# TekExpress® XGbT-10GBASE-T Automated Solution Online Help





077-0348-03

TekExpress® XGbT-10GBASE-T Automated Solution Online Help





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

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- 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.

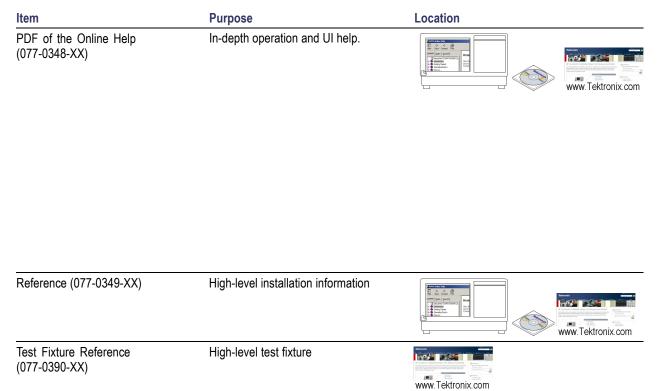
**TIP.** If topics include expanding or drop-down hot spot, click the hotspots to display the information before you print.

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**



#### 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

lcon	Meaning	
Anna an Anna an Anna an Anna an Anna an Anna an Anna an	This icon identifies important information.	
$\bigwedge$	This icon identifies conditions or practices that could result in loss of data.	
<b>@</b>	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.
- Vour 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
DP07354	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
	Tektronix TDP3500 - A minimum of one and a maximum of four are required.	minimum of two 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,
	P7350SMA, P7380SMA, and P7313SMA - A minimum of one and a maximum of four are required.	and P7380A - A minimum of two are required.

Table 3: Recommended probes (cont.)

# **Minimum System Requirements**

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

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 <sup>1</sup> .	
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.	
	<ul> <li>Adobe Reader 6.0 or equivalent software for viewing portable document format (PDF) files.</li> </ul>	
Other Devices	Microsoft compatible mouse or compatible pointing device.	
	Four USB ports (two USB ports minimum).	
	PCI-GPIB or equivalent interface for instrument connectivity <sup>2</sup> .	

#### Table 4: System requirements

- 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.
- 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:

Bin
🚞 Compliance Suites
🚞 Data Manager
🚞 Data Storage
🚞 Documents
🚞 Examples
🚞 ICP
🚞 Lib
🚞 Report Generator
🚞 SCP
🚞 Tools

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	Includes instrument and application specific interface libraries of
\TekExpress\SCP	the XGbT application.
\TekExpress\ICP	
\TekExpress\Documents	Includes the Method of Implementation documents and technical documentation for the application.
\TekExpress\Data Manager	Includes the result management specific libraries of the XGbT
\TekExpress\Data Storage	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:

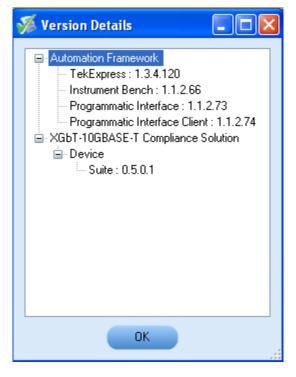
#### Table 6: File name extensions

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.

🚿 TekExpress XGbT-10GBASE-T End-User Licen 🔳	
TEKTRONIX SOFTWARE LICENSE AGREEMENT THE ENCLOSED OR ACCOMPANYING PROGRAM IS FURNISHED SUBJECT TO THE TERMS AND CONDITIONS OF THIS AGREEMEN USE OF THE PROGRAM IN ANY MANNER, DOWNLOADING AND UNPACKING THE PROGRAM FROM ITS COMPRESSED STATE OR INSTALLING THE PROGRAM FROM A CD WILL BE CONSIDERED ACCEPTANCE OF THE AGREEMENT TERMS. IF THESE TERMS AF NOT ACCEPTABLE, THE UNUSED PROGRAM AND ANY ACCOMPANYING DOCUMENTATION SHOULD BE RETURNED PROMPTLY TO TEKTRONIX FOR A REFUND OF ANY LICENSE FEE	RE
PAID FOR THE PROGRAM. DEFINITIONS. "Program" means the software program accompanying this Agreement. "Customer" means the person or organization that downloaded the Program or to whom the Program was otherwise furnished by Tektronix.	>
Print Clos	e

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.

¥	License Info				
	TekExpress XGbT-10GBASE-T compliance solution supports following options. This dialog allows user to activate/reactivate one or more of following options depending upon license keystring and available USB dongle.				
	Options	Status			
	10GBASE-T	Active			
	License Key 4EN8J-JFFGG-0C390-607K7-6B8AU-KP				
		Reactivate Close			

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.

 $\triangle$ 

**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. <u>Map</u> 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, <u>Signal Path Compensation (SPC)</u> 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.

My TekExpress Properties ? 🔀
General Sharing Security Web Sharing Customize
My TekExpress
Advanced Attributes 🛛 🛛 🔀
Choose the settings you want for this folder When you apply these changes you will be asked if you want the changes to affect all subfolders and files as well.
Archive and Index attributes
Folder is ready for archiving
For fast searching, allow Indexing Service to index this folder
Compress or Encrypt attributes
Compress contents to save disk space
Details
OK Cancel
OK Cancel Apply
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<sup>TM</sup>.
- Previous versions of TekExpress use NI LabVIEW<sup>TM</sup> 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 Me 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.

DUTID	DUT001	Run	Stop
DOTID		- Tour	0.0p

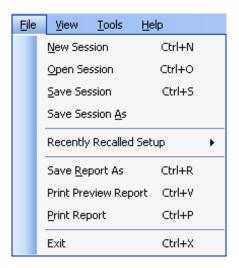
### Table 7: Global controls

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.
- <b>I</b>	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.
Run Stop	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

Function
Starts a default session of 10GBASE-T.
Opens a saved session.
Saves the session.
Saves a session in a different name.
Recalls the recently saved setup.
Saves the report in user specified location.
Previews the report before printing.
Opens the Windows "Print" dialog box.
Closes the application.

## **View Menu**

Click View on the application menu bar.

View	Tools	Help
LZ L	og C	itrl+L

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.

R	ols	Help		
4	Ir	nstrument Bench	Ctrl+I	
	E	-mail Settings	Ctrl+E	
Return Loss Calibration				

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:

		📃 Serial			TekVISA 300
📃 TekLink	📃 USB	📃 VXI	📃 Non - VISA Reso		Timeout
Retrieved Instr	ruments (2)				
Connection Re	esource	Serial No	Options	Resource Address	
/ISA-GPIB DS/	A70404	Q006	10×L	GPIB8::1::INSTR	
ISA-LAN DP	07354	Q370	2RL:	TCPIP::134.64.235.8	1::INSTR

### **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.

🚿 Email Settings		×
Mandatory Fields Recipient Email Address		
SMTP Server	(Separate multiple email addresses with a comma) Sender's Address	
Add Email Attachments Report Scorecard Analysis Screenshot Status Message Log	: a: ● Last 20 Lines of log only ○ Full Log	
	HTML       Plain Text         1       Maximum Email Size (MB)         5       1         to Send       1         Password       Host Name	
📃 E-Mail Test Results W	/hen Complete or on Error Test E-mail Save Close	

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.

🚿 Return	Loss Calibration 🛛 🔀
2	Do you want to perform calibration now or use calibration files from a previous calibration?
	Live Calibration Use Files

Use the Return Loss Calibration to do the following:

- Perform <u>live calibration</u> for the Return Loss measurement.
- Perform calibration <u>using the files</u> of the earlier calibration for the Return Loss measurement.

## **Help Menu**

Click Help on the application menu bar.

Help	D			
	1	TekExpress Help	F1	
	Ą	About TekExpress		
	Ą	Activate License		

### 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.

🚿 TekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (Untitled)*	
File View Tools Help	
DUT ID DUT001	Run Stop
Select Acquire Analyze Report	
Source Test Lanes	DUT Automation
<ul> <li>Differential</li> <li>All Lanes</li> </ul>	O Using MDIO
O Single Ended O Select Lane	<ul> <li>Manual</li> </ul>
V Lane A V Lane B V Lane C V Lane D	
Test Measurements	Test Description
<ul> <li>Droop</li> <li>Power Spectral Density</li> <li>Linearity</li> <li>Tone-1</li> <li>Tone-2</li> <li>Tone-3</li> <li>Tone-4</li> <li>Tone-5</li> <li>Clock Frequency</li> <li>Jitter-Master</li> <li>Jitter-Slave</li> <li>Return Loss</li> </ul>	Jitter Slave> (IEEE Std 802.3an-2006 section 55.5.3.3):For DUT supporting loop timing mode, the MASTER PUT is set to test mode 1 and the SLAVE DUT is set to test mode 3. Transmitter Timing Jitter computes root mean square of the period Jitter. The RMS period jitter <u>Click to view image of the waveform</u> <u>Configure</u> <u>Show Schematic</u> <u>Select All</u>
	The
TekExpress launched successfully.	Tektronix <sup>.</sup>

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
Configure	Opens the configuration panel for the selected test.
Show Schematic	Opens the schematic for the selected test. This is useful if you want to verify the test setup before running the test.
SelectAll	Selects all tests in the table.
DeselectAl	Deselects all tests in the table.
Calibrate	Performs calibration on the selected lane for the Return Loss measurement.
Re-Calibrate	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. <u>Click here</u> for the options.

% Configuration Panel 🛛 🛛 🔀				
Configuration for Device - Suite				
Parameter Value				
Real Time Scope DSA70404 ( GPIB8::1::INSTR )				
Number of selected lane 1				
Source Type	Differential			
Configuration for Droop				
Parameter Value				
Ref Levels	Percentage			
MidLevel	50			
Hysteresis	5			
Start Time (ns)	10			
End Time (ns)	90			
Population 1000				
Compliance Mode     Default Settings     User Defined Mode     Restore				

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

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.

### Table 13: Button controls on the Configure panel

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

		<u> </u>
Configuration for Device - Suite		
Parameter		Value
Real Time Scope		
Number of selected lane		1
Source Type		Differential
		tion for Droop
	omments	
No Acquisition Parame	ters associated with tr	
Compliance Mode	Default Settings	ß

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.

🚿 Configuration Panel				
	Configuratio	n for Device - Suite		
Parameter		Value		
Real Time Scope		DSA70404 ( GPIB8::1::INSTR	3)	
Number of selected lane		1		
Source Type		Differential		
Acquire Analyze Limits	s Comments	ration for Droop		
Details	s Comments Value1	Compare String	Value2	
Details Droop Positive (%)	s Comments	Compare String GELE (>= <=)	10	
Details	s Comments Value1 0	Compare String		
Details Droop Positive (%)	s Comments Value1 0	Compare String GELE (>= <=)	10	

🔏 Configuration Panel	2
Configuratio	on for Device - Suite
Parameter	Value
Real Time Scope	DSA70404 ( GPIB8::1::INSTR )
Number of selected lane	1
Source Type	Differential
	n for Clock Frequency
Acquire Analyze Limits Comments Parameter	Value
	T dius
	Percentage
Parameter Ref Levels MidLevel	Percentage 50
Ref Levels	
Ref Levels MidLevel	50

## **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.

🔏 TekExpress Instrument Bench									
Search Crit	eria			Refresh					
🗹 LAN	🗹 GPIB	📃 Serial		TekVISA 300 s					
📃 TekLi	ink 🗌 USB	📃 VXI	📃 Non - VISA Reso	Timeout					
Retrieved I	nstruments (2)								
Connection	Resource	Serial No	Options	Resource Address					
VISA-GPIB	DSA70404	Q006	10×L	GPIB8::1::INSTR					
VISA-LAN	DP07354	Q370	2RL:	TCPIP::134.64.235.81::INSTR					
, Last Update	d June 30, 2009 16:	38:14		Close					

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.

🚿 Configuration Panel								
Configuration for Device - Suite								
Parameter	Value							
Real Time Scope	DSA70404 ( GPIB8::1::INSTR )							
Number of selected lane	1							
Source Type	Differential							
Configuration fo	r Clock Frequency							
Parameter	Value							
Ref Levels	Percentage							
MidLevel	50							
Hysteresis	5							
Compliance Mode     Default Settings								
O User Defined Mode Restore	Apply Close							

**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.

ile ⊻iew <u>T</u> ools <u>H</u> elp		
		DUTID DUT001 Run
elect Acquire Analyze	Report	
		Device : Suite
Acquire Live Waveform		
·		
Use Pre-recorded Run	.: 20090818_01312 🗸	
est Measurement	Status	WaveForm File
quo		
Lane A	Completed acquisition	X:\XGbT-10GBASE-T\180809.run1.p\DUT001\20090818_013128\Droop_LaneA.wfm
Lane B	Completed acquisition	X:\XGbT-10GBASE-T\180809.run1.p\DUT001\20090818_013128\Droop_Lane.B.wfm
wer Spectral Density	Consultate di su su deblica	X:\XGbT-10GBASE-T\180809.run1.pr\DUT001\20090818_013128\PSD_LaneA.wfm
Lane A Lane B	Completed acquisition Completed acquisition	X:VXGb1+T0GBASE+T\180809.run1.pr0/1001/20090818_013128VPSD_LaneB.wfm X:VXGb1+T0GBASE+T\180809.run1.pr\DUT001\20090818_013128VPSD_LaneB.wfm
Larie D	Completed acquisition	A. VAGUT-TUGBASE-T 110000310/11 pro/01/001/20030016_013120/F3D_Lafteb.will
Lane A	Completed acquisition Tone-1	X:\XGbT-10GBASE-T\180809.run1.pr\DUT001\20090818_013128\LaneA_Linearity_Tone-1.wfm
Lane B	Completed acquisition Tone-1	X:\XGbT-10GBASE-T\180809.run1.pr\DUT001\20090818_013128\LaneB_Linearity_Tone-1.wfm
ter-Master		
Lane A	Started acquisition	No waveform selected
Lane B	Started acquisition	
Acquire Step By Step		
8/2009 1:31 AM::Searching f 8/2009 1:31 AM::Found. Valu	or parameter: Number of retries for instrument IO	errors 🗹 Display Status
	or parameter: Time between retries (seconds)	Auto Scroll
8/2009 1:31 AM::Found: Valu	eis:20	
8/2009 1:31 AM::Initializing T 8/2009 1:31 AM::Calibration :		Clear All
8/2009 1:31 AM::Write: "RST		Save Status
8/2009 1:31 AM::Write: HEA	DER 0	
8/2009 1:31 AM::Write: VERI		
	analyze tab	
8/2009 1:31 AM::Executing A		
8/2009 1:31 AM::Executing A		
8/2009 1:31 AM::Executing A		

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\ClockFre- quency_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, <u>click here</u>.

• 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.

🚿 TekExpress XGbT-10GBASE-T Automated Solution (Evaluation	n Version) (LaneA)*
File View Tools Help	
	JT001 👔 Run Stop
Select Acquire Analyze Report	
Acquire Live Waveform Lane A Channel 1 V Lane B	Channel 2 V Lane C Channel 3 V Lane D Channel 4 V
O Use Pre-recorded	
Test Measurement	Status 🛆
Droop	
Lane A	To be started
Lane B	To be started
Lane C	To be started
Lane D	To be started
Power Spectral Density	
Lane A Lane B	To be started View of the
Lane B	To be started
Acquire Step By Step	
	🗹 Display Status
	Auto Scroll
	Clear All
	Save Status
TekExpress launched successfully.	Tektronix

#### 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.				

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.

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

### **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.

TekExpress XGb	T-10GBASE-T Autome	ated Solution (Untitl	ed)*			
<u> i</u> le ⊻iew <u>T</u> ools	Help					
			DUTID DUT00	1		Run Stop
elect Acquire	Analyze Report					
			Device : Suite			Show Pass / I
ane A Overall Tes.	t Result : 🗹 Pass					
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fail
Droop	Test Completed	Droop Positive	0% - 10 %	2.32	7.68 %	✓ Pass
5100p	rest completed	Droop Negative	0%.10%	2.18	7.82 %	↓ 1 dss
TestName	Status	Measurement Droop Positive	Limit	Results	Margin	Pass/Fail
		Droop Positive	0% · 10 %	2.03	7.97 %	
Огоор	Test Completed	Droop Negative	0%.10%	1.25	8.75 %	V Pass
ane C Overall Tes	t Result : 🗹 Pass					
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fal
29/2009 5:01 PM::Set 29/2009 5:01 PM::Set 29/2009 5:01 PM::Set 29/2009 5:01 PM::Set 29/2009 5:01 PM::Sta	rted acquisition mpleted Droop-Device test nerating Tek Report	IR · · · · · · · · ·				splay Status uto Scroll Dear All ve Status

#### 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.

🖇 TekExp			ASE-T Automated	Solution (	Untitled)*							
<u>F</u> ile ⊻iew	Tools	Help										
					DUT	ID DUT	101				Run	Stop
Select	Acquire	Analyze	Report									
					Dev	ice : Suite						
Tek	tro	nix <sup>.</sup>				TekEx	press	Automat	tion Framev	vork		^
Enabling	Innovatio	'n			XG	ibT Si	gnal	Chara	cteristics	Test Re	eport	
	Da	DUT ID : te/Time :	DUT00 6/29/09 17:0	1 De 1 Exec	evice Type : ution Time :		Т	ransmitter 4 Min	Compliance Overall Tes			_
		pe Model : on Status :	DSA70404 PASS;PASS		Serial Number : press Version :					e F/W Version : _ XGbT Version :		_
Lane-A :												
Т	est Nam	e	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution Time	Comm	ent
Clock Fr	equency		Clock Frequency	-	-	-	ppm	-	-	-	-	_
Droop			Droop Positive Droop Negative	0.00	2.32 2.18	10.00 10.00	%	Pass Pass	TRUE	1 Min		
			Linearity Tone-1 Linearity Tone-2	-	-	-		-				~
<   « < > » [[	Report Si	ummary [	Lane A Lane B I	ane C L	ane D							>
kExpress la	unched su	cessfully.									Tektro	onix

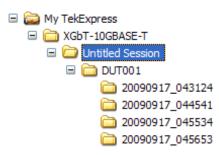
### **View Test Related Files**

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

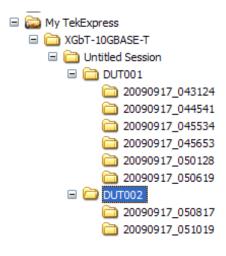
**Case 1**. An example image of data when the session is still not saved and is in the My TekExpress/XGbT-10GBASE-T path as "Untitled Session", the DUT ID is set to DUT001, and

How To

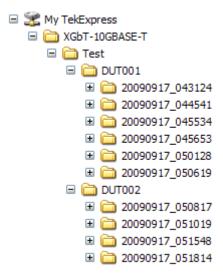
the tests are performed four times (four folders are created with the file naming convention YYYYMMDD\_HHMMSS (Date\_Time).



**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.

i	Clock Frequency_Lane A	24,415 KB	Waveform
Ì	🚰 Droop_Lane A	2,443 KB	Waveform
	Jitter Master_Lane A	9,767 KB	Waveform
	JitterTIEData	3,338 KB	Microsoft Excel Com.
	Lane A_Clock Frequency	77 KB	PNG Image
	Lane A_Droop Negative	76 KB	PNG Image
	Lane A_Droop Positive	76 KB	PNG Image
	Lane A_Jitter-Master	77 KB	PNG Image
	Lane A_Linearity Tone-1	91 KB	PNG Image
	Lane A_Linearity Tone-2	89 KB	PNG Image
	Lane A_Linearity Tone-3	90 KB	PNG Image
	Lane A_Linearity Tone-4	91 KB	PNG Image
	Lane A_Linearity Tone-5	91 KB	PNG Image
	Lane A_Linearity_Tone-1	41 KB	Waveform
	Lane A_Linearity_Tone-2	41 KB	Waveform
	Lane A_Linearity_Tone-3	41 KB	Waveform
	Lane A_Linearity_Tone-4	41 KB	Waveform
	Lane A_Linearity_Tone-5	41 KB	Waveform
	Lane A_Power Level	71 KB	PNG Image
	SPSD_Lane A	31 KB	Waveform
	💐 v1_0_1_4Afterv1_1_0_10_noNeedToDeleteXGb	1,905 KB	MHTML Document

## **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%

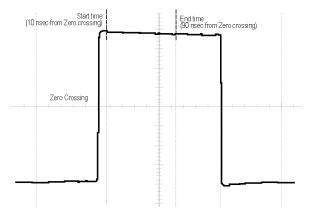
To configure the Droop parameters, enter a Start time, End time, and Population value for the signal in the Droop parameter panel.

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**

🚿 Configuration Panel	×
Config	guration for Device - Suite
Parameter	Value
Real Time Scope	DSA70404 ( GPIB8::1::INSTR )
Number of selected lane	1
Source Type	Differential
Contract Con	Configuration for Droop
Parameter	Value
Ref Levels	Percentage
MidLevel	50
Hysteresis	5
Start Time (ns)	10
End Time (ns)	90
Population	1000
Compliance Mode     Default Settings	\$
O User Defined Mode Restore	Apply Close

### **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 <u>Droop</u> measurement.
- 5. Click <u>Configure</u> 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 <u>input signal of the</u> <u>Droop</u> 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 <u>Analyze</u> 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 <u>Report</u> 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

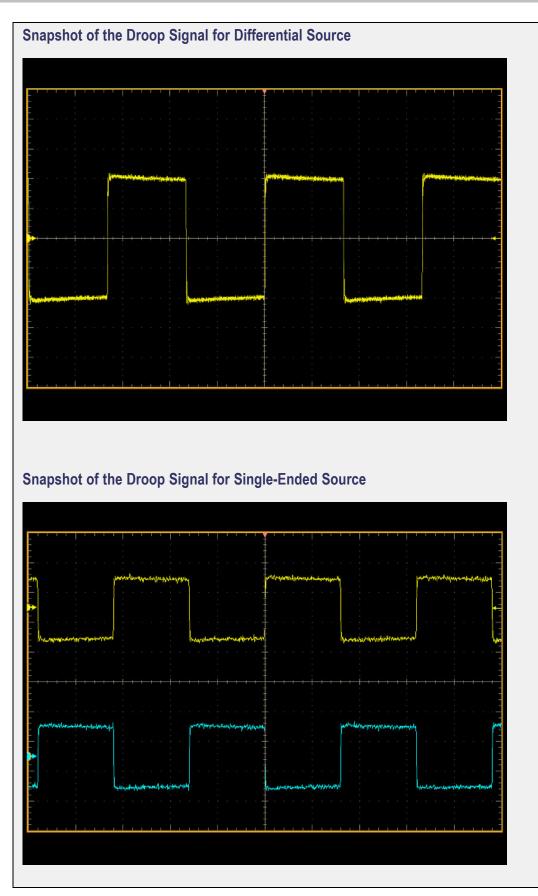
My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DU-TID>\<DATE>(YYYYMMDD)\_<TIME>(HHMMSS)

**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	
File View Tools Help	
DUT ID DUT001	Run Stop
Source     Test Lanes       O Differential     O All Lanes       O Single Ended     Select Lane       Image: Constraint of the select Lane     Image: Constraint of the select Lane	DUT Automation Using MDIO Manual
Test Measurements	Test Description         Droop → [IEEE Std 802.3an-2006         section 55.5.3.1]: Set the DUT to         operate in test mode 6. Droop Positive         is performed by measuring voltage levels         at 10 ns and 90 ns after the zero         crossing on the rising edge. Similarly,         Droop Negative is performed by         Click to view image of the waveform         Configure         Show Schematic         Select All
TekExpress launched successfully.	Tektronix

	bT-10GBASE-T Autom	ated Solution (Untitl	ed)*				×
<u>-</u> jle ⊻iew <u>T</u> ools	Help						
			DUT ID DUT001			Run Stop	
Select Acquire	Analyze Report						
	The port		Device : Suite			Show Pass / Fr	
			Device . June				
Lane A Overall Te	est Result : 🗸 Pass						
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fail	
Droop	Test Completed	Droop Positive	0% · 10 %	2.32	7.68 %	✓ Pass	
		Droop Negative	0%-10%	2.18	7.82 %		
Lane B Overall Te	est Result : 🗹 Pass						
T est Name	Status	Measurement	Limit	Results	Margin	Pass/Fail	
Droop	Test Completed	Droop Positive	0% · 10 %	2.03	7.97 %	✓ Pass	
bioop		Droop Negative	0% • 10%	1.25	8.75 %		
Lane C Overall Te	est Result : 🗹 Pass						
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fai	~
/29/2009 5:01 PM::Se	etting export format to:png etting export file name to:Lar etting export palette to:COLC etting export readout to: ONC	ne D_Droop Negative.png JR			✓ Au	splay Status to Scroll lear All ve Status	
/29/2009 5:01 PM::S/ /29/2009 5:01 PM::S/ /29/2009 5:01 PM::S/ /29/2009 5:01 PM::S/ /29/2009 5:01 PM::C/ /29/2009 5:01 PM::G	arted acquisition ompleted Droop-Device test						

	I Automateu 3	olution (Unt	titled)*							
e ⊻iew <u>T</u> ools <u>H</u> elp										
			DUT	ID DUTO	101				lun Sto	P
lect Acquire Analyze	Report									
			Devi	ce : Suite	:					
<b>Tektronix</b> <sup>.</sup>				TekEv	Drees	Automat	ion Framew	ork		^
Enabling Innovation			vo		•					
			XG	015	gnai	Charac	cteristics	Test Re	ροπ	
DUT ID :	DUT001	Devic	ce Type :		Тг	ansmitter 4 Min	Compliance			
Date/Time :	6/29/09 17:01	Executio								
		LACCUU	on Time :			4 Min	Overall Tes	t Result :		-
Scope Model :	DSA70404		_					_	4.3.3 BUILD 1	2
Scope Model : Calibration Status :		Scope Seri	ial Number :		Q006		Scope	t <b>Result :</b> F/W Version : (GbT Version :		-
	DSA70404	Scope Seri	ial Number :		Q006		Scope	F/W Version :		- - -
Calibration Status :	DSA70404	Scope Seri TekExpres	ial Number :		Q006 1.3.4.124		Scope	F/W Version :	0.6.1.6	
Calibration Status : ane-A : Test Name	DSA70404 PASS;PASS Aleasurement Details	Scope Seri TekExpres	ial Number : ss Version : leasured value	Limit2	Q006 1.3.4.124 Units	Test Result	Scope S Compliance Mode	F/W Version : (GbT Version : Execution Time		
Calibration Status : ane-A : Test Name	DSA70404 PASS;PASS Measurement	Scope Seri TekExpres	ial Number : ss Version : leasured		Q006 1.3.4.124	Test	Scope 2 Compliance	F/W Version : (GbT Version : Execution	0.6.1.6	
Calibration Status	DSA70404 PASS;PASS Aeasurement Details ock Frequency Droop Positive	Scope Seri TekExpres	ial Number : ss Version : leasured value - 2.32	Limit2 - 10.00	Q006 1.3.4.124 Units	Test Result Pass	Scope S Compliance Mode	F/W Version : (GbT Version : Execution Time	0.6.1.6	
Calibration Status	DSA70404 PASS;PASS Aleasurement Details ock Frequency	Scope Seri TekExpres	ial Number : ss Version : leasured value	Limit2	Q006 1.3.4.124 Units ppm	Test Result	Scope 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	GbT Version :	0.6.1.6	
Calibration Status	DSA70404 PASS;PASS Aeasurement Details ock Frequency Droop Positive	Scope Seri TekExpres	ial Number : ss Version : leasured value - 2.32	Limit2 - 10.00	Q006 1.3.4.124 Units ppm	Test Result Pass	Scope 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	GbT Version :	0.6.1.6	



# **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:

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	

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

#### **Configuration Panel to Set the Power Spectral Density Parameters**

🚿 Configuration Panel	
Configura	ration for Device - Suite
Parameter	Value
Real Time Scope	DSA70404 ( GPIB8::1::INSTR )
Number of selected lane	1
Source Type	Differential
Configuration	n for Po <del>w</del> er Spectral Density
Parameter	Value
PSD Start Frequency (MHz)	1
PSD Resolution Bandwidth (MHz)	1
PSD Stop Frequency (MHz)	3000
Power Level Start Frequency (MHz)	1
Power Level Stop Frequency (MHz)	3000
⊙ Compliance Mode Default Settings	
O User Defined Mode Restore	Apply Close

## **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 <u>Configure</u> 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 <u>input signal of the</u> <u>Power Spectral Density</u> 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 <u>Analyze</u> 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 <u>Report</u> 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\<DU-TID>\<DATE>(YYYYMMDD)\_<TIME>(HHMMSS)

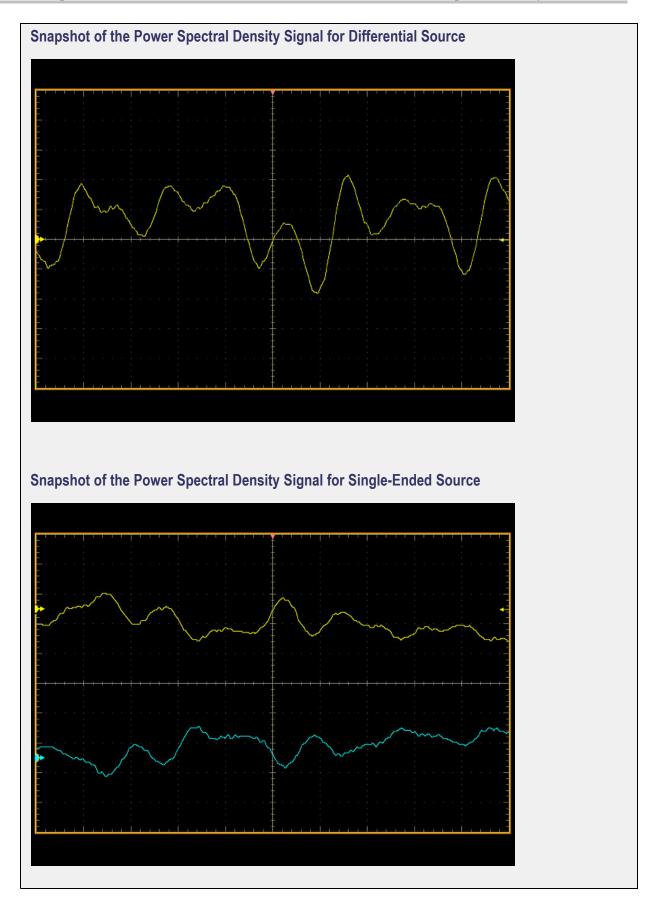
**NOTE.** After a measurement is complete and a report is generated, if you select **File** > **Save Report** As and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated .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		
File       View       Tools       Help         DUT ID       PUT001       Put       Run       Step         Select       Acquire       Analyze       Report       DUT Automation       Using MDIO         Source       Test Lanes       DUT Automation       Using MDIO       Manual         Single Ended       Select Lane       Manual       Manual         Test Measurements       PDroop       PSD-> [IEEE Std 802.3an-2006 section         Standard       Cane A       Lane B       Lane C       Lane D         Test Measurements       PSD-> [IEEE Std 802.3an-2006 section       55.5.3.4]; Set the DUT to operate in the transmit power and checks if it is in the range of 3.2 dBm to 5.4 dBm. It also checks if the PSD computes the transmit power and checks if it is in the range of 3.2 dBm to 5.4 dBm. It also checks if the POwer Spectrum Density, measured into a 100 ohm load is within         Click to view image of the waveform       Configure         Show Schematic       Show Schematic         Jitter-Master       Select All	Select Panel with Power Spectral Density Measure	ment Selected
File       View       Tools       Help         DUT ID       DUTOD1       Image: Step of the state		
DUT ID DUT OUTION     Select Acquire   Analyze Repot     Source Test Lanes   O Differential All Lanes   Single Ended Select Lane   Image: Construction of the structure of t	TekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (LaneA)*	
Select Acquire Analyze Report     Source Test Lanes   O Differential All Lanes   Single Ended Select Lane   Image: Lane A Lane B Lane C   Lane A Lane B Lane C   Lane A Lane B Lane C   Droop Power Spectral Density   Image: Linearity Tone-1   Tone-2 Tone-3   Tone-3 Tone-4   Tone-4 Tone-4   Jitter-Master Jitter-Slave   Return Loss Calibrate	File View Tools Help	
Source       Test Lanes         O Differential       All Lanes         Single Ended       Select Lane         Lane A       Lane B         Droop       Power Spectral Density         Power Spectral Density       FSD> (IEEE Std 802.3an-2006 section)         State and the state an	DUTUD DUTUD	Run Stop
O Differential       All Lanes       Using MDI0         Single Ended       Select Lane       Manual         ✓ Lane A       Lane B       Lane C       Lane D         Test Measurements       PSD-> (IEEE Std 802.3an-2006 section)       PSD-> (IEEE Std 802.3an-2006 section)         Power Spectral Density       PSD-> (IEEE Std 802.3an-2006 section)       PSD-> (IEEE Std 802.3an-2006 section)         Tone-1       Tone-1       PSD-> (IEEE Std 802.3an-2006 section)       PSD-> (IEEE Std 802.3an-2006 section)         Tone-1       Tone-1       FSD-> (IEEE Std 802.3an-2006 section)       PSD-> (IEEE Std 802.3an-2006 section)         Tone-2       Tone-1       Example of the sector process the transmit power and checks if it is in the ransmit power and checks if the Power Spectrum Density, measured into a 100 ohn load is within         Clock Frequency       Tone-4       Configure         Jitter-Master       Show Schematic       Select All         Jitter-Slave       Calibrate       Select All	Select Acquire Analyze Report	
Onlinemental       ○ An Lanes         O Differential       ○ Select Lane         ○ Lane A       Lane B         □ Droop       Power Spectral Density         □ Tone-1       FSD -> (IEEE Std 802.3an-2006 section)         □ Tone-3       FSD -> (IEEE Std 802.3an-2006 section)         □ Tone-4       FSD -> (IEEE Std 802.3an-2006 section)         □ Tone-5       Clock frequency         □ Jitter-Master       Show Schematic         □ Jitter-Slave       Select All	Source Test Lanes	DUT Automation
Single Ended       © Select Lane	Differential     O All Lanes	O Using MDIO
Test Measurements       Test Description         Power Spectral Density       Power Spectral Density         Linearity       Cone-1         Tone-1       Tone-2         Tone-3       Click to view image of the waveform         Clock Frequency       Show Schematic         Jitter-Slave       Select All	○ Single Ended ③ Select Lane	Manual
Droop       PSD-> (IEEE Std 802.3an-2006 section 55.5.3.4): Set the DUT to operate in test mode 5. The PSD computes the transmit power and checks if it is in the ransmit power and checks if it is in the ransmit power and checks if the Power Spectrum Density, measured into a 100 ohm load is within	V Lane A 🗌 Lane B 🗌 Lane C 📄 Lane D	
Power Spectral Density       55.5.3.3): Set the DUT to operate in test mode 5. The PSD computes the transmit power and checks if it is in the range of 3.2 dBm to 5.4 dBm. It also checks if the Power Spectrum Density, measured into a 100 ohm load is within         Tone-1       Chick to view image of the waveform         Tone-3       Click to view image of the waveform         Tone-5       Chock Frequency         Jitter-Slave       Select All	Test Measurements	Test Description
Power Spectral Density       Lest mode 5. The PSD computes the transmit power and checks if it is in the range of 3.2 dBm to 5.4 dBm. It also checks if the Power Spectrum Density, measured into a 100 ohm load is within         Tone-1       Tone-2         Tone-3       Click to view image of the waveform         Tone-5       Configure         Octock Frequency       Show Schematic         Jitter-Master       Select All         Return Loss       Calibrate	Поор	
inearity     range of 3.2 dBm to 5.4 dBm. It also checks if the Power Spectrum Density, measured into a 100 ohm load is within       Tone-1     Tone-2       Tone-3     Click to view image of the waveform       Tone-5     Clock Frequency       Jitter-Master     Show Schematic       Jitter-Slave     Select All		
Image: Control of the second secon		range of 3.2 dBm to 5.4 dBm. It also
Image: Click to view image of the waveform       Image: Click to view image of the wavefor		
Image: Construction of the second		Click to view image of the waveform
Image: Tone-5       Image: Dick Frequency		Configure
Jitter-Master     Jitter-Slave     Select All     Select All	Tone-5	
Calibrate     Select All		Show Schematic
Return Loss Calibrate		
		Select All
		DeselectAl
TekExpress launched successfully. Tektronix*	ekExpress launched successfully.	Tektronix <sup>®</sup>

		ted Solution (Untit	led)*			
<u>Fi</u> le ⊻iew <u>T</u> ools <u>H</u>	elp					
			DUT ID DUT001			Run Sto
Select Acquire Ar	nalyze Report					
			Device : Suite			Show Pass /
Lane A Overall Test F	Result : 🗸 Pass					
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fai
Power Spectral Density	Test Completed	PSD	3.2 dBm - 5.2 dBm	4.04	1.16 dBm	🗸 Pass
Lane B Overall Test F	lesult : 🗸 Pass					
TestName	Status	Measurement	Limit	Results	Margin	Pass/Fail
Power Spectral Density	Test Completed	PSD	3.2 dBm - 5.2 dBm	4.87	0.33 dBm	🗸 Pass
Lane C Overall Test F	lesult : 🗸 Pass					
	Status	Measurement	Limit	Results	Margin	Pass/Fai
TestName				4.09	1.11 dBm	V Pass
Test Name Power Spectral Density	Test Completed	PSD	3.2 dBm - 5.2 dBm	4.03	1.11 dbin	
		PSD	3.2 dBm - 5.2 dBm	4.03		
Power Spectral Density	g export format to:png g export file name to:Lane g export palette to:CDLOF g export readout to: DNG g export start a coquisition eted Power Spectral Der ating Tek Report	s D_Power Level.png R RATICULE	3.2 dBm - 5.2 dBm		► Dis ► Auto Cle	play Status
Power Spectral Density 5/29/2009 5:19 PM::Setting 5/29/2009 5:19 PM::Setting 5/29/2009 5:19 PM::Setting 5/29/2009 5:19 PM::Setting 5/29/2009 5:19 PM::State 5/29/2009 5:20 PM::Gener 5/29/2009 5:20 PM::Gener	g export format to:png g export file name to:Lane g export palette to:CDLOF g export readout to: DNG g export start a coquisition eted Power Spectral Der ating Tek Report	s D_Power Level.png R RATICULE	3.2 dBm - 5.2 dBm		► Dis ► Auto Cle	play Status o Scroll ear All

DUT ID     DUT ID     Run     Stop       ect     Acquire     Analyze     Report	TekExpress XGD1-10G	BASE-T Automated S	olution (	Untitled)*					
ect       Acquire       Analyze       Repot         Device : Suite         Scope Model :       DSA70404 Calibration Status :       Scope Serial Number :       Q006 1.3.4.124       Scope F/W Version :         Calibration Status :       PASS;PASS       TekExpress Version :       1.3.4.124       Scope F/W Version :         ne-A :         Test Name       Measurement       Limit1       Measured       Limit2       Units       Test       Compliance       Execution         Ock Frequency         Clock Frequency       -       -       -         Oroop Positive       - </td <td>e ⊻iew <u>T</u>ools <u>H</u>elp</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	e ⊻iew <u>T</u> ools <u>H</u> elp								
ect       Acquire       Analyze       Repot         Device : Suite         Scope Model :       DSA70404 Calibration Status :       Scope Serial Number :       Q006 1.3.4.124       Scope F/W Version :         Calibration Status :       PASS;PASS       TekExpress Version :       1.3.4.124       Scope F/W Version :         ne-A :         Test Name       Measurement       Limit1       Measured       Limit2       Units       Test       Compliance       Execution         Ock Frequency         Clock Frequency       -       -       -         Oroop Positive       - </td <td></td> <td></td> <td></td> <td>DUT מודנות</td> <td>001</td> <td></td> <td></td> <td></td> <td>Run Sto</td>				DUT מודנות	001				Run Sto
Device : Suite         Scope Model :       DSA70404 PASS;PASS       Scope Serial Number :       Q006 1.3.4.124       Scope F/W Version :         calibration Status :       PASS;PASS       TetExpress Version :       1.3.4.124       XGbT Version :         ne-A :         Test Name       Measurement Details       Limit1       Measured value       Limit2       Units       Test Note Result       Compliance Mode       Execution Time         ock Frequency       Clock Frequency       -       -       ppm       -       -         roop       Droop Positive       -       -       %       -       -       -         Linearity Tone-1       - <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
Scope Model :       DSA70404 Calibration Status :       Scope Serial Number :       Q006       Scope F/W Version :         Calibration Status :       PASS;PASS       TekExpress Version :       1.3.4.124       XGbT Version :         ne-A :         Test Name       Measurement Details       Limit1       Measured value       Limit2       Units       Test Result       Compliance Mode       Execution Time         ock Frequency       Clock Frequency       -       -       ppm       -       -         toop       Droop Positive       -       -       %       -       -         timearity Tone-1       -       -       %       -       -       -         Linearity Tone-2       -       -       0       -       -       -       -         Linearity Tone-3       -	elect Acquire Analyze	Report							
Calibration Status       Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Colspan="2				Device : Su	iite				
Calibration Status       Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Colspan="2									
Test Name       Measurement Details       Limit1       Measured value       Limit2       Units       Test Result       Compliance Mode       Execution Time         ock Frequency       Clock Frequency       -       -       ppm       -       -         oop       Droop Positive       -       -       %       -       -       -         inearity Tone-1       -       -       -       -       -       -       -         Linearity Tone-2       -       -       -       -       -       -       -         Linearity Tone-3       -       -       -       -       -       -       -         nearity       Linearity Tone-5       -       -       -       -       -       -         wer Spectral Density       PSD       3.20       4.16       5.20       dBm       Pass       TRUE       2 Min		DOMICTOR							
Test Name       Measurement Details       Limit1       Measured value       Limit2       Units       Test Result       Compliance Mode       Execution Time         ock Frequency       Clock Frequency       -       -       ppm       -	Calibration Status	PASS;PASS	TekEx	press Version		1.3.4.124			KGbT Version :
Droop Positive         -			Limit1		Limit2	Units			
Coop         Droop Negative         -         -         %         -	Clock Frequency	Clock Frequency	-	-	-	ppm	-	-	-
Coop         Droop Negative         -         -         %         -		Den en Densition	1	1	1			1	
Linearity Tone-1         -	)roop					%			-
Linearity Tone-2         -		Droop Negative		-	-		-		I I
Linearity Tone-3         -         -         -         -         dBm         -		Linearity Tone-1	-	-	-		-		
Linearity     Linearity Tone-4     -     -       Linearity     Inearity Tone-5     -     -       ower Spectral Density     PSD     3.20     4.16     5.20     dBm     Pass     TRUE     2 Min				-			-	-	
Linearity     Linearity Tone-5     -     -       ower Spectral Density     PSD     3.20     4.16     5.20     dBm     Pass     TRUE     2 Min						dBm			-
wer Spectral Density PSD 3.20 4.16 5.20 dBm Pass TRUE 2 Min	inearity					-	-	-	
	neancy	Emeanly rone-5	-	-	-		-	1	
	Power Spectral Density	PSD	3.20	4.16	5.20	dBm	Pass	TRUE	2 Min
> » Report Summary Lane A Lane B Lane C Lane D									
	< > » Report Summary	Lane A Lane B L	ane C 🛛 La	ane D					



# **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 va	alues 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**

🚿 Configuration Panel				X
	Configuration	for Device - Suite		
Parameter		Value		
Real Time Scope		DSA70404 ( GPIB8::1::INST	'R )	
Number of selected lane		1		
Source Type		Differential		
Acquire Analyze Limits Cor	Configural	ion for Linearity		
Parameter	mierits	Value		
Start Frequency (KHz)		1000		
Stop Frequency (KHz)		400000		
Resolution Bandwidth (KHz)		20		
Compliance Mode	Defect Cations			
- T. () ()	Default Settings			
🔿 User Defined Mode	Restore		Apply	Close

## **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 <u>Linearity</u> 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 <u>input signal of the Linearity Tone-1</u>, <u>input signal of the Linearity Tone-2</u>, <u>input signal of the Linearity Tone-3</u>, <u>input signal of the Linearity Tone-4</u>, and <u>input signal of the Linearity Tone-5</u> 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 <u>Analyze</u> 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 <u>Report</u> 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

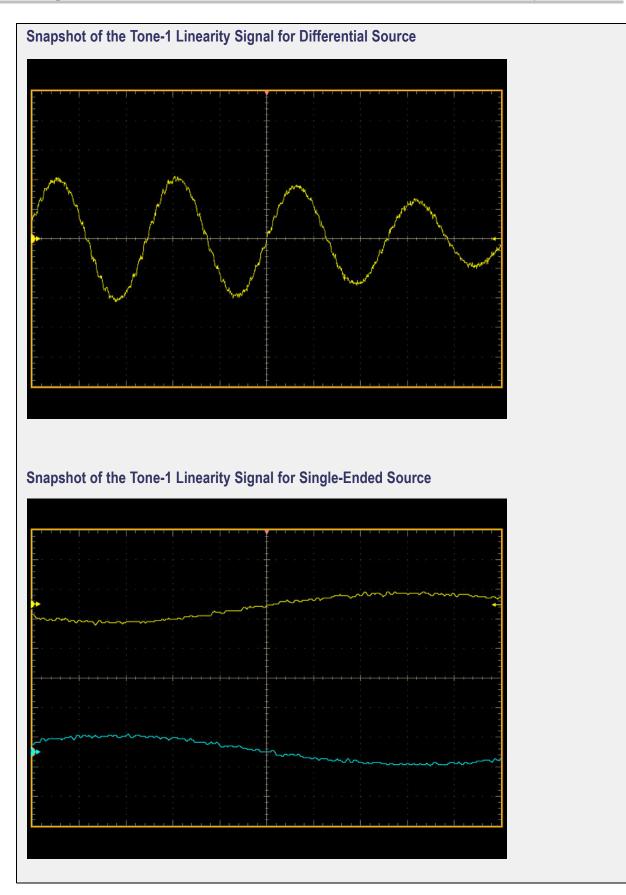
```
My Documents\My TekExpress\XGbT-10GBASE-T\Untitled Session\<DU-
TID>\<DATE>(YYYYMMDD)_<TIME>(HHMMSS)
```

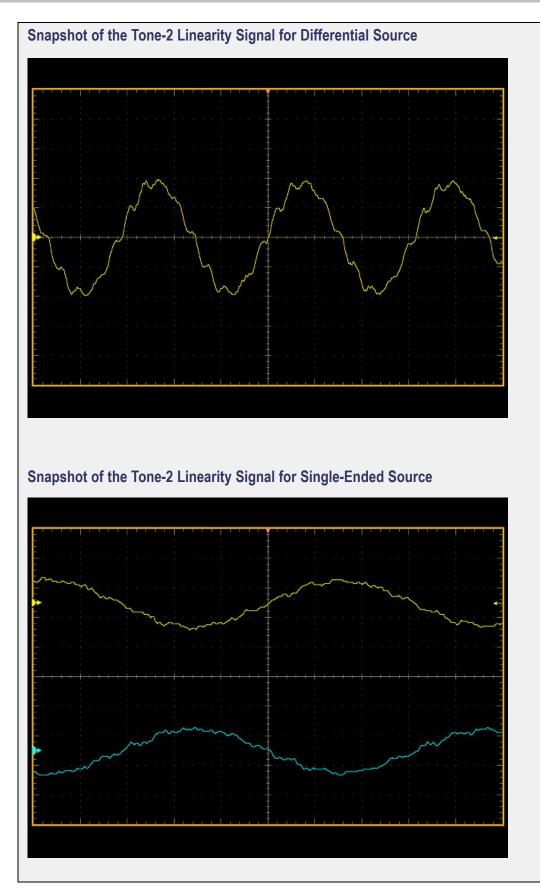
**NOTE.** After a measurement is complete and a report is generated, if you select **File** > **Save Report** As and save the file in MHT format a blank .mht file is created at the target location. This is a known problem and happens because of an issue with Internet Explorer. Instead copy the generated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

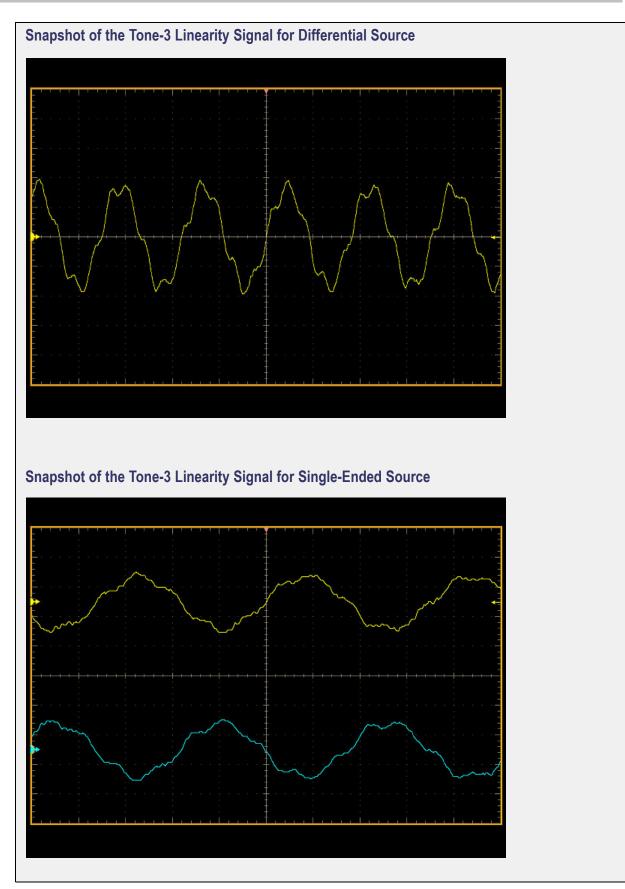
FekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (LaneA)*	
DUTID DUT001	Run Stop
Source     Test Lanes <ul> <li>Differential</li> <li>All Lanes</li> <li>Single Ended</li> <li>Select Lane</li> <li>Lane A</li> <li>Lane B</li> <li>Lane C</li> <li>Lane D</li> </ul>	DUT Automation Using MDIO Manual
Test Measurements  Droop Power Spectral Density Interarity Tone-1 Tone-2 Tone-3 Tone-5 Clock Frequency Jitter-Master Return Loss Calibrate Calibrate	Test Description Linearity> (IEEE Std 802.3an-2006 section 55.5.3.2): Set the DUT to operate in test mode 4. Set the frequency to 1.2.4.5.6 for Linearity Tone 1, Tone 2, Tone 3, Tone 4 and Tone 5 respectively. Linearity measures the Spurious free dynamic range for each Click to view image of the waveform Configure Show Schematic Select All Deselect Al

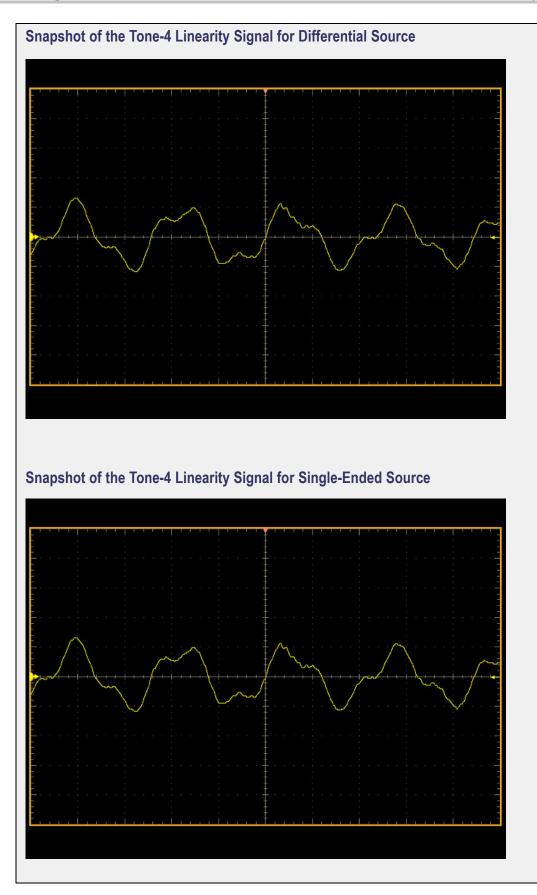
rekexpress XGb	T-10GBASE-T Autor	mated Solution (Untit	led)*			
jile ⊻iew <u>T</u> ools	Help					
			DUTID DUT002	2		Run S
Select Acquire	Analyze Report					
			Device : Suite			📃 Show Pass
Lane A Overall Tes	st Result : 🗹 Pas	s				
Test Name	Status	Measurement	Limit	Results	Margin	Pass/Fai
		Tone-1	> 54.5 dBm	59.9	5.4 dBm	
Linearity Test Corr		Tone-2	> 50.3 dBm	57.53	7.23 dBm	
	Test Completed	Tone-3	> 45.4 dBm	57.81	12.41 dBm	<ul> <li>Pass</li> </ul>
		Tone-4	> 41.6 dBm	55.86	14.26 dBm	
				00.00	14.20 dbiii	
		Tone-5	> 38.5 dBm	52.55	14.05 dBm	
/29/2009 6:13 PM::Call /29/2009 6:13 PM::Pas /29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cor	mpleted run stop operatio ling CompareLimit with: G ssed mpleted run stop operatio mpleted run stop operatio mpleted Linearity-Device	in 17, Value1: 38.5, Value2: 0, m	> 38.5 dBm	52.55	14.05 dBm	Display Status Auto Scroll Clear All Save Status
/29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cal /29/2009 6:13 PM::Pas /29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cor	mpleted run stop operatio ling CompareLimit with:G ssed mpleted run stop operatio mpleted run stop operatio mpleted Linearity-Device nerating Tek Report	in 17, Value1: 38.5, Value2: 0, m	> 38.5 dBm	52.55	14.05 dBm	Auto Scroll Clear All
/29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cal /29/2009 6:13 PM::Cal /29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cor /29/2009 6:13 PM::Cor /29/2009 6:14 PM::Cor	mpleted run stop operatio ling CompareLimit with:G ssed mpleted run stop operatio mpleted run stop operatio mpleted Linearity-Device nerating Tek Report	in 17, Value1: 38.5, Value2: 0, m	> 38.5 dBm	52.55	14.05 dBm	Auto Scroll Clear All

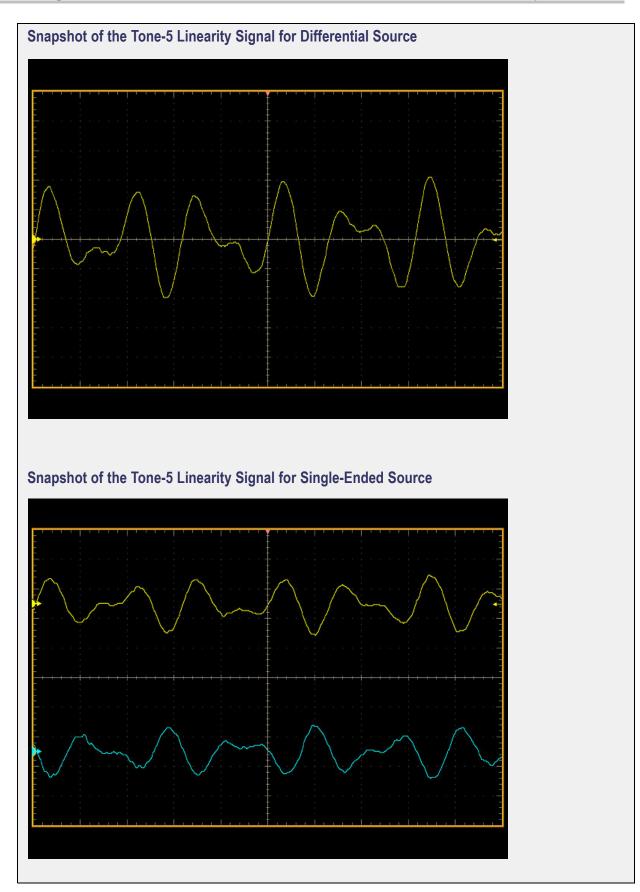
Test Name	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution Time	Comment	Remarks
Clock Frequency	Clock Frequency	-50.00	0.52	50.00	ppm	Pass	TRUE	2 Min		Clock Frequency = 200.0
Droop	Droop Positive Droop Negative	-	-	-	%	-	-		-	-
	Linearity Tone-1	54.50	63.95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











## **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 Frequence	able 20: De	fault and lir	nit configure	values for	<b>Clock Frequenc</b>
--	-------------	---------------	---------------	------------	-----------------------

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**

×
juite
GPIB8::1::INSTR )
uency
Apply

### **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 <u>Clock Frequency</u> measurement.
- 5. Click <u>Configure</u> 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 <u>Pre-recorded</u> 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 <u>input signal of the Clock</u> <u>Frequency</u> 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 <u>Analyze</u> 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 <u>Report</u> panel. The reports are automatically saved in MHT format to the default location:

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

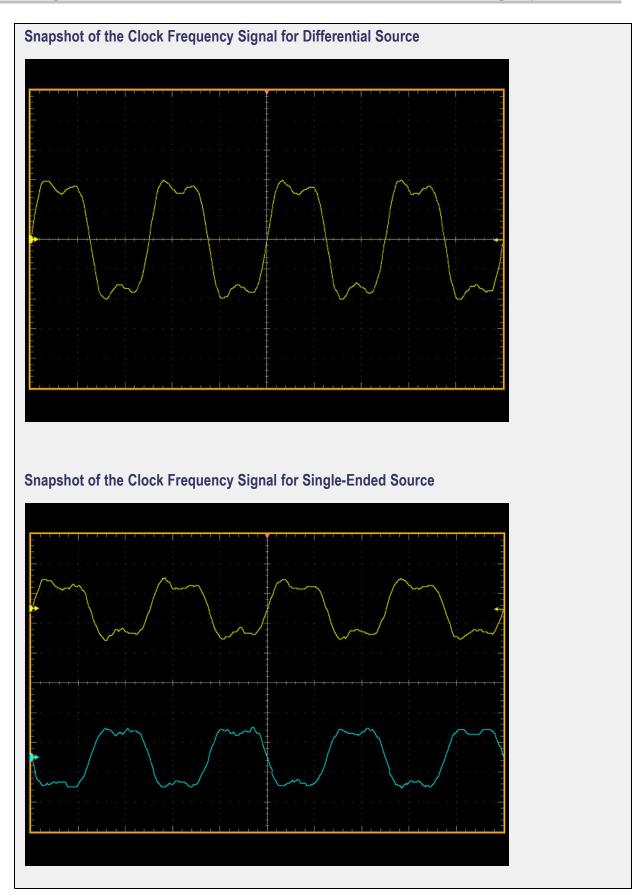
or

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

Select Panel with Clock Frequency Measurement S	Selected
TekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (LaneA)*	
File View Tools Help	
DUT001	Run Stop
Select Acquire Analyze Report	
Source Test Lanes	DUT Automation
Differential     O All Lanes	<ul> <li>Osing Moto</li> <li>Manual</li> </ul>
○ Single Ended	C Manada
🗹 Lane A 📃 Lane B 📃 Lane C 📃 Lane D	
Test Measurements	Test Description
Droop - Power Spectral Density - Linearity - Tone-1 - Tone-2	Tx-Clk> [IEEE Std 802.3an-2006 section 55.5.3.5]: Set the DUT to operate in test mode 2. The Clock Frequency computes the deviation of the clock frequency from 200MHz value in terms of KHz.
Tone-3	Click to view image of the waveform
	Configure
Clock Frequency	Show Schematic
	SelectAll
Return Loss Calibrate	Deselect Al
ekExpress launched successfully.	Tektronix

TekExpress X(	GBT-10GBA	SE-T Auton	nated Solution (Ur	rtitled)*				
<u>File View T</u> ools	<u>H</u> elp							
			DI	UTID DUT001			Run Sto	2
Select Acquire	Analyze	Report						
				Device : Suite		E	Show Pass /	Fail
Lane A Overall T	est Result :	V Pass	;					
TestName	Status		Measurement	Limit	Results	Margin	Pass/Fai	
Clock Frequency								
	Test Co	npleted	Clock Frequency	-50 ppm - 50 ppm	-0.6	50.6 ppm	✓ Pass	
	Test Co	npleted	Clock Frequency	-50 ppm - 50 ppm	-0.6	50.6 ppm	V Pass	
7/7/2009 12:35 PM::: 7/7/2009 12:35 PM::	Setting export f	le name to:La	ine A_Clock Frequency DR			 ♪ V Displ	ay Status	
7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM::	Setting export f Setting export p Setting export s	le name to:La alette to:COL adout to: ON tart	ine A_Clock Frequency DR			<ul> <li>✓ Displ.</li> <li>✓ Auto 5</li> </ul>	ay Status Scroll	
7/7/2009 12:35 PM::S 7/7/2009 12:35 PM::S 7/7/2001 2:35 PM::S	Setting export f Setting export Setting export Started acquist Completed Clob Seneration Tet	le name to:La alette to:COL eadout to: ON tart ion k Frequency- Report	ine A_Clock Frequency QR GRATICULE			 ♪ V Displ	ay Status Scroll - All	
7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM:: 7/7/2009 12:35 PM::	Setting export f Setting export Setting export Started acquist Completed Clob Seneration Tet	le name to:La alette to:COL eadout to: ON tart ion k Frequency- Report	ine A_Clock Frequency QR GRATICULE			<ul> <li>✓ Displ.</li> <li>✓ Auto 1</li> <li>Clean</li> </ul>	ay Status Scroll - All	

TekExpress XGbT-10G	BASE-T Automated S	olution (l	Untitled)*						
e <u>V</u> iew <u>T</u> ools <u>H</u> elp									
		I	DUT ID DUT	001				Run	Stop
elect Acquire Analyze	e Report								
			Device : Su	iite					
									^
Scope Model	DSA70804	Scope	Serial Number :		Q435		Scope	F/W Version :	4.3
Calibration Status			oress Version				-	XGbT Version :	
ane-A :						,	- '		=
ane-A : Test Name	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution Time	
ane-A :	Measurement		Measured			Test	Compliance	Execution	
ane-A : Test Name Clock Frequency	Measurement Details	Limit1	Measured value	Limit2	Units ppm	Test Result	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name	Measurement Details Clock Frequency	Limit1 -50.00	Measured value -0.60	Limit2 50.00	Units	Test Result Pass	Compliance Mode	Execution Time	
ane-A : Test Name Nock Frequency	Measurement Details Clock Frequency Droop Positive Droop Negative	Limit1 -50.00 -	Measured value -0.60 - -	Limit2 50.00 -	Units ppm	Test Result Pass	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Nock Frequency	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1	Limit1 -50.00	Measured value -0.60	Limit2 50.00	Units ppm	Test Result Pass -	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Clock Frequency	Measurement Details Clock Frequency Droop Positive Droop Negative	Limit1 -50.00 -	Measured value -0.60 - -	Limit2 50.00 - -	Units ppm	Test Result Pass - -	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Clock Frequency	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1 Linearity Tone-2	Limit1 -50.00 - - -	Measured value -0.60 - -	Limit2 50.00 - - -	Units ppm	Test Result Pass - - - -	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Clock Frequency	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1 Linearity Tone-2 Linearity Tone-3	Limit1 -50.00 - - - -	Measured value -0.60 - - - - -	Limit2 50.00 - - - - -	Units ppm	Test Result Pass - - - -	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Clock Frequency Droop inearity	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1 Linearity Tone-2 Linearity Tone-3 Linearity Tone-4 Linearity Tone-5	Limit1 -50.00 - - - - - - - - - -	Measured value -0.60 - - - - - - - - - - - -	Limit2 50.00 - - - - - - - - - -	Units ppm %	Test Result Pass - - - - - - - - - -	Compliance Mode FALSE	Execution Time 1 Min -	
ane-A : Test Name Clock Frequency Droop inearity	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1 Linearity Tone-2 Linearity Tone-4	Limit1 -50.00 - - - - -	Measured value -0.60 - - - - - - - - - - -	Limit2 50.00 - - - - - -	Units ppm	Test Result Pass - - - -	Compliance Mode	Execution Time 1 Min	
ane-A : Test Name Clock Frequency Droop	Measurement Details Clock Frequency Droop Positive Droop Negative Linearity Tone-1 Linearity Tone-2 Linearity Tone-3 Linearity Tone-4 Linearity Tone-5	Limit1 -50.00 - - - - - - - - - -	Measured value -0.60 - - - - - - - - - - - -	Limit2 50.00 - - - - - - - - - -	Units ppm %	Test Result Pass - - - - - - - - - -	Compliance Mode FALSE	Execution Time 1 Min -	



## **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**

🚿 Configuration Panel	X							
C	Configuration for Device - Suite							
Parameter	Value							
Real Time Scope DSA70404 ( GPIB8::1::INSTR )								
Number of selected lane 1								
Source Type	Differential							
Acquire Analyze Limits Comments	Configuration for Jitter-Master							
Parameter	Value							
Ref Levels	Percentage							
MidLevel	50							
Hysteresis	5							
Apply Filter	True							
Compliance Mode     Default Set	tinos							
O User Defined Mode Restor								

## **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 <u>Jitter-Master</u> measurement.
- 5. Click <u>Configure</u> 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 <u>input signal of the</u> <u>Jitter-Master</u> 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 <u>Analyze</u> 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 <u>Report</u> panel. The reports are automatically saved in MHT format to the default location:

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

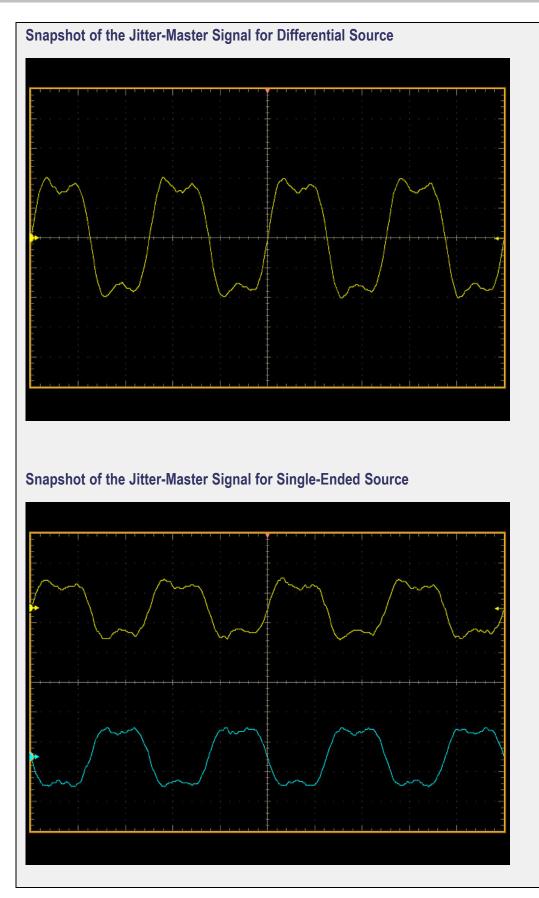
or

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

ekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (LaneA)*	
ïle View Tools Help	
	🔒 Run Stop
Select Acquire Analyze Report	
Source     Test Lanes       Image: O Differential     All Lanes       Single Ended     Select Lane	DUT Automation Using MDIO Manual
✓ Single Linded ✓ Select Lane ✓ Lane A □ Lane B □ Lane C □ Lane D	
Test Measurements	Test Description
Droop Droop Power Spectral Density Linearity Tone-1 Tone-2	Jitter Master-> (IEEE Std 802.3an-2006 section 55.5.3.3): Set the DUT to operate in test mode 2. Transmitter Timing Jitter computes root mean square of the period Jitter. The RMS period jitter measured at the MDI output should not exceed 5.5 ps.
	<u>Click to view image of the waveform</u>
Tone-4	Configure
Clock Frequency	Show Schematic
- <mark>♥ Jitter-Master</mark> - □ Jitter-Slave	SelectAll
Return Loss Calibrate	DeselectAl

DUT ID DUT002 Run Stop Acquire Analyze Report Device : Suite Show Pass / Fail A Overall Test Result : Pass Nane Status Measurement Limit Results Margin Pass/Fail taster Test Completed Jitter Master 0 psec - 5.5 psec 1.25 4.25 psec Pass (* Pass) Display Status Vaster V	yze Panel after Ru	nning Jitter-	Master Mea	sureme	ent	
Select       Acquire       Analyze       Report         Device : Suite         Bevice : Suite         Show Pass / Fail         Lane A Overall Test Result :        Pass         Test Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         Jitter-Master       Test Completed       Jitter Master       Opsec : 5.5 psec       1.25       4.25 psec        Pass         Setting export format to png 6/29/2008 6:26 PM::Setting e	🚿 TekExpress XGbT-10GBASE-T Automa	ted Solution (Untitled	)*			
Select       Acquire       Analyze       Report         Device : Suite       □ Show Pass / Fail         Lane A. Overall Test Result :       ✓ Pass       Test Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         Jitter Master       Test Completed       Jitter Master       0 pace : 55 pace       1.25       4.25 pace       ✓ Pass         6/29/2009 6:26 PM:-Setting export format toppg       6/29/2009 6:26 PM:-Setting export file name to Lane A_Jitter-Master.png       ✓ Display Status       ✓ Auto Scroll         6/29/2009 6:26 PM:-Setting export file name to Lane A_Jitter-Master.png       ✓ Auto Scroll       ✓ Auto Scroll         6/29/2009 6:26 PM:-Setting export file name to Lane A_Jitter-Master.png       ✓ Auto Scroll       ✓ Auto Scroll         6/29/2009 6:26 PM:-Setting export file name to Lane A_Jitter-Master.png       ✓ Auto Scroll       ✓ Clear All	<u>Eile V</u> iew <u>T</u> ools <u>H</u> elp					
6/29/2009 6:26 PM::Setting export format to png       For the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export format to png       Very and the setting export readout to: NoRFARTICULE         6/29/2009 6:26 PM::Setting export readout to: NoRFARTICULE       Very and the setting export format to png         6/29/2009 6:26 PM::Setting export readout to: NoRFARTICULE       Setting export readout to: NoRFARTICULE         6/29/2009 6:26 PM::Setting export format to png       Setting export format to png         6/29/2009 6:26 PM::Setting export feedout to: NoRFARTICU			DUTID DUT002			Run Stop
Test Name       Status       Measurement       Limit       Results       Margin       Pass/Foil         Jitter Master       Test Completed       Jitter Master       0 psec - 5.5 psec       1.25       4.25 psec       ✓ Pass         6/29/2009 6:26 PM::Setting export format topng         ✓       ✓       ✓       Pass         6/29/2009 6:26 PM::Setting export format topng        ✓       ✓       ✓       ✓       Ø         6/29/2009 6:26 PM::Setting export format topng        ✓       ✓       Ø	Select Acquire Analyze Report		Device : Suite			Show Pass / Fa
Jitter-Master       Test Completed       Jitter Master       0 psec - 5.5 psec       1.25       4.25 psec       Pass         6/29/2009 6.26 PM::Setting export format topng       6/29/2009 6.26 PM::Setting export format topng       Display Status       Display Status         6/29/2009 6.26 PM::Setting export format topng       6/29/2009 6.26 PM::Setting export file name toLane A_Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export file name toLane A_Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export readout to: UNGRATICULE       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export readout to: UNGRATICULE       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export readout to: UNGRATICULE       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export readout to: UNGRATICULE       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png       Image: Completed Jitter-Master.png         6/29/2009 6.26 PM::Setting export feet to: Completed Jitter-Master.png       Image: Completed Jitter-Master.	Lane A Overall Test Result : 🗸 Pass					
5/29/2009 6:26 PM::Setting export format to png 5/29/2009 6:26 PM::Setting export fairnait to png 5/29/2009 6:26 PM::Setting export fairnait to chare A_litter-Master, png 5/29/2009 6:26 PM::Setting export readout to :OUGRATICULE 5/29/2009 6:26 PM::Setting export setting 5/29/2009 6:26 PM::Setting s	Test Name Status	Measurement	Limit	Results	Margin	Pass/Fai
6/29/2009 6.26 PM::Setting export format to:png 6/29/2009 6.26 PM::Setting export file name to:Lane A_Jitter-Master.png 6/29/2009 6.26 PM::Setting export palette to:COLDR 6/29/2009 6.26 PM::Setting export reduct to: ONGRATICULE 6/29/2009 6.26 PM::Setting export start 6/29/2009	Jitter-Master Test Completed	Jitter Master	0 psec - 5.5 psec	1.25	4.25 psec	🗸 Pass
2/2/2009 6:26 PM::Setting export file name to:Lane A_litter/Master.png       ✓       ✓       Display Status         2/2/2009 6:26 PM::Setting export file name to:Lane A_litter/Master.png       ✓       ✓       Display Status         2/2/2009 6:26 PM::Setting export file to:CluOR       ✓       ✓       Auto Scroll         2/2/2009 6:26 PM::Setting export readout to: ONGRATICULE       ✓       ✓       Auto Scroll         2/2/2009 6:26 PM::Stated acquisition       Clear All       Save Status         2/2/2009 6:26 PM::Generating Tek Report       Save Status       Save Status						

		-							
🖇 TekExpress XGbT-10G	BASE-T Automated S	olution (	Untitled)*						
<u>∃</u> ie ⊻iew <u>T</u> ools <u>H</u> elp									
Select Acquire Analyze	Report		DUT	ID DUTC	102				Run Stop
	Topor		Dev	ice : Suite	:				
Scope Model	DSA70404	Scope	Serial Number		Q006		Scop	e F/W Version :	4.3.3 BUILD 12
Calibration Status			press Version		1.3.4.124	ļ.	-	XGbT Version :	0.6.1.6
Lane-A : Test Name	Measurement	Limit1	Measured	Limit2	Units	Test	Compliance		Comment
	Details		value			Result	Mode	Time	
Clock Frequency	Clock Frequency	0.00	1.52	50.00	ppm	Pass	TRUE	2 Min	
Droop	Droop Positive Droop Negative	-	-	-	%	-		-	•
Linearity	Linearity Tone-1 Linearity Tone-2 Linearity Tone-3 Linearity Tone-4 Linearity Tone-5	54.50 50.30 45.40 41.60 38.50	59.90 57.53 57.81 55.86 52.55	0.00 0.00 0.00 0.00 0.00	dBm	Pass Pass Pass Pass Pass	TRUE	18 Min	
Power Spectral Density	PSD	-	-	-	dBm	-	-	-	
Jitter-Master	Jitter-Master	0.00	1.25	5.50	psec	Pass	TRUE	1 Min	
Lane-B : Contemport Summary	Lane A Lane B L	ane C   La	ane D						>
Express launched successfully.									Tektroniz



## **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

🔏 Configuration Panel	X
	Configuration for Device - Suite
Parameter	Value
Real Time Scope	DSA70404 ( GPIB8::1::INSTR )
Number of selected lane	1
Source Type	Differential
Acquire Analyze Limits Comments	Configuration for Jitter-Slave
Parameter	Value
Ref Levels	Percentage
MidLevel	5
Hysteresis Apply Filter	Diruce
	It Settings
	estore Apply Close

## **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 <u>Jitter-Slave</u> measurement.
- 5. Click <u>Configure</u> 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 <u>input signal of the</u> <u>Jitter-Slave</u> 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 <u>Analyze</u> 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 <u>Report</u> panel. The reports are automatically saved in MHT format to the default location:

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

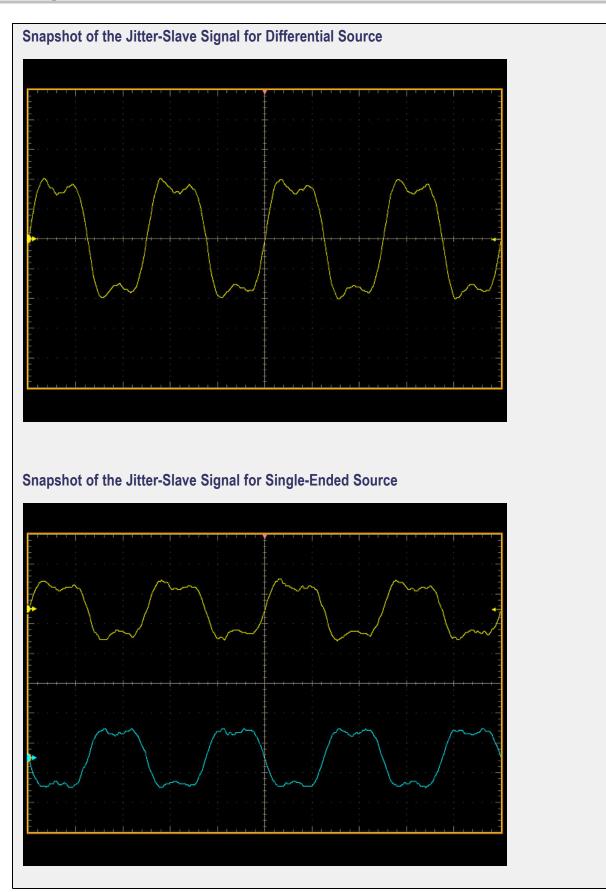
or

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

Select Panel with Jitter-Slave Selected  TekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (LaneA)*  File View Tools Help	
File View Tools Help DUT ID DUT001 Select Acquire Analyze Report	Bun Stop
Source     Test Lanes <ul> <li>Differential</li> <li>Single Ended</li> <li>Select Lane</li> <li>Lane A</li> <li>Lane B</li> <li>Lane C</li> <li>Lane D</li> </ul>	OUT Automation Using MDIO Manual
Test Measurements  Droop  Power Spectral Density  Tinearity Tone-1 Tone-2 Tone-3 Tone-4 Tone-5 Clock Frequency Jitter-Master VJtter-Slave Return Loss Calibrate	Test Description         Jitter Slave-> (IEEE Std 802.3an-2006         section 55.5.3.3):For DUT supporting         loop timing mode, the MASTER DUT is         set to test mode 1 and the SLAVE DUT         is set to test mode 3. Transmitter Timing         jitter computes root mean square of the         period Jitter. The RMS period jitter         Click to view image of the waveform         Configure         Show Schematic         Select All
ekExpress launched successfully.	Tektronix

V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export format toppg     V2009 6:31 PM::Setting export format toppg       V2009 6:31 PM::Setting export statt     V2009 6:31 PM::Setting export statt       V2009 6:31 PM::Gomentating T4 Report     Save Status       V2009 6:31 PM::Gomentating T4 Report     Save Status		-10GBASE-T Automat Help	ed Solution (Untitled	1)*			
Device : Suite       Show Pass / Fa         ane D Overall Test Result : Pass         Test Name       Limit       Results       Margin       Pass/Fal         Test Name       Status       Margin       Pass/Fal         Test Completed       Jiter Slave       0 psec -5.5 psec       1.33       4.17 psec       Pass         9/2009 6:31 PM::Setting export format top pg         9/2009 6:31 PM::Setting export format top pg	Jact Acquire	Analuza Report		DUTID DUT002			Run Stop
Status     Measurement     Limit     Results     Margin     Pass/Fail       ter:Slave     Test Completed     Jitter Slave     0 psec - 5.5 psec     1.33     4.17 psec     ✓ Pass	ect Acquire 7	riepoit		Device : Suite			Show Pass / F
Jitter-Slave Test Completed Jitter Slave 0 psec - 5.5 psec 1.33 4.17 psec ✓ Pass	.ane D Overall Test	Result : 🖌 Pass	1	1	1		
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9/2009 6:31 PM:Setting export file name toLane D_litter/Slave.png 9/2009 6:31 PM:Setting export readout to: ONGRATICULE 9/2009 6:31 PM:Setting export readout to: ONGRATICULE 9/2009 6:31 PM:Statted acquisition 9/2009 6:31 PM:Campleted Jitter/Slave.Device test 9/2009 6:31 PM:Completed Jitter/Slave.Device test 9/2009 6:31 PM:Cenerating Tek Report							
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Test Name	Measurement	Limit1	Measured	Limit2	Units	Test	Compliance	Execution	Comment
	Details		value	LIIIILZ		Result	Mode	Time	Comment
Clock Frequency	Clock Frequency	-	-	-	ppm	-	-	-	
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Droop	Droop Negative	-	-	-	%	-	-	-	-
			1				1		
	Linearity Tone-1 Linearity Tone-2	-	-	-	-	-	-		
	Linearity Tone-3	-	-	-	dBm	-	1 .		
	Linearity Tone-4	-	-	-	ubiii	-			
Linearity	Linearity Tone-5		-	-		-	1		
ower Spectral Density	/ PSD				dBm		1		
ower Spectral Density	/ PSD	-	-	-	ubm	-	-	-	
itter-Master	Jitter-Master	-	-	-	psec	-	-	-	-
						_			
litter-Slave	Jitter-Slave	0.00	1.33	5.50	psec	Pass	TRUE	2 Min	



## **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

Deveneter		Values		To do
Parameter	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.

🚿 Configuration Panel	×
	Configuration for Device - Suite
Parameter	Value
Real Time Scope	DP070404B ( GPIB8::1::INSTR )
Signal Source	AWG7102 ( GPIB0::2::INSTR )
Source Type	Differential
Acquire Analyze Limits Comments	Configuration for Return Loss
Parameter	Value
Acquisition Averages	10
Smooth Averaging	5
Compliance Mode     De     User Defined Mode	ault Settings
	Restore Apply Close

## **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 <u>Return Loss</u> 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 <u>input signal of the</u> <u>Return Loss</u> 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.

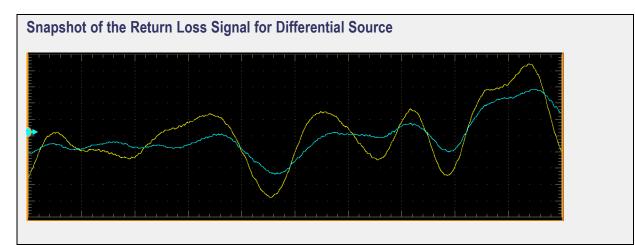
- 9. The status of the measurements is displayed in the <u>Analyze</u> panel. To view the pass or fail status for each of the measurements, click **Show Pass/Fail**.
- **10.** After the measurement runs successfully, a summary report of all lanes and detailed report of each of the lanes are displayed in the <u>Report</u> 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

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

elect Panel when Selecting the	Return Loss Measurement	:	
-			
TekExpress XGbT-10GBASE-T Automated Solution	(Evaluation Version) (LaneA)*		
File View Tools Help			
	DUT001	🔋 🔒 Run Stop	
Select Acquire Analyze Report			
Source Test Lanes	1	DUT Automation	
Differential     O All Lanes		O Using MDIO	
○ Single Ended		💿 Manual	
🔽 Lane A 📃 Lane	B Lane C 🔽 Lane D		
	🚿 Return Loss		
Test Measurements	-		
	The Return Loss measurement needs	to be calibrated before it can be	
Power Spectral Density			
Tone-1			
Tone-2			
Tone-4			
Tone-5	Deselect ReturnLoss Cal	ibrate now	
Clock Frequency			
Jitter-Master			
Jitter-Slave		SelectAll	
Return Loss Calibrate		DeselectAl	
kExpress launched successfully.		Tektronix <sup>*</sup>	
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Select Acquire	Analyze Repo	rc					
			Device : Suite	1		📃 Show Pas	/Fail
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Test Name	Status	Measurement	Limit	Results	Margin	Pass/Fai	
		85 ohms	N.A	Pass	Nil		
Return Loss	Test Completed	100 ohms	N.A.	Pass	Nil	V Pass	
			1941				
		115 ohms	N.A	Pass	Nil		
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)roop	Droop Negative	-	-	-	%	-		-		
	Linearity Tone-1	-	-	-		-				
	Linearity Tone-2	-	-	-		-	4			
	Linearity Tone-3	-	-	-	dBm	-	-	-		
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inearity	Linearity Tone-5	-	-	-		-			_	
ower Spectral Density	PSD	-	-	-	dBm	-	-	-	_	
itter-Master	Jitter-Master	-	-	-	psec	-	-	-	_	
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#### **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. <u>Select</u> 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 <u>Pre-recorded</u> 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 <u>Report</u> 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\<DU-TID>\<DATE>(YYYYMMDD)\_<TIME>(HHMMSS)

File View Tools Help     DUT ID UTIO     Select Acquire     Analyze Report     Select Acquire     O Differential     O All Lanes     O All Lanes     O Lane A     Calibrate     O Droop     Power Spectral Density     Calibrate now     Differential     Calibrate now     Calibrate now     Show Schematic     Select All     Deselect All	elect Panel with Multiple I	
Select Acquire Analyze Report     Source Test Lanes   O Differential   O All Lanes   O Select Lane   V Lane A   Lane A   Calco B     Return Loss     Test Measurements     Test Measurements     Torosp   Power Spectral Density   Torne-1   Tone-2   Tone-3   O Lone A     Deselect ReturnLoss     Calcock Frequency   Show Schematic     Select All   Deselect All		
Source       Test Lanes       Using MDIO         O Differential       O All Lanes       Manual         Single Ended       Select Lane       Manual         Image: Construction of the second		DUT ID DUT001 👪 Run Stop
<ul> <li>Differential</li> <li>All Lanes</li> <li>Select Lane</li> <li>Lane A</li> <li>Lane A</li> <li>Lane A</li> <li>Lane B</li> <li>Return Loss measurement needs to be calibrated before it can be turn.</li> </ul>	Select Acquire Analyze Report	
Single Ended     Select Lane     Lane A     Lane B     Return Loss     Manual     Manu	Source Test Lanes	
Vertex Lane A     Vertex Lane B     Vertex Lane B     Vertex Lane B     Vertex Lane B     Vertex Lane A     Vertex Lane A     Vertex Lane B        Vertex Lane B           Vertex Lane B                       Vertex Lane B	O Differential O All Lanes	
Test Measurements	○ Single Ended ○ Select Lane	
Poop   Power Spectral Density   Linearity   Tone-1   Tone-2   Tone-3   Tone-4   Tone-5   Clock Frequency   Jitter-Master   Jitter-Slave   Return Loss   Calibrate   Deselect All   Deselect All	🗹 Lane A	Lane B Return Loss
Jitter-Master     Select All       Beturn Loss     Calibrate	V Droop     V Power Spectral Density     V Linearity     V Tone-1     V Tone-2     V Tone-3     V Tone-4	
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			-50 ppm - 50 ppm	1.58	48.42 ppm	✓ Pass	
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Device : Suite         TekExpress Automation Framework         TekExpress Automation Framework         DUT ID :         DUT ID :       DUT001         Device Type :       Transmitter       Compliance Mode :         DUT ID :       DUT001       Device Type :       Transmitter       Compliance Mode :       Overall Test Result :         Dut ID :       DUT001       Device Type :			DUT ID DUT	001			Run	Stop	
TekExpress Automation Framework         Constraint         DUT ID:       DUT001         Date/Time:       7/7/09 13:33       Device Type :       Transmitter       Compliance Mode :       Overall Test Result :         Scope Model:       DSA70804       Scope Serial Number :       Q435       Scope F/W Version :       4.1         Calibration Status :       PASS,PASS       TekExpress Version :       1.3.4.125       Scope F/W Version :       4.2         Lane-A :       Test Name       Measurement       Limit1       Measured       Limit2       Units       Test       Compliance       Execution         Clock Frequency       Clock Frequency       -50.00       1.58       50.00       ppm       Pass       FALSE       Min         Droop Positive       0.00       0.74       10.00       %       Pass       TBLE       1 Min	elect Acquire Analyze	Report							
TekExpress Automation Framework         DUT ID:       DUT001       Device Type :       Transmitter       Compliance Mode :         Date/Time:       7/7/09 13:33       Execution Time :       9 Min       Overall Test Result :         Scope Model:       DSA70804       Scope Serial Number :       Q435       Scope F/W Version :       4.2         Calibration Status :       PASS;PASS       TekExpress Version :       1.3.4.125       Scope F/W Version :       4.2         Lane-A :         Test Name       Measurement       Limit1       Measured       Limit2       Units       Test       Compliance       Execution         Clock Frequency       Clock Frequency       -50.00       1.58       50.00       ppm       Pass       FALSE       2 Min         Droop       Droop Positive       0.00       0.74       10.00       %       Pass       TBUE       1 Min			Device · Si	uite					
TekExpress Automation Framework         DUT ID :       DUT001       Device Type :       Transmitter       Compliance Mode :         Dut ID :       DUT001       Device Type :       Transmitter       Overall Test Result :			Defice. St	iite					
Enabling Innovation       XGbT Signal Characteristics Test Rep         DUT ID :       DUT001       Device Type :       Transmitter       Compliance Mode :         Date/Time :       7/7/09 13:33       Execution Time :       9 Min       Overall Test Result :	Talatanatan							^	
AGD F Signal Characteristics Test Rep         DUT ID :       DUT001       Device Type :       Transmitter       Compliance Mode :         Date/Time :       7/7/09 13:33       Execution Time :       9 Min       Overall Test Result :	<b>IEKITONIX</b>			TekExp	ress Autor	nation Frame	work	=	
Dence Type :	Enabling Innovation		XG	bT Sig	nal Cha	racteristic	s Test R	ep	
Scope Model:       DSA70804       Scope Serial Number :       Q435       Scope F/W Version :       4.5         Calibration Status :       PASS;PASS       TekExpress Version :       1.3.4.125       Scope F/W Version :       4.5         Lane-A :         Test Name       Measurement Details       Limit1       Measured Value       Limit2       Units       Test Result       Compliance       Execution Time         Clock Frequency       -50.00       1.58       50.00       Pass       FALSE       2 Min         Troop       Droop Positive       0.00       0.74       10.00       %       Pass       TBUE       1 Min									
Calibration Status     Decrement     Limit1     Measured value     Limit2     Units     Test Result     Compliance     Execution       Clock Frequency     Clock Frequency     -50.00     1.58     50.00     pmp     Pass     FALSE     2 Min	DUT ID	DUT001	Device Type :		Transmit	ter Complian	e Mode :		
Calibration Status     Decrete     Decrete     Decrete     Decrete       Lane-A :     Test Name     Measurement Details     Limit1     Measured value     Limit2     Units     Test Result     Compliance Mode     Execution Time       Clock Frequency     Clock Frequency     -50.00     1.58     50.00     ppm     Pass     FALSE     2 Min       Droop     Droop Positive     0.00     0.74     10.00     %     Pass     TRUE     1 Min		001001	Device Type : Execution Time :		Transmit 9 I	<u>ter</u> Compliand Iin Overall Te		=	
Lane-A :       Test Name     Measurement Details     Limit1     Measured Value     Limit2     Units     Test Result     Compliance     Execution Time       Clock Frequency     Clock Frequency     -50.00     1.58     50.00     ppm     Pass     FALSE     2 Min       Droop     Droop Positive     0.00     0.74     10.00     96     Pass     TBUE     1 Min	Date/Time	7/7/09 13:33						=	
Test Name         Measurement Details         Limit1         Measured value         Limit2         Units         Test Result         Compliance Mode         Execution Time           Clock Frequency         -50.00         1.58         50.00         ppm         Pass         FALSE         2 Min           Droop         Droop Positive         0.00         0.74         10.00         %         Pass         TBUE         1 Min	Date/Time Scope Model	7/7/09 13:33					st Result :		
Test Name         Details         Limit/Limit/Limit/2         Units         Result         Mode         Time           Clock Frequency         Clock Frequency         -50.00         1.58         50.00         ppm         Pass         FALSE         2 Min           Droop         Doop Positive         0.00         0.74         10.00         %         Pass         TRUE         1 Min	Date/Time Scope Model Calibration Status	7/7/09 13:33					st Result :		
Clock Frequency         Clock Frequency         -50.00         1.58         50.00         ppm         Pass         FALSE         2 Min           Droop         Droop Positive         0.00         0.74         10.00         %         Pass         TRUE         1 Min	Date/Time Scope Model Calibration Status	7/7/09 13:33					st Result :		
	Date/Time Scope Model Calibration Status Lane-A :	DSA70804 PASS;PASS	Scope Serial Number : TekExpress Version : Limit1 Measured	1	Q435 .3.4.125	Sco	st Result : De F/W Version : XGbT Version : Execution		
	Date/Time Scope Model Calibration Status Lane-A : Test Name	DSA70804 PASS;PASS Measurement Details	Scope Serial Number : TekExpress Version : Limit1 Measured value	1 Limit2	Q435 .3.4.125 Units Test Resu	Score Compliance Mode	st Result : De F/W Version : XGbT Version : Execution Time		
	Date/Time Scope Model Calibration Status Lane-A : Test Name Clock Frequency	DSA70804 DSA70804 PASS;PASS Measurement Details Clock Frequency	Scope Serial Number : TekExpress Version : Limit1 Measured value -50.00 1.58	1 Limit2 50.00	Q435 .3.4.125 Units Test Resu ppm Pass	Compliance Mode FALSE	st Result : be F/W Version : XGbT Version : Execution Time 2 Min		

# 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. <u>Select</u> 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 <u>Pre-recorded</u> 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

Condi- tion	Lane A	Lane B	Lane C	Lane D	Description
Using Fo	ur Probes				
1	CH1	CH2	СНЗ	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 Tw	vo 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 <u>popup window</u> appears where you can set the correct test mode and set the channel (CH1) on Lane C for each of the selected measurements.

tion	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 <u>popup window</u> 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 Or	ne Probe				
1	CH1	CH1			A <u>popup window</u> 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.

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

- 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 <u>Report</u> panel. The reports are automatically saved in MHT format to the default location:

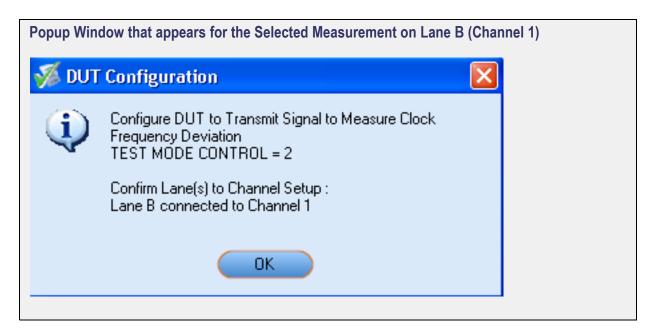
X:\XGbT-10GBASE-T\Untitled Session\<DUTID>\<DATE>(YYYYMMDD)\_<TIME>(HHMMSS)

or

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

Popup Window that Appears for the Selected Measurement on Lane A (Channel Channel 2), Lane C (Channel 3), and Lane D (Channel 4)	nel 1), Lane B
🚿 DUT Configuration 🛛 🛛	
Configure DUT to Transmit Signal to Measure Droop TEST MODE CONTROL = 6 Confirm Lane(s) to Channel Setup : Lane A connected to Channel 1 Lane B connected to Channel 2 Lane C connected to Channel 3 Lane D connected to Channel 4	
UK	

DUT Configuration       Image: Configure DUT to Transmit Signal to Measure Clock         Image: Configure DUT to Transmit Signal to Measure Clock         Frequency Deviation
TEST MODE CONTROL = 2 Confirm Lane(s) to Channel Setup : Lane A connected to Channel 1



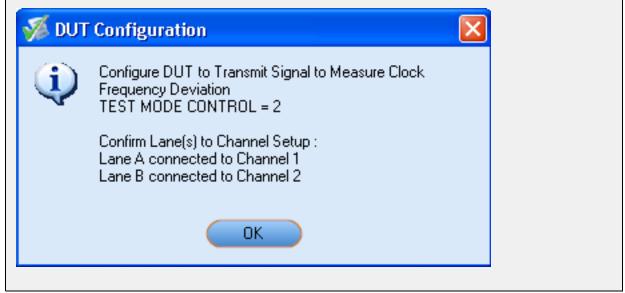
Popup Wind (Channel 2)	ow that Appears for the Selected Measurement on Lane A (Chan	nel 1) and Lane B
🚿 DUT	Configuration	
<b>(</b>	Configure DUT to Transmit Signal to Measure Clock Frequency Deviation TEST MODE CONTROL = 2 Confirm Lane(s) to Channel Setup : Lane A connected to Channel 1 Lane B connected to Channel 2	

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

🚿 DUT	Configuration	×
(j)	Configure DUT to Transmit Signal to Measure Clock Frequency Deviation TEST MODE CONTROL = 2	
	Confirm Lane(s) to Channel Setup : Lane A connected to Channel 1 Lane B connected to Channel 2	
	ОК	

Popup Win	dow that Appears for the Selected Measurement on Lane C (Chann	iel 1)
🚿 DUT	Configuration	
(j)	Configure DUT to Transmit Signal to Measure Clock Frequency Deviation TEST MODE CONTROL = 2 Confirm Lane(s) to Channel Setup : Lane C connected to 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)

🚿 DUT	🚿 DUT Configuration 🛛 🛛 🔀		
٩	Configure DUT to Transmit Signal to Measure Clock Frequency Deviation TEST MODE CONTROL = 2		
	Confirm Lane(s) to Channel Setup : Lane C connected to Channel 1 Lane D connected to Channel 2		
	ОК		

elect Panel with One or More Measurements Sele	cted
File View Tools Help DUT ID DUT001 Select Acquire Analyze Report	Bun Stop
Source     Test Lanes <ul> <li>Differential</li> <li>Single Ended</li> <li>Select Lane</li> <li>Lane A</li> <li>Lane B</li> <li>Lane C</li> <li>Lane D</li> </ul>	DUT Automation Using MDIO Manual
Test Measurements	Test Description         Jitter Slave> [IEEE Std 802.3an-2006         section 55.5.3.3):For DUT supporting         loop timing mode, the MASTER DUT is         set to test mode 1 and the SLAVE DUT         is set to test mode 3. Transmitter Timing         Jitter computes root mean square of the         period Jitter. The RMS period jitter         Click to view image of the waveform         Configure         Show Schematic         Select All         Deselect All
kExpress launched successfully.	<b>Tektronix</b> <sup>®</sup>

Device : Suite       Show Pass / Fail         ne A Overall Test Result :        Pass         oop       Test Completed       Droop Positive       0% -10 %       1.34       8.66 %       Pass         oop       Test Completed       Droop Negative       0% -10 %       1.34       8.66 %       Pass         ock Frequency       Test Completed       Clock Frequency       -50 ppm - 50 ppm       0.6       50.6 ppm       Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         Droop Positive       0% -10 %       6.3       37 %       A
ect       Acquire       Analyze       Report         Device : Suite       Show Pass / Fail         ne A Overall Test Result :        Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         oop       Test Completed       Droop Positive       0% · 10 %       1.34       8.66 %         Pass         ock Frequency       Test Completed       Clock Frequency       50 ppm · 50 ppm       0.6       50.6 ppm        Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         onon       Test Completed       Droop Positive       0% · 10 %       6.3       3.7 %       Pass
Device : Suite       Show Pass / Fail         ne A Overall Test Result : ✓ Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         oop       Test Completed       Droop Positive       0% · 10 %       1.34       8.66 %       ✓ Pass         ock Frequency       Test Completed       Clock Frequency       ·50 ppm · 50 ppm       0.6       50.6 ppm       ✓ Pass         ne B Overall Test Result : ✓ Pass         est Name       Status       Measurement       Limit       Results       Margin       Pass/Fail         oon       Test Completed       Droop Positive       0% · 10 %       6.3       3.7 %       ✓ Pass
Distribution of the second o
est Name     Status     Measurement     Limit     Results     Margin     Pass/Fail       oop     Test Completed     Droop Positive     0% · 10 %     1.34     8.66 % <ul> <li>Pass</li> <li>Droop Negative</li> <li>0% · 10 %</li> <li>2.7</li> <li>7.3 %</li> <li>Pass</li> <li>Dest Completed</li> <li>Clock Frequency</li> <li>50 ppm · 50 ppm</li> <li>0.6</li> <li>50.6 ppm</li> <li>Pass</li> <li>rest Name</li> <li>Status</li> <li>Measurement</li> <li>Limit</li> <li>Results</li> <li>Margin</li> <li>Pass/Fail</li> <li>Droop Positive</li> <li>0% · 10 %</li> <li>6.3</li> <li>3.7 %</li> <li>Pass</li> <l< td=""></l<></ul>
est Name     Status     Measurement     Limit     Results     Margin     Pass/Fail       oop     Test Completed     Droop Positive     0% · 10 %     1.34     8.66 % <ul> <li>Pass</li> <li>Droop Negative</li> <li>0% · 10 %</li> <li>2.7</li> <li>7.3 %</li> <li>Pass</li> <li>Dest Completed</li> <li>Clock Frequency</li> <li>50 ppm · 50 ppm</li> <li>0.6</li> <li>50.6 ppm</li> <li>Pass</li> <li>rest Name</li> <li>Status</li> <li>Measurement</li> <li>Limit</li> <li>Results</li> <li>Margin</li> <li>Pass/Fail</li> <li>Droop Positive</li> <li>0% · 10 %</li> <li>6.3</li> <li>3.7 %</li> <li>Pass</li> <l< td=""></l<></ul>
Droop Positive     0% - 10 %     1.34     8.66 %     ✓ Pass       Droop Negative     0% - 10 %     1.34     8.66 %     ✓ Pass       Droop Negative     0% - 10 %     2.7     7.3 %     ✓ Pass       Droop Negative     0% - 10 %     0.6     50.6 ppm     ✓ Pass
oop     Test Completed     Droop Negative     0 % 10 %     2.7     7.3 %     ✓ Pass       Droop Negative     0 % 10 %     2.7     7.3 %     ✓ Pass       Droop Negative     0 % 10 %     2.7     7.3 %     ✓ Pass       ne B Overall Test Result : ✓ Pass     ✓ Pass     ✓ Pass       est Name     Status     Measurement     Limit     Results     Margin     Pass/Fal       non     Test Completed     Droop Positive     0% 10 %     6.3     3.7 %     ✓ Pass
ne B Overall Test Result : ✓ Pass est Name Status Measurement Limit Results Margin Pass/Fail onon Test Committed Droop Positive 0% · 10 % 6.3 3.7 % ✓ Pass
est Name Status Measurement Limit Results Margin Pass/Fail Droop Positive 0% · 10 % 6.3 3.7 %
est Name Status Measurement Limit Results Margin Pass/Fail Droop Positive 0% · 10 % 6.3 3.7 %
nnn Test Conneleted Droop Positive 0% · 10 % 6.3 3.7 %
oon Test Completed
2009 1:00 PM::Setting export file name to:Lane B_Clock Frequency.png
/2009 1:00 PM::Setting export palette to:COLOR
/2009 1:00 PM::Setting export start
2009 1:00 PM::Started acquisition 2009 1:00 PM::Completed Clock Frequency-Device test
2009 1:00 PM::Generating Tek Report 2009 1:00 PM::Test execution completed
2009 1:00 PM:: 1 est execution completed
press launched successfully. Tektronix

eport Panel aft	er Running	Multi	ole Mea	surer	nent	on Mu	Itiple La	nes	
🏅 TekExpress XGbT-10G	RASE T Automated 9	alution (	(Intitled)*						
File View Tools Help	DASE-1 Automoteu s		onniced)						کارکار
Tile Mew Tools Telb									
			DUTID DU	T001				Run	Stop
Select Acquire Analyze	e Report								
			Device : S	uite					
<b>Tektronix</b> <sup>•</sup>				TakEv	nraee	Automat	tion Framev	vork	^
/			•		•				
Enabling Innovation XGbT Signal Characteristics Test Rep									lep
DUT ID :	DUT001	De	vice Type :		Т	ransmitter	Compliance	e Mode :	
Date/Time :			ition Time :						
Scope Model :	DSA70804	Scope	Serial Number		Q435		Scope	e F/W Version	: 4.3
Calibration Status :	PASS;PASS	TekExp	oress Version		1.3.4.125	;	1	XGbT Version	:
Lane-A :									
					I	-	0 "		
Test Name	Measurement Details	Limit1	Measured value	Limit2	Units	Test Result	Compliance Mode	Execution	
Clock Frequency	Clock Frequency	-50.00	-0.60	50.00	ppm	Pass	FALSE	2 Min	
	Droop Positive	0.00	1.34	10.00		Pass			_
Droop	Droop Negative	0.00	2.70	10.00	%	Pass	TRUE	2 Min	
	Line de Tran 4								
<		- 1.	_						>
« < > »   Report Summary	Lane A Lane B L	ane C   L	ane D						
kExpress launched successfully									

## **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, <u>click here</u>.
- 5. In the DUT Automation panel, select <u>Using MDIO</u> 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 <u>error message</u> 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

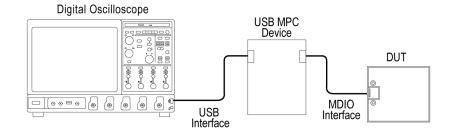
 $\label{eq:model} My \ Documents \ Wy \ Tek \ Express \ XGbT-10GBASE-T \ Untitled \ Session \ DUTID \ OATE> (YYYM-MDD) \ <TIME> (HHMMSS).$ 

**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	
√ TekExpress XGbT-10GBASE-T Automated Solution (Evaluation Version) (Untitled)*	
File View Tools Help DUT ID DUT001	Run Stop
Select       Acquire       Analyze       Report         Source       Test Lanes       Image: Analyze and the second s	DUT Automation Using MDIO Manual
Test Measurements	Test Description         Jitter Slave> (IEEE Std 802.3an-2006)         Section 55.3.3;For DUT supporting         loop timing mode, the MASTER DUT is         set to test mode 1 and the SLAVE DUT         is set to test mode 3. Transmitter Timing         Jitter computes root mean square of the         period Jitter. The RMS period jitter         Click to view image of the waveform         Configure         Show Schematic         Select All         Deselect All
TekExpress launched successfully.	Tektronix <sup>*</sup>
Cannot establish a connection to DUT through USB M connection with DUT and USB MPC device	PC. Please check the

DUT Automation Panel	
DUT Automation	
O Using MDIO	
🔿 Manual	
	J

## 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:

🚿 Return	Loss Calibration 🔀
2	Do you want to perform calibration now or use calibration files from a previous calibration?
	Live Calibration Use Files

1. Select a channel for each of the probes.

Return Loss (	alibration		
Probes Probe: P1	Channel 1 🗸	Probe: P2	Channel 2 💌
Step 1: Per	form Calibration - Lane	A	
<u>Measureme</u>	ent	<u>Status</u>	
Short	<u>View SetupDiagram</u>	Not Run	Run
Load	View SetupDiagram	Not Run	Run
Open	<u>View SetupDiagram</u>	Not Run	Run
Step 2: Ver	ify Calibration		
Verify Resu	ılts	Not Run	Verify
		Cancel	Apply Calibration

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 <u>Return Loss Calibration: Run Short</u> 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.

		Compa		oration for Shi veform on the		expected res	sult			
Est Vertical	Horizutoq Trig D	solay Cu-son	e Measurs Mi	ask Visir Hr.Scope	Analyze Utilites	Hop 💽		Tek 🚍 🛽		
Reference	Reference Ref 1 🔻	Display	Ref 1 Delete	Vert Poston	Scale 10.048	Her & Position 50.05	Label	Recal	3	
10.0dB 50	0.0MHz				Actua	∫_522mV	4.0µsidiv 25.0 Provine Si 0 acqs Man August	IGS/s 40.0ps/pt ingle Seq RL:1.0N		

- **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 <u>Return Loss Calibration: Run Load</u> 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 Complete 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 <u>Return Loss Calibration: Run Open</u> 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 Complete and the Run button changes to Re-Run.

Return Loss	Calibration		
Probes Probe: P1	Channel 1	Probe: P2	hannel 2 💌
Step 1: Pe	form Calibration - Lane	Α	
Measureme	<u>ent</u>	<u>Status</u>	
Short	View Setup Diagram	Complete	Re-Run
Load	View Setup Diagram	Complete	Re-Run
Open	<u>View SetupDiagram</u>	Complete	Re-Run
Step 2: Ve	rify Calibration		
Verify Res	ults	Not Run	Verify
		Cancel	Apply Calibration

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 <u>Return Loss Calibration: Run</u> <u>Verify</u> 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 <u>Return Loss Calibration</u> dialog box appears again for each of selected lanes to either perform the live calibration (Step 1) or to cancel the calibration.

obes			
Probe: P1	Channel 1 🛛 👻	Probe: P2	Channel 2 💌
Step 1: Per	form Calibration - Lane	В	
<u>Measureme</u>	<u>ent</u>	<u>Status</u>	
Short	<u>View SetupDiagram</u>	Not Run	Run
Load	<u>View SetupDiagram</u>	Not Run	Run
Open	View SetupDiagram	Not Run	Run
Step 2: Ver	ify Calibration		
Verify Resu	llts	Not Run	Verify
		Cancel	Apply Calibration

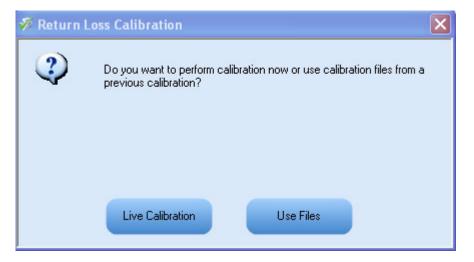
Calibration for Load done. Compare the waveform on the scope to this e	xpected result
Est Vertical Hutstance Trig Disciny Cursore Measurs Mosk Mair MrSkope Analyze Alliles Hea	
	Position D.0div Scale
	10.008
· · · · · · · · · · · · · · · · · · ·	
Reference Display Rof 1 Vert Position Scale Ref 1 Con Orders Utility a 100100 b)	Her c Position Label Sine &
A Com 10.0dB 50.0MHz	313mV 4.0,m/dtv 25.003fs 40.0ps/pt Provine Single Seg 0 acqs RL:1.0M Men August 27, 200 04-27,38

	Calil Compare the wa	oration for Oper		avpacted ros	alt			
					uit	Tek 🚍	-	
ile Est Vertikal Horizvikog Trig D	somy Co-sore Measure M	ook van Wyscope	Analyze Danies H	ab 🚺				
						Position 0.0div		
						Scale		
						10.0dB		
·	<u> </u>			<u></u>		<u> </u>		
Reference Reference	Display Ref 1	Vert Position U.U.div a	Scale 10.040 b	Herz Position 50.05	Label	Save Recal	*	
10.0dB 50.0MHz			A case.	/ 532mV	4.0µsidiv 25.00 Proview Sin	38/s 40.0ps/p gle Seg		
					0 acqs Man August 2	RL:1.0N	12	

	Calibrati	on Verified				
Co	mpare the wavefo	orm on the scop	e to this expec	ted result		
Ept Vertical Horizkee Trig Discley	Cursore Measure Mask	Malis MyScope Analyze	utilles Help 🔽	6820	🔆 Tek 📃 😿	
10,048 50.0MHz	<u>* -   , , , ,   ,</u>		A / 512mV	4.0µsidiv	25.0G8/s 40.0ps/pt	
				Preview 0 acqs	Single Seq RL:1.0N gust 27, 2003 04 29:41	

## 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.

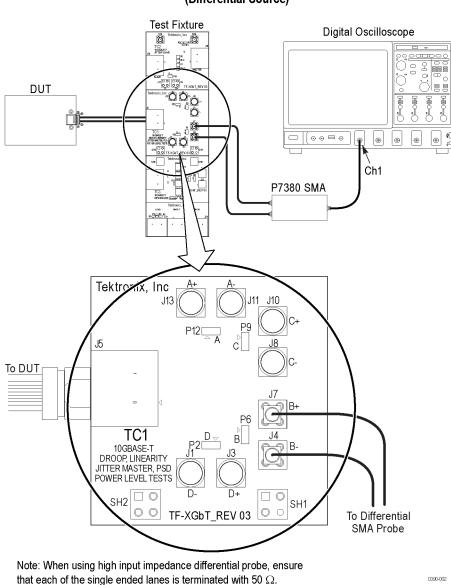
Return Loss Calibration
Probes Probe: P1 Channel 1  Probe: P2 Channel 2
Step 1: Select Directory - Lane A
X:\XGbT-10GBASE-T\Calibration\ Browse
Select the directory where calibration files for this lane are saved. All the calibration files pertaining to each configuration (short/load/open) should be available in the selected directory.
Step 2: Verify Calibration
Verify Results Not Run Verify Live Calibration
Cancel Apply Calibration

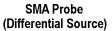
**NOTE.** *Make sure all the calibration files of Short, Load, and Open configuration are available in the selected directory.* 

- **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 <u>Live Calibration</u> 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 <u>1</u>) or use the existing calibrated files (Step 1).

## **Connection Setup**

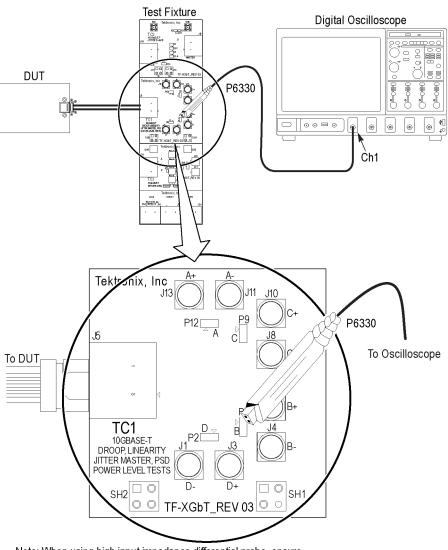
## **Connections with SMA Probe (Differential Source)**





- 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 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)**



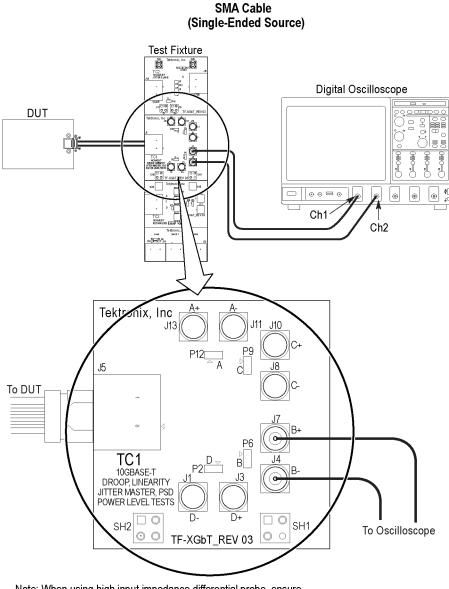
Differential Probe

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

0390-003

- 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  $\Omega$ .

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).

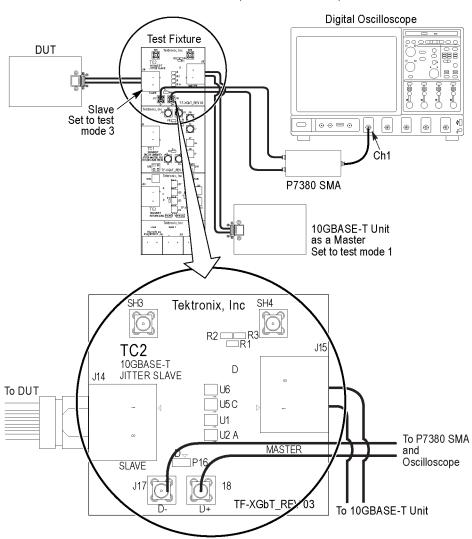
To perform analysis using prerecorded waveform file, <u>click here</u> to view the steps.

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



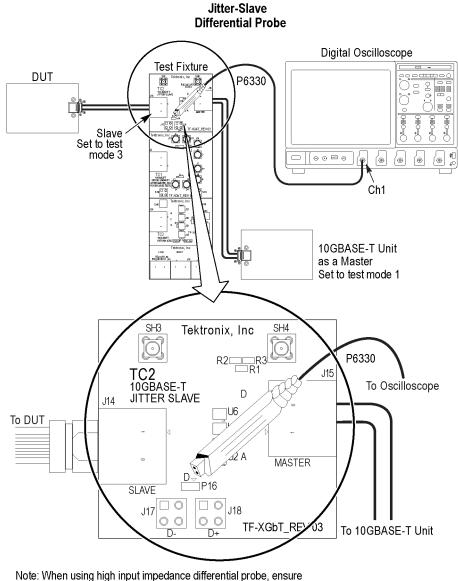
Jitter-Slave SMA Probe (Differential Source)

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

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

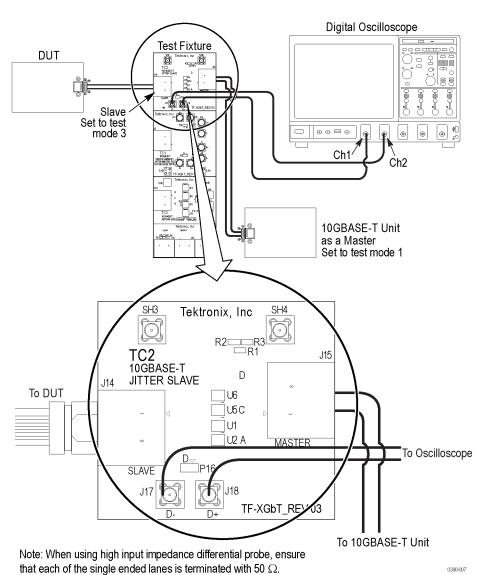


that each of the single ended lanes is terminated with 50  $\Omega$ .

0390-006

- 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



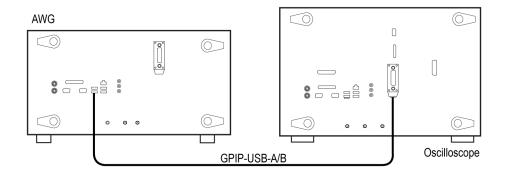
Jitter-Slave SMA Cable (Single-Ended Source)

- 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.

37	GPIB		GPIB Configuratio	IB Configuration	
		Talk / Listen	Controller	Off Bus	

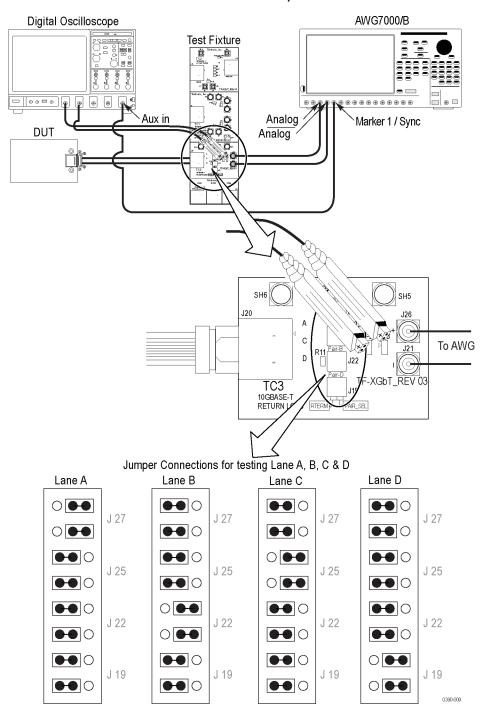
4. In the AWG instrument, select System > GPIB/LAN Configuration > Talk/Listener.

GPIB/LAN Configuration
GPIB
● Talk/Listen
Address : 2 💌
◯ Off Bus
VXI-11 Server (LAN) Use VXI-11 Server Control in the Task Tray to Start/Stop VXI-11 Server
Raw Socket (LAN)
On Port Number : 4 000
Off
OK Cancel Help

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

✓ LAN TekL Retrieved I	ink 🗌 USB	📃 Serial 📃 VXI	🗌 Non - VISA Reso	TekVISA 300 Timeout
Connection	Resource	Serial No	Options	Resource Address
VISA-LAN	AWG7102	B010190	01	TCPIP::134.64.235.18::INSTR
/ISA-LAN	DP07254	Q222	MTM:	TCPIP::134.64.235.77::INSTR
/ISA-GPIB	AWG7102	B010190	01	GPIB0::2::INSTR
/ISA-GPIB	DP070404	Q006	10×L	GPIB8::1::INSTR

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



Return Loss Setup

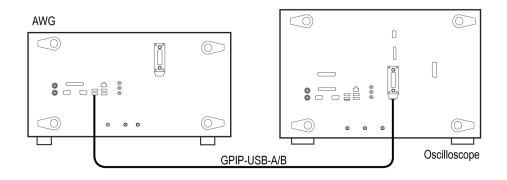
**NOTE.** ••• *is used to denote short jumpers.* 

- 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.



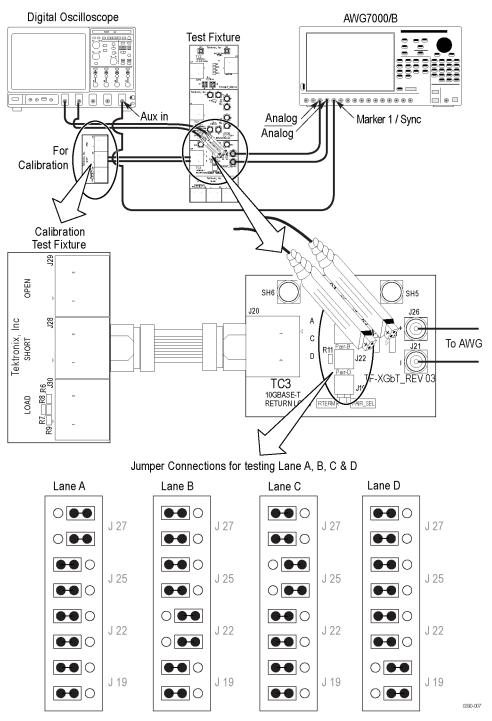
4. In the AWG instrument, select System > GPIB/LAN Configuration > Talk/Listener.

GPIB/LAN Configuration
GPIB
● Talk/Listen
Address : 2 💌
◯ Off Bus
VXI-11 Server (LAN) Use VXI-11 Server Control in the Task Tray to Start/Stop VXI-11 Server
Raw Socket (LAN)
On Port Number: 4 000
Off
OK Cancel Help

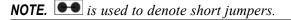
5. In the XGbT application, select Tools > Instrument Bench and verify that the connected AWG instrument is listed.

✓ LAN □ TekL Betrieved I	GPIB ink USB nstruments (4)	Serial	🗌 Non - VISA Reso	TekVISA 300 Timeout
Connection	Resource	Serial No	Options	Resource Address
/ISA-LAN	AWG7102	B010190	01	TCPIP::134.64.235.18::INSTR
/ISA-LAN	DP07254	Q222	MTM:	TCPIP::134.64.235.77::INSTR
/ISA-GPIB	AWG7102	B010190	01	GPIB0::2::INSTR
/ISA-GPIB	DP070404	Q006	10KL	GPIB8::1::INSTR

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



**Return Loss Calibration** 



- 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 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

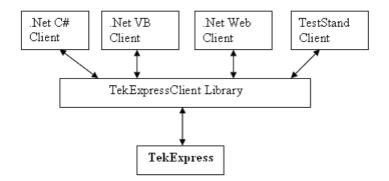
Related Topics Server and Client Proxy Objects

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:

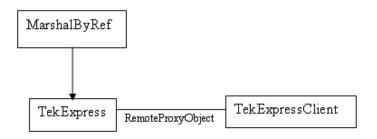
- 1. The client needs to provide the IP address of the PC at which the server is running in order to connect to the server.
- 2. The client needs to lock the server application to avoid conflict with any other Client that may try to control the server simultaneously. "Lock" would also disable all user 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.

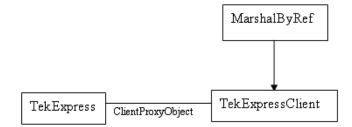
For example,

//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.

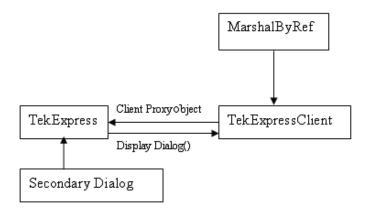
Click here to see examples.

```
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.

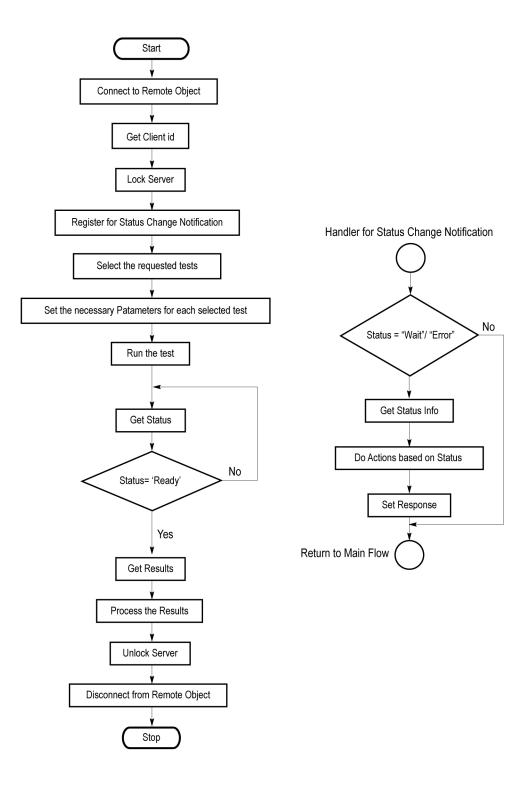
In the secondary dialog library, the assembly that is calling for the dialog box to be displayed is checked and if a remote connection is detected, the messages are directed to the remote end.

#### **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:



- 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	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote function.
Ready: Tes	t configured and ready to	) start.	
Running: T	est running.		
Paused: Te	st paused.		
Wait: A po	pup that needs your inpu	ts.	
Error: An e	error is occurred.		

Name	Туре	Direction	Description
dutName	string	IN	The new DUT ID of the setup.
out bool sav <sub>Name</sub>	ed 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.

Name	Туре	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	Туре	Direction	Description
Ŭ	Type String	Direction OUT	Description Identifier of the client that is connected to the server.

**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 dutld			
Name	Туре	Direction	Description
dutld	string	OUT	The DUT ID of the setup.
The dutId param	eter is set after the	server processes the requ	iest.
string device			
Name	Туре	Direction	Description
device	string	IN	Specifies the name of the device.
string suite			
Name	Туре	Direction	Description
suite	string	IN	Specifies the name of the suite.
string test			
Name	Туре	Direction	Description
test	string	IN	Specifies the name of the test to obtain the pass or fail status.
string paramete	erString		
Name	Туре	Direction	Description
parameterString	string	IN	Selects or deselects a test.
int rowNr			
Name	Туре	Direction	Description
rowNr	int	IN	Specifies the zero based row index of the sub-measurement for obtaining

**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	Туре	Direction	Description
status	string array	OUT	The list of status messages generated during run.
string name			
Name	Туре	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	9		
Name	Туре	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	Туре	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	Туре	Direction	Description
isSelected	bool	IN	Selects or deselects a test.

string time			
Name	Туре	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.

Direction	Description
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.

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

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

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

Name	Туро	Direction	Description
	Туре		
message	String	OUT	The wait state /error state message to you.
out string[]	buttonTexts		
Name	Туре	Direction	Description
buttonTexts	string array	OUT An array of strings containing possible response types that send.	
string respo	nse		
Name	Туре	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 cl	ientID		
Name	Туре	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**

Command name	Parameters	Description	Return Value	Example
Connect()	string ipAddress out string clientID	This method connects the client to the server. <u>Note</u> 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.Con- nect(ipaddress,m_clientID)

#### Table 25: Connect through an IP address

**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!".

# Lock the Server

#### Table 26: Lock the server

Command name	Parameters	Description	Return Value	Example
LockSession()	<u>string clientID</u>	This method locks the server. <u>Note</u> 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.	<pre>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)</pre>

**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!".

# **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 is set to false, the return value is "Verbose mode turned off. All dialog box will be shown to server".	<pre>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)</pre>

**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!".

# 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(clien- tID,desiredDutId) <u>Note</u>
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(clien- tID, out DutId)

#### Table 28: Set or Get the DUT ID

**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!".

# 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
SetGeneralParam- eter()	string clientID string device string suite string test string parame- terString	This method sets the general parameters that are not specific to any given suite or measurement. <b>NOTE.</b> 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 <u>Lane Selection</u> <u>Select Channel</u> <u>Select Source Type (Differential)</u> <u>Select Source Type (Single</u> Ended)
SetAnalyzeParam- eter()	string clientID string device string suite string test string parame- terString	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 <u>Configure Droop</u> <u>Configure Power Spectral</u> <u>Density</u> <u>Configure Linearity</u> <u>Configure Clock Frequency</u> <u>Configure Jitter-Master</u> <u>Configure Jitter-Slave</u> <u>Configure Return Loss</u>
SetAcquireParame- ter()	string clientID string device string suite string test string parame- terString	This method sets the configuration parameters in the Analyze panel of the Configuration Panel dialog box for a given suite or measurement.	returnVal = re- moteObject.Se- tAcquireParam- eter(id, device, suite, test, pa- rameterString) if ((OP_STATUS) returnVal != OP_STA- TUS.SUC- CESS) return Command- Failed(re- turnVal)	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
GetGeneralParam- eter()	string clientID string device string suite string test string parame- terString	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 <u>Lane Selection</u> <u>Select Channel</u> <u>Select Source Type (Differential)</u> <u>Select Source Type (Single</u> Ended)
GetAnalyzeParam- eter()	string clientID string device string suite string test string parame- terString	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 <u>Configure Droop</u> <u>Configure Power Spectral</u> <u>Density</u> <u>Configure Linearity</u> <u>Configure Clock Frequency</u> <u>Configure Jitter-Master</u> <u>Configure Jitter-Slave</u> <u>Configure Return Loss</u>
GetAcquireParame- ter()	string clientID string device string suite string test string parame- terString	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!".

#### 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

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

Table 35: Jitter-Master Co	onfigure 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 co	nfigure 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")
	returnval = mClient.GetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Slave", "Apply Filter")
Apply Filter	
	Parameter Examples
Return Loss Configure	
Return Loss Configure	Parameter Examples
Return Loss Configure	
Return Loss Configure Table 37: Return Loss co	onfigure parameter examples

# Select a Measurement

Table 38:	Select a	measurement
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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.	<pre>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.Se- lectTest(clientID, "Device", "Suite", "Droop", true) Select Measurement (Power Spectral Density): returnval=mClient.Se- lectTest(clientID, "Device", "Suite", " Linearity-&gt;Tone-2", True)</pre>

**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!".

# Select a Suite

	Table	39:	Select	а	suite
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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.	<pre>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)</pre>

**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!".

# **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")

Table 42: Linearity configure p	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 Table 43: Clock Frequency co	•	
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 Para Table 44: Jitter-Master configu Parameter	•	
Ref Levels	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Ref Levels\$Absolute")	
	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "MidLevel\$50")	
MidLevel	Jiller-Master, MidLevelaso)	
MidLevel Hysteresis	returnval = mClient.SetAnalyzeParameter(clientID, "Device", "Suite", "Jitter-Master", "Hysteresis\$5")	

Jitter-Slave Configure Parameter Examples			
Table 45: Jitter-Slave conf	gure 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 F Table 46: Return Loss con	Parameter Examples figure 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

Command name	Parameters	Description	Return Value	Example
Run()	<u>string clientID</u>	Runs the selected measurements. <u>Note</u> 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(clien- tID)
Stop()	<u>string clientID</u>	Stops the currently running measurements. <u>Note</u>	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(clien- tID)

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

**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

Command name	Parameters	Description	Return Value	Example
GetTimeOut()	<u>string clientID</u>	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)

#### Table 48: Get or Set the Timeout value

**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.

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 <u>Ready,</u> <u>Running, Paused,</u> 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.Applica- tionStatus(clientID)
QueryStatus()	<u>string clientID</u> out string[] <u>status</u>	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".	<pre>m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL returnVal as string returnVal=m_Client.QueryS- tatus(clientID, out statusMes- sages) if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS) return "Status updated" else return CommandFailed(re- turnVal)</pre>

## Table 49: Wait for the test to complete

Command name	Parameters	Description	Return Value	Example
GetCurrentState- Info() <b>NOTE.</b> 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() <b>NOTE.</b> 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 informa- tion using the method GetCurrentState- Info(), the client can decide on the re- sponse to send and send the response to the application us- ing 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 _mes- sage should match the information re-	This command does not return any value.	<pre>m_Client = new Client() //m_Client is a reference to the Client class in the Client DLL m_Client.SendResponse(cli- entID, caption,message, response)</pre>
		ceived earlier in the GetCurrentStateInfo function.		

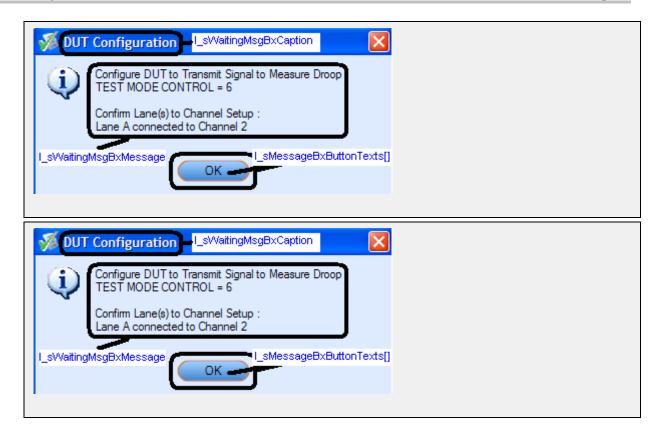
#### Table 49: Wait for the test to complete (cont.)

**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!".



# After the Test is Complete

#### Table 50: After the test is complete

Command name	Parameters	Description	Return Value	Example
GetPassFailSta- tus()	string clientID string device string suite string test	This method gets the pass or fail status of the measurement after test completion. <b>NOTE.</b> 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.GetPass- FailStatus(clientID, device, suite, "Droop") //Pass or Fail
GetResultsValue()	string clientID string device string suite string test string parame- terString	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.GetRe- sultsValue(clientID, "Device", "Suite", "Droop", "Lane ARe- sults")

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.	<pre>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)</pre>
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.	<pre>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")</pre>

## 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.TransferRe- port(clientID,"C:\Report")
TransferWave- forms()	string clientID string filePath	This method transfers all the waveforms from the folder for the current run. <b>NOTE.</b> 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.Transfer- Waveforms(clientID,"C:\Wave- forms")
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). <b>NOTE.</b> 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.TransferIm- ages(clientID, "C:\Waveforms")

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

**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 paramete	erString		
Name	Туре	Direction	Description
parameterString	string	IN	Specifies the oscilloscope model, TekExpress version, and XGbT version.

# 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)

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

**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!".

# **Unlock the Server**

Table	<b>52</b> :	Unlock	the	server
-------	-------------	--------	-----	--------

Command name	Parameters	Description	Return Value	Example
UnlockSession()	<u>string clientID</u>	This method unlocks the server from the client. The ID of the client to be unlocked must be provided. <u>Note</u>	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. <u>Note</u>	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:

Code	Description	
-1	The operation failed.	
1	The operation succeeded.	
2	Server not found	
3	The server is locked by another client, so operation cannot be performed.	
4	The server is not locked. Lock the server before performing the operation.	
0	Nothing	
	-1 1 2 3	

# **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", "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", "End Time [ns]\$92") '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, WaitingMsbBxMessage, 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 XGbT-10GBASE-T\Examples\Programmatic Interface\TestStand

🛎 🖬 👗 📬 💼 🤶 🔰 📑 🗗 🗗	NET 🗸	🐵 tê 👬 🖷	М 🖓 🖗	3
Setup Cleanup Parameters Locals	View:	MainSequence		
ep	Description	Flow Properties	Requirements	Comment
Connect	Action, Create TekExpressClient.Client; Call Te			Connect to the se
🙇 Lock the sever so that other client object will have rea.				
Event Locking the server	"Locking server"			
10 LockServer	Action, Call TekExpressClient.Client.LockServer			Lock Server to bl
📩 Demonstrating - Time Out feature of the client				
🕼 Get TimePeriod	Action, Get TekExpressClient.Client.TimeOut			Gets the Time Ou
🕮 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-ou
📓 Wait	TimeInterval(Parameters.TimeOut + 2)			Wait for the time
🕮 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				
10 LockServer	Action, Call TekExpressClient.Client.LockServer			Lock Server to bl
🕼 Set TimePeriod	Action, Call TekExpressClient.Client.SetTimeOut			Sets the Time-ou
Demonstrating Save/Recall Session				
10 GetDUTID	Action, Call TekExpressClient.Client.GetDutId			Checking if DUT-i
Show default DUT ID	"DUT ID"			
SetDUTID	Action, Call TekExpressClient.Client.SetDutId			Change the DUT
W SaveSession	Action, Call TekExpressClient.Client.SaveSession			Saves the curren
Notice the saved session	"Session save"			
W SaveSessionAs	Action, Call TekExpressClient.Client.SaveSessio			Saves the curren
Notice the saved As	"Session save"			
W RecallSession	Action, Call TekExpressClient.Client.RecallSession			Recall the saved
Notice the recalled session	"Session save"			
Demonstrating Run, Query results and Transfer results				
Run stop demo	"Run/Stop"			
WRun	Action, Call TekExpressClient.Client.Run			Run TekExpress i
Wait	TimeInterval(30)			Wait for the run I
Stop	Action, Call TekExpressClient.Client.Stop			Transfer the rep
A Demo ends	"Demo ends"			

# **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 $\Omega$ , 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.

Test name Clock Frequency	Purpose To verify that the frequency of the Transmit Clock is within the conformance limits.	Reference to the standard IEEE standard 802.3an-2006, subclause 55.5.2, Test modes. IEEE Std 802.3an-2006, clause 55.5.3.5, Transmit clock frequency.	What the standard saysIEEE standard 802.3an-2006, subclause55.5.2: Configure the DUT for test mode 2operation.The IEEE Std 802.3an-2006, clause 55.5.3.5:The 10GBase-T devices when operating inMaster timing mode must have a quinarysymbol transmission rate of 800.00 MHz ±50 ppm.The IEEE Std 802.3an-2006, clause 55.5.3.5:The IEEE Std 802.3an-2006, clause 55.5.3.5:The IEEE Std 802.3an-2006, clause 55.5.3.5:The frequency of the reference clock that isextracted from the transmitted waveform has abase 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 $\pm$ 10%) is the root mean square period difference from the average period (T – Tavg) that is accumulated over a sample size of 200,000 $\pm$ 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.)

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).

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.

## Table 56: Error Codes for XGbT (cont.)

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