



**TekExpress Automotive Ethernet (10Base-T1S)
Compliance Analysis Solution for 5/6 Series Mixed Signal
Oscilloscope (MSO)**

Printable Application Help



077-1679-01



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Compliance Analysis Solution for 5/6 Series Mixed Signal
Oscilloscope (MSO)**

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Contacting Tektronix

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

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

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

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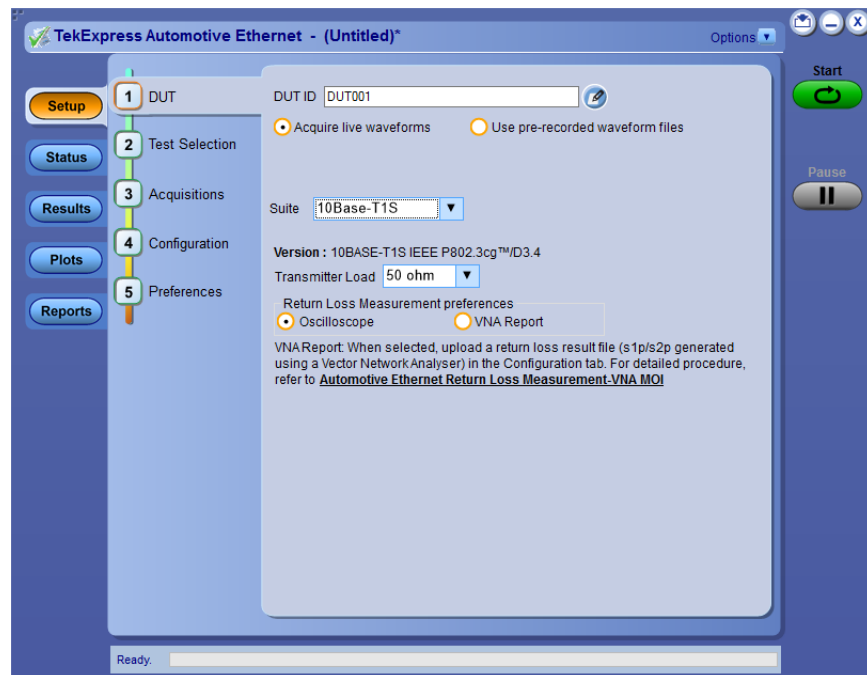
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Welcome

The TekExpress Automotive Ethernet application (10Base-T1S) is a compliance test solution for performing transmitter electrical specification measurements and MDI return loss measurements in accordance to IEEE P802.3cg™ specifications. The 10Base-T1S PHYs supports a point-to-point communications on a link segment up to least 15 meters and also a multi-drop mode technology for PHYs interconnected to a trunk up to least 25 meters.



Key features

- Fully automated setup wizard to perform transmitter electrical specification measurements and MDI electrical specification return loss measurements.
- Comprehensive reports of results with Pass/Fail status along with plots.
- Offers full coverage of test measurements.
- One instrument offering full coverage of measurements. Return Loss measurement is offered as a patented approach and requires an oscilloscope only, without the need of an additional instrument (VNA).
- Power Spectral Density (PSD) is an oscilloscope-based measurement and Spectrum analyzer is not required.
- Validates Test Mode signals before performing measurements.
- Ability to run the measurements multiple times and generate result statistics across runs.

Supported measurements

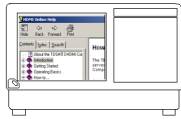

- Transmitter Output Droop
- Transmitter Timing Jitter
- Transmitter Power Spectral Density
 - Power Level
- Transmitter Output Voltage
- Transmit Clock Frequency
- MDI Return Loss

Getting help and support

Related documentation

The following manuals are available as part of the TekExpress Automotive Ethernet Solution documentation set.

Table 1: Product documentation




Item	Purpose	Location
Online Help	In-depth operation and UI help.	
PDF of the Online Help	In-depth operation and UI help.	

Conventions

Help uses the following conventions:

- The term "Application," and "Software" refers to the TekExpress Automotive Ethernet 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: 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.

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
- If possible, save the waveform on which you are performing the measurement as a .wfm file

Getting started

Required instruments and applications

This table lists the recommended/minimum configuration for the application.

Table 3: Required instruments and applications

Category	Description	Model/Part number
Instrument	Oscilloscope 5/6 series MSO oscilloscope with bandwidth 350 MHz or above	MSO54 with 5-BW-350, 5-WIN (Windows 10 only)
Software option	Serial compliance testing package - TekExpress Automotive Ethernet	CMAUTOEN10
Instrument	Signal Generator to test return loss 2-Channel AFG with a frequency range of 100 MHz or above	AFG31102
Probe	Differential Probes	TDP1500 Quantity = 2
Cable	Same length SMA cable for Signal source connections	Quantity = 3
Accessory	Adapter, SMA female to BNC male	Part number: 015-0572-00 Quantity = 4
	TF-XGbT Compliance Test Fixture and Calibration Board	TF-XGbT
Accessory	SMA-T M to 2F	SMA male to 2 SMA female RF coaxial adapter connector 3 way splitter Quantity = 2
	SMA F-F	SMA female to female adapter Quantity = 2
	SMA M-M	SMA Male to SMA Male RF coaxial cable adapter. Quantity = 2
	50 Ω SMA M	Terminator cap Quantity = 6

NOTE.

1. *Recommended oscilloscope firmware version v1.22 or later.*
2. *A short RJ45 cable recommended for return loss calibration and measurement.*
3. *To have common ground of the DUT, fixture and oscilloscope, one could use few minigator clip to stacking banana plug [partnumber : 3220-12-2], to connect to the ground point on the oscilloscope.*
4. *External PC monitor/display recommended.*

List of supported instrument models

This table lists all the supported oscilloscopes, signal sources, and probe models by this application.

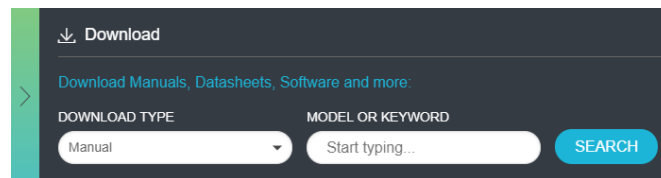
Table 4: List of supported instrument models

Category	Description	Models
Instrument	Oscilloscope MSO 5/6 series oscilloscope with bandwidth 350 MHz or above. (Windows 10 only)	<ol style="list-style-type: none"> 1. MSO54 with 5-BW-350, 5-WIN 2. MS056 with 5-BW-350, 5-WIN 3. MSO58 with 5-BW-350, 5-WIN 4. MSO64 with 6-BW-1000, 6-WIN
Instrument	Signal Generator to test return loss. 2-Channel AFG with a frequency range of 100 MHz or above	<ol style="list-style-type: none"> 1. AFG31102 2. AFG31152 3. AFG31252
Probe	Differential probes	<ol style="list-style-type: none"> 1. TDP1500 2. P6248 (with TPA-BNC adapter) 3. P6247 (with TPA-BNC adapter)

Downloading and installing the software

Complete the following steps to download and install the latest TekExpress Automotive Ethernet application. See [Required instruments and applications](#) on page 3 for compatibility.

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



3. Select the latest version of software and follow the instructions to download. Copy the executable file to the oscilloscope.
4. Double-click the installer (.exe) and follow the on-screen instructions.
5. Select **Application > TekExpress Automotive Ethernet** from the Oscilloscope menu bar to launch the application.

Activate the license

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

1. From the MSO 5/6 Series Oscilloscope menu bar, click **Help > About**.
2. Click **Install License**, and then select the license file (*.Lic).
3. Follow the application instructions in the oscilloscope to activate the license.
4. After successful activation of the license, reboot the oscilloscope.

View software version

To view version information for Automotive Ethernet, click **Options > About TekExpress**.



File name extensions

The TekExpress Automotive Ethernet software uses the following file name extensions:

Table 5: 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	Tektronix waveform file.

Operating basics

Launch the application

To launch the TekExpress Automotive Ethernet application, select **Applications** > **TekExpress Automotive Ethernet** from the oscilloscope menu bar.

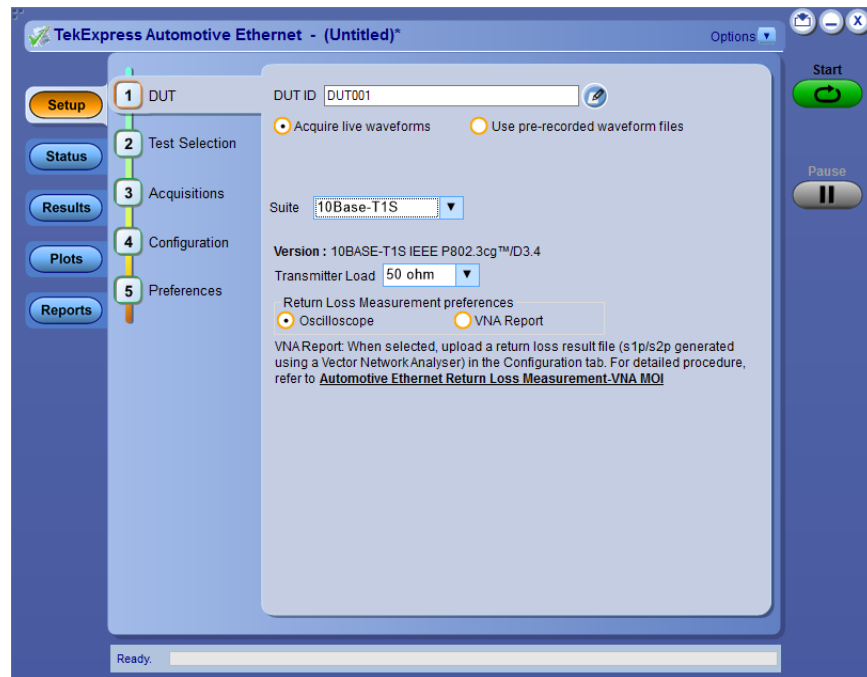


Figure 1: DUT tab displayed when you launch the application


During launch, 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 will get unmapped. Session files are then stored inside the X:\Automotive Ethernet folder. If this file is not found, the application runs an instrument discovery program to detect connected instruments before launching TekExpress Automotive Ethernet.

To keep the TekExpress Automotive Ethernet application on top of any application, select **Keep On Top** from the *Options menu*. If the application goes behind the oscilloscope application, click **Applications** > **TekExpress Automotive Ethernet** to move the application to be in front.

See also

[Exit the application](#)

Exit the application


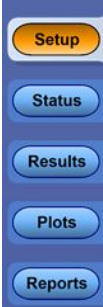



To exit the application, click  on the application title bar. Follow on-screen prompts to save any unsaved session, save test setup files, or exit the application.








NOTE. *Using other methods to exit the application can result in abnormal termination of the application.*

Application controls

This section describes the application controls.

Table 6: Application control description


Item	Description
<p data-bbox="553 457 691 485"><i>Options menu</i></p> 	<p data-bbox="870 457 1287 485">Menu to display global application controls.</p>
<p data-bbox="553 636 659 663"><i>Test panel</i></p> 	<p data-bbox="870 636 1487 663">Controls that open tabs for configuring test settings and options.</p>
<p data-bbox="553 1094 732 1121">Start / Stop button</p>  	<p data-bbox="870 1094 1494 1245">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.</p>
<p data-bbox="553 1446 789 1474">Pause / Continue button</p> 	<p data-bbox="870 1446 1471 1503">Use the Pause button to pause the acquisition. When a test is paused, this button changes as Continue.</p>

Item	Description
<p>Clear button</p> 	<p>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.</p> <p>NOTE. This button is visible only when there are results data on the panel.</p>
<p>Application window move icon</p> 	<p>Place the cursor over the top of the application window to move the application window to the desired location</p>
<p>Minimize icon</p> 	<p>Minimizes the application.</p>
<p>Close icon</p> 	<p>Close the application.</p>
<p>Mini view / Normal view</p>  	<p>Toggles the application between mini view and 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.</p> 

Global application controls

The menus and controls that appear outside the individual tabs are called “Global Controls”. These are used to specify the devices to be tested.

Options menu overview

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

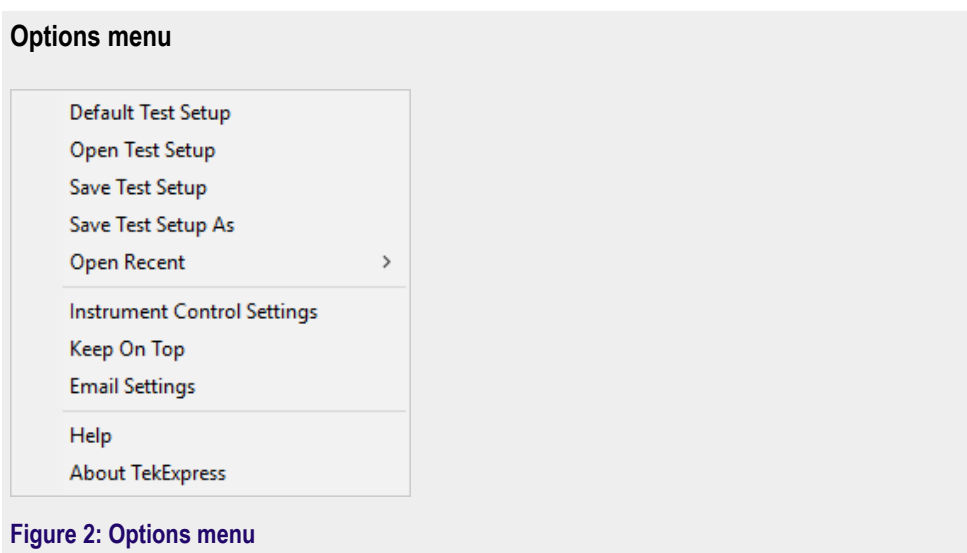


Figure 2: Options menu

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.
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 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 Automotive Ethernet application on top of all the application.
Email Settings	Configures email options for test run and results notifications
Help	Displays the TekExpress Automotive Ethernet help
About TekExpress	Displays application name, version, and hyperlink to end user license agreement.

See also. [Application controls](#)

TekExpress instrument control settings

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

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

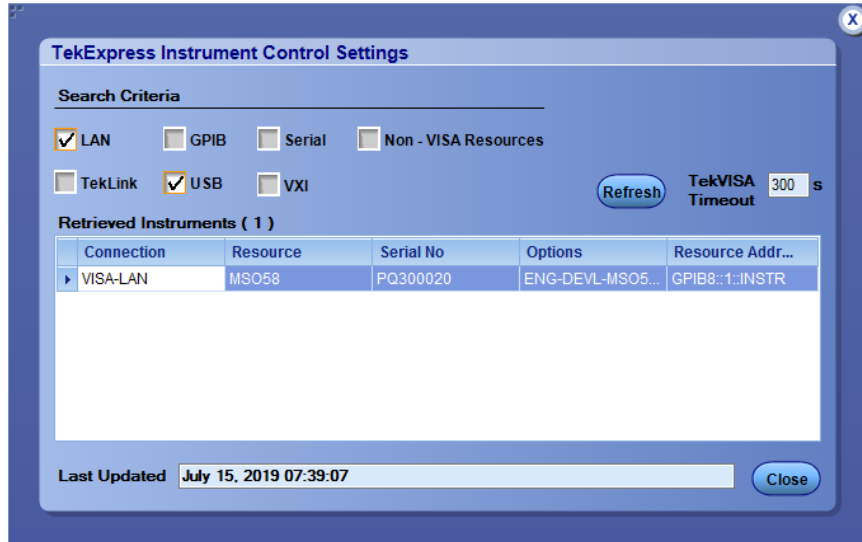


Figure 3: TekExpress Instrument Control Settings window

See also. [Options menu overview](#)

View connected instruments

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. 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.

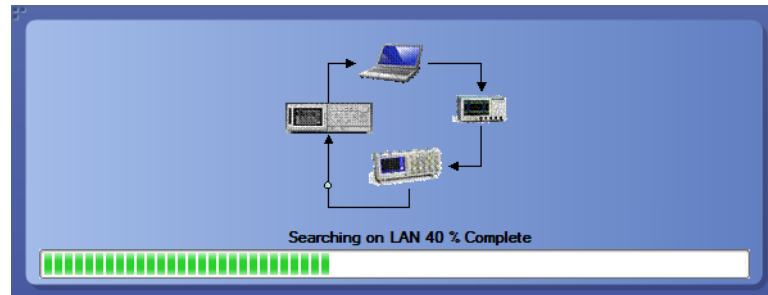


Figure 4: Search status of the instruments connected to LAN

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.

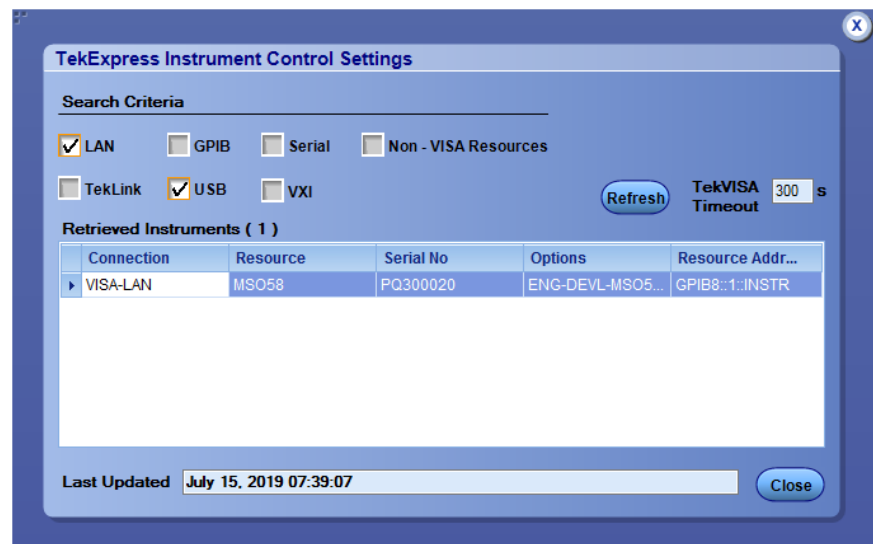


Figure 5: TekExpress Instrument Control Settings window

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.

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:

Email Settings

Figure 6: 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.

Application panels overview

TekExpress Automotive Ethernet solution uses panels to group Test Setup 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.

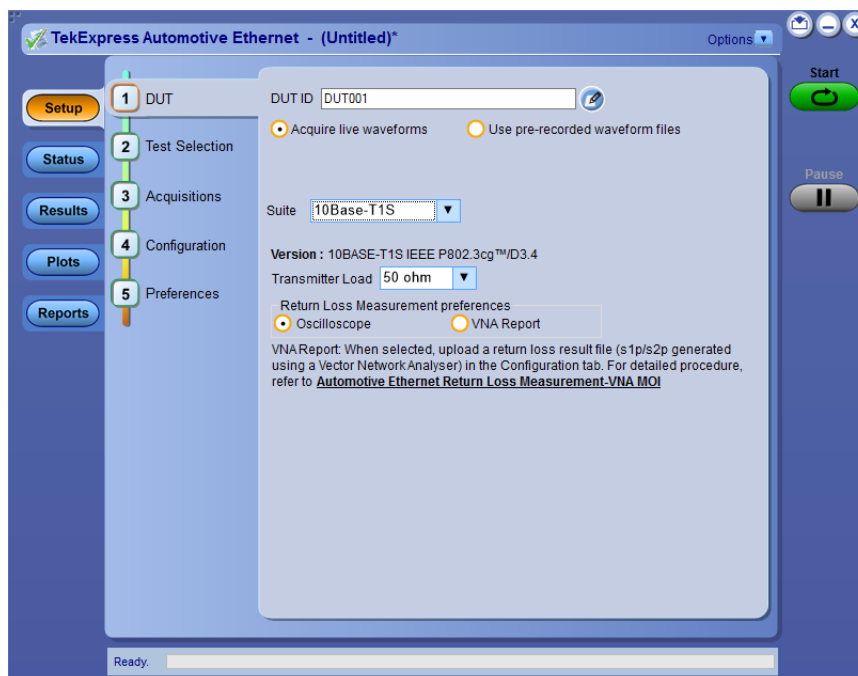


Table 8: Application panels overview

Panel Name	Purpose
Setup panel	<p>The Setup panel shows the test setup controls. Click the Setup button to open this panel.</p> <p>Use this panel to:</p> <ul style="list-style-type: none"> ■ 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.
Plots panel	View the result as a two-dimensional plot for measurement analysis.
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, etc.), and select report viewing options.

See also [Application controls](#)

Setup panel

Setup panel overview

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

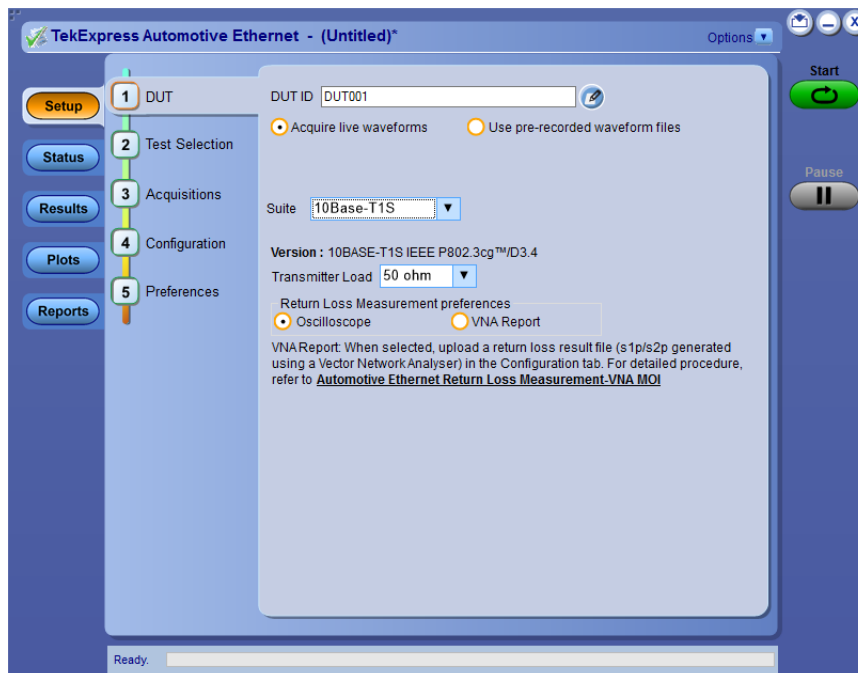


Figure 7: Setup panel

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 the current session. The DUT settings also affect the list of available tests in the Test Selection tab.

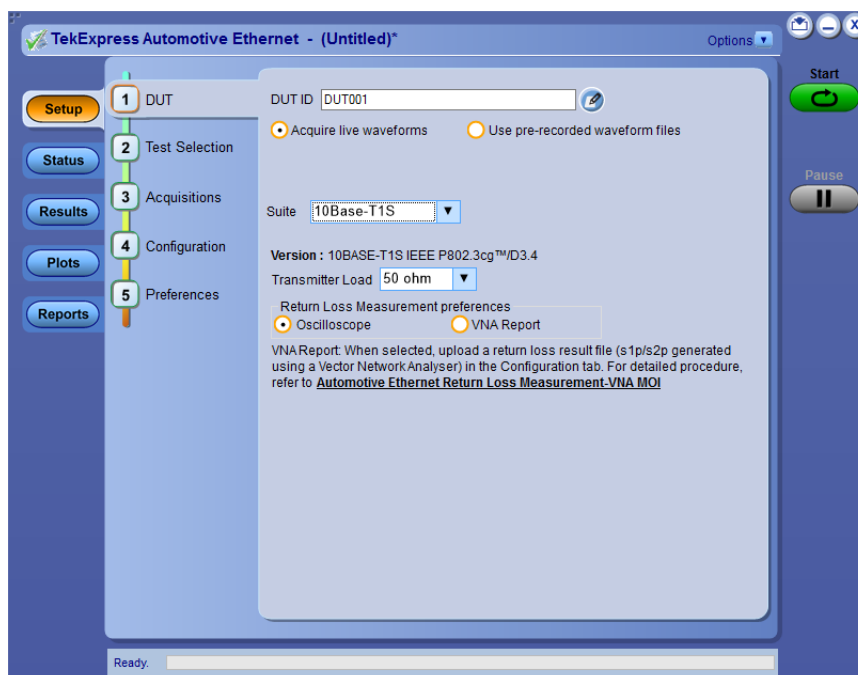



Figure 8: DUT tab

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

Table 9: 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		Acquires active signals from the DUT for measurement and analysis.
Use pre-recorded waveform files		Select to run tests on a saved waveform. See Open (load) a saved test setup for steps to load a saved waveform.
Suite		Select the suite from the drop-down list. The available value is 10Base-T1S .
Version		Displays the CTS specification for the selected suite.
Transmitter load		Select the operating mode from the drop-down list. The available values are 100 Ω, 50 Ω, Both .
Return Loss Measurement preference	Oscilloscope	Runs oscilloscope based measurements when selected.
	VNA Report	Uses a return loss result (s1p/s2p generated using a vector network analyzer) in the configuration tab for measurement.

See also. [Select tests](#)

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

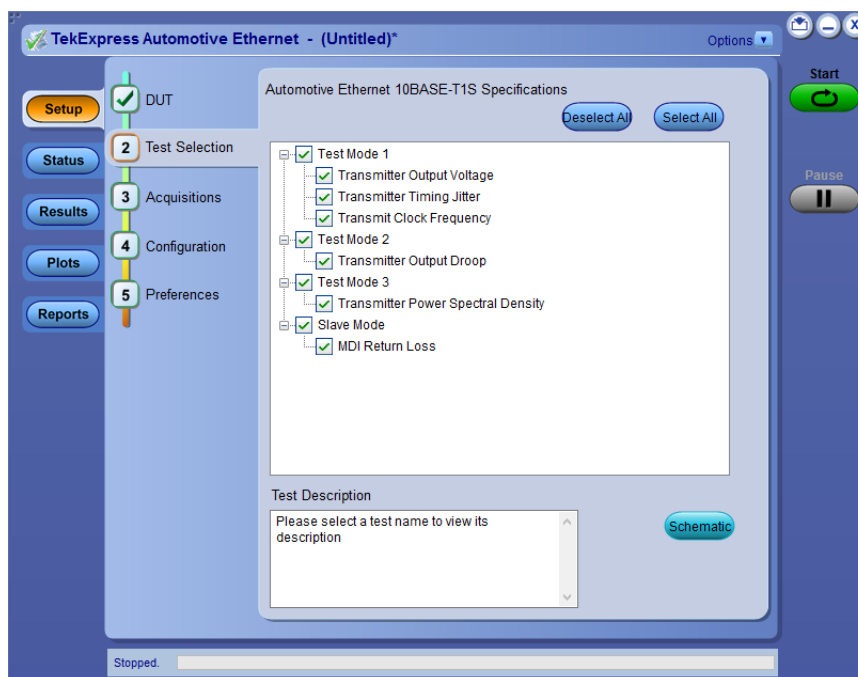


Figure 9: Test Selection tab

Table 10: Test Selection tab settings

Setting	Description
Deselect All Select All	Deselect or select all tests in the list.
Tests	Click on a test to select or unselect. Highlight a test to show details in the Test Description pane. The application automatically selects all required tests when in Compliance mode.
Test Description	Displays brief description of the highlighted test in the test tree.
Schematic	Displays an equipment and test fixture setup schematic (connection diagram) for the selected test. Use to set up the equipment and fixtures or to verify the setup before running the test.

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 acquisition mode selected in the DUT tab.

The TekExpress Automotive Ethernet 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 Automotive Ethernet\Untitled Session\

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.

Acquire live waveforms for analysis. Select **Acquire Live Waveforms** on the DUT tab, to perform live acquisitions.

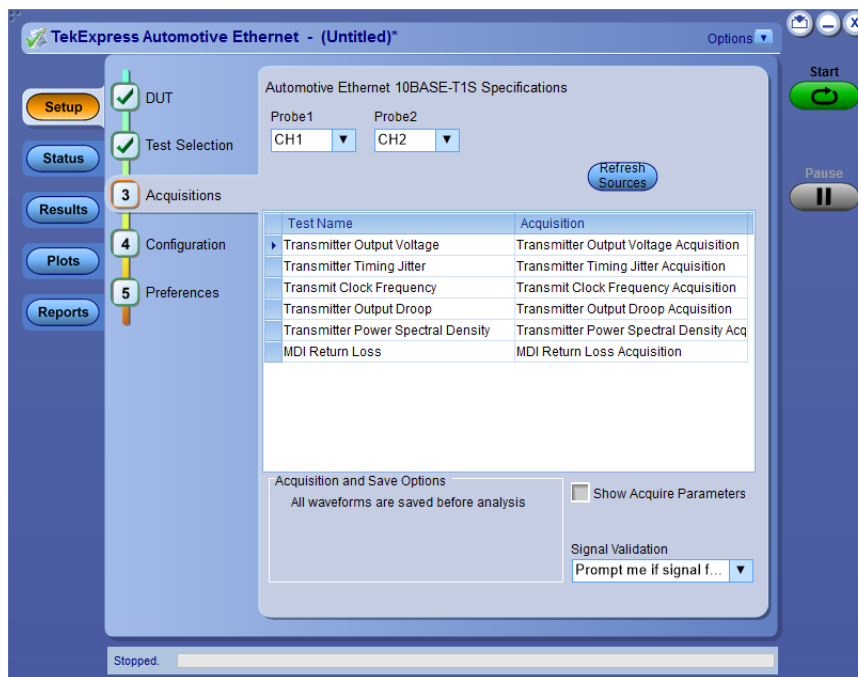



Figure 10: Acquisitions tab for *Acquire Live Waveforms*

Table 11: Acquisitions tab settings for *Acquire Live Waveforms*

Column name	Description
Probe<x>	Select the probe source channel for each listed signal in the Probe selection drop-down menu.
Refresh Sources	Click to refresh the sources.
Show Acquire Parameters	Select to view the acquisition parameters for the selected tests in the results table.

Column name	Description
Signal Validation	<ul style="list-style-type: none"> ■ Prompt me if signal fails: Select to prompt if the signal fails. ■ Use Anyway: Click to Run the test on the current acquired signal in spite of failed signal. ■ Skip Test: Click to skip the current test after signal validation fails. ■ Reacquire: Click to reacquire the signal for the test being Run. ■ Use signal as is-Don't check: Select to perform the test without signal validation. ■ Skip test if signal fails: Select to skip the test for which signal validation fails.

Use pre-recorded waveforms for analysis. Select **Use pre-recorded waveform files** on the DUT tab, to use pre-recorded waveforms for analysis. Click  for the selected measurement and select the waveform file (.wfm).

NOTE.

While using waveforms in pre-recorded mode:

Channel waveform needs to be selected for all the measurements, except power spectral density.

MATH waveform must be selected for the power spectral density measurement.

Also use the RBW for the measurement during live mode; it must be noted and configured in pre-recorded mode, to replicate live mode condition.

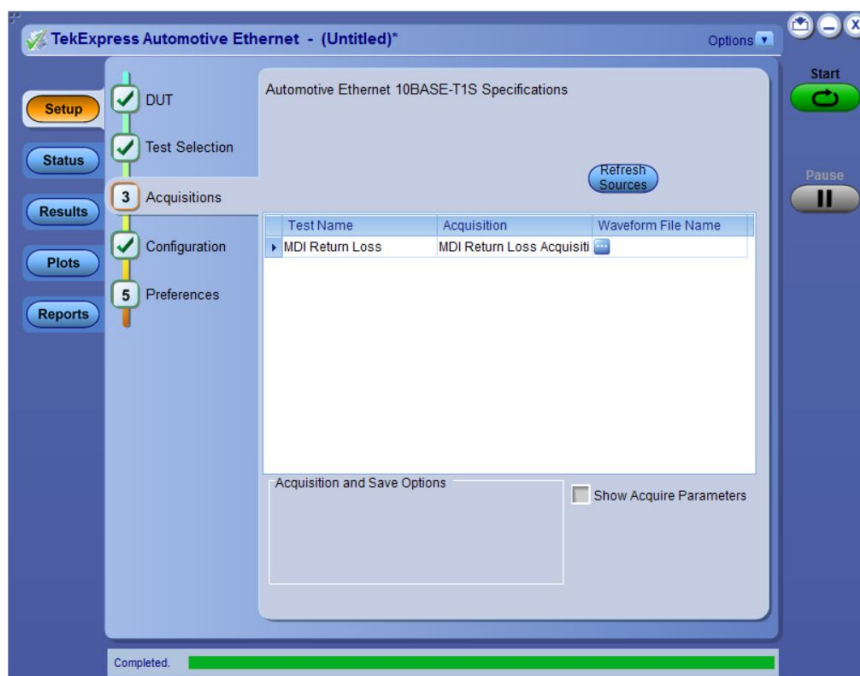


Figure 11: Acquisitions tab for Use pre-recorded waveform files

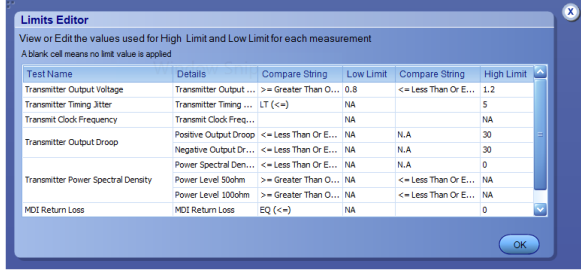
Table 12: Acquisitions tab settings for Use pre-recorded waveform files

Column name	Description
Refresh Sources	Click to refresh the sources.
Show Acquire Parameters	Select to view the acquisition parameters for the selected tests in the results table.

Set configuration tab parameters

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

Table 13: Configuration tab: Common parameters

Setting	Description																																																									
Mode	<p>Determines whether test parameters are in compliance or can be edited</p> <ul style="list-style-type: none"> ■ Compliance: Select to run the tests using compliance mode values. The measurement specific parameters are set to optimal values. ■ User Defined: Select to run the tests using custom values. All test parameters and global parameters are editable. 																																																									
Limits Editor	<p>Displays the upper and lower limits for the applicable measurement using different types of comparisons. In User Defined mode, you can configure the measurement limits.</p>  <p>The screenshot shows a dialog box titled "Limits Editor" with the following table:</p> <table border="1"> <thead> <tr> <th>Test Name</th> <th>Details</th> <th>Compare String</th> <th>Low Limit</th> <th>Compare String</th> <th>High Limit</th> </tr> </thead> <tbody> <tr> <td>Transmitter Output Voltage</td> <td>Transmitter Output ...</td> <td>>= Greater Than O...</td> <td>0.8</td> <td><= Less Than Or E...</td> <td>1.2</td> </tr> <tr> <td>Transmitter Timing Jitter</td> <td>Transmitter Timing ...</td> <td>LT (<=)</td> <td>NA</td> <td></td> <td>5</td> </tr> <tr> <td>Transmit Clock Frequency</td> <td>Transmit Clock Freq...</td> <td></td> <td>NA</td> <td></td> <td>NA</td> </tr> <tr> <td rowspan="2">Transmitter Output Droop</td> <td>Positive Output Droop</td> <td><= Less Than Or E...</td> <td>NA</td> <td>N.A</td> <td>30</td> </tr> <tr> <td>Negative Output Dr...</td> <td><= Less Than Or E...</td> <td>NA</td> <td>N.A</td> <td>30</td> </tr> <tr> <td rowspan="2">Transmitter Power Spectral Density</td> <td>Power Spectral Den...</td> <td><= Less Than Or E...</td> <td>NA</td> <td>N.A</td> <td>0</td> </tr> <tr> <td>Power Level 55ohm</td> <td>>= Greater Than O...</td> <td>NA</td> <td><= Less Than Or E...</td> <td>NA</td> </tr> <tr> <td rowspan="2">MDI Return Loss</td> <td>Power Level 100ohm</td> <td>>= Greater Than O...</td> <td>NA</td> <td><= Less Than Or E...</td> <td>NA</td> </tr> <tr> <td>MDI Return Loss</td> <td>EQ (<=)</td> <td>NA</td> <td></td> <td>0</td> </tr> </tbody> </table>	Test Name	Details	Compare String	Low Limit	Compare String	High Limit	Transmitter Output Voltage	Transmitter Output ...	>= Greater Than O...	0.8	<= Less Than Or E...	1.2	Transmitter Timing Jitter	Transmitter Timing ...	LT (<=)	NA		5	Transmit Clock Frequency	Transmit Clock Freq...		NA		NA	Transmitter Output Droop	Positive Output Droop	<= Less Than Or E...	NA	N.A	30	Negative Output Dr...	<= Less Than Or E...	NA	N.A	30	Transmitter Power Spectral Density	Power Spectral Den...	<= Less Than Or E...	NA	N.A	0	Power Level 55ohm	>= Greater Than O...	NA	<= Less Than Or E...	NA	MDI Return Loss	Power Level 100ohm	>= Greater Than O...	NA	<= Less Than Or E...	NA	MDI Return Loss	EQ (<=)	NA		0
Test Name	Details	Compare String	Low Limit	Compare String	High Limit																																																					
Transmitter Output Voltage	Transmitter Output ...	>= Greater Than O...	0.8	<= Less Than Or E...	1.2																																																					
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Transmit Clock Frequency	Transmit Clock Freq...		NA		NA																																																					
Transmitter Output Droop	Positive Output Droop	<= Less Than Or E...	NA	N.A	30																																																					
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Transmitter Power Spectral Density	Power Spectral Den...	<= Less Than Or E...	NA	N.A	0																																																					
	Power Level 55ohm	>= Greater Than O...	NA	<= Less Than Or E...	NA																																																					
MDI Return Loss	Power Level 100ohm	>= Greater Than O...	NA	<= Less Than Or E...	NA																																																					
	MDI Return Loss	EQ (<=)	NA		0																																																					

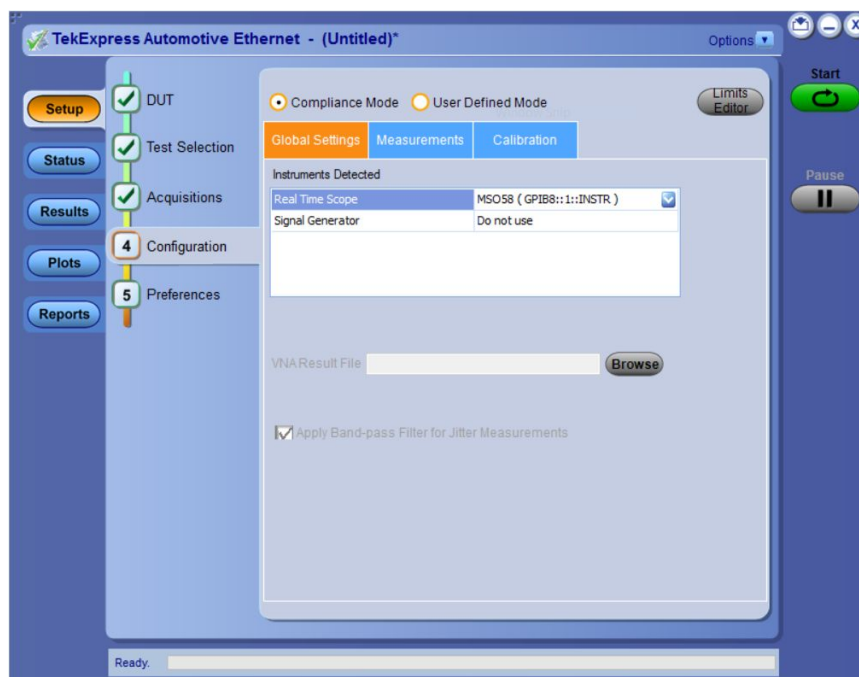


Figure 12: Configuration tab: Global Settings

Table 14: Configuration tab: Global settings

Setting	Description
Instruments Detected	<p>Displays the instruments connected to this application. Click on the instrument name to open a list of available (detected) instruments.</p> <p>Select Options > Instrument Control Settings and click Refresh to update the instrument list.</p> <p>NOTE. Verify that the LAN and USB search criteria is selected in the Instrument Control Settings when using the TekExpress Automotive Ethernet application.</p>
VNA Result File	Click Browse to select VNA Result file.

Measurement parameters

The configuration parameters are displayed for the measurements selected in the Test Selection tab.



Figure 13: Configuration tab: Measurement

Table 15: Configuration tab: Measurement settings

Measurements	Group	Settings	Default Value
Test Mode 1			
Transmitter Output Voltage	Acquire	Record Length (M)	0.03
		Sample Rate (GS/s)	0.625
Transmitter Timing Jitter	Acquire	Record Length (M)	0.65
		Sample Rate (GS/s)	0.625
	Analyze	Edge	Both
		Hysteresis (%)	5 %
Transmitter Clock Frequency	Acquire	Record Length (M)	0.03
		Sample Rate (GS/s)	0.625
Test Mode 2			
Transmitter Output Droop	Acquire	Averages	8
		Record Length (M)	0.04
		Sample Rate (GS/s)	0.625
Test Mode 3			

Measurements	Group	Settings	Default Value
Transmitter Power Spectral Density	Acquire	Spectral Averages	2
		Record Length (M)	2.5
		Sample Rate (GS/s)	1.25
	Analyze	RBW (KHz)	1
		Start Frequency (MHz)	0.3
		Stop Frequency (MHz)	40
Slave Mode			
MDI Return Loss	Acquire	Averages	100
		Record Length (M)	0.1
		Sample Rate (GS/s)	0.625
	Analyze	Smooth	7

Calibration for return loss measurement

Calibration procedure corrects for probe loading and fixture loading in the final measured results.

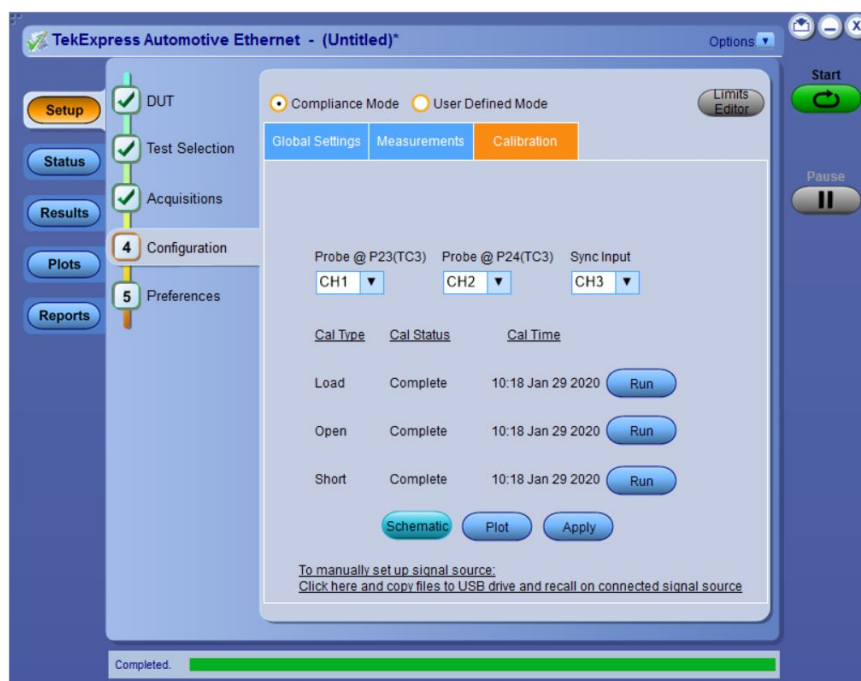


Figure 14: Configuration tab: Calibration

Table 16: Configuration tab: Calibration settings

Parameter	Description
Channel drop down	Select the relevant channel and probes. <i>NOTE. When you change the input sources (Channel) other than calibrated sources, you need to re-calibrate with the latest sources.</i>
Cal Type	Displays the type of calibration (Load, Open, or Short).
Cal Status	Displays the status of the calibration: (Pending, Inprogress, Error or Complete).
Cal Time	Displays the previous calibration time in Month, Date, and Year format.
Run	Click to run the calibration.
Schematic	Click to view the schematic.
Plot	Click to view the plot.
Apply	Click to apply the configured parameters to calibration.
To manually set up signal source: Click here and copy files to USB drive and recall on connected signal source.	In case of manual signal source (AFG) setup, click the link and copy the relevant folder and recall the setup on connected signal source.

Set preferences tab parameters

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

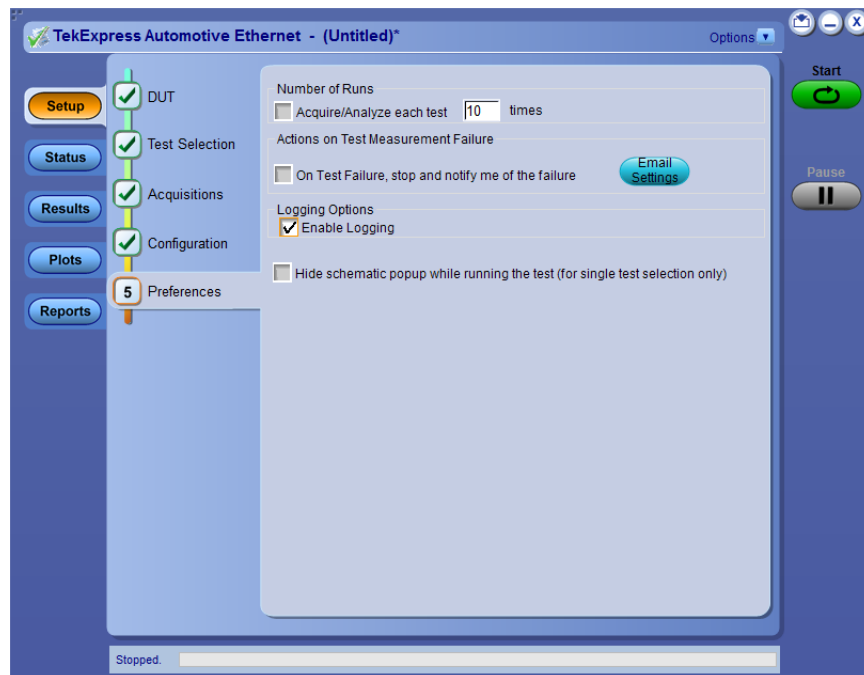


Figure 15: Preferences tab

Table 17: 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, checkbox is disabled. Upon enabling, the default value is 10.
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.
Logging Options	
Enable Logging	When selected, the application records the actions of the user. By default, it is selected.
Hide schematic popup while running the test (for single test selection only)	When selected, the user message pop-up is not displayed. This is enabled when you select Operating Mode as 100 Ω or 50 Ω in the DUT panel and select a single measurement only in the Test Selection 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) 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 tab

Test 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. To collapse and expand the table rows, click the expand (+) / collapse (-) button.

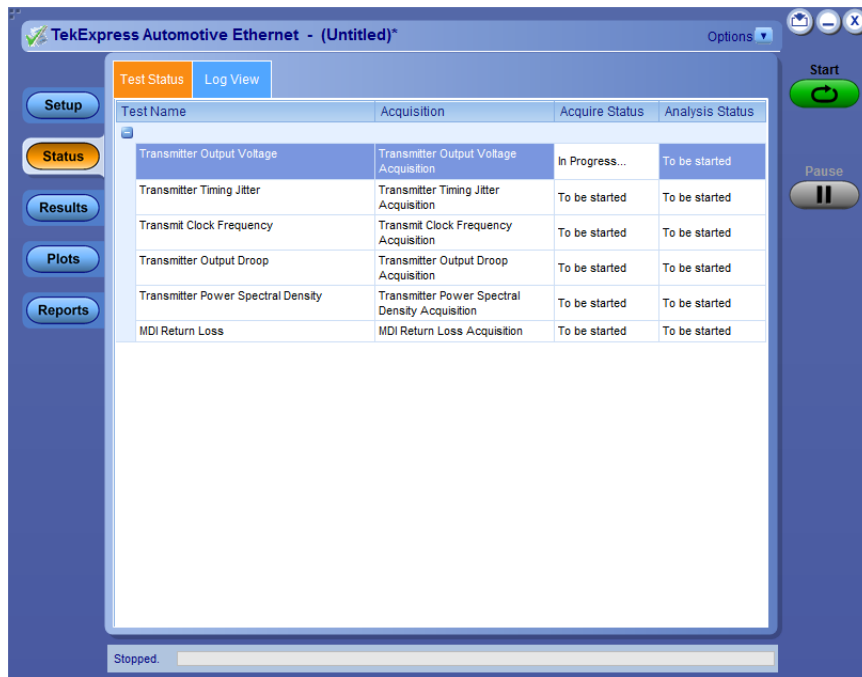


Figure 16: Test status view in Status panel

Table 18: Test 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: <ul style="list-style-type: none"> ■ To be started ■ Started Acquisition ■ Completed Acquisition
Analysis Status	Displays the progress state of the analysis: <ul style="list-style-type: none"> ■ To be started ■ In Progress ■ Completed ■ Aborted ■ Skipped

Log View tab

Log View: It displays the detailed execution status of the tests.

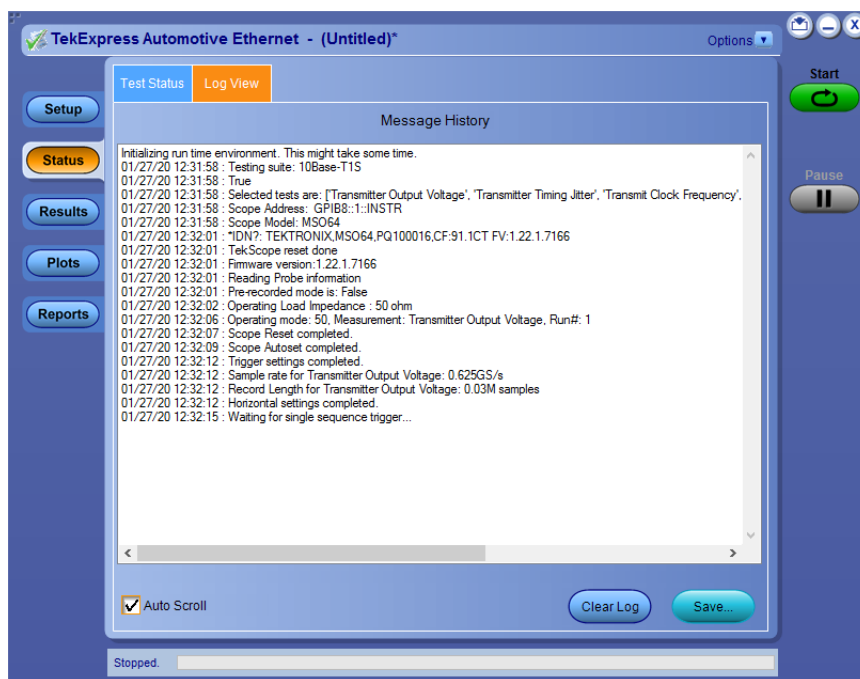


Figure 17: Log view in Status panel

Table 19: Status panel settings

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 execution.
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.

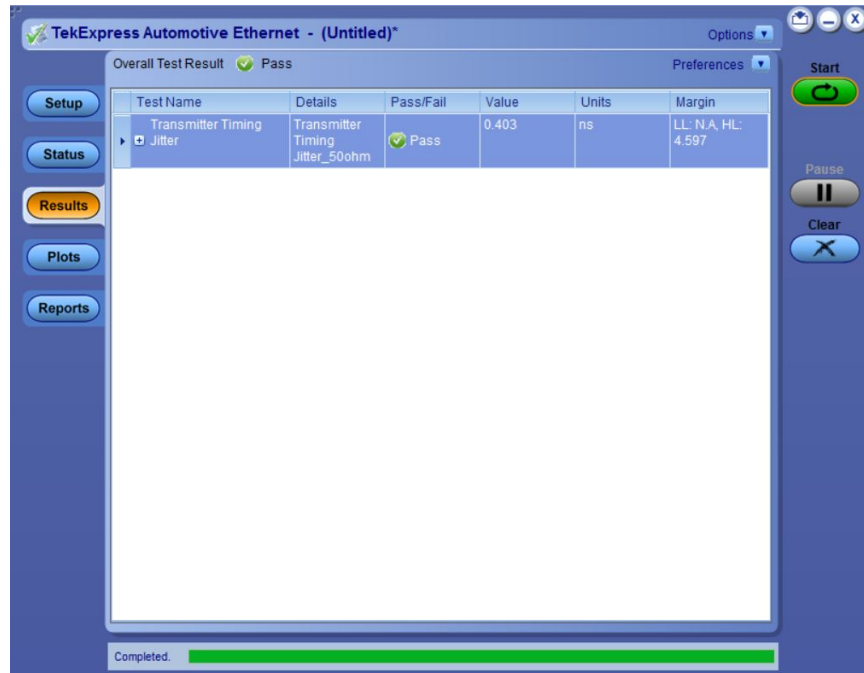


Figure 18: Results panel with measurement results

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

See also. [View a report](#)

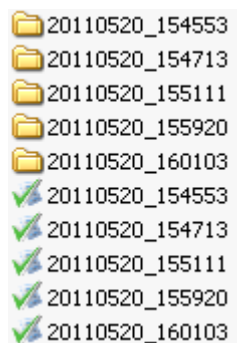
[Application panel overview](#)

View test-related files

Files related to tests are stored in My TekExpress\Automotive Ethernet\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:\Automotive Ethernet. 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 Automotive Ethernet application.

See also. [File name extensions](#)

Plots panel

Plots panel overview The Plots panel displays the result as a two-dimensional plot for additional measurement analysis. The plots are displayed only during run and only for the measurements which supports plots.

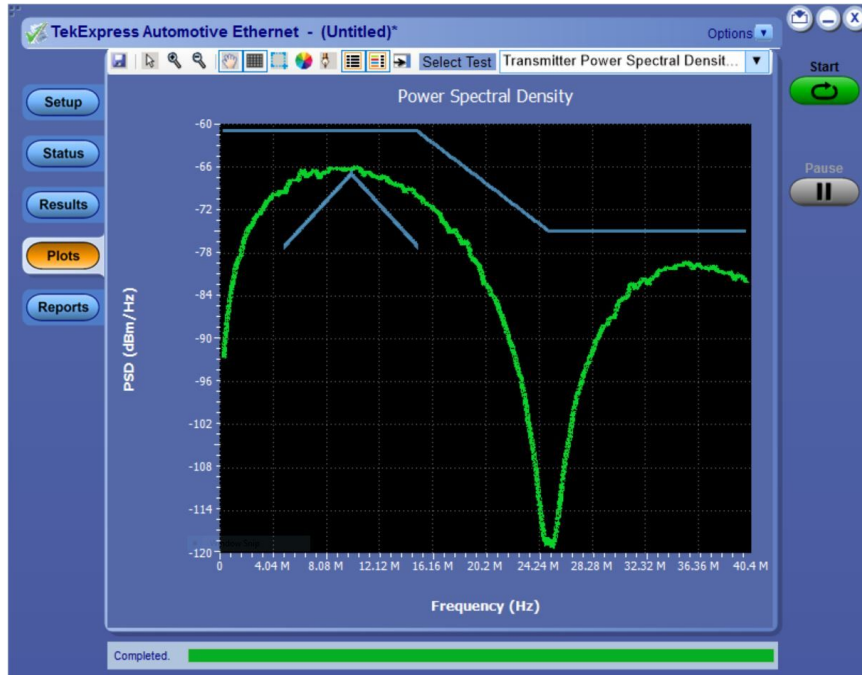












Figure 19: Plots panel

Toolbar functions in plot windows. The Plot Toolbar window includes the following functions:

Icon	Functions
 Save	Saves the plot.
 Select & Zoom	Expands the selected plot area. Left-click and drag the mouse to mark the region on the plot to zoom.
 Zoom In	Expands part of the plot (Horizontal and Vertical); the data appears in more detail.
 Zoom Out	Contracts part of the plot (Horizontal and Vertical); the data appears in less detail.
 Pan	Moves the plot anywhere within the scale.
 Hide Gridlines	Hides the gridlines.
 Reset	Resets the zoom to 100%.
 Choose Waveform Colors	Sets the plot color. Click and select the color in the Color window and click OK . Click in the plot area to apply the color.

Icon	Functions
 Show/Hide Markers	Displays or hides the markers.
 UnDock/Dock	Click to undock/dock the plot window.
Select Test	Select the measurement.

Viewing plots

The Plots panel displays a summary of the plot generated during run. The plots are displayed for the following measurements:

1. Transmitter power spectral density
 - a. Power spectral density plot with mask
2. Return loss measurement
 - a. Calibration of the different termination cases
 - b. Return loss with mask

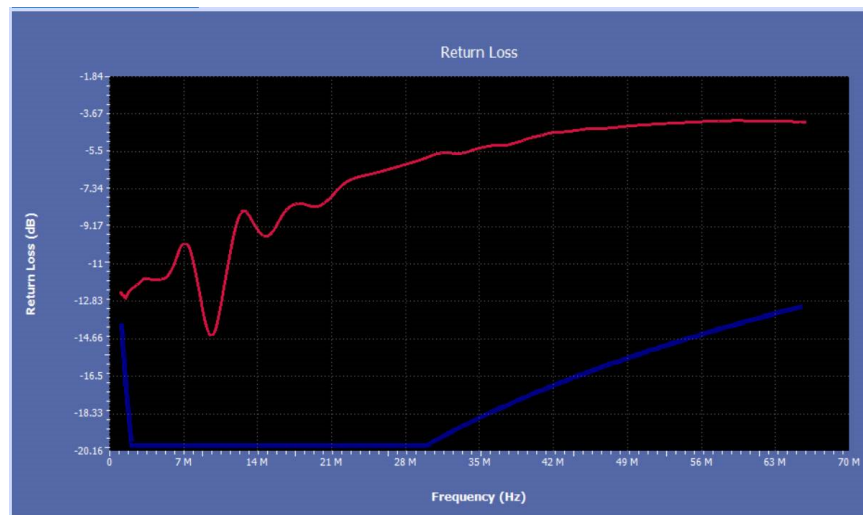


Figure 20: Return loss

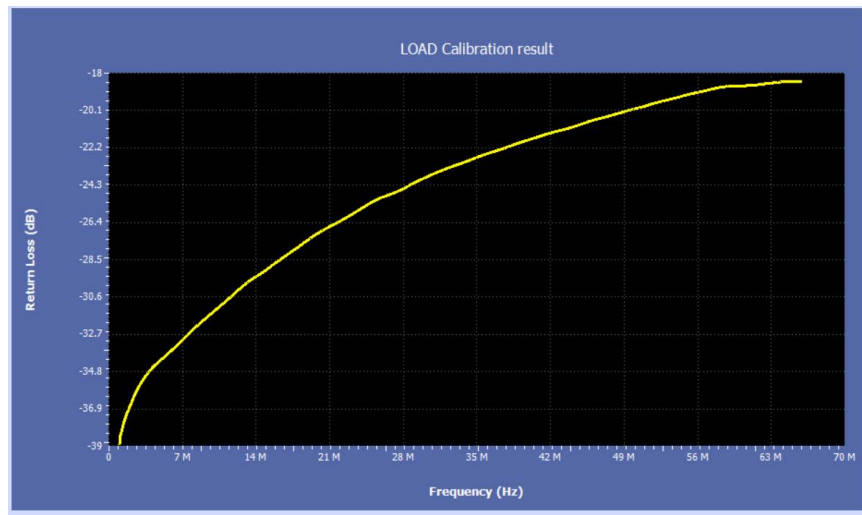


Figure 21: Return loss load calibration

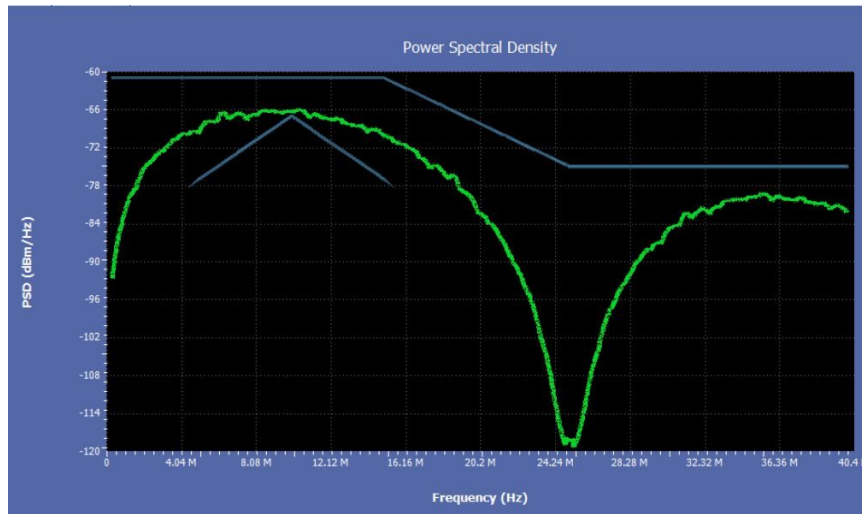


Figure 22: Transmitter power spectral density

Reports panel

Reports panel overview

Use the Reports panel to configure report generation settings parameters, view the report, generate the report, browse for reports, name and save reports, select test content to include in reports, and select report viewing options.

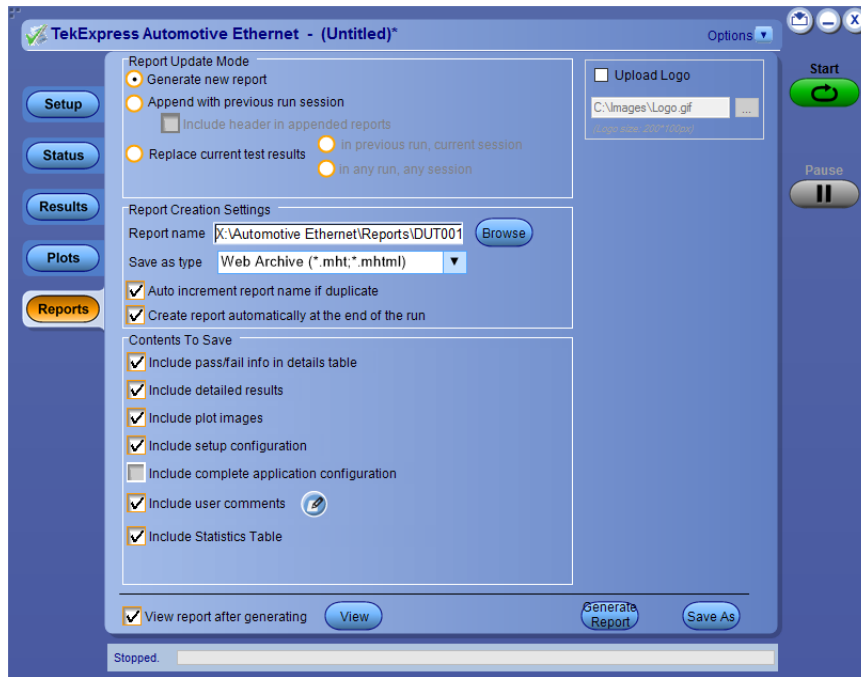


Figure 23: Results tab

For information on setting up reports, see [Select report options](#).

See also. [View a report](#)

[Application panels 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 20: Report generation settings

Setting	Description
Report Update Mode	
Generate new report	Creates 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.
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.
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	<p>Displays the name and path of the Automotive Ethernet report. The default location is at <i>My TekExpress\Automotive Ethernet\Untitled Session</i>. 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.</p> <p>Change the report name or location. Do one of the following:</p> <ul style="list-style-type: none"> ■ 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. <p>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\Automotive Ethernet\DUT001.mht.</p> <hr/> <p>NOTE. You cannot set the file location using the Browse button.</p> <hr/> <p>Open an existing report. Click Browse, locate and select the report file and then click View at the bottom of the panel.</p>
Save as type	<p>Saves a report in the specified file type, selected from the drop-down list. The report are saved in .csv, .pdf or .mht.</p> <hr/> <p>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.</p>
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.

Setting	Description
Include detailed results	Includes detailed results in the report.
Include plot images	Includes 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 complete application configuration.
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.
Include statics table	Select to include test run statistics in the report. This is enabled when you run any test for more than once. Set Acquire/Analyze each test in the Preferences tab to more than one to run any test for multiple times.
Upload Logo	Select to add your logo into the generated report.
Image file path	Displays the name and path of the logo file. The default location is <i>C:\images</i> . The maximum size of the logo is 200*100px.
View report after generating	Automatically opens the report in a Web browser when the test completes. This option is selected by default.
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**.

NOTE. *The iteration column will be displayed only when more than one test run is selected.*

For information on changing the file type, file name, and other report options, see [Select report options](#).

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

Tektronix® TekExpress Automotive Ethernet Transmitter Test Report							
Setup Information							
DUT ID	DUT001	TekExpress Automotive-Ethernet		1.3.0.95			
Date/Time	2020-01-28 12:48:20	Framework Version		4.15.0.2			
Pre-Recorded Mode	False	Scope Model		MSO54			
Compliance Mode	True	Firmware Version		1.14.13.6144			
Suite Name	10Base-T15	Probe1 Model		TDP1500			
Overall Execution Time	0:00:28	Probe1 Serial Number		Q100012			
Overall Test Result	Pass	Probe2 Model		TCA-SMA			
		Probe2 Serial Number		N.A			
DUT COMMENT:		General Comment - Automotive Ethernet DUT					
Test Name Summary Table							
Transmitter Power Spectral Density		Informative					
Statistics							
Measurement Details	Run Count	Min	Max	Average	Units	Standard Deviation	
Power Spectral Density 50ohm	1	0	0	0	Hits	0	
Power Level 50ohm	1	6.266	6.266	6.266	dBm	0	
Transmitter Power Spectral Density							
Measurement Details	Test Result	Low Limit	Measured Value	High Limit	Units	Margin	Run#
Power Spectral Density 50ohm	Pass	NA	0	0	Hits	LL: N.A, HL: 0	1
Power Level 50ohm	Informative	NA	6.266	NA	dBm	LL: N.A, HL: N.A	1
COMMENTS	Signal Validation : Pass. For run 1: Sample rate: 1.25GS/s, Record length: 2.5M, RBW: 1.0kHz, Start frequency: 0.3MHz, Stop frequency: 40.0MHz, Spectral average value: 2						

[Back to Summary Table](#)

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

Automate the signal generation

The TekExpress Automotive Ethernet application allows you to automatically load the pattern files in Arbitrary Function Generator (AFG) and generate the signals. Ensure that the LAN/USB connection between the oscilloscope and AFG is established, before you automate the signal generation. The AFG automation is supported for return loss measurement only.

Return Loss measurement and calibration: The AFG is used to transmit a wide band signal. The CH1 and CH2 are used for transmission of the signal. A marker signal has to be connected to the oscilloscope channel as a trigger source.

Steps to automate signal generation from AFG:

1. Select **Options > Instrument Control Settings** in the upper right corner of the application.
2. Select Search Criteria (**LAN** and **USB**) and click **Refresh**; when the Retrieved Instruments table is uploaded with the connected instruments list, click **Close**.

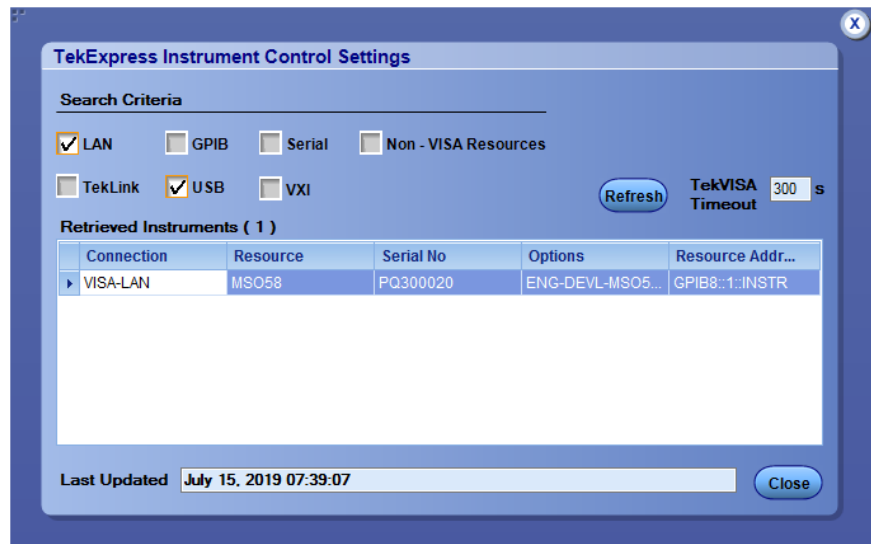


Figure 24: Instrument Control Settings

3. Select **Setup > Configurations > Global Settings**. In the Instruments Detected window, the Signal Generator is selected as **Do not Use**, by default.

You can manually set the signal source (AFG) by selecting the signal generator address from the drop-down list.

An example AFG waveform is shipped with the application and located at C:\Program Files\Tektronix\TekExpress\TekExpress Automotive Ethernet\AWG Waveforms\.

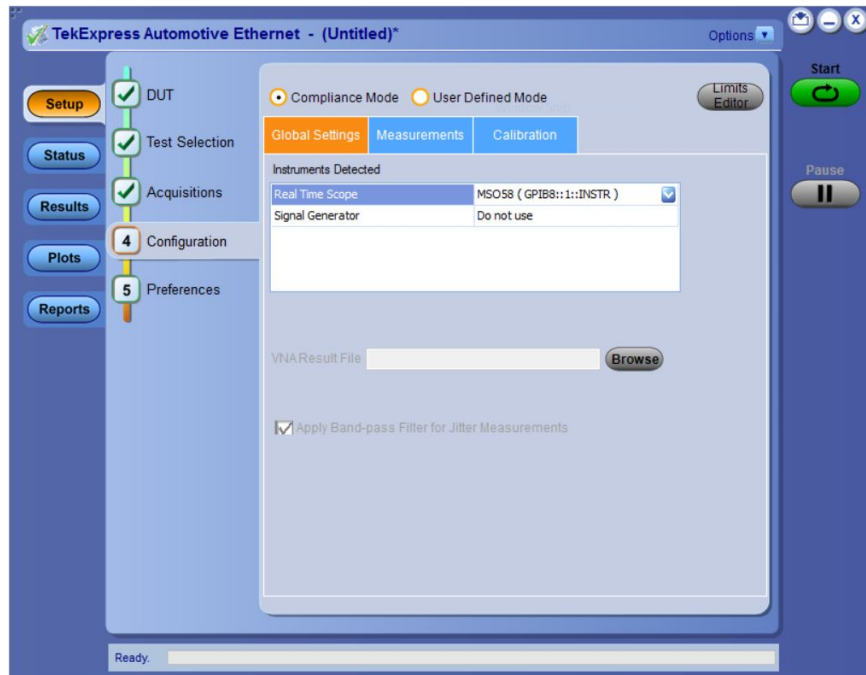


Figure 25: Test Selection tab

Running tests

Set DUT parameters, 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 tests are running, the other applications will be displayed at the background. If you want the TekExpress Automotive Ethernet application to run in the foreground 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.

View test results

When a test completes, the application switches to the Results panel, which displays a summary of test results.

Each test result occupies a row in the Results table. By default, results are displayed in summary format, with the measurement details collapsed. You can change the view in the following ways:

- To view the results grouped by lane, test, or data rate, select the corresponding item from the Preferences menu.
- To expand all tests listed, select **View Results Details** from the Preferences menu.
- To expand and collapse tests, use the plus and minus buttons to the left of the test rows.
- To collapse all expanded tests, select **Preferences > View Results Summary**.
- To enable or disable the wordwrap feature, select **Preferences > Enable Wordwrap**.
- To expand the width of a column, place the cursor over the vertical line that separates the column from the one 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 sort the test information by column, click the column head. When sorted in ascending order, a small up arrow is displayed. When sorted in descending order, a small down arrow is displayed.
- To clear all test results displayed, click **Clear** ()

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:\Automotive Ethernet**.

Use test setups to:

- Run a new session, acquire 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 save a setup, all the parameters, measurement limits, waveform files (if applicable), test selections, and other configuration settings are all 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.

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:\Automotive Ethernet\.

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:\Automotive Ethernet*<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**.

Automotive Ethernet measurements

Test procedure for Automotive Ethernet measurements

This section describes the test modes, test fixture sections, and the measurement details for the automotive ethernet measurements.

[Required instruments and applications](#) on page 3

[List of supported instrument models](#) on page 4

Table 21: Measurement test mode

Measurement Name	Test Mode Signal	Coupon/Section of the test fixture
Transmitter Output Droop	Test Mode 2	TC1
Transmitter Timing Jitter	Test Mode 1	TC1
Transmitter Power Spectral Density	Test Mode 3	TC1
Transmitter Output Voltage	Test Mode 1	TC1
Transmit Clock Frequency	Test Mode 1	TC1
MDI Return Loss	Slave Idle Mode	TC3 Return Loss

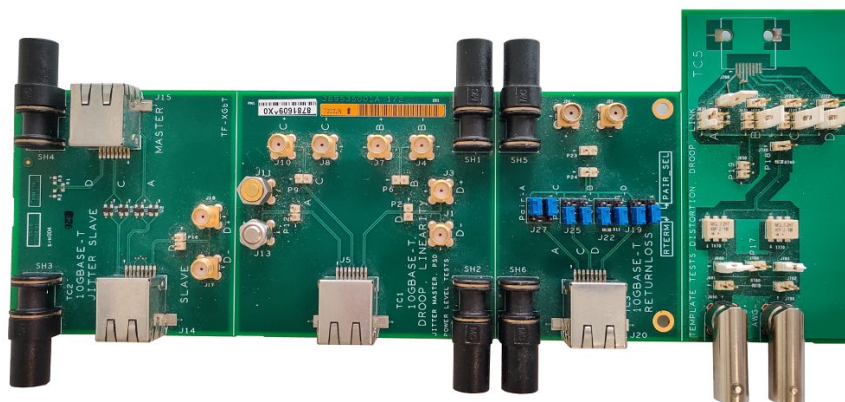


Figure 26: Test fixture

Table 22: 10Base-T1S test measurement limits

Measurements	Operating Mode	Low	High	Unit
Transmitter Output Droop (positive & negative)	Both		30	%
Transmitter Timing Jitter	Both		5	ns
Transmitter Power Spectral Density (Mask)	Both		0	Mask Hits
Power Level (Informative)	100 Ω	NA	NA	dBm
	50 Ω	NA	NA	dBm
Transmit Clock Frequency (Informative)	Both	NA	NA	MBd
Transmitter Peak Differential Output		0.8	1.2	V

Example test mode signal

Plots of Testmode 1 and Testmode 3 signals are given.

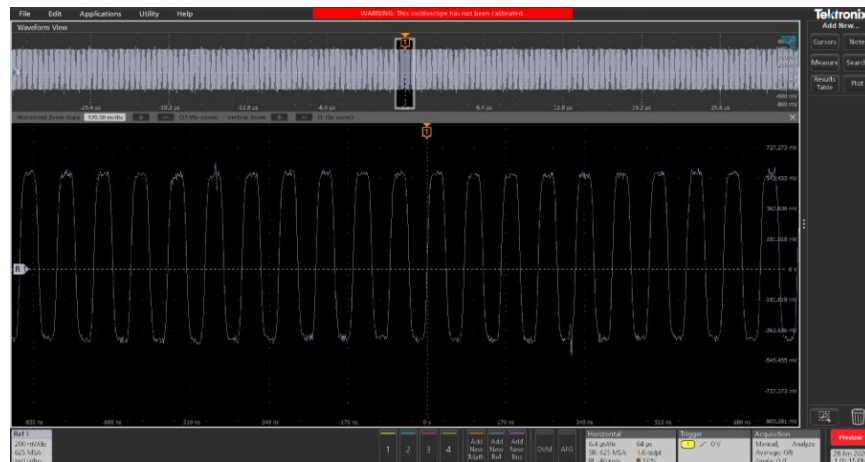


Figure 27: Test mode 1 signal

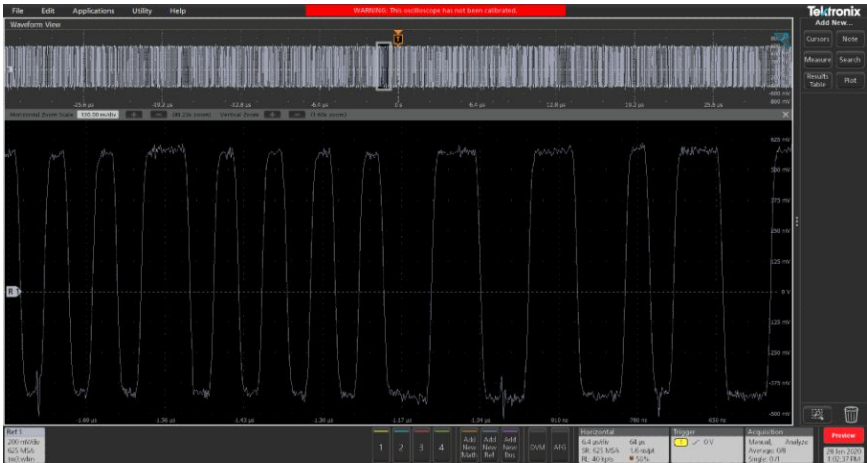


Figure 28: Test mode 3 signal

Setting up the different transmitter load conditions with the fixture

The section describes the instructions and the accessories needed for setting up the XGBT fixture for two different transmitter load conditions; 50 Ω and 100 Ω, to test a 10Base-T1S device.

1. Transmitter load of 100 Ω

The SMA output is terminated by a pair of two 50 Ω caps as shown.

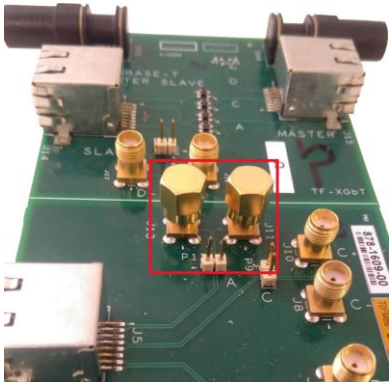


Figure 29: Representation of the connection diagram for the transmitter load of 100 Ω

2. Transmitter load of 50 Ω

To achieve differential 50 Ω load at the DUT, connect SMA- T and SMA 50 Ω terminators as shown. and required accessories are listed below:

2 x SMA-T M to 2F	
2 x SMA F-F	
2 x SMA M-M	
4 x 50 Ω SMA M terminator cap	

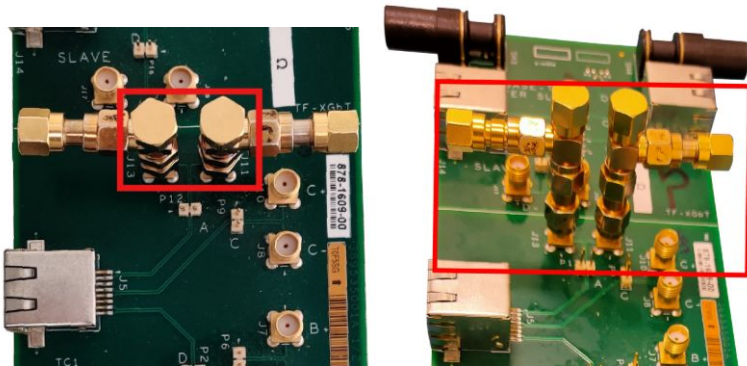


Figure 30: Representation of the connection diagram for the transmitter load of 50 Ω

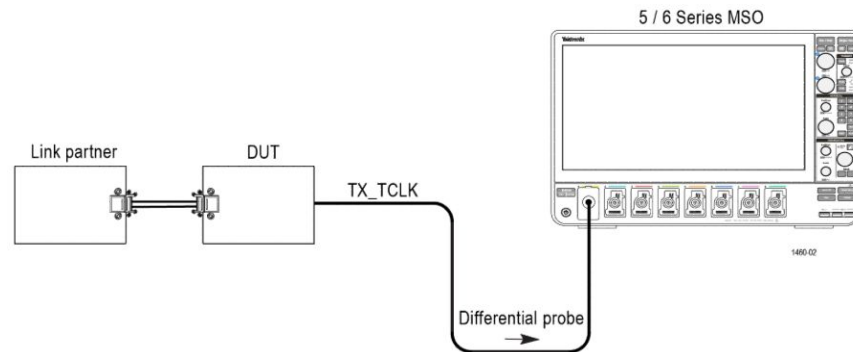
3. In a case, the DUT offers the necessary termination, a direct connection of the probe (without using the fixture) to the DUT can be used.

Required instruments and applications on page 3

Measurements using symbol rate clock (TX_TCLK) of DUT

This section describes the equipment connection diagram and test procedure for the following measurements.

- Transmitter Timing Jitter
- Transmit Clock Frequency



Note: For best results, connect the Oscilloscope, DUT, and test fixture to a common ground.

Figure 31: Connection diagram for link mode

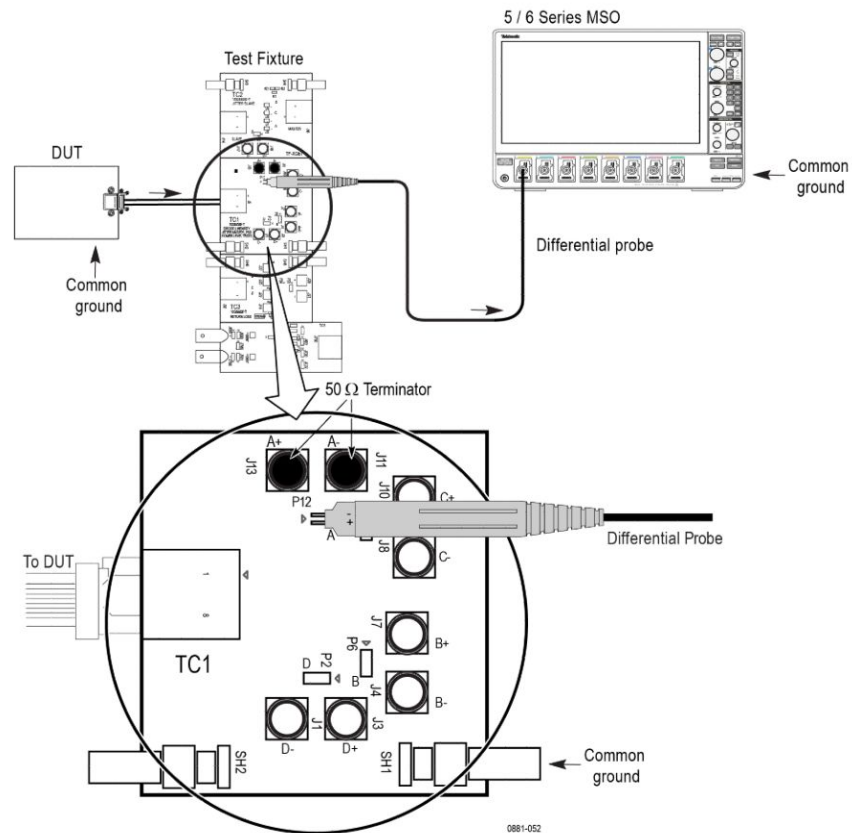
Test procedure

1. Make the connections as shown in the [Figure 31: Connection diagram for link mode](#) on page 53.
2. Connect the DUT to Master / Slave configuration and probe the TX_TCLK line from the DUT to test the symbol rate clock line (TX_TCLK).
 - For master TX_TCLK test, set the DUTs in Master-Slave configuration.
 - For slave TX_TCLK test, set the DUT in Slave mode and connect it to the link partner.
3. Click **Start**. Once the test execution is complete, a report with result compared against results, and necessary plots are generated.

Measurements using TC1 coupon of the test fixture

This section describes the equipment connection diagram, test procedure, and waveform details for the following measurements of the 10Base-T1S specification.

- Transmitter Output Droop
- Transmitter Timing Jitter
- Transmitter Power Spectral Density and Power Level
- Transmitter Output Voltage
- Transmit Clock Frequency



Note: For best results, connect the Oscilloscope, DUT, and test fixture to a common ground.

Figure 32: Connection diagram for TC1 coupon test fixture

Test procedure

1. Make the connections as shown in the Figure 32: Connection diagram for TC1 coupon test fixture. Refer Figure 32: Connection diagram for TC1 coupon test fixture for the transmitter load of 100 Ω and refer [Setting up the different transmitter load conditions with the fixture](#) on page 51 for the transmitter load of 50 Ω.
2. Terminate the SMA pins J11 and J13 with 50 Ω terminators.
3. Connect the DUT Ethernet cable to J5 Ethernet port (TC1 segment) of test fixture.
4. Connect the differential probe to P12 on the fixture. Ensure to connect the positive of the probe tip (+) to the pin marked as (XX) to the text fixture.
5. Configure the DUT to transmit the Test mode signal, as per the measurement specification in [Table 21: Measurement test mode](#) on page 49.
6. Select **Setup > DUT**. In the DUT panel, select the Operating mode (**50 Ω/ 100 Ω/Both**).
7. Click **Start**. Once the test execution is complete, a report with result compared against results, and necessary plots are generated.

Examples of test results and plots

Tektronix® TekExpress Automotive Ethernet Transmitter Test Report							
Setup Information							
DUT ID	DUT001	TekExpress Automotive-Ethernet	1.3.0.95				
Date /Time	2020-01-28 12:59:09	Framework Version	4.15.0.2				
Pre-Recorded Mode	False	Scope Model	MS054				
Compliance Mode	True	Firmware Version	1.14.13.6144				
Suite Name	10Base-T1S	Probe1 Model	TDP1500				
Overall Execution Time	0:00:31	Probe1 Serial Number	Q100012				
Overall Test Result	Pass	Probe2 Model	TCA-SMA				
		Probe2 Serial Number	N.A				
DUT COMMENT:		General Comment - Automotive Ethernet DUT					
Test Name Summary Table							
Transmitter Output Droop		Pass					
Statistics							
Measurement Details	Run Count	Min	Max	Average	Units	Standard Deviation	
Positive Output Droop_50ohm	5	3.245	3.47	3.3828	%	0.0934	
Negative Output Droop_50ohm	5	3.219	3.809	3.6254	%	0.2297	
Transmitter Output Droop							
Measurement Details	Test Result	Low Limit	Measured Value	High Limit	Units	Margin	Run#
Positive Output Droop_50ohm	Pass	NA	3.457	30	%	LL: N.A, HL: 26.543	1
Negative Output Droop_50ohm	Pass	NA	3.52	30	%	LL: N.A, HL: 26.48	1
Positive Output Droop_50ohm	Pass	NA	3.446	30	%	LL: N.A, HL: 26.554	2
Negative Output Droop_50ohm	Pass	NA	3.809	30	%	LL: N.A, HL: 26.191	2
Positive Output Droop_50ohm	Pass	NA	3.245	30	%	LL: N.A, HL: 26.753	3
Negative Output Droop_50ohm	Pass	NA	3.219	30	%	LL: N.A, HL: 26.781	3
Positive Output Droop_50ohm	Pass	NA	3.47	30	%	LL: N.A, HL: 26.534	4
Negative Output Droop_50ohm	Pass	NA	3.792	30	%	LL: N.A, HL: 26.208	4
Positive Output Droop_50ohm	Pass	NA	3.296	30	%	LL: N.A, HL: 26.704	5
Negative Output Droop_50ohm	Pass	NA	3.787	30	%	LL: N.A, HL: 26.213	5
COMMENTS		Signal Validation : Pass. For run 5: 50ohm mode : Positive droop :Max value = 3.64%, Min value = 2.92%, Count = 19 50ohm mode : Negative droop :Max value = 4.13%, Min value = 3.55%, Count = 18					

[Back to Summary Table](#)

Figure 33: Droop result table for two runs

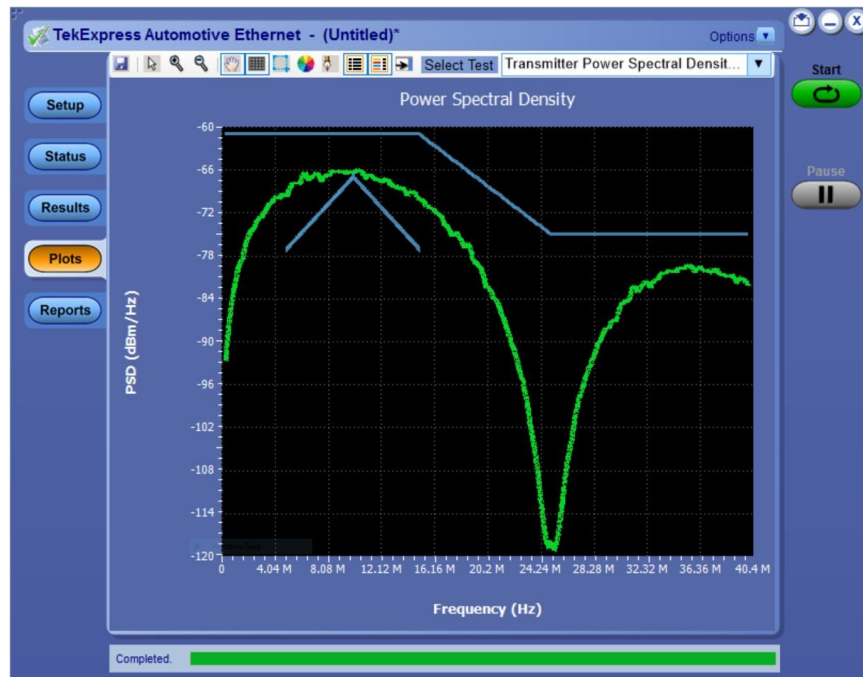


Figure 34: PSD result against a limit line

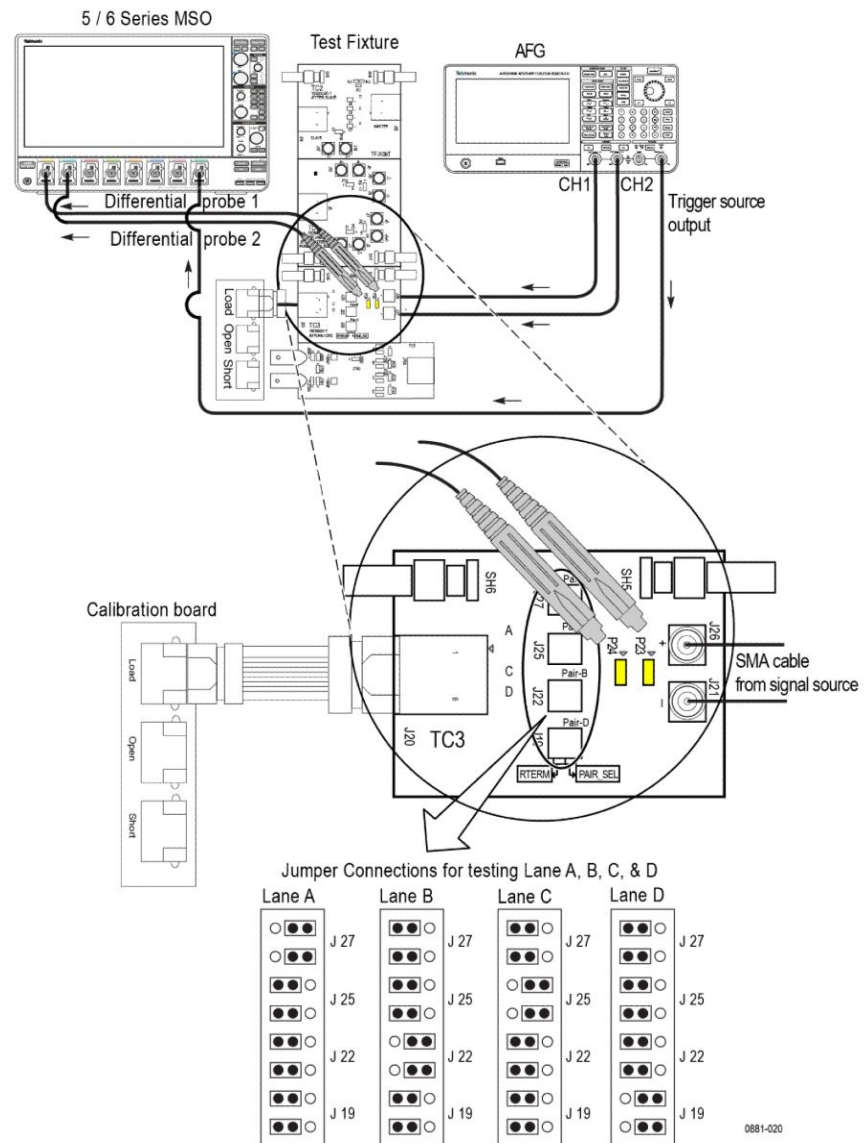
Return loss measurement

This section describes the equipment connection diagram and test procedure for the return loss calibration and measurement. To run the return loss measurement, a pre-requisite step is to calibrate the test setup. Calibration has three steps (Load Calibration, Open Calibration, and short Calibration). Calibration would need the following accessories/fixture.

1. Two supported differential probes (For 10Base-T1S, set the attenuator factor to 1X on the probe if you are using P6247/6248).
2. LAN/USB cable to automate signal source.
3. One pair of SMA cable, to tap signal source output.
4. Same length SMA cable with two SMA to BNC adapters to connect the trigger input from the signal source.
5. One short RJ45 cable.
6. Fixture and calibration board.

The application also provide an option to read the return loss results captured using a VNA (s1p/s2p files) and compare the results against the measurement limits to determine the test measurement is Pass/Fail. It also generates the report with return loss plot against the limits. Refer [Return loss measurement using VNA Result File](#) on page 61 steps to perform return loss measurement using VNA result file.

The results of the calibration steps are available as plots to the use.



Note: For best results, connect the Oscilloscope, DUT, and test fixture to a common ground.

Figure 35: Connection diagram for return loss calibration

Return Loss calibration procedure

1. Make the connections as shown in the Figure 35: Connection diagram for return loss calibration.
2. Connect two probe from oscilloscope channel to the fixture. Two oscilloscope channels (say CH1 and CH2) are connected to P23 and P24 respectively on the return loss test coupon (TC3) of the test fixture.
3. Connect a pair of SMA cable (with the BNC and SMA connectors) from CH1 and CH2 of the signal source (AFG) to the J26 and J21 respectively, on the return loss test coupon (TC3) of the test fixture.

4. Connect a trigger signal from the signal source to the oscilloscope.
 - a. With AFG 31xxx, connect the trigger output channel of AFG to a oscilloscope channel or Aux trigger(on 6 Series MSO).
5. To enable remote control of the signal source by the oscilloscope, connect the oscilloscope and signal source (AFG) either using LAN/USB.
6. Ensure the DUT, Fixture and Oscilloscope are connected to a common ground.
7. Ensure the jumper setting on the Fixture is as per the schematic in the test setup.
8. To enable remote connections on the TekExpress application:
 - a. Click **Options > Instrument Control Settings**
 - b. Select the options from the Search Criteria and click **Refresh**.
 - c. Wait for the signal source to be displayed in list. If you are using LAN connect, follow the LAN configuration steps before doing these steps.
 - d. Click **Setup > Test Selection > Global Settings** and view the list of detected instruments. For more details refer [Automate the signal generation](#) on page 43.
9. Setup the return loss calibration board – Connect a short RJ45 cable from J20 of the test fixture to one of the three connectors (LOAD/OPEN/SHORT) on the calibration board, based on the calibration step.
10. Run all the three calibrations one after another, with appropriate connections to the calibration board – a) Load Calibration b) Open Calibration and C) short Calibration. The application screen for calibration is show in Figure 36: Return loss Calibration.
11. Click **Apply** to generate the calibration coefficients using the calibration data. The live calibration data is stored at X:\Automotive Ethernet\LiveCal\10Base-T1S\.
12. After successfully completing the above steps, the necessary calibration data is available to run the return loss measurement. Click **Plot** to view the calibration result.

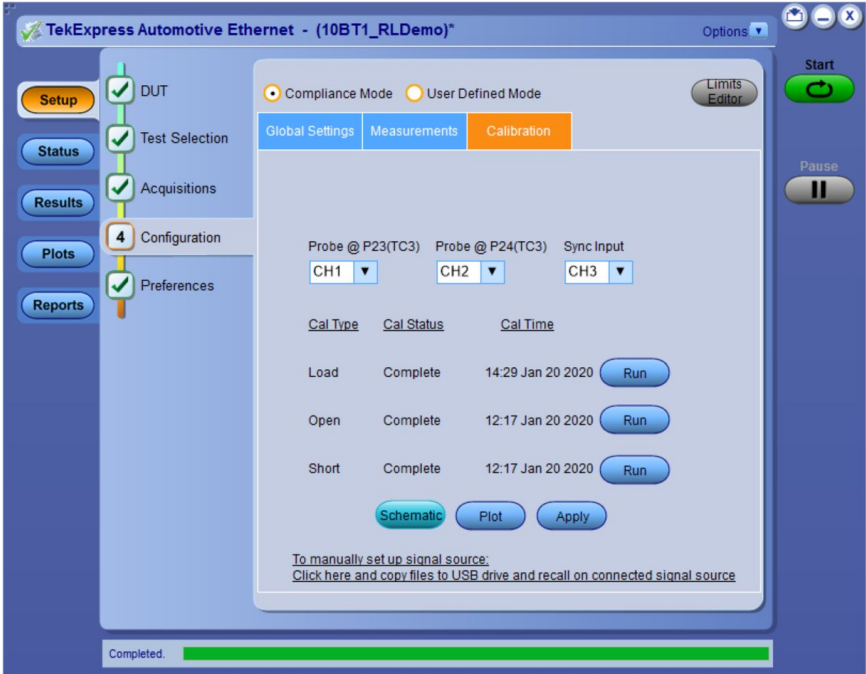


Figure 36: Return loss Calibration

Example results and plots

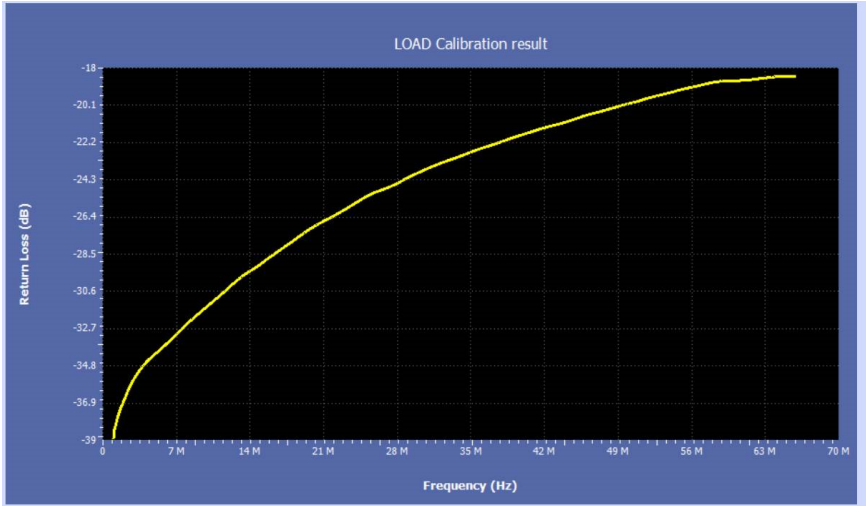
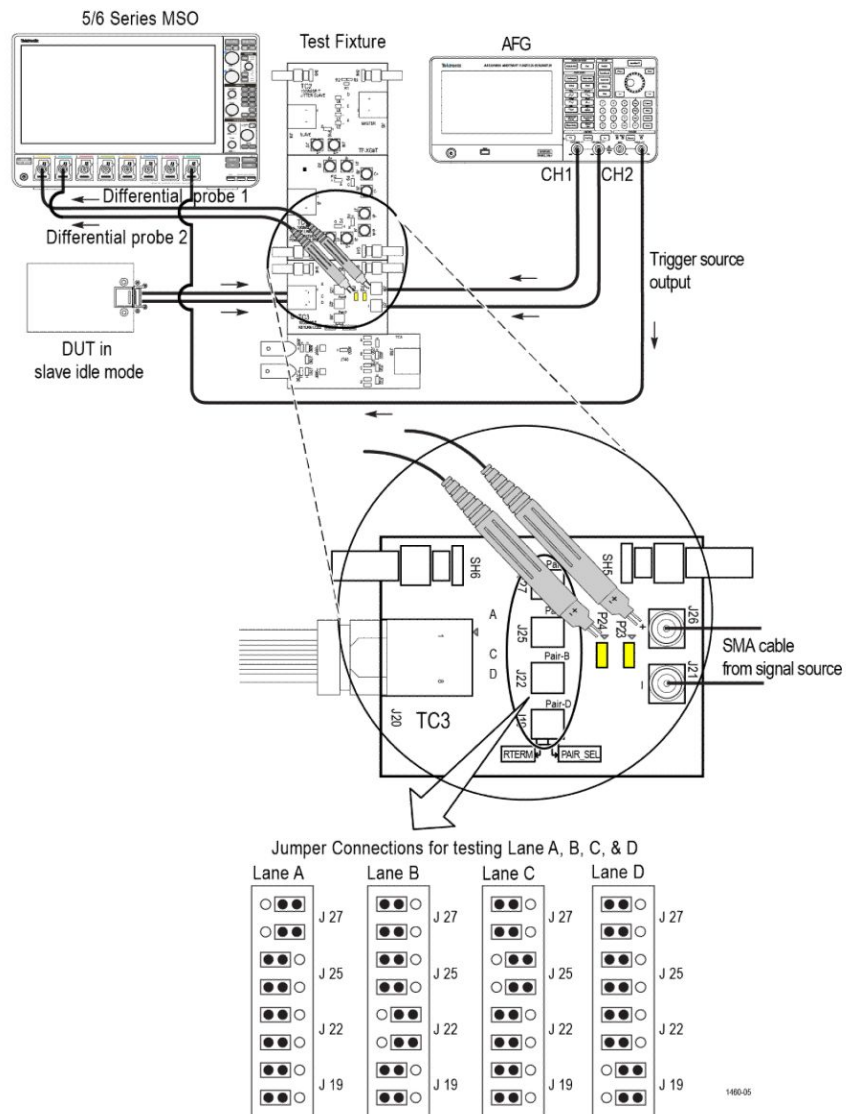


Figure 37: Load calibration result

Measurement procedure



Note: For best results, connect the oscilloscope, DUT, and test fixture to a common ground.

Figure 38: Connection diagram for return loss measurement

1. Perform the test setup calibration. Please refer to [Calibration procedure](#) section for the steps.
2. Make the connections as shown in the Figure 38: Connection diagram for return loss measurement.
3. Setup the DUT – Connect a short RJ45 cable from J20 of the fixture to the DUT
4. Configure the DUT to SLAVE IDLE mode of operation.
5. Click **Start**. Once the test execution is complete, a report with the plots of the calibration and return loss against the mask limits will be generated.

Return loss measurement using VNA Result File

Steps to perform return loss measurement using **VNA Result File**:

1. Select **Setup > DUT**.
2. In the **DUT** tab > Select **Return Loss Measurement preferences as VNA Report**
3. Select **Configuration > Global Settings**. Click **Browse** to select the **VNA Result File**
4. Click **Start** to run the measurement.
5. Select **Results** panel to view the measurement statistics and Pass/Fail status. Once the test execution is complete, displays the detailed test report as shown.



SCPI commands

About SCPI command

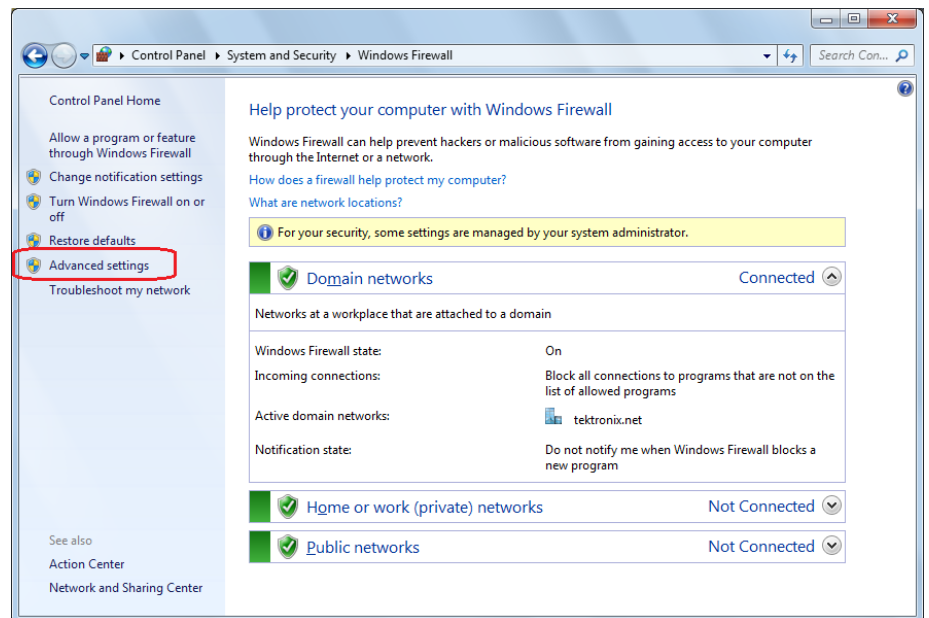
You can use Standard Commands for Programmable Instruments (SCPI) to communicate with the TekExpress application.

Socket configuration for SCPI commands

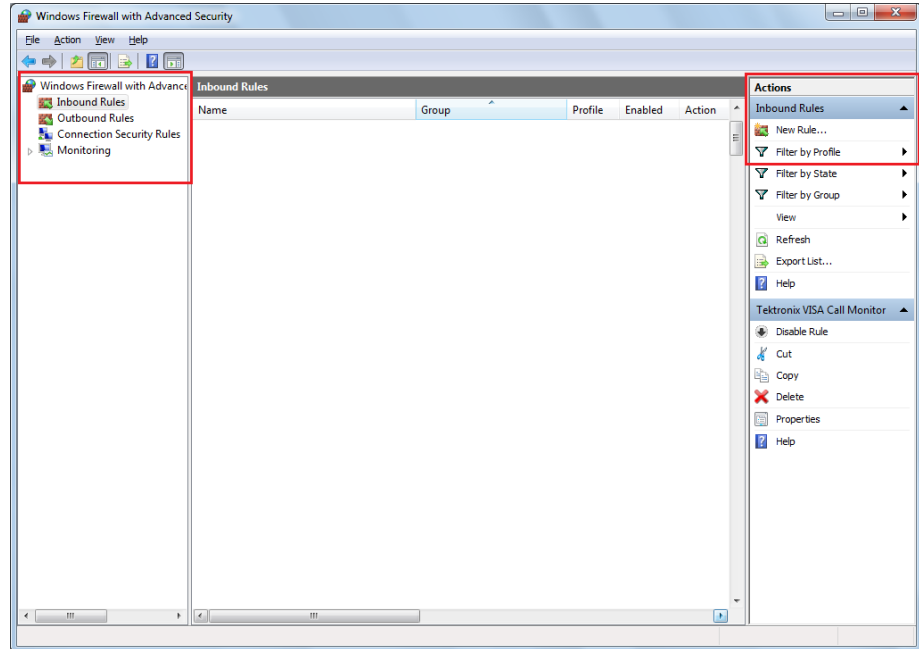
This section describes the steps for TCP/IP socket configuration and TekVISA configuration to execute the SCPI commands.

TCP/IP socket configuration

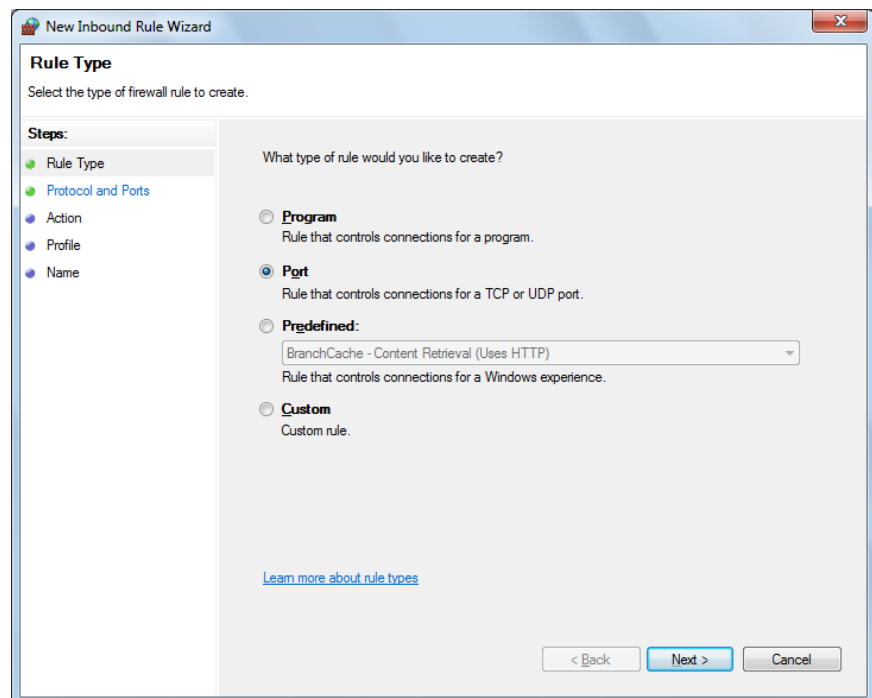
1. Click **Start > Control Panel > System and Security > Windows Firewall > Advanced settings**.



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**.



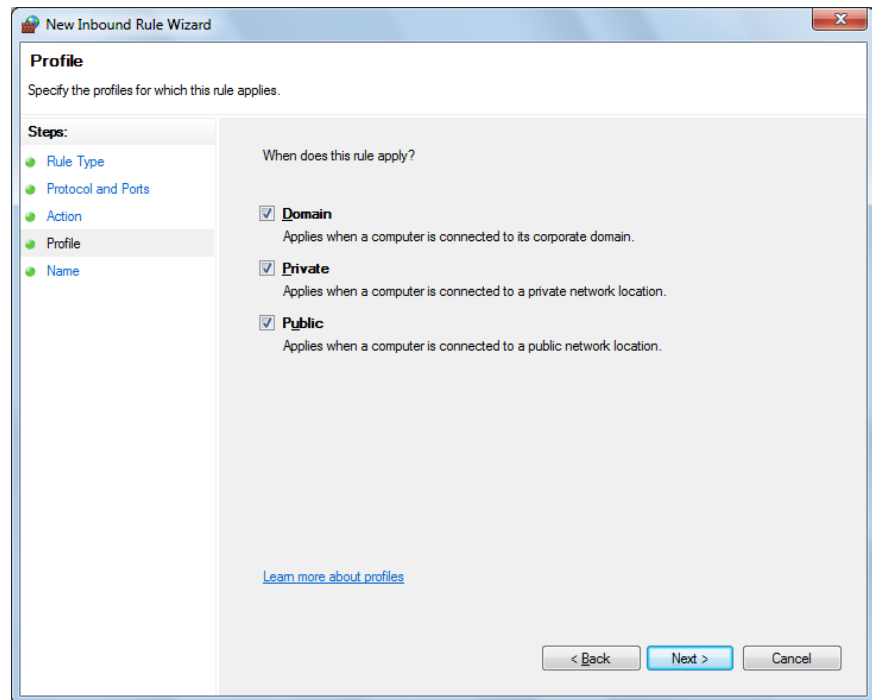
- b. Select **TCP** as rule apply and enter 5000 for **Specific local ports** and click **Next**.

The screenshot shows the 'New Inbound Rule Wizard' dialog box, specifically the 'Protocol and Ports' step. The title bar reads 'New Inbound Rule Wizard'. The main heading is 'Protocol and Ports' with the instruction 'Specify the protocols and ports to which this rule applies.' On the left, a 'Steps:' list shows 'Rule Type', 'Protocol and Ports', 'Action', 'Profile', and 'Name', with 'Protocol and Ports' selected. The main area contains two questions: 'Does this rule apply to TCP or UDP?' with radio buttons for 'TCP' (selected) and 'UDP'; and 'Does this rule apply to all local ports or specific local ports?' with radio buttons for 'All local ports' and 'Specific local ports:' (selected). A text box next to 'Specific local ports:' contains '5000' and an example 'Example: 80, 443, 5000-5010' is shown below it. A link 'Learn more about protocol and ports' is at the bottom left. At the bottom right are buttons for '< Back', 'Next >', and 'Cancel'.

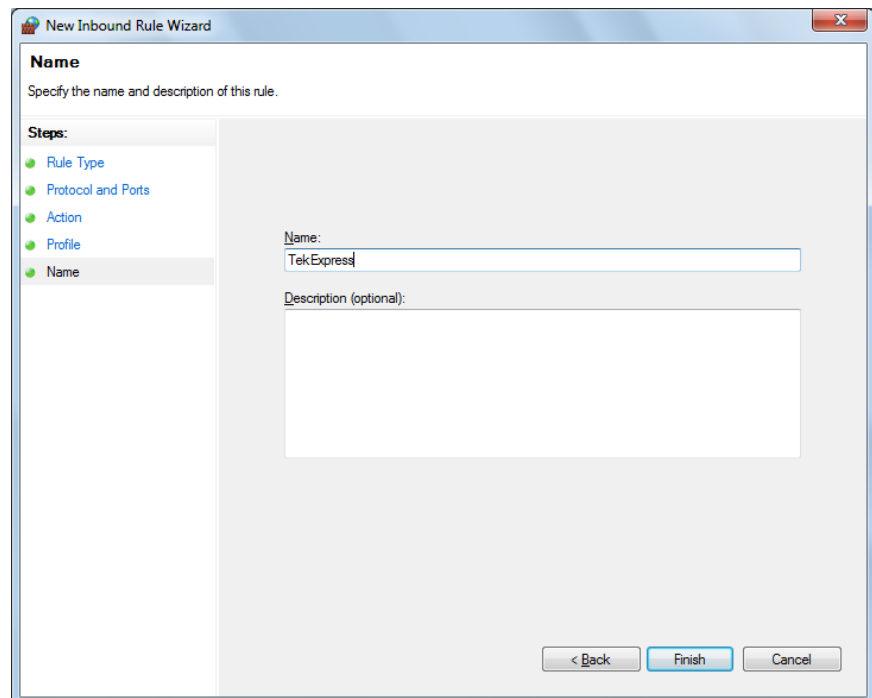
- c. Select **Allow the connection** and click **Next**.

The screenshot shows the 'New Inbound Rule Wizard' dialog box, specifically the 'Action' step. The title bar reads 'New Inbound Rule Wizard'. The main heading is 'Action' with the instruction 'Specify the action to be taken when a connection matches the conditions specified in the rule.' On the left, a 'Steps:' list shows 'Rule Type', 'Protocol and Ports', 'Action', 'Profile', and 'Name', with 'Action' selected. The main area contains the question 'What action should be taken when a connection matches the specified conditions?' with three radio button options: 'Allow the connection' (selected), 'Allow the connection if it is secure', and 'Block the connection'. The 'Allow the connection' option has a description: 'This includes connections that are protected with IPsec as well as those are not.' The 'Allow the connection if it is secure' option has a description: 'This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node.' and a 'Customize...' button. The 'Block the connection' option has a description: 'This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node.' A link 'Learn more about actions' is at the bottom left. At the bottom right are buttons for '< Back', 'Next >', and 'Cancel'.

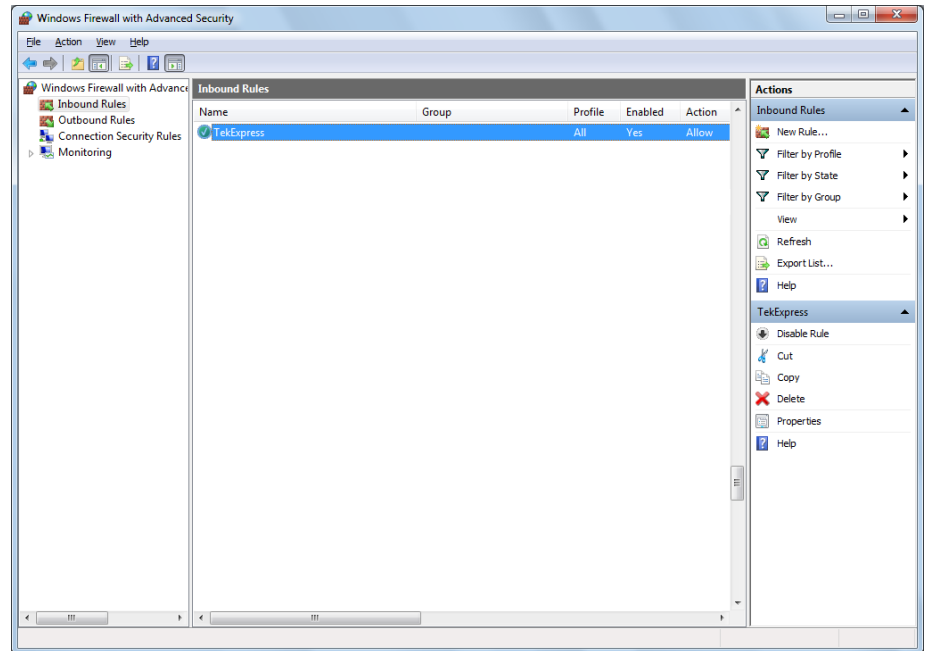
- d. Select **Domain**, **Private**, **Public** and click **Next**.



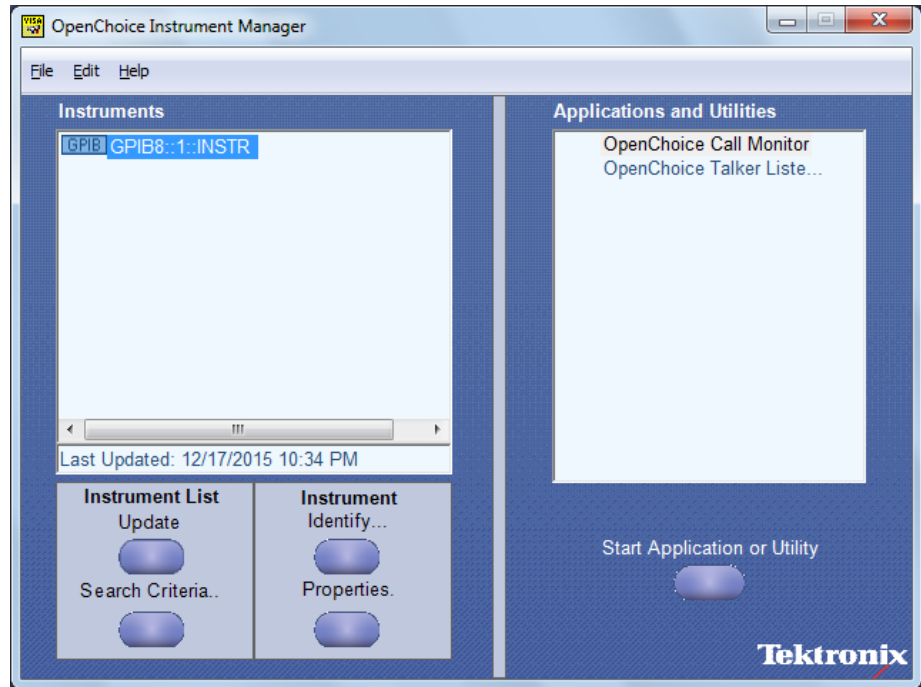
- e. Enter **Name**, Description (optional), and click **Finish**.




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



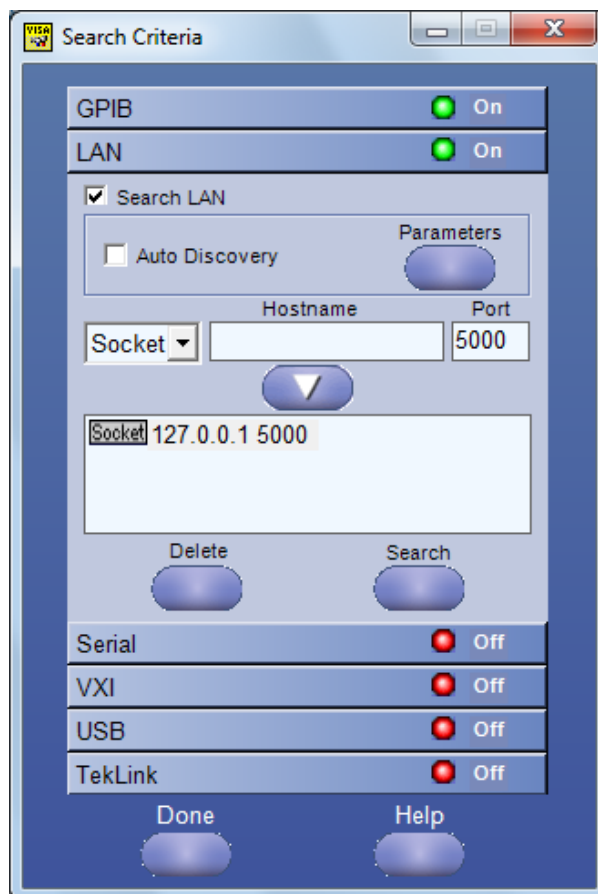
- TekVISA configuration**
1. Click **Start > All Programs > TekVISA > OpenChoice Instrument Manager**.



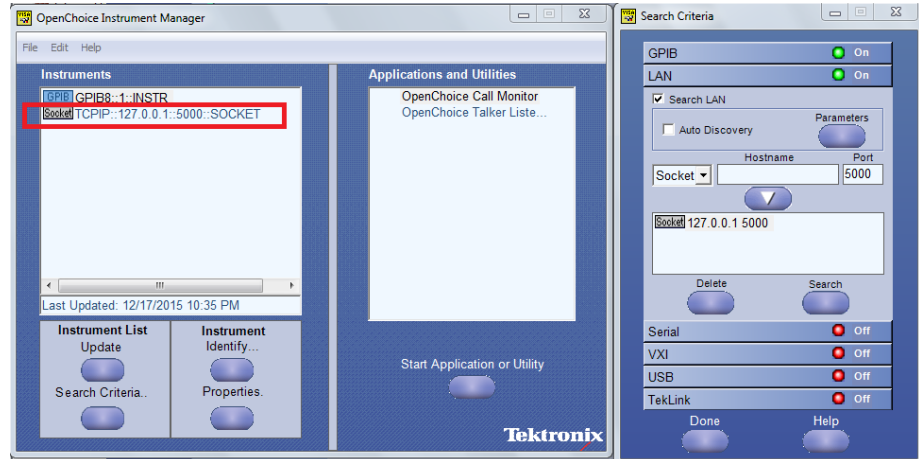
2. Click **Search Criteria**. In Search Criteria menu, click **LAN** to Turn-on. Select **Socket** from the drop-down list, enter the IP address of the

TekExpress device in **Hostname** and type **Port** as 5000. Click  to configure the IP address with Port.

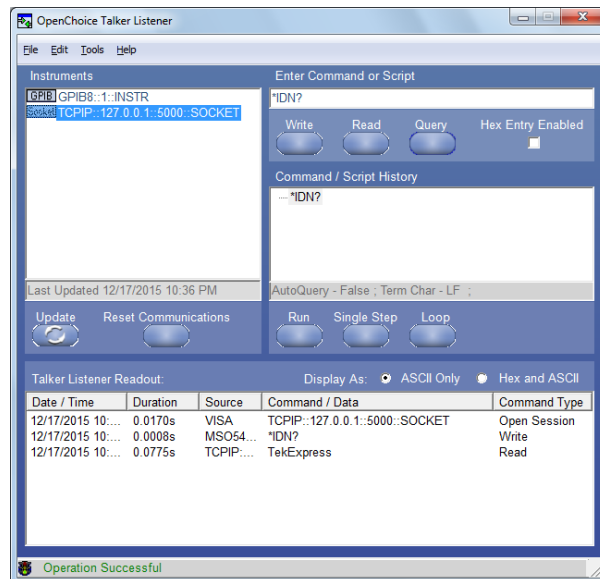
Enter the Hostname as 127.0.0.1 if the TekVISA and TekExpress application are in the same system, else enter the IP address of the TekExpress application system.



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



- 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: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

TEKEXP:MODE?

This command queries the execution mode type.

Syntax TEKEXP:MODE?\n

Inputs NA

Outputs {COMPLIANCE | USER-DEFINED}

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 ¹

- 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.

¹ Row number starts from zero.

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>,<Acquire_Type>,<FileName1$FileName2>\n
```

Inputs

- ParameterName - Specifies the parameter name
- TestName - Specifies the test name
- AcquireType - Specifies the acquire type
- Value - Specifies the value to set
- FileName1\$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? WFMMFILE,<Test_Name>,<Acquire_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 list

This section provides the parameters list for the SCPI commands.

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 23: ParameterName and Value for DUT tab

Parameters	Description
DUT ID	Specifies the value parameters. For DUTID, valid value is: <ul style="list-style-type: none"> ■ Comment
Acquiremode	Specifies the acquire mode parameters: <ul style="list-style-type: none"> ■ Acquire live waveforms ■ Use pre-recorded waveform files.

Table 24: ParameterName and Value for Test selection tab

Parameters	Description
TestName	Specifies the test measurement name. Valid values are: <ul style="list-style-type: none"> ■ Transmitter Output Voltage ■ Transmitter Timing Jitter ■ Transmit Clock Frequency ■ Transmitter Output Droop ■ Transmitter Power Spectral Density ■ MDI Return Loss

Table 25: ParameterName and Value for Acquisitions tab

Parameters	Description
Probe1, Probe 2	Specifies the probe source channel for each listed signal. Valid values are: <ul style="list-style-type: none"> ■ CH1 ■ CH2 ■ CH3 ■ CH4 ■ CH5 ■ CH6 ■ CH7 ■ CH8
Show Acquire Parameters	TRUE or FALSE
Signal Validation	<ul style="list-style-type: none"> ■ Prompt me if signal fails ■ Use signal as it is-Don't check ■ Skip test if signal fails

Table 26: ParameterName and Value for Preferences tab

Parameters	Description
On Test Failure, stop and notify me of the failure	TRUE or FALSE

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 27: ParameterName and Value for General

ParameterName	Value
Report Update Mode	<ul style="list-style-type: none"> ■ New ■ Append ■ Replace
Report name	X:\Automotive Ethernet\Reports\DUT001.mht
Save As Type	<ul style="list-style-type: none"> ■ Web Archive (*.mht;*.mhtml) ■ PDF (*.pdf;) ■ CSV (*.csv;)

ParameterName	Value
Auto increment report name if duplicate	TRUE or FALSE
Create report at the end	<ul style="list-style-type: none"> ■ Included ■ Excluded
Upload logo	Need info
Contents to Save	
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 Complete Application Configuration	TRUE or FALSE
Include User Comments	TRUE or FALSE

Table 28: ParameterName and Value for Acquire

Measurements	ParameterName	Value
Transmitter Output Voltage	Record Length (M)	0.03
	Sample Rate (GS/s)	0.625
Transmitter Timing Jitter	Record Length (M)	0.65
	Sample Rate (GS/s)	0.625
Transmitter Clock Frequency	Record Length (M)	0.03
	Sample Rate (GS/s)	0.625
Transmitter Output Droop	Averages	8
	Record Length (M)	0.04
	Sample Rate (GS/s)	0.625
Transmitter Power Spectral Density	Spectral Averages	2
	Record Length (M)	2.5
	Sample Rate (GS/s)	1.25
MDI Return Loss	Averages	100
	Record Length (M)	0.1
	Sample Rate (GS/s)	0.625

Table 29: ParameterName and Value for Analyze

Measurements	Settings	Default Value
Transmitter Timing Jitter	Edge	Both
	Hysteresis (%)	5 %

Measurements	Settings	Default Value
Transmitter Power Spectral Density	RBW (KHz)	1
	Start Frequency (MHz)	0.3
	Stop Frequency (MHz)	40
MDI Return Loss	Smooth	7

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.
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.
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 filesize 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 filesize in bytes for the filename WfmFileName2.wfm.
TEKEXP:INSTRUMENT "Real Time Scope",MSO58 (GPIB8::1::INSTR)	It sets the instrument value as MSO58 (GPIB8::1::INSTR) for the selected instrument type Real Time Scope.
TEKEXP:INSTRUMENT? "Real Time Scope"	It returns "MSO58 (GPIB8::1::INSTR)", when MSO58 (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? INSTRUMENT,"Real Time Scope"	It returns "MSO58 (GPIB8::1::INSTR),MSO64 (TCPIP::134.64.248.91::INSTR)" when MSO58 (GPIB8::1::INSTR), MSO64 (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.
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"	It returns "MSO58" when MSO58 is the scope model.

Example	Description
TEKEXP:REPORT? "DUT ID"	It returns "DUT001" when DNI_DUT001 is the DUT ID.
TEKEXP:RESULT? "Transmitter Output Droop"	It returns Pass, then the test result is Pass.
TEKEXP:RESULT? "Transmitter Output Droop", "Margin"	It returns list of values then that is 'Margin' column data.
TEKEXP:RESULT? "Transmitter Output Droop", "Units",0	It returns the unit of the first row of result.
TEKEXP:SELECT SUITE,"10Base-T1S"	It sets the suite as 10Base-T1S.
TEKEXP:VALUE GENERAL,"Operating Voltage","50 ohm"	It sets the operating voltage as 50 ohm.
TEKEXP:SELECT TEST,"Transmitter Output Droop", TRUE	It selects "Transmitter Output Droop" measurement.
TEKEXP:SETUP DEFAULT	It restores the application to default setup.
TEKEXP:VALUE WFMFILE,"Transmitter Output Droop","Transmitter Output Droop Acquisition","C:\AutomotiveEthernet_SCPI_TestSuite\RefWaveforms\10Base-T1S\Transmitter Output Droop_50_Run1_Ch1.wfm"	It assigns the pre recorded waveform to the Droop measurement.
TEKEXP:VALUE? WFMFILE,,"Transmitter Output Droop","Transmitter Output Droop Acquisition"	It queries the pre recorded assigned waveform.

References

Measurement error messages

The following table lists all of the error messages associated with 10Base-T1S measurements.

Table 30: Application error messages

Type	Error message
Acquisition error	Configured channel source has no signal. Check DUT and channel connections and run the measurement.
Return Loss test is not run	Calibration which is the pre-requisite is incomplete.
Error	Exception occurred while connecting to signal source. Check if signal source is configured correctly.
Error	Exception occurred while running the calibration. Check if signal source is configured correctly.
Error	Error while saving the waveform. Check if sufficient disk space is available.
Error	Invalid Signal for Return loss - Please check Scope AUX or Sync Input Channel is connected with AFG Trigger output [TTL] and Re-Run.
Error	Return Loss Calibration files are missing. Ensure all calibration steps are performed.
Signal Validation failed for <testname>	Either the waveform record length is too low or it is invalid testmode signal.
Insufficient RBW	Insufficient RBW, 'RBW value is low for PSD test. Change the RBW value to be

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