TekExpress®
XGbT-10GBASE-T Automated Solution

Online Help

077-0348-03

Tektronix

TekExpress®
XGbT-10GBASE-T Automated Solution

Online Help

www.tektronix.com
077-0348-03

Tektronix

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TekExpress XGbT-10GBASE-T Automated Solution Online Help, 076-0195-03.

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

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

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Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

Using Online Help

The XGbT online help serves as a reference for using the 10GBASE-T Ethernet Compliance Test Software.

Contents. The Contents tab displays books and pages that represent the categories of information in the online Help system. The Search tab enables you to search for keywords in the Help system and to locate topics containing those words.

Back and Forward. The Back and Forward buttons allow you to browse through topics.

Index. The Index tab displays a multi-level list of keywords and keyword phrases. These terms are associated with topics in the Help system and direct you to specific topics.

Search. When the search is completed, a list of topics is displayed so that you can select a specific topic to view.

To print a topic. Select the Print button from the Help Topics menu bar.

While using the online help, you can print topics and information from the HTML Help viewer.

To print a single topic.

1. Find the topic in the Contents tab.
2. Click Print.
3. Click Print the selected topic and click OK.

To print all topics in a selected TOC book.

1. Find the TOC book in the Contents tab.
2. Click Print.
3. Click Print the selected heading and all subtopics and click OK.

TIP. *If topics include expanding or drop-down hot spot, click the hotspots to display the information before you print.*

Hotspot is a clickable text that displays additional information below the link. Click on the hotspot text to show or hide the hotspot content.

Related Documentation

The following manuals are available as part of the TekExpress XGbT-10GBASE-T Automated Solution documentation set.

Table 1: Product documentation

Item	Purpose	Location
PDF of the Online Help (077-0348-XX)	In-depth operation and UI help.	
Reference (077-0349-XX)	High-level installation information	
Test Fixture Reference (077-0390-XX)	High-level test fixture	

Other documents

http://www.tek.com/Measurement/applications/serial_data/ethernet.html.

For information on USB-MPC device, refer to http://www.teamfdi.com/pages/products_index.html.

Conventions

Online Help uses the following conventions:

- The term “XGbT” refers to Extended 10GBASE-T Attachment.
- The term “DUT” is an abbreviation for Device Under Test.
- The term “select” is a generic term that applies to the two mechanical methods of choosing an option: using a mouse or using the touch screen.

Table 2: Icon descriptions

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

Technical Support

Tektronix values your feedback on our products. To help us serve you better, please send us your suggestions, ideas, or comments on your application or oscilloscope.

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.
- Probes 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 and status messages text file.
- If possible, save the waveform on which you are performing the measurement as a .wfm file.

Forward the information to technical support using one of these methods:

- E-mail – techsupport@tektronix.com
- FAX – (503) 627-5695

Accessories

About the Test Fixture

The TF-XGbT test fixture is ROHS compliant and provides the functionality as described in IEEE 802.3an-2006 sub-clause 55.5.2.1. The test fixture is needed to perform the conformance tests and device characterization for 10GBASE-T Ethernet electrical signals.

Products supported

Tektronix DPO7354 Digital Oscilloscope

Tektronix DPO/DSA70404, DPO/DSA70604, DPO/DSA70804, DPO/DSA71254, DPO/DSA71604, and DPO/DSA72004 Series Digital Oscilloscopes

Tektronix DPO/DSA70404B, DPO/DSA70604B, DPO/DSA70804B, DPO/DSA71254B, DPO/DSA71604B, and DPO/DSA72004B Series Digital Oscilloscopes

Tektronix MSO70404, MSO70604, MSO70804, MSO71254, MSO71604, and MSO72004 Series Mixed Signal Oscilloscopes

Recommended AWGs for Return Loss Measurement. Tektronix AWG7101, AWG7101B, AWG7102, and AWG7102B

Table 3: Recommended probes

Oscilloscope model	For Droop, Power Spectral Density, Linearity, Clock Frequency, Jitter-Master, and Jitter-Slave measurements	For Return Loss measurement
DPO7354	Tektronix P6330 - A minimum of one and a maximum of four are required.	Tektronix P6330 - A minimum of two are required.
	SMA cables - A minimum of two are required.	Tektronix TDP3500 - A minimum of two are required.
	Tektronix TDP3500 - A minimum of one and a maximum of four are required.	
DPO70000, DSA70000, MSO70000, DPO70000B, and DSA70000B Series	P6330 - A minimum of one and a maximum of four are required.	P6330 - A minimum of two are required.
	P7330 and P7350 - A minimum of one and a maximum of four are required.	P7330 and P7350 - A minimum of two are required.
	Trimode probes (P7520, P7516, P7513A, P7508, P7506, and P7504) - A minimum of one and a maximum of four are required.	Trimode probes (P7520, P7516, P7513A, P7508, P7506, P7504) - A minimum of two are required.
	SMA cables - A minimum of two are required.	P7340A, P7360A, P7313, and P7380A - A minimum of two are required.
	P7350SMA, P7380SMA, and P7313SMA - A minimum of one and a maximum of four are required.	

Table 3: Recommended probes (cont.)

Minimum System Requirements

The minimum system requirements for a PC to run TekExpress are as follows:

Table 4: System requirements

Processor	Pentium 4/M or equivalent processor.
Operating System	Windows XP Service Pack 2.
Memory	512 MB of memory.
Hard Disk	Approximately 2 GB of available hard-disk space for the recommended installation, which includes full TekExpress installation and distributed components.
Drive	DVD drive.
Display	Super VGA resolution or higher video adapter (800x600 minimum video resolution for small fonts or 1024x768 minimum video resolution for large fonts). The application is best viewed at 96 dpi display settings [1].
Software	■ Microsoft Excel 2002 or above. ■ Microsoft Internet Explorer 6.0 SP1 or later. ■ Microsoft Photo Editor 3.0 or equivalent software for viewing image files. ■ Adobe Reader 6.0 or equivalent software for viewing portable document format (PDF) files.
Other Devices	■ Microsoft compatible mouse or compatible pointing device. ■ Four USB ports (two USB ports minimum). ■ PCI-GPIB or equivalent interface for instrument connectivity [2].

1 If TekExpress is running on an instrument having a video resolution lower than 800x600 (for example, sampling oscilloscope), it is recommended to connect a secondary monitor and this must be enabled before launching the application.

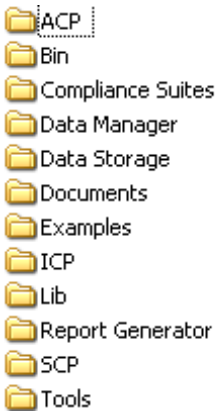
2 If TekExpress is installed on a Tektronix oscilloscope, the virtual GPIB port will be used by TekExpress for communicating with oscilloscope applications. If external GPIB communication devices like USB-GPIB-HS or equivalent are used for instrument connectivity, ensure that the Talker Listener utility is enabled in the DPO/DSA oscilloscope's GPIB menu.

Install the Software

1. Close all applications.
2. Download XGbTWebinstaller_<version>.EXE.
3. Double-click the executable to extract the files. After extraction, the XGbT installer launches and the software is installed in `C:\Program Files\Tektronix\TekExpress\TekExpress XGbT-10GBASE-T`.

Application Directories and Usage

The application directory and associated files are organized as follows:



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

Table 5: Application directories and usage

Directory names	Usage
InstallDir\TekExpress	Contains the application and associated files.
\TekExpress\Compliance Suites	Contains compliance specific files.
\TekExpress\Bin	Includes the Miscellaneous libraries of the XGbT application.
\TekExpress\Lib	Includes utility files specific to the XGbT application.
\TekExpress\Tools	Includes instrument application specific files for XGbT application.
\TekExpress\ACP \TekExpress\SCP \TekExpress\ICP	Includes instrument and application specific interface libraries of the XGbT application.
\TekExpress\Documents	Includes the Method of Implementation documents and technical documentation for the application.
\TekExpress\Data Manager \TekExpress\Data Storage	Includes the result management specific libraries of the XGbT application are present in these folders.
\TekExpress\Report Generator	Includes Excel Active X interface Library for Report Generation.

File Name Extensions

The software uses the following file name extensions:

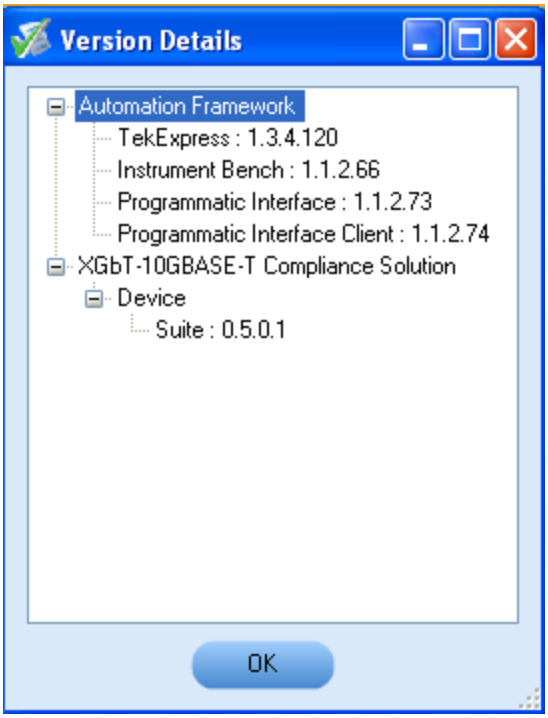
Table 6: File name extensions

File name extension	Description
.TekX	The session file will be saved in this format.
.seq	The test sequence file.
.xml	The encrypted XML file that contains the test specific configuration information. The log file extension is also xml.
.wfm	The test waveform file.
.mht	The measurement result report will be saved in this format.

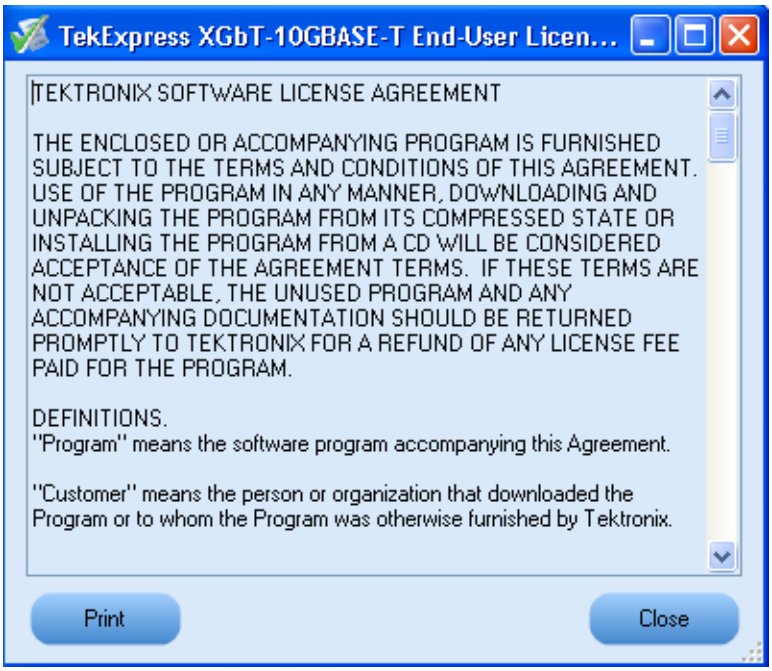
Activate the License

Follow the steps below to activate the license:

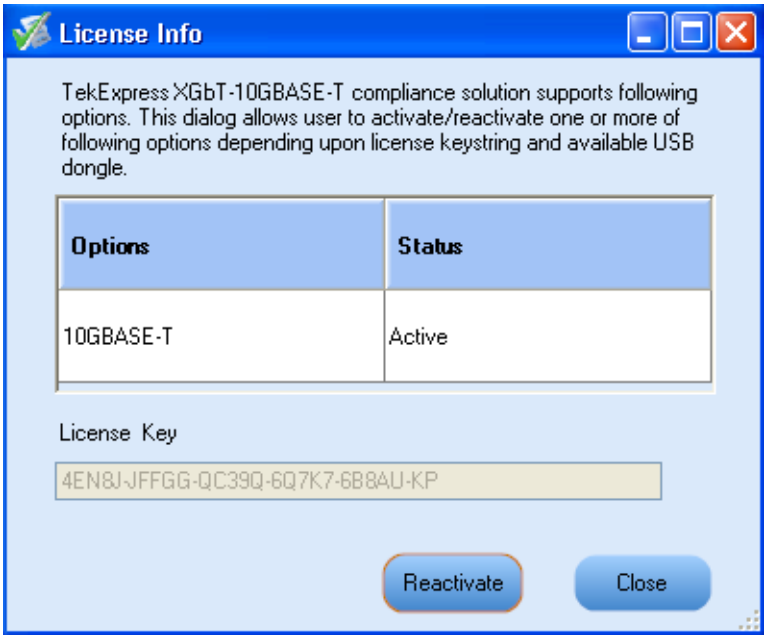
1. Click **Help** > **Activate License** or **Help** > **About TekExpress** > **License Info** to view the license information and activate the application.
2. Click the **View Version Details** link to check the version numbers of the installed test suites.



3. Click the **View End-User License Agreement** link to open the following Tektronix Software License Agreement window. Click **Print** to print the License Agreement.



4. Click the **License Info** to view the available software options. This window shows the license key and the various options with their status (active or inactive) with the current license key.



a

5. If you are activating the license for the first time, the license key field will be empty. To activate the license, connect the USB dongle to your computer, enter the license key provided in the license key

certificate, and click **Activate**. If the activation is successful, a sign is displayed next to the license key field.

6. If you are reactivating the license, click **Reactivate**, enter the new license key and click **Activate**.

Before You Click Run

After you install XGbT, it creates the following folders on your computer:

- `\Program Files\Tektronix\TekExpress\TekExpress XGbT-10GBASE-T`.

NOTE. *Ensure that the "TekExpress" folder has read and write access.*

- `\My Documents\My TekExpress\XGbT-10GBASE-T`.
- `\My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session`.

  Every time the `TekExpress XGbT-10GBASE-T.exe` is launched, an Untitled Session folder is created under `XGbT-10GBASE-T` folder. The Untitled Session folder is deleted when you exit the `XGbT` application.

CAUTION. *Each session has multiple files associated with it. Do not modify any of the session files and/or folders as this may result in loss of data or corrupted session files.*

- The `My TekExpress` folder is created as a shared folder with share name as <domain><user ID>My TekExpress (or if the PC is not connected to domain, then share name is `<Computer name><user ID> My TekExpress)`.
- The above shared folder is mapped as X: (X drive) on to the instrument where 10GBASE-T is running.

NOTE. *If X drive is mapped to any other shared folder, 10GBASE-T will display a warning message window asking you to disconnect the X: drive manually.*

Do the following before you click Run:

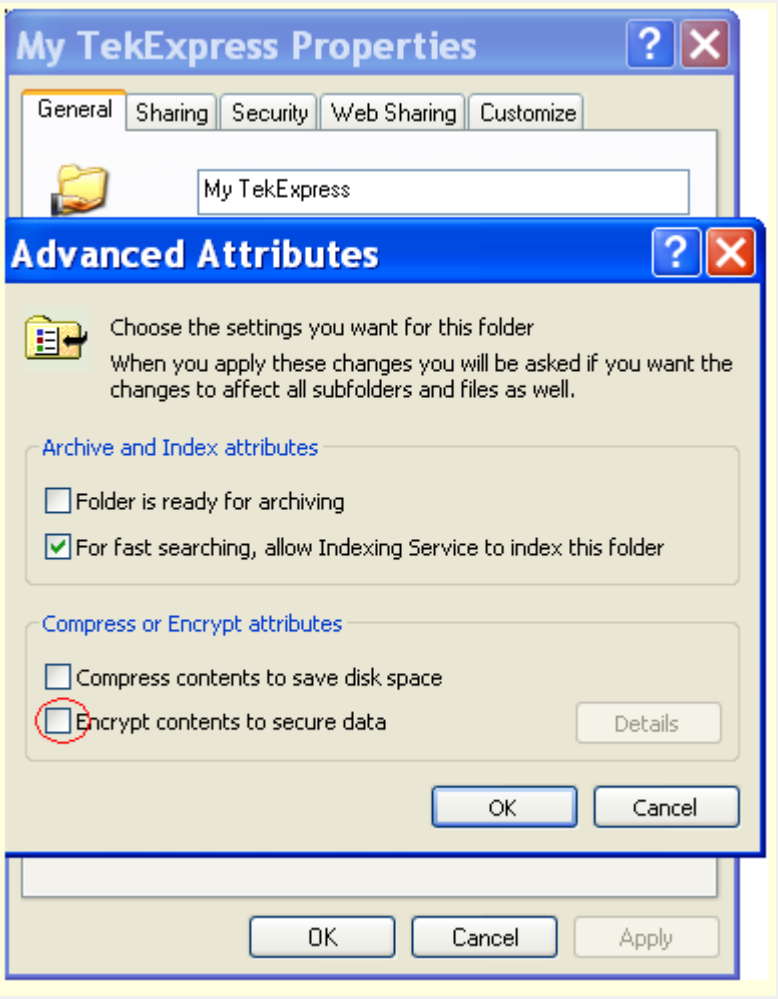
NOTE. *Ensure that the network connectivity is enabled on the instrument running the 10GBASE-T application.*

1. Map the shared My TekExpress folder as X: (X drive) on all the instruments used in test setup running Microsoft Windows Operating System. This shared folder is used to save the waveform files or used during any other file transfer operations.
2. Right-click on the My TekExpress folder and open the **Properties** dialog box. Select the **General** tab and then **Advanced**. In the **Advanced Attributes** window, ensure that the option **Encrypt contents to secure data** is NOT selected. Click here to view the picture.
3. Ensure that all the required instruments are properly warmed up, Signal Path Compensation (SPC) performed, followed by cable deskew.

Mapping My TekExpress Folder

To map the My TekExpress folder on the instruments, follow the steps below:

1. Open Windows Explorer.
2. From the Windows Explorer menu, select **Tools > Map Network** drive.
3. Select the Drive letter as X: (if there is any previous connection on X:, disconnect it first through **Tools > Disconnect Network drive** menu of Windows Explorer).
4. In the Folder field, enter the remote My TekExpress folder path (for example, \\192.158.97.65\ John's My TekExpress)
5. You can determine the IP address of the PC where "My TekExpress" folder exists by doing the following:
   - Select **Start > Run** menu on the PC where the My TekExpress folder exists.
   - Enter cmd and press **Enter**.
   - At the command prompt, type ipconfig.



You can find SPC by following the steps:

1. On the oscilloscope main menu, select the **Utilities** menu.
2. Click the **Instrument Calibration** option.

XGbT Application Overview

TekExpress is the Tektronix Compliance Test Automation Framework, developed to support current and future test automation needs of customers. Developed using National Instruments' TestStand, TekExpress leverages on the capabilities of Microsoft .NET framework. It uses a highly modular architecture that enables deploying automated test solutions for various standards in a relatively short time.

Key Features

The key features of the application are as follows:

- Provides an automated solution for performing Clock Frequency, Droop, Jitter-Master, and Jitter-Slave measurements in compliance with IEEE 802.3an-2006, sub clause 55.5.3. Using the spectral features of the oscilloscope, the application also facilitates performing spectral-based measurements such as Power Spectral Density, Power Level, Linearity (All Tones), and Return Loss.
- XGbT users will also have to qualify their DUTs for 1000BASE-T/100BASE-T/10BASE-T compliance. To meet this, Tektronix provides the necessary softwares (TekExpress XGbT-10GBASE-T Automated Solution and TDSET3 Ethernet Compliance Software), fixtures (TF-XGbT and TF-GBE), oscilloscopes, Arbitrary Waveform Generators, and probes. This takes away the burden of designing their own fixture.
- Facilitates selecting, configuring, and running measurements. You can also perform the measurements on all four lanes in one click and reduce the testing time.
- Generates well correlated, repeatable, and accurate results using SMA cables and probes. The results obtained for spectral-based measurements Power Spectral Density and Linearity using an oscilloscope correlate well with the results obtained using a spectrum analyzer.
- For a selected measurement test suite, the MDIO Automation Controller helps in setting up the test mode automatically. You can avoid setting the test mode manually and also have the flexibility of working at your desk.
- Ensures that you calibrate the selected lane at least once before running the Return Loss measurement. This way you can run the Return Loss measurement multiple times on the calibrated lane.
- Performs marginal testing that is flexible and beyond what is specified in the IEEE standard for Droop, Power Spectral Density, and Linearity measurements.
- Provides a summary report of all lanes and detailed reports of each lane in the report panel. Test margins and statistical information help you to find answers quickly. You can save the reports in MHT format.
- Provides you the flexibility to work in comfort at your desk, as it allows you to load and run the application on your desktop and laptop computer. Use an Ethernet or USB-GPIB cable to connect to an oscilloscope.
- Helps in debugging and designing the 10GBASE-T PHY layer and analyzing it beyond compliance needs.
- Seamlessly integrates with high-level TestStand Automation Layer.

- Powered by NI TestStand™.
- Previous versions of TekExpress use NI LabVIEW™ for instrument control.

  You can automate your test bench by saving and recalling setup files in your automation script. You can call TekExpress XGbT-10GBASE-T application programmatically through NI LabVIEW/NI TestStand for controlling XGbT along with the other test components like Thermal chambers and Power supplies.

It also reduces the implementation time for the automation design and to integrate TekExpress with the existing NI LabVIEW automation for various qualification and environmental tests.

Starting the Application

The application uses a USB dongle that contains the license key. This dongle must be present on the instrument hosting the XGbT application.

The application also checks for a file, called Resources.xml, located in My TekExpress folder. If this file is not found, instrument discovery is performed before launching 10GBASE-T. The Resources.xml file contains information regarding instruments available on network.

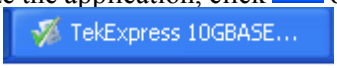
When the application starts, it checks for the appropriate license key. If the valid license key is not present, the application switches to the "Demo" mode. If the application fails to detect the dongle, it continues to run in Demo mode.

To start the application, you can do one of the following:

- Click **Start** > **Programs** > **Tektronix** > **TekExpress** > **TekExpress XGbT-10GBASE-T**.
- Double click the icon on the desktop.
- If you have previously saved a session, you can double-click the session file stored under My TekExpress\10GBASE-T.

NOTE. *If the application was not terminated properly during the last use, a dialog box asks to recall the previously unsaved session.*

Resizing the Application Window

To minimize the application, click on the application title bar. To restore the application to its previous size, select 

in the Windows task bar.

To maximize the application, click . To restore the application to its previous size, click on the application title bar.

Exiting the Application

To exit the application, do one of the following:

- Click **File** > **Exit**.
- Click on the application title bar.

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

Global 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.

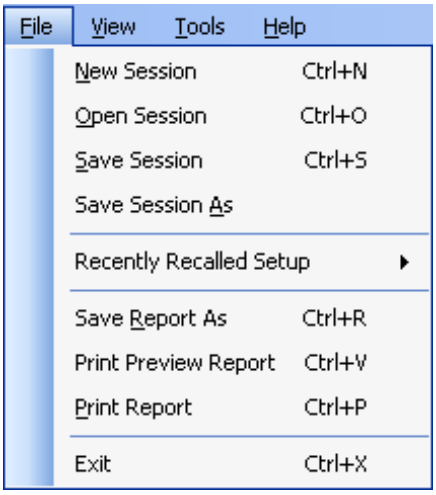
Table 7: Global controls

Control name	Function
DUT	The device ID is specified at the global level and the information is stored in the default location for all data files. This field cannot be empty and does not allow these special characters (.,..,...,\,/:?”<>|*). The maximum length of characters allowed is 32.
	Displays the status of the disk space. When the disk space is low, a warning dialog appears to perform the cleanup and continue working on the application.
	You will be able to run, pause, resume, and stop the tests.

Menus

File Menu

Click **File** on the application menu bar.



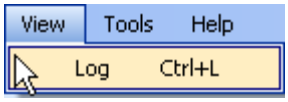
The File menu has the following selections:

Table 8: File menu

Menu	Function
New Session	Starts a default session of 10GBASE-T.
Open Session	Opens a saved session.
Save Session	Saves the session.
Save Session As	Saves a session in a different name.
Recently Recalled Setup	Recalls the recently saved setup.
Save Report As	Saves the report in user specified location.
Print Preview Report	Previews the report before printing.
Print Report	Opens the Windows “Print” dialog box.
Exit	Closes the application.

View Menu

Click **View** on the application menu bar.



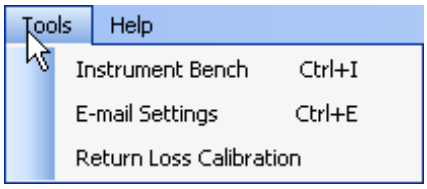
The View menu has the following selections:

Table 9: View menu

Menu	Function
Log	Opens the log (log.xml) file in the default viewer.

Tools Menu

Click **Tools** on the application menu bar.



The Tools menu has the following selections:

Table 10: Tools menu

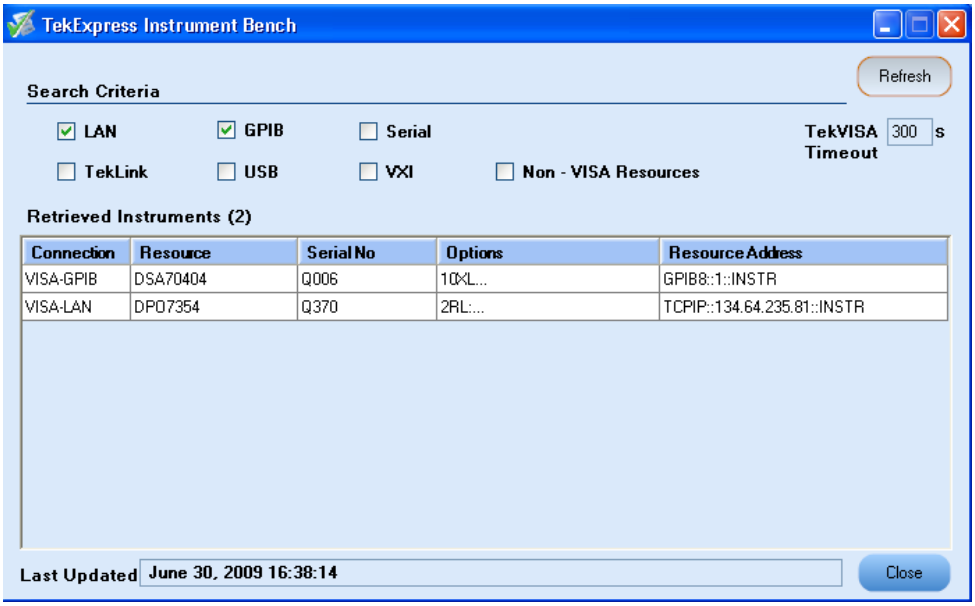
Menu	Function
Instrument Bench	Shows the list of instruments connected to the test setup.
E-mail Setting	Allows you to configure and set the e-mail options.
Return Loss Calibration	Ensures that the calibration for Return Loss measurement is performed before running the test.

Instrument Bench

The Instrument Bench window shows the list of VISA and Non-VISA resources found on different interfaces/connections. It serves two purposes at the launch of TekExpress:

- Discovers the connected instruments.
- Confirms the instrument connection setup.

When you click **Tools** > **Instrument Bench**, the following dialog box is displayed:

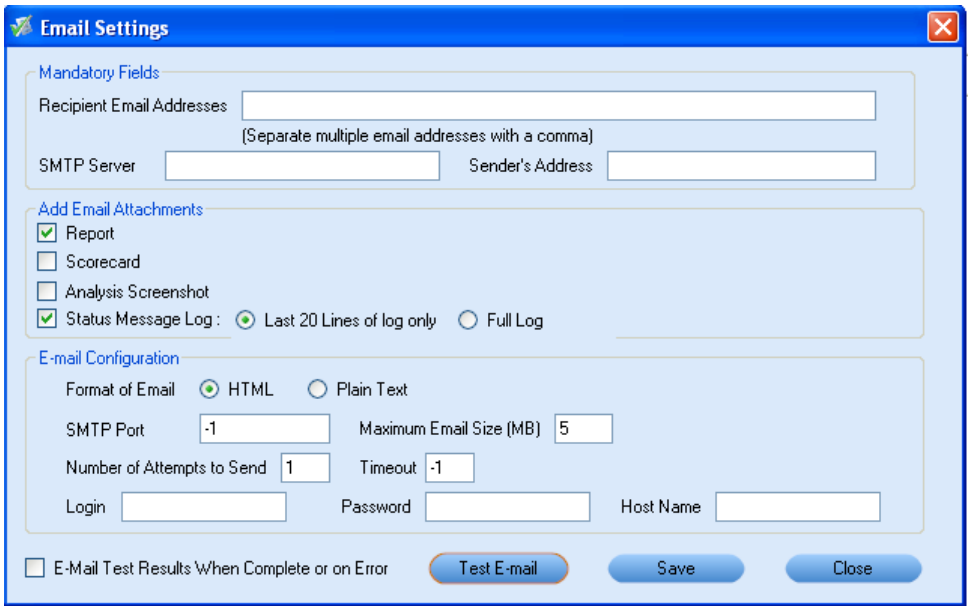


E-mail Settings

The E-mail Settings utility allows you to configure and set the e-mail options. The following fields are mandatory for receiving e-mail notification from TekExpress:

1. Recipient Email Addresses. For example, User@domain.com
2. Sender's Address
3. SMTP Server address of the Mail server configured at client location

If any of the above mentioned fields are left blank, the settings will not get saved and e-mail notification will not be sent.

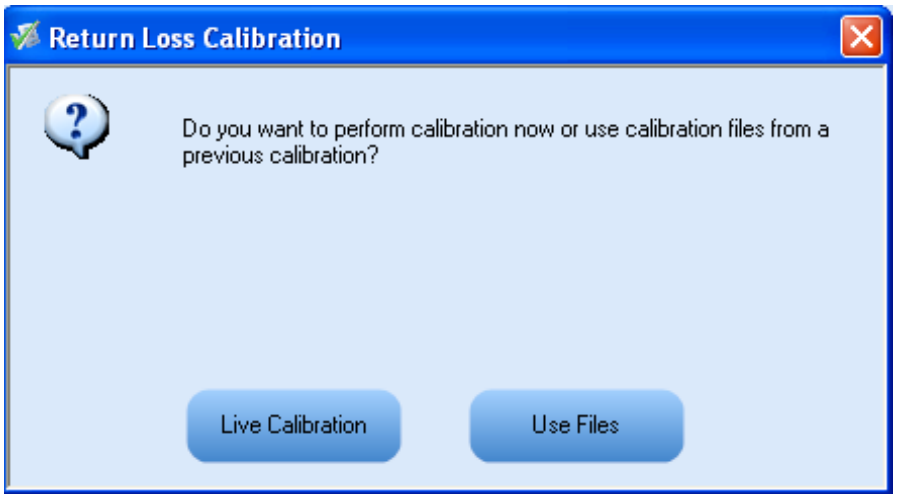


Check the option "E-mail Test Results When Complete or on Error" to receive the e-mail. The attachment list depends on the choice which is made while configuring the email setup.

NOTE. *The Analysis Screenshot option in the Add Email Attachments pane is not yet functional.*

Return Loss Calibration

Click **Tools** > **Return Loss Calibration** to display the Return Loss Calibration dialog box.

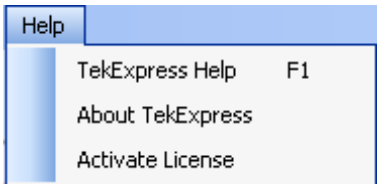


Use the Return Loss Calibration to do the following:

- Perform live calibration for the Return Loss measurement.
- Perform calibration using the files of the earlier calibration for the Return Loss measurement.

Help Menu

Click **Help** on the application menu bar.



The Help menu has the following selections:

Table 11: Help menu

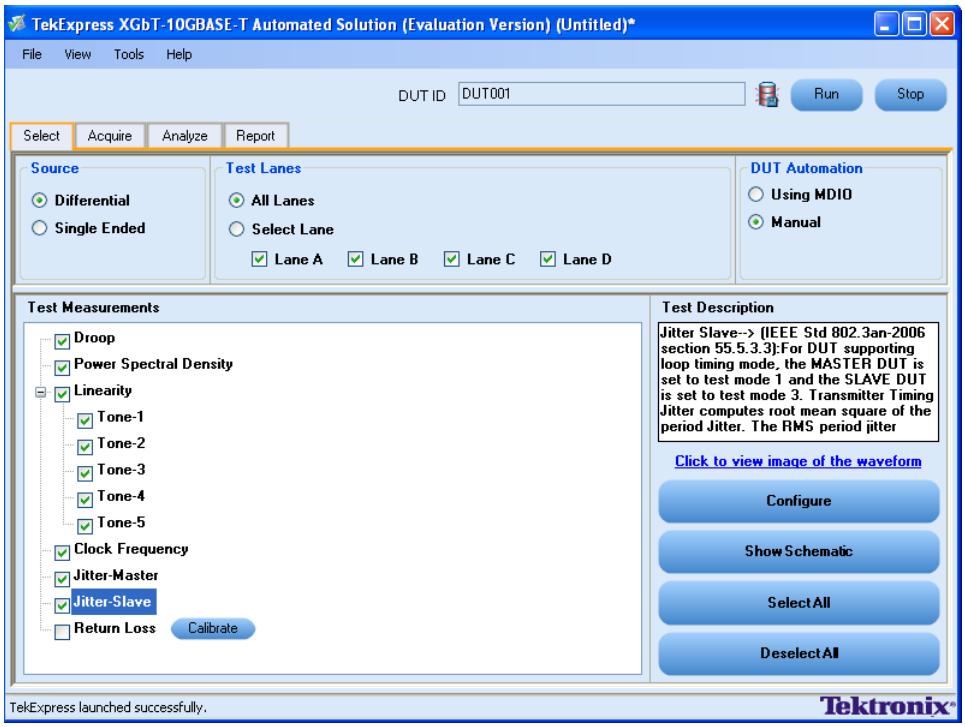
Menu	Function
TekExpress Help	Displays TekExpress Help (F1).
About TekExpress	Displays the TekExpress Mock up screen with description of 10GBASE-T heading "TekExpress XGbT-10GBASE-T Automated Solution". Also displays the application details such as software name, version number, and copyright.
Activate License	Displays the details of activating the application.

Select Test(s)

The application tests the following measurements:

- Droop
- Power Spectral Density
- Linearity
- Clock Frequency
- Jitter-Master
- Jitter-Slave
- Return Loss

The Select panel allows you to select, configure, and run the tests.



The application allows you to select a subset of tests to execute.

Source. Select the Source type. Differential is the default. The Test Lanes option is automatically updated corresponding to the selected source.

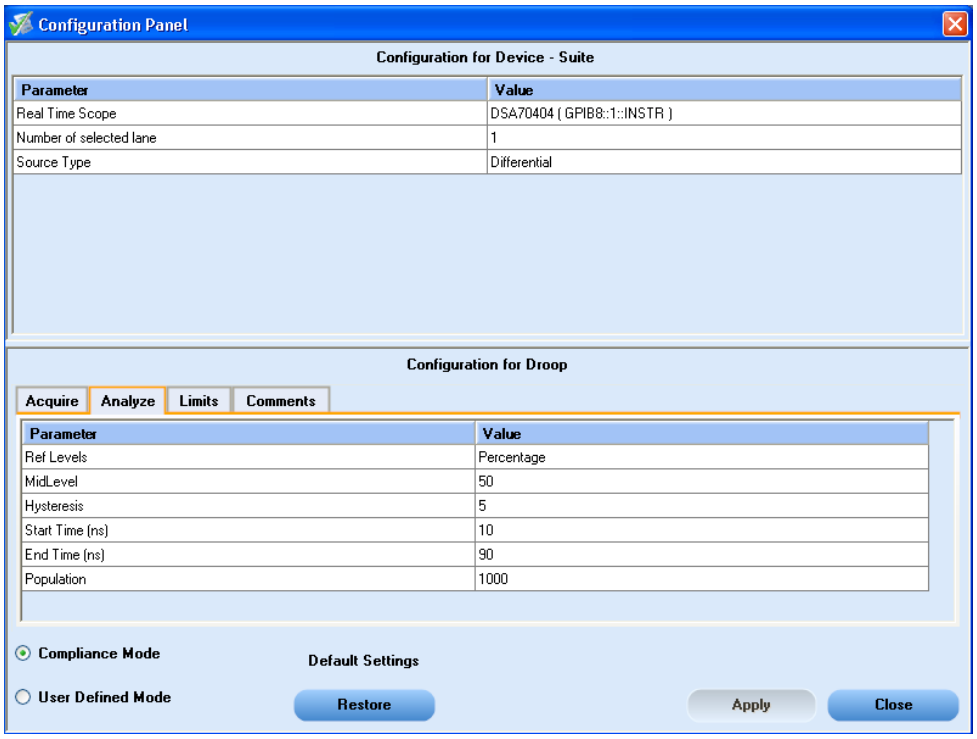
Test Lanes. Select the Test Lanes. Select Lane option is the default. You can select one of the available lanes.

Table 12: Button controls on the Select panel

Button	Description
	Opens the configuration panel for the selected test.
	Opens the schematic for the selected test. This is useful if you want to verify the test setup before running the test.
	Selects all tests in the table.
	Deselects all tests in the table.
	Performs calibration on the selected lane for the Return Loss measurement.
	Appears when the selected lane has already been calibrated for the Return Loss measurement. Click Re-Calibrate button to calibrate on the selected lane again.

Configure and Run the Test(s)

The configuration panel is used to view and edit the parameters associated with the acquisition and the analysis of the selected test. Click here for the options.



NOTE. *If any of the test parameters are grayed, it means that these parameters are not editable.*

Table 13: Button controls on the Configure panel

Configure parameters	Description
Acquire	Shows the various parameters related to acquisition of a selected test. For 10GBASE-T, there are no acquisition parameters for any of the selected tests.
Analyze	Shows the various parameters related to analysis of a selected test. These parameters can vary from one test to another test. For example, the parameters shown for the Linearity measurement are Start Frquency, Stop Frequency, and Resolution Bandwidth.
Limits	Applies to a specific version. It shows the measurement lower and upper limits using different types of comparisons like EQ(==), NE(!=), GT(>), LT(<), GE(>=), LE(<=), GTLT(> <), GELT(>= <), GTLE(> <=), LTGT(< >), LEGE(<= >=), LEGT(<= >), LTGE(< G=), GELE(>= <=). Some use unary operands and some use binary operands. For unary operands, only value1 (on the left) is active.
Comments	You can specify a comment up to 256 characters long for selected test.
Restore	Restores the default values.
Apply	Applies the configuration parameters that you have set.
Close	Dismisses the dialog box.

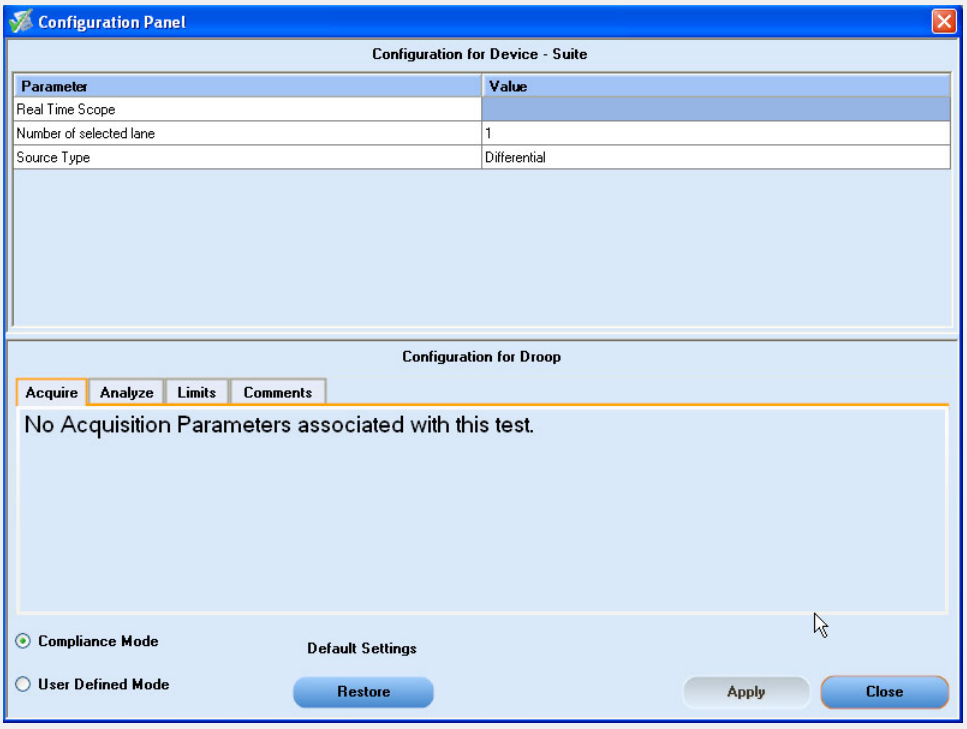
Click **Run** in the Select panel to run the selected tests.

Refer to the following table for different test limit comparisons:

Table 14: Different test limit comparisons

Comparison string	Description
EQ(==)	Equal to
NE(!=)	Not equal to
GT(>)	Greater than
LT(<)	Less than
GE(>=)	Greater than or Equal to
LE(<=)	Less than or Equal to
GTLT(><)	Greater than and Less than
GELT(>=<)	Greater than or equal to and Less than
GTLE(><=)	Greater than and Less or equal to
LTGT(<>)	Less than and Greater than
LEGE(<= >=)	Less than or equal to and Greater than or equal to
LEGT(<= >)	Less than or equal to and Greater than
LTGE(< >=)	Less than and Greater than or equal to
GELE(>= =<)	Greater than or equal to and Less than or equal to

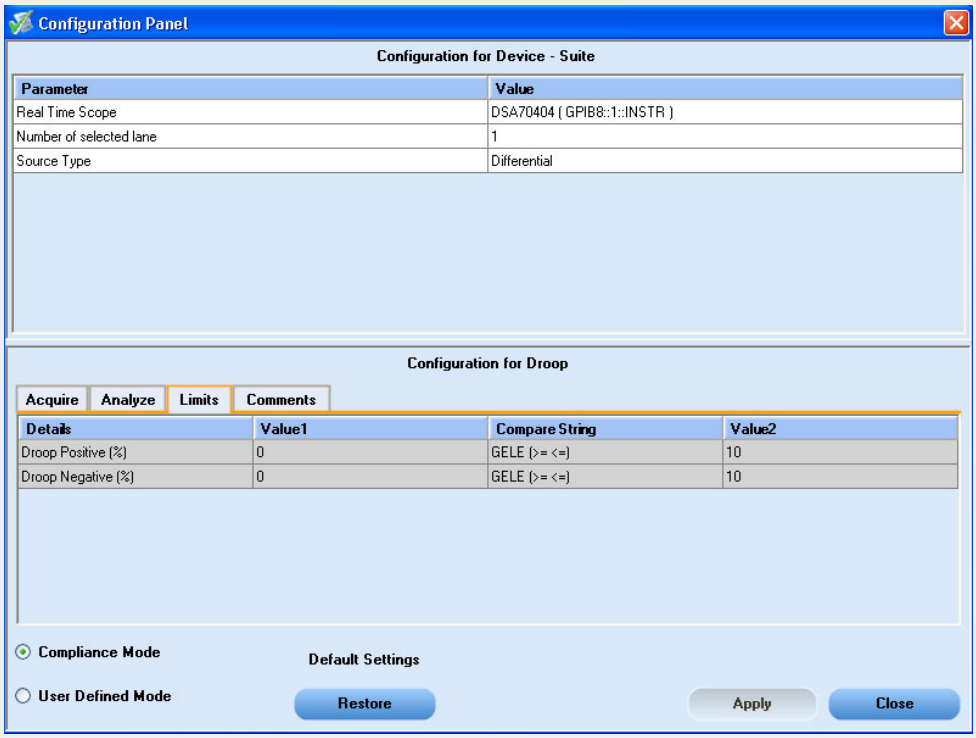
Configure Acquire Panel



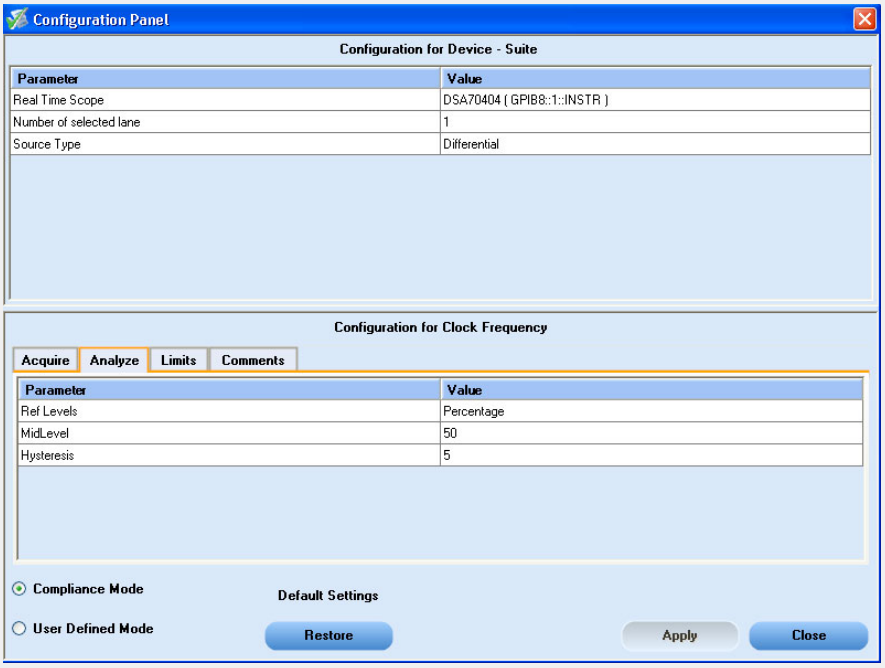
You have the following options:

- Restore load compliance mode values.
- Change the parameters associated with analysis configuration.
- Change the test limits in the User Defined mode.
- Add comments for the selected measurement that would appear in the Report panel.

Configure Limits Panel



Configure Analyze Panel



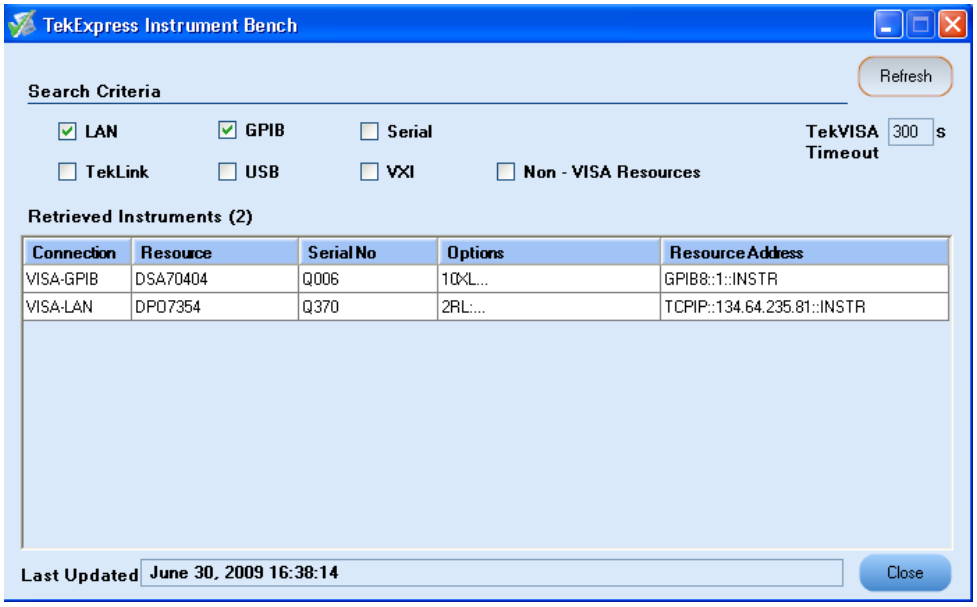
View and Select Connected Instruments

Viewing Connected Instruments

The **Tools > Instrument Bench** menu item is used to discover connected instruments required for the tests. The application uses TekVISA to discover the connected instruments. Once the operation is done, the Instrument Bench dialog box resumes operation and lists the instrument-related details based on the selected search criteria.

NOTE. *When the TekVISA Instrument Manager checks for connected Instruments, the Instrument Bench dialog box does not respond.*

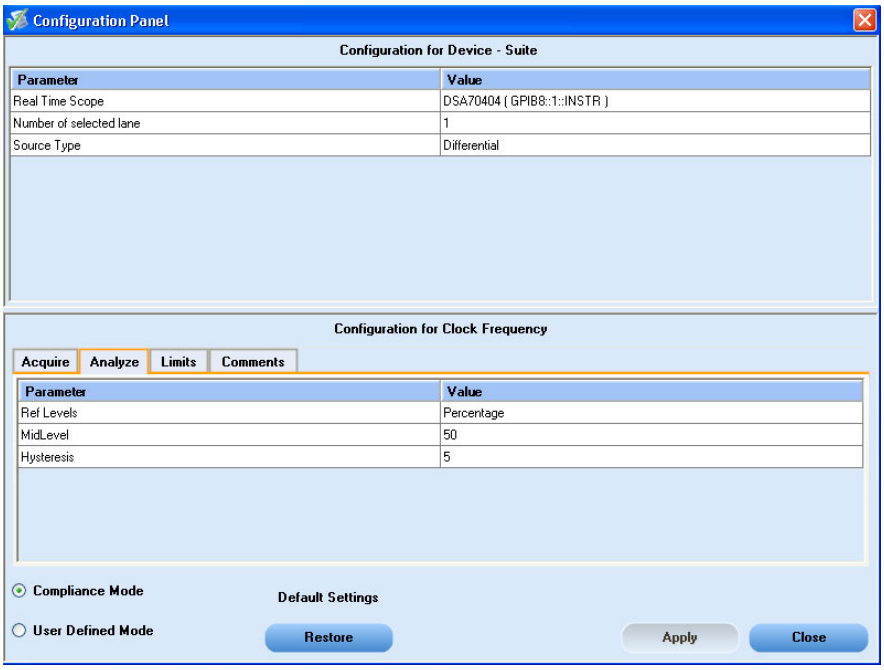
For example, if you select LAN and GPIB as the search criteria in the Instrument Bench dialog box and click Refresh, the TekVISA Instrument Manager checks for the availability of instruments over LAN and the details of the instruments are displayed under Retrieved Instruments table.



You can provide the time in the TekVISA Refresh Timeout (Seconds) field, within which if the TekVISA Instrument Manager does not find the instruments, the TekExpress application resumes the operation. If you choose Non-VISA resources, all the instruments supported by TekExpress but not communicating over the VISA layer can be searched.

Selecting Connected Instruments

You can view the instruments connected in the Configuration panel. The upper half of the panel displays the general parameters for the tests under the selected test suite.

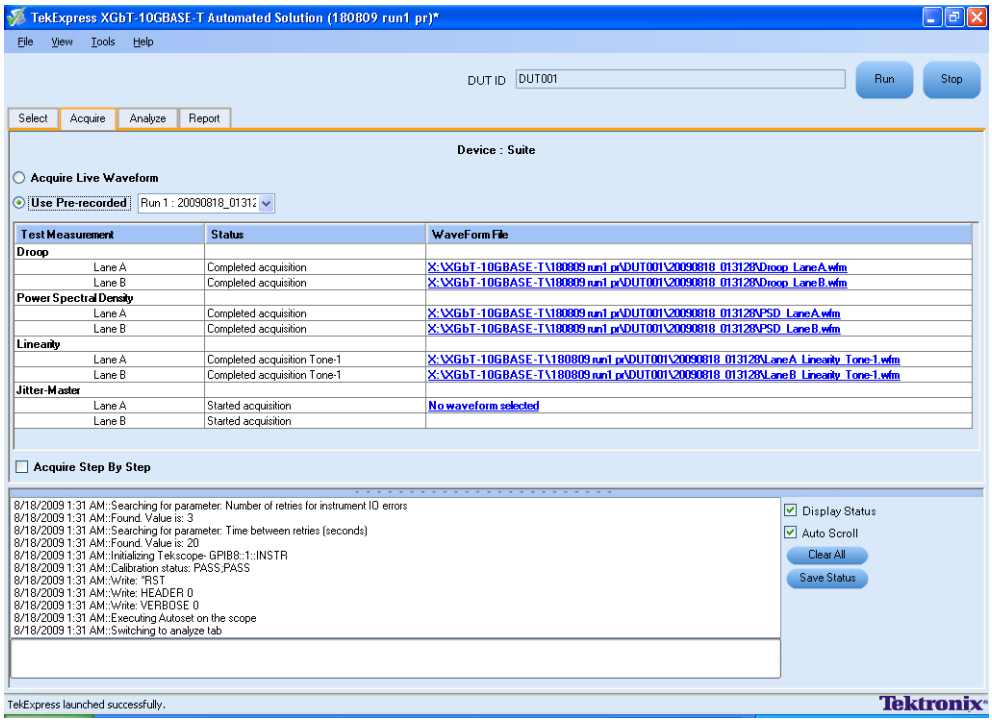


NOTE. *The list of instruments displayed is specific to the selected test suite. It does not show all the connected instruments.*

Use Prerecorded Waveforms for Analysis

From the Acquire tab, you can see unique acquisitions, acquisition parameters, acquisition status, and prerecorded waveform files of the selected test suite. The Acquire panel is specific to a suite and gets updated every time the selected test suite is changed. This panel shows the acquisition details for the tests in the currently selected suite. The tests with the common acquisition parameters are grouped together and shown as a single acquisition.

NOTE. *To use the prerecorded option, it is recommended that you use a waveform file (.wfm) which has been captured from a Tektronix oscilloscope. This eliminates the need to use an oscilloscope. You can manually select waveforms and in one-click on the Run button you can perform the measurements.*



Column name	Function
Test Measurement	Name of the tests performing acquisitions. One or more tests can perform the same acquisitions.
Status	Test acquisition status of the running test passed at intervals.
Waveform File	Prerecorded waveform files of unique acquisitions. You can select waveform files by clicking the hyperlink for example `X:\XGbT-10GBASE-T\10Sep730\DUT001\20090910_065259\ClockFrequency_Lane.wfm` here. This allows you to select any waveform file using the standard file open window.

The following Acquire source options are available:

- **Use Pre-recorded**: Enabling or disabling the option shows or hides the waveform file column in the acquisition table.

  To know how to use the prerecorded waveform files for performing a measurement or the selected test suite, click here.

- **Acquire Step by Step**: Selecting this prompts you at the end of each acquisition before proceeding to the next one.

When you select “Use Pre-recorded”, the first column shows the Test Measurement, the second column shows the Status, and the next column shows the Waveform File for analysis.

Use Acquire Live Waveform for Analysis

From the Acquire tab, you can see acquisition parameters, and acquisition status of the selected test suite. The Acquire panel is specific to a suite and gets updated every time the selected test suite is changed. This panel shows the acquisition details for the tests in the currently selected suite. The tests with common acquisition parameters are grouped together and shown as a single acquisition.

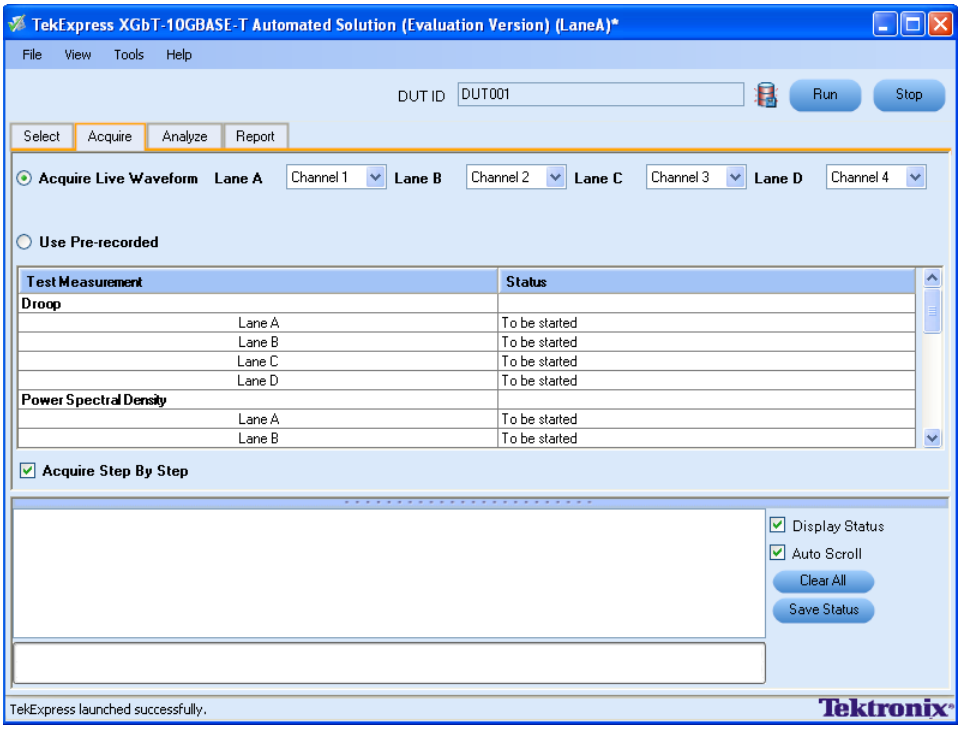


Table 15: Button controls on the Acquire panel

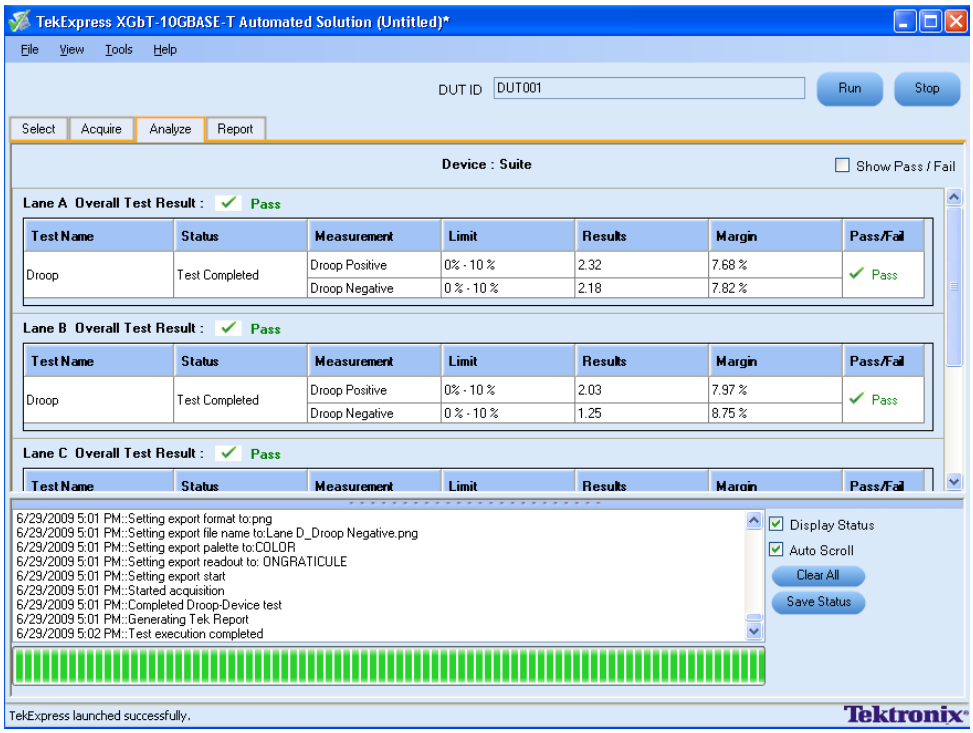
Column name	Function
Test Measurement	Displays the name of the selected test and lane for performing acquisitions. One or more tests can perform the same acquisitions.
Status	Acquisition status of the running test at intervals. The messages are passed only in live acquisition.
Acquisition	Updates the location of the acquisition name.
Acquire Source Options	
Acquire Live Waveform	When enabled, the lane selection is available.

Table 15: Button controls on the Acquire panel (cont.)

Column name	Function
Lane and Channel selection	Select the lane. The channel selection is based on the single-ended or differential source options.
Acquire Step By Step	When enabled, displays the reference input waveform of the selected measurement. This helps you to compare the input waveform with the reference waveform, allows you to change the setup before acquiring the waveforms, and then proceeds with the next selected measurement.

View the Progress of Analysis

You can view the progress of the analysis in the Analyze panel. As the analysis of each test is complete, the result value is updated.



Analyze Table

The table contains the following:

- The test name.
- The status of the tests that are being run.

The tests that are not yet started are shown with a “To be Started” status. A summarized status of the currently running test is shown in the Status Messages panel.

The **Status Messages** window time-stamps all run time messages and displays them. You can do the following:

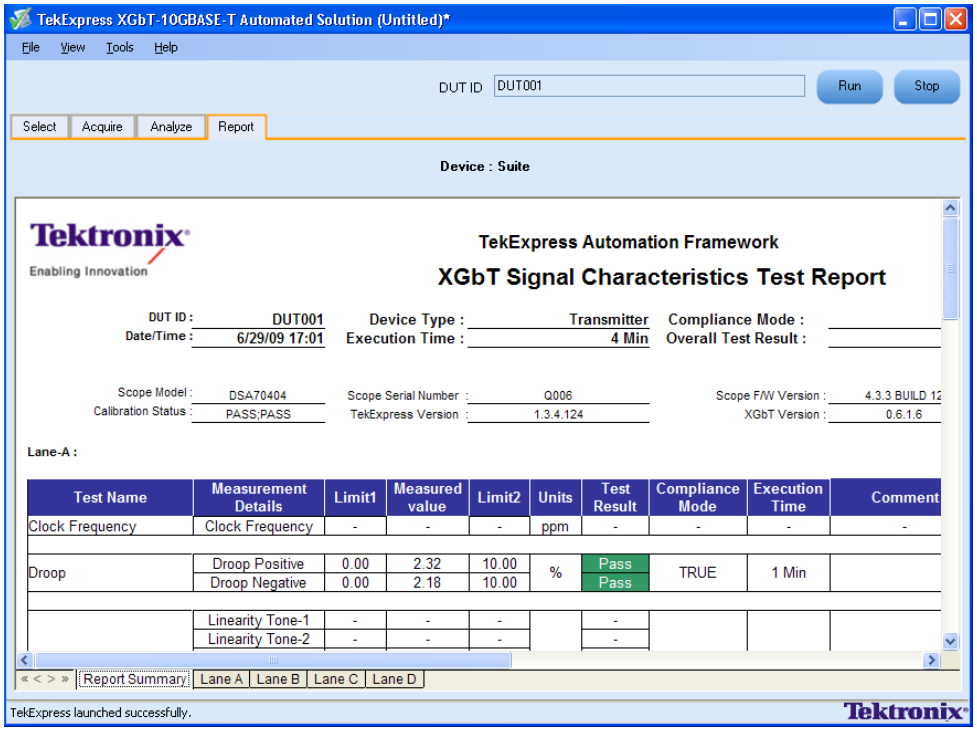
- **Display Status**: Enable/Disable status messages.
- **Auto Scroll**: Scroll the status messages automatically.
- **Clear All**: Clear all status messages in Status Window.
- **Save Status**: Save all status messages in text file. Displays a standard save file window and saves the status messages in the user specified file.

View the Report

After the analysis, a report is automatically generated and displayed in the report panel. The device information such as oscilloscope model, serial number, firmware version of the oscilloscope, version information of the TekExpress and the application, calibration status, start time, and the execution time are displayed.

The panel shows a summary report of all the lanes and detailed report of each of the lanes - Lane A, Lane B, Lane C, and Lane D. The details of the test such as the name, limit values, measured value with units, pass/fail status, compliance mode, execution time, and additional information are displayed.

The Report View Area contains an HTML version of the report template. You can select any area of the report and copy it to the clipboard to make it available to other application.

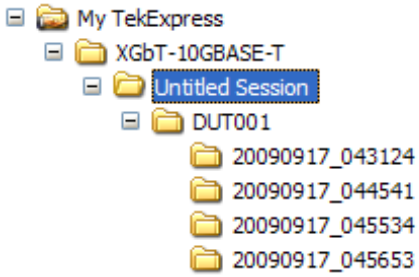


View Test Related Files

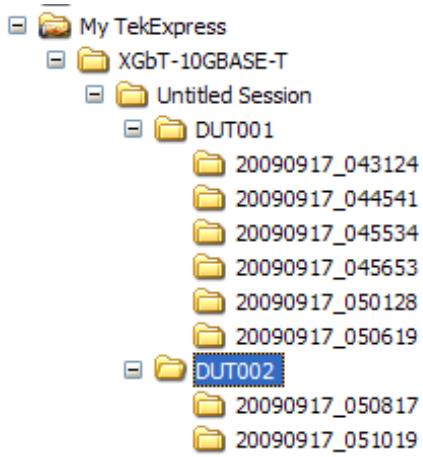
All the test related files for currently selected tests are always saved under: `My Documents\My TekExpress\XGbT-10GBASE-T\SessionName`.

Case 1. An example image of data when the session is still not saved and is in the `My TekExpress/XGbT-10GBASE-T` path as "`Untitled Session`", the DUT ID is set to `DUT001`, and

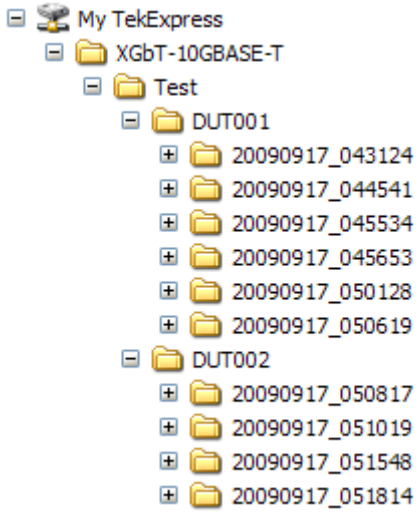
the tests are performed four times (four folders are created with the file naming convention YYYYMMDD_HHMMSS (Date_Time).



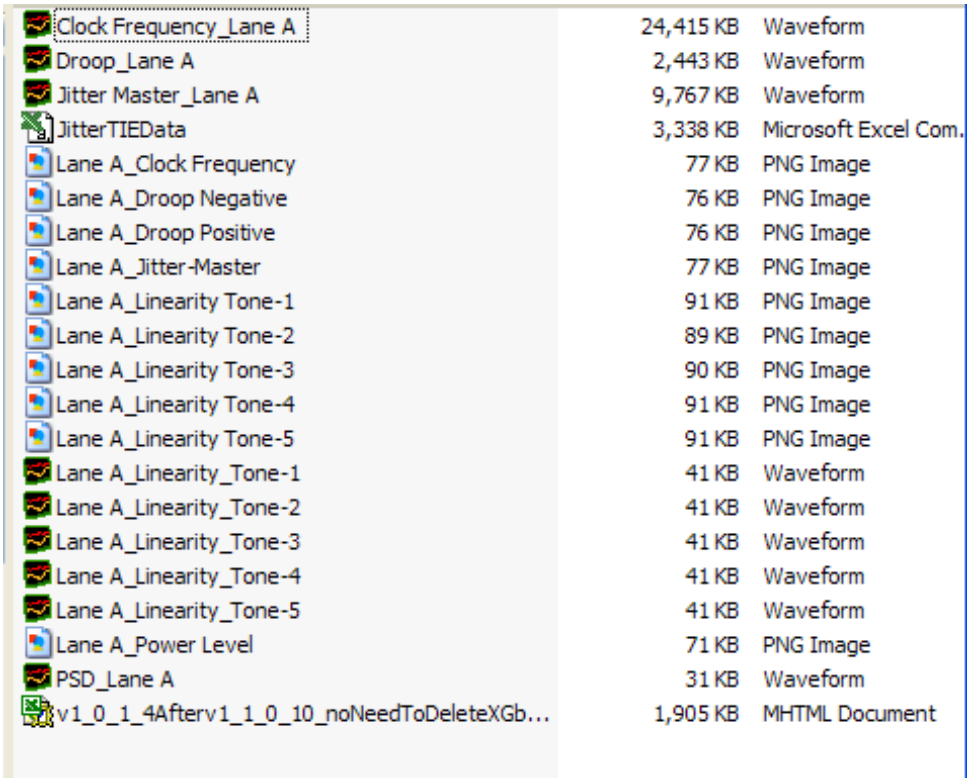
Case 2. An example image of data when the session is still not saved and is in the My TekExpress/XGbT-10GBASE-T path as "Untitled Session", theDUT001 folder already present (tests are performed six times), and the DUT ID is now set to DUT002 (here the tests are performed twice).



Case 3. An example image of data when the session is saved and is in the My TekExpress/XGbT-10GBASE-T path as "Test".



Case 4. An example image of the test related files that are generated after performing the selected measurements (report file, snapshot of the output waveforms for the selected measurements, input waveform file for the selected measurements with the lane name used). These files are saved in the path `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session`.



Configure Droop Parameters

In the Configuration Panel, set the Ref Levels to either Absolute or Percentage. Set the MidLevel and Hysteresis values of the signal for Droop measurement.

The limit and default values for MidLevel and Hysteresis parameters are listed in the following table:

Table 16: Default and limit configure values for MidLevel and Hysteresis parameters

Parameter	Absolute			Percentage		
	Minimum	Maximum	Default	Minimum	Maximum	Default
MidLevel	–10 V	+10 V	0 V	20%	80%	50%
Hysteresis	0 V	2 V	0.05 V	2%	20%	5%

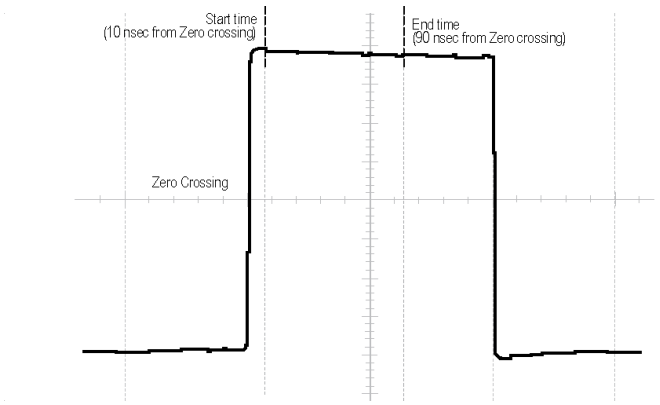
To configure the Droop parameters, enter a Start time, End time, and Population value for the signal in the Droop parameter panel.

The limit and default value for these parameters are listed in the following table:

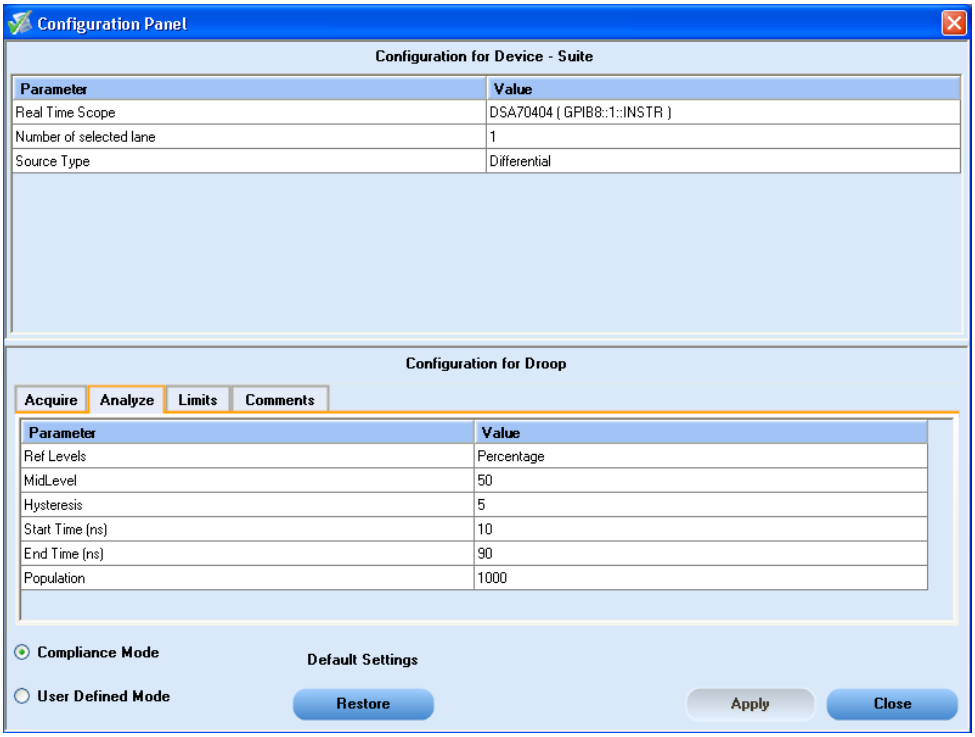
Table 17: Default and limit configure values for Droop measurement

Parameter	Minimum	Maximum	Default
Start time	5 ns	15 ns	10 ns
End time	85 ns	95 ns	90 ns
Population	100	5000	1000

The population is the number of cycles considered for the droop measurement. The start and the end time parameters are indicated in the following waveform.



Configuration Panel to Set the Droop Parameters



Connections for Droop Measurement

Click here for information on connections for Droop measurement.

Configure the DUT and operate in transmitter test mode 6 to output the required waveforms.

Run the Droop Measurement

To run the Droop measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Droop measurement.
5. Click Configure to set the test parameters for the Droop measurement in the User Defined Mode.

To set up the connections for Droop measurement, click **Show Schematic** and to view a snapshot of the Droop signal, select **Click to view image of the waveform**.

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze the live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

8. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Droop measurement. This helps you to compare the applied input signal with the snapshot of a typical Droop input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Droop signal in the correct test mode and lane.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

9. Click **Run**.
10. The status of the measurement is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.
11. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

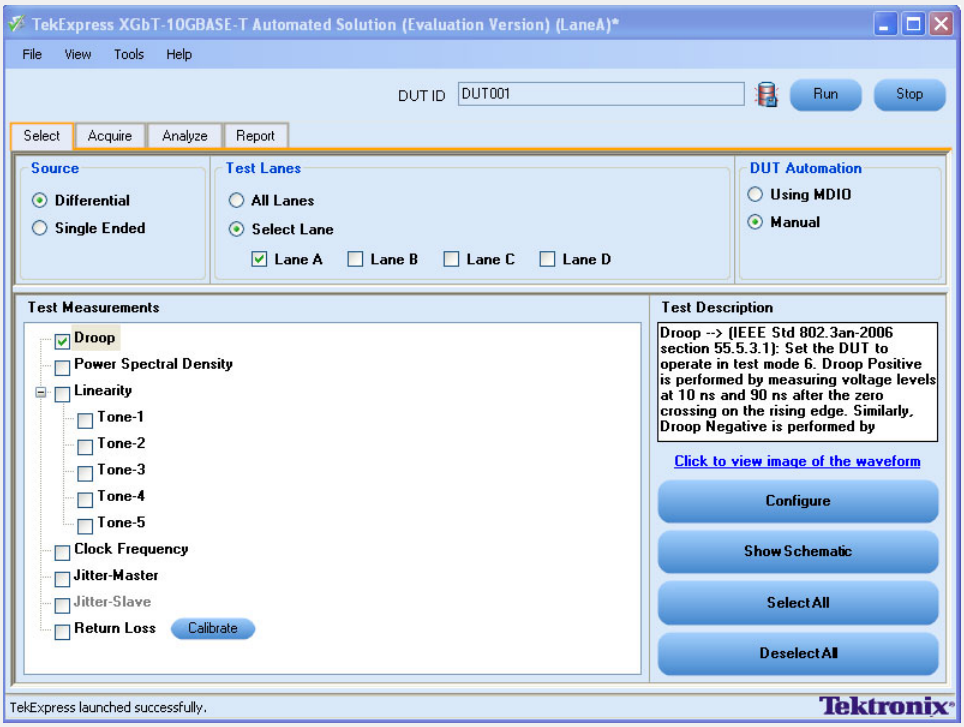
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

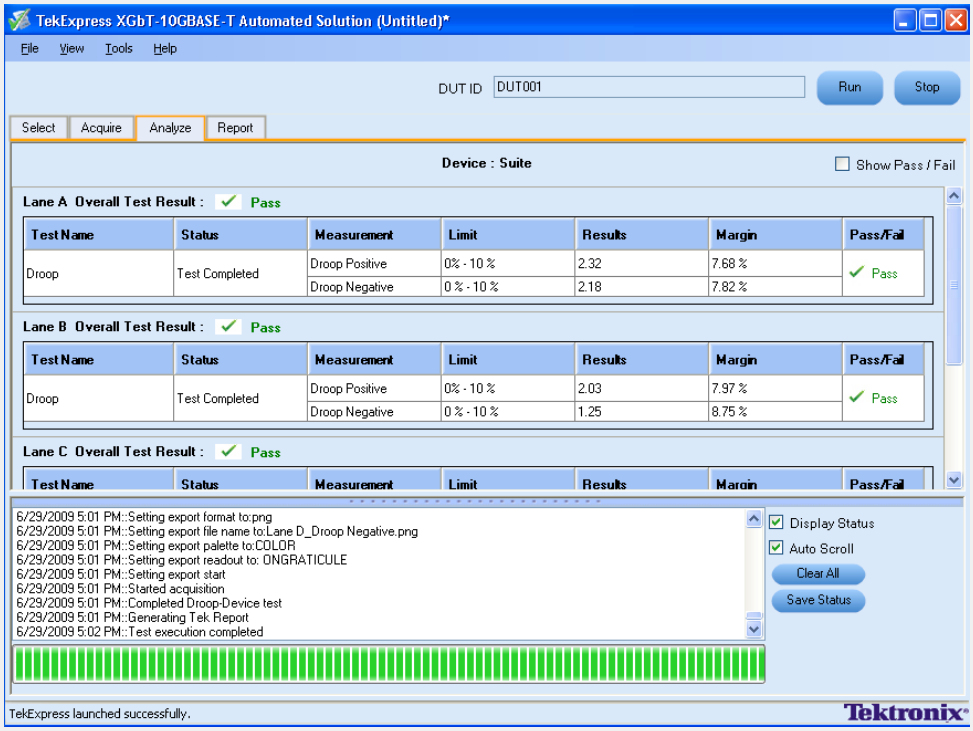
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

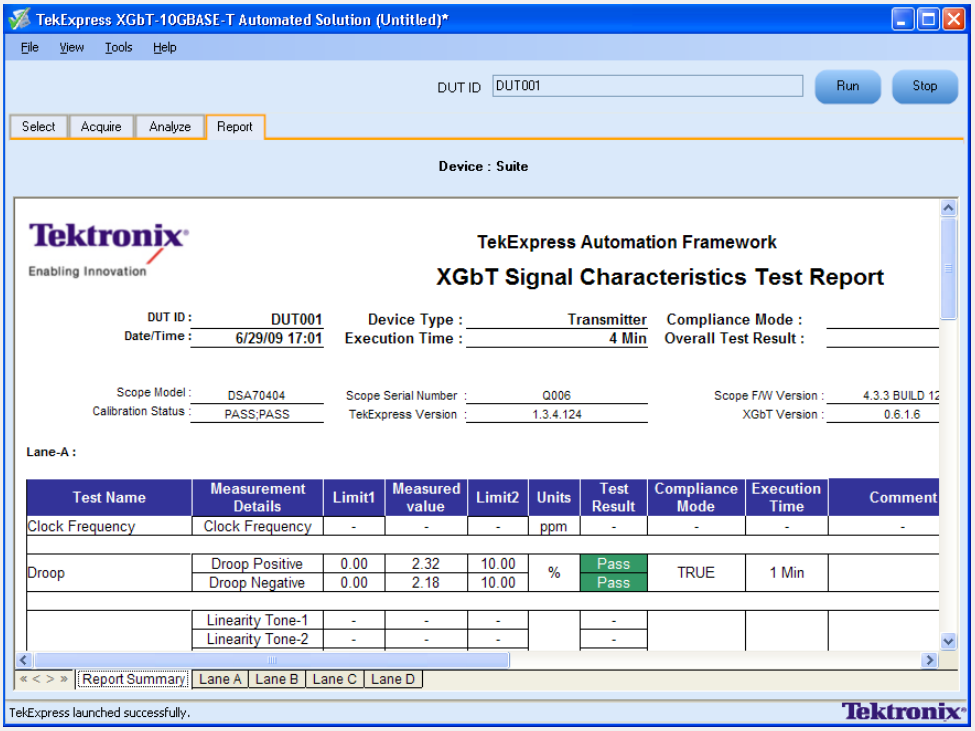
Select Panel with Droop Measurement Selected



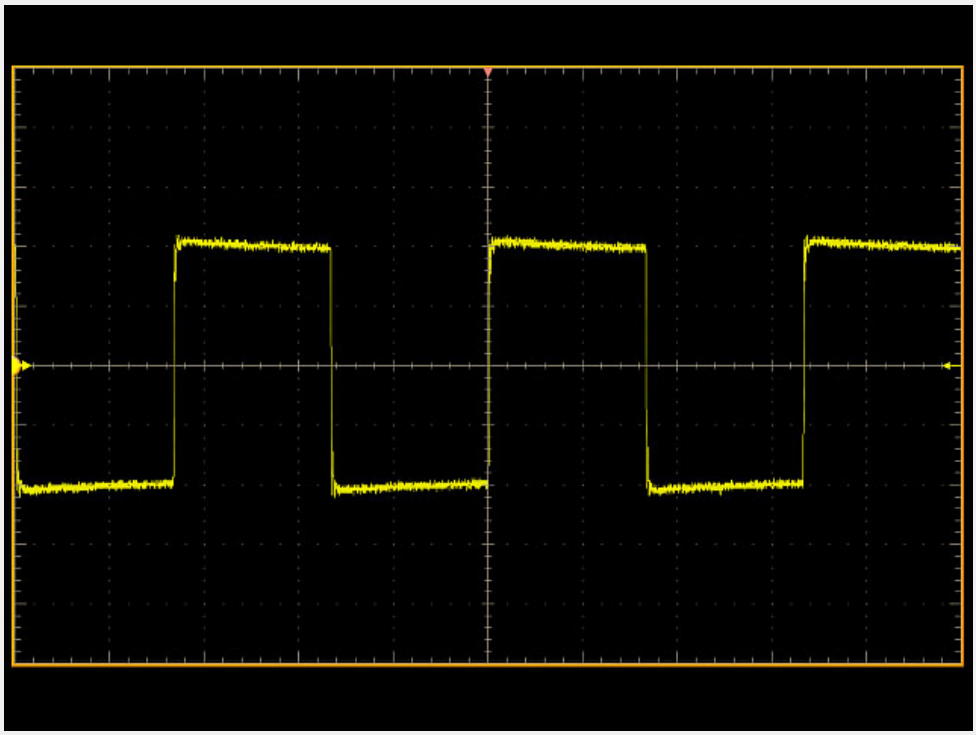
Analyze Panel after Running Droop Measurement



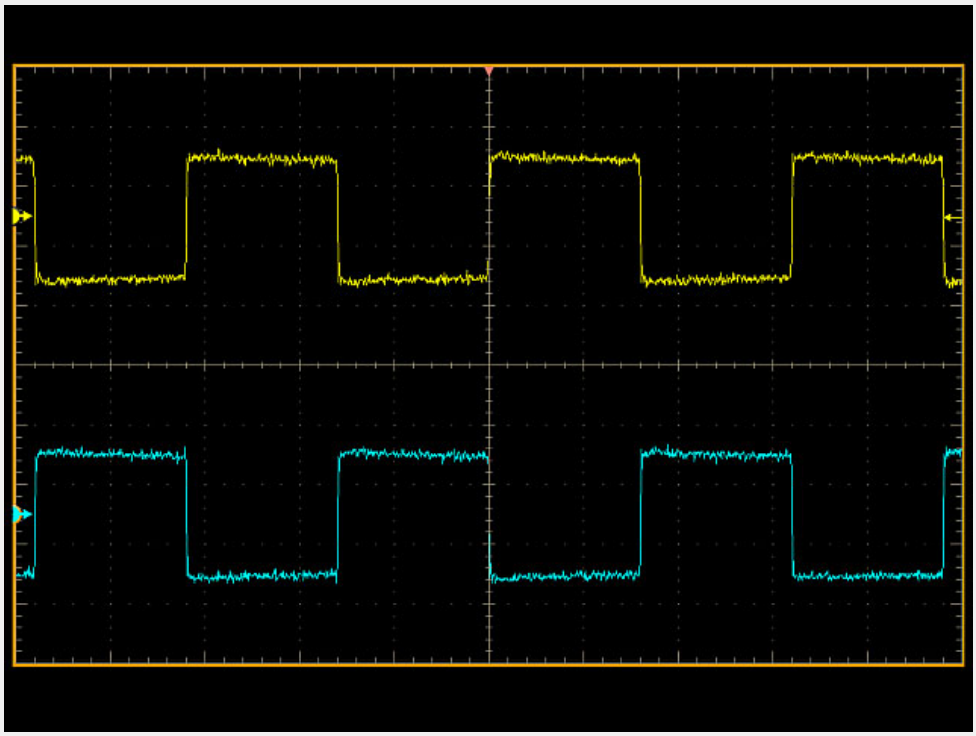
Report Panel after Running Droop Measurement



Snapshot of the Droop Signal for Differential Source



Snapshot of the Droop Signal for Single-Ended Source



Configure Power Spectral Density Parameters

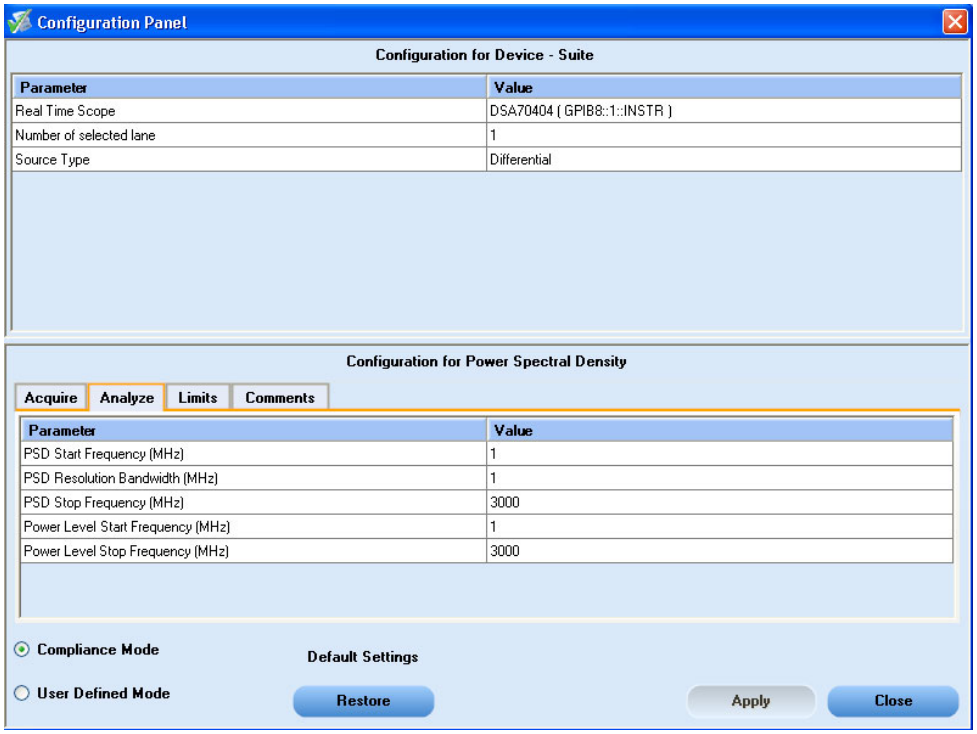
In the Configuration Panel, set the PSD Start Frequency, PSD Stop Frequency, PSD Resolution Bandwidth, Power Level Start Frequency, and Power Level Stop Frequency values of the signal for Power Spectral Density measurement.

The limit and default values for these parameters are listed in the following table:

Table 18: Default and limit configure values for Power Spectral Density measurement

Parameter	Description	Minimum	Maximum	Default
PSD Start Frequency	PSD curve is measured from this frequency	1 MHz	1.5 GHz	1 MHz
PSD Stop Frequency	PSD curve is measured upto this frequency	1.6 GHz	4 GHz	3 GHz
PSD Resolution Bandwidth	Based on this value, the sample rate and record length are set	1 MHz	5 MHz	1 MHz
Power Level Start Frequency	Power Level is measured from this frequency	1 MHz	1.5 GHz	1 MHz
Power Level Stop Frequency	Power Level is measured upto this frequency	1.6 GHz	4 GHz	3 GHz

Configuration Panel to Set the Power Spectral Density Parameters



Connections for Power Spectral Density Measurement

Click here for information on connections for Power Spectral Density measurement.

Configure the DUT and operate in transmitter test mode 5 to output the required waveforms.

Run the Power Spectral Density Measurement

To run the Power Spectral Density measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Power Spectral Density measurement.

5. Click Configure to set the test parameters for the Power Spectral Density measurement in the User Defined Mode.

   To set up the connections for Power Spectral Density measurement, click **Show Schematic** and to view a snapshot of the Power Spectral Density signal, select **Click to view image of the waveform**.

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Power Spectral Density measurement. The display helps you to compare the applied input signal with the snapshot of a typical Droop input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Power Spectral Density measurement signal in the correct test mode and lane.

NOTE. *When using prerecorded waveform files, the **Acquire Step By Step** option is not available.*

8. Click **Run**.

9. The status of the measurement is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.

10. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

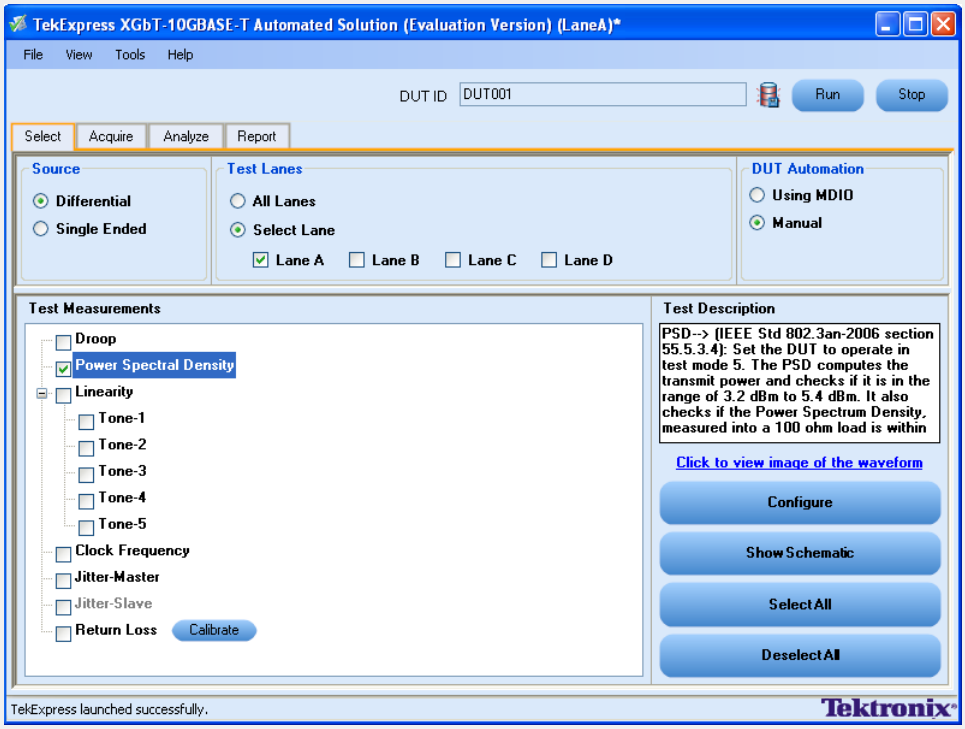
    or

    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

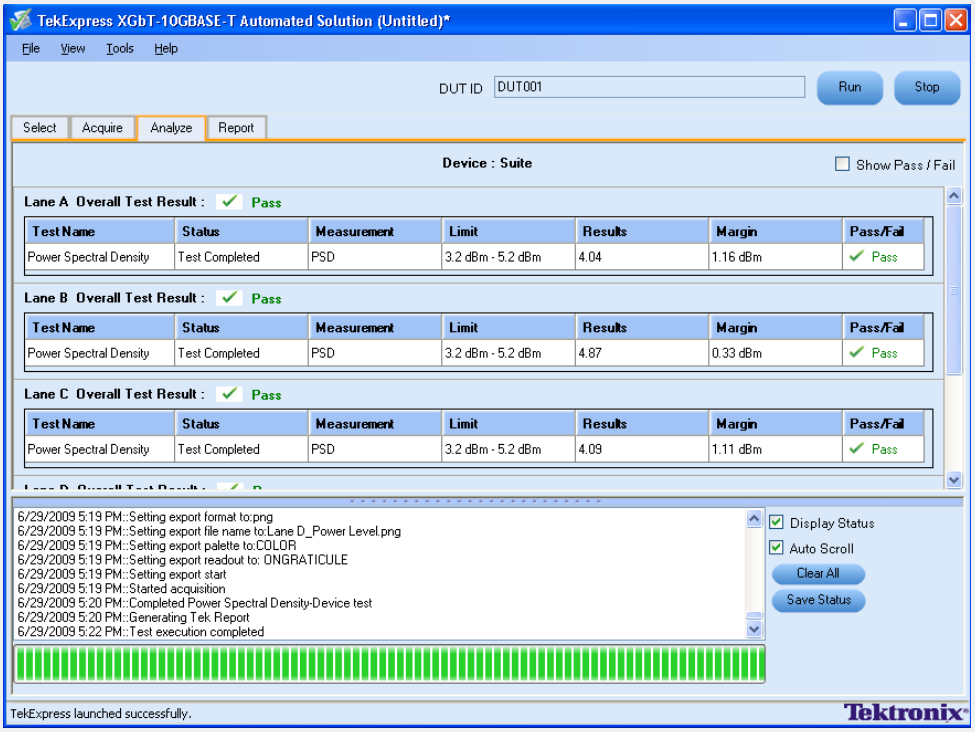
NOTE. *After a measurement is complete and a report is generated, if you select **File** > **Save Report As** and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

NOTE. *The Power Spectral Density test computes the transmitted power and checks if the power level is within the limits of 3.2 dBm to 5.2 dBm. The application also checks if the Power Spectrum Density measured with a 100 W load is within the specified upper and lower masks.*

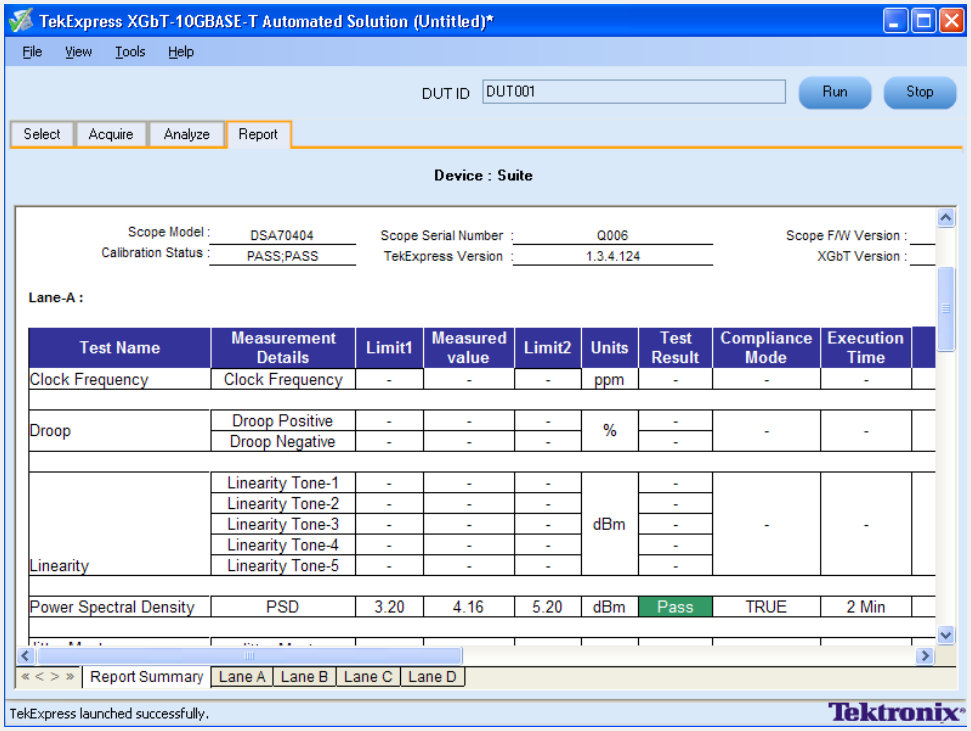
Select Panel with Power Spectral Density Measurement Selected



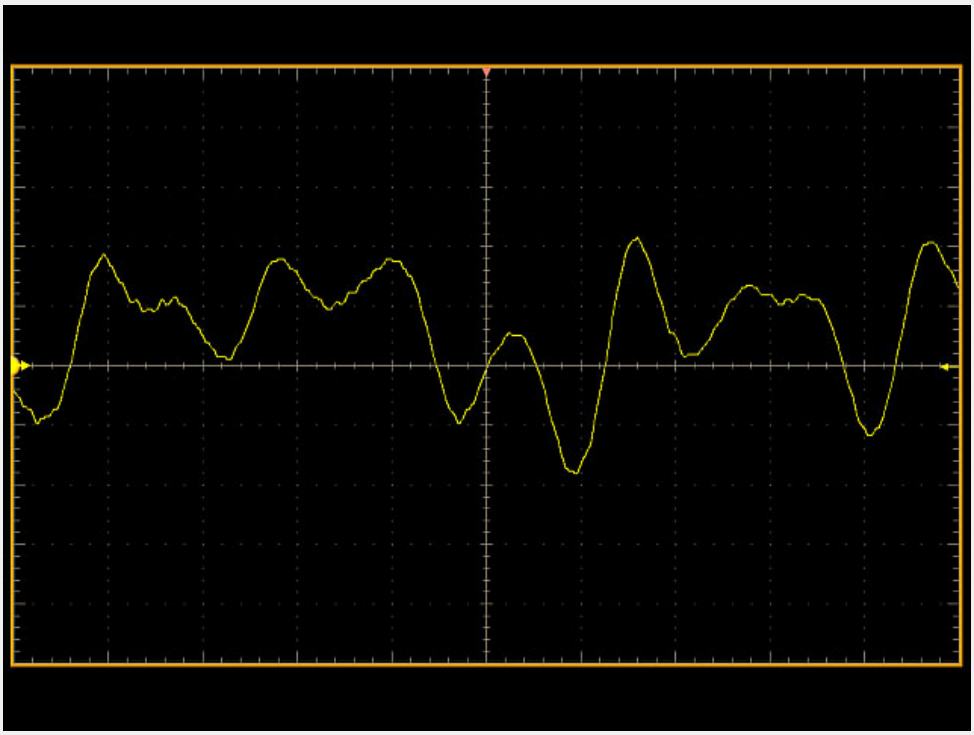
Analyze Panel after Running Power Spectral Density Measurement



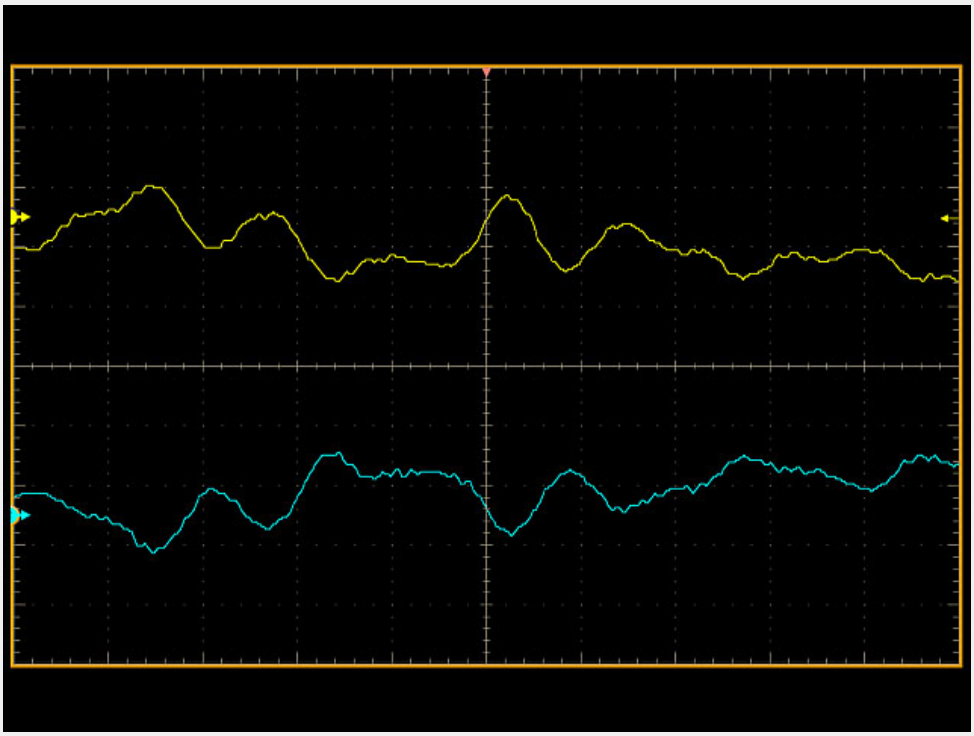
Report Panel after Running Power Spectral Density Measurement



Snapshot of the Power Spectral Density Signal for Differential Source



Snapshot of the Power Spectral Density Signal for Single-Ended Source



Configure Linearity Parameters

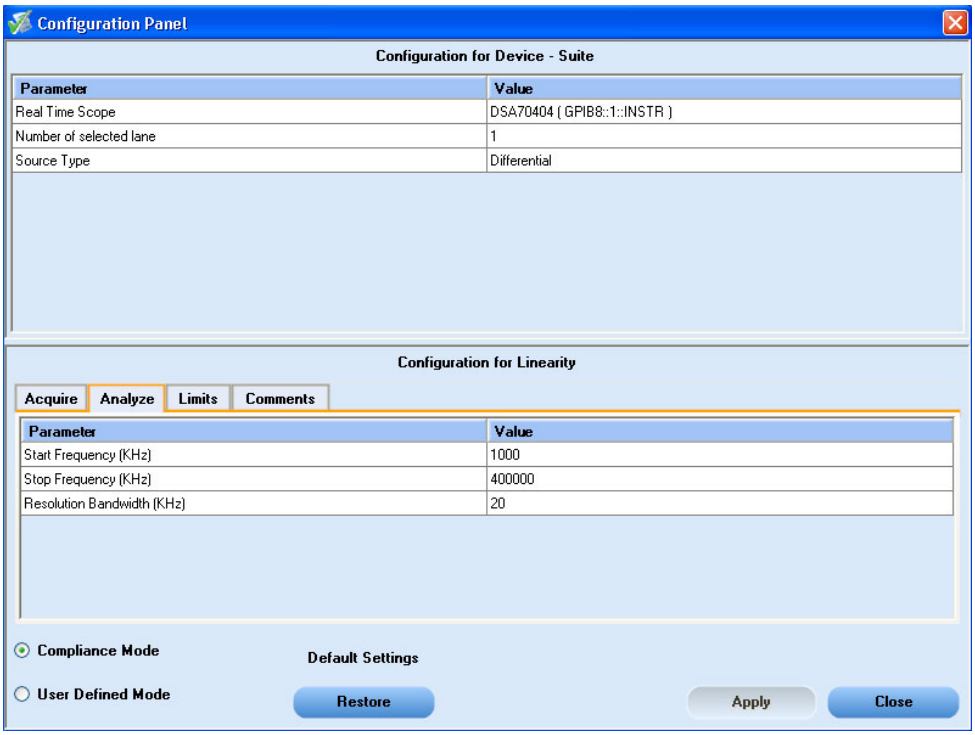
In the Configuration Panel, set the start frequency, stop frequency, and resolution bandwidth value of the signal for Linearity measurement.

The limit and default values for these parameters are listed in the following table:

Table 19: Default and limit configure values for Linearity measurement

Parameter	Description	Minimum	Maximum	Default
Start Frequency	SFDR is measured by searching levels from this frequency	1 KHz	30 MHz	1 MHz
Stop Frequency	SFDR is measured upto this frequency	350 MHz	800 MHz	400 MHz
Resolution Bandwidth	Based on this value, the sample rate and record length are set	1 KHz	500 KHz	20 KHz

Configuration Panel to Set the Linearity Parameters



Connections for Linearity Measurement

Click here for information on connections for Linearity measurement.

Configure the DUT and operate in transmitter test mode 4 to output the required waveforms.

Run the Linearity Measurement

To run the Linearity measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Linearity measurement with all the five tones selected by default. You have the option to select one or more tones.

NOTE. *When using prerecorded waveform files for Linearity measurement with multiple tones selected, ensure that waveform files corresponding to the selected tones are selected in the* ***File*** > ***Open*** *dialog window.*

5. Click Configure to set the test parameters for the Linearity measurement in the User Defined Mode.

   To set up the connections for Linearity measurement, click **Show Schematic** and to view a snapshot of the Linearity signal **Click to view image of the waveform**.

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze the live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Linearity Tone-1, input signal of the Linearity Tone-2, input signal of the Linearity Tone-3, input signal of the Linearity Tone-4, and input signal of the Linearity Tone-5 measurement. This helps you to compare the applied input signal with the snapshot of a typical Linearity input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Linearity signal in the correct test mode and also confirms if the lanes are connected to the appropriate channels correctly.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

8. Click **Run**.

NOTE. *The application prompts you to set the appropriate test mode (for Linearity) and submode (for Tone selection) before performing the measurement. The following two examples indicate that setting both the test mode and submode correctly are important in performing the Linearity measurement:*

1. To perform Linearity measurement on a Tone 2 signal, the application prompts you to set the mode to 4 and sub mode to 2. When you set them correctly, the measurement algorithm will identify the tone as Tone 2 and return the results appropriately.

2. To perform Linearity measurement on the Tone 2 signal, the application prompts you to set the mode to 4 and sub mode to 2. When you set them incorrectly (for example, test mode to 4 and sub mode to 1), the measurement algorithm will identify the tone as a Tone 4 signal. Because there is a mismatch between the measurement request and measurement signal sent as input, the result is shown as fail.

9. The status of the measurement is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.

10. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

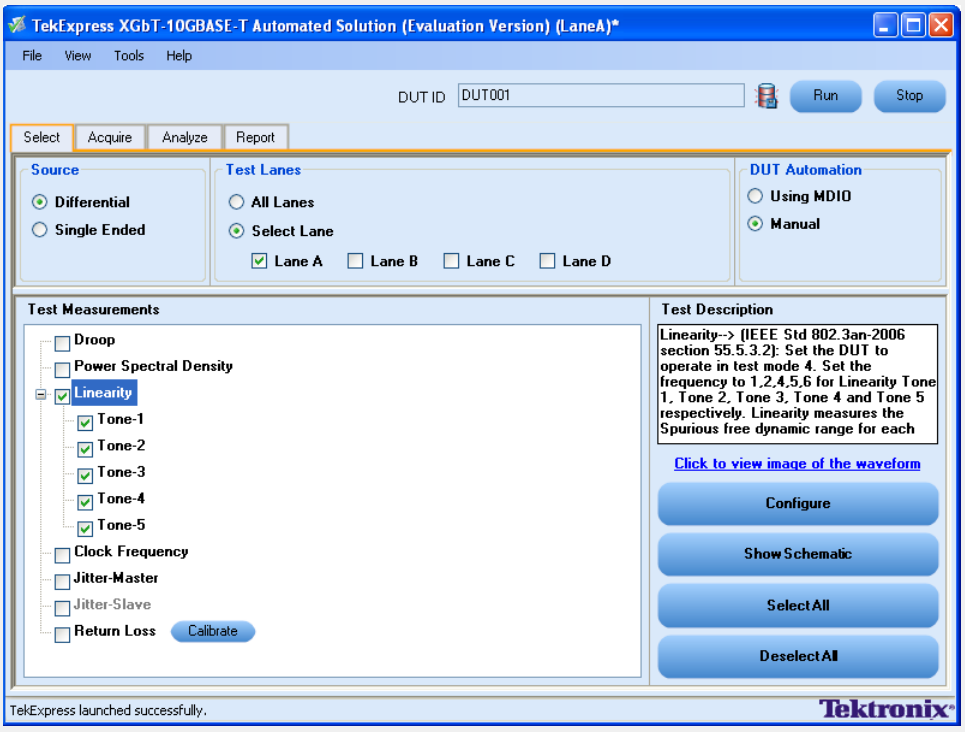
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

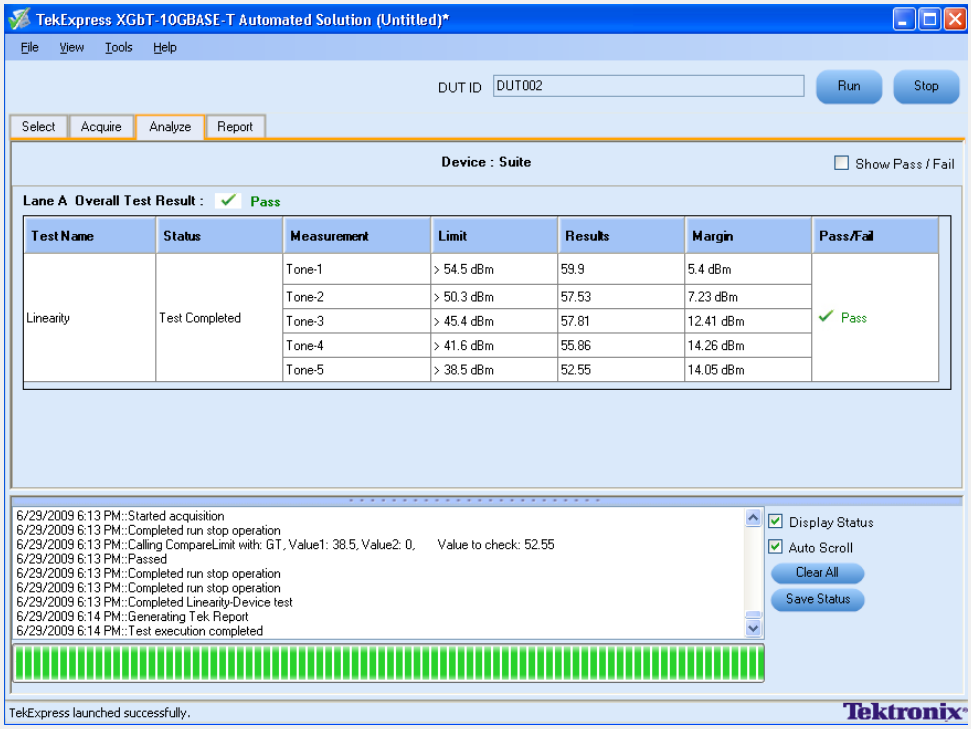
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

Select Panel with Linearity Measurement Selected



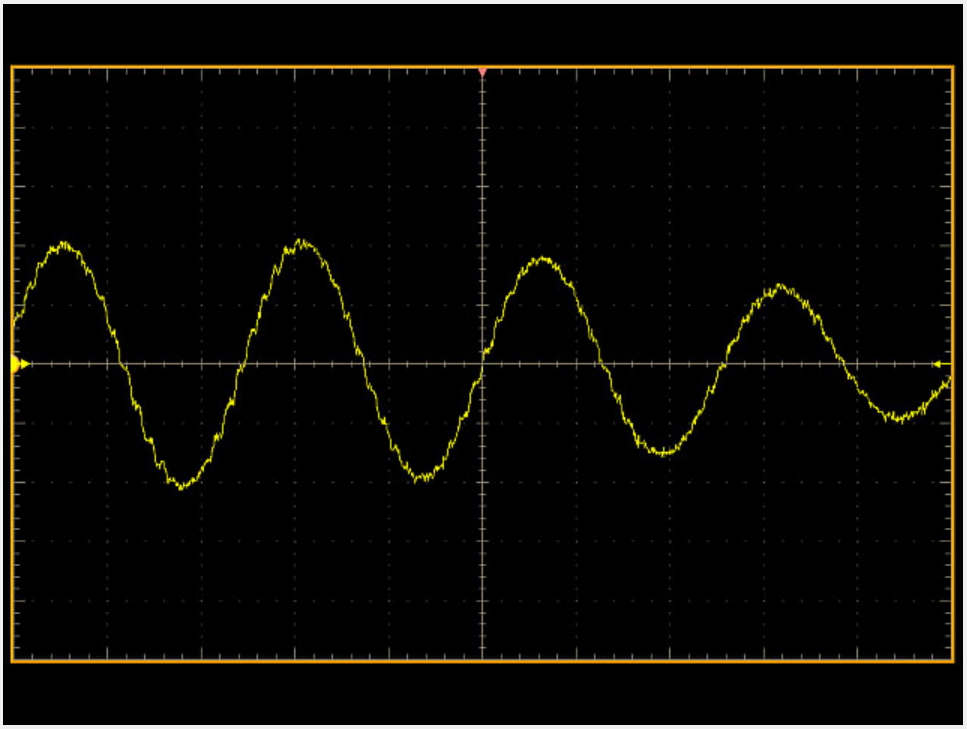
Analyze Panel after Running Linearity Measurement



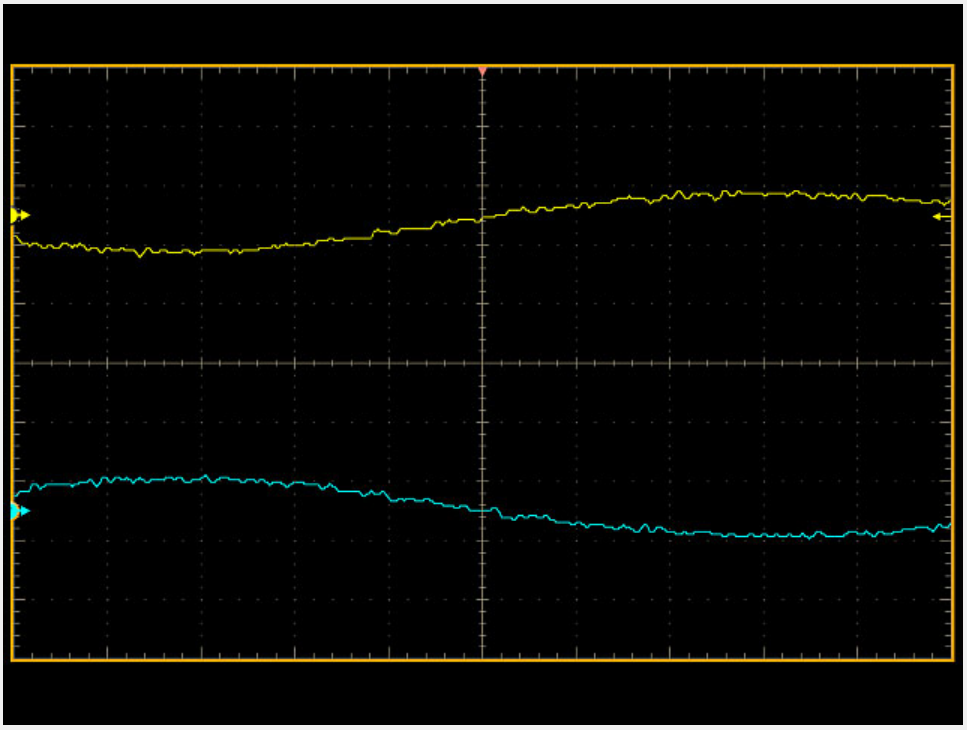
Report Panel after Running Linearity Measurement

Test Name	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution Time	Comment	Remarks
Clock Frequency	Clock Frequency	-50.00	0.52	50.00	ppm	Pass	TRUE	2 Min		Clock Frequency = 200.0
Droop	Droop Positive	-	-	-	%	-	-	-	-	-
	Droop Negative	-	-	-		-				-
Linearity	Linearity Tone-1	54.50	63.95	0.00	dBm	Pass	TRUE	3 Min	Tone Frequency 1	IMD = 0.24 % Tf1 =36.7 MHz Tf2 =41.4 MHz IMF =55.4 MHz
	Linearity Tone-2	-	-	-		-			Tone Frequency 2	-
	Linearity Tone-3	-	-	-		-			Frequency with worst Intermodulation product	-
	Linearity Tone-4	-	-	-		-				-
	Linearity Tone-5	-	-	-		-				-
Power Spectral Density	PSD	3.20	3.46	5.20	dBm	Pass	TRUE	2 Min		Curve Fit Pass

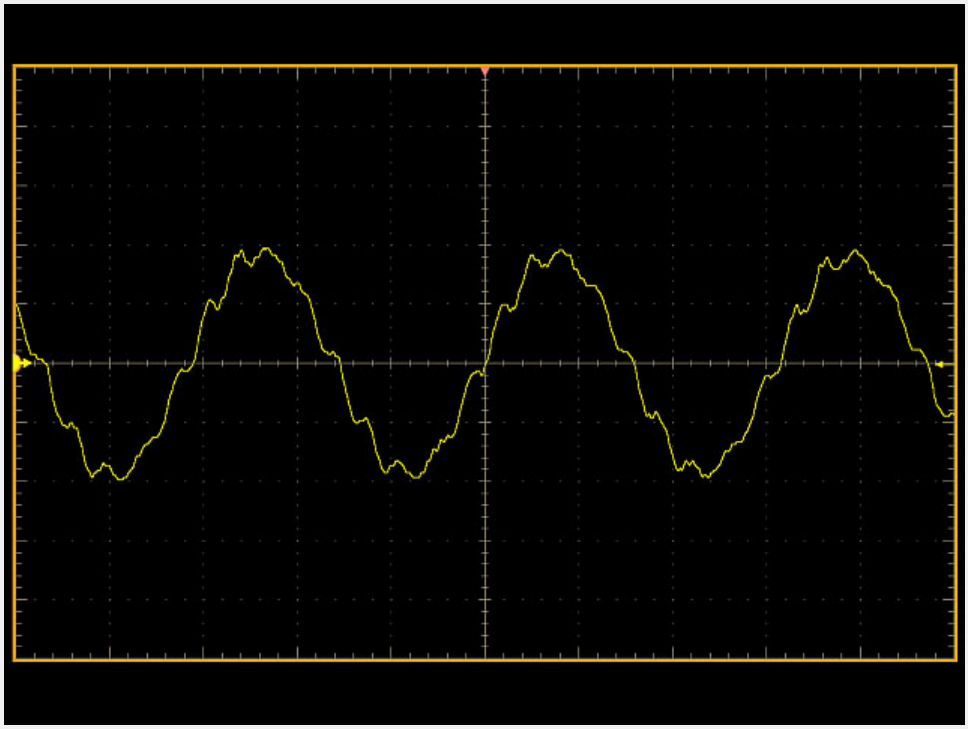
Snapshot of the Tone-1 Linearity Signal for Differential Source



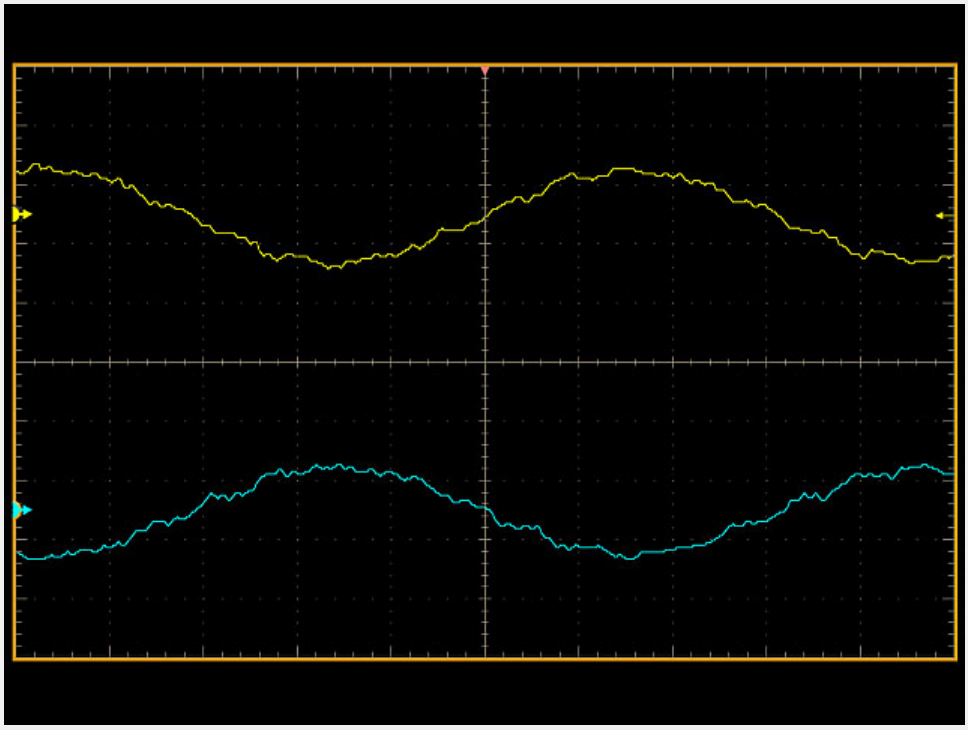
Snapshot of the Tone-1 Linearity Signal for Single-Ended Source



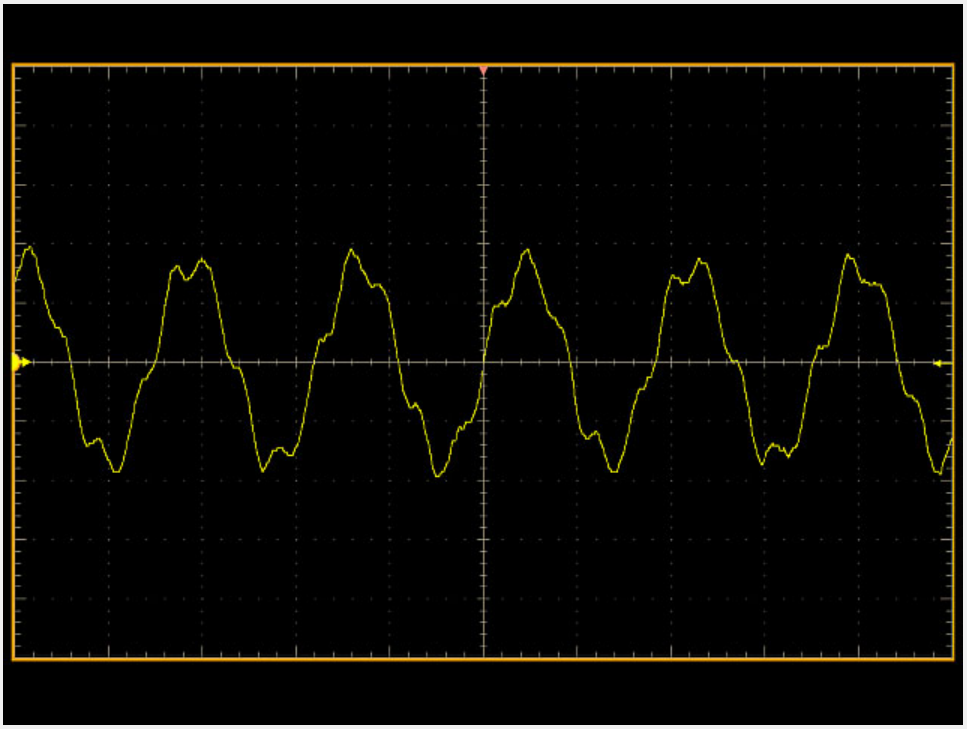
Snapshot of the Tone-2 Linearity Signal for Differential Source



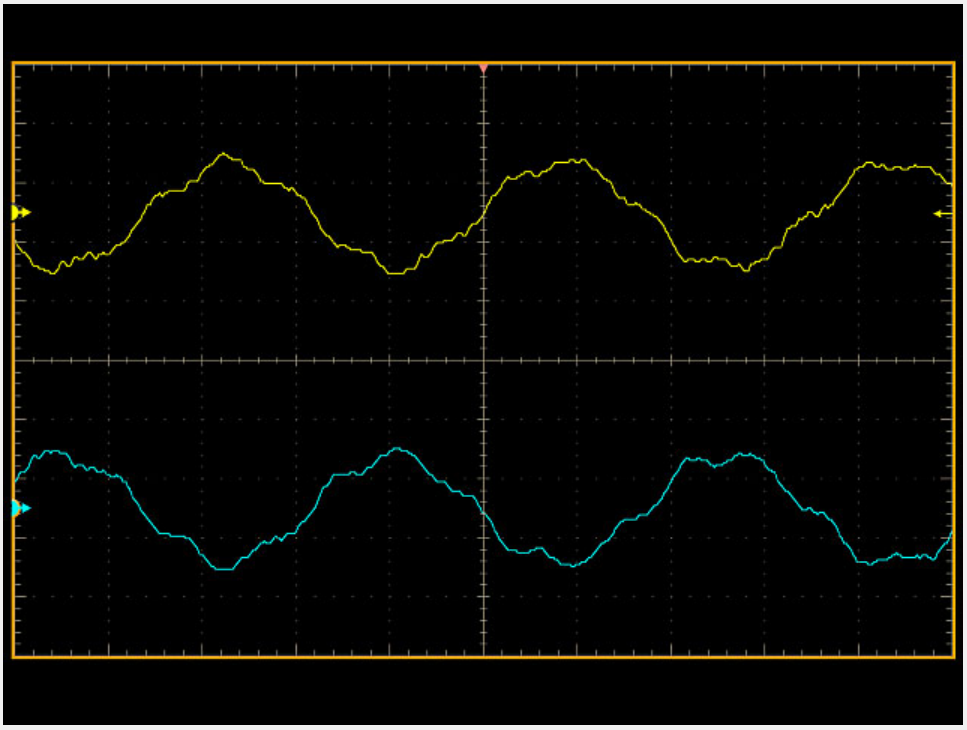
Snapshot of the Tone-2 Linearity Signal for Single-Ended Source



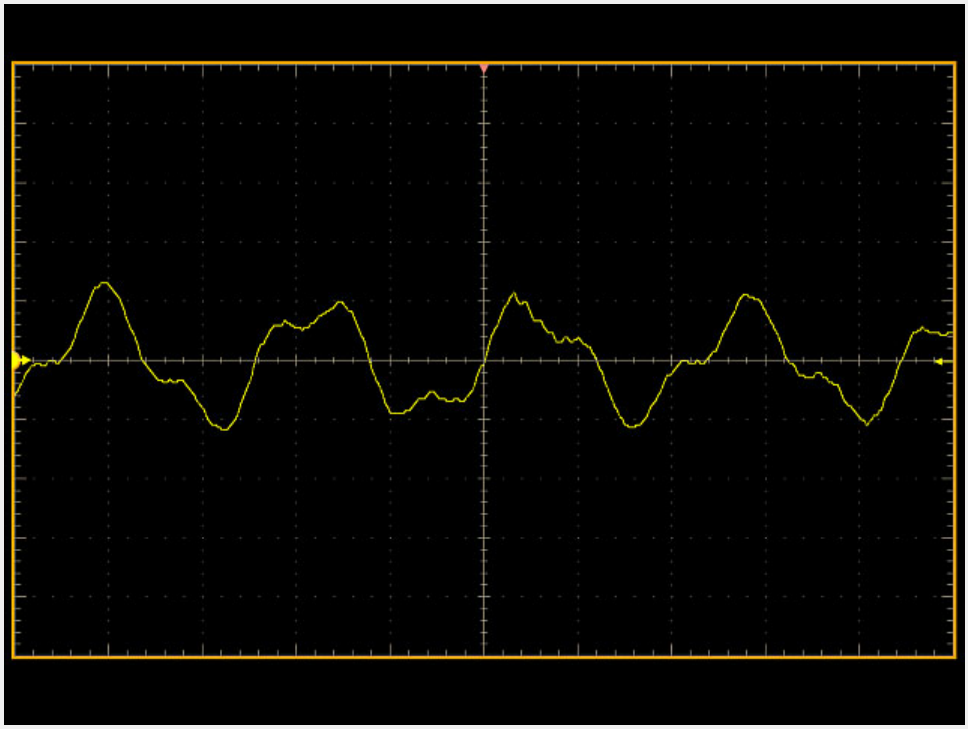
Snapshot of the Tone-3 Linearity Signal for Differential Source



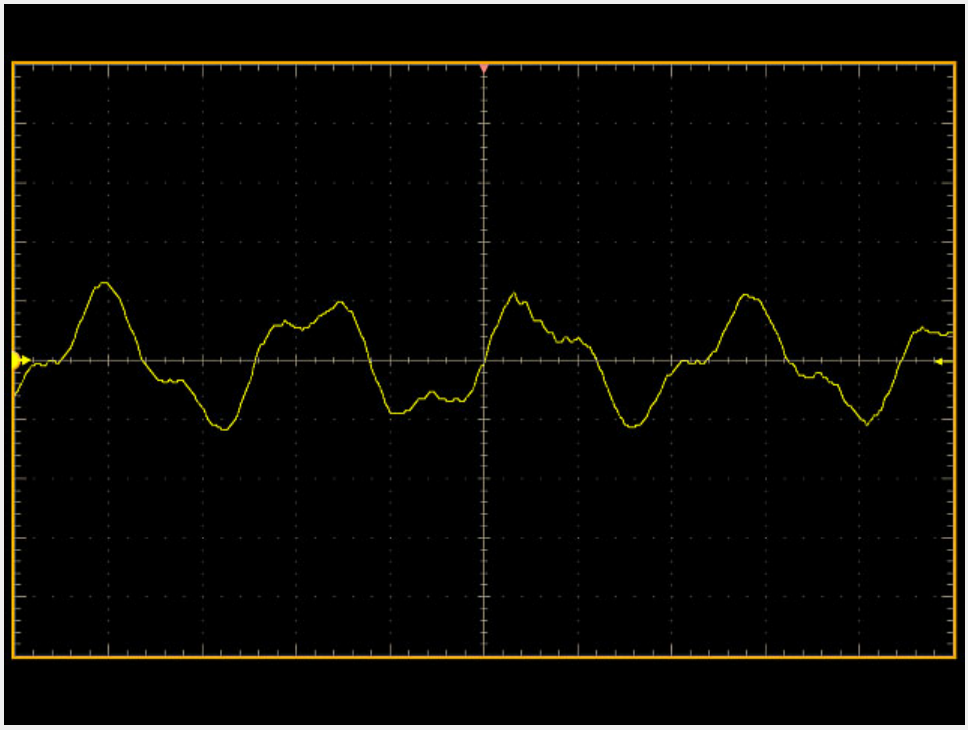
Snapshot of the Tone-3 Linearity Signal for Single-Ended Source



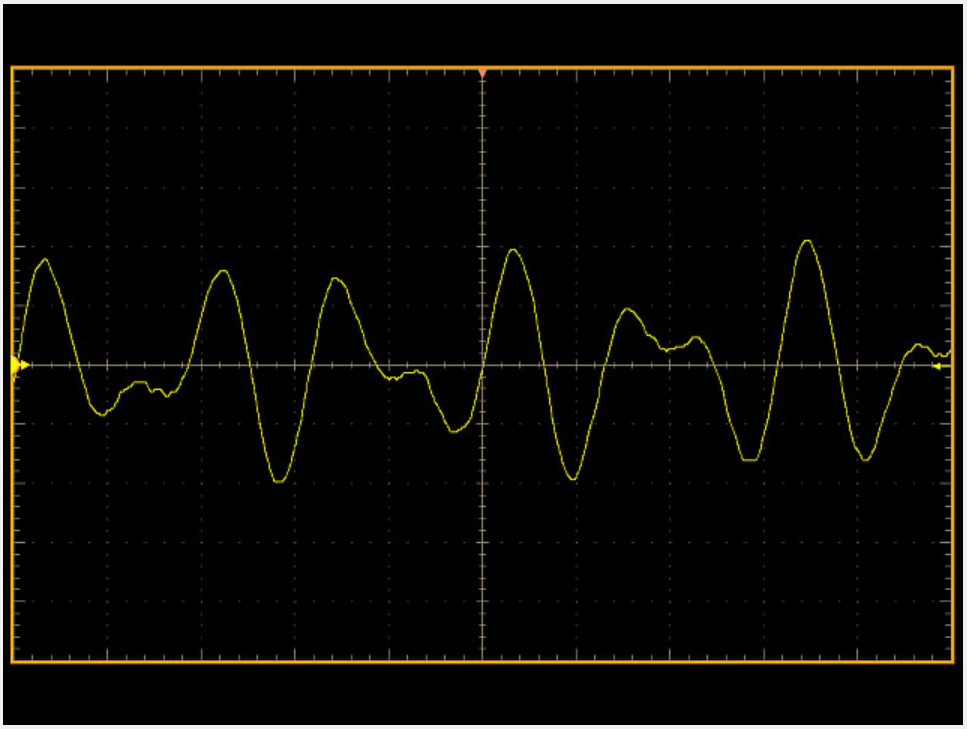
Snapshot of the Tone-4 Linearity Signal for Differential Source



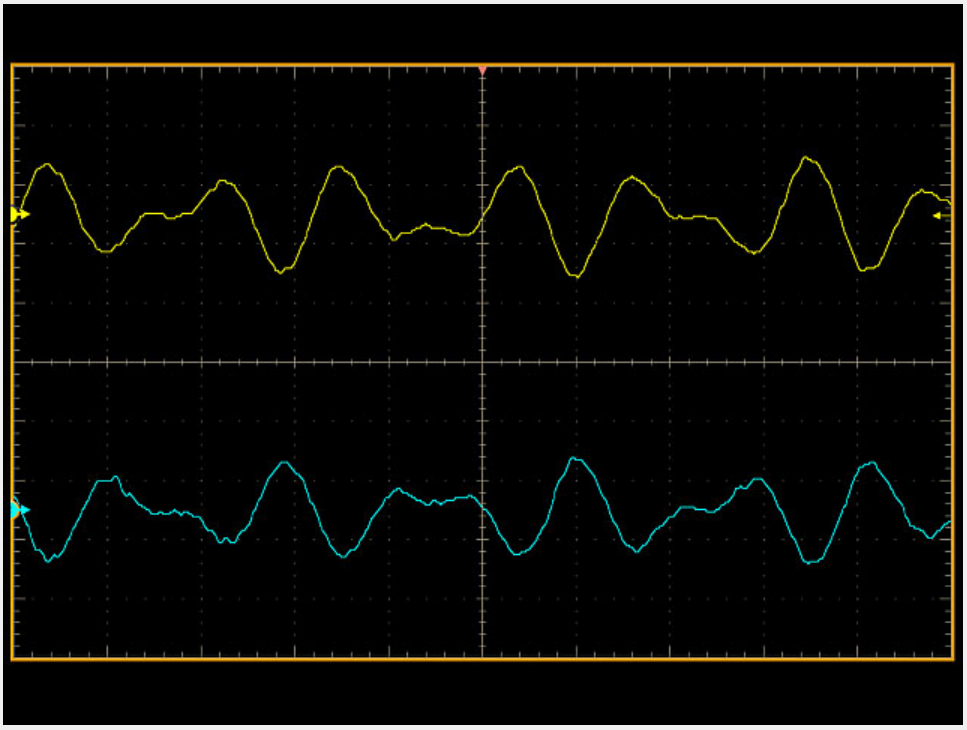
Snapshot of the Tone-4 Linearity Signal for Single-Ended Source



Snapshot of the Tone-5 Linearity Signal for Differential Source



Snapshot of the Tone-5 Linearity Signal for Single-Ended Source



Configure Clock Frequency Parameters

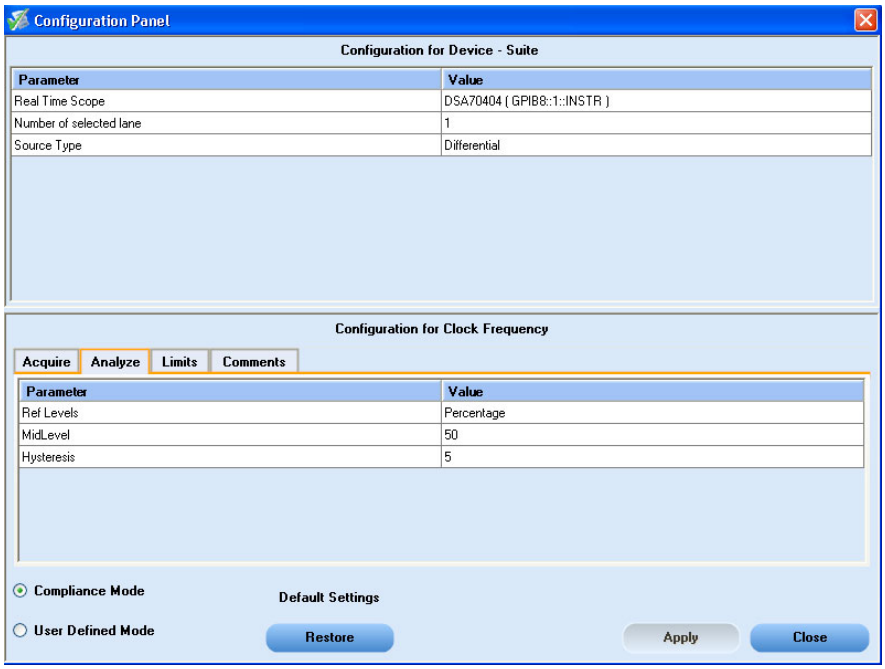
In the Configuration Panel, set the Ref Levels to either Absolute or Percentage. Set the MidLevel and Hysteresis values of the signal for Clock Frequency measurement.

The limit and default values for MidLevel and Hysteresis parameters are listed in the following table:

Table 20: Default and limit configure values for Clock Frequency

Parameter	Absolute			Percentage		
	Minimum	Maximum	Default	Minimum	Maximum	Default
MidLevel	0 V	+10 V	0 V	20%	80%	50%
Hysteresis	0 V	2 V	0.05 V	2%	20%	5%

Configuration Panel to Set the Clock Frequency Parameters



Connections for Clock Frequency Measurement

Click here for information on connections for Clock Frequency measurement.

Configure the DUT and operate in transmitter test mode 2 to output the required waveforms.

Run the Clock Frequency Measurement

To run the Clock Frequency measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Clock Frequency measurement.
5. Click Configure to set the test parameters for the Clock Frequency measurement in the User Defined Mode.
6. To set up the connections for Clock Frequency measurement, click **Show Schematic** and to view a snapshot of the Clock Frequency signal **Click to view image of the waveform**.
7. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

8. In the Acquire panel, click **Acquire Step By Step** displays a snapshot of the input signal of the Clock Frequency measurement. This helps you to compare the applied input signal with the snapshot of a typical Clock Frequency input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Clock Frequency signal in the correct test mode and lane.

NOTE. *When using prerecorded waveform files, the **Acquire Step By Step** option is not available.*

9. Click **Run**
10. The status of the measurements is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.
11. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

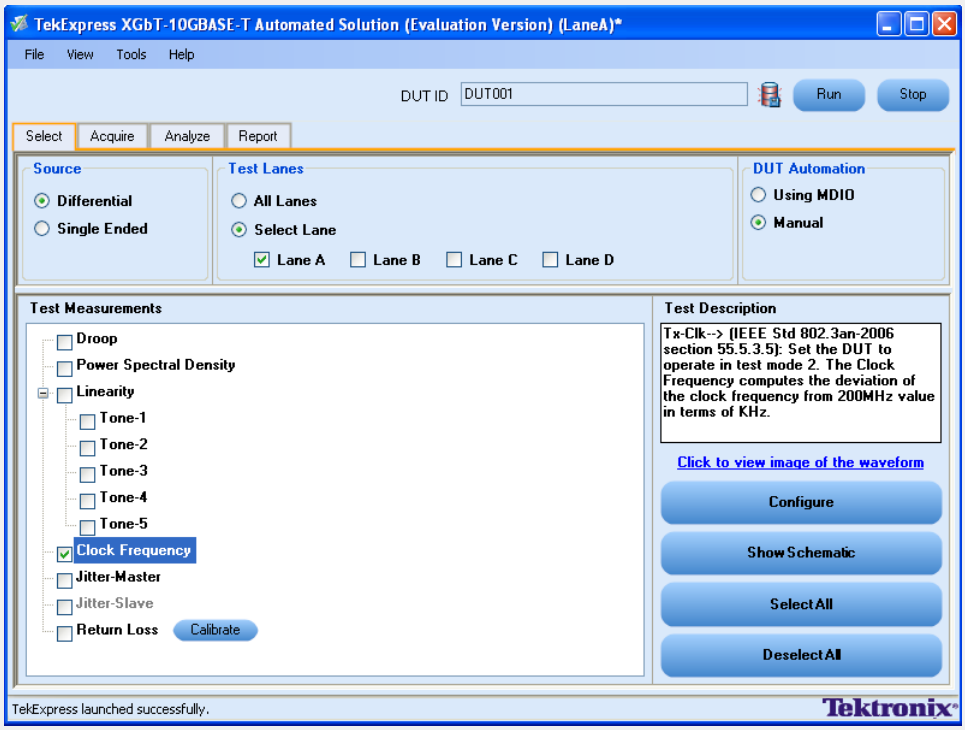
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

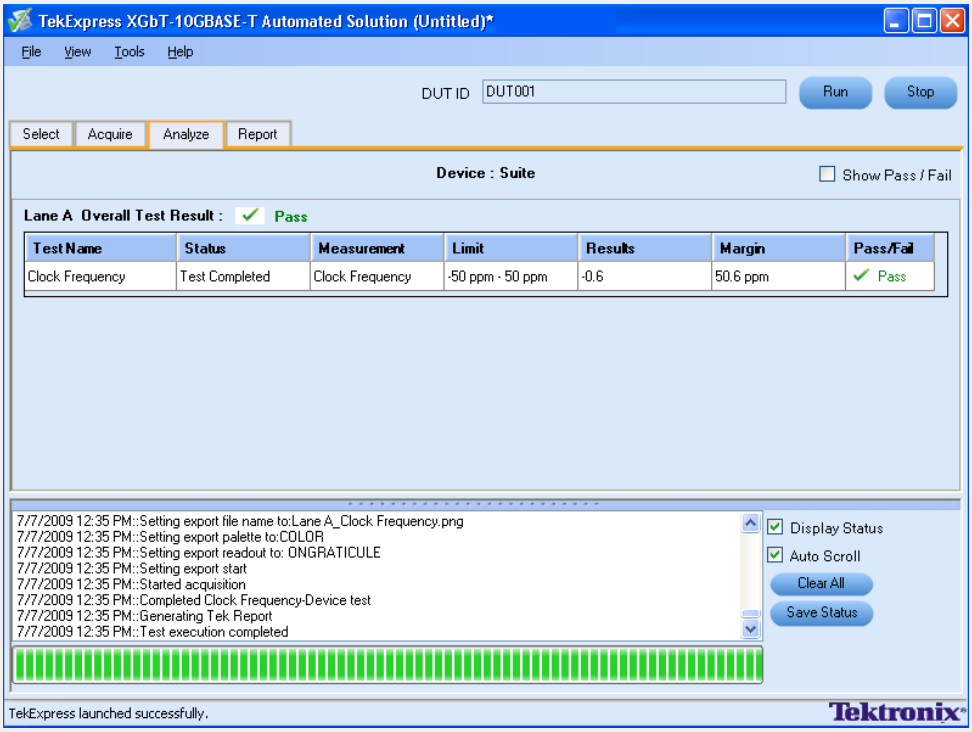
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

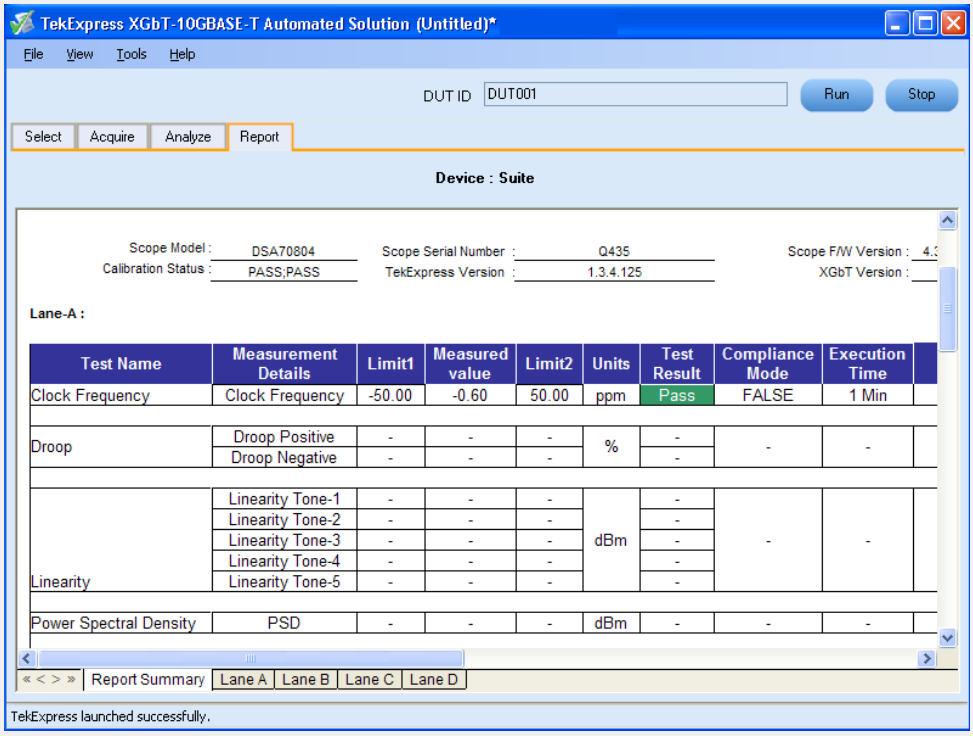
Select Panel with Clock Frequency Measurement Selected



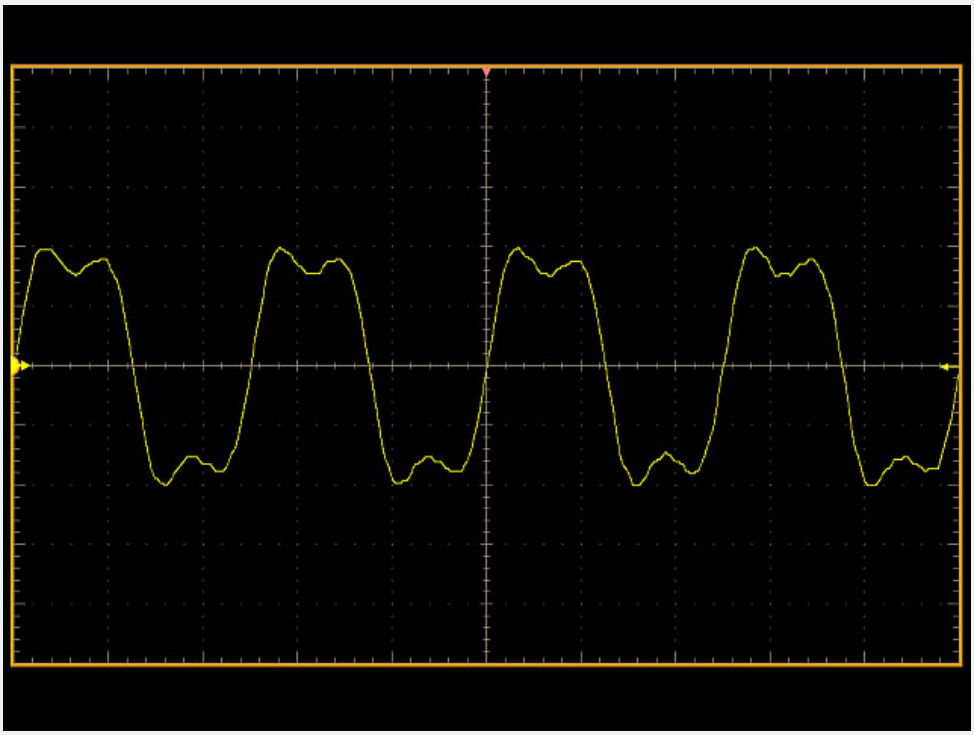
Analyze Panel after Running Clock Frequency Measurement



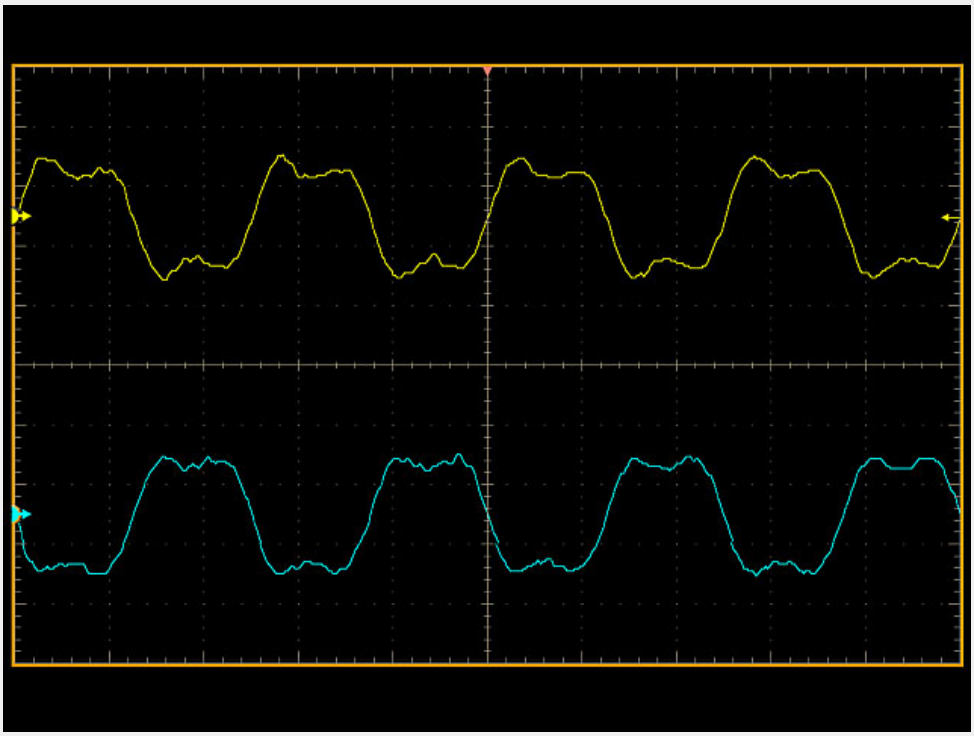
Report Panel after Running Clock Frequency Measurement



Snapshot of the Clock Frequency Signal for Differential Source



Snapshot of the Clock Frequency Signal for Single-Ended Source



Configure Jitter-Master Parameters

In the Configuration Panel, set the Ref Levels to either Absolute or Percentage. Set the MidLevel and Hysteresis values of the signal for Jitter-Master measurement.

You have the option to apply filter corresponding to the sampling frequency, the filter is not applied by default.

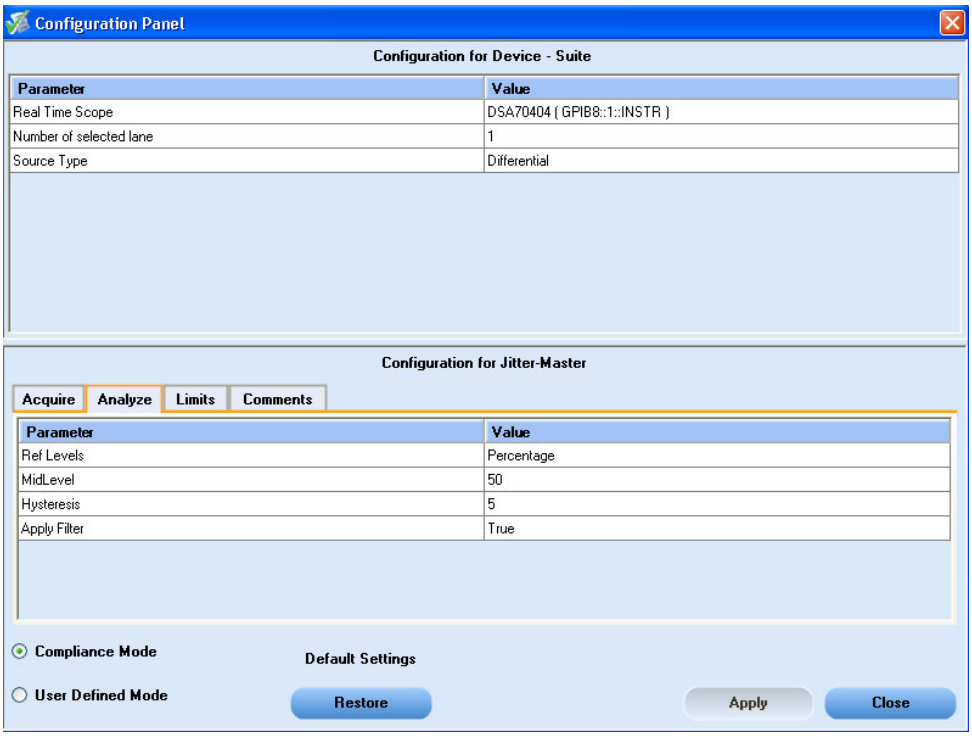
NOTE. *An appropriate filter available for each oscilloscope is applied to the input waveform. The output of the filter is then computed for the jitter.*

The limit and default values for MidLevel and Hysteresis parameters are listed in the following table:

Table 21: Default and limit configure values for Jitter-Master measurement

Parameter	Absolute			Percentage		
	Minimum	Maximum	Default	Minimum	Maximum	Default
MidLevel	–10 V	+10 V	0 V	20%	80%	50%
Hysteresis	0 V	2 V	0.05 V	2%	20%	5%

Configuration Panel to Set the Jitter-Master Parameters



Connections for Jitter-Master Measurement

Click here for information on connections for Jitter-Master measurement.

Configure the DUT and operate in transmitter test mode 2 to output the required waveforms.

Run the Jitter-Master Measurement

To run the Jitter-Master measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Jitter-Master measurement.
5. Click Configure to set the test parameters for the Jitter-Master measurement in the User Defined Mode.

To set up the connections for Jitter-Master measurement, click **Show Schematic** and to view a snapshot of the Jitter-Master signal, select **Click to view image of the waveform**.

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Jitter-Master measurement. This helps you to compare the applied input signal with the snapshot of a typical Jitter-Master input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Jitter-Master signal in the correct test mode.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

8. Click **Run**.
9. The status of the measurements is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.
10. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

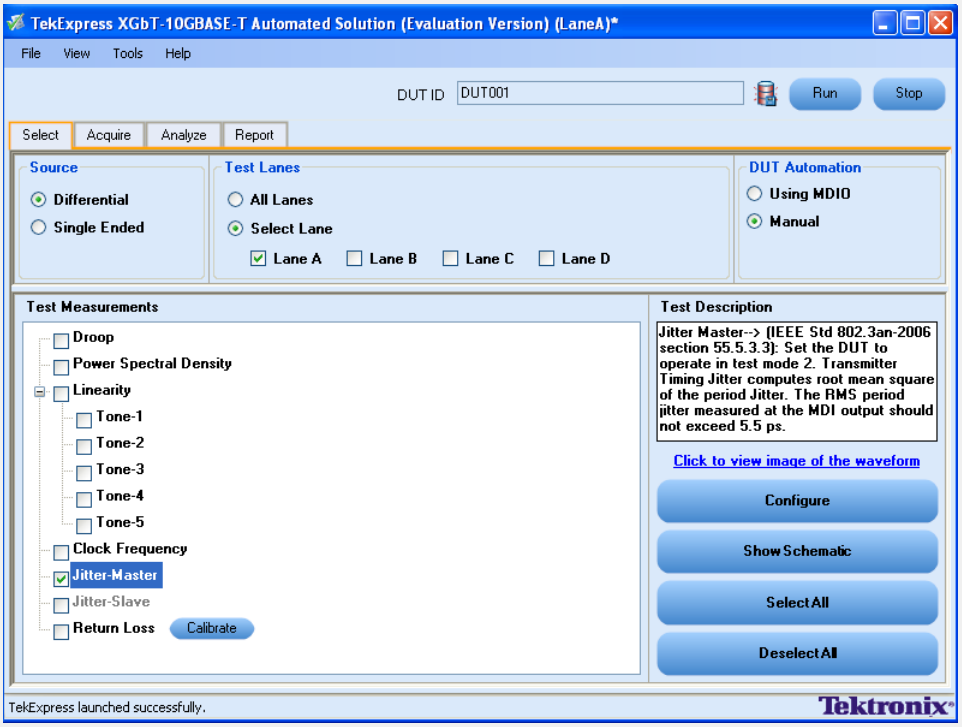
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

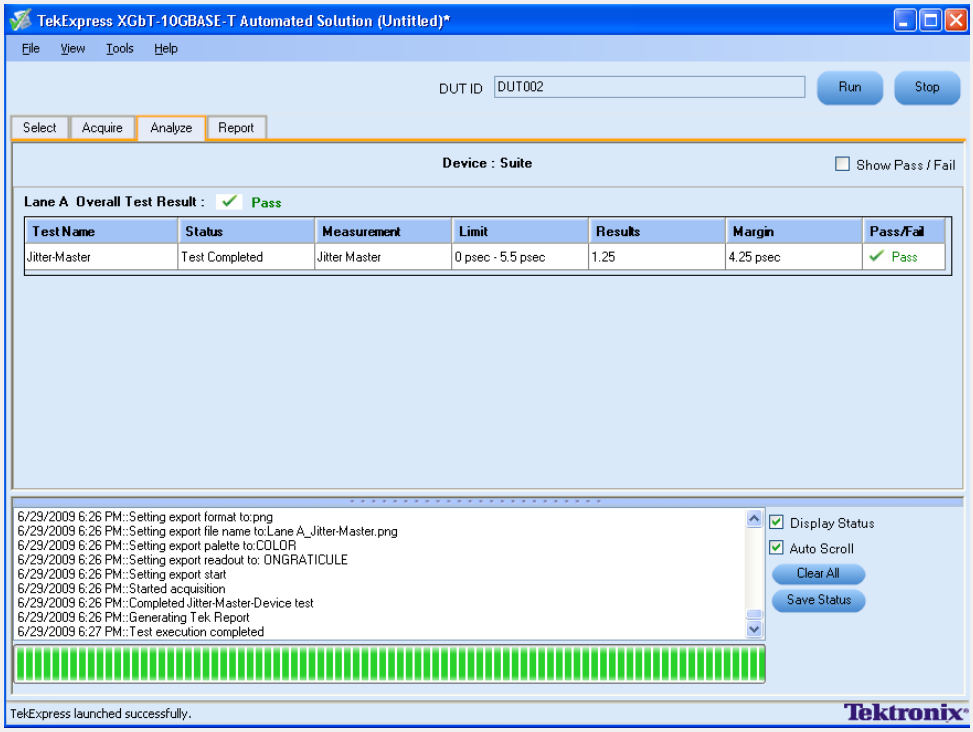
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

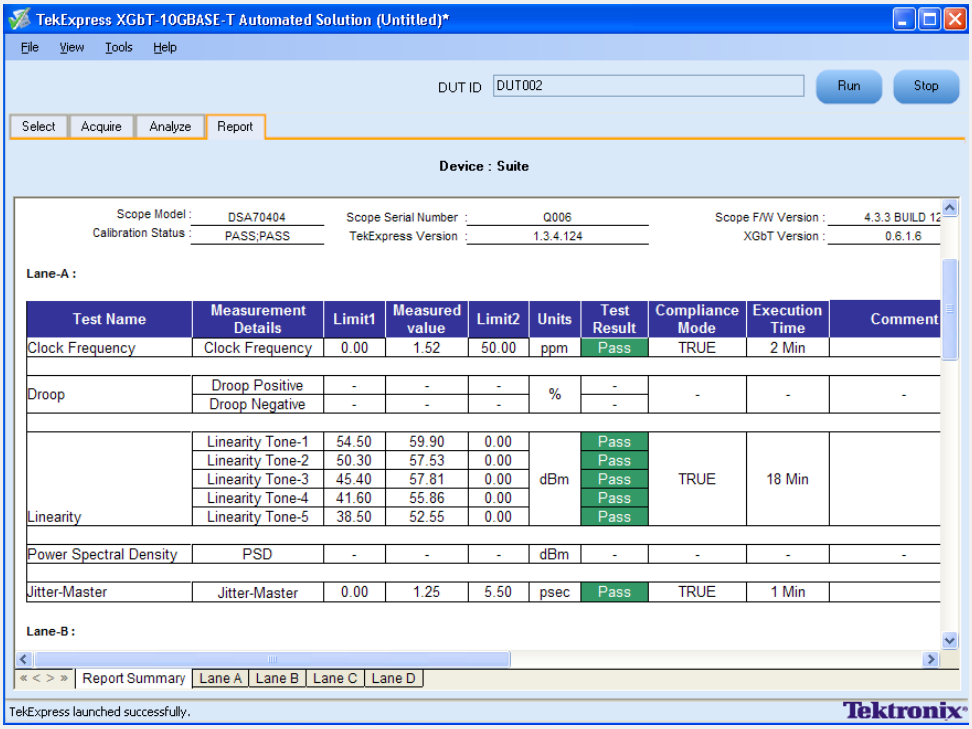
Select Panel with Jitter-Master Selected



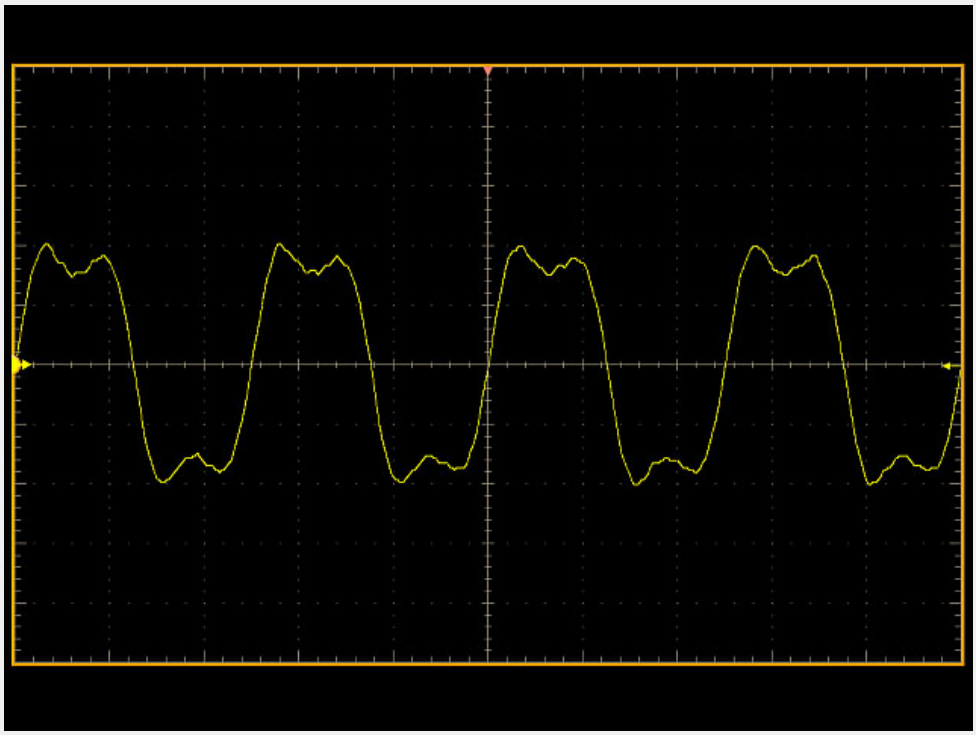
Analyze Panel after Running Jitter-Master Measurement



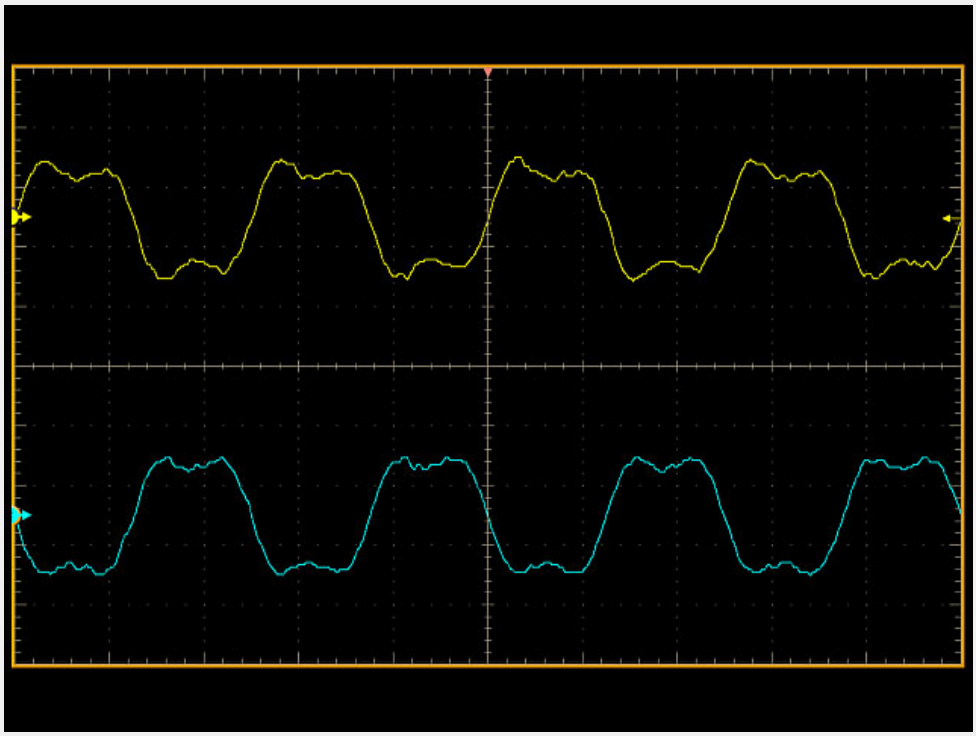
Report Panel after Running Jitter-Master Measurement



Snapshot of the Jitter-Master Signal for Differential Source



Snapshot of the Jitter-Master Signal for Single-Ended Source



Configure Jitter-Slave Parameters

In the Configuration Panel, set the Ref Levels to either Absolute or Percentage. Set the MidLevel and Hysteresis values of the signal for Jitter-Slave measurement.

You have the option to apply filter corresponding to the sampling frequency, the filter is not applied by default.

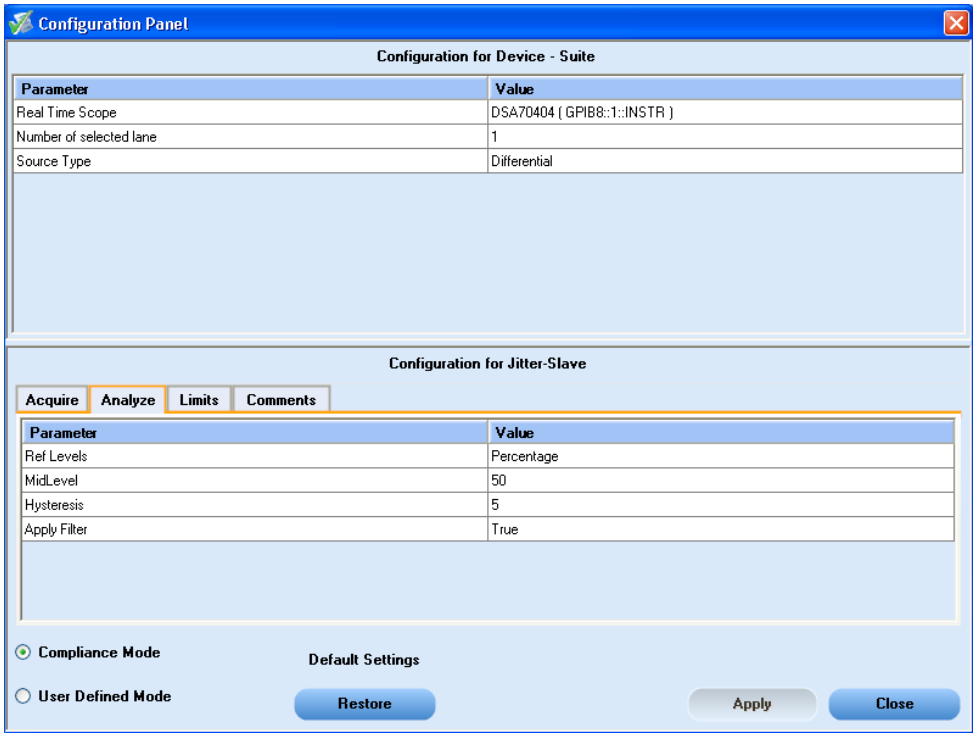
NOTE. *An appropriate filter available for each oscilloscope is applied to the input waveform. The output of the filter is then computed for the jitter.*

The limit and default values for MidLevel and Hysteresis parameters are listed in the following table:

Table 22: Default and limit configure values for Jitter-Slave measurement

Parameter	Absolute			Percentage		
	Minimum	Maximum	Default	Minimum	Maximum	Default
MidLevel	–10 V	+10 V	0 V	20%	80%	50%
Hysteresis	0 V	2 V	0.05 V	2%	20%	5%

Configuration Panel to Set the Jitter-Slave Parameters



Connections for Jitter-Slave Measurement

Click here for information on connections for Jitter-Slave measurement.

Configure the DUT and operate in transmitter test mode 2 to output the required waveforms.

Run the Jitter-Slave Measurement

To run the Jitter-Slave measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select Lane D.
3. Enter the DUT ID.
4. Select the Jitter-Slave measurement.
5. Click Configure the test parameters for the Jitter-Slave measurement in the User Defined Mode.

To set up the connections for Jitter-Slave measurement, click **Show Schematic** and to view a snapshot of the Jitter-Slave signal, select **Click to view image of the waveform**.

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Jitter-Slave measurement. This helps you to compare the applied input signal with the snapshot of a typical Jitter-Slave input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Jitter-Slave signal in the correct test mode.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

8. Click **Run**.
9. The status of the measurements is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click Show Pass/Fail.
10. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

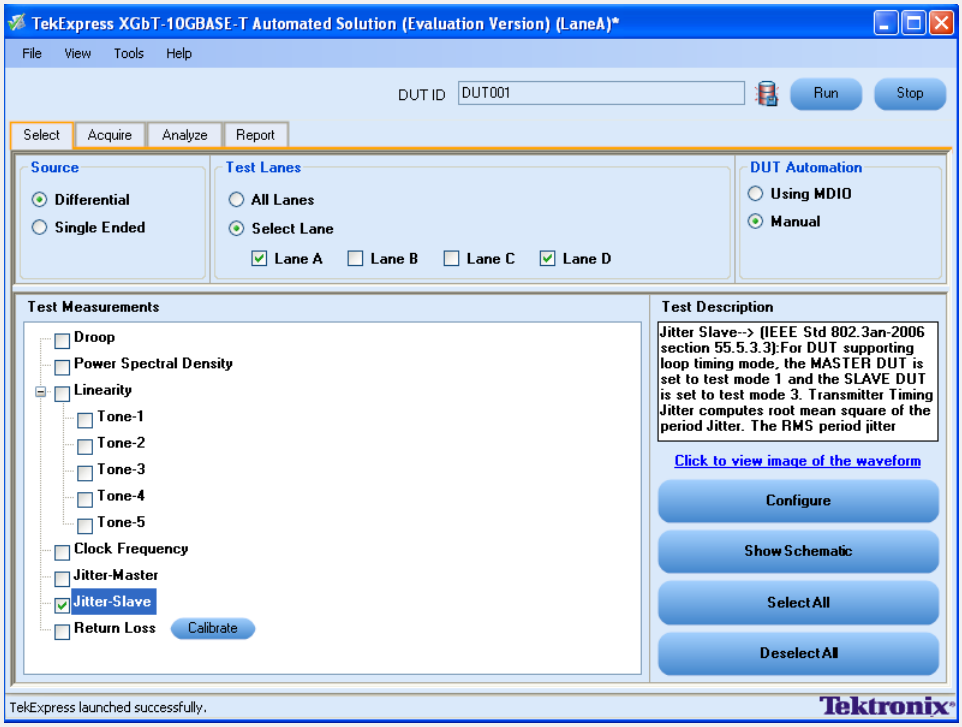
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

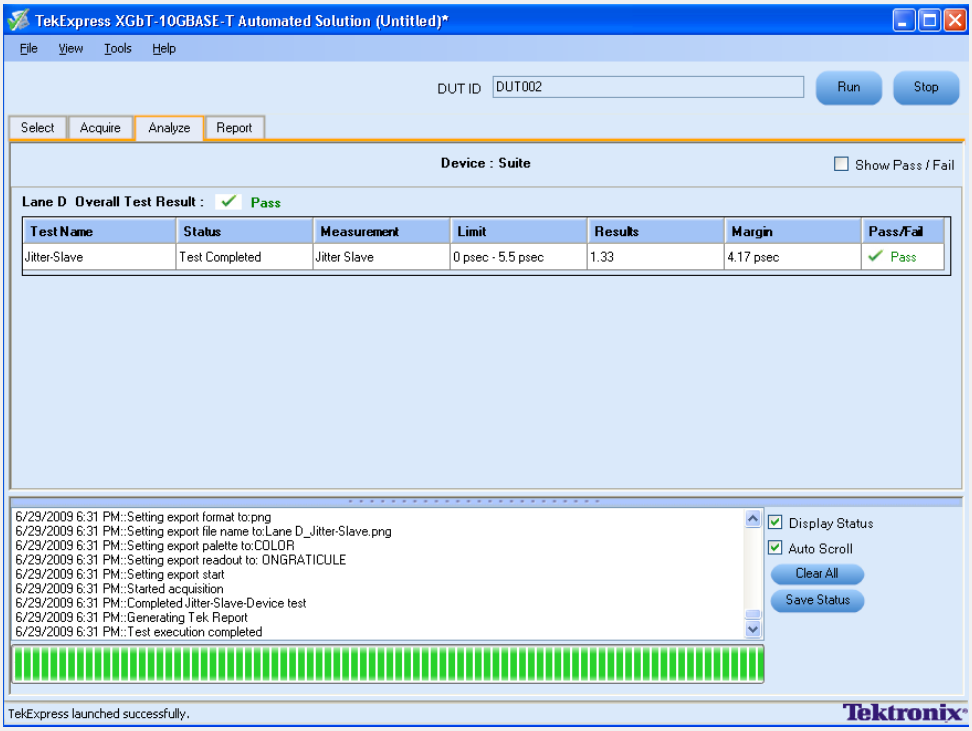
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

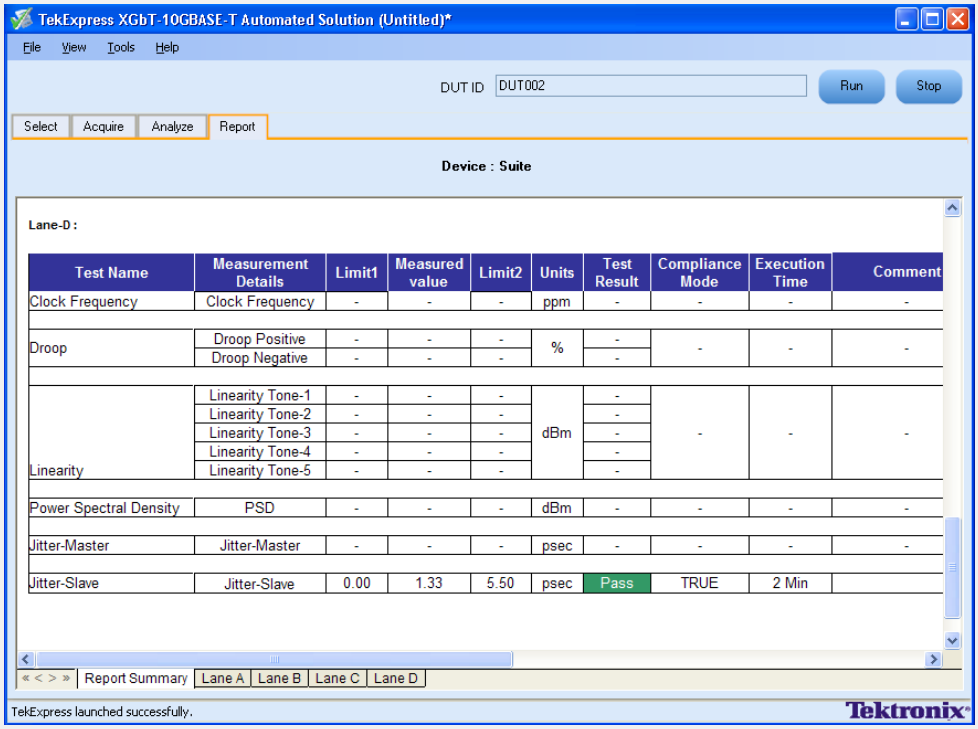
Select Panel with Jitter-Slave Selected



Analyze Panel after Running Jitter-Slave Measurement

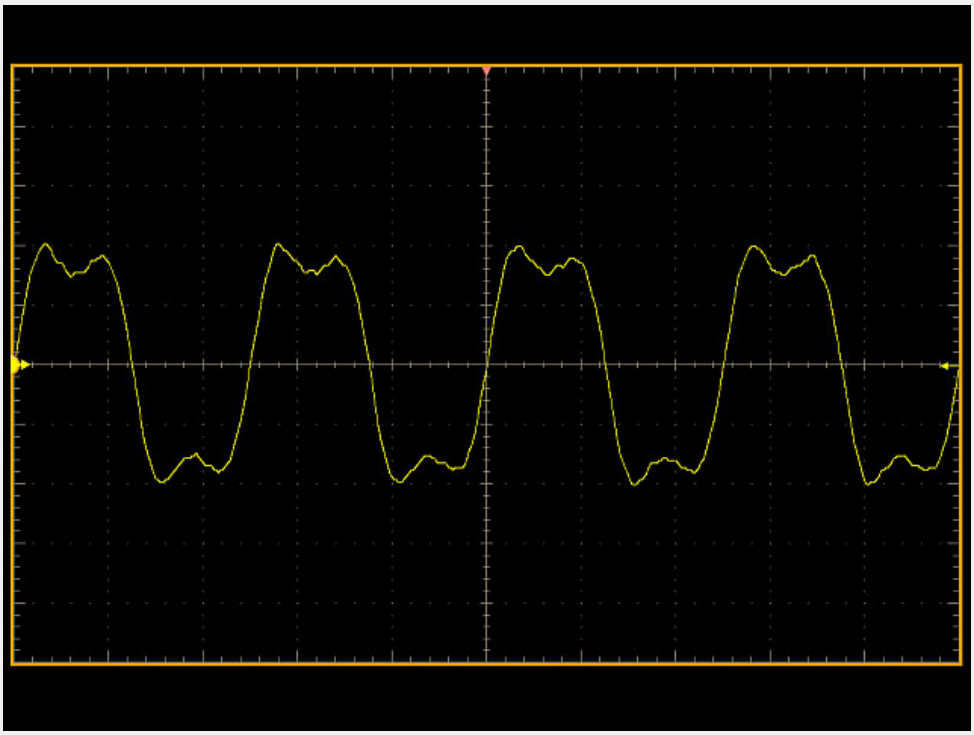


Report Panel after Running Jitter-Slave Measurement

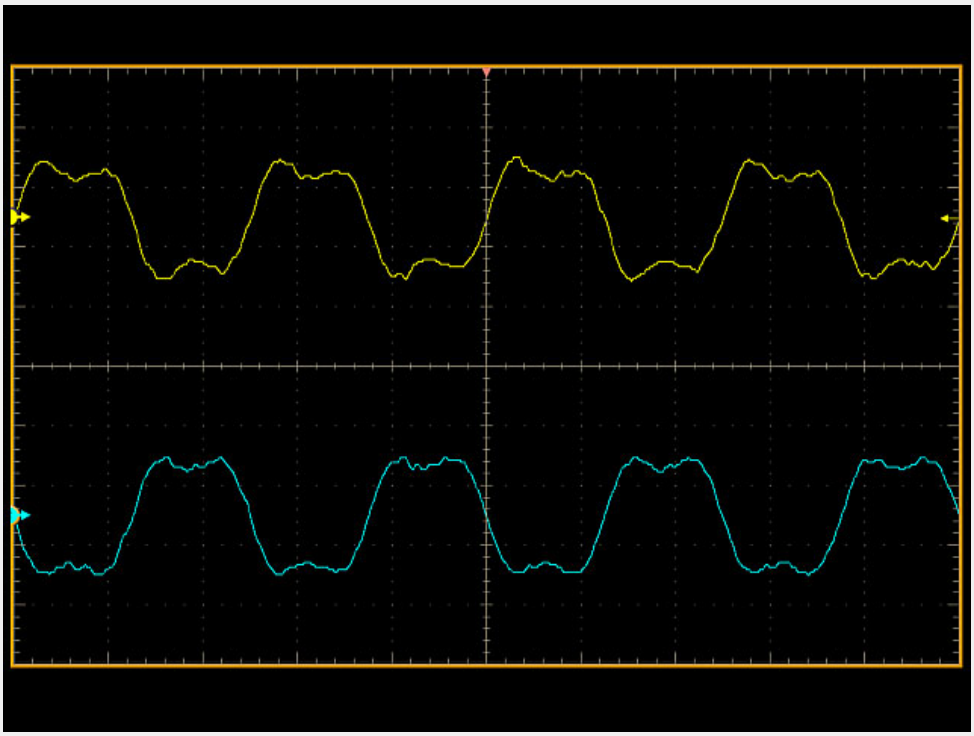


Test Name	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution Time	Comment
Clock Frequency	Clock Frequency	-	-	-	ppm	-	-	-	-
Droop	Droop Positive	-	-	-	%	-	-	-	-
	Droop Negative	-	-	-		-			
Linearity	Linearity Tone-1	-	-	-	dBm	-	-	-	-
	Linearity Tone-2	-	-	-		-			
	Linearity Tone-3	-	-	-		-			
	Linearity Tone-4	-	-	-		-			
	Linearity Tone-5	-	-	-		-			
Power Spectral Density	PSD	-	-	-	dBm	-	-	-	-
Jitter-Master	Jitter-Master	-	-	-	psec	-	-	-	-
Jitter-Slave	Jitter-Slave	0.00	1.33	5.50	psec	Pass	TRUE	2 Min	

Snapshot of the Jitter-Slave Signal for Differential Source



Snapshot of the Jitter-Slave Signal for Single-Ended Source



Configure Return Loss Parameters

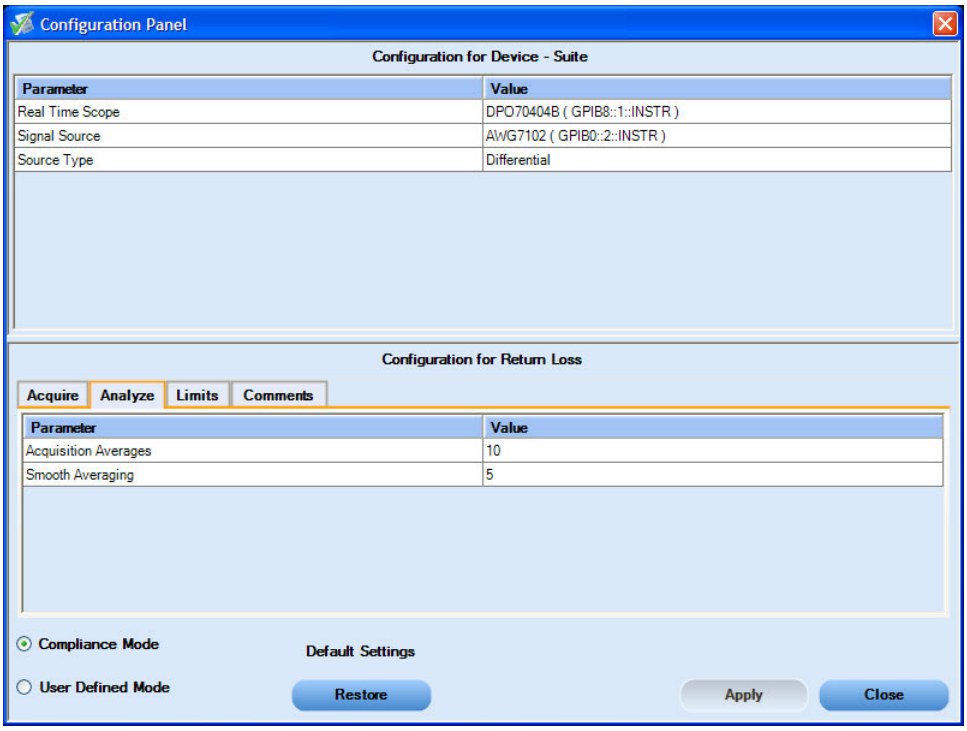
In the Configuration Panel, set the Acquisition Averages and Smooth Averaging values of the signal for Return Loss measurement.

NOTE. *You cannot configure the Return Loss parameters.*

The limit and default values are listed in the following table:

Table 23: Default and limit configure values for Acquisition Averages and Smooth Averaging parameters

Parameter	Values			To do
	Minimum	Maximum	Default	
Acquisition Averages	100	200	100	Enter the number of waveforms you want to average.
Smooth Averaging	0	10	5	Enter the smoothening factor.



Connections for Return Loss Measurement

Click here for steps and connections for performing the Return Loss measurement.

Configure the DUT and operate in transmitter test mode 4 to output the required waveforms.

Calibration for Return Loss Measurement

Perform the following steps for calibration of the Return Loss measurement:

1. For setting up the AWG and the oscilloscope, click here for the steps.
2. Click Live Calibration or Use Files.

NOTE. *Use the TC3 of the test fixture.*

Run the Return Loss Measurement

To run the Return Loss measurement in conformance with the 10GBASE-T standards, follow these steps:

1. In the Select panel, select **Differential** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the Return Loss measurement.

NOTE. *To ensure that the selected lane is calibrated at least once before performing the measurement, the application prompts you to either run calibration or deselect the measurement. See the set up for the calibration of the measurement.*

5. To set up the connections for Return Loss measurement, click **Show Schematic** and to view a snapshot of the Return Loss signal, select **Click to view image of the waveform**.

NOTE. *You cannot configure the Return Loss parameters.*

NOTE. *While performing the measurement, ensure that you connect the CAT5 cable to the DUT.*

6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files for Return Loss measurement, ensure to point to the appropriate location of the calibration files for the selected lane using "Use Files" dialog box.*

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Return Loss measurement. This helps you to compare the applied input signal with the snapshot of a typical Return Loss input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Return Loss signal in the correct test mode.

NOTE. *When using prerecorded waveform files, the **Acquire Step By Step** option is not available.*

8. Click **Run**.

9. The status of the measurements is displayed in the Analyze panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.

10. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

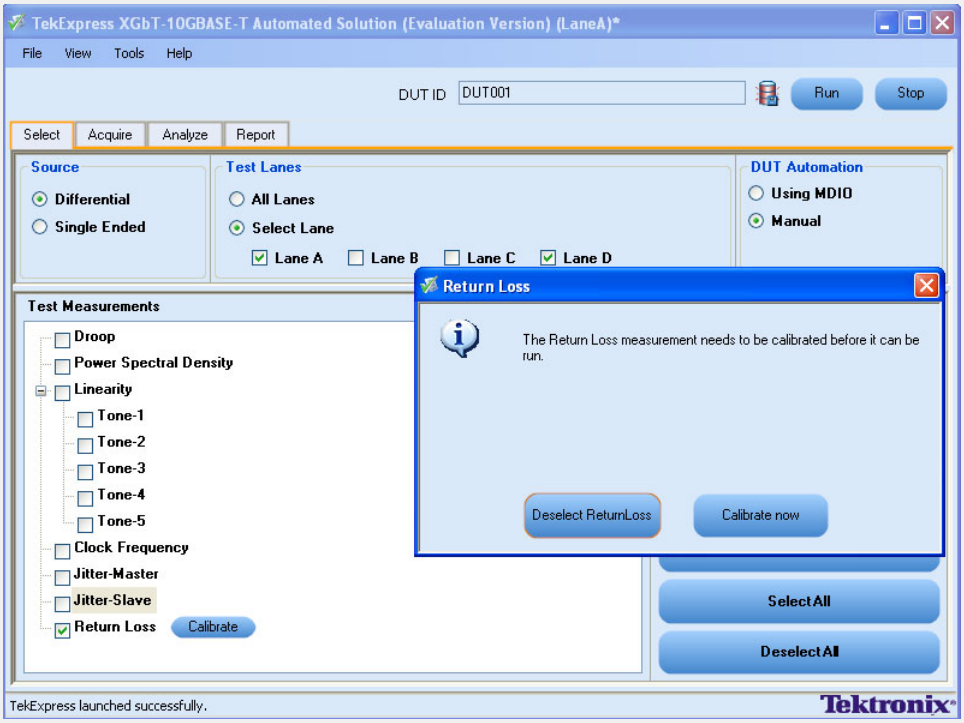
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

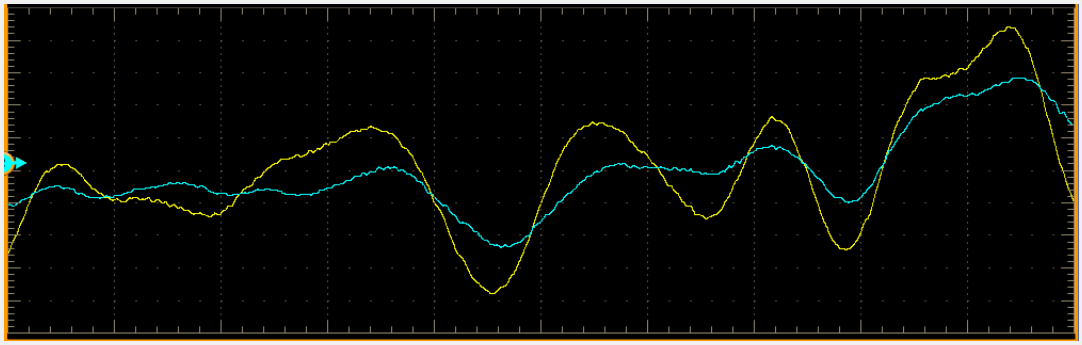
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

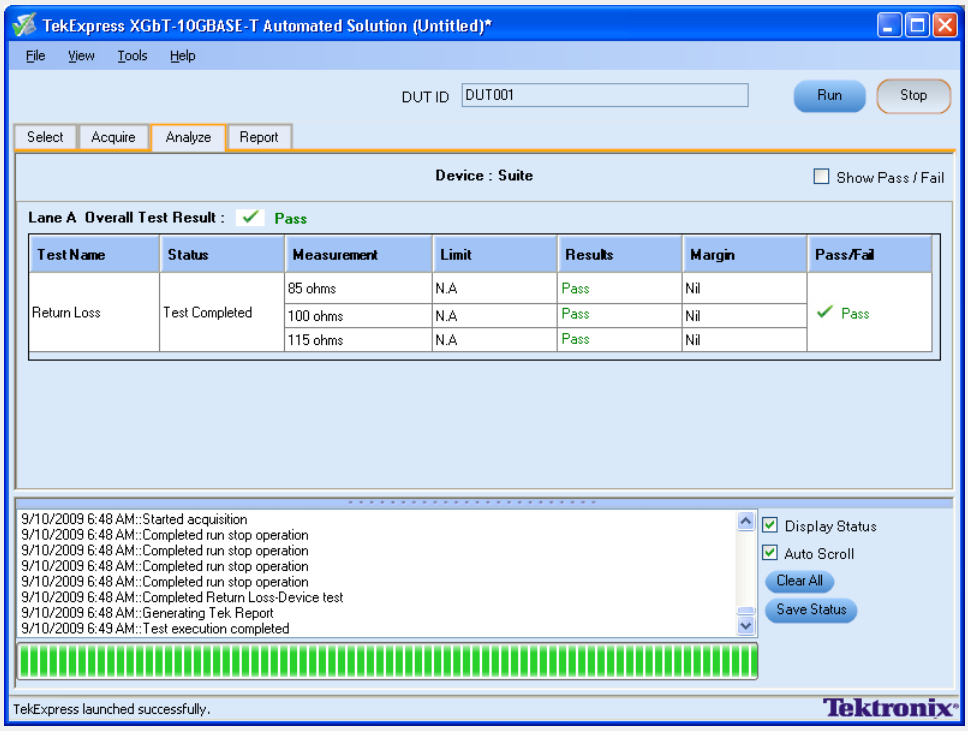
Select Panel when Selecting the Return Loss Measurement



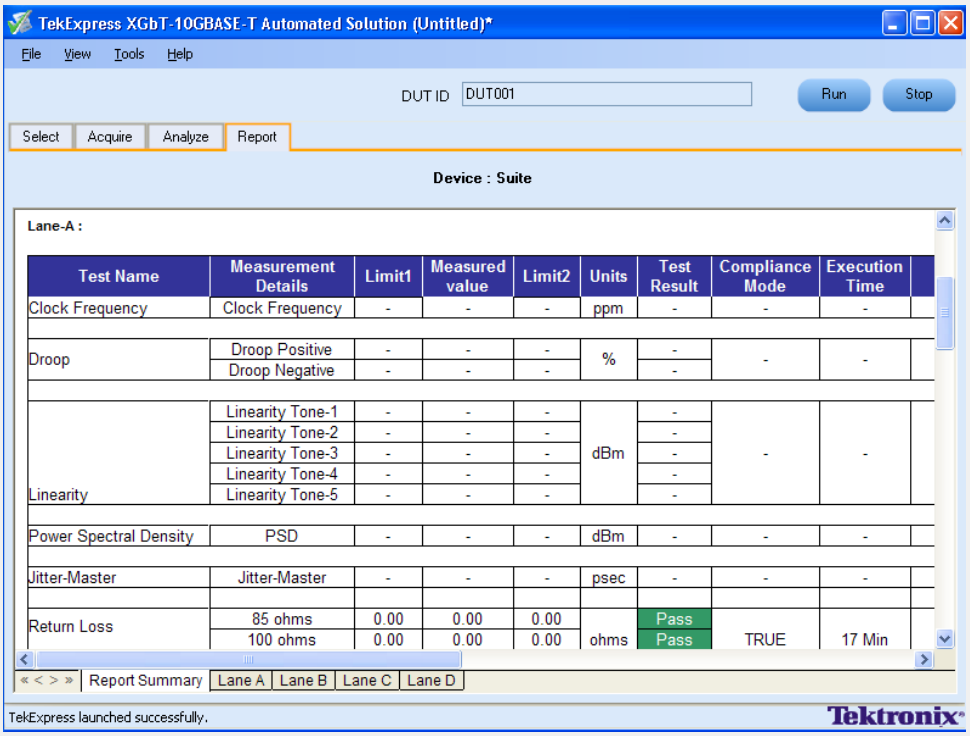
Snapshot of the Return Loss Signal for Differential Source



Analyze Panel after Running Return Loss Measurement



Report Panel after Running Return Loss Measurement



Run Multiple Measurements on a Single Lane

To run multiple measurements in conformance with the 10GBASE-T standards, follow these steps:

1. Select **Differential** or **Single Ended** as the source.
2. Select one of the test lanes.
3. Enter the DUT ID.
4. Select the measurements.
5. Click Configure to set the test parameters for each of the selected measurements in the User Defined Mode.

   To set up the connections for each of the selected measurements, click **Show Schematic** and to view a snapshot of the signal, select **Click to view image of the waveform**.
6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of the Droop measurement. This helps you to compare the applied input signal with the snapshot of a typical Droop input signal, allowing you to change the setup before acquisition. The application then prompts you to configure the DUT to transmit the Droop signal in the correct test mode and lane.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

8. Click **Run**.

   The application then prompts you to configure the DUT to transmit the selected measurement signals in the correct test modes and if the lane is connected to the appropriate channel correctly.

9. The status of the selected measurements is displayed in the Analyze panel.

10. After the measurements run successfully, the results are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

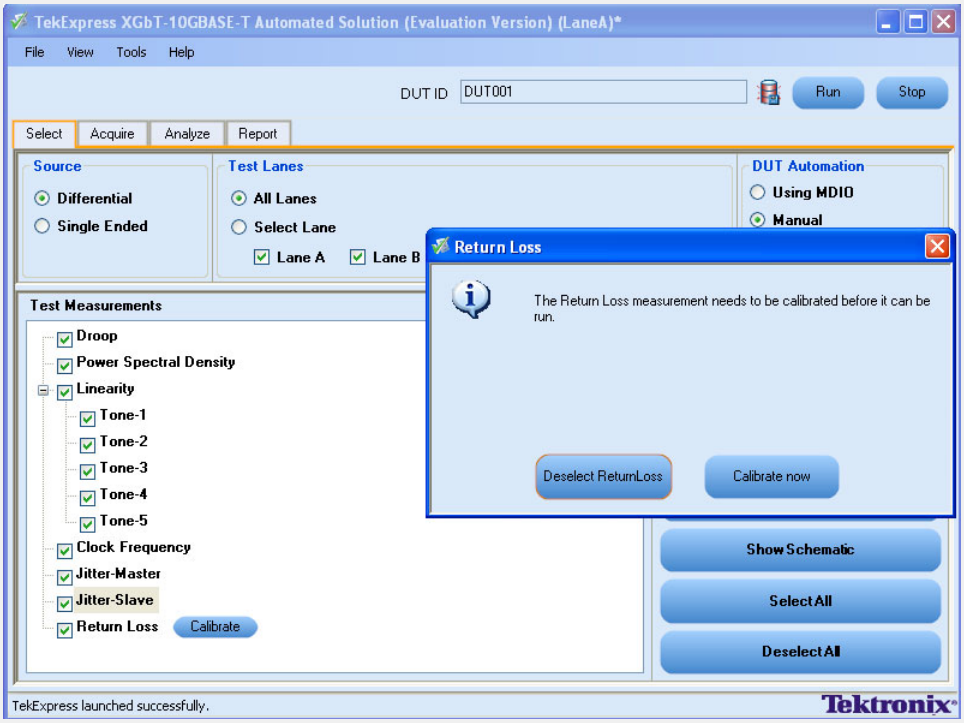
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

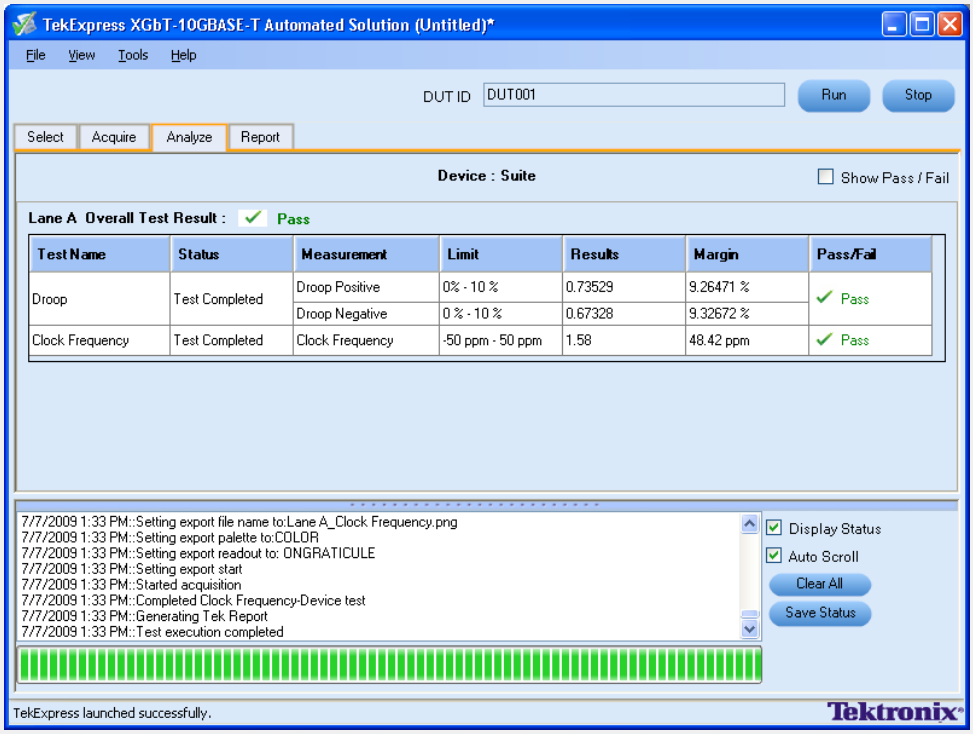
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

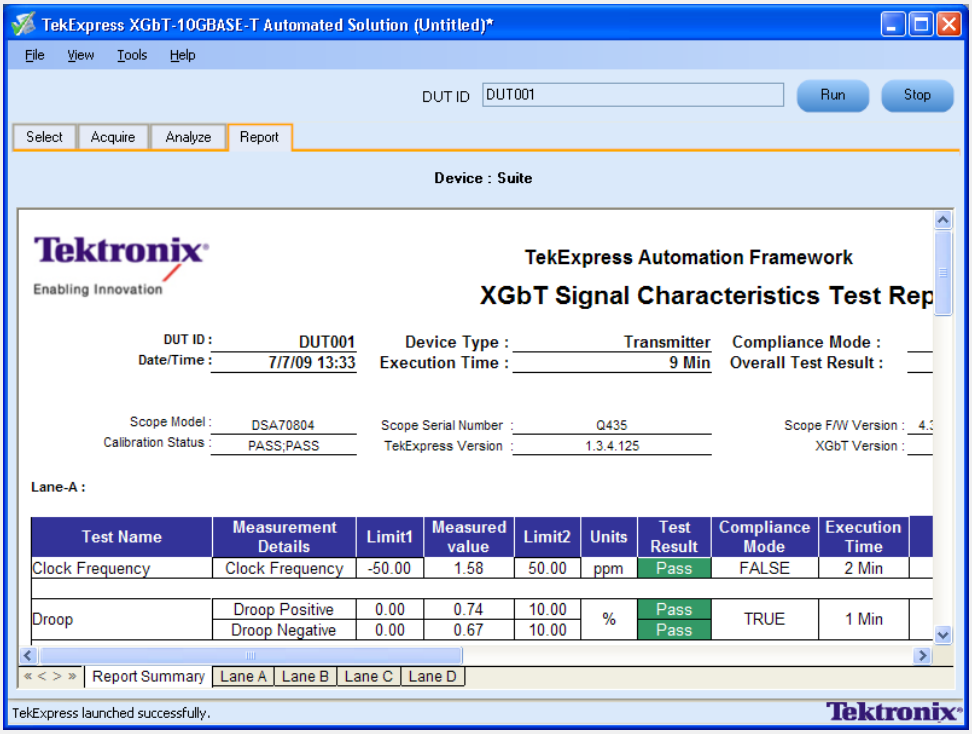
Select Panel with Multiple Measurements Selected



Analyze Panel after Running Multiple Measurements



Report Panel after Running Multiple Measurements



Run One or More Measurements on Multiple Lanes

To run one or more measurements on multiple lanes in conformance with the 10GBASE-T standards, follow these steps:

1. Select **Differential** or **Single Ended** as the source.
2. Select two or more test lanes.
3. Enter the DUT ID.
4. Select the measurements.
5. Click Configure to set the test parameters for each of the selected measurements in the User Defined Mode. To set up the connections for each of the selected measurements, click **Show Schematic** and to view a snapshot of the signal, select **Click to view image of the waveform**.
6. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

7. When enabled, **Acquire Step By Step** displays the input signal of the selected measurement. This helps you to compare the applied input signal with the snapshot of a typical input signal for the selected measurement, allowing you to change the setup before acquisition, and then proceeds to the next selected measurement. This is repeated for each of the selected measurements.

NOTE. *When using prerecorded waveform files, the* ***Acquire Step By Step*** *option is not available.*

8. Click **Run**.

The application then prompts you to configure the DUT to transmit the selected measurement signals in the correct test modes and lanes correctly. You can have different conditions depending on the probe, lane, and channel setting as follows:

Table 24: Examples of using one or more probes

Condition	Lane A	Lane B	Lane C	Lane D	Description
Using Four Probes					
1	CH1	CH2	CH3	CH4	A popup window appears where you can set the correct test mode, channel (CH1) on the selected lane (Lane A), channel (CH2) on the selected lane (Lane B), channel (CH3) on the selected lane (Lane C), and channel (CH4) on the selected lane (Lane D) for each of the selected measurements.
Using Two Probes					
1	CH1	CH2			A popup window appears where you can set the correct test mode, channel (CH1) on the selected lane (Lane A), and channel (CH2) on the selected lane (Lane B) for each of the selected measurements.
2	CH1	CH2	CH1		A popup window appears where you can set the correct test mode, channel (CH1) on the selected lane (Lane A), and channel (CH2) on the selected lane (Lane B) for each of the selected measurements. Another popup window appears where you can set the correct test mode and set the channel (CH1) on Lane C for each of the selected measurements.

Table 24: Examples of using one or more probes (cont.)

Condition	Lane A	Lane B	Lane C	Lane D	Description
3	CH1	CH2	CH1	CH2	A popup window appears where you can set the correct test mode, channel (CH1) on the selected lane (Lane A), and channel (CH2) on the selected lane (Lane B) for each of the selected measurements. Another popup window appears where you can set the correct test mode, channel (CH1) on the selected lane (Lane C), and channel (CH2) on the selected lane (Lane D) for each of the selected measurements.
Using One Probe					
1	CH1	CH1			A popup window appears where you can set the correct test mode and channel (CH1) on lane A for each of the selected measurements. Another popup window appears where you can set the correct test mode and channel (CH1) on lane B for each of the selected measurements.

9. The status of the selected measurements is displayed in the Analyze panel.
10. After the measurements run successfully, the results are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

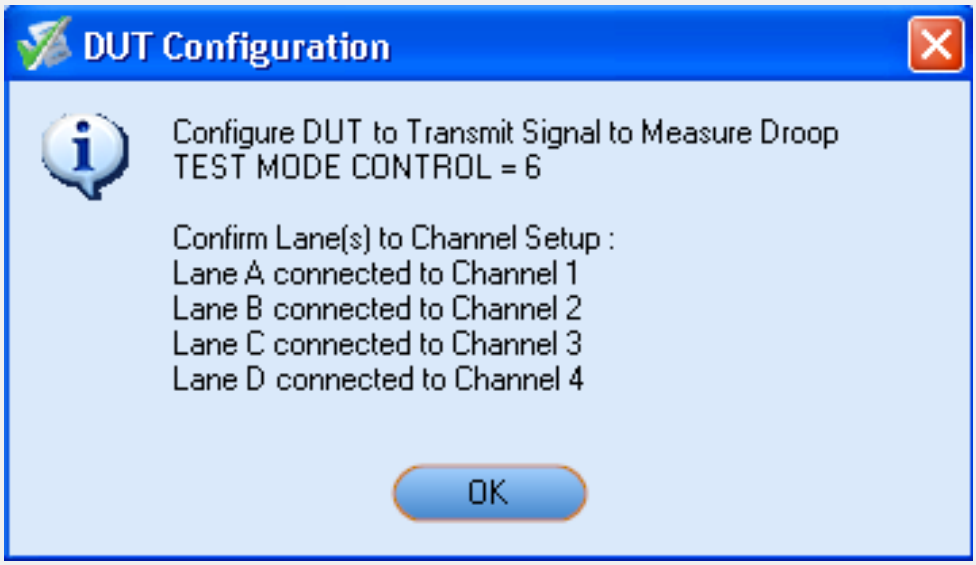
    `X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

    or

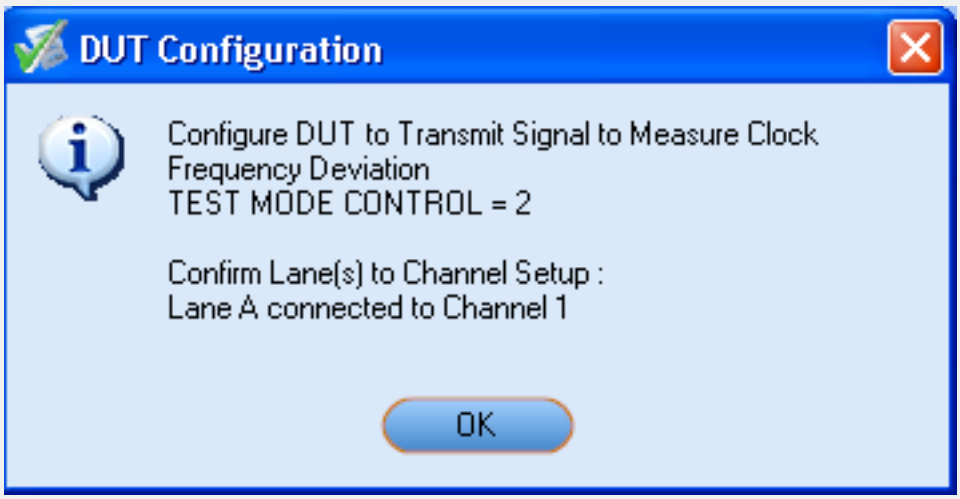
    `My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)`

NOTE. *After a measurement is complete and a report is generated, if you select* ***File*** *>* ***Save Report As*** *and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

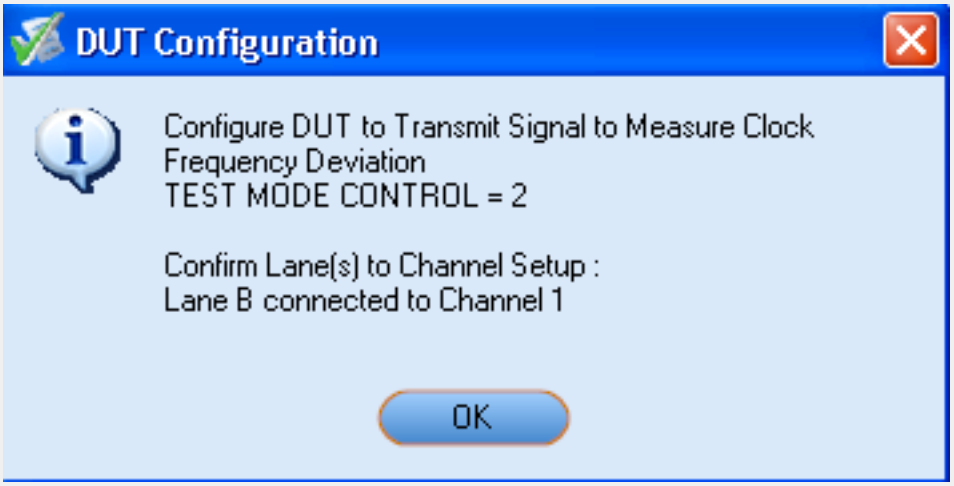
Popup Window that Appears for the Selected Measurement on Lane A (Channel 1), Lane B (Channel 2), Lane C (Channel 3), and Lane D (Channel 4)



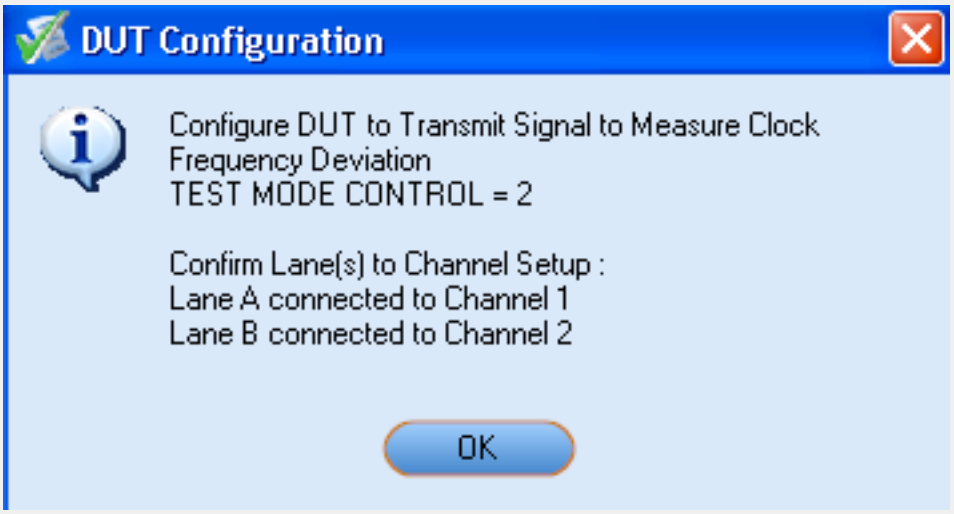
Popup Window that Appears for the Selected Measurement on Lane A (Channel 1)



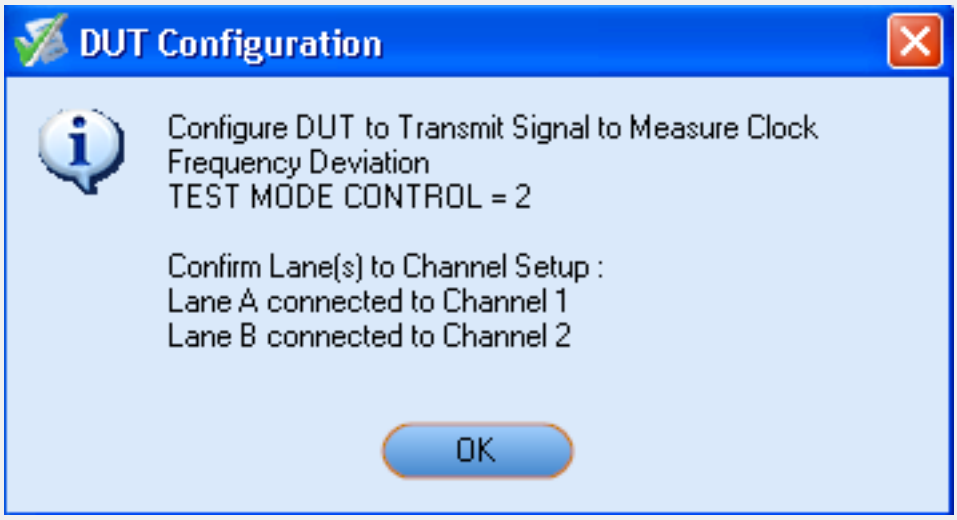
Popup Window that appears for the Selected Measurement on Lane B (Channel 1)



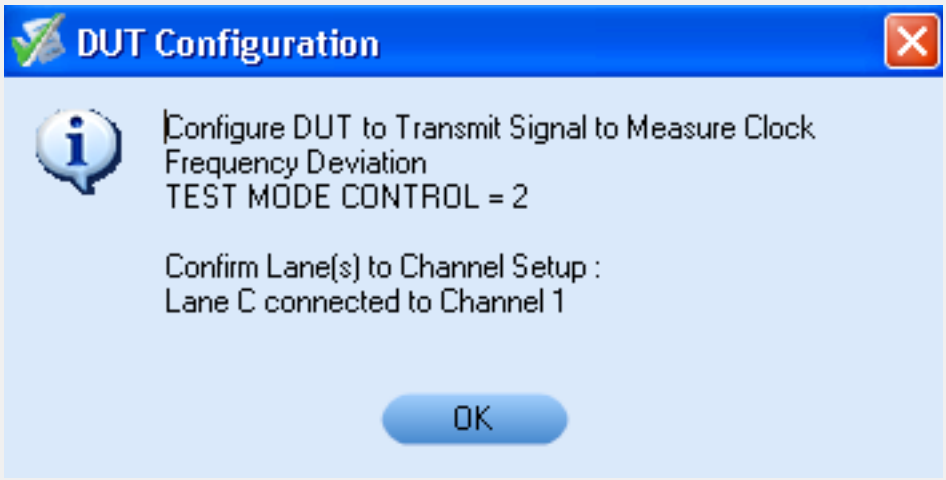
Popup Window that Appears for the Selected Measurement on Lane A (Channel 1) and Lane B (Channel 2)



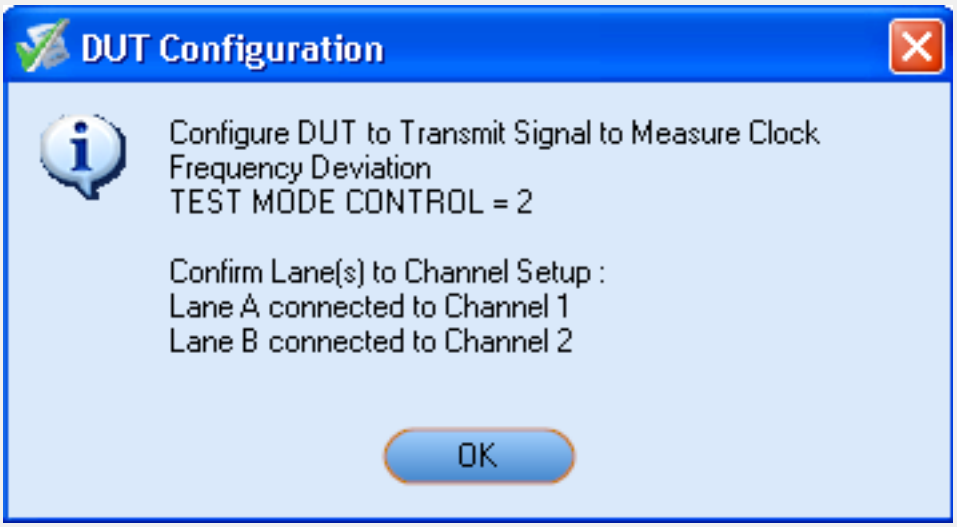
Popup Window that Appears for the Selected Measurement when Lane A (Channel 1) and Lane B (Channel 2)



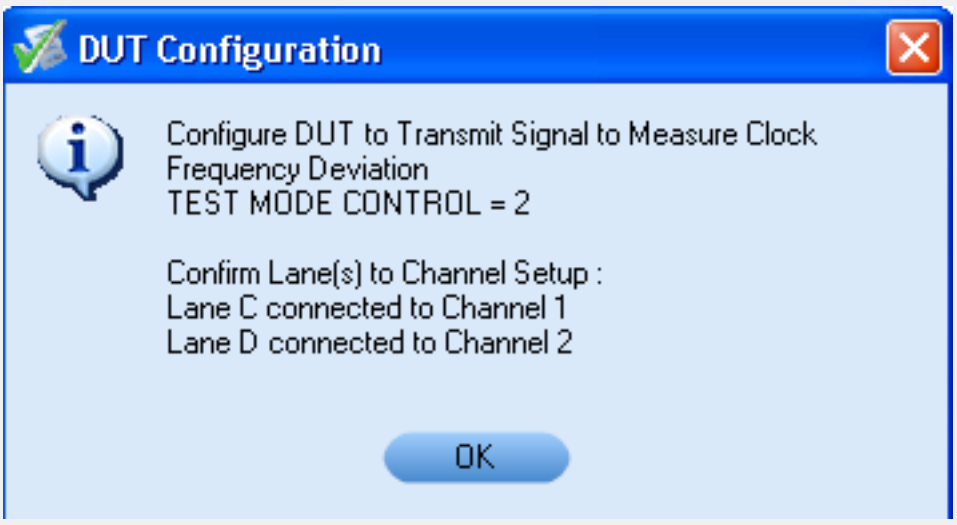
Popup Window that Appears for the Selected Measurement on Lane C (Channel 1)



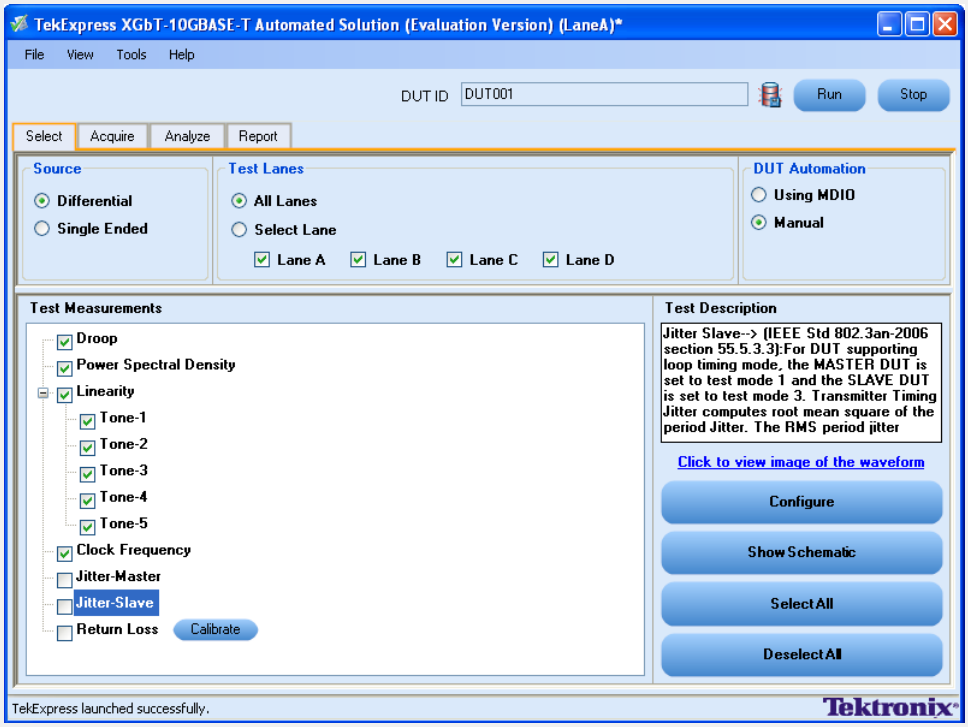
Popup Window that Appears for the Selected Measurement when Lane A (Channel 1) and Lane B (Channel 2)



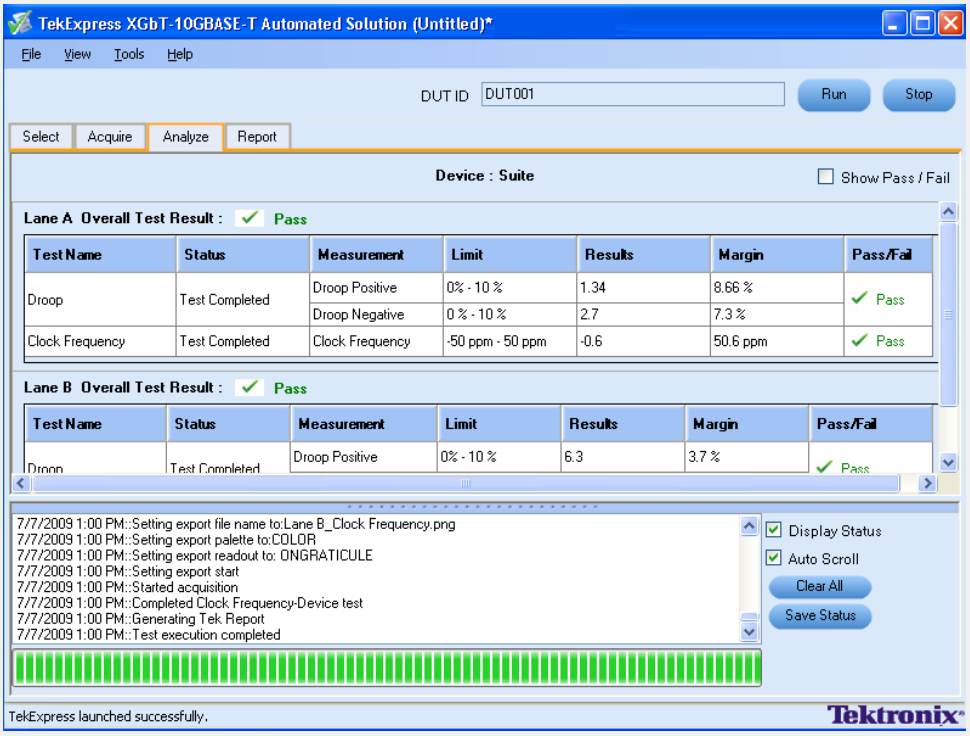
Popup Window that Appears for the Selected Measurement when Lane C (Channel 1) and Lane D (Channel 2)



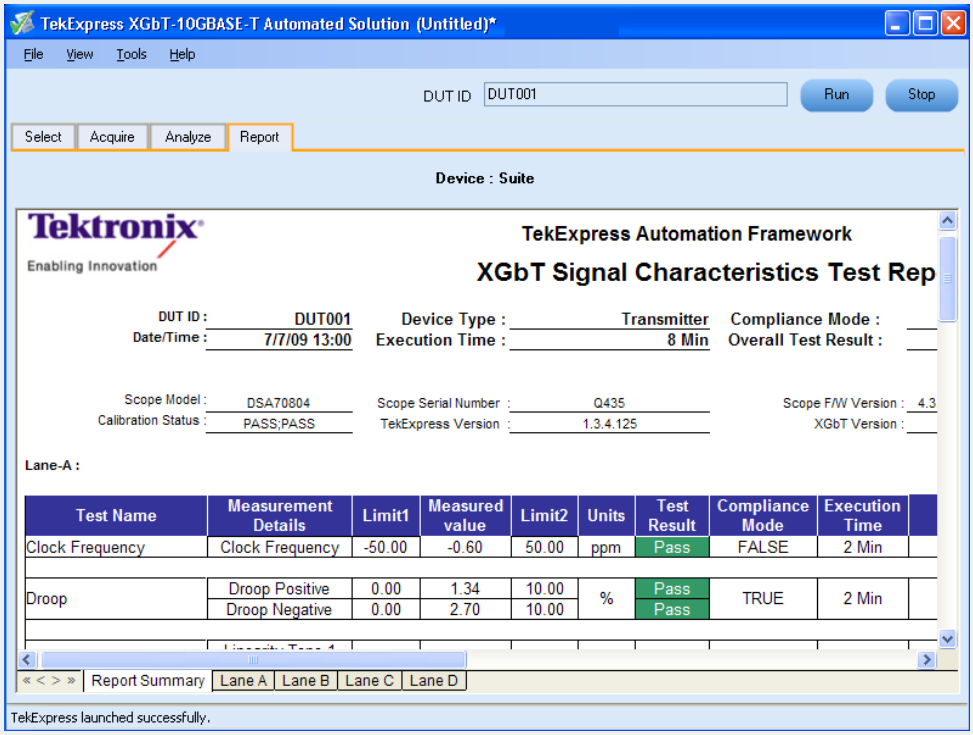
Select Panel with One or More Measurements Selected



Analyze Panel after Running Multiple Measurement on Multiple Lanes



Report Panel after Running Multiple Measurement on Multiple Lanes



Automate DUT Operation

To run the selected measurements in conformance with the 10GBASE-T standards using USB MPC Device for DUT automation, follow these steps:

1. In the Select panel, select **Differential** or **Single Ended** as the source.
2. Select the test lanes.
3. Enter the DUT ID.
4. Set up for the DUT automation of the selected tests, click here.
5. In the DUT Automation panel, select Using MDIO to automate the test mode set up for each of the selected measurements.

NOTE. *Ensure that the drivers for the USB MPC device are installed. When the standard Windows dialog "New hardware found" is displayed, follow the on-screen instructions to complete the installation.*

An error message is displayed when selecting ***Using MDIO*** *the first time after launching the application or when the driver is not installed.*

6. Select the measurements.

7. Click **Configure** in the Select panel to set up the configuration parameters for each of the selected measurements.

   To set up the connections for each of the selected measurement, click **Show Schematic** and to view a snapshot of the Droop signal, select **Click to view image of the waveform**.

8. In the Acquire panel, select either **Acquire Live Waveform** to analyze live waveform or select Use Pre-recorded to analyze the prerecorded waveform files.

NOTE. *When using prerecorded waveform files, the waveforms in the Report panel are not available after the measurement is run.*

9. In the Acquire panel, click **Acquire Step By Step** to display a snapshot of the input signal of each the selected measurements. This helps you to compare the applied input signal with the snapshot of a typical input signal, allowing you to change the setup before acquisition.

NOTE. *When using prerecorded waveform files, the **Acquire Step By Step** option is not available.*

10. Click **Run**.

11. The status of the measurements is displayed in the Analyze panel.

12. After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the Report panel. The reports are automatically saved in MHT format to the default location:

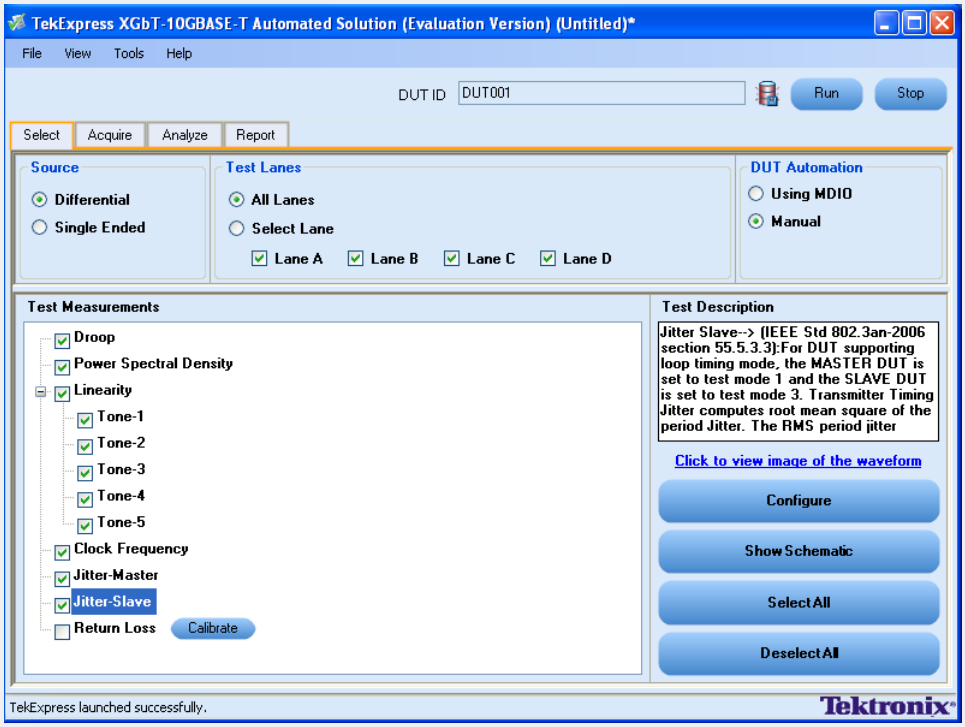
    X:\XGbT-10GBASE-T\Untitled Session\DUTID\DATE\(YYYYMMDD)_(HHMMSS)

    or

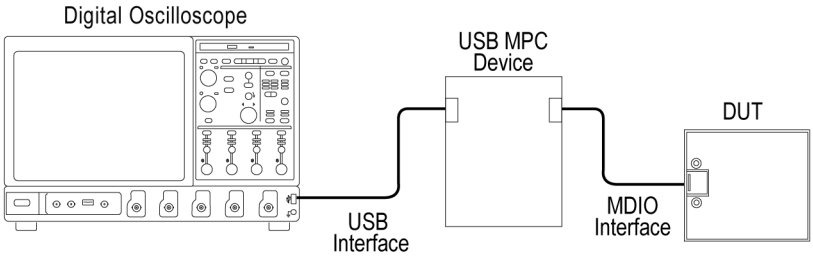
    My Documents\My TekExpress\XGbT–10GBASE-T\Untitled Session\DUTID\<DATE>(YYYYMMDD)_<TIME>(HHMMSS).

NOTE. *After a measurement is complete and a report is generated, if you select **File** > **Save Report As** and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .mht file to a different location manually.*

Select Panel



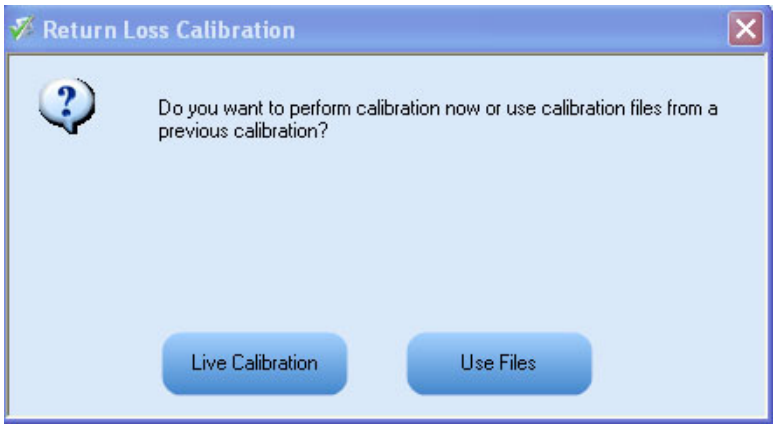
Set Up for DUT Automation



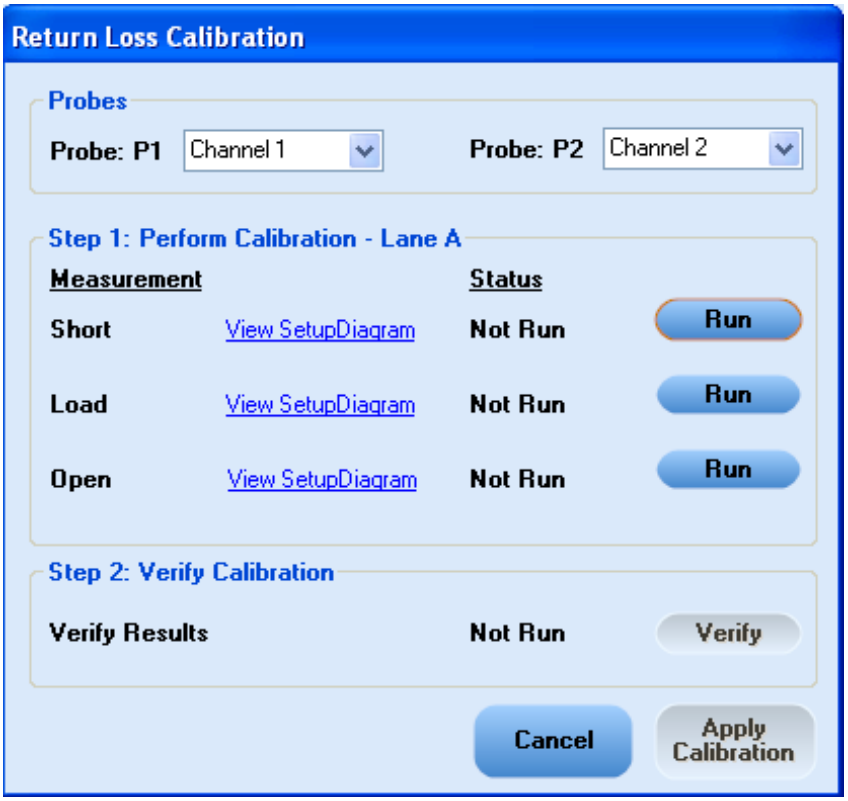
Perform Live Calibration for Return Loss Measurement

NOTE. *Ensure that atleast one lane is selected for calibration.*

Select the test lanes and click **Tools** > **Return Loss Calibration** or **Calibrate** button in the test measurement Select panel. A Return Loss Calibration dialog box is displayed. Click **Live Calibration** to perform calibration as follows:

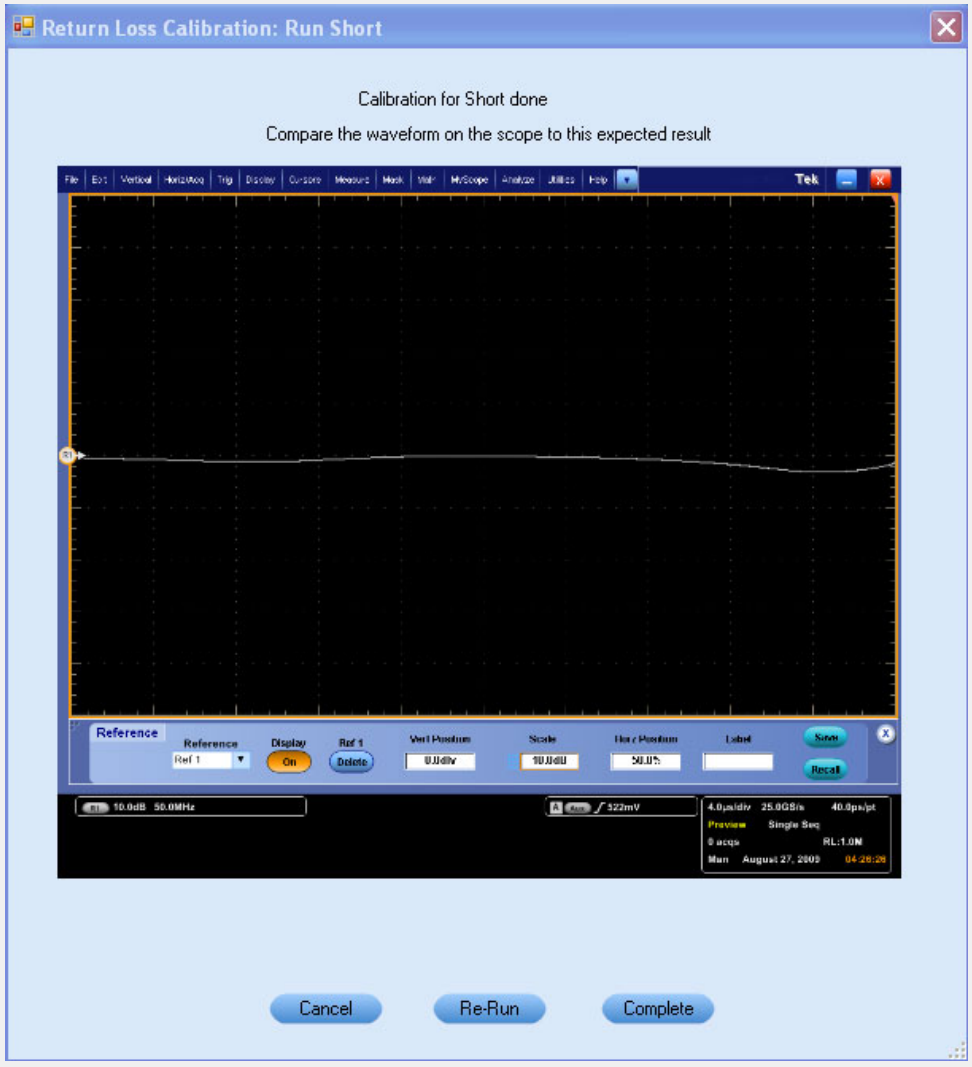


1. Select a channel for each of the probes.



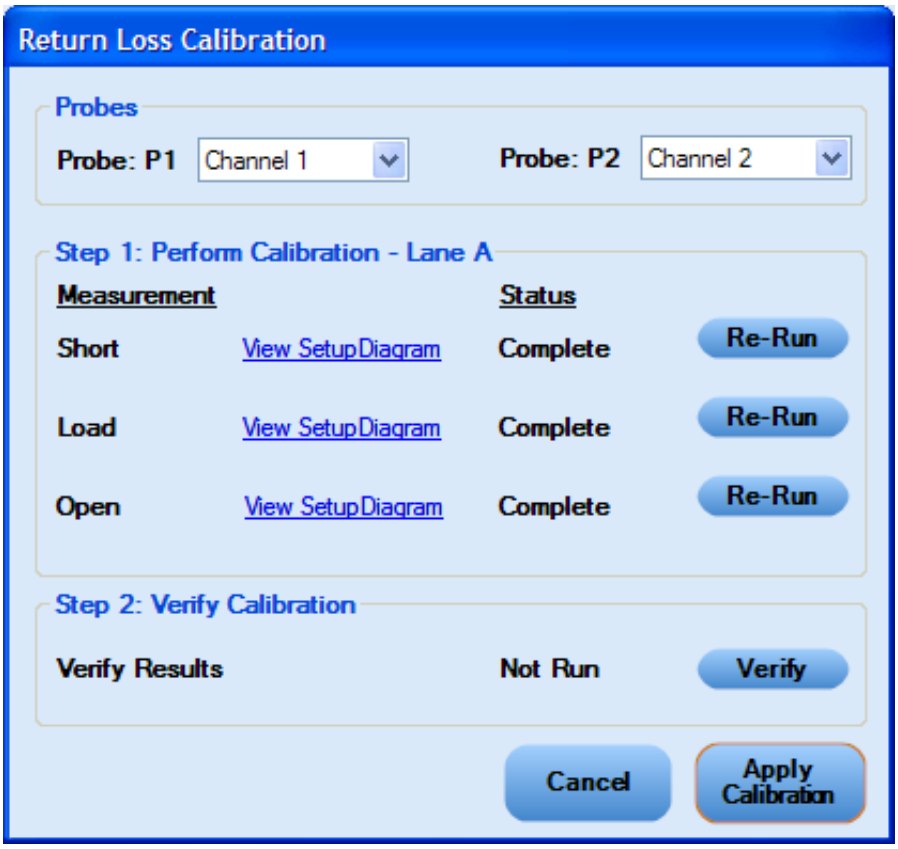
2. Click **View SetupDiagram** to view and configure the test fixture (connect CAT5 cable to J20 of TC3 and J28 on the daughter board to the Short slot) and click **Run** for acquiring data with Short calibration on the selected lane. A Return Loss Calibration: Run Short dialog box appears displaying the reference waveform for Short calibration. To complete the calibration, run the Short calibration again. Initially the status of Short calibration appears as Not Run. Once the calibration is done the status changes to Completed and the Run button changes to Re-Run.

Typical Waveform for Return Loss Short Calibration



3. Click **View SetupDiagram** to view and configure the test fixture (connect CAT5 cable to J20 of TC3 and J30 on the daughter board to the Load slot) and click **Run** for acquiring data with Load calibration on the selected lane. A Return Loss Calibration: Run Load dialog box appears displaying the reference waveform for Short calibration. To complete the calibration, run the Short calibration again, and cancel the current calibration. Initially the status of Load calibration appears as Not Run. Once the calibration is done the status changes to Completed and the Run button changes to Re-Run.

4. Click **View SetupDiagram** to view and configure the test fixture (connect CAT5 cable to J20 of TC3 and J30 on the daughter board to the Open slot) and click **Run** for acquiring data with Open calibration on the selected lane. A Return Loss Calibration: Run Open dialog box appears displaying the reference waveform for Open calibration. To complete the calibration, run the Short calibration again, and cancel the current calibration. Initially the status of Open calibration appears as Not Run. Once the calibration is done the status changes to Completed and the Run button changes to Re-Run.



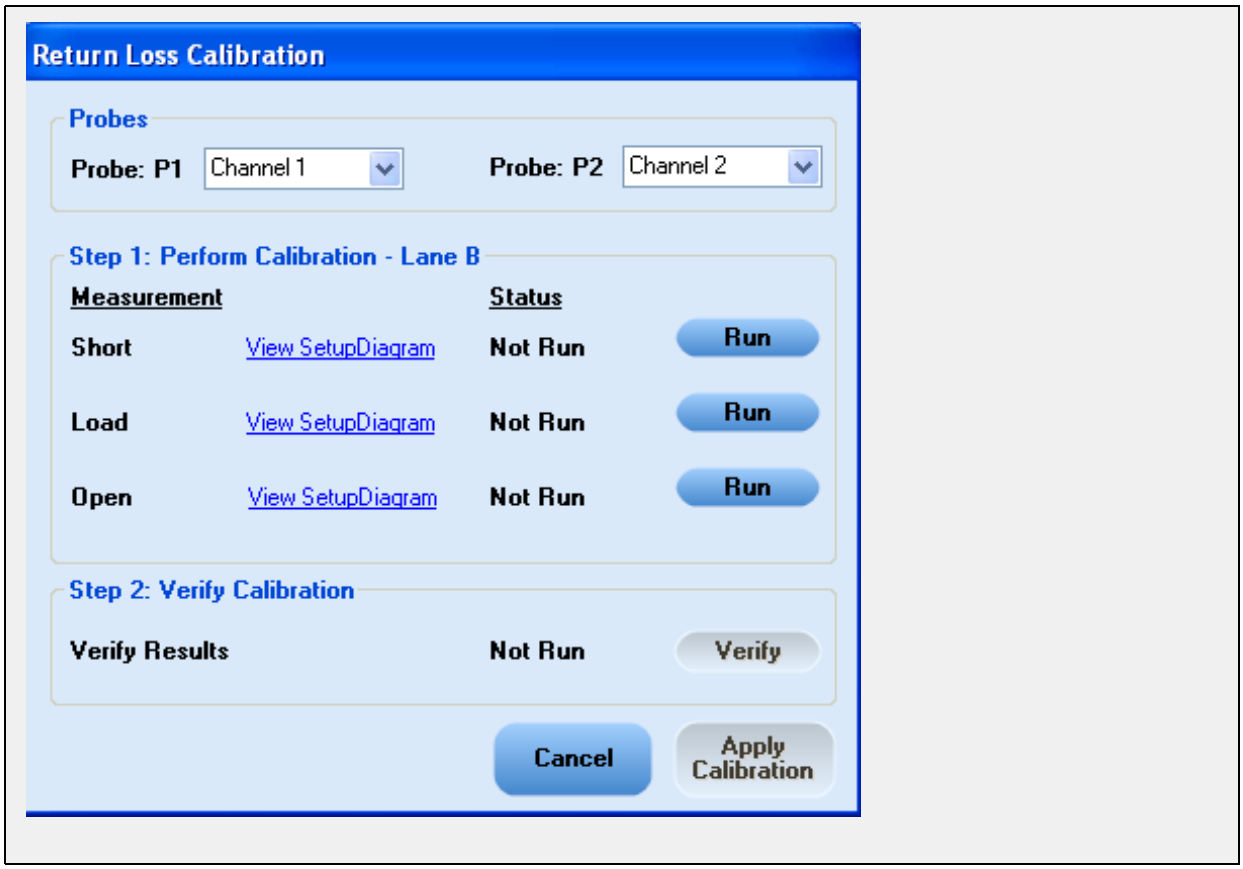
5. Do one of the following:

   Click **Apply Calibration** to apply these calibrated values to perform the Return Loss measurement.

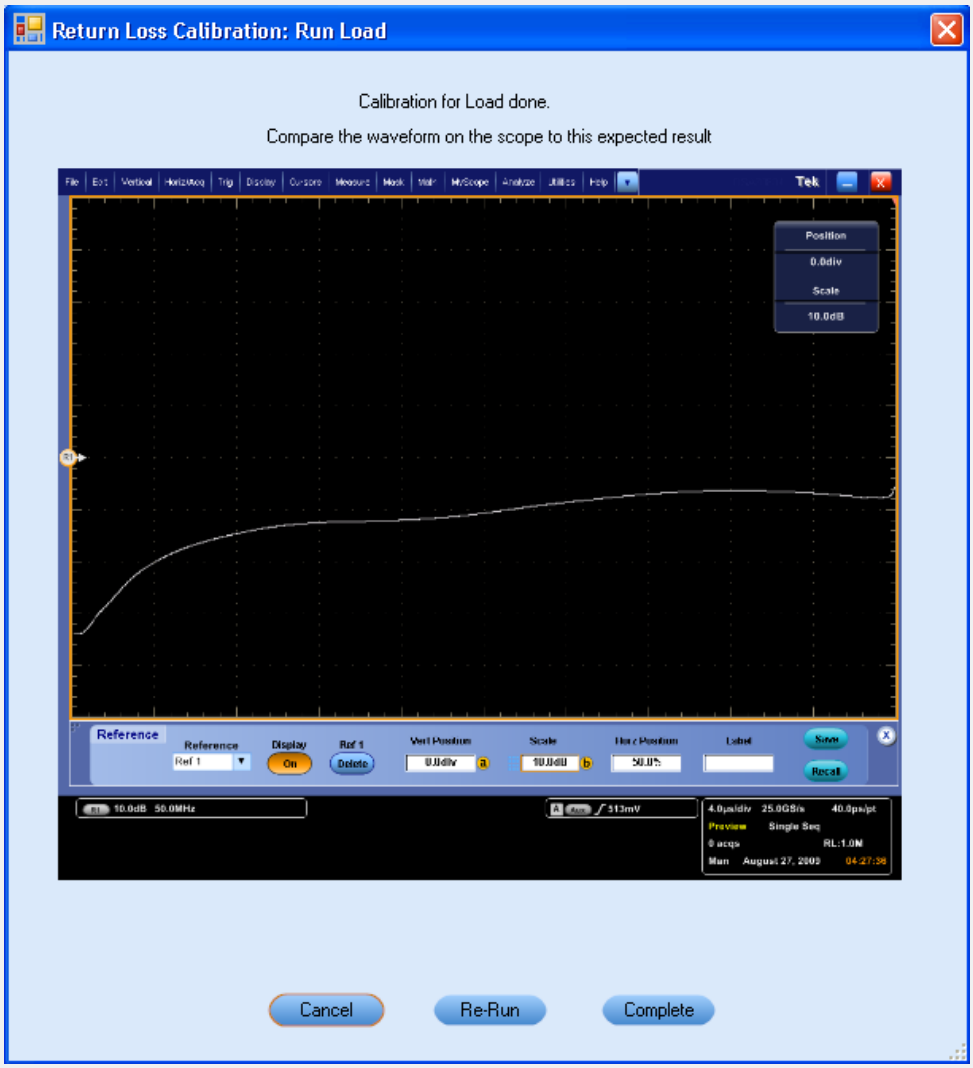
   Connect the CAT5 cable to J20 of TC3 and J30 on the daughter board to the Open slot. Click **Verify** for acquiring data on the selected lane and validating the Short, Load, and Open calibration values. Apply the calibrated values to perform the Return Loss measurement. A Return Loss Calibration: Run Verify dialog box appears displaying the reference waveform for Verify calibration. Initially the status of Verify calibration appears as Not Run, once the calibration is done the status changes to Completed.

   Click **Cancel** to exit calibration.

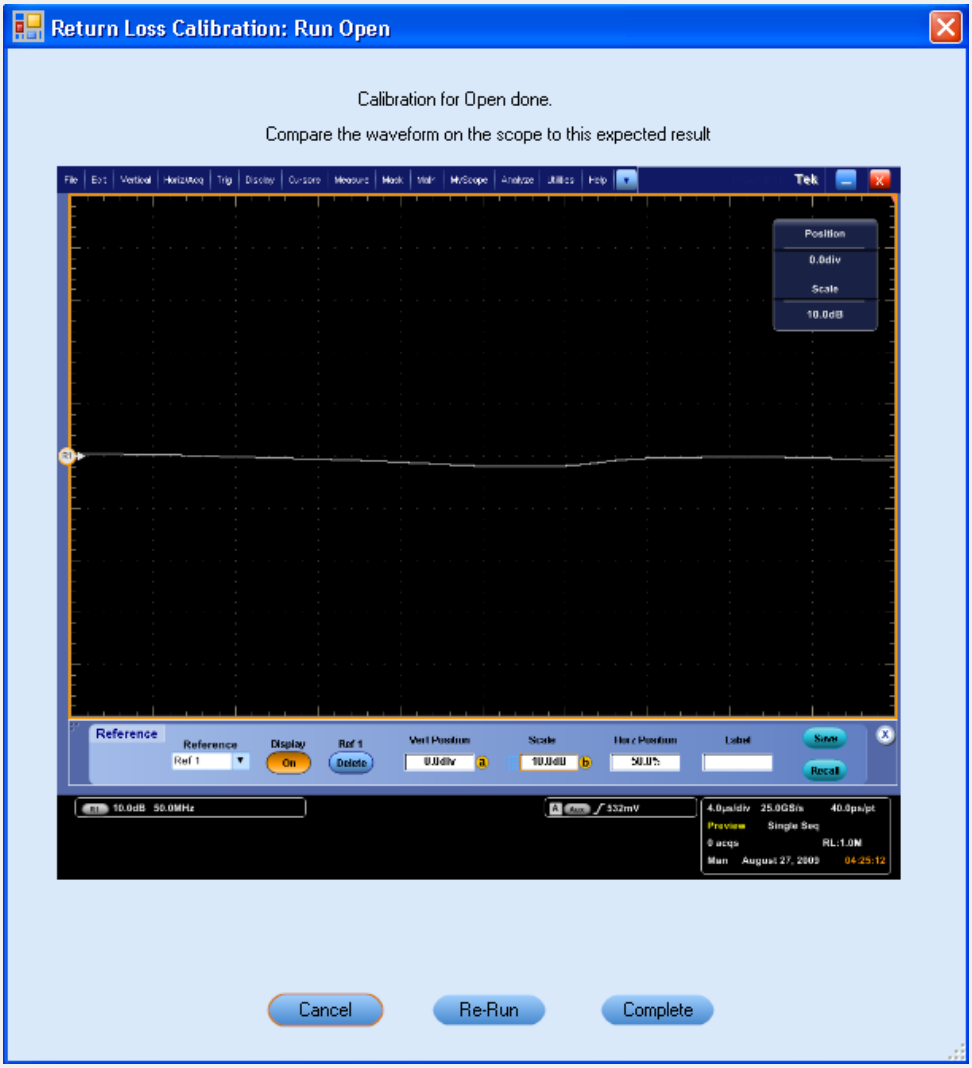
6. For multiple lanes, the Return Loss Calibration dialog box appears again for each of selected lanes to either perform the live calibration (Step 1) or to cancel the calibration.


Return Loss Calibration
Probes
Probe: P1
Channel 1
Probe: P2
Channel 2
Step 1: Perform Calibration - Lane B
Measurement
Status
Short
View SetupDiagram
Not Run
Run
Load
View SetupDiagram
Not Run
Run
Open
View SetupDiagram
Not Run
Run
Step 2: Verify Calibration
Verify Results
Not Run
Verify
Cancel
Apply Calibration

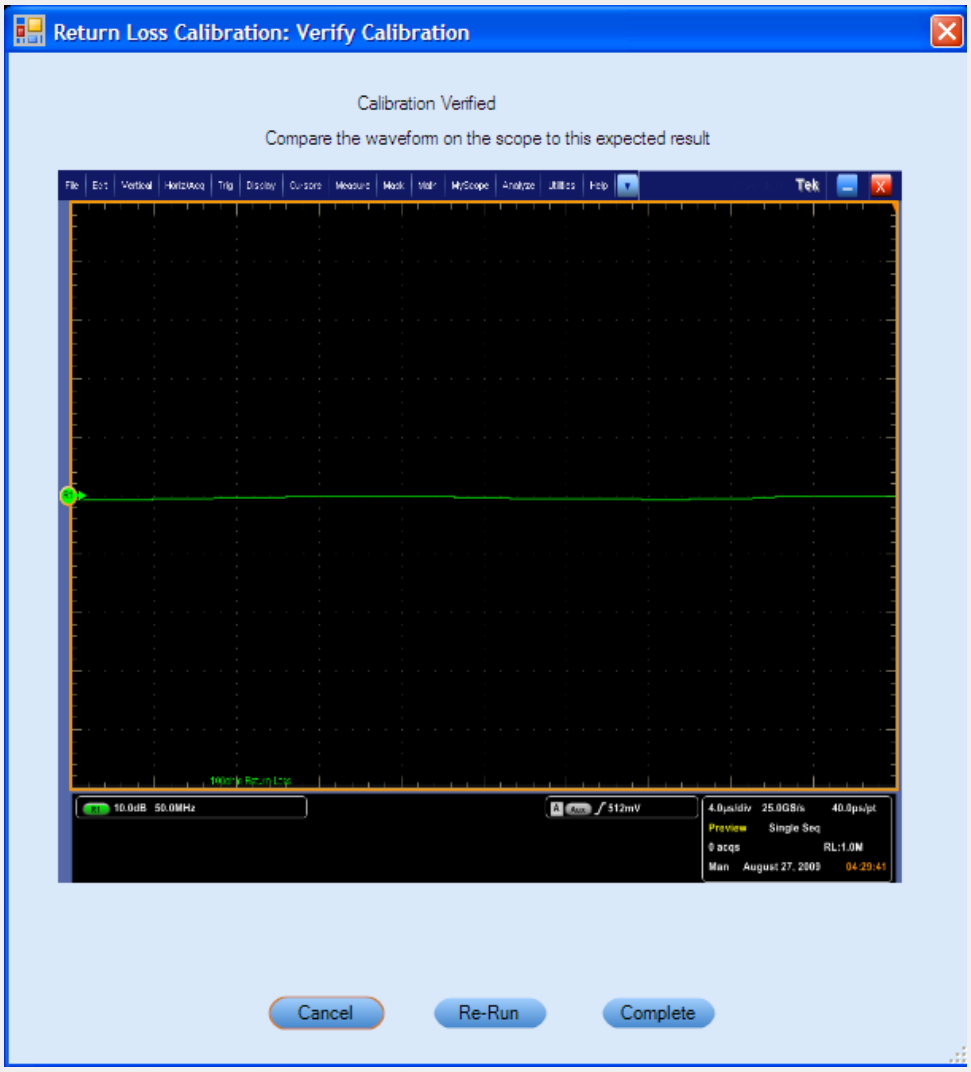
Typical Waveform for Return Loss Load Calibration



Typical Waveform for Return Loss Open Calibration

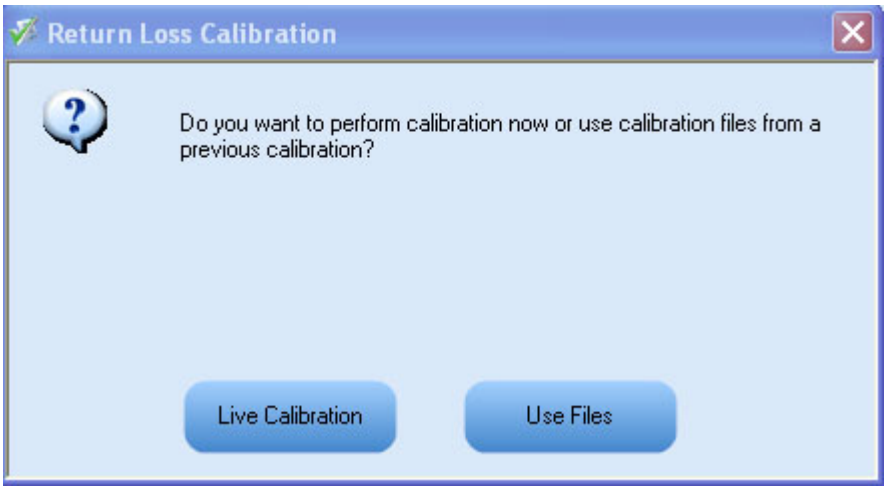


Typical Waveform for Return Loss Verify Calibration

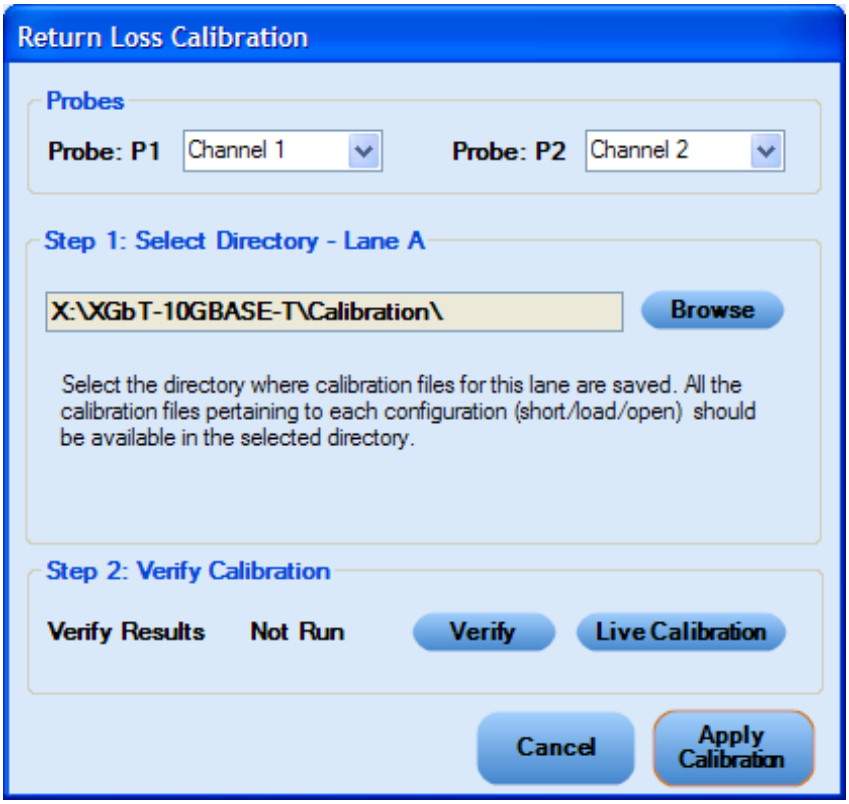


Use Calibration Files for Return Loss Measurement

Select the test lanes and click **Tools** > **Return Loss Calibration** or **Calibrate** button in the test measurement Select panel. A Return Loss Calibration dialog box is displayed. Click **Use Files** to use the calibration files of the earlier calibration and perform the Return Loss measurement.



1. Select a channel for each of the probes.
2. Click **Browse** to select the directory where calibration files for this lane are saved.

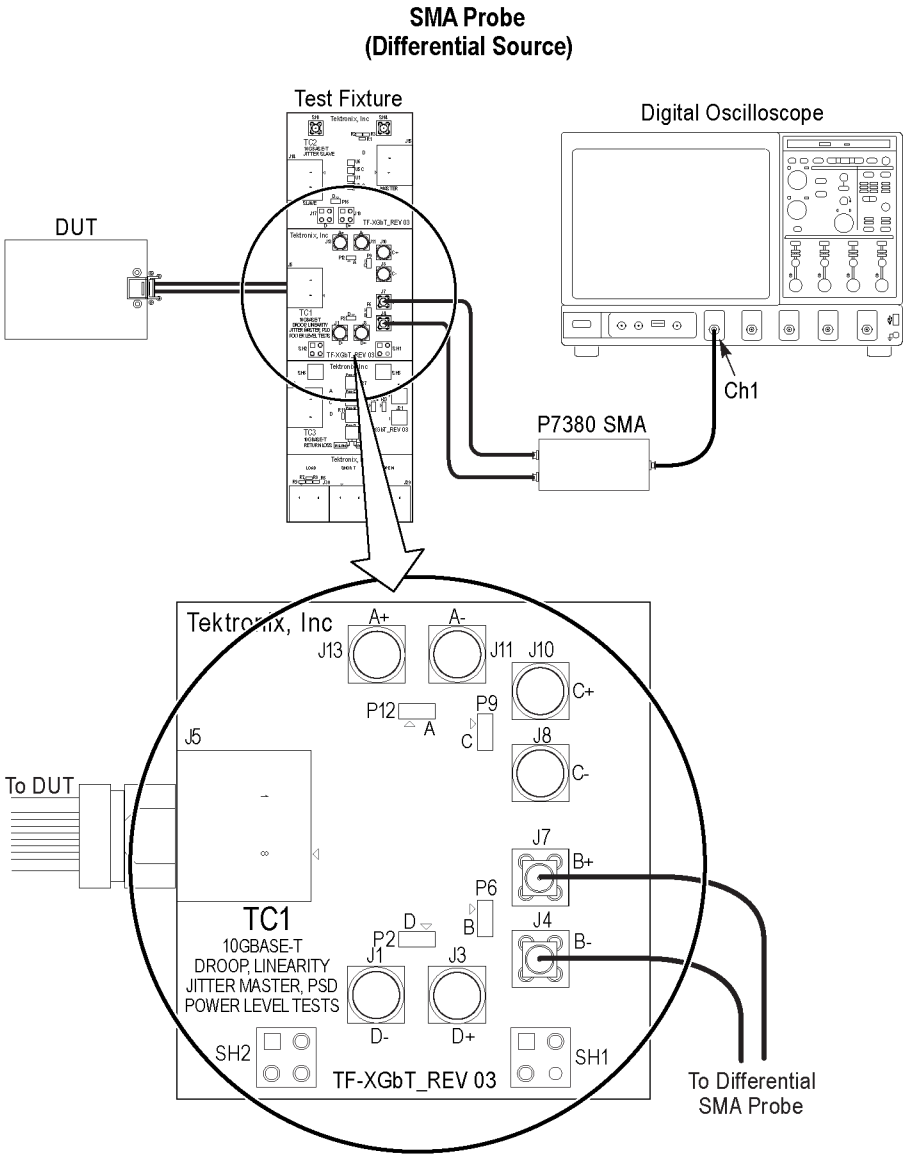


NOTE. *Make sure all the calibration files of Short, Load, and Open configuration are available in the selected directory.*

3. Do one of the following:
   - Click **Apply Calibration** to apply these calibrated values to perform the Return Loss measurement.
   - Click **Verify** to validate the Short, Load, and Open calibration values and then apply the calibrated values to perform the measurement. Initially the status of Verify calibration appears as Not Run. Once the calibration is done the status changes to Completed.
   - Click Live Calibration to perform a new live calibration.
   - Click **Cancel** to exit calibration.
4. For multiple lanes, the Return Loss Calibration dialog box appears again for each of selected lanes to either perform the live calibration (Step 1) or use the existing calibrated files (Step 1).

Connection Setup

Connections with SMA Probe (Differential Source)

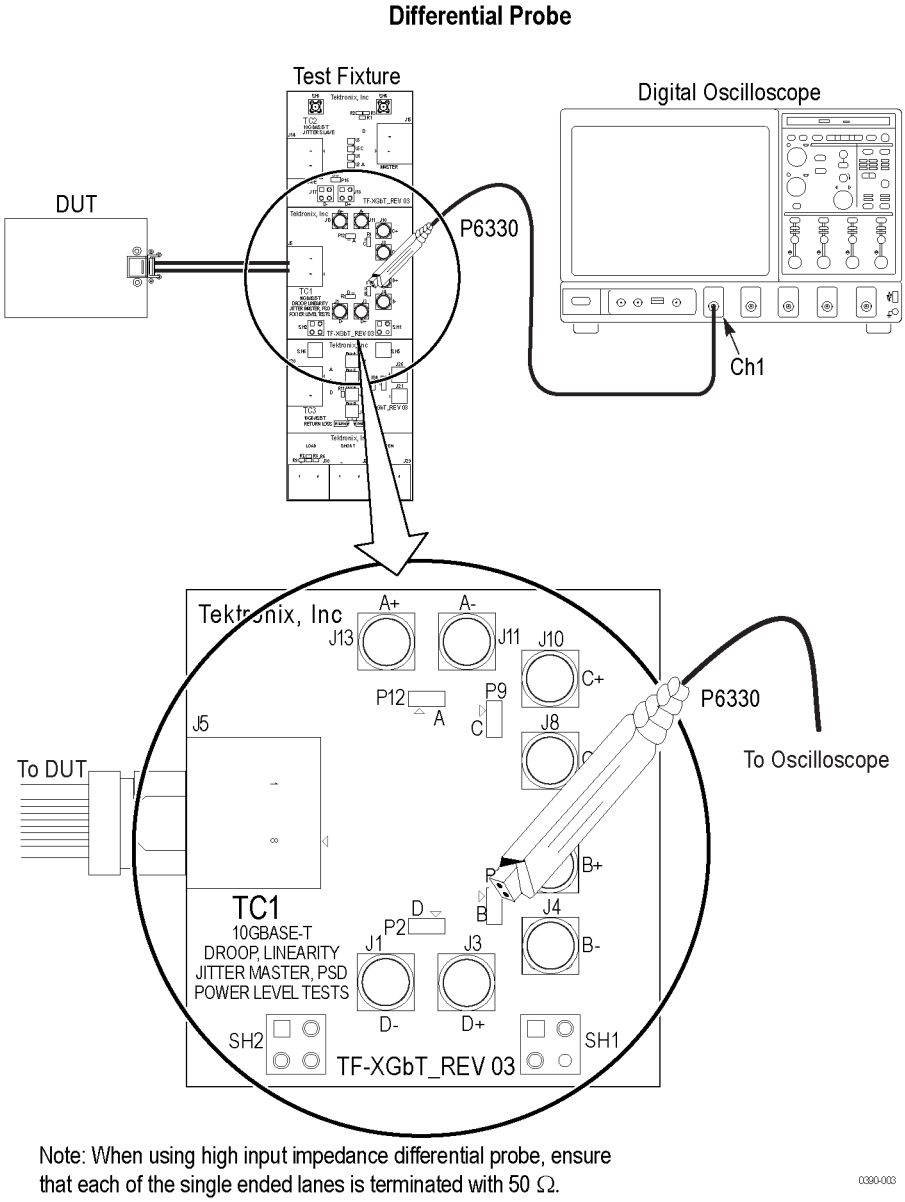


Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-002

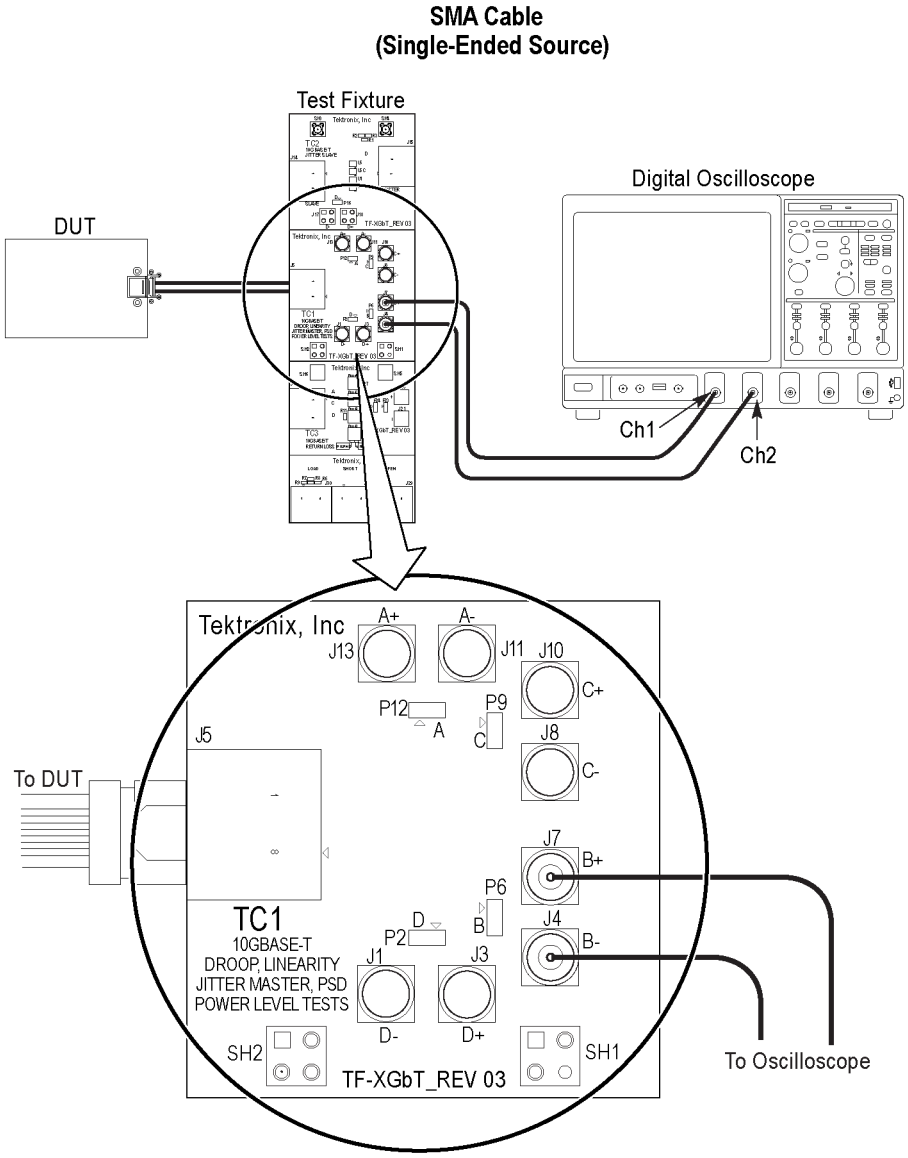
1. Connect the DUT to the TC1 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using the SMA probe.
3. Configure the source DUT in the correct test mode to output the required waveforms.

Connection with a Differential Probe (Differential Source)



1. Connect the DUT to the TC1 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using a differential P7350 probe.
3. Configure the source DUT in the correct test mode to output the required waveforms.

Connections with SMA Cables (Single-Ended Source)



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-004

1. Connect the DUT to the TC1 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using the SMA cables.
3. Configure the source DUT in the correct test mode to output the required waveforms.

Performing Analysis Using Prerecorded Waveforms

1. Open the session that you have saved using **File** > **Open Session** or **File** > **Recently Recalled Setup** (a recent file). A drop-down box appears showing the session name with the date details.
2. Select **Use Pre-recorded** in the Acquire panel and select one of the sessions listed in the drop-down box.
3. You can modify the waveform file for each lane of the measurements, add or delete a lane, and even add or delete a new measurement to the existing test suite. Once you select run, data corresponding for that run is populated (such as the selected test, the test configuration settings, and the test summary status).

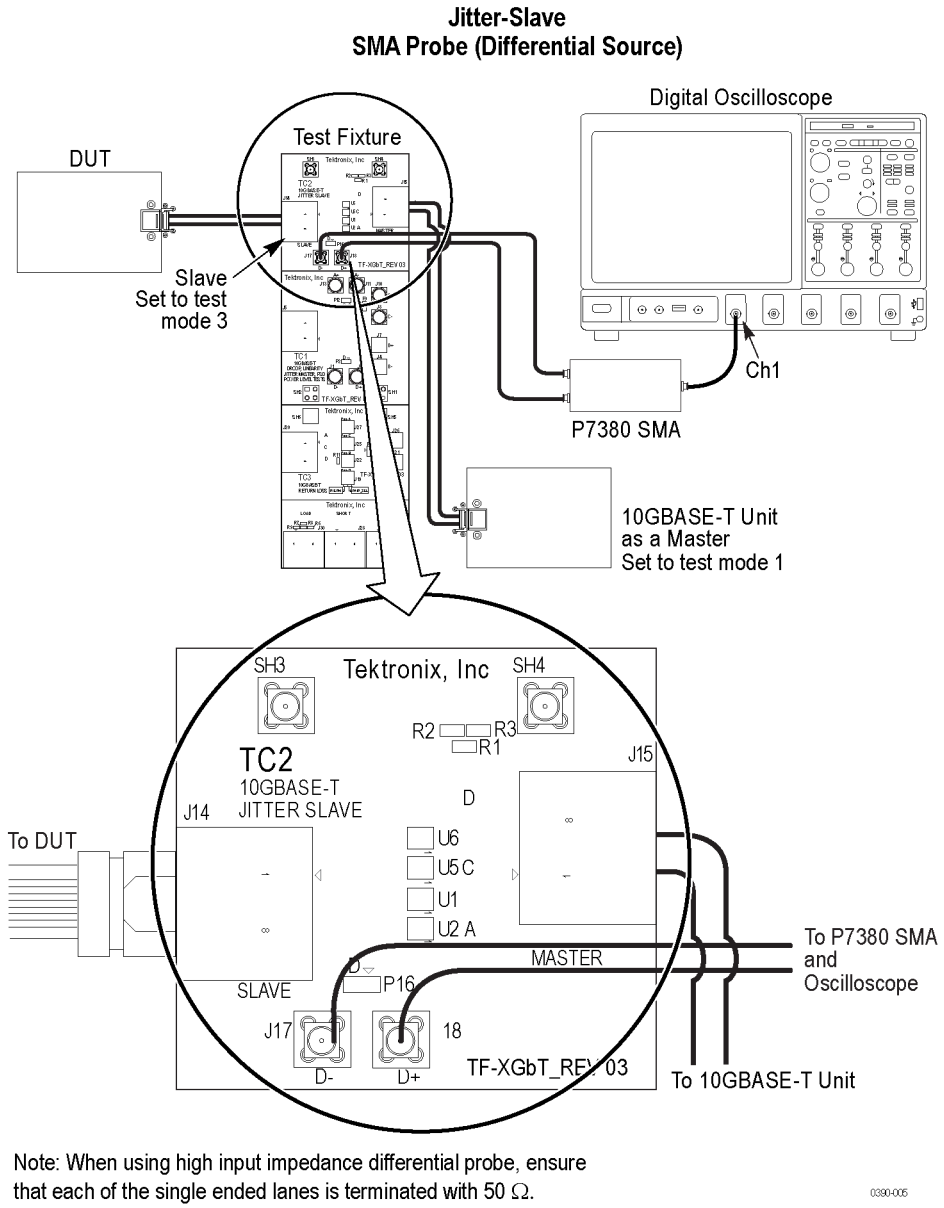
To perform analysis using prerecorded waveform file, click here to view the steps.

Perform Analysis Using Prerecorded Waveform File

1. Create a new session, click **File** > **New Session**.
2. Select a measurement in the Select panel.
3. Save the session, click **File** > **Save Session**.
4. In the Acquire panel, select **Use Pre-recorded** and browse to the location where the prerecorded waveform file is located.
5. Click **Run**.

Connection Setup for Jitter-Slave

Connections with SMA Probe (Differential Source) for Jitter-Slave Measurement

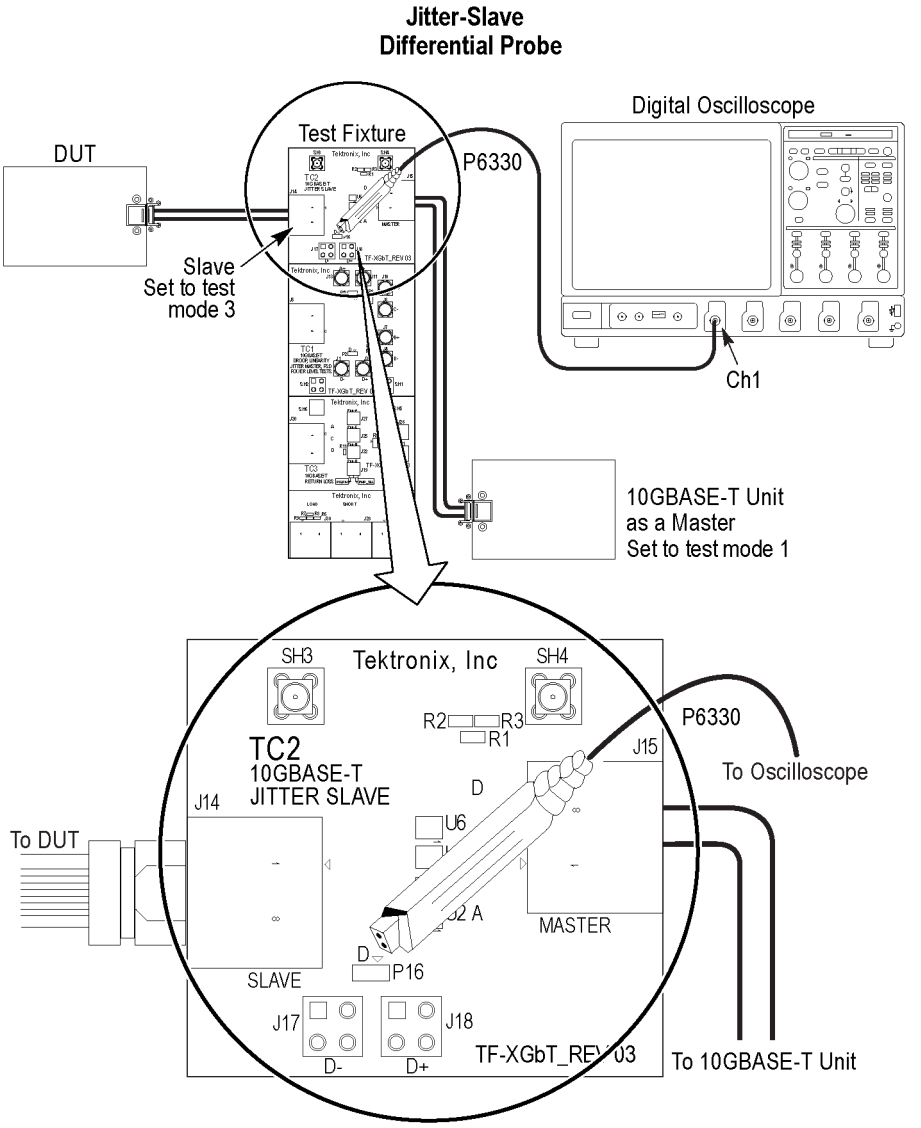


Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-005

1. Connect the DUT to the TC2 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using the SMA probe.
3. Configure the source DUT in the correct test mode to output the required waveforms.

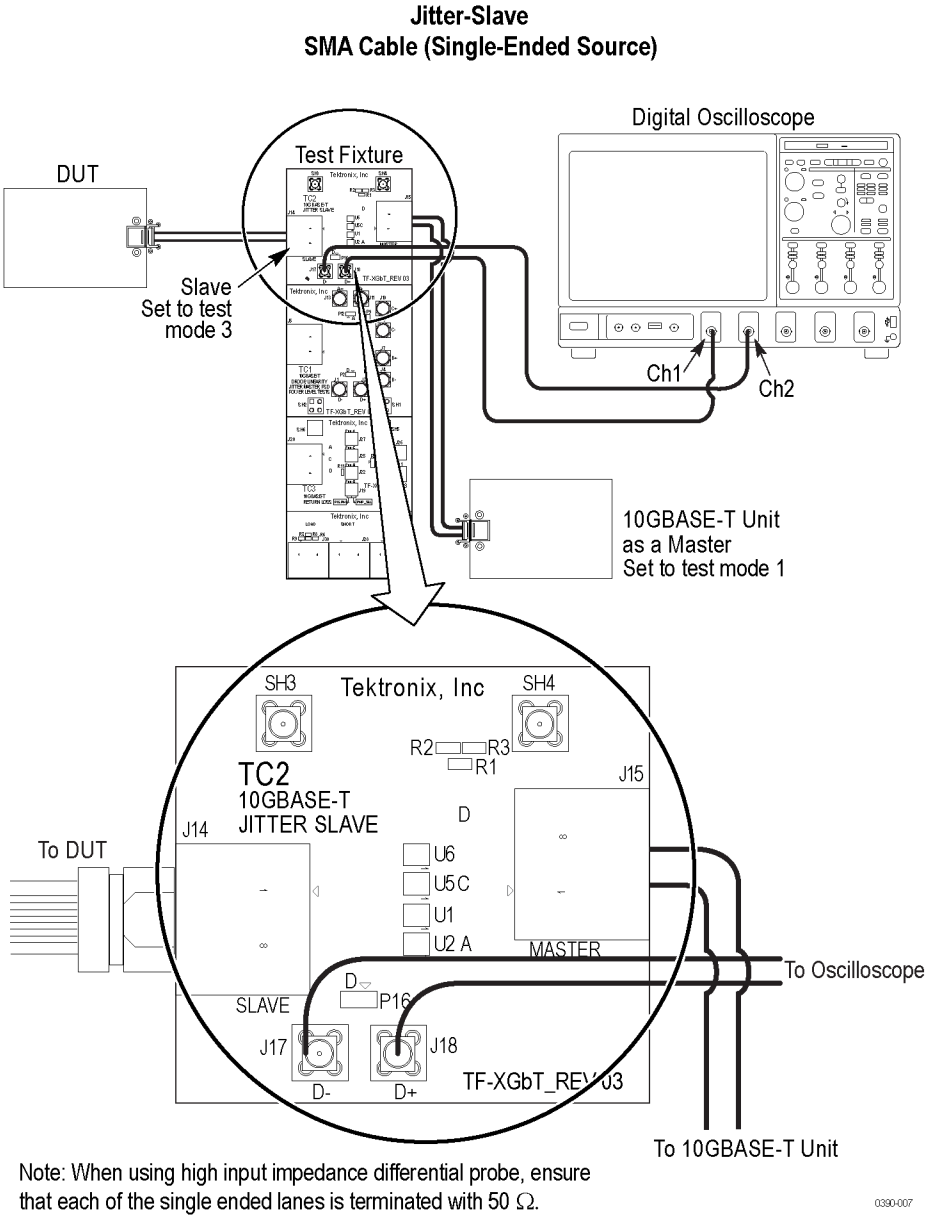
Connection with a Differential Probe (Differential Source) for Jitter-Slave Measurement



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

1. Connect the DUT to the TC2 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using a differential P7350 probe.
3. Configure the source DUT in the correct test mode to output the required waveforms.

Connections with SMA Cables (Single-Ended Source) for Jitter-Slave Measurement



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

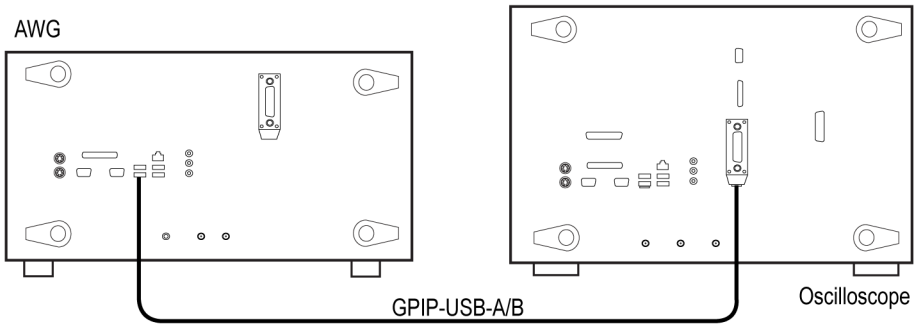
0390-007

1. Connect the DUT to the TC2 of the TF-XGbT test fixture.
2. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using the SMA cables.
3. Configure the source DUT in the correct test mode to output the required waveforms.

Connection Setup for Return Loss

The Steps and connections for performing the Return Loss measurement are as follows:

1. Connect the oscilloscope and the AWG instrument as shown in the following rear view diagram:

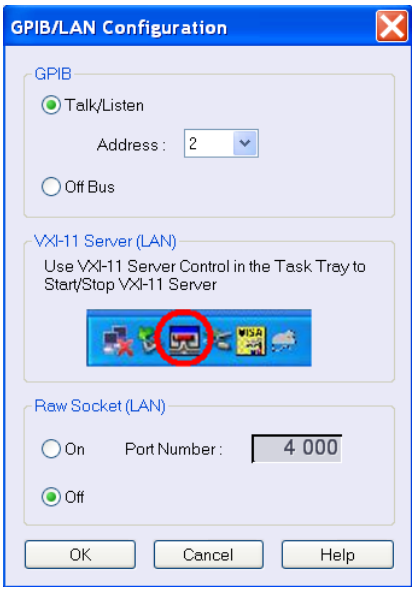


2. Check if the LAN ports are ON for both the oscilloscope and the AWG (only if the connectivity between AWG and oscilloscope is via LAN).

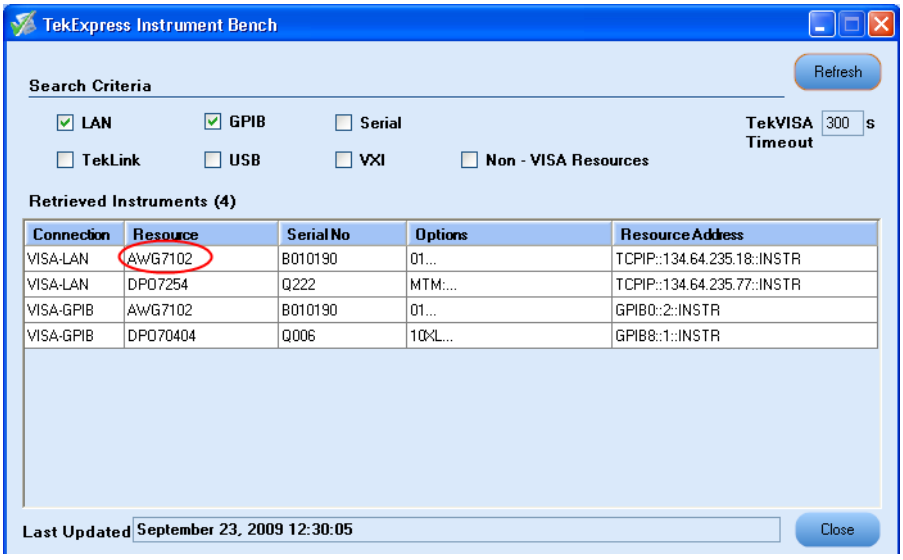
NOTE. *The connectivity between AWG and oscilloscope can also be via LAN.*

3. In the oscilloscope, select **Utilities** > **GPIB Configuration...** > **Controller**.

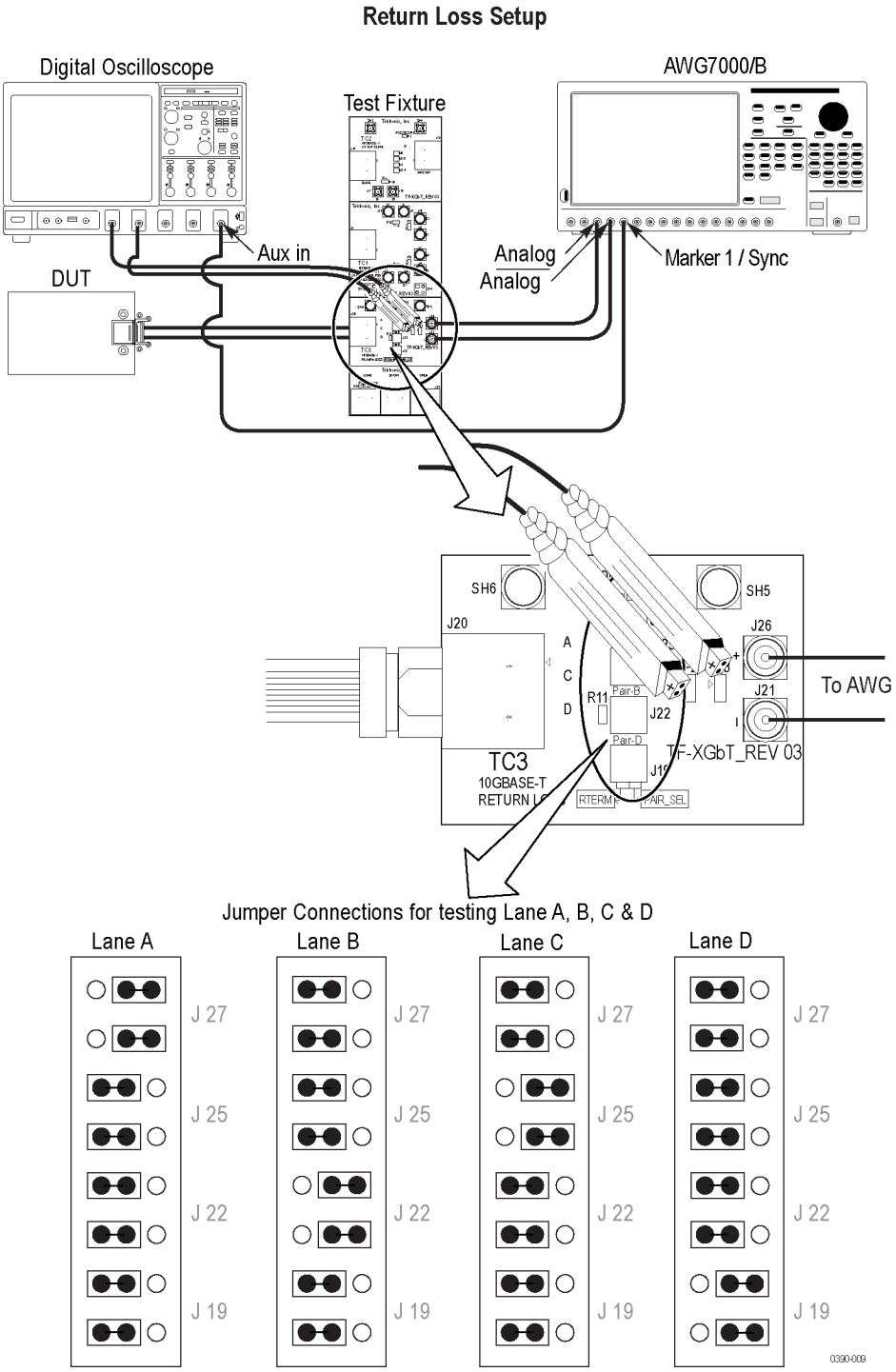
4. In the AWG instrument, select **System** > **GPIB/LAN Configuration** > **Talk/Listener**.



5. In the XGbT application, select **Tools** > **Instrument Bench** and verify that the connected AWG instrument is listed.



6. Once the connection between the AWG and oscilloscope is established, make the connections as follows:



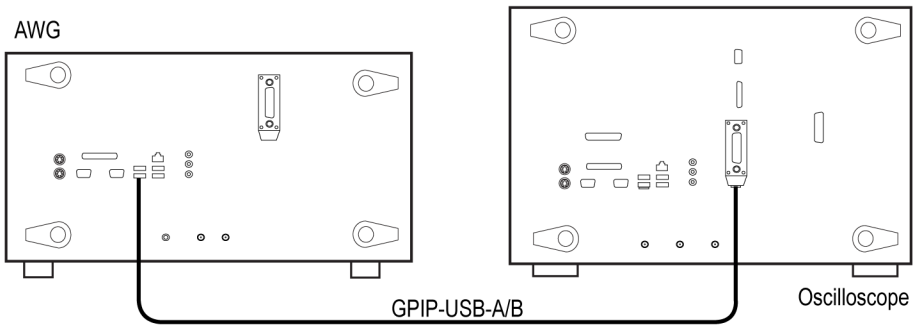
NOTE. *is used to denote short jumpers.*

7. Connect the DUT to the TC3 of the TF-XGbT test fixture.
8. Connect the positive and negative points of the test fixture to the configured oscilloscope channel using a differential P7350 probe.
9. Configure the source DUT in the correct test mode to output the required waveforms.

Setting up the AWG and the Oscilloscope for Calibration

Follow these steps to set up the AWG and the oscilloscope for calibration of the Return Loss measurement are as follows:

1. Connect the oscilloscope and the AWG instruments as shown in the following rear view diagram:

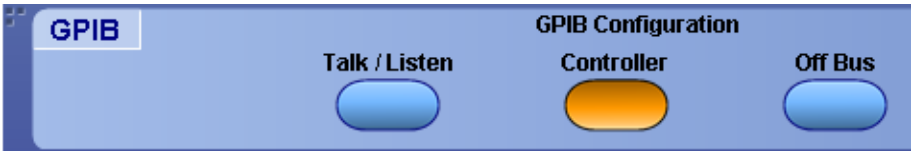


NOTE. *The GPIB port on DPO7K Series is on the side of the instrument.*

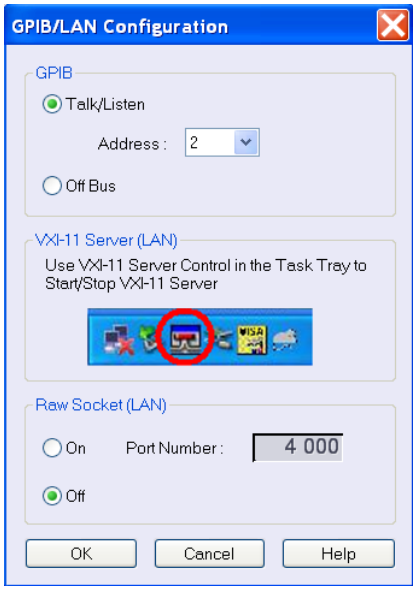
2. Check if the LAN ports are ON for both the oscilloscope and the AWG (only if the connectivity between AWG and Oscilloscope is via LAN).

NOTE. *The connectivity between AWG and oscilloscope can also be via LAN.*

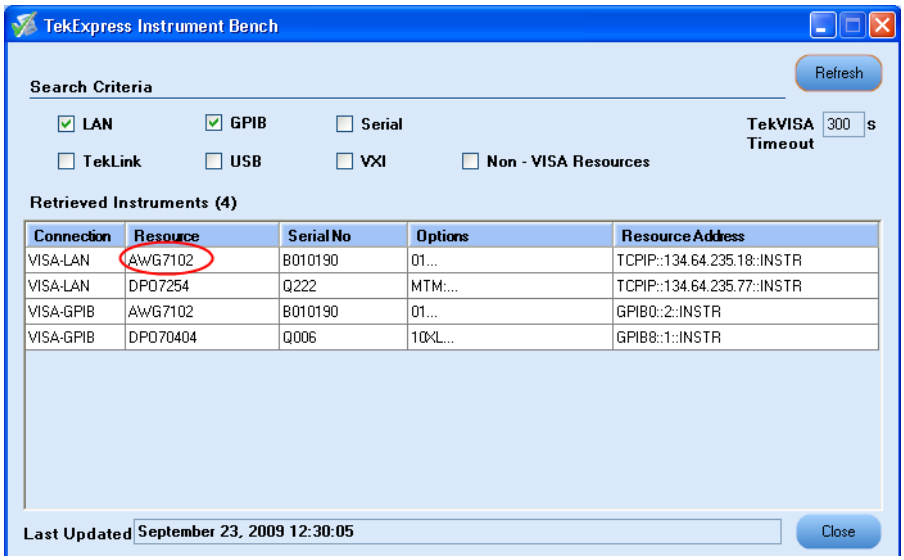
3. In the oscilloscope, select **Utilities** > **GPIB Configuration...** > **Controller**.



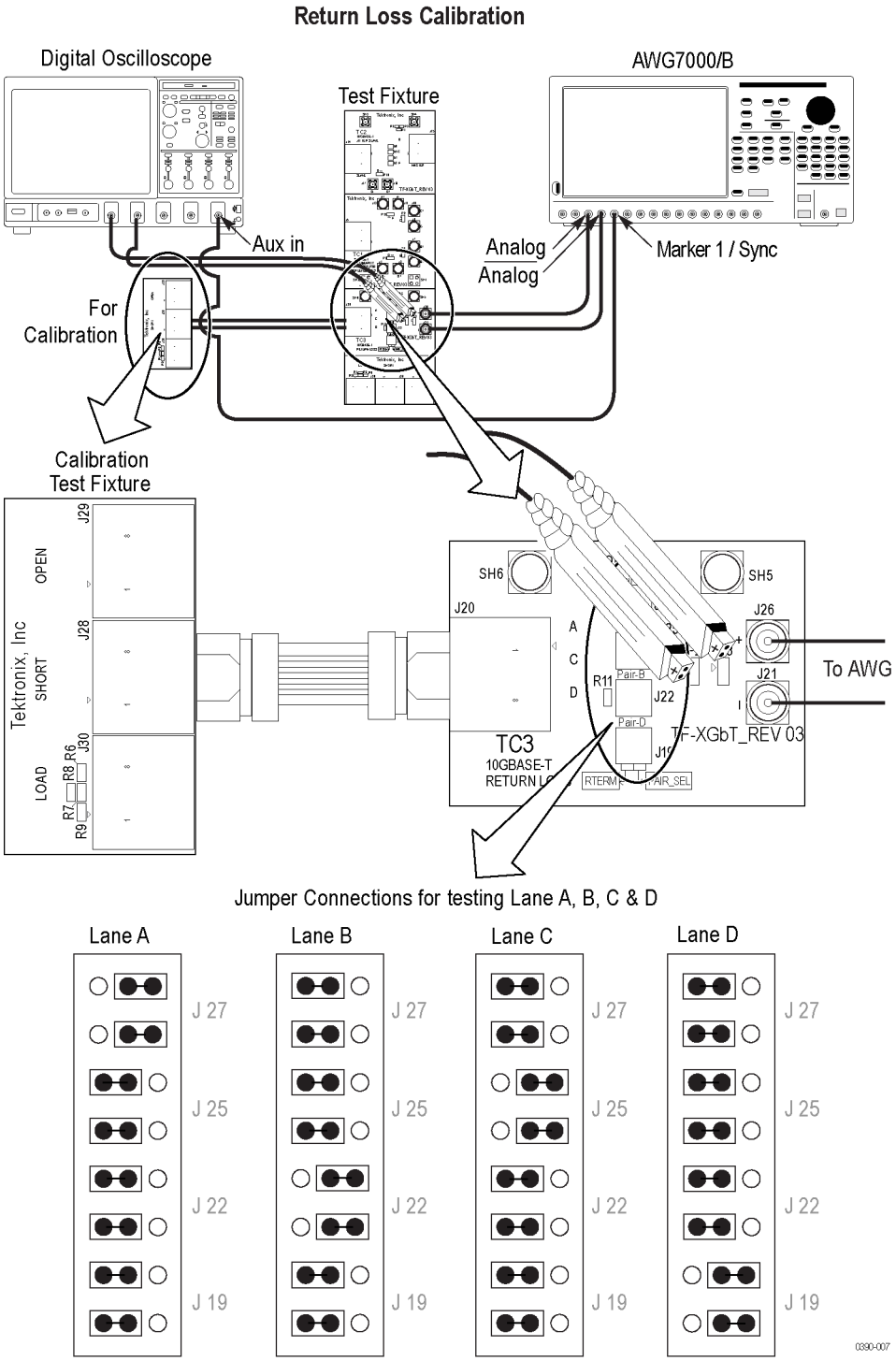
4. In the AWG instrument, select **System** > **GPIB/LAN Configuration** > **Talk/Listener**.



5. In the XGbT application, select **Tools** > **Instrument Bench** and verify that the connected AWG instrument is listed.



6. Once the connection between the AWG and oscilloscope is established, make the connections as follows:



NOTE. *is used to denote short jumpers.*

7. Connect an SMA cable to the AWG Analog channel of Arbitrary Waveform Generator and J21 of test fixture.
8. Connect another SMA cable to the AWG $\overline{\text{Analog}}$ channel of Arbitrary Waveform Generator and J26 of test fixture.
9. Connect another SMA cable to Marker 1/ Sync of AWG to Aux In of the oscilloscope.
10. To test Lane A, B, C, or D connect the differential probes to configured channels of the oscilloscope and positive and negative points of the test fixture as shown in the calibration setup diagram.

About the Programmatic Interface

Related Topics

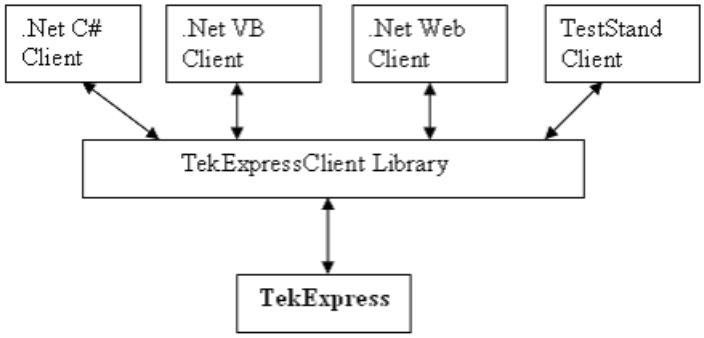
Server and Client Proxy Objects

The Programmatic interface allows you to seamlessly integrate the TekExpress test automation application with the high-level automation layer. This also allows you to control the state of TekExpress application running on a local or a remote computer.

For simplifying the descriptions, the following terminologies are used in this section:

- **TekExpress Client:** A High level automation application that communicates with TekExpress using TekExpress Programmatic Interface.
- **TekExpress Server:** The TekExpress application when being controlled by TekExpress Client.

TekExpress leverages .Net Marshalling to enable the Programmatic Interface for TekExpress Client. TekExpress provides a client library for TekExpress clients to use the programmatic interface. The TekExpress client library is inherited from .Net MarshalByRef class to provide the proxy object for the clients. The TekExpress client library maintains a reference to the TekExpress Server and this reference allows the client to control the server state.



Click the following links to get details on them:

What does one need to have to develop TekExpress Client ?

While developing TekExpress Client one needs to use the TekExpressClient.dll. The client can be a VB .Net, C# .Net, TestStand or web application. The examples for interfaces in each of these applications are in `Samples` folder.

References required

TekExpressClient.dll has internal reference to *IIdlglib.dll* and *IRemoteInterface.dll*.

IIdlglib.dll has a reference to *TekDotNetLib.dll*.

IRemoteInterface.dll provides the interfaces required to perform the remote automations. It is an interface that forms the communication line between the server and the client.

IIdlglib.dll provides the methods to generate and direct the secondary dialog messages at the client-end.

NOTE. *The end-user client application does not need any reference to above mentioned DLL files. It is essential to have these DLLs (IRemoteInterface.dll, IIdlglib.dll and TekDotNetLib.dll) in same folder location as that of TekExpressClient.dll.*

What steps does a client need to follow ?

The following are the steps that a client needs to follow to use the TekExpressClient.dll to programmatically control the server:

A client UI must be developed to access the interfaces exposed through the server. This client needs to load `TekExpressClient.dll` to access the interfaces. Once the TekExpressClient.dll is loaded, the client UI can call the specific functions to run the operations requested by the client. Once the client is up and running, it must do the following to run a remote operation:

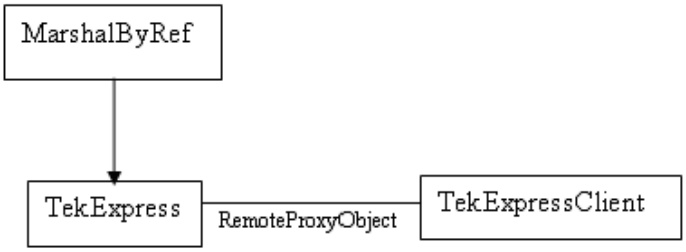
1. The client needs to provide the IP address of the PC at which the server is running in order to connect to the server.
2. The client needs to lock the server application to avoid conflict with any other Client that may try to control the server simultaneously. “Lock” would also disable all user controls on server so that server state cannot be changed by manual operation.
3. If any other client tries to access a server which is locked, it will get a notification that the server is locked by another client.
4. When the client has connected to and locked the server, the client can access any of the programmatic controls to run the remote automations.

5. Once the client operations are completed, the server needs to be "unlocked" by the client.

Server and Client Proxy Objects

Remote Proxy Object

The server exposes a remote object to let the remote client access and perform the server side operations remotely. The proxy object is instantiated and exposed at the server-end through marshalling.



The following is an example:

```
RemotingConfiguration.RegisterWellKnownServiceType (typeof (TekExpressRe-
moteInterface), "TekExpress Remote interface", WellKnownObjectMode.Singleton);
```

This object lets the remote client access the interfaces exposed at the server side. The client gets the reference to this object when the client gets connected to the server.

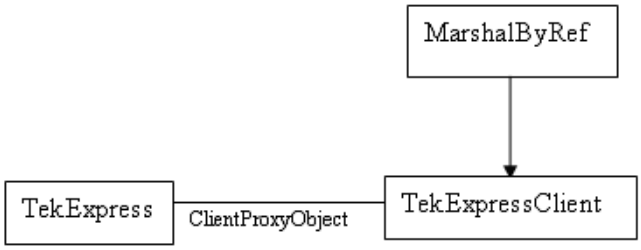
For example,

//Get a reference to the remote object

```
remoteObject = (IRemoteInterface)Activator.GetObject(typeof(IRemoteInterface),
URL.ToString());
```

Client Proxy Object

Client exposes a proxy object to receive certain information.



For example,

//Register the client proxy object

```
WellKnownServiceTypeEntry[] e = RemotingConfiguration.GetRegisteredWell-
KnownServiceTypes();
```

```
clientInterface = new ClientInterface();
```

```
RemotingConfiguration.RegisterWellKnownServiceType(typeof(ClientInterface),
“Remote Client Interface”, WellKnownObjectMode.Singleton);
```

//Expose the client proxy object through marshalling

```
RemotingServices.Marshal(clientInterface, "Remote Client Inteface");
```

The client proxy object is used for the following:

1. To get the secondary dialog messages from the server.
2. To get the file transfer commands from the server while transferring the report.

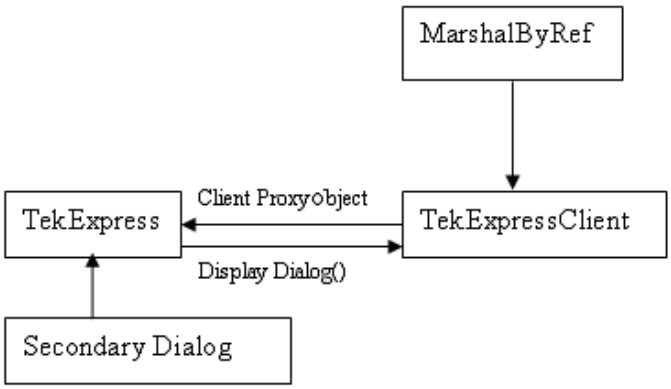
Click here to see examples.

```
clientObject.clientIntf.DisplayDialog(caption, msg,iconType, btnType);
```

```
clientObject.clientIntf.TransferBytes(buffer, read, fileLength);
```

To know more on the topics below, click the links.

Secondary Dialog Message Handling



The secondary dialog messages from the Secondary Dialog library are redirected to the client-end when a client is performing the automations at the remote end.

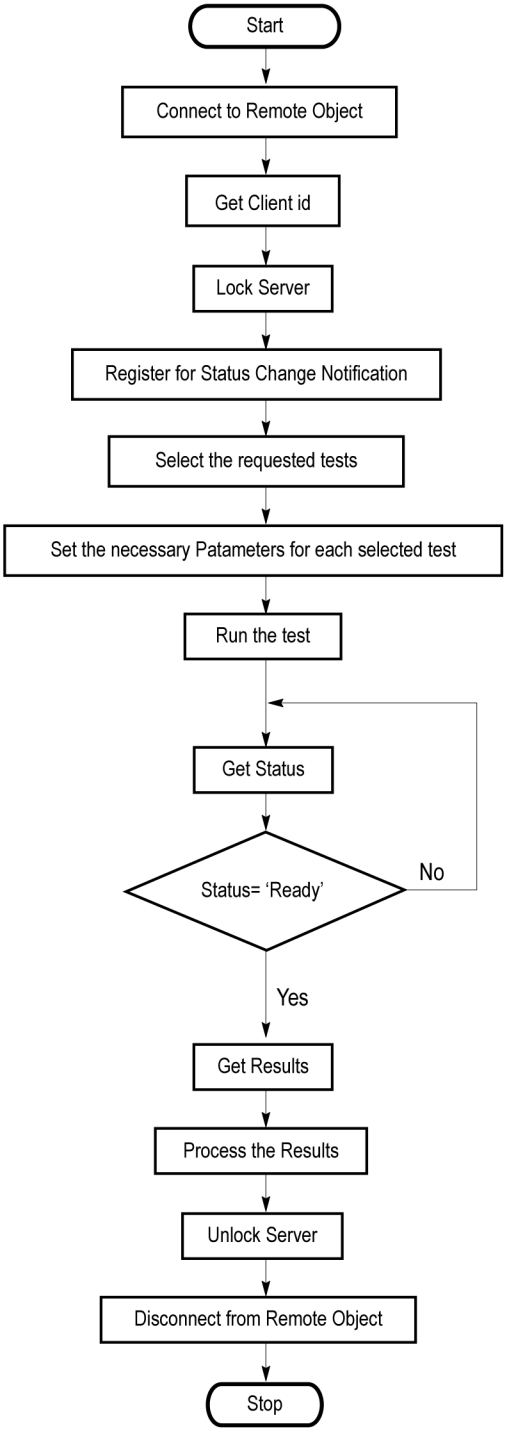
In the secondary dialog library, the assembly that is calling for the dialog box to be displayed is checked and if a remote connection is detected, the messages are directed to the remote end.

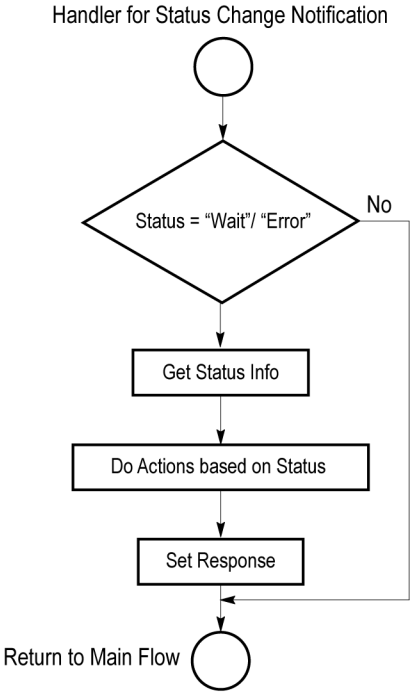
File Transfer Events

When the client requests the transfer of the report, the server reads the report and transfers the file by calling the file transfer methods at the client-end.

Client Programmatic Interface: An Example

An example of the client programmatic interface is described and shown as follows:


Start
Connect to Remote Object
Get Client id
Lock Server
Register for Status Change Notification
Select the requested tests
Set the necessary Patameters for each selected test
Run the test
Get Status
Status= 'Ready'
No
Yes
Get Results
Process the Results
Unlock Server
Disconnect from Remote Object
Stop


Handler for Status Change Notification
Status = "Wait"/ "Error"
No
Get Status Info
Do Actions based on Status
Set Response
Return to Main Flow

1. Connect to a server or remote object using the programmatic interface provided.
2. Get the client ID that is created when connecting to the remote object. This client ID is one of the required parameters to communicate with the server.

NOTE. *Server identifies the client with this ID only and rejects any request if the ID is invalid.*

3. Lock the server for further operations. This disables the application interface.

NOTE. *You can get values from the server or set values from the server to the client only if application is locked.*

4. Register for receiving notifications on status change events on the server. To register you need to give a handler as a parameter.

NOTE. *Whenever there is a change in the status of the server, all the clients registered with the server receive a notification from the server.*

5. Select the tests that you want to run through the programmatic interface.
6. Set the necessary parameters for each test.
7. Run the tests.
8. Poll for the status of the application.

NOTE. *You can skip this step if you are registered for the status change notification and when the status is Ready.*

9. After completing the tests, get the results.
10. Create a report or display the results and verify or process the results.
11. Unlock the server once you complete all the tasks.
12. Disconnect from the remote object.

Handler of Status Change Notification

1. Get the status. If the status is Wait or Error, get the information which contains the title, message description, and the expected responses for the status.
2. Perform the actions based on the status information.
3. Set the response as expected.

XGbT Application Command Arguments and Queries

Connect through an IP address

Lock the server

Disable the popups

Set or get the DUT ID

Set the configuration parameters for a suite or measurement

Query the configuration parameters for a suite or measurement

Select a measurement

Select a suite

Run with set configurations or stop the run operation

Handle Error Codes

Get or set the timeout value

Wait for the test to complete

After the test is complete

Save, recall, or check if a session is saved

Unlock the server

Disconnect from server

string id

Name	Type	Direction	Description
id	string	IN	Identifier of the client that is performing the remote function.

Ready: Test configured and ready to start.

Running: Test running.

Paused: Test paused.

Wait: A popup that needs your inputs.

Error: An error is occurred.

string dutName

Name	Type	Direction	Description
dutName	string	IN	The new DUT ID of the setup.

out bool saved

Name	Type	Direction	Description
saved	bool	OUT	Boolean representing whether the current session is saved.

This parameter is used as a check in SaveSession() and SaveSessionAs() functions.

string ipAddress

Name	Type	Direction	Description
ipAdress	string	IN	The ip address of the server to which the client is trying to connect to. This is required to establish the connection between the server and the client.

out string clientID

Name	Type	Direction	Description
clientid	String	OUT	Identifier of the client that is connected to the server. clientId = unique number + ipaddress of the client. For example, 1065–192.157.98.70

NOTE. *If the dutName parameter is null, the client is prompted to provide a valid DUT ID.*

NOTE. *The server must be active and running for the client to connect to the server. Any number of clients can be connected to the server at a time.*

NOTE. *When the client is disconnected, it is unlocked from the server and then disconnected. The id is reused.*

string dutId

Name	Type	Direction	Description
dutId	string	OUT	The DUT ID of the setup.

The dutId parameter is set after the server processes the request.

string device

Name	Type	Direction	Description
device	string	IN	Specifies the name of the device.

string suite

Name	Type	Direction	Description
suite	string	IN	Specifies the name of the suite.

string test

Name	Type	Direction	Description
test	string	IN	Specifies the name of the test to obtain the pass or fail status.

string parameterString

Name	Type	Direction	Description
parameterString	string	IN	Selects or deselects a test.

int rowNr

Name	Type	Direction	Description
rowNr	int	IN	Specifies the zero based row index of the sub-measurement for obtaining the result value.

NOTE. *When the client tries to lock a server that is locked by another client, the client gets a notification that the server is already locked and it must wait until the server is unlocked. If the client locks the server and is idle for a certain amount of time then the server is unlocked automatically from that client.*

out string[] status

Name	Type	Direction	Description
status	string array	OUT	The list of status messages generated during run.

string name

Name	Type	Direction	Description
name	string	IN	The name of the session being recalled.

The name parameter cannot be empty. If it is empty, the client is prompted to provide a valid name.

NOTE. *When the run is performed, the status of the run is updated periodically using a timer.*

string name

Name	Type	Direction	Description
name	string	IN	The name of the session being saved.

The name parameter cannot be empty. If it is empty, the client is prompted to provide a valid name.

Once the session is saved under 'name' you cannot use this method to save the session in a different name. Use SaveSessionAs instead.

string name

Name	Type	Direction	Description
name	string	IN	The name of the session being recalled.

The same session is saved under different names using this method. The name parameter cannot be empty. If it is empty, the client is prompted to provide a valid name.

bool isSelected

Name	Type	Direction	Description
isSelected	bool	IN	Selects or deselects a test.

string time

Name	Type	Direction	Description
time	string	IN	The time in seconds which refers to the timeout period.

The time parameter gives the timeout period, that is the time the client is allowed to be locked and idle. After the timeout period if the client is still idle, it gets unlocked.

The time parameter should be a positive integer. Else, the client is prompted to provide a valid timeout period.

bool_verbose

Name	Type	Direction	Description
_verbose	bool	IN	Specifies whether thec verbose mode should be turned ON or OFF.

NOTE. *When the session is stopped, the client is prompted to stop the session and is stopped at the consent.*

string filePath

Name	Type	Direction	Description
filePath	string	IN	The location where the report must be saved in the client.

NOTE. *If the client does not provide the location to save the report, the report is saved at C:\ProgramFiles.*

NOTE. *When the client is disconnected, the client is automatically unlocked.*

out string caption

Name	Type	Direction	Description
caption	String	OUT	The wait state or error state message sent to you.

out string message

Name	Type	Direction	Description
message	String	OUT	The wait state /error state message to you.

out string[] buttonTexts

Name	Type	Direction	Description
buttonTexts	string array	OUT	An array of strings containing the possible response types that you can send.

string response

Name	Type	Direction	Description
response	string	IN	A string containing the response type that you can select (it must be one of the strings in the string array buttonTexts).

out string clientID

Name	Type	Direction	Description
clientID	String	OUT	Identifier of the client that is connected to the server. clientID = unique number + ipaddress of the client. For example, 1065–192.157.98.70

Connect Through an IP Address

Table 25: Connect through an IP address

Command name	Parameters	Description	Return Value	Example

Connect()	string ipAddress
	out string clientID
		This method connects the client to the server.
		Note
		The client provides the IP address to connect to the server.
		The server provides a unique client identification number when connected to it.
			Return value is either True or False.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as boolean
				returnval = m_Client.Connect(ipaddress,m_clientID)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Lock the Server

Table 26: Lock the server

Command name	Parameters	Description	Return Value	Example
LockSession()	string clientID	This method locks the server. Note The client must call this method before running any of the remote automations. The server can be locked by only one client.	String value that gives the status of the operation after it has been performed. The return value is "Session Locked..." on success.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval = m_Client.LockServer(clientID)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Disable the Popups

Table 27: Disable the popups

Command name	Parameters	Description	Return Value	Example
SetVerboseMode()	string clientID bool _verbose	This method sets the verbose mode to either true or false. When the value is set to true, then any of the message boxes appearing during the application will be routed to the client machine which is controlling TekExpress. When the value is set to false, then all the message boxes are shown on the server machine.	String that gives the status of the operation after it has been performed. When Verbose mode is set to true, the return value is "Verbose mode turned on. All dialog box will be shown to client ...". When Verbose mode is set to false, the return value is "Verbose mode turned off. All dialog box will be shown to server ...".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string **Verbose mode is turned on** return=m_Client.SetVerbose-Mode(clientID, true) **Verbose mode is turned off** returnval=m_Client.SetVerbose-Mode(clientID, false)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Set or Get the DUT ID

Table 28: Set or Get the DUT ID

Command name	Parameters	Description	Return Value	Example
SetDutId()	string clientID string dutName	This method changes the DUT ID of the set up. The client must provide a valid DUT ID.	String that gives the status of the operation after it has been performed. Return value is "DUT Id Changed..." on success.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string return=m_Client.SetDutId(clientID,desiredDutId) Note
GetDutId()	string clientID string dutId	This method gets the DUT ID of the current set up.	String that gives the status of the operation after it has been performed.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string return=m_Client.GetDutid(clientID, out DutId)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Set the Configuration Parameters for a Suite or Measurement

Table 29: Set the configuration parameters for a suite or measurement

Command name	Parameters	Description	Return Value	Example
SetGeneralParameter()	string clientID string device string suite string test string parameterString	This method sets the general parameters that are not specific to any given suite or measurement. ***NOTE.*** *Using this command we can select a lane, channel, or source type.*	String that gives the status of the operation after it has been performed. The return value is "" (an empty String) on success.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string Lane Selection Lane Deselection Select Channel Select Source Type (Differential) Select Source Type (Single Ended)
SetAnalyzeParameter()	string clientID string device string suite string test string parameterString	This method sets the configuration parameters in the Analyze panel of the Configuration Panel dialog box for a given suite or measurement.	The return value is "" (an empty String) on success.	m_Client = new Client() //m_Clientis a reference to the Client class in the Client DLL returnval as string Configure Droop Configure Power Spectral Density Configure Linearity Configure Clock Frequency Configure Jitter-Master Configure Jitter-Slave Configure Return Loss
SetAcquireParameter()	string clientID string device string suite string test string parameterString	This method sets the configuration parameters in the Analyze panel of the Configuration Panel dialog box for a given suite or measurement.	returnVal = remoteObject.SetAcquireParameter(id, device, suite, test, parameterString) if ((OP_STATUS) returnVal != OP_STATUS.SUCCESS) return CommandFailed(returnVal)	Currently there are no acquisitions parameters for XGbT, hence this is not applicable.

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Lane Selection Example

returnval=mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane A$Included")

Lane Deselection Example

returnval=mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane A$Excluded")

Select Channel Example

returnval=mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane AConnected to$Channel 1")

Select Source Type (Differential) Example

returnval=mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Source Type$Differential")

Select Source Type (Single Ended) Example

returnval=mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Source Type$Single Ended")

Query the Configuration Parameters for a Suite or Measurement

Table 30: Query the configuration parameters for a suite or measurement

Command name	Parameters	Description	Return Value	Example

GetGeneralParameter()	string clientID
	string device
	string suite
	string test
	string parameterString
		This method gets the general configuration parameters for a given suite or measurement.	The return value is the general configuration parameter for a given suite or measurement that is set.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Lane Selection
				Lane Deselection
				Select Channel
				Select Source Type (Differential)
				Select Source Type (Single Ended)

GetAnalyzeParameter()	string clientID
	string device
	string suite
	string test
	string parameterString
		This method gets the configuration parameters set in the Analyze panel of the Configuration Panel dialog box for a given suite or measurement.	The return value is the configuration parameter set in the Analyze panel of the Configuration Panel dialog box for a given suite or measurement.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Configure Droop
				Configure Power Spectral Density
				Configure Linearity
				Configure Clock Frequency
				Configure Jitter-Master
				Configure Jitter-Slave
				Configure Return Loss

GetAcquireParameter()	string clientID string device string suite string test string parameterString	This method gets the configuration parameters set in the Acquire panel for a given suite or measurement.	The return value is the configuration parameter set in the Acquire panel for a given suite or measurement.	Currently there are no acquisitions parameters for XGbT, hence this is not applicable.

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Lane Selection Example

returnval=mClient.GetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane A$Included")

Lane Deselection Example

returnval=mClient.GetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane A$Excluded")

Select Channel Example

returnval=mClient.GetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane AConnected to$Channel 1")

Select Source Type (Differential) Example

returnval=mClient.GetGeneralParameter(clientID, "Device", "Suite", "Droop", "Source Type$Differential")

Select Source Type (Single Ended) Example

returnval=mClient.GetGeneralParameter(clientID, "Device", "Suite", "Droop", "Source Type$Single Ended")

Droop Configure Parameter Examples

Table 31: Droop configure parameter examples

Parameter	Example
Ref levels	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Ref Levels")
MidLevel	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "MidLevel")
Hysteresis	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Hysteresis")
Start time [ns]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Start time [ns]")
End time [ns]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "End time [ns]")
Population	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Population")

Power Spectral Density Configure Parameter Examples

Table 32: Power Spectral Density configure parameter examples

Parameter	Example
PSD Start Frequency [MHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Start Frequency [MHz]")
PSD Resolution Bandwidth [MHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Resolution Bandwidth [MHz]")
PSD Stop Frequency [MHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Stop Frequency [MHz]")
Power Level Start Frequency [MHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "Power Level Start Frequency [MHz]")
Power Level Stop Frequency [MHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "Power Level Stop Frequency [MHz]")

Linearity Configure Parameter Examples

Table 33: Linearity configure parameter examples

Parameter	Example
Start Frequency [KHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Start Frequency [KHz]")
Stop Frequency [KHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Stop Frequency [KHz]")
Resolution Bandwidth [KHz]	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Resolution Bandwidth [KHz]")

Clock Frequency Configure Parameter Examples

Table 34: Clock Frequency configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "Ref Levels")
MidLevel	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "MidLevel")
Hysteresis	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "Hysteresis")

Jitter-Master Configure Parameter Examples

Table 35: Jitter-Master configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Ref Levels")
MidLevel	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "MidLevel")
Hysteresis	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Hysteresis")
Apply Filter	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Apply Filter")

Jitter-Slave Configure Parameter Examples

Table 36: Jitter-Slave configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Ref Levels")
MidLevel	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "MidLevel")
Hysteresis	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Hysteresis")
Apply Filter	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Apply Filter")

Return Loss Configure Parameter Examples

Table 37: Return Loss configure parameter examples

Parameter	Example
Acquisition Averages	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Return Loss", "Acquisition Averages")
Smooth Averaging	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Return Loss", "Smooth Averaging")

Select a Measurement

Table 38: Select a measurement

Command name	Parameters	Description	Return Value	Example

SelectTest()	string clientID
	string device
	string suite
	string test
	bool isSelected
		This method selects or deselects a given test.
		Setting parameter isSelected to true, you can select a measurement.
		Setting parameter isSelected to false, you can deselect a measurement.
			String that displays the status of the operation after it has been performed.
			The return value is "" (an empty String) on success.
				m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Select Measurement (Droop):
				returnval=m_Client.SelectTest(clientID, "Device", "Suite", "Droop", true)
				Select Measurement (Power Spectral Density):
				returnval=mClient.SelectTest(clientID, "Device", "Suite", " Linearity->Tone-2", True)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Select a Suite

Table 39: Select a suite

Command name	Parameters	Description	Return Value	Example

SelectSuite()	string clientID
	string device
	string suite
	bool isSelected
		This method selects or deselects a given suite.
		Setting parameter isSelected to true, you can select a suite.
		Setting parameter isSelected to false, you can deselect a suite.
			String that gives the status of the operation after it has been performed.
			The return value is "" (an empty String) on success.
				m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Select Suite (Default):
				returnval=m_Client.Select-Suite(clientID, "Device", "Suite", true)
				Select Calibration Suite:
				returnval=mClient.SelectTest(cli-entID, "Device", "Calibration", true)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Configure the Selected Measurement

Droop Configure Parameter Examples

Table 40: Droop configure parameter examples

Parameter	Example
Ref levels	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Ref Levels$Absolute")
MidLevel	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "MidLevel$50")
Hysteresis	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Hysteresis$5")
Start time [ns]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Start time [ns]$10")
End time [ns]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "End time [ns]$90")
Population	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Population$1000")

Power Spectral Density Configure Parameter Examples

Table 41: Power Spectral Density configure parameter examples

Parameter	Example
PSD Start Frequency [MHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Start Frequency [MHz]$1")
PSD Resolution Bandwidth [MHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Resolution Bandwidth [MHz]$1")
PSD Stop Frequency [MHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "PSD Stop Frequency [MHz]$3000")
Power Level Start Frequency [MHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "Power Level Start Frequency [MHz]$1")
Power Level Stop Frequency [MHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Power Spectral Density", "Power Level Stop Frequency [MHz]$3000")

Linearity Configure Parameter Examples

Table 42: Linearity configure parameter examples

Parameter	Example
Start Frequency [KHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Start Frequency [KHz]$1000")
Stop Frequency [KHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Stop Frequency [KHz]$400000")
Resolution Bandwidth [KHz]	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Linearity", "Resolution Bandwidth [KHz]$20")

Clock Frequency Configure Parameter Examples

Table 43: Clock Frequency configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "Ref Levels$Absolute")
MidLevel	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "MidLevel$50")
Hysteresis	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Clock Frequency", "Hysteresis$5")

Jitter-Master Configure Parameter Examples

Table 44: Jitter-Master configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Ref Levels$Absolute")
MidLevel	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "MidLevel$50")
Hysteresis	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Hysteresis$5")
Apply Filter	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Apply Filter$True")

Jitter-Slave Configure Parameter Examples

Table 45: Jitter-Slave configure parameter examples

Parameter	Example
Ref Levels	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Ref Levels$Absolute")
MidLevel	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "MidLevel$50")
Hysteresis	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Hysteresis$5")
Apply Filter	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Apply Filter$True")

Return Loss Configure Parameter Examples

Table 46: Return Loss configure parameter examples

Parameter	Example
Acquisition Averages	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Return Loss", "Acquisition Averages$10")
Smooth Averaging	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Return Loss", "Smooth Averaging$5")

Run with Set Configurations or Stop the Run Operation

Table 47: Run with set configurations or Stop the run operation

Command name	Parameters	Description	Return Value	Example
Run()	string clientID	Runs the selected measurements. Note Once the server is set up and is configured, it can be run remotely using this function.	String that gives the status of the operation after it has been performed. The return value is "Run started..." on success.	m_Client = new Client() //m_Clientis a reference to the Client class in the Client DLL returnval as string returnval=m_Client.Run(clientID)
Stop()	string clientID	Stops the currently running measurements. Note	String that gives the status of the operation after it has been performed. The return value is "Stopped..." on success.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.Stop(clientID)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Get or Set the Timeout Value

Table 48: Get or Set the Timeout value

Command name	Parameters	Description	Return Value	Example
GetTimeOut()	string clientID	Returns the current timeout period set by the client.	String that gives the status of the operation after it has been performed. The default return value is 1800000.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.GetTime-Out()
SetTimeOut()	string clientID string time	Sets a timeout period specified by client. After expiry of this timeout period, the server is automatically unlocked.	String that gives the status of the operation after it has been performed. On success the return value is "TimeOut Period Changed".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.SetTime-Out(clientID, desiredTimeOut)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Wait for the Test to Complete

The commands in this group are executed while tests are running. The GetCurrentStateInfo() and SendResponse() commands are executed when application is running and in wait state.

Table 49: Wait for the test to complete

Command name	Parameters	Description	Return Value	Example
ApplicationStatus()	string clientID	This method gets the status of the server application. The states at a given time are Ready, Running, Paused, Wait, or Error.	String value that gives the status of the server application.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.ApplicationStatus(clientID)

QueryStatus()	string clientID
	out string[] status
		It is an interface for the user to transfer Analyze panel status messages from the server to the client.	String that gives the status of the operation after it has been performed.
			On success the return value is "Transferred...".
				m_Client = new Client()
				//m_Client is a reference to the Client class in the Client DLL
				returnval as string
				returnVal=m_Client.QueryStatus(clientID, out statusMessages)
				if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
				return "Status updated..."
				else
				return CommandFailed(returnVal)

Table 49: Wait for the test to complete (cont.)

Command name	Parameters	Description	Return Value	Example
GetCurrentState-Info() ***NOTE.*** *This command is used when the application is running and is in the wait or error state.*	string clientID out string caption out string message out string[] buttonTexts	This method gets the additional information of the states when the application is in Wait or Error state. Except client ID, all the others are out parameters.	This command does not return any value. This function fills up the out parameters that are passed when invoking this function.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL m_Client.GetCurrentState-Info(clientID, caption,message, buttonTexts)

SendResponse()
NOTE. *This command is used when the application is running and is in the wait or error state.*
	string clientID
	out string caption
	out string message
	string response
		After receiving the additional information using the method GetCurrentState-Info(), the client can decide on the response to send and send the response to the application using this function.The response should be one of the strings that was earlier received as a string array in the GetCurrentState-Info function.The _caption and _message should match the information received earlier in the GetCurrentStateInfo function.	This command does not return any value.	m_Client = new Client()
				//m_Client is a reference to the Client class in the Client DLL
				m_Client.SendResponse(clientID, caption,message, response)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

After the Test is Complete

Table 50: After the test is complete

Command name	Parameters	Description	Return Value	Example

GetPassFailStatus()	string clientID
	string device
	string suite
	string test
		This method gets the pass or fail status of the measurement after test completion.
		NOTE. *Execute this command after completing the measurement.*
			String that gives the status of the operation after it has been performed.
			Returns the pass or fail status in the form of a string.
				m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				returnval=m_Client.GetPassFailStatus(clientID, device, suite, "Droop") //Pass or Fail

GetResultsValue()	string clientID
	string device
	string suite
	string test
	string parameterString
		This method gets the result values of the measurement after the run.	String that gives the status of the operation after it has been performed.
			Returns the result value in the form of a string.
				m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as srting
				returnval=m_Client.GetResultsValue(clientID, "Device", "Suite", "Droop", "Lane AResults")

Table 50: After the test is complete (cont.)

Command name	Parameters	Description	Return Value	Example

GetResultsValue-ForSubMeasure-ments()	string clientID
	string device
	string suite
	string test
	string parame-terString
	int rowNr
		This method gets the result values for individual sub-measurements, after the run.	String that gives the status of the operation after it has been performed.
			Returns the result value in the form of a string.
				m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Droop Positive
				returnval=m_Client.GetRe-sultsValueForSubMeasure-ments(clientID, "Device", "Suite", "Droop", "Lane ARe-sults",0)
				Linearity Tone 4
				returnval=m_Client.GetRe-sultsValueForSubMeasure-ments(clientID, "Device", "Suite", "Linearity", "Lane BRe-sults",3)

GetReportParame-ter()	string clientID
	string device
	string suite
	string test
	string parame-terString
		This method gets the general report details such as oscilloscope model, TekExpress version, and XGbT version.	The return value is the oscilloscope model, TekExpress version, and XGbT version.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL
				returnval as string
				Oscilloscope Model
				returnval=m_Client.GetRe-portParameter(clientID,"Scope Model")
				TekExpress Version
				returnval=m_Client.GetReport-Parameter(clientID,"TekExpress Version")
				XGbT Version
				returnval=m_Client.GetRe-portParameter(clientID,"XGbT Version")

Table 50: After the test is complete (cont.)

Command name	Parameters	Description	Return Value	Example
TransferReport()	string clientID string filePath	This method transfers the report generated after the run. The report contains the summary of the run. The client must provide the location where the report is to be saved at the client-end.	String that gives the status of the operation after it has been performed. Transfers all the result values in the form of a string.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.TransferReport(clientID,"C:\Report")
TransferWaveforms()	string clientID string filePath	This method transfers all the waveforms from the folder for the current run. ***NOTE.*** *For each click of Run button, a folder is created in the X: drive. Transfer the waveforms before clicking the Run button.*	String that gives the status of the operation after it has been performed. Transfers all the waveforms in the form of a string. On success the return value is "Transferred...".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.TransferWaveforms(clientID,"C:\Waveforms")
TransferImages()	string clientID od string filePath	This method transfers all the images (screenshots) from the folder for the current run (for a given suite or measurement). ***NOTE.*** *For each click of Run button, a folder is created in the X: drive. Transfer the waveforms before clicking the Run button.*	String that gives the status of the operation after it has been performed. Transfers all the images in the form of a string.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.TransferImages(clientID, "C:\Waveforms")

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

string parameterString

Name	Type	Direction	Description
parameterString	string	IN	Specifies the oscilloscope model, TekExpress version, and XGbT version.

Save, Recall, or Check if a Session is Saved

Table 51: Save, Recall, or Check if a session is saved

Command name	Parameters	Description	Return Value	Example
CheckSession-Saved()	string clientID out bool saved	This method is called when a check is to be made to know if the current session is saved.	Return value is either True or False.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.Check-SessionSaved(m_clientID, out savedStatus)
RecallSession()	string clientID string name	Recalls a saved session. The name of the session is provided by the client.	String that gives the status of the operation after it has been performed. The return value is “Session Recalled...”.	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.RecallSes-sion(clientID, savedSession-Name)
SaveSession()	string clientID string name	Saves the current session. The name of the session is provided by the client.	String that gives the status of the operation after it has been performed. The return value is "Session Saved..."/"Failed...".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.SaveSes-sion(clientID, desiredSession-Name)
SaveSessionAs()	string clientID string name	Saves the current session in a different name every time this method is called. The name of the session is provided by the client.	String that gives the status of the operation after it has been performed. The return value is "Session Saved...".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.SaveSes-sionAs(clientID, desiredSes-sionName)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Unlock the Server

Table 52: Unlock the server

Command name	Parameters	Description	Return Value	Example
UnlockSession()	string clientID	This method unlocks the server from the client. The ID of the client to be unlocked must be provided. Note	String that gives the status of the operation after it has been performed. The return value is "Session Un-Locked...".	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.Unlock-Server(clientID)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Disconnect from the Server

Table 53: Disconnect from the server

Command name	Parameters	Description	Return Value	Example
Disconnect()	string clientID	This method disconnects the client from the server it is connected to. Note	Integer value that gives the status of the operation after it has been performed. 1 for Success –1 for Failure	m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnval as string returnval=m_Client.Discon-nect(m_clientID)

NOTE. *The Fail condition for PI commands occurs in any of the following cases:*

The server is LOCKED and the message displayed is "Server is locked by another client".

The session is UNLOCKED and the message displayed is "Lock Session to execute the command".

The server is NOTFOUND and the message displayed is "Server not found...Disconnect!".

When none of these fail conditions occur, then the message displayed is "Failed...".

Handle Error Codes

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

Value	Code	Description
FAIL	−1	The operation failed.
SUCCESS	1	The operation succeeded.
NOTFOUND	2	Server not found
LOCKED	3	The server is locked by another client, so operation cannot be performed.
UNLOCK	4	The server is not locked. Lock the server before performing the operation.
NULL	0	Nothing

Program Example

This is a reference program to illustrate how to communicate to TekExpress XGbT-10GBASE-T remotely.

A typical application does the following:

1. Start the application.
2. Connect through an IP address.

   `m_Client.Connect("localhost")` 'True or False

   `clientID = m_Client.getClientID`
3. Lock the server.

   `m_Client.LockServer(clientID)`
4. Disable the Popups.

   `m_Client.SetVerboseMode(clientID, false)`
5. Set the Dut ID.

   `m_Client.SetDutId(clientID, "DUT_Name")`
6. Select a source type.

   `mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Source Type$Differntial")` 'Droop measurement selected
7. Select a lane.

   `mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "LaneA$Included")` 'Droop measurement selected

8. Select a measurement.

   ```
   mClient.SelectTest(clientID, "Device", "Suite", "Droop", true) 'Droop measurement selected
   ```

9. Select a channel.

   ```
   mClient.SetGeneralParameter(clientID, "Device", "Suite", "Droop", "Lane AConnected to$Channel 1") 'Droop measurement selected
   ```

10. Configure the selected measurement.

    ```
    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Ref Levels$Percentage") 'Droop measurement selected

    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "MidLevel$40") 'Droop measurement selected

    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Hysteresis$5") 'Droop measurement selected

    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Start Time [ns]$8") 'Droop measurement selected

    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "End Time [ns]$92") 'Droop measurement selected

    mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Droop", "Population$2000") 'Droop measurement selected
    ```

11. Run with set configurations.

    ```
    m_Client.Run(clientID)
    ```

12. Wait for the test to complete.

    ```
    Do

    Thread.Sleep(500)

    m_Client.Application_Status(clientID)

    Select Case status

    Case "Wait"

    'Get the Current State Information

    mClient.GetCurrentStateInfo(clientID, WaitingMsbBxCaption, WaitingMsbBxMes-
    sage, WaitingMsbBxButtontexts)

    'Send the Response

    mClient.SendResponse(clientID, WaitingMsbBxCaption, WaitingMsbBxMessage,
    WaitingMsbBxResponse)

    End Select

    Loop Until status = "Ready"
    ```

13. After the Test is Complete.

    ’Save all results values from folder for current run

    ```
    m_Client.TransferResult(clientID, logDirname)
    ```

    ’Save all waveforms from folder for current run

    ```
    m_Client.TransferWaveforms(clientID, logDirname)
    ```

    ’Save all images from folder for current run

    ```
    m_Client.TransferImages(clientID, logDirname)
    ```

14. Unlock the server.

    ```
    m_Client.UnlockServer(clientID)
    ```

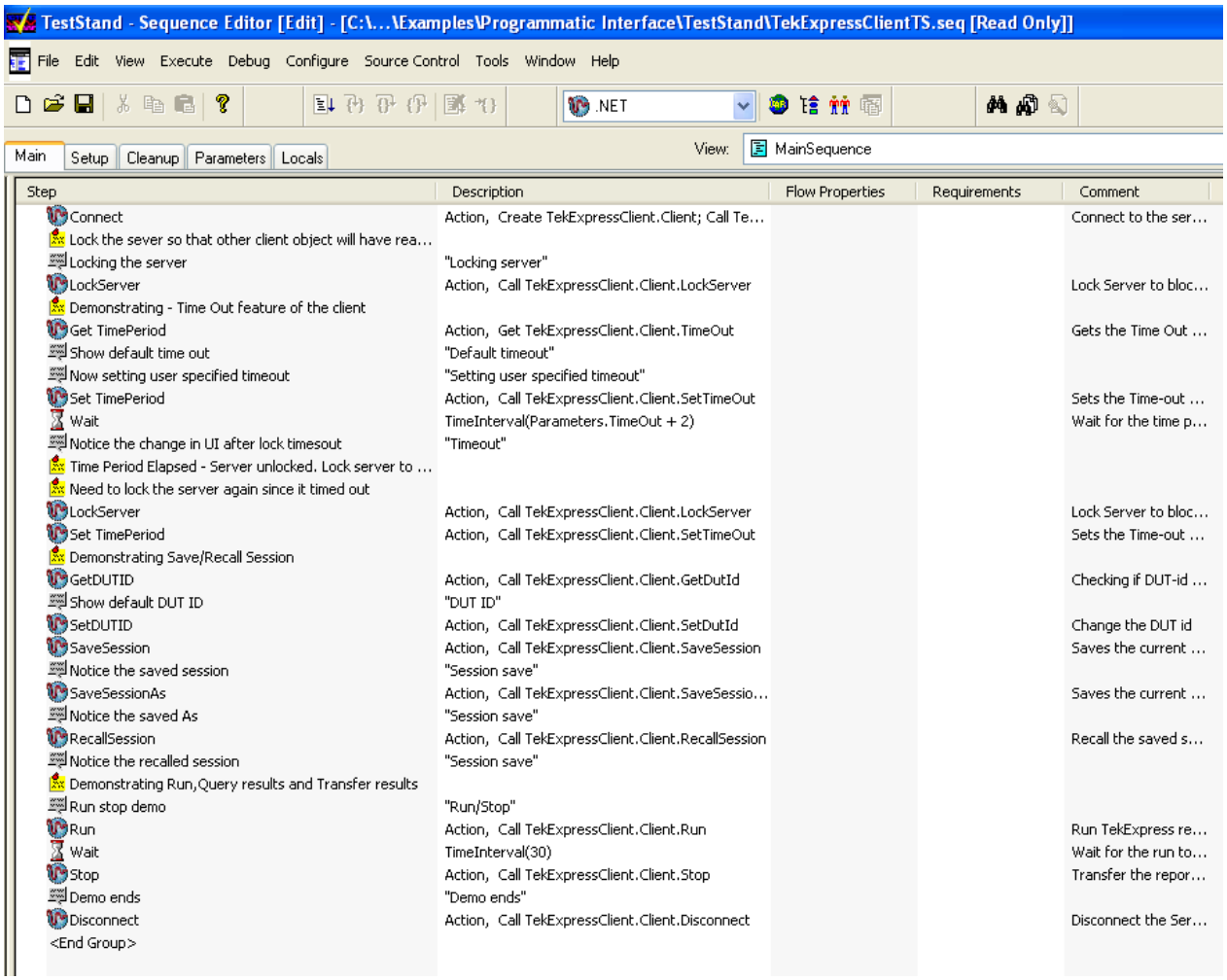
15. Disconnect from server.

    ```
    m_Client.Disconnect()
    ```

16. Exit the application.

NI TestStand Client Example

The following is an example for NI TestStand Client available in the path, `C:\Program Files\Tektronix\TekExpress\TekExpress XGbT-10GBASE-T\Examples\Programmatic Interface\TestStand`


TestStand - Sequence Editor [Edit] - [C:\...\Examples\Programmatic Interface\TestStand\TekExpressClientTS.seq [Read Only]]
File Edit View Execute Debug Configure Source Control Tools Window Help
.NET
Main Setup Cleanup Parameters Locals
View: MainSequence
Step | Description | Flow Properties | Requirements | Comment
Connect | Action, Create TekExpressClient.Client; Call Te... | Connect to the ser...
Lock the sever so that other client object will have rea...
Locking the server | "Locking server"
LockServer | Action, Call TekExpressClient.Client.LockServer | Lock Server to bloc...
Demonstrating - Time Out feature of the client
Get TimePeriod | Action, Get TekExpressClient.Client.TimeOut | Gets the Time Out ...
Show default time out | "Default timeout"
Now setting user specified timeout | "Setting user specified timeout"
Set TimePeriod | Action, Call TekExpressClient.Client.SetTimeOut | Sets the Time-out ...
Wait | TimeInterval(Parameters.TimeOut + 2) | Wait for the time p...
Notice the change in UI after lock timesout | "Timeout"
Time Period Elapsed - Server unlocked. Lock server to ...
Need to lock the server again since it timed out
LockServer | Action, Call TekExpressClient.Client.LockServer | Lock Server to bloc...
Set TimePeriod | Action, Call TekExpressClient.Client.SetTimeOut | Sets the Time-out ...
Demonstrating Save/Recall Session
GetDUTID | Action, Call TekExpressClient.Client.GetDutId | Checking if DUT-id ...
Show default DUT ID | "DUT ID"
SetDUTID | Action, Call TekExpressClient.Client.SetDutId | Change the DUT id
SaveSession | Action, Call TekExpressClient.Client.SaveSession | Saves the current ...
Notice the saved session | "Session save"
SaveSessionAs | Action, Call TekExpressClient.Client.SaveSessio... | Saves the current ...
Notice the saved As | "Session save"
RecallSession | Action, Call TekExpressClient.Client.RecallSession | Recall the saved s...
Notice the recalled session | "Session save"
Demonstrating Run,Query results and Transfer results
Run stop demo | "Run/Stop"
Run | Action, Call TekExpressClient.Client.Run | Run TekExpress re...
Wait | TimeInterval(30) | Wait for the run to...
Stop | Action, Call TekExpressClient.Client.Stop | Transfer the repor...
Demo ends | "Demo ends"
Disconnect | Action, Call TekExpressClient.Client.Disconnect | Disconnect the Ser...
<End Group>

Measurement Standards

Table 54: Measurement standards

Test name	Purpose	Reference to the standard	What the standard says
Droop	To verify that the transmitter output level does not decay faster than the maximum specified rate.	IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE standard 802.3an-2006, subclause 55.5.3.1, Maximum output droop.	IEEE standard 802.3an-2006, subclause 55.5.2: Configure the DUT for test mode 6 operation. IEEE standard 802.3an-2006, subclause 55.5.3.1: Maximum output droop provides a specification for the maximum allowable droop for the transmitter. The resulting magnitude of both the positive and negative droop shall be less than 10%.
Power Spectral Density	To verify that the transmitter power level and power spectral density are within the conformance limits.	IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE standard 802.3an, subclause 55.5.3.4, Transmitter PSD and power level.	IEEE standard 802.3an, subclause 55.5.2: Configure the DUT for test mode 5 operation. The transmit power shall be between 3.2 dBm and 5.2 dBm. The power spectral density, measured into 100 Ω, shall fit within the upper and lower masks.
Linearity	To verify that the output of the transmitter conforms to the transmitter linearity mask.	IEEE standard 802.3an-2006, subclause 55.5.2, Test Modes. IEEE standard 802.3an, subclause 55.5.3.2, Transmitter linearity.	IEEE standard 802.3an-2006, subclause 55.5.2: Configure the DUT for test mode 4 operation. The SFDR of the transmitter when subjected to single tone inputs produce an output peak-to-peak transmit amplitude meets the requirement: SFDR ≥ 2.5 + min{52,58 − 20 * log (f/25)} Where f is the maximum frequency of the two test tones in MHz SFDR (in dB) is the ratio of the minimum RMS value of either input tone to the RMS value of the worst intermodulation product in the frequency range of 1 to 400 MHz.

Table 54: Measurement standards (cont.)

Test name	Purpose	Reference to the standard	What the standard says
Clock Frequency	To verify that the frequency of the Transmit Clock is within the conformance limits.	IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE Std 802.3an-2006, clause 55.5.3.5, Transmit clock frequency.	IEEE standard 802.3an-2006, subclause 55.5.2: Configure the DUT for test mode 2 operation. The IEEE Std 802.3an-2006, clause 55.5.3.5: The 10GBase-T devices when operating in Master timing mode must have a quinary symbol transmission rate of 800.00 MHz ± 50 ppm. The IEEE Std 802.3an-2006, clause 55.5.3.5: The frequency of the reference clock that is extracted from the transmitted waveform has a base frequency of 800 MHz ± 50 ppm.
Jitter-Master	To verify that the transmitter timing jitter of the PMA is within the conformance limits.	IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE standard 802.3an-2006, subclause 55.12.6, Item PME21 (Master).	The IEEE standard 802.3an-2006, subclause 55.5.2: Configure the DUT for transmitter test mode 2 operation. The IEEE standard 802.3an-2006, subclause 55.5.3.3: Transmit timing jitter the RMS period jitter (for a integration time interval of 1 ms ± 10%) is the root mean square period difference from the average period (T – Tavg) that is accumulated over a sample size of 200,000 ± 20,000.
Jitter-Slave	To verify that the transmitter timing jitter of the PMA is within the conformance limits.	IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE standard 802.3an-2006, subclause 55.12.6, Item PME22 (Slave).	For a PHY supporting loop timing mode, the SLAVE PHY is in test mode 3. The SLAVE must synchronize its transmit clock to the signals received from the MASTER PHY. The RMS period jitter measured at the SLAVE PHY MDI output shall be less than 5.5 ps.
Return Loss	To measure the return loss at the MDI for all four channels	IEEE Std 802.3an-2006, subclause 55.5.3 – Test modes. IEEE Std 802.3an-2006, subclause 55.8.2.1 – MDI return loss.	Set the DUT to test mode 4 Tone 1. Specifies that the Return Loss (reflected power) at the MDI must be at least 16 dB less than the incident power over the range of 1.0 MHz to 40 MHz. The return loss must be at least 16 dB (10*log10(f /40)) from 40 MHz to 400 MHz and at least 6 dB (30*log10(f /400)) from 400 MHz to 500 MHz (where f is in MHz).

Table 54: Measurement standards (cont.)

Shortcut Keys

The following table lists the short cut keys to access the application:

Table 55: Shortcut keys

Menu	Shortcut keys
File	Alt + F
New Session	Ctrl + N
Open Session	Ctrl + O
Save Session	Ctrl + S
Save Session As	Alt + F + A
Save Report As	Alt + F + R Ctrl + R
Print Preview Report	Alt + F + V Ctrl+ V
Print Report	Ctrl + P
Exit	Ctrl + X
View	Alt + V
Log	Ctrl + L
Tools	Alt + T
Instrument Bench	Ctrl + I
Help	Alt + H
TekExpress Help (F1)	Alt + H + H
About TekExpress	Alt + H + A

Error Codes for XGbT

The following table lists the error codes and their descriptions:

Table 56: Error Codes for XGbT

Error code	Error message	Description	Possible solution
50101	Insufficient number of edges	The combination of Mid Level and Hysteresis values are such that the measurement does not find any edges.	Set the Mid level close to 50% (in Percentage option) or 0 (in Absolute) and Hysteresis close to 3% (in Percentage option) or 0.03 (in Absolute option).

Table 56: Error Codes for XGbT (cont.)

Error code	Error message	Description	Possible solution
50102	Start time is after the stop time	The stop time of the measurement is before the start time of the measurement. The user should check the start and stop time values.	Make sure that the start time value is smaller than the stop time.
50103	Data points are less than the number of peaks required	The user should check the start frequency, stop frequency and resolution bandwidth setting. If the waveform does not have enough frequencies between the start and stop frequency, this error will occur.	Set the Start Frequency, Stop Frequency, and Resolution Bandwidth such that (Start Frequency - Stop Frequency)/Resolution Bandwidth >= 3.
50104	Start frequency is greater than stop frequency	The stop frequency of the measurement should be higher than the start frequency. The user should check the start and stop frequency values.	Make sure that the start frequency is smaller than the stop frequency.
50105	Data points insufficient for average filtering	The number of data points in the waveform are too few for average filtering. This problem can occur when there are not many frequency values between the start and stop frequency.	Increase the Sample Rate.
50106	Invalid Linearity Signal	Incorrect signal is used for the Linearity test.	Connect to the appropriate Linearity signal.
50107	Invalid Path	The intermediate files required by the algorithm library are not stored in the correct path.	Return Loss measurement is not able to find calibration data. Check if the X: is available for read and write.
50108	Negative spacing between output data points	The interpolated points have negative spacing between them. This error will not occur under normal run conditions.	Make sure smooth averaging is ≥ 0.
50109	Data length should be positive	The smooth averaging is < 0.	Make sure smooth averaging is ≥ 0.
50110	Averaging filter length should be a positive integer	The smooth averaging is < 0.	Make sure smooth averaging is ≥ 0.

Table 56: Error Codes for XGbT (cont.)

Error code	Error message	Description	Possible solution
50111	Waveform file not found + WAVEFORM NAME	This error occurs when the input waveform required for the measurement is not available.	Ensure that the input waveform required for the measurement is present in the correct session folder.
59999	Unknown error	Incorrect signal is used for the test.	Check the input signal and provide correct input signal.

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