kHz	LL: , HL: 985.642 Hz	10G
SSC Phase Deviation	Pass	SSCPhaseDeviation p-p	20.141 ns	LL: 17.641 ns, HL: 1.859 ns	10G
SSC Slew Rate	Pass	SSCSlewRate Max	434.094 ppm/us	LL: , HL: 815.906 ppm/us	10G
TJ using PRBS15	Pass	TJ_PRBS15 Max	128.523 mUI	LL: , HL: 251.477 mUI	10G
TJ using PRBS15	Informative	DJ Max	51.706 mUI	LL: NA, HL: NA	10G
UJ (Uncorrelated Jitter)	Pass	UJ Max	73.174 mUI	LL: , HL: 236.826 mUI	10G
UDJ (Uncorrelated Deterministic Jitter)	Pass	UDJ Max	14.526 mUI	LL: , HL: 155.474 mUI	10G
DDJ (Data Dependent Jitter)	Pass	DDJ Max	55.348 mUI	LL: , HL: 94.652 mUI	10G
UDJ_LF (Low Frequency Uncorrelated Deterministic Jitter)	Pass	UDJ_LF Max	14.407 mUI	LL: , HL: 25.593 mUI	10G

Figure 13: Results panel with measurement results

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

Filter the test results

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

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

Reports panel: Configure report generation settings

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

Report configuration settings

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

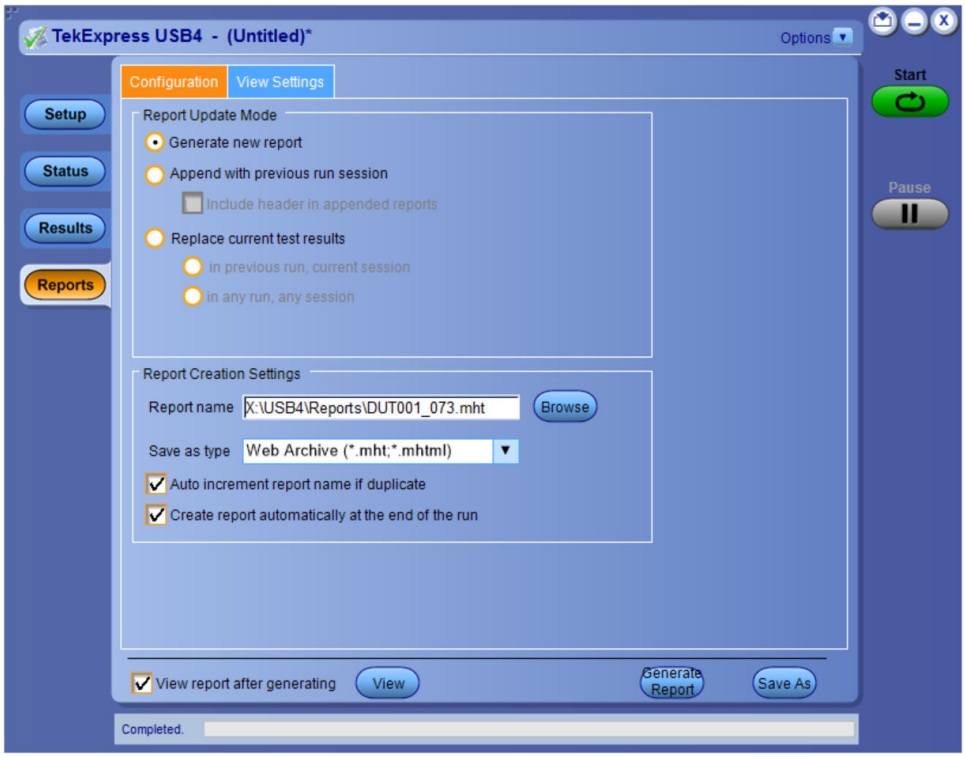


Figure 14: Report panel- Configuration tab

Table 17: Report configuration panel settings

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

Table continued…

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

Configure report view settings

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

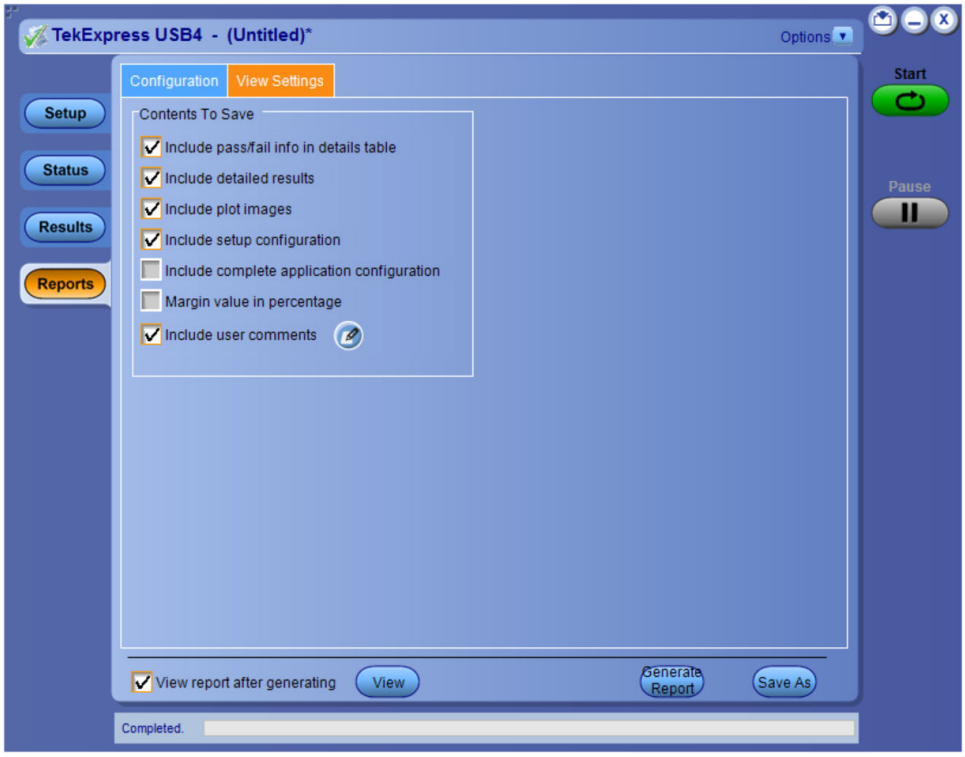


Figure 15: Report panel-View settings tab

Table 18: Report panel view settings

Control	Description
Contents To Save Settings	
Include pass/fail info in details table	Select to include pass/fail information in the details table of the report.
Include detailed results	Select to include detailed results in the report.
Include plot images	Select to include the plot images in the report.
Include setup configuration	Sets the application to include hardware and software information in the summary box at the top of the report. Information includes: the oscilloscope model and serial number, the oscilloscope firmware version, and software versions for applications used in the measurements.
Include complete application configuration	Select to include the complete application configuration in the report.
Margin value in percentage	
Include user comments	Select to include any comments about the test that you or another user have added in the DUT tab of the Setup panel. Comments appear in the Comments section, below the summary box at the beginning of each report.

View a generated report

Sample report and its contents

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

TekExpress USB4
Transmitter Test Report

Setup Information			
DUT ID	DUT001	Scope Model	DPO73304SX
Date/Time	4/20/2022 7:54:01 AM	Scope Serial Number	QU000062
Acquisition Mode	Live	Scope F/W Version	10.12.1 Build 26
DUT Control	Automated	SPC Factory:S/W Calibration	PASS;PASS
DUT Type	Host	TekExpress USB4 TX	10.1.3.6
Test Method	SigTest	TekExpress Framework	5.5.0.91
Total Acquisition Time	00:01:44.25	SigTest version	0.7
Total Analysis Time	00:01:41.20	CTS Version	v1.02
Over All Test Result	Pass		
DUT COMMENT:	General Comment - USB4 Transmitter DUT		

TJ using PRBS15							
Measurement Details	Data Rates	Lane	Measured Value	Test Result	Margin	Low Limit	High Limit
TJ_PRBS15 Max	20G	Lane 0	263.633 mUI	Pass	LL: NA, HL: 196.367 mUI	NA	460 mUI
COMMENTS							

UJ (Uncorrelated Jitter)							
Measurement Details	Data Rates	Lane	Measured Value	Test Result	Margin	Low Limit	High Limit
UJ Max	20G	Lane 0	165.288 mUI	Pass	LL: NA, HL: 144.712 mUI	NA	310 mUI
COMMENTS							

UDJ (Uncorrelated Deterministic Jitter)

Figure 16: Report

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

Saving and recalling test setup

Overview

You can save the test setup and recall it later for further analysis. Saved setup includes the selected oscilloscope, general parameters, acquisition parameters, measurement limits, waveforms (if applicable), and other configuration settings. The setup files are saved under the setup name at **X:\TekExpress USB4**

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

Figure 17: Example of Test Setup File

Use test setups to:

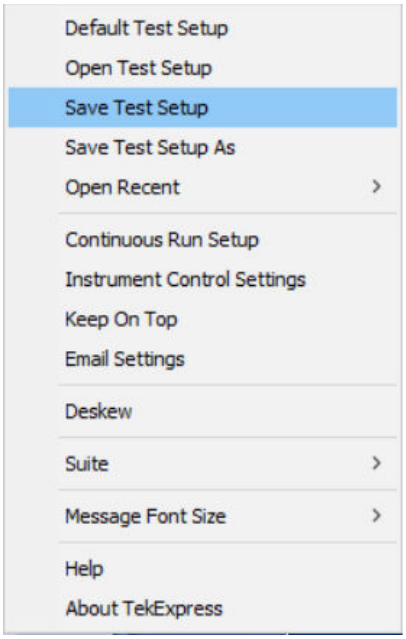
- Recall a saved configuration.
- Run a new session or acquire live waveforms.
- Create a new test setup using an existing one.
- View all the information associated with a saved test, including the log file, the history of the test status as it executed, and the results summary.
- Run a saved test using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

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

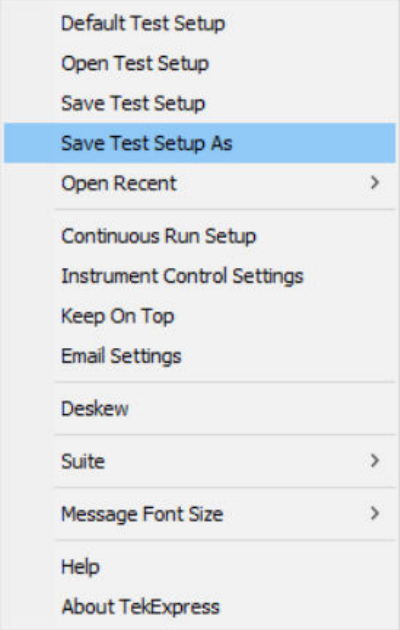
Save the configured test setup

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

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



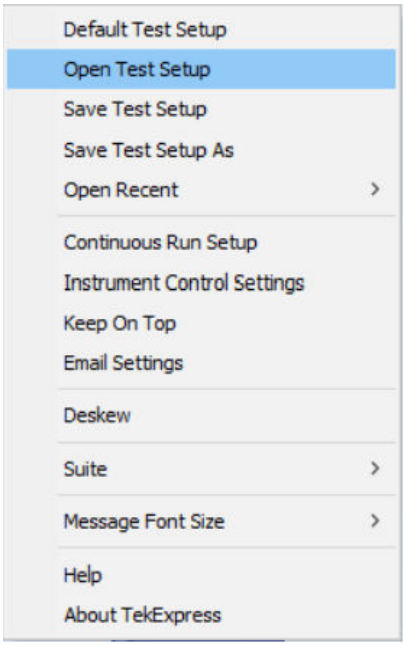
- Select **Options > Save Test Setup As** to save the setup with different name.



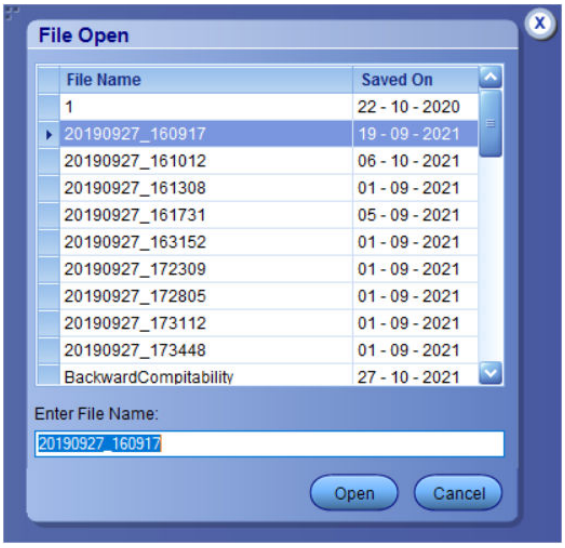
Load a saved test setup

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

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



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

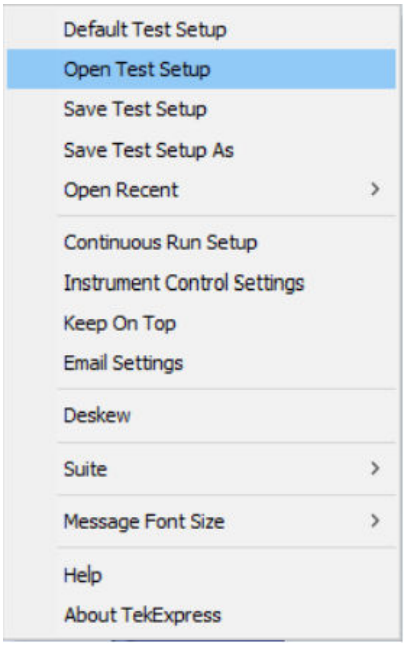


Note: Parameters that are set for the respective test setup will enable after opening the file.

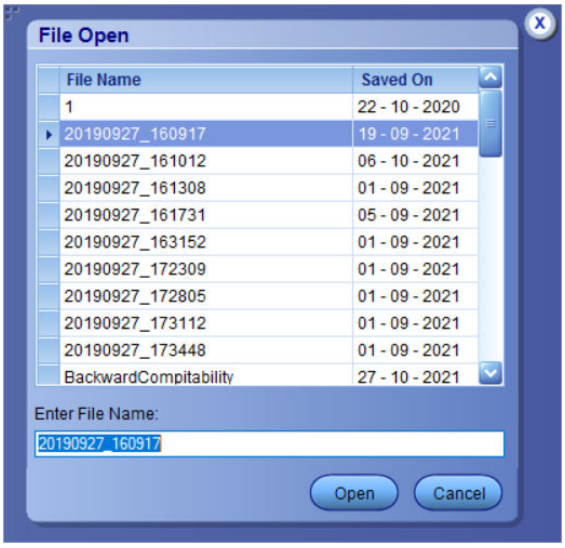
Perform a test using pre-run session files

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

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

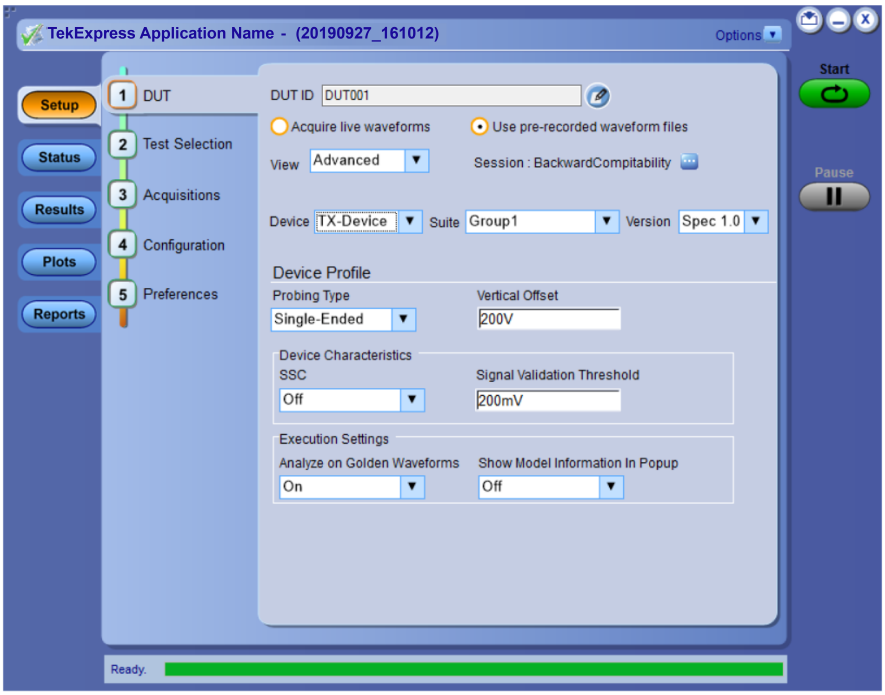


2. From the **File Open** menu, select a setup from the list and then click **Open**.

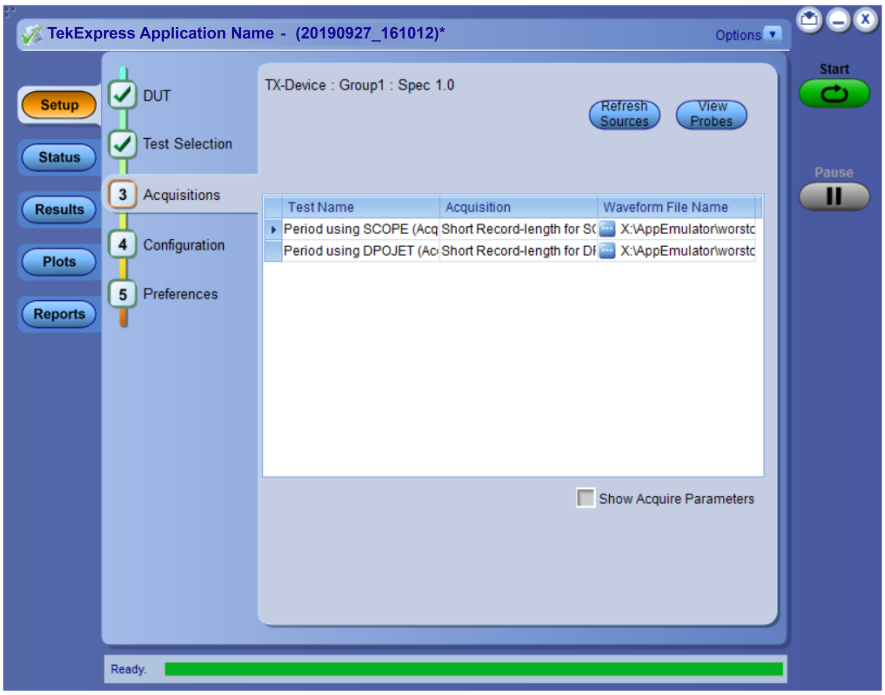


Note: Parameters that are set for the respective test setup will enable after opening the file.

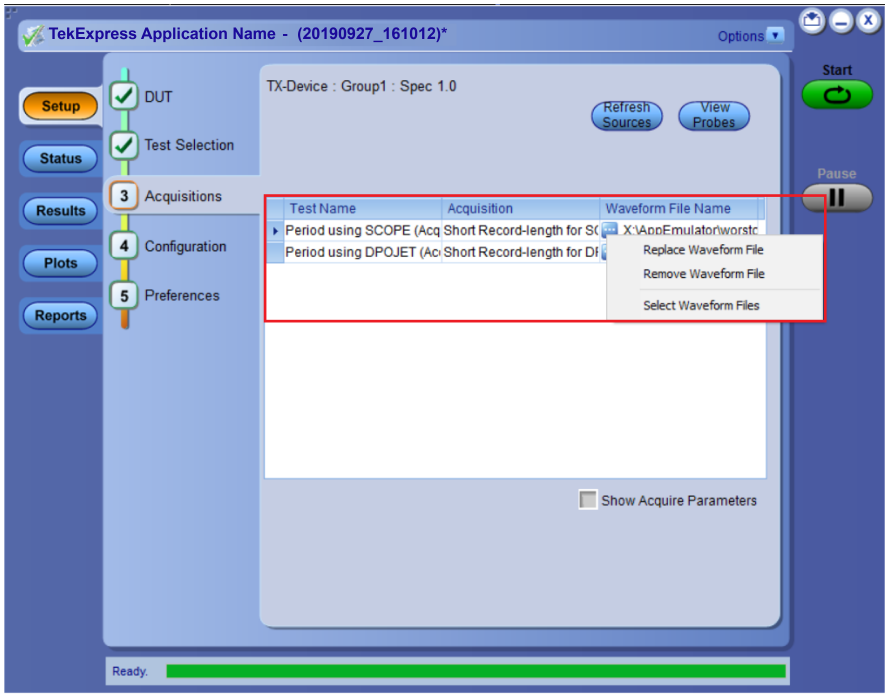
3. Switch the mode to **Use Pre-recorded waveform files** in the DUT panel.



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



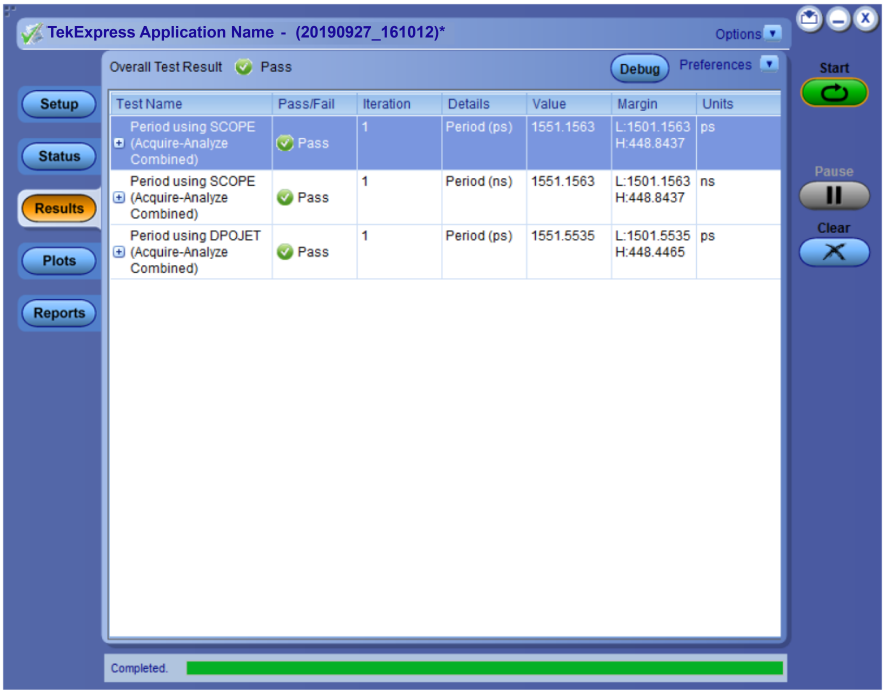
5. The selected waveform file can be removed/replaced by clicking on the ( ) icon.



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

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

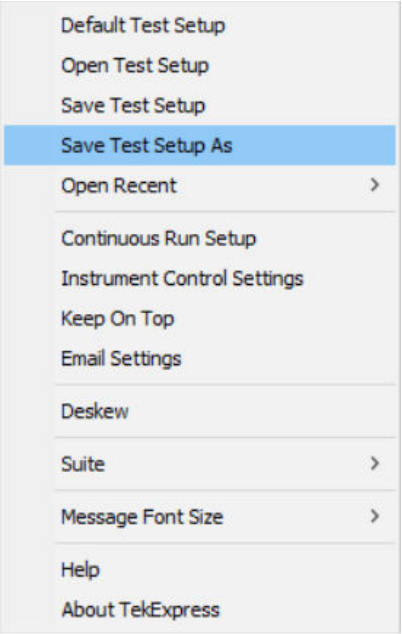
7. The overall test result status after completion of the test execution is displayed in the Results Panel.



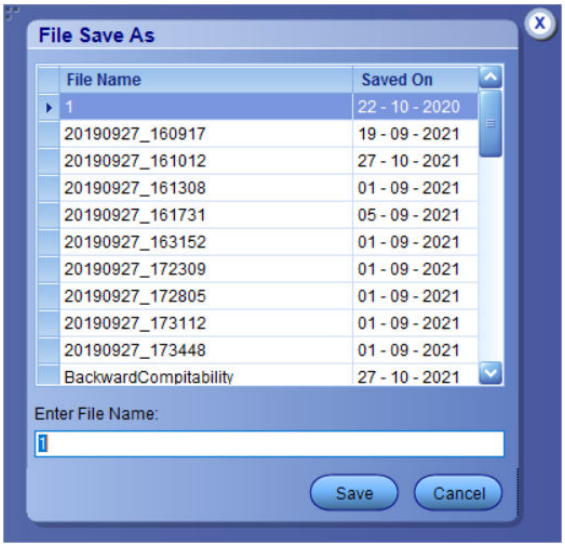
Save the test setup with a different name

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

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



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



SCPI Commands

About SCPI command

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

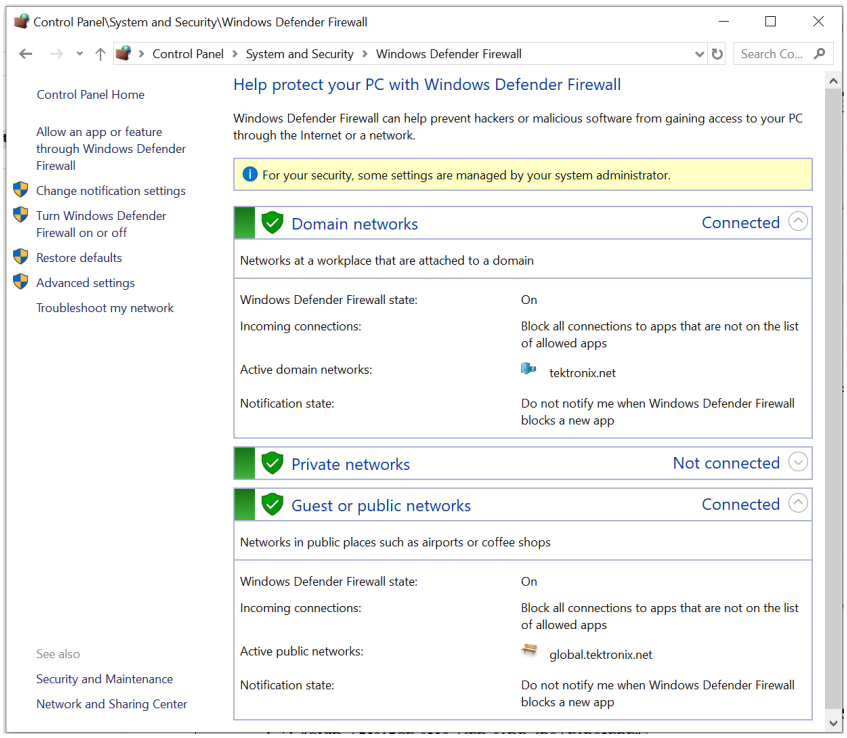
Note: If you are using an external PC to execute the remote interface commands, then install TekVISA in the PC to make the configurations.

Socket configuration for SCPI commands

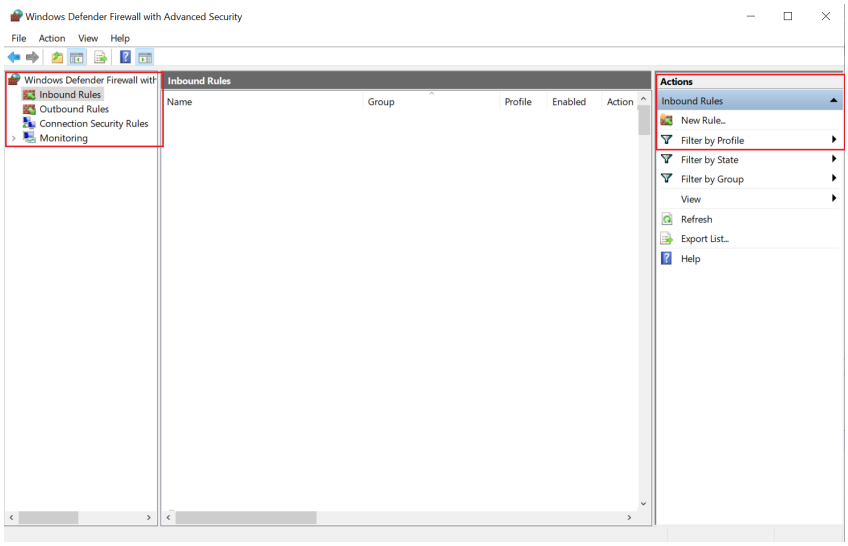
This section describes the steps to configure the TCPIP socket configuration in your script execution device and the steps to configure the TekVISA configuration in the oscilloscope to execute the SCPI commands.

TCPIP socket configuration

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

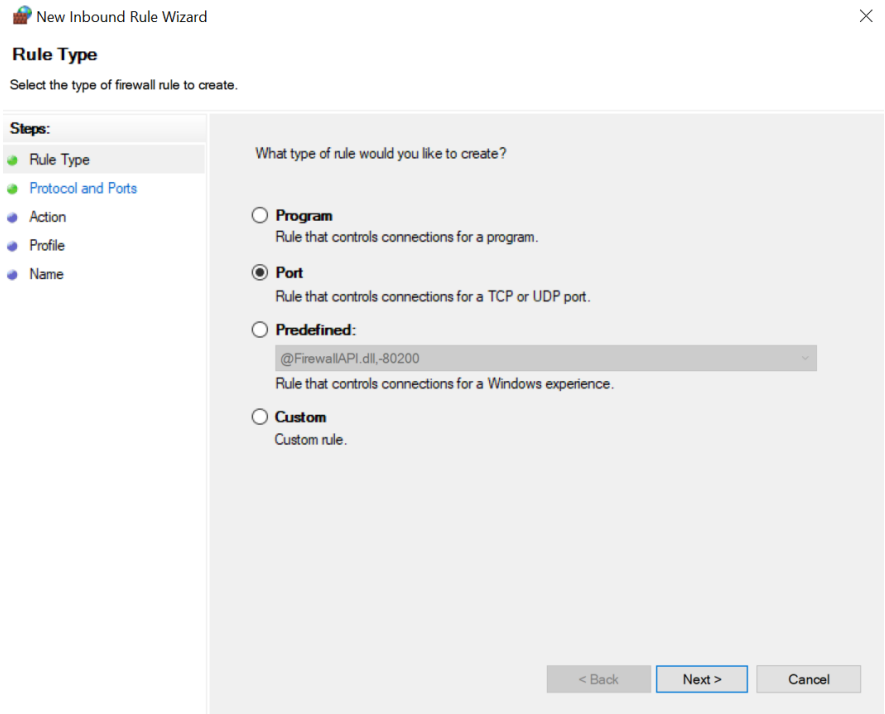


2. In Windows Firewall with Advanced Security menu, select **Windows Firewall with Advanced Security on Local Computer** > **Inbound Rules** and click **New Rule…**

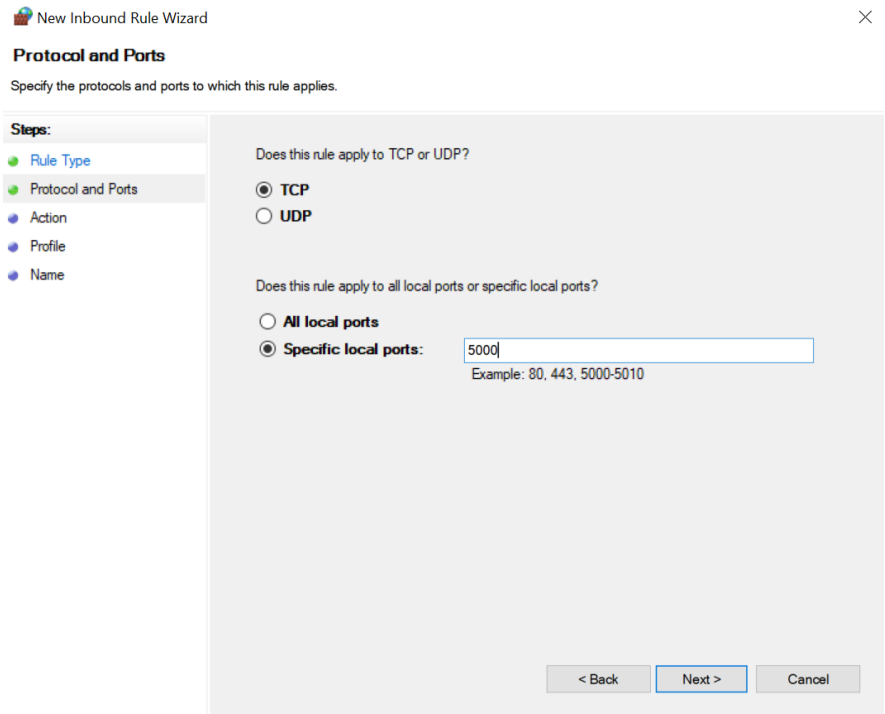


3. In **New Inbound Rule Wizard** menu

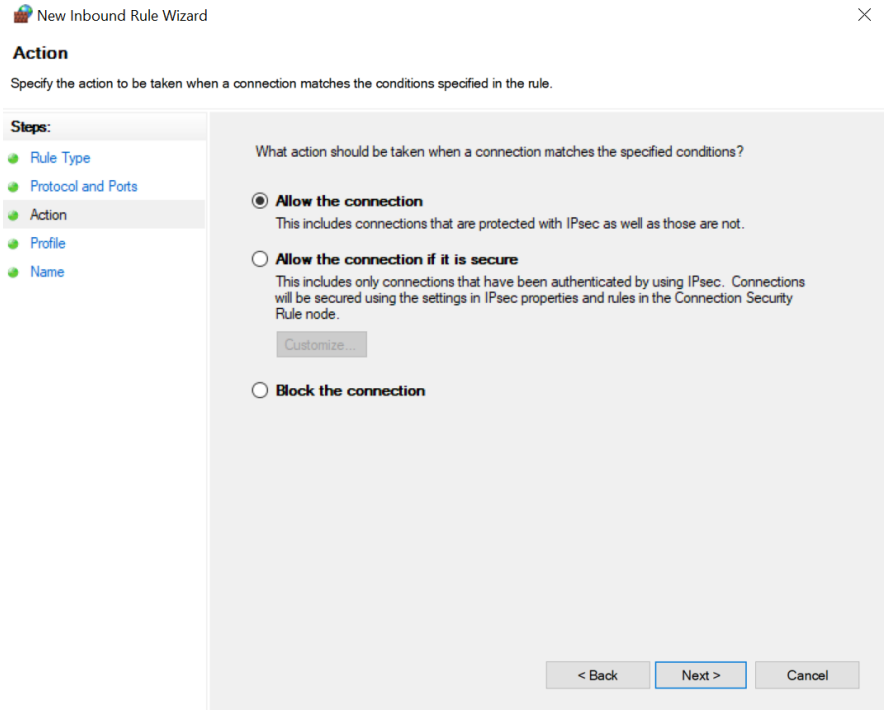
   a. Select **Port** and click **Next**.



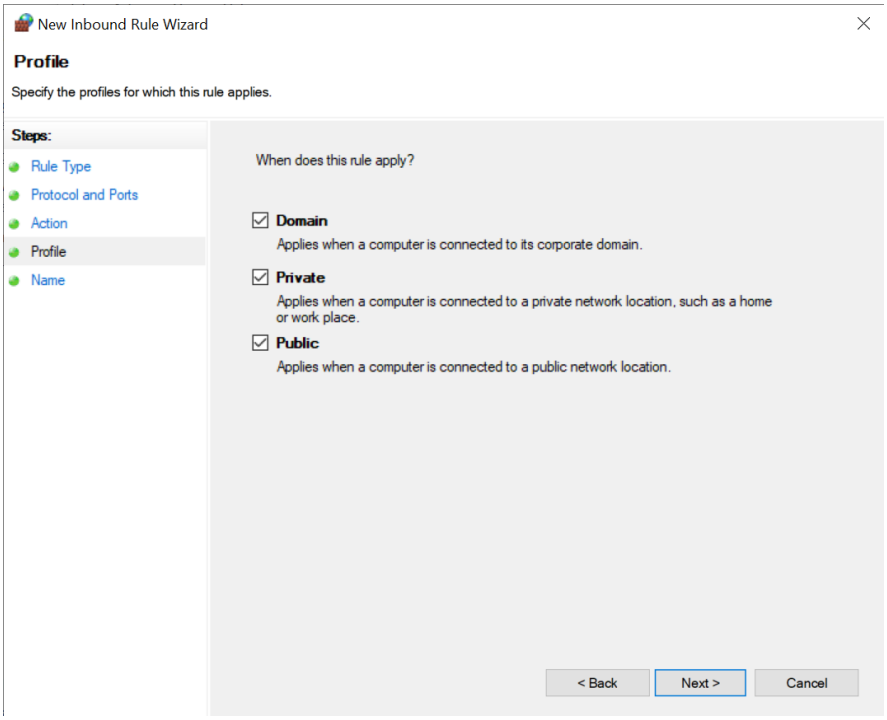
   b. Select **TCP** as rule apply, enter 5000 for **Specific local ports** and click **Next**.



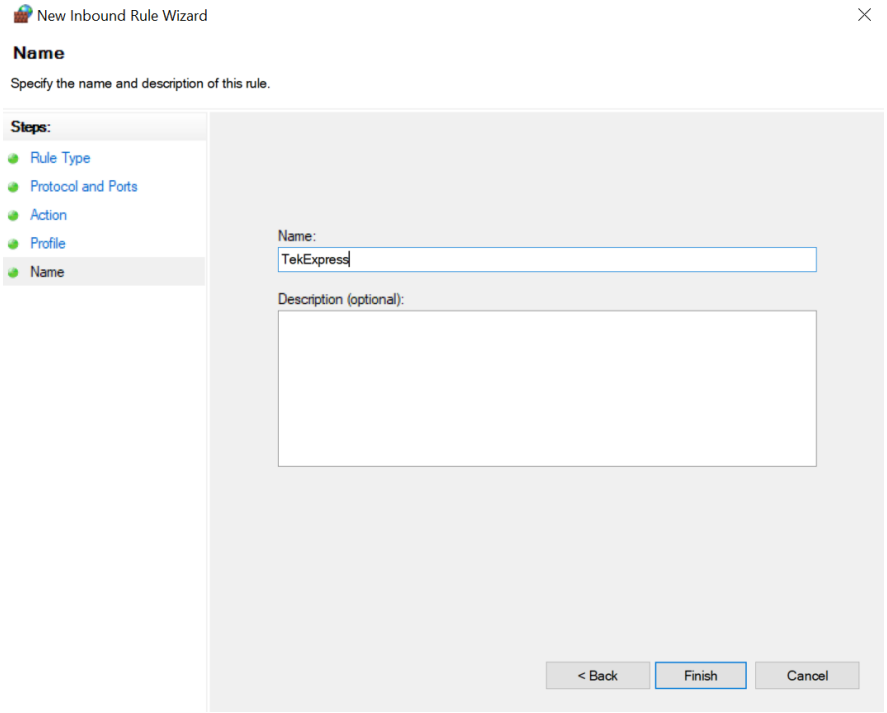
c. Select **Allow the connection** and click **Next**.



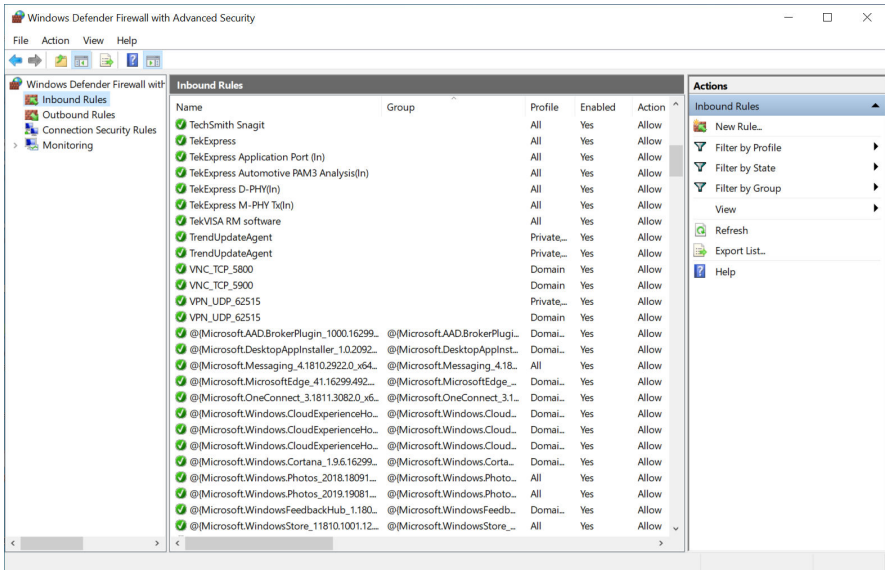
d. Select **Domain, Private, Public** checkbox and click **Next**.



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

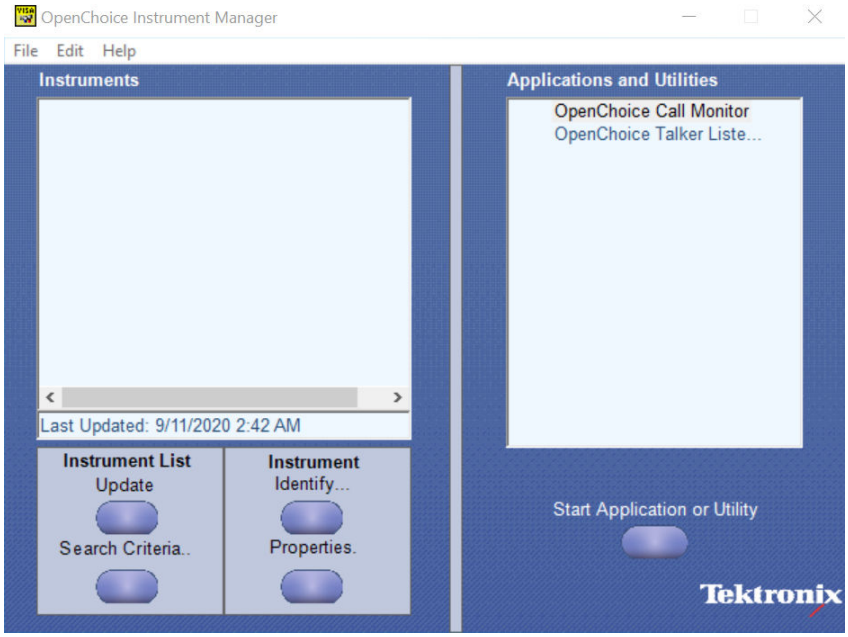


4. Check whether the Rule name is displayed in **Windows Firewall with Advanced Security menu** > **Inbound Rules**.



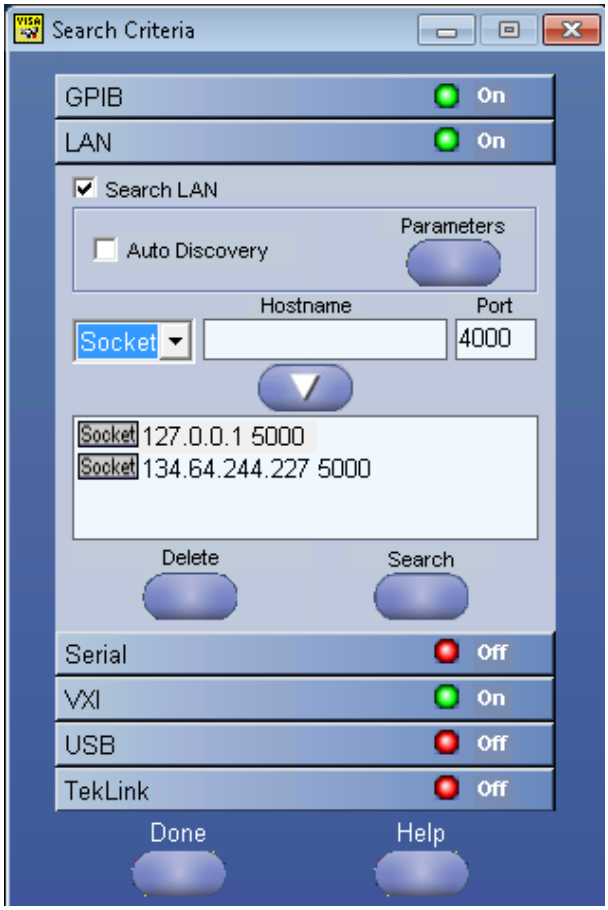
TekVISA configuration

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

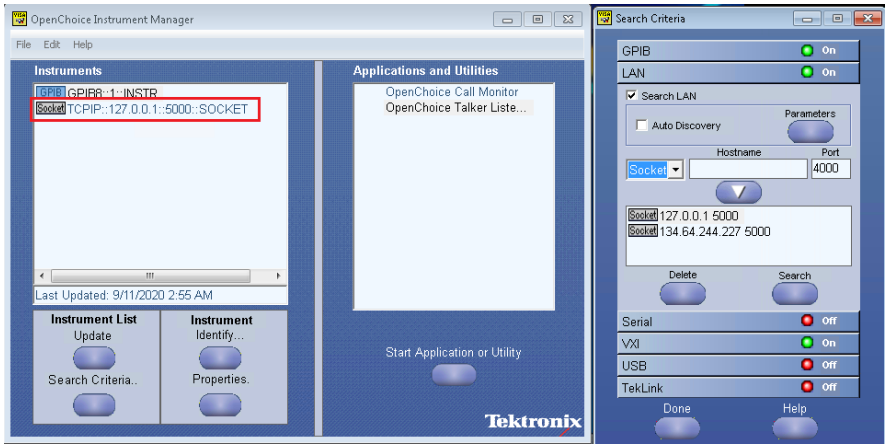


2. Click **Search Criteria**. In **Search Criteria** menu, click **LAN** to Turn-on. Select **Socket** from the drop-down list, enter the IP address of the TekExpress device in **Hostname** and type **Port** as 5000. Click  to configure the IP address with Port.

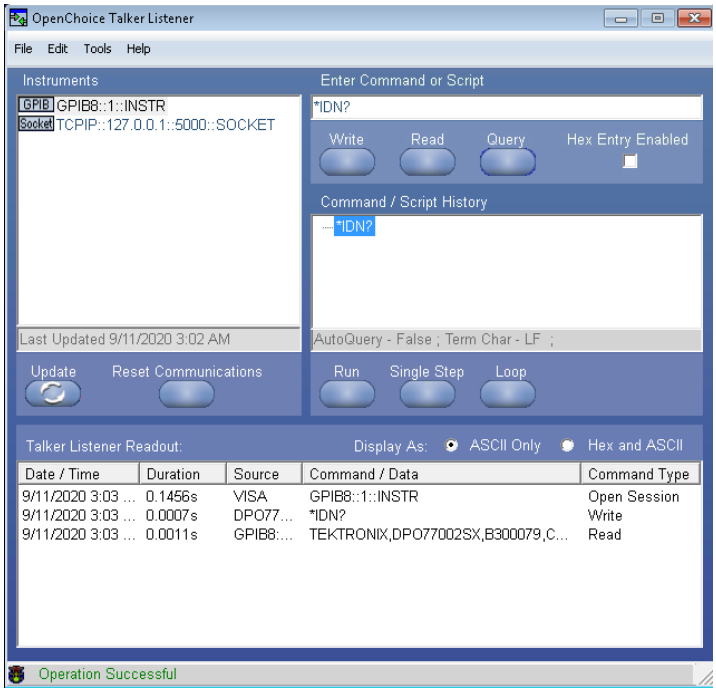
   Enter the Hostname as 127.0.0.1 if the TekVISA and TekExpress application are in the same system, else enter the IP address of the oscilloscope where the TekExpress application is running.



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



TEKEXP:*IDN?

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

Syntax

```
TEKEXP:*IDN?\n
```

Inputs

NA

Outputs

Returns active TekExpress application name running on the oscilloscope.

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

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

TEKEXP:ACQUIRE_MODE?

This command queries the acquire mode type.

Syntax

```
TEKEXP:ACQUIRE_MODE?\n
```

Inputs

```
NA
```

Outputs

```
{LIVE | PRE-RECORDED}
```

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

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>" ;...

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* section for InstrumentType and Value parameters.

Outputs

NA

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* section for InstrumentType parameters.

Outputs

Returns the instrument selected for the specified instrument type

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>

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* section for InstrumentType parameters.

TEKEXP:POPUP

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

Syntax

`TEKEXP:POPUP "<PopupResponse>"\n`

Inputs

`PopupResponse`

Outputs

NA

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.

TEKEXP:REPORT

This command generates the report for the current session.

Syntax

`TEKEXP:REPORT GENERATE\n`

Inputs

`GENERATE`

Outputs

NA

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

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

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 **Results** panel for TestName, ColumnName, and RowNumber parameters.

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* section for DeviceName, SuiteName, VersionName, and TestName parameters.

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.

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`	Saves the already existing modified session
`TEKEXP:SETUP SAVE,"<SessionName>"\n`	Save the session

Inputs

`SessionName` - The name of the session

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

TEKEXP:STATE?

This command queries the current setup state.

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

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,“<TestName>","<AcquireType>", "<ParameterName>",“<Value>”\n
TEKEXP:VALUE ANALYZE,“<TestName>","<ParameterName>".“<Value>”\n
TEKEXP:VALUE DUTID,“<Value>”\n
TEKEXP:VALUE VERBOSE,{TRUE | FALSE}\n
TEKEXP:VALUE WFMFILE,<Test_Name>,<Aquire_Type>,<FilesName1$FileName2>\n
```

Inputs

`ParameterName` - Specifies the parameter name

`TestName` - Specifies the test name

`AcquireType` - Specifies the acquire type

`Value` - Specifes the value to set

`FilesName1$FileName2` - Specifies the waveform file name

`TRUE` - Pop-ups are enabled

`FALSE` - Pop-ups are disabled

Tip: Check *Command parameters list* section for ParameterName, AcquireType, and Value parameters.

Outputs

NA

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,"<TestName>", "<AcquireType>","<ParameterName>"\n`	Returns the value of Parameter for type ACQUIRE
`TEKEXP:VALUE? ANALYZE, "<TestName>","<ParameterName>"\n`	Returns the value of Parameter for type ANALYZE
`TEKEXP:VALUE? DUTID\n`	Returns the DUTID value
`TEKEXP:VALUE? WFMFILE,<Test_Name>,<Aquire_Type>\n`	Returns the waveform file name
`TEKEXP:VALUE? VERBOSE`	Returns the verbose mode type

Inputs

`ParameterName` - Specifies the parameter name

`TestName` - Specifies the test name

`AcquireType` - Specifies the acquire type

`TRUE` - Pop-ups are enabled

`FALSE` - Pop-ups are disabled

Tip: Check *Command parameters list* section for ParameterName and AcquireType parameters.

Outputs

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

Command parameters

This section provides the parameters list for the SCPI commands.

TekExpress USB4 command parameters

ParameterName and Value for DUT, Test selection, Acquisition, Configuration, and Preferences tabs

Specifies the ParameterName and Value for DUT, Test selection, Acquisition, Configuration, and Preferences tabs

Table 19: ParameterName and Value for DUT tab

ParameterName	Value
InstrumentType	Specifies the instrument type. Valid value is Real Time Scope.
DeviceName	Specifies the acquire mode parameter: USB4
SuiteName	Device Host

Table continued…

ParameterName	Value
DataRate Rounded 10 Gbps Option button	Included Excluded
DataRate Rounded 20 Gbps Option button	Included Excluded
Lane Selection	Lane0 Lane1 Both
DUT Automation	Manual Automated
Test Mode	Compliance
Test Method	DPOJET SigTest
Embed/De-embed port selection for:	
Port Selection 1	Port 1
Port Selection 2	Port 2 Port 3
Port Selection 3	Port 2 Port 3
Port Selection 4	Port 4

Table 20: ParameterName and Value for Test Selection tab

ParameterName	Description
Specifies the test measurement name.	Selects\deselects the given test name. Valid values are: • TRUE • FALSE
TP2 • Minimum Unit Interval 10 G • SSC Down Spread Range 10 G • SSC Down Spread Rate 10 G • SSC Phase Deviation 10 G • SSC Slew Rate 10 G • Rise Fall Time 10 G • Electrical Idle 10 G • TJ (Total Jitter) TJ using PRBS15 10 G TJ using SQ2 10 G • UJ (Uncorrelated Jitter) 10 G • UDJ (Uncorrelated Deterministic Jitter) 10 G • DDJ (Data Dependent Jitter) 10 G • UDJ_LF (Low Frequency Uncorrelated Deterministic Jitter) 10 G • DCD (Duty Cycle Distortion) 10 G • AC Common Mode 10 G • Eye Diagram TP2 10 G	
TP3 • Total Jitter TP3 TJ TP3 using PRBS15 10 G TJ TP3 using SQ2 10 G • UJ TP3 (Uncorrelated Jitter TP3) 10 G • DJ TP3 (Uncorrelated Deterministic Jitter TP3) 10 G • Eye Diagram TP3 10 G	

Table continued…

ParameterName	Description
Transmitter Equalization • Preset 0 10 G • Preset 1 10 G • Preset 2 10 G • Preset 3 10 G • Preset 4 10 G • Preset 5 10 G • Preset 6 10 G • Preset 7 10 G • Preset 8 10 G • Preset 9 10 G • Preset 10 10 G • Preset 11 10 G • Preset 12 10 G • Preset 13 10G • Preset 14 10G • Preset 15 10G	Selects\deselects the given test name. Valid values are: • TRUE • FALSE
TP2 • Minimum Unit Interval 20 G • SSC Down Spread Range 20 G • SSC Down Spread Rate 20 G • SSC Phase Deviation 20 G • SSC Slew Rate 20 G • Rise Fall Time 20 G • Electrical Idle 20 G • TJ (Total Jitter) TJ using PRBS15 20 G TJ using SQ2 20 G • UJ (Uncorrelated Jitter) 20 G • UDJ (Uncorrelated Deterministic Jitter) 20 G • DDJ (Data Dependent Jitter) 20 G • UDJ_LF (Low Frequency Uncorrelated Deterministic Jitter) 20 G • DCD (Duty Cycle Distortion) 20 G • AC Common Mode 20 G • Eye Diagram TP2 20 G	

Table continued…

ParameterName	Description
TP3 • Total Jitter TP3 TJ TP3 using PRBS15 20 G TJ TP3 using SQ2 20 G • UJ TP3 (Uncorrelated Jitter TP3) 20 G • DJ TP3 (Uncorrelated Deterministic Jitter TP3) 20 G • Eye Diagram TP3 20 G	Selects\deselects the given test name. Valid values are: • TRUE • FALSE
Transmitter Equilization • Preset 0 20 G • Preset 1 20 G • Preset 2 20 G • Preset 3 20 G • Preset 4 20 G • Preset 5 20 G • Preset 6 20 G • Preset 7 20 G • Preset 8 20 G • Preset 9 20 G • Preset 10 20 G • Preset 11 20 G • Preset 12 20 G • Preset 13 20 G • Preset 14 20 G • Preset 15 20 G	

Table 21: ParameterName and Value for Acquisition tab

ParameterName	Value
Acquisition and Save Options	Saves the acquisitions and waveforms: Save All Waveforms Before Analysis
Signal Validation	Prompt when signal fails Use signal as is - Dont Check Skip test if signal validation fails

Table 22: ParameterName and Value for Configuration tab

ParameterName	Value
Mode	Compliance Mode
Global Settings	Instruments Detected: Real Time Scope

Table continued…

ParameterName	Value
Measurements	Displays the selected measurements to configure
Gen2 CTLE Index	• 0 db • 1 db • 2 db • 3 db • 4 db • 5 db • 6 db • 7 db • 8 db • 9 db
Gen3 CTLE Index	• 0 db • 1 db • 2 db • 3 db • 4 db • 5 db • 6 db • 7 db • 8 db • 9 db
Gen3 Perform with DFE	Included Excluded
Gen2 Perform with DFE	Included Excluded
Gen2 CTLE Option	Fixed Optimize
Gen3 CTLE Option	Fixed Optimize

Table 23: ParameterName and Value for Preferences tab

ParameterName	Value
Auto close Warnings and informations during Sequencing Auto close after <no> Seconds	Included Excluded Value to be given in seconds
Auto close Error Messages during Sequencing. Show in Reports. Auto close after <no> Seconds	Included Excluded Value to be given in seconds
Show messages with a beep sound.	Included Excluded

Table 24: ParameterName and Value for General

ParameterName	Value
PortSelection1	Port1
PortSelection2	• Port2 • Port3
PortSelection3	• Port2 • Port3
PortSelection4	Port4
Gen2 CTLE Option	• Fixed • Optimize
Gen2 Ctle Index	• 0 db • 1 db • 2 db • 3 db • 4 db • 5 db • 6 db • 7 db • 8 db • 9 db
Gen2 Perform DFE Checkbox	• Included • Excluded

Table continued…

ParameterName	Value
Gen3 Ctle Option	• Fixed • Optimize • 0 db • 1 db • 2 db • 3 db • 4 db • 5 db • 6 db • 7 db • 8 db • 9 db
Gen3 Perform DFE Checkbox	• Included • Excluded
PresetGen2	The following selects the preset calibration measurements: • P0 • P1 • P2 • P3 • P4 • P5 • P6 • P7 • P8 • P9 • P10 • P11 • P12 • P13 • P14 • P15

Table continued…

ParameterName	Value
PresetGen3	The following selects the preset calibration measurements: • P0 • P1 • P2 • P3 • P4 • P5 • P6 • P7 • P8 • P9 • P10 • P11 • P12 • P13 • P14 • P15
Example 1: TEKEXP: VALUE GENERAL, "PresetGen2, "P1_P11_P7".	This selects presets 1, 7, and 11 from preset cal Gen2
Example 2: TEKEXP: VALUE GENERAL, "PresetGen2, "P1_P11_P7_P8".	Value Should contain the following: If preset 8 needs to be added along with the selected presets, then the existing presets along with preset 8 must be specified in the command.
Data+	• CH1 • CH2 • CH3 • CH4
Data-	• CH1 • CH2 • CH3 • CH4
Report Update Mode	• New • Append • Replace • Replace Any
Email when test setup change in needed	• True • False

Table continued…

ParameterName	Value
Append Report	• True • False
Auto increment report name if duplicate	• True • False
Include pass/fail results summary	• Included • Excluded
Include detailed results	• True • False
Include plot images	• True • False
Include setup configuration	• True • False
Include user comments	• True • False
Include Header in apended reports	• True • False
Include report at the end	• True • False
Save As Type	• PDF (*.pdf;) • Web Archive (*.mht;*.mhtml) • CSV (*.csv;)
Report Generation Template Path	C:\ProgramFiles\Tektronix\TekExpress\TekExpressUSB4\ReportGenerator\TekExpress_Template_GroupByTestName_CSV.xsl
Report Path	X:\USB4\Reports\USB4.csv
View Report After Generating	• True • False
Report Group Mode	• Test Name • Lane Name

Examples

This section provides the examples for the SCPI commands.

Example	Description
`TEKEXP:*IDN?`	It returns the active TekExpress application name running on the scope.
`TEKEXP:*OPC?`	It returns the last command execution status, if status is executed it returns "1" else "0".
`TEKEXP:SELECT TEST`	+ ParameterName+ "," + value
`TEKEXP:ACQUIRE_MODE PRE-RECORDED`	It sets the acquire mode as pre-recorded.
`TEKEXP:ACQUIRE_MODE?`	It returns LIVE when acquire mode is set to live or it returns pre-recorded when acquire mode is set to pre-recorded.
`TEKEXP:EXPORT REPORT`	It returns the report file in bytes. This can be written into another file for further analysis.
`TEKEXP:INFO? REPORT`	It returns “100,”ReportFileName.mht”", when 100 is the file size in bytes for the filename ReportFileName.
`TEKEXP:INFO? WFM`	It returns “100,“WfmFileName1.wfm”";“200, “WfmFileName2.wfm”" when 100 is the filesize in bytes for the filename WfmFileName1.wfm and 200 is the file size in bytes for the filename WfmFileName2.wfm.
`TEKEXP:INSTRUMENT "Real Time Scope",DPO73304SX ( GPIB8::1::INSTR)`	It sets the instrument value as DPO73304SX(GPIB8::1::INSTR) for the selected instrument type Real Time Scope.
`TEKEXP:INSTRUMENT? "Real Time Scope"`	It returns "DPO73304SX (GPIB8::1::INSTR), when DPO73304SX (GPIB8::1::INSTR)" is the selected instrument for the instrument type Real Time Scope.
`TEKEXP:LASTERROR?`	It returns ERROR: INSTRUMENT_NOT_FOUND, when no instrument is found.
`TEKEXP:LIST? DEVICE`	It returns "USB4" when TX-Device, RXDevice are the available device.
`TEKEXP:LIST? INSTRUMENT,"Real Time Scope"`	It returns "DPO73304SX (GPIB8::1::INSTR), DPO73304DX (TCPIP:: 134.64.248.91::INSTR)" when DPO73304SX (GPIB8::1::INSTR), DPO73304DX (TCPIP::134.64.248.91::INSTR) are the list of available instruments.
`TEKEXP:MODE COMPLIANCE`	It sets the execution mode as compliance.
`TEKEXP:MODE?`	It returns COMPLIANCE when the execution mode is compliance or It returns USER-DEFINED when the execution mode is user defined.
`TEKEXP:POPUP OK`	It sets OK as the response to active popup in the application.
`TEKEXP:POPUP?`	It returns "OK", when OK is the active popup information shown in the application.
`TEKEXP:REPORT GENERATE`	It generates report for the current session.
`TEKEXP:REPORT? "Scope Model Number"`	Returns "DPO73304SX" when DPO73304SX is the scope model.
`TEKEXP:REPORT? DUT ID`	It returns "DUT001" when DNI_DUT001 is the DUT ID.
`TEKEXP:RESULT? "Total Jitter"`	It returns Pass when the test result is Pass.
`TEKEXP:RESULT? "Total Jitter",1`	It returns the 2nd Sub measurements Margin L and H values.
`TEKEXP:SELECT DEVICE, USB4, TRUE`	It selects USB4.
`TEKEXP:SELECT? DEVICE`	It returns USB4
`TEKEXP:SETUP DEFAULT`	It restores the application to default setup.
`TEKEXP:STATE STOP`	It stops the test execution.

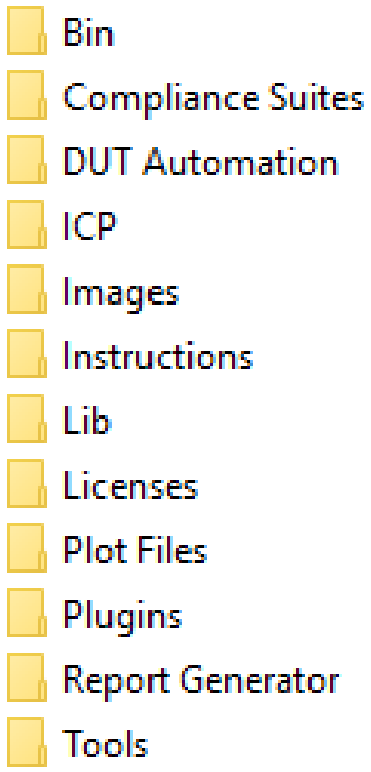
Table continued…

Example	Description
`TEKEXP:STATE?`	It returns as READY when the application is ready to run next measurement.
`TEKEXP:STATE? SETUP`	It returns as NOT_SAVED when the current setup is not saved else it returns SAVED.
`TEKEXP:VALUE GENERAL,"Test Method","DPOJET"`	It sets the Test Method parameter value to DPOJET.
`TEKEXP:VALUE? GENERAL,"Test Method"`	It returns "DPOJET" when DPOJET is the Test Method value.
`TEKEXP:SELECT TEST ,"Total Jitter",True`	Execute this command to select an individual test. This command will select "Total Jitter" test in the Signal Test tab.

References

Application directories

You can find the application files at *C:\Program Files\Tektronix\TekExpress USB4*. The application directory and associated files are organized as follows:



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

Table 25: Application directories and usage

Directory names	Usage
Bin	Contains application libraries
Compliance Suites	Contains test suite specific files
DUT Automation	Contains batch files to run DUT in Automated mode
ICP	Contains instrument and application specific interface libraries
Images	Contains images of the application
Lib	Contains utility files specific to the application
Licenses	Contains all the license files
Plot Files	Contains DPOJET and scope period plots csv
Plugins	Contains the dll path for DUT automation
Report Generator	Contains style sheets for report generation

Table continued…

Directory names	Usage
Tools	Contains instrument and application specific files

File name extensions

The TekExpress USB4 software uses the following file name extensions:

Table 26: File name extension

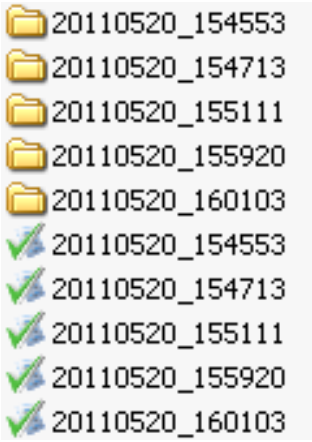
File name extension	Description
*.TekX	Application session files (the extensions may not be displayed)
*.py	Python sequence file.
*.xml	Test-specific configuration information (encrypted) files. Application log files
*.csv	Test result reports Plot data
*.mht	Test result reports (default) Test reports can also be saved in HTML format
*.pdf	Test result reports Application help document
*.xslt	Style sheet used to generate reports
*.png	Captured images
.wfm	Test waveform file

View test-related files

Files related to tests are stored in My Documents\TekExpress USB4\Untitled session folder. Each test setup in this folder has both a test setup file and a test setup folder, both with the test setup name. The test setup file is preceded by the TekExpress icon.

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

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



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

The first time you run a new, unsaved session, the session files are stored in the Untitled Session folder located at X:\TekExpress USB4. When you name and save the session, the files are placed in a folder with the name that you specify. A copy of the test files stay in the Untitled Session folder until you run a new test or until you close the application.

Handle error codes

The return value of the remote automations at the server-end is OP_STATUS, which changes to a string value depending on its code, and is returned to the client. The values of OP_STATUS are as follows:

Code	Value	Description
-1	FAIL	The operation failed
1	SUCCESS	The operation succeeded
2	NOT FOUND	Server not found
3	LOCKED	The server is locked by another client, so the operation cannot be performed
4	UNLOCK	The server is not locked; lock the server before performing the operation
0	NULL	Nothing

Note: The Fail condition for PI commands occurs in any of the following cases:

If the server is locked, the application displays "Server is locked by another client".

If the session is unlocked, the application displays "Lock session to execute the command".

If the server is not found, the application displays " Server not found-Disconnect!".

If the fail condition is not one of the above types, the application displays "Failed".

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