TekExpress[™] Serial ATA Automated Compliance Solutions Online Help



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TekExpress Serial ATA Online help, 076-0096-01.

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

Table of Contents

General Safety Summar	у	۲
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Introduction

Using Online Help	1
Related Documentation	2
Conventions	2
Technical Support	3

Getting Started

What is new in this release	5
Accessories	6
Minimum System Requirements	7
Application Directories and Usage	8
File Name Extensions	9
How To Activate the License	10
Before You Click Run	12

Operating Basics

TekExpress Application Overview	15
Key Features	15
Starting the Application	16
Resizing the Application Window	17
Exiting the Application	17
Global Controls	18
Menus	
File Menu	19
View Menu	20
Tools Menu	21
Help Menu	24

How To

25
28
31
33
37
39
40

Application Examples

RSG-RMT Suite	
Testing a Drive	
RSG-RMT Equipment Setup: Drive	42
RSG-01 - Gen1 (1.5Gb/s) Receiver Signalling Group	44
RMT- Receiver Margin Test	47
Testing a Host	
RSG-RMT Equipment Setup: Host	50
RSG-02 - Gen2 (3.0Gb/s) Receiver Signalling Group	52
RMT- Receiver Margin Test	56
PHY-TSG-OOB Suite	
Testing a Drive	
PHY-TSG-OOB Equipment Setup: Drive	59
PHY01 - Unit Interval-Gen1 Test	60
TSG02 - Rise-Fall Time-Gen1 Test without RF Switch	64
OOB01 - OOB Signal Detection Threshold-Gen1 Test	69
Testing a Host	
PHY-TSG-OOB Equipment Setup:Host	73
TSG03 - Differential Skew-Gen 2 Test	74
OOB06 - COMWAKE Gap Detection Windows Test	78
Rx-Tx Suite	
Testing a Drive	
Rx-Tx Equipment Setup: Drive	82
Rx01 - Pair Differential Impedance test	83
Tx02 - Single-Ended Impedance test	87
Testing a Host	
Rx-Tx Equipment Setup: Host	91
Rx03 - Differential Mode Return Loss	92
SI Cable test	
SI Equipment Setup	96
SI-02 - Cable Absolute Differential Impedance test on a SATA Cable	97

Deskew Operation

Deskewing Real Time Oscilloscopes	102
Manual Deskew Procedure for Sampling Oscilloscopes	103
Mixed Mode TDR Channel Alignment with Independent TDR Source	103
Deskew parameters for RxTx	108
RxTx Default Deskew Parameters Settings	108
RxTx Deskew Parameters Settings with Long Cable and/or RF Switch	108

Overriding Acquire Parameters

About Overriding Acquire Parameters	109
Acquire parameters with "Automatically" option	109
Acquire Parameters with "Manually" Option	110

Pattern Generation Utility

Using the Pattern Generation Utility to Test Receivers	113
Calibration Procedure	115

User Configuration for TekExpress SATA

Setting User Option for SATA DUT Power Cycle Method	121
Setting User Option for SATA DOT Tower Cycle Method	141

TekExpress Programmatic Interface

About Programmatic Interface	125
Server and Client Proxy Objects	127
Remote Proxy Object	127
Client Proxy Object	128
Programmatic Interface APIs	
Connect()	130
Disconnect()	131
LockSession()	132
UnlockSession()	133
SetTimeOut()	134
GetTimeOut()	135
GetDutId()	136
ChangeDutId()	137
SaveSession()	138
SaveSessionAs()	139
RecallSession()	140
Run()	141
Stop()	142
QueryStatus()	143
TransferReport()	144
CheckSessionSaved()	145

ErrorCodes	146
Example	147

Troubleshooting

Instrument Connectivity	149
User Interface	149
TestStand Run time Engine Installation	150
Test Limit is Single Sided	151
Report shows as NAN	152

Reference

Shortcut Keys	153
Error Codes for TekExpress	154

Index

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Connect the probe reference lead to the circuit under test before connecting the probe input. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement instrument.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Operate With Suspected Failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Terms in this Manual

These terms may appear in this manual:



WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Using Online Help

Select Help from the menu to open the help file. You can also find an electronic copy of the help file in the Documents directory on the 063-4068-XX DVD.

Tables of Contents (TOC) tab — Organizes the Help into book-like sections. Select a book icon to open a section; select any of the topics listed under the book.

Index tab — Enables you to scroll a list of alphabetical keywords. Select the topic of interest to bring up the appropriate help page.

Search tab — Allows a text-based search.

Follow these steps:

- 1. Type the word or phrase you want to find in the search box. If the word or phrase is not found, try the Index tab.
- 2. Choose a topic in the lower box, and then select the Display button.

General Help Functions:

- Select the Print button from the Help topics menu bar to print a topic.
- To return to the previous window, select the Back button.
- Use hyperlinks to jump from one topic to another.
- If the back button is grayed out or a jump is not available, choose the Help Topics button to return to the originating help folder.

Related Documentation

In addition to this TekExpress Online Help, the following documentation is included with the software:

- TekExpress Installation Manual, Tektronix part number 071-2268-XX. The Installation Manual has information about installing and upgrading the software.
- TekExpress Quick Start User Manual, Tektronix part number 071-2298-XX. The Quick Start User Manual has information about how to use the software and includes application examples.

Technical Specification documents

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

Conventions

Online Help uses the following conventions:

- The term "SATA" refers to Serial Advanced Technology 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 1: Icon descriptions

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

Technical Support

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

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

General Information

- All instrument model numbers.
- Hardware options, if any.
- Probes used.
- 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

What is new in this release

This version of TekExpress Serial ATA includes the following feature enhancements:

- The Programmatic interface which allows you to seamlessly integrate the TekExpress Test Automation application with the high-level automation layer.
- The PHY-TSG-OOB test suite is included for Serial ATA Gen1 and Gen2 test coverage which offers compliance test automation solution for PHY General requirements (PHY: 1-4), PHY Transmitted Signal Group Requirements (TSG: 1-12), PHY OOB Requirements (OOB: 1-7) using a Tektronix Real Time DSO.
- The RX-TX test suite is included for Serial ATA Gen1 and Gen2 test coverage which offers compliance test automation solution for PHY Transmit (TX: 1-6) and PHY Receive (RX: 1-6) channel test requirements using Tektronix sampling oscilloscope.
- The SI test suite is included for SATA electrical cable assembly compliance testing using a sampling oscilloscope with IConnect-S-parameter and impedance profile computational software.

This release also includes RSG-RMT test suite for Serial ATA Gen1 and Gen2 test coverage which offers Phy Receiver Signal Group Requirements (RSG 1-2) and Receiver Margin Test (RMT) which were part of earlier version of TekExpress Serial ATA.

Accessories

About the Test Fixture

The TF-SATA-NE-ZP and TF-SATA-FE-ZP test fixtures that facilitate SATA Compliance testing are manufactured and distributed by Crescent Heart Software, Inc. For more information, visit the Crescent Heart Software Web site www.c-h-s.com.

About Frame Error Analyzer

The Crescent Heart Software SATA II probe adapter facilitates Receiver Signalling Group test. Visit www.c-h-s.com for more information.

About Keithley Switch

The S46 Microwave Switch System is designed to simplify the automated switching needed to test a wide range of telecommunications products and devices. For more information, visit http://www.keithley.com/applications/aerospace/?mn=S46.

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 in 96 dpi display settings ¹ .	
Software	IConnect S-parameter software (80SSPAR) and JIT3 3.0x.	
	Microsoft Excel 2002 or above.	
	Microsoft Internet Explorer 6.0 SP1 or later.	
	Microsoft Photo Editor 3.0 or equivalent software for image files viewing.	
	 Adobe Reader 6.0 or equivalent software for viewing portable document format (PDF) files. 	
Other Devices	Microsoft compatible mouse or compatible pointing device.	
	Four USB ports (2 USB ports minimum).	
	PCI-GPIB or equivalent interface for instrument connectivity ² .	

Table 2: System requirements

I 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 has to be enabled before launching the application.

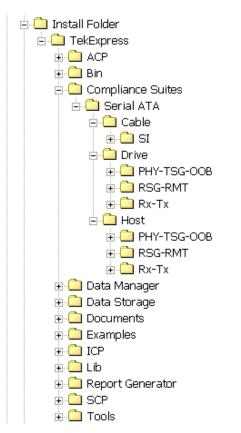
If TekExpress is installed on a Tektronix oscilloscope, the virtual GPIB port cannot be used by TekExpress for communicating with oscilloscope applications. If external devices like USB-GPIB or equivalent are used for instrument connectivity, then ensure that the Talker Listener utility is enabled in DPO/DSA oscilloscope's GPIB menu.

Application Directories and Usage

Related Topics

<u>File Name Extensions</u> <u>How To Activate the License</u> View Test Related Files

The application directory and associated files are organized as follows:



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

Table 3: Default directory names and their usage

Directory names	Usage
InstallDir\TekExpress	Contains the application and associated files.
\TekExpress\Compliance Suites	Has compliance specific sequence files. The folders under this directory represent the devices to be tested.
\TekExpress\Compliance Suites\Serial ATA\	The folders under this are Cable, Drive and Host.
\TekExpress\Compliance Suites\Serial ATA\Cable	Includes the SI folder. This represents the suite of install tests for SATA cables.
\TekExpress\Compliance Suites\Serial ATA\Drive\ \TekExpress\Compliance Suites\Serial ATA\Host\	Includes the PHY-TSG-OOB, RSG-RMT, and RX-TX folders. These represent the suites of install tests for the SATA drive and host devices.

Table 3: Default directory names and their usage (cont.)

Directory names	Usage	
\TekExpress\ACP	Includes instrument and application specific	
\TekExpress\SCP	interface libraries of TekExpress.	
\TekExpress\ICP		
\TekExpress\Data Manager	Includes the result management specific libraries	
\TekExpress\Data Storage	TekExpress are present in these folders.	
\TekExpress\Report Generator		
\TekExpress\Documents	Includes the Method of Implementation documents and technical documentation for the application.	
\TekExpress\Bin	Includes the Miscellaneous libraries of TekExpress.	
\TekExpress\Lib		
\TekExpress\Tools		

File Name Extensions

Related Topics

Application Directories and Usage How To Activate the License

The software uses the following 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.
.PDF	The PDF file that details the method of implementation for the test.

How To Activate the License

Related Topics
Application Directories and Usage
File Name Extensions

Follow the steps below to activate the license:

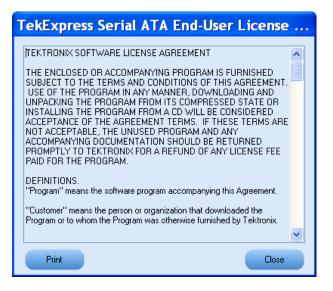
1. Click **Help > About** to view the license information.

🛿 About Tektronix TekExpress Serial ATA			
	Tektronix TekExpress Serial ATA Compliance Solutions Version 1.0.1 Build 5 View Version Details Copyright © Tektronix, Inc. All rights reserved. Tektronix and Tek are registered trademarks and TekExpress is a trademark of Tektronix, Inc. View End-User License Agreement OK		
TekExpress Automated Compliance Solutions Network and anticipation of the Compliance Solutions	License Info		

2. Click the View Version Details link to check the version numbers of the installed test suites.

V	Version Details 🛛 🛛 🚺	<
	Automation Framework TekExpress: 1.0.1.34 Instrument Bench: 1.0.1.9 Programmatic Interface Client: 1.0.1.29 Programmatic Interface Client: 1.0.1.29 Serial ATA Compliance Solution Cable SI: 1.0.1.28 Drive PHY-TSG-00B: 1.0.1.30 RSG-RMT: 1.0.1.25 Host PHY-TSG-00B: 1.0.1.30	
	RSG-RMT : 1.0.1.24 Rx-Tx : 1.0.1.25	
	ОК	

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



- **4.** Click **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.
- **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 \bigotimes sign is displayed next to the license key field.

License Info	
This dialog allows user to	ompliance solution supports following options. activate/reactivate one or more of following icense keystring and available USB dongle.
Options	Status
RSG	Active
TSG	Active
TXBX	Active
SI	Active
License Key DN4MR7Y8967UK4HV9	CM2MR
	Reactivate Close

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

Before You Click Run

After you first launch TekExpress, it creates the following folders on your computer:

■ \My Documents\My TekExpress

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

NOTE. If a user with a different Windows login ID launches TekExpress, a new *My TekExpress* folder is created under that user's *My Documents* folder

- My Documents\My TekExpress\Serial ATA
- My Documents\My TekExpress\Serial ATA\Untitled Session. Every time the TekExpress SATA.exe is launched a Untitled Session folder is created under Serial ATA folder. The Untitled Session folder is deleted when you exit TekExpress.



WARNING. 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 PC where TekExpress is running.

NOTE. If X drive is mapped to any other shared folder, TekExpress will pop-up a Warning message window asking to disconnect the X: drive manually.

Do the following before you click Run:

NOTE. Ensure that the network connectivity is enabled on the PC running the TekExpress.

- 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 share folder is used to save the waveform files or any other file transfer operations.
- 2. Right click on the My TekExpress folder and open the **Properties** dialog box. Select **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 the SATA setup files provided with TekExpress DVD are available on the respective instruments. For more details, refer to the ReadmeFirst.txt located in the SATA Setup Files folder on theTekExpress DVD.
- **4.** Ensure that all the required instruments are properly warmed up, <u>Signal Path Compensation (SPC)</u> is perfomed, 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 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 My TekExpress folder exists.
 - Enter cmd and click Enter.
 - At 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 below:	
. On the oscilloscope main menu, click Utilities men	າມ

2. Click Instrument Calibration option.

TekExpress 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 is a highly modular architecture that enables deploying automated test solutions for various serial standards in a relatively short time. TekExpress provides a compliance test automation for the Serial ATA Gen 1 and Gen 2 standard.

Options available with TekExpress Serial ATA are:

- PHY/TSG/OOB Test Suite The PHY-TSG-OOB test suite is included for Serial ATA Gen1 and Gen2 test.
- RSG-RMT Test Suite Offers Phy Receiver Signal Requirements (RSG 1-2) and Receiver Margin Test (RMT).
- Rx-Tx Test Suite The RX-TX test suite is included for Serial ATA Gen1 and Gen2 test.
- TekExpress SATA Bundle for the Host and Drive Test Suites.
- SI Cable Tests for TekExpress SATA The SI test suite is included for SATA electrical cable assembly compliance test.

Key Features

The TekExpress provides the following salient features:

- Complete SATA Gen1 and Gen2 Test Coverage for Hosts, Drives and Cables.
- Completely automated single button solution.
- Significant Reduction In Testing Time Through Automation.
- Performs all (UTD 1.2 conformant) SATA MOI required Transmitter, Receiver and Channel measurements.
- Single & Simple Microsoft Windows XP User Interface for Multi-instrument Testing.
- Repeatable and Accurate Results.
- Automatic HTML Report and SATA-IO (MS Excel) Scorecard Generation.
- Receiver Margin Testing.
- Direct Synthesis and Device State Control Eliminates the Need for Multiple Sources.
- Powered by NI TestStandTM.
- Seamlessly Integrate with High-level TestStand Automation Layer.

Starting the Application

Related Topics

Resizing the Application Window Exiting the Application

The application uses a USB dongle that contains the license key. This dongle must be present on the PC or the instrument hosting the TekExpress 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 TekExpress. 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 SATA. Other applications follow similar pattern.
- Double click the icon Markov on the desktop.
- If you have previously saved a session, you can double-click the session file stored under My TekExpress\Serial ATA.

When the application is launched it displays the splash screen providing launch information. The application also checks for the presence and validity of the USB dongle.



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

Related Topics Starting the Application Exiting the Application To restore the application to its previous size, select TekExpress Serial... in the Windows task bar. To maximize the application, click To restore it to previous size, click on the application

Exiting the Application



To exit the application, do one of the following:

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

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.

DUT: DUT001	Run	Stop

Table 4: Controls and Functions

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.
Run Stop	You will be able to run/stop the tests.

File Menu

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

File	View	Tools	Help	
	New Sess	ion	Ctrl+N	
2	Open Ses	sion	Ctrl+O	
	Save Sess	sion	Ctrl+S	
	Save Ses	sion As.		
	Save Rep	ort As		
4	Print Prev	iew Rep	ort	
8	Print Repo	ort	Ctrl+P	
	Recent Se	essions		۲
	Exit		Ctrl+X	

The File menu has the following selections:

Menu	Function	
New Session	Starts a default session of TekExpress.	
Open Session	Opens a saved session.	
Save Session	Saves the session.	
Save Session As	Saves a session in a different name.	
Save Report As	Saves the report in user specified location.	
Print Preview Report	Previews the report before printing.	
Print Report	Opens the Windows "Print" dialog box.	
Recent Sessions	Lists recent sessions.	
Exit	Closes the application.	

Related Topics	
View Menu	
Tools Menu	
Help Menu	

I

View Menu

Related Topics	
File Menu	
Tools Menu	
Help Menu	

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

View	Tools	Help	
Lo	ıg File	Ctrl+L	

The View menu has the following selections:

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

Tools Menu

 File Menu

 View Menu

 Help Menu

 Deskewing Real Time Oscilloscopes

Click Tools on the application menu bar.

То	ols	Help
	Ins	strument Bench Ctrl+I
	De	bug - Deskew Utility

The Tools menu has the following selections:

Menu	Function
Instrument Bench	Opens a dialog box showing the list of instruments attached to the test setup.
<u>Debug – Deskew Utility</u>	Opens a control panel that allows to control the RF-switch for debugging and cable deskew.

Tools > 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:

LAN	✓ GPIB ink □ USB nstruments (4)	📃 Serial	🗌 Non - VISA Reso	urces	TekVISA 300 Timeout
Connection	Resource	Serial No	Options	Resource Addres	\$
VISA-GPIB	DP072004	B010436	20XL	GPIB0::1::INSTR	
/ISA-GPIB	AWG7102	B010190	01	GPIB0::7::INSTR	
/ISA-GPIB	MODEL SYSTEM 46	0986116		GPIB0::11::INSTR	
/ISA-GPIB	DP072004	B010436	20KL	GPIB8::1::INSTR	

- Search Criteria: The various connections on which you can search. Non-VISA Resources are the instruments that cannot be searched using TekVISA.
- **Retrieved Instruments:** Displays the count and details of instruments that were discovered.
- **Last Updated:** Displays the time when the last time search was performed.
- TekVISA Refresh Timeout (Seconds): This time out specifies the maximum time that TekExpress can wait for TekVISA update.

NOTE. TekExpress uses TekVISA for instrument search. Ensure that TekVISA is running on your system before you refresh the instrument bench window.

Table 5: Retrieved Resources properties in the Instrument Bench window

itle Description		
Connection	Shows the type of connection with the instrument.	
Resource	Shows the name of the resource.	
Serial Number	Shows the serial number of the resource.	
Options	Shows the options available on the instrument. ¹	
Resource Address Shows IP Address/Port number of the resource.		

1 The option column displays the options that fit in the field. To view complete options on the instrument, move the mouse cursor over the option.

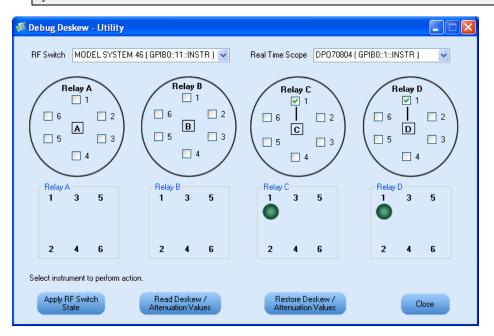
Table 6: Button controls on Instrument Bench dialog box

Button	Function
Refresh	The application searches on the selected connection for resources. While searching resources it shows the Instrument Bench discovery window. The Discovery window shows the connection currently being scanned and the percentage of task completed.
Close	Closes the dialog box.

Tools > Debug-Deskew Utility

The debug-deskew utility allows you to control the RF-switch state for setup debug purpose with primary objective to perform a real-time oscilloscope <u>deskew</u> operation for complex wiring path from the DUT TX terminals to the oscilloscope channels through the RF-switch. Using this utility, you can set the oscilloscope deskew values that will be retained by TekExpress SATA automation script thoughout various testing suites.

To ensure accurate results for two-channel measurements and differential signals acquired on two channels, it is important to first deskew the oscilloscope channels before you take measurements of your DUT.



The Debug Deskew Utility has the following functions:

Apply RF Switch State: Sets the Open/Close state of the RF switch channels.

As per the setup requirement, select the channels on the panel to be closed or opened. The previous state of the RF switch will be overridden by the new state. The current state of the RF Switch is not Apply RF Switch

recalled when the Debug panel is launched. Click State and the current state as seen on the panel will be applied on the selected RF Switch. The selection shown by LEDs on the RF Switch should be same as the selection shown on the panel.

Read Deskew/Attenuation Values: Reads the the current Deskew values of the real time oscilloscope.

With the selected switch state, you are expected to manually perform the deskew (by removing SMA cable connection from TX terminals of CHS fixture at DUT and reconnecting them to Fast-edge output

of the oscilloscope). Once the deskew values are set on the oscilloscope, click Attenuation Values. The deskew values of all the four channels on the selected real time oscilloscope is read by TekExpress and are retained during test automation sequencing.

 Restore Deskew/Attenuation values. Click Restore Deskew/ Attenuation Values to restore the last values of deskew/attenuation. It will be restored to the selected oscilloscope.

NOTE. The address of the instruments are passed to the panel on the current suite selection (as detected in instrument discovery). For example, in RX-TX and SI test suites, the Real Time Oscilloscope is not available and so it will not be passed. Only the address of the RF Switch is passed, if detected.

For more information on how to deskew real time oscilloscopes, refer to the section Deskew operation.

Help Menu

Operating Basics

Related Topics <u>File Menu</u> <u>View Menu</u> <u>Tools Menu</u>

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

Hel	p		
	Т	ekExpress Help	F1
	A	bout	

The Help menu has the following selections:

Selection	Description or Function
TekExpress Help	Displays TekExpress Help (F1).
About	Displays application details such as software name, version number and copyright.

Select the Test(s)

Related Topics

 View and Select Connected Instruments

 Configure and Run the Tests

 View the Progress of Analysis

 View the Report

 View Test Related Files

The application tests three types of SATA devices for compliance.

- Cable
- Drive
- Host

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

🚿 Tek	Exp	press	Serial /	ATA Co	mpliance Solutio	n (Untitled)*			
Eile S	<u>V</u> iew	Tool	s <u>H</u> elp						
						DUT: DUT001		Run	Stop
Select	t 🖌	Acquire	Analyze	Report					
		Select	Device	_	Select Test S	Guite	Ve	rsion	
	00	Cable			PHY-TSG-00B		SATA Ger	n1 🗸	
	ם ()	Drive			RSG-RMT		SATAGer	ni 💌	
	O F	Host			◯ Bx-Tx				
					0				Less
									(
				Drive : P	HY-TSG-OOB SATA Gen 1				
Sel	_	TestNa					<u>^</u>	Con	figure
	_		-	etection Thre	shold-Gen 1				
			II During OOE					Shor	w MOI
					4WAKE Transmit Burst Length	1		Shot	WMOI
	2	00B04-C	OMINIT_RES	SET Transmit	Gap Length			Show S	chematic
	2	00805-C	OMWAKE T	ransmit Gap L	.ength				
	2	00806-C	:OMWAKE G	ap Detection	Windows				
	2	00807-C	OMINIT Gap	Detection W	indows			Sele	ect All
	2	PHY01-U	nit Interval-G	en 1					
	2	PHY02-Fr	requency Lor	ng Term Stabi	lity			Select	Required
	2	PHY03-S	pread-Spectr	- um Modulatio	n Frequency			Deve	lect All
	2	PHY04-S	pread-Spectr	um Modulatio	n Deviation		~	Dese	aectAir
								Tel	ktronix [.]

This panel provides the following functions:

Select Device

Select the Device type. And the test suite options will be automatically updated corresponding to the device selected.

Select Test Suite

The application allows you to select a subset of tests to execute. Based on the test suite selected, the Version drop-down list will be populated.

Version

You can select the appropriate version. For example, SATA Gen 1 or SATA Gen 2.

NOTE. The SI test suite for cable measurement does not have any versions.

More/Less

The table has the following two columns:

- Select: You can include or exclude any test for analysis.
- **Test Name:** Displays the name of the test.

NOTE. If any of the check box in the Select column is grayed, you cannot make any changes. It implies that the test is mandatory.

Once you select a row, the following options are available:

Table 7: Button controls on the Select panel

Button	Description
Configure	Opens the configuration panel for the selected test.
Show MOI	Opens the PDF of method of implementation (MOI) 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.
Select All	Selects all tests in the table.

Button	Description
Select Required	Selects all the SATA-IO required tests in the grid and deselects all informative tests in the table.
Deselect All	Deselects all tests in the table.

Table 7: Button controls on the Select panel (cont.)

Configure and Run the Test(s)

Related Topics
Select the Tests
View and Select Connected Instruments
View the Progress of Analysis
View the Report
View Test Related Files

The configuration panel is used to create, view, and edit the parameters associated with the acquisition and the analysis of the selected test.

Parameter		Value		
BESwitch			46 (TCPIP::192.158.96.183::INSTR)	
Signal Source			2:192.158.96.133::vxi0,2::INSTR)	
Real Time Scope			P::192.158.96.133::vxi0,1::INSTR)	
BIST-L initialization by		Auto		
Set scope scale, resolution and sampling rate		Automatically		
Horizontal scale for PHY-TSG BIST-L acquisition	us/div)	4		
Resolution for PHY-TSG BIST-L acquisition (ps/pt	È CARA	20		
Horizontal scale for initial OOB validation (us/div)		2		
Resolution for initial OOB validation (ps/pt)		80		
		105		1
Sampling rate for initial OOB validation (Gs/s)		12.5		
Sampling rate for initial OOB validation (Gs/s)		12.5		~
000	ration for 00801-00	First Garage and	Threshold-Gen 1	~
000		First Garage and	Threshold-Gen 1	¥
Configu		First Garage and	Threshold-Gen 1 Value	
Configu Acquire Analyze Limits Commen	s	First Garage and	1	
Configu Acquire Analyze Limits Commen	s Parameter	First Garage and	Value	
Configu Acquire Analyze Limits Commen	s Parameter Sampling rate (Gs/s)	B Signal Detection	Value 1.25	
Configu Acquire Analyze Limits Comment Acquire Type	s Parameter Sampling rate (Gs/s) Resolution (ps/pt)	B Signal Detection	Value 1.25 800	
Configu Acquire Analyze Limits Commen	s Parameter Sampling rate (Gs/s) Resolution (ps/pt) Horizontal position (%	B Signal Detection	Value 1.25 800 50	
Configu Acquire Analyze Limits Comment Acquire Type	S Parameter Sampling rate (Gs/s) Resolution (ps/pt) Horizontal position (% Vertical position for m	B Signal Detection	Value 1.25 800 50 0	

You have the following options:

- To choose between running the tests in a Compliance or User Defined mode.
- To reload compliance mode values.
- To change the parameters associated with the configuration of acquisition.
- To change the parameters associated with analysis configuration.

The upper half of the Configure panel has general parameters that are common for all the tests under the selected test suite that are editable. The lower half of the Configure panel has test specific parameters.

NOTE. If any of the test parameters are grayed, it means that these parameters cannot be modified in compliance mode. When you switch to user-defined mode, these parameters are editable.

Table 8: Test parameters

Parameters to configure			Description
Acquire Parameters			Shows the various parameters related to acquisition of a selected
Confi	guration for RMT - SSC Margin Receiver Tol	erance	test. These parameters can vary
Acquire Analyze Limits Comments			from one test to another such as,
Acquire Type	Parameter	Value	Number of Samples and Record
HETP	Scope Horizontal Scale (us)	10	
	Scope Record Length (M)	2.5	Length.
Compliance Mode Compliance	Settings		
User Defined Mode Resto	re	Apply Close	

		Configuration for	RMT - SSC Margin Receiver	Tolerance	
Acquire Analyze	Limits	Comments			
Parameter			Value		
Start Frequency (MHz)			1		
End Frequency (MHz)		100			
Incremental Step Freque	ncy (MHz)		1		
Start UI Jitter (UI)			0.1		
End UI Jitter (UI)			0.7		
<					>
		Compliance Settings			

Shows the various parameters related to analysis of a selected test. These parameters can vary from one test to another such as, Jitter values.

est Limits					
Configuration for RMT - SSC Margin Receiver Tolerance					
Acquire Analyze Li	imits Comments				
Details	Value1	Compare String	Value2		
Error Count	0	LE (<=)	0		
Compliance Mode	Compliance Settings				
User Defined Mode	Restore		Apply	Close	

Applies to a specific test. It shows the measurement limits using different types of comparisons.

Table 8: Test parameters (cont.)

Parameters to c	onfigure		Description
Comments			You can specify a comment up to 256 characters long for the selected
	Configuration for RMT - SSC Margin R	eceiver Tolerance	test.
Acquire Analyze Lin Enter Text	nits Comments		7
Enter more text			
Compliance Mode	Compliance Settings		
 User Defined Mode 	Restore	Apply Close	

Restore	The compliance settings will be restored.
Apply	Accepts all changes that you made.
Close	Dismisses the dialog box and does not apply changes.

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

Refer to the following table for different test limit comparisons:

Table 9: 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

View and Select Connected Instruments

Related Topics

Select the Tests Configure and Run the Tests View Test Related Files View the Progress of Analysis View the Report

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 as the search criteria in the Instrument Bench dialog and click Refresh, the TekVISA Instrument Manager checks for the instruments availability over LAN and the details of the instrument are displayed under **Retrieved Instruments** table.

LAN	GPIB ink USB nstruments (4)	📃 Serial	🗌 Non - VISA Reso	urces	TekVISA 300 Timeout
Connection	Resource	Serial No	Options	Resource Addres	s
/ISA-GPIB	DP072004	B010436	20XL	GPIB0::1:INSTR	
/ISA-GPIB	AWG7102	B010190	01	GPIB0::7::INSTR	
/ISA-GPIB	MODEL SYSTEM 46	0986116		GPIB0::11::INSTR	
/ISA-GPIB	DP072004	B010436	20KL	GPIB8::1::INSTR	

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.

You can choose the instruments from the drop-down list as shown in the following figure:

🕫 Configure	
Configuration for Dri	ive : RSG-RMT SATA Gen 1
Parameter	Value
Real Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)
Signal Source	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)
RF Switch	
Frame Error Counter	CHS SATA-II Probe (TCPIP::192.158.96.138::INSTR)
BIST-L Initialization by	Auto
Set scope scale, resolution and sampling rate	Automatically
Horizontal scale (us/div)	10
Resolution (ps/pt)	20
Verify Frame Error Counter operation	No
DUT input (HR+/DT+) connected to RF Switch relay	Relay A
Canal Counce and as to Dard Time Counce from DE Council allowed	Channel 1
Configuration for RSG-01 - Ger	n1 (1.5Gb/S) Receiver Signaling Group
Acquire Analyze Limits Comments	
Parameter	Value
5MHz-0.45UI	Include
10MHz-0.45UI	Include
33MHz-0.45UI	Include
62MHz-0.45UI	Include
Test Duration for each frequency (Seconds)	900
Compliance Mode Compliance 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 everytime 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.

TekExpress Serial ATA Compliance Solution (Untitled)*							
le ⊻iew Tools <u>H</u> elp							
	DUT: DUT001	Bun	Stop				
ielect Acquire Analyze Report							
Select Acquire Analyze Report							
	Drive : PHY-TSG-00B SATA Gen 1						
Acquisition	Test	WaveFormFile	^				
	00B02-UI During 00B Signaling						
COMINIT and COMWAKE	OOB03-COMINIT_RESET and COMWAKE Transmit Burst Length						
	OOB04-COMINIT_RESET Transmit Gap Length	1	=				
	OOB05-COMWAKE Transmit Gap Length						
COMINIT INSPECILL	OOB07-COMINIT Gap Detection Windows						
COMINIT INSPEC UL	00B07-COMINIT Gap Detection Windows						
COMINIT OUTOFSPEC LL	OOB07-COMINIT Gap Detection Windows						
COMINIT OUTOFSPEC UL	OOB07-COMINIT Gap Detection Windows						
COMINIT/COMRESET/COMWAKE-No re							
COMINIT/COMRESET/COMWAKE-Respo	nse 00801-008 Signal Detection Threshold-Gen 1						
COMWAKE INSPECILL	OOB06-COMWAKE Gap Detection Windows						
COMWAKE INSPEC UL	OOB06-COMWAKE Gap Detection Windows						
COMWAKE OUTOFSPEC LL	00B06-COMWAKE Gap Detection Windows		×				
		Le	• •				
Select Acquisition Source	Status Messages						
Use PreRecorded Waveform Files	1/21/2008 11:17 AM:: Searching for parameter: Number of retries for instrument ID		~				
	1/21/2008 11:17 AM:: Searching for parameter: Number of retries for instrument ID	i errors					
Acquire Step By Step	1/21/2008 11:17 AM::Searching for parameter: Number of retries for instrument IO	errors	<u> </u>				
Show Acquire Parameters	 III 	>					
		Tektro	onix				

Column name	Function
Acquisition	Acquisition Name
Test	Name of the tests performing acquisitions. One or more test can perform same acquisitions.
Acquire Parameters	Every acquisition can have "n" number of acquire parameters. Based on the maximum number of parameters, the number of columns and the width of the table varies.
Status	Test acquisition status of the running test passed at intervals.
Waveform File(s)	Pre recorded waveform files of unique acquisitions. You can select waveform files by selecting browse on individual cells. This allows you to select any waveform file using the standard file open window.

- Use Pre Recorded Waveform files: Enabling or disabling the option shows or hides the waveform file column in the acquisition table.
- Acquire Step by Step: Selecting this prompts you at the end of each acquisition before proceeding to the next one.
- Show Acquire Parameters: On enabling this option, the acquisition parameters for each unique acquisition is displayed in the acquisition table.
- More/Less: Allows you to show/hide advance panel.

The following Acquire source options are available:

TekExpress follows a certain waveform file naming conventions that helps it understand which waveform needs to be used for different test analysis. Upon selecting "User Prerecorded Waveform Files", the first column will display the type of waveform and second column shows the tests that will be using the given waveform type for analysis purpose. Following guidelines will help you to appropriately specify correct pre-recorded waveform for selected test analysis to be performed in pre-recorded fashion.

TIP. Select "Show Acquire Parameters" to verify the acquire parameters that are specified and the corresponding waveform.

Click the following links to get details on them:

Guidelines for PHY-TSG-OOB test suite waveforms

You need to know that for a selected test differential or single ended waveform is required. If there are multiple test combinations that requires both single ended and differential waveforms (for example, as shown in picture below the Unit interval measurement requires differential waveform and rise-fall time measurement requires single-ended waveforms), you need to specify all required waveforms. The naming convention is that the waveform file name should contain one of the keywords "Diff", "Pos", "Neg" for application to be able to identify which waveform is Differential (Diff), and which one is Positive (Pos) signal & Negative (Neg) signal of single ended waveforms.

ect Acquire	Analyze Report			
			Drive · PHY-TSG	-ANR SATA Gen 1
Acquisition	Test	Horizontal scale (us/div)	Resolution [ps/pt]	WaveFormFile
1000	PHY01-Unit Interval-Gen 1	10	10	X\Serial ATA\DSA72004\DF0\DUT001\20080102_041145\HFTP_G1_Drive_10_40_DW2_Dift.wfm
HFTP-Gen 1	TSG02-Rise-Fall Time-Ger 1	10	40	X:\Senial ATA\DSA^2004\DP0\DUT001\20080102_041145\HFTP_G1_Drive_10_40_DW2_CH2_Pos.wfm X:\Senial ATA\DSA^2004\DF0\DUT001\20080102_041145\HFTP_G1_Drive_10_40_DW2_CH4_Neg.wfm

Guidelines for RXTX test suite waveforms

Test suites such as RXTX and SI need to have reference waveforms and waveforms with DUT. The acquire panel allows you to specify only DUT waveforms. The reference waveforms are stored in the following folder location:

Reference Waveforms

Location: X:\Serial ATA\Sampling Scope\TxRxScopeOperation

Naming Convention: Ref_<Acquire Type>_<Parameter1>_<Parameter2>_<Parameter3>_<Parameter3>_<Parameter4>_<Parameter5>_<Channel Pattern>.wfm

Example:

- 1. Ref_MFTP-TDR Common_4000_300_4e-011_1e-011_Even_CH3+CH4.wfm
- 2. Ref_MFTP-TDR Differential_4000_300_4e-011_1e-011_Even_CH3-CH4.wfm
- 3. Ref_MFTP-TDR Single Ended_4000_300_4e-011_1e-011_Even_CH3.wfm
- 4. Ref_TDR Common_4000_300_4e-011_1e-011_Even_CH1+CH2.wfm
- 5. Ref_TDR Differential_4000_300_4e-011_1e-011_Even_CH1-CH2.wfm
- 6. Ref_TDR Single Ended_4000_300_4e-011_1e-011_Even_CH1.wfm

DUT waveforms

DUT waveforms need to be specified in TekExpress Acquire panel as described above. The file naming convention should be as follows:

Naming Convention: <Acquire Type> <Channel Pattern>

Acquire type and corresponding channel pattern:

Acquire Type	Channel Pattern	
TDR Differential	CH1-CH2	
TDR Single Ended	CH1& CH2	
TDR Common	CH1+ CH2	
MFTP - TDR Differential	CH3-CH4	
MFTP - TDR Single Ended	CH3, CH4	
MFTP - TDR Common	CH3+CH4	

Examples:

TDR Differential_CH1-CH2_EUT.wfm

TDR Single Ended_CH1.wfm

User1_TDR Common_CH1+CH2.wfm

MFTP - TDR Differential_CH3-Ch4_Session1.wfm

MFTP - TDR Single Ended_CH4_Jan31.wfm

MFTP - TDR Common_CH3+Ch4.wfm

Guidelines for SI test suite waveforms

As mentioned in the guidelines for RXTX test suite, the SI test suite also need to have reference waveforms and waveforms with DUT. The acquire panel allows you to specify only DUT waveforms. The reference waveforms are stored in the following folder location:

Reference Waveforms

Location: X:\Serial ATA\Sampling Scope\SIScopeOperation

Naming Convention:

 $\label{eq:ref_NoFixture_Acquire Type} $$ $$ Parameter 1> $$ Parameter 2> $$ Parameter 3> $$ Parameter 4> $$ arameter 5> $$ Parameter 6> $$ Parameter 7> $$ Parameter 8> $$ Channel Pattern>.wfm $$ $$ Parameter 6> $$ Parameter 7> $$ Parameter 6> $$ Parame$

Example: Reference without fixture

Ref_NoFixture_TDR Differential_Odd_4000_128_5e-010_7e-011_5.5e-011_80_20_CH1-CH2.wfm

Ref_NoFixture_TDR Single Ended_Even_4000_128_5e-010_7e-011_5.5e-011_80_20_CH1.wfm

Ref_NoFixture_TDT CrossTalk_Odd_4000_128_3e-009_CH3-CH4.wfm

Ref_NoFixture_TDT Differential_Odd_4000_128_3e-009_CH5-CH6.wfm

Ref_NoFixture_TDR Common_Even_4000_128_5e-010_7e-011_5.5e-011_80_20_CH3+CH4.wfm

Example: Reference with fixture

Ref_TDR Common_Even_4000_128_5e-010_7e-011_5.5e-011_80_20_CH1+CH2.wfm

Ref_TDR Differential_Odd_4000_128_5e-010_7e-011_5.5e-011_80_20_CH1-CH2.wfm

Ref_TDR Single Ended_Even_4000_128_5e-010_7e-011_5.5e-011_80_20_CH4.wfm

DUT waveforms

DUT waveforms need to be specified in TekExpress "Acquire" panel as described above. The file naming convention should be as follows:

Naming Convention: <Acquire Type>_<Channel Pattern>

Acquire type and corresponding channel pattern:

Acquire Type	Channel Pattern
TDR Differential	CH1-CH2, CH3-CH4, CH5-CH6, CH7-CH8
TDR Single Ended	CH1, CH2, CH3, CH4
TDR Common	CH1+CH2, CH3+CH4
TDT Differential	CH5-CH6, CH7-CH8
TDT Crosstalk	CH3-CH4, CH7-CH8

Examples:

TDR Differential_CH1-CH2_EUT.wfm

TDR Single Ended_CH1.wfm

User1_TDR Common_CH1+CH2.wfm

TDT Differential_CH5-CH6_Session1.wfm

TDT Crosstalk_CH4_Jan31.wfm

View the Progress of Analysis

 Select the Tests

 View and Select Connected Instruments

 Configure and Run the Tests

 View the Report

 View Test Related Files

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

TekExpress Serial ATA Compliance Solu	tion (Untitled)*
<u>Eile ⊻iew Tools H</u> elp	
	DUT: DUT001 Bun Stop
Select Acquire Analyze Report	
Select Acquire Analyze Report	
Drive : Pt	IY-TSG-OOB SATA Gen 1
TestName	Status ^
00B01-00B Signal Detection Threshold-Gen 1	To Be Started
00B02-UI During 00B Signaling	To Be Started
00B03-COMINIT_RESET and COMWAKE Transmit Burst Length	To Be Started
00B04-COMINIT_RESET Transmit Gap Length	To Be Started
00B05-COMWAKE Transmit Gap Length	To Be Started
00B06-COMWAKE Gap Detection Windows	To Be Started
OOB07-COMINIT Gap Detection Windows	To Be Started
PHY01-Unit Interval-Gen 1	To Be Started
PHY02-Frequency Long Term Stability	To Be Started
PHY03-Spread-Spectrum Modulation Frequency	To Re Started
	Less
	• • • • • • • • • • • • •
Status Me	essages 🗹 Display Status
	V Auto Scroll
	Clear All
	Save Status
	Tektronix [,]

Analysis 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 on the status.

More/Less

The **Status Messages** window timestamps all runtime messages and displays them. You can do the following:

- **Display Status :** Enable/Disable status messages.
- Auto Scroll : The status messages are scrolled 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.

NOTE. The Status Messages window is dockable and can be resized.

View the Report

 Select the Tests

 View and Select Connected Instruments

 Configure and Run the Tests

 View the Progress of Analysis

 View Test Related Files

After the analysis, a report is automatically generated and displayed in the report panel. The report shows the results of the tests, including device information and pass/fail status of each test.

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.

The View Scorecard option opens the report in Microsoft Excel¹.

TekExpress Serial ATA Compliance Solution (te	est)*			
Eile View Iools Help				
		DUT	DUT001	Run Stop
Select Acquire Analyze Report				
	Drive : RSG-RMT SATA	A Gen 1		View ScoreCard
Tektronix.				<u>^</u>
	RSG/RMT Te	st Report		
UUT ID:DUT001	Device Type: Drive		Version: SAT	A Gen 1
Date/Time:7/26/2007 13:23	Overall Execution Time:2Min		UUT Compliant for RSG Test :110	
			Overall Test Result :PAS	<u>s</u>
Test Name	Test Details Frame Error Freg (MHz) Jitter (UI) Count Rate	C Test Limits Test result	ompliance Test Execution Mode Time	Comment
RSG-01 - Gen1 (1.5Gb/S) Receiver Signaling Group		0 LE 0 Pass No 0 LE 0 0 LE 0	2Min	
<				~
,				Tektronix [,]

¹ You need to load Miscrosoft Excel 2002 before using the "View Scorecard" option.

View Test Related Files

🖃 🔂 My TekExpress

All the test related files for currently selected tests are always saved under My Documents\My TekExpress\Serial ATA\Untitled Session.

When you save a session, it is saved with the session name under the path My Documents\My TekExpress\Serial ATA\SessionName for future references.

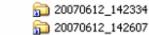
The session that is currently running will be stored in the same path as "Untitled" until you save it.

WARNING. Sessions should not be saved in the name "Untitled" and "Backup" as they are application specific files and will be deleted when the application exits.

A session folder can contain results for more than one DUT, and a DUT folder can contain more than one run data folder marked by date-time stamp as folder name.

Below is an example image of data storage:





20070612_142711

Related Topics

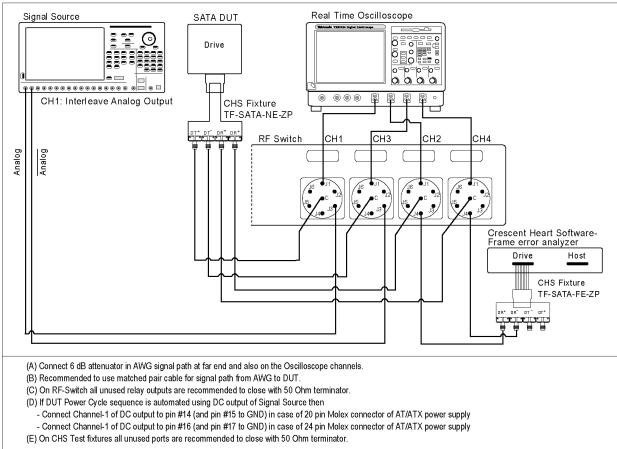
Application Directories and Usage

RSG-RMT Equipment Setup: Drive

You need the following equipment to set up the application:	
---	--

Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	Tektronix DPO/DSA 72004, DPO/DSA 71604, DPO/DSA 71254, TDS6154C, and TDS6124C
	 For Gen1-only testing, the following oscilloscopes are also acceptable: DPO/DSA 70804 or TDS6804B
RF Switch	Keithley S46-6666A
Frame Error Analyzer	Crescent Heart Software SATA II probe adapter
Test Fixture	Crescent Heart Software Fixture TF-SATA-NE-ZP, TF-SATA-FE-ZP
DUT	A SATA Drive to test

Connect the equipments as shown in the following diagram:



Setup diagram for Drive RSG-RMT test suite

RSG-01 - Gen1 (1.5Gb/s) Receiver Signalling Group

Related Topics
Equipment Setup Drive
Run RMT Receiver Margin Test1

To run an RSG test on a SATA Drive to conformance standards defined by SATA-IO Interoperability, follow these steps:

NOTE. This test is applicable for both Drive and Host devices. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer to <u>Figure 2</u> for Host connection diagram.

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select **Drive** as the device type.
- 2. Select RSG-RMT as the Test Suite and SATA Gen 1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select RSG01-Gen1 (1.5Gb/s) Receiver Signalling Group option.

V.	TekEx	press Serial A	TA Co	mpliance Solution (Untit	ed)*		
E	ile ⊻iew	v Tools <u>H</u> elp					
				DUT: DUT	001	Run	Stop
	Select	Acquire Analyze	Report				
		Select Device		Select Test Suite		Version	_
	0	Cable		PHY-TSG-00B	SATA	Gen 1 🗸	
	۲	Drive		● RSG-RMT	SATA	uen i 💌	
	0	Host		◯ Rx-Tx			
							Less
			Drive : I	SG-RMT SATA Gen 1			
	Select	TestName	_			Co	nfigure
		RMT - Receiver Margin RSG-01 - Gen1 (1.5Gb		- Cianalina Chana			
		nod-or - deni (1.5dc	izaj necelve	i signaling broup		Sh	ow MOI
						Show	Schematic
						Se	elect All
						Selec	t Required
						Des	elect All
						Te	ktronix [,]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

- 7. If you want to change the parameters, choose User Defined Mode. The message reports that the changes made to a test may no longer be compliant.
- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program, MOI* document for information on how to configure the drive receiver tests, click **Show MOI** in the Select panel.
- 9. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

Conriguration for	r Drive : RSG-RMT SATA Gen 1	
Parameter	Value	
leal Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)	
ignal Source	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)	
IF Switch	MODEL SYSTEM 46 (TCPIP::192.158.96.183::INSTR)	
rame Error Counter	CHS SATA-II Probe (TCPIP::192.158.96.138::INSTR)	
IST-L Initialization by	Auto	
et scope scale, resolution and sampling rate	Automatically	
lorizontal scale (us/div)	10	
lesolution (ps/pt)	20	
erify Frame Error Counter operation	No	
UT input (HR+/DT+) connected to RF Switch relay	Relay A	
ianal Carrier and an an David Time Carrier Gale DE Criterie I	Ch11	
Acquire Analyze Limits Comments	Gen1 (1.5Gb/S) Receiver Signaling Group	
Parameter	Value	
5MHz-0.45UI	Include	
10MHz-0.45UI	Include	
33MHz-0.45UI	Include	
	Include Include	
33MHz-0.45UI		
33MHz-0.45UI 62MHz-0.45UI	Include	

10.Click Run to run the selected tests.

The status of the tests is displayed in the Analyze panel.

TekExpress Serial ATA Compliance Solution	on (Untitled)*	
ile ⊻iew Tools <u>H</u> elp		
	DUT: DUT001	Run Stop
Select Acquire Analyze Report		
Drive : RSG-	RMT SATA Gen 1	
TestName	Status	
RSG-01 - Gen1 (1.5Gb/S) Receiver Signaling Group	To Be Started	
		Less
Status Mess	ages 🗸	Display Status
1/21/2008 11:39 AM::Closing CHS 1/21/2008 11:39 AM::Closing probe communication 1/21/2008 11:29 AM::Closing probe communication		Auto Scroll
1/21/2008 11:39 AM::Generating report in Tektronix format 1/21/2009 11:39 AM::Generating report in SATA exercise format	×	Clear All
		Save Status
		Tektroni

11. After the tests run successfully, a report is generated and displayed in the Report panel.

ekExpress Serial ATA Compliance Solution (te View Iools Help	st)*					
Select Acquire Analyze Report				DUT DUT001		Run Stop
		Drive : RSG-RMT SAT	A Gen 1			View ScoreCard
Tektronix*						<u>^</u>
		RSG/RMT Te	st Report			
UUT ID:DUT001		Device Type: Drive			Version: SAT	A Gen 1
Date/Time:7/26/2007 13:23	Overall E	execution Time:2Min		UUT Con	upliant for RSG Test :llo	
					Overall Test Result : <u>PAS</u>	<u>s</u>
Test Name	Test Details Freq (MHz) Jitter (UI)	Frame Error Frame Error Count Rate	Test Limits Test resu	Compliance Ilt Mode	Test Execution Time	Comment
RSG-01 - Gen1 (1.5Gb/S) Receiver Signaling Group	10 0.45 33 0.45 62 0.45	0 0.00E+00 0 0.00E+00 0 0.00E+00	0 LE 0 Pass 0 LE 0 0 LE 0	No	2Min	
<		ш				~
						Tektroni

You can save the report using File > Save Report As option.

RMT- Receiver Margin Test

Related Topics
Equipment Setup Drive
Run RSG01 Gen1 1 5Gbs Receiver Signalling
Group

To run a RMT test on a Drive device, do the following:

- 1. Select Drive as the Device type, select RSG-RMT test suite and SATA Gen1 as the version.
- 2. Select RMT Receiver Margin Test as the test to run.
- 3. Click Show Schematic to view the setup diagram for the application.

NOTE. Refer to the Equipment Setup: Drive section for the setup diagram.

- 4. For information on how to configure the RMT test parameters, refer to RSG RMT Method of Implementation document by clicking Show MOI.
- 5. Click Configure to configure the test parameters.

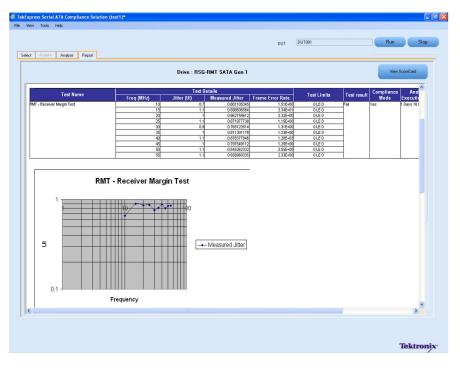
1	TekEx	press Serial /	ATA Co	mpliance Solution (Untitled	i)*		
E	le ⊻iev	v Tools <u>H</u> elp					
				DUT: DUT001		Run	Stop
Γ	Select	Acquire Analyze	Report				
		Select Device		Select Test Suite	v	ersion	
	0	Cable	-	O PHY-TSG-00B			
	۲	Drive		• RSG-RMT	SATA G	en 1 💌	
	0	Host		⊖ Rx-Tx			
							Less
			Drive : F	SG-RMT SATA Gen 1		_	
	Select	TestName				Confi	igure
		RMT - Receiver Margin RSG-01 - Gen1 (1.5Gb		Signaling Group			
		nsd-or - den (r.sdr	5/3) Heceive	Signaling Group		Show	MOI
						Show So	hematic
						Selec	et All
						Select R	lequired
						Desele	ect All
						Tek	tronix [,]

6. The default settings are in User Defined Mode. Configure the Analyze parameters such as, the Start Frequency and End Frequency. Click Apply to apply the new settings. Click Close.

Parameter	Value	
Real Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0.1::INSTR)	
Signal Source	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)	
RF Switch	MODEL SYSTEM 46 (TCPIP::192.158.96.183::INSTR)	
Frame Error Counter	CHS SATA-II Probe (TCPIP::192.158.96.138::INSTR)	
BIST-L Initialization by	Auto	
Set scope scale, resolution and sampling rate	Automatically	
Horizontal scale (us/div)	10	
Resolution (ps/pt)	20	
Verify Frame Error Counter operation	No	
DUT input (HR+/DT+) connected to RF Switch relay	Relay A	
DUT input (HR+/DT+) connected to RF Switch relay	Relay A	
DUT input (HR+/DT+) connected to RF Switch relay Circuit Course and the Deel Time Course from DE Cuidade alexan Configuratio Acquire Analyze Limits Comments	Relay A Phone 11 on for RMT - Receiver Margin Test	
DUT input (HR+/DT+) connected to RF Switch relay Circuit Configuratio Configuratio Acquire Analyze Limits Comments Parameter	Relay A	
DUT input (HR+/DT+) connected to RF Switch relay Configuratio Configuratio Acquire Analyze Limits Comments Parameter Start Frequency (MHz)	Relay A Relay A on for RMT - Receiver Margin Test Value 1	
DUT input (HR+/DT+) connected to RF Switch relay Configuration Acquire Analyze Limits Comments Parameter Start Frequency (MHz) End Frequency (MHz)	Relay A Phone 11 on for RMT - Receiver Margin Test	
DUT input (HR+/DT+) connected to RF Switch relay Configuration Acquire Analyze Limits Comments Parameter Start Frequency (MHz) End Frequency (MHz) Incremental Step Frequency (MHz)	Relay A Relay A on for RMT - Receiver Margin Test Value 1 100 1	
DUT input (HR+/DT+) connected to RF Switch relay Configuration Acquire Analyze Limits Comments Parameter Start Frequency (MHz) End Frequency (MHz)	Relay A Provide the second sec	
DUT input (HR+/DT+) connected to RF Switch relay Configuration Acquire Analyze Limits Comments Parameter Start Frequency (MHz) End Frequency (MHz) Incremental Step Frequency (MHz)	Relay A Relay A on for RMT - Receiver Margin Test Value 1 100 1	
DUT input (HR+/DT+) connected to RF Switch relay Configuratio Acquire Analyze Limits Comments Parameter Start Frequency (MHz) Incremental Step Frequency (MHz) Start UI Jitter (UI)	Relay A Provide the second sec	

- 7. Enter the DUT ID in the DUT field of Select panel, and click **Run**.
- 8. The progress of the Analysis is displayed in the Analyze tab.

9. The test result report is displayed in the **Report** panel.



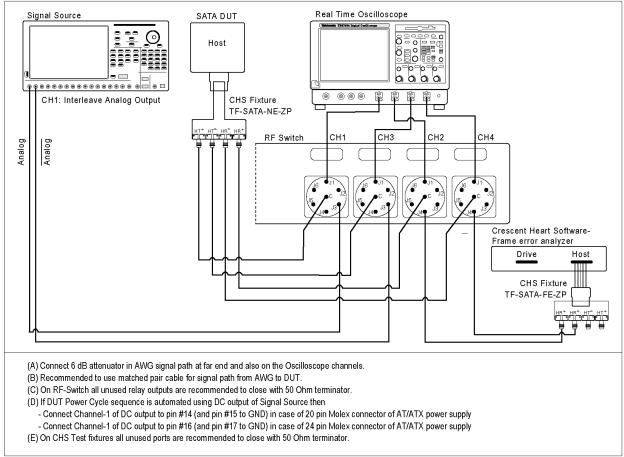
RSG-RMT Equipment Setup: Host

You need the following equipment to setup the application:

254,
cceptable:
.P

Connect the equipment as shown in the following diagram:





RSG-02 - Gen2 (3.0Gb/s) Receiver Signalling Group

Related Topics
Equipment Setup Host
Run RMT Receiver Margin Test

To run a RSG test on a SATA Host to conformance standards defined by SATA-IO Interoperability, follow these steps:

NOTE. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer Figure 1 for the Drive connection diagram.

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select Host as the device type.
- 2. Select RSG-RMT test suite and SATA Gen 2 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select RSG-02 Gen2 (3.0Gb/s) Receiver Signalling Group option.

🚿 TekEx	press Serial ATA Con	pliance Solution (Untitled)*		
Eile ⊻iev	v Tools <u>H</u> elp			
		DUT: DUT001		Run Stop
Select	Acquire Analyze Report			
	Select Device	Select Test Suite	Versi	ion
0	Cable	O PHY-TSG-00B	CATA C 2	
0	Drive	• RSG-RMT	SATA Gen 2	
۲	Host	⊖ Bx-Tx		
				Less
	Host · BS	G-RMT SATA Gen 2		
Select	TestName			Configure
	RMT - Receiver Margin Test			
	RSG-02 - Gen2 (3.0Gb/S) Receiver	Signaling Group		Show MOI
				SHOW MOI
				Show Schematic
				Select All
				Select Required
				Deselect All
,				Tektronix [,]

6. Click **Configure** if you want to configure the test parameters. Observe that the default settings are in Compliance mode.

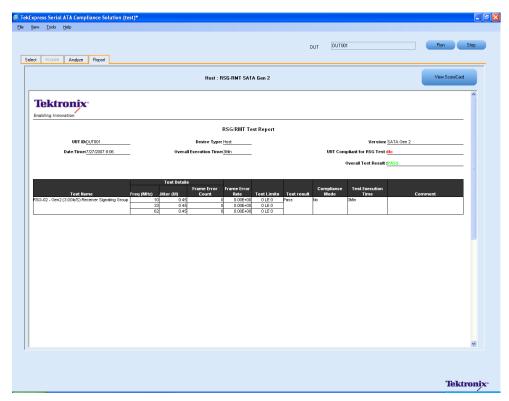
- 7. If you want to change the parameters, choose User Defined Mode.
- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI for information on how to configure the host receiver tests, click **Show MOI** in the Select panel.
- 9. Click Apply to apply the new settings for the selected test. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

Conriguration for	Host : RSG-RMT SATA Gen 2		
Parameter	Value		
Real Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)		
Signal Source	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)		
RF Switch	MODEL SYSTEM 46 (TCPIP::192.158.96.183::INSTR)		
Frame Error Counter	CHS SATA-II Probe (TCPIP::192.158.96.138::INSTR)		
BIST-L Initialization by	Auto		
Set scope scale, resolution and sampling rate	Automatically		
Horizontal scale (us/div)	10		
Resolution (ps/pt)	20		
Verify Frame Error Counter operation	No		
DUT input (HR+/DT+) connected to RF Switch relay	Relay A		
	Okamata		
		<u> </u>	
Configuration for RSG-02 - (Okamata		
Configuration for RSG-02 - 0	Gen2 (3.0Gb/S) Receiver Signaling Group		
Configuration for RSG-02 - 0 Acquire Analyze Limits Comments Parameter	Gen2 (3.0Gb/S) Receiver Signaling Group Value		
Configuration for RSG-02 - 0 Acquire Analyze Limits Comments Parameter 5MH2-0.45UI	Gen2 (3.0Gb/S) Receiver Signaling Group Value Include		
Acquire Analyze Limits Comments Parameter 5MHz-0.45UI 10MHz-0.45UI	Gen2 (3.0Gb/S) Receiver Signaling Group Value Include Include Include		
Configuration for RS6-02 - 0 Acquire Analyze Limits Comments Parameter 5MH2-0.45UI 10MH2-0.45UI 33MH2-0.45UI	Sen2 (3.0Gb/S) Receiver Signaling Group Value Include Include Include		

⊻iew Tools <u>H</u> elp		
	DUT: DUT001 Pause	Sto
ect Acquire Analyze Report		
Ho	st : RSG-RMT SATA Gen 2	
TestName	Status	
RSG-02 - Gen2 (3.0Gb/S) Receiver Signaling Group	To Be Started	
		Less
	atus Messages Dis	•
Sta 1/21/2008 11:45 AM::Searching for parameter: Signal Source-	atus Messages 🛛 🗸 🗸 Dis	play Status
Sta	atus Messages V Dis input to Real Time Scope channel. V Aut 58 96 133 will 2: INSTR	play Status

10. Click **Run** to run the selected tests. The status of the tests is displayed in the Analyze panel.

11. After the tests run successfully, a report is generated and displayed in the Report panel.



You can save the report using File > Save Report As menu option.

RMT- Receiver Margin Test

Related Topics
Equipment Setup Host
Run RSG02 Gen2 3 0Gbs Receiver Signalling
Group

To run an RMT test on a Host device, do the following:

- 1. Select Host as the Device type.
- 2. Select RSG-RMT test suite and SATA Gen2 as the version.
- 3. Select RMT Receiver Margin Test as the test to run.
- 4. Click Show Schematic to view the setup diagram for the application.

NOTE. Refer to **Equipment Setup: Host** section, for the setup diagram.

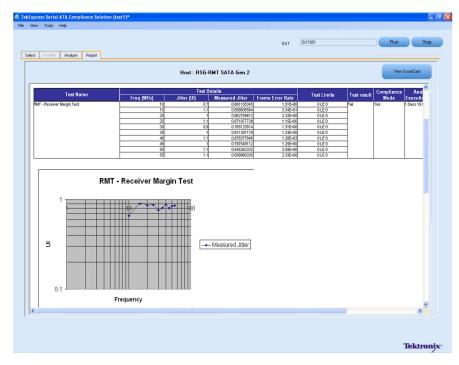
- 5. For information on how to configure the RMT test parameters, refer to RSG RMT Method of Implementation document by clicking Show MOI.
- 6. Click Configure to configure the test parameters.

TekExpress Serial A	TA Compliance Solution (Untitled)*	
Eile ⊻iew Tools <u>H</u> elp		
Select Acquire Analyze	DUT: DUT001	Run Stop
Select Device	Select Test Suite	Version
O Cable	O PHY-TSG-00B	SATA Gen 2
O Drive	RSG-RMT	SATA den 2
 Host 	⊖ R×Tx	
		Less
	Host : RSG-RMT SATA Gen 2	
Select Test Name MMT - Receiver Margin	T	Configure
	/S) Receiver Signaling Group	
		Show MOI
		Show Schematic
		Select All
		Select Required
		Deselect All
]		Tektronix [®]

- 7. The default settings are in User Defined Mode. Configure the Analyze parameters such as, the Start Frequency and End Frequency.
- 8. Click Apply to apply the new settings. Click Close.

Configure						
Configuration for Host : RSG-RMT SATA Gen 2						
Parameter	Value	1				
Real Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)					
Signal Source	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)					
RF Switch	MODEL SYSTEM 46 (TCPIP:: 192.158.96.183::INSTR)					
rame Error Counter	CHS SATA-II Probe (TCPIP::192.158.96.138::INSTR)					
IST-L Initialization by	Auto					
iet scope scale, resolution and sampling rate	Automatically					
forizontal scale (us/div)	10					
Resolution (ps/pt)	20					
/erify Frame Error Counter operation	No					
UT input (HR+/DT+) connected to RF Switch relay	Relay A					
Configuration	n for RMT - Receiver Margin Test					
Acquire Analyze Limits Comments						
Parameter	Value					
Jit3 Application Name	Jitter Analysis					
Start Frequency (MHz)	1					
End Frequency (MHz)	100					
Incremental Step Frequency (MHz)	1					
Start UI Jitter (UI)	0.1					
End UI Jitter (UI)	1.9					
Compliance Mode Compliance Settings						
) User Defined Mode Restore		lose				

9. Enter the DUT ID in the **DUT** field. Click **Run.** The progress of the analysis is displayed in the **Analysis** tab.



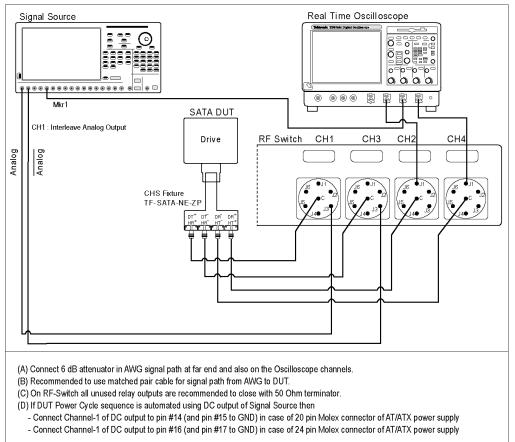
10. The test results are displayed in the **Report** panel.

PHY-TSG-OOB Equipment Setup: Drive

You need the following equipment to set up the application:

Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	 Tektronix DPO/DSA 72004, DPO/DSA 71604, DPO/DSA 71254, TDS6154C, and TDS6124C
	For Gen1-only testing, the following oscilloscopes are also acceptable: DPO/DSA 70804 or TDS6804B
RF Switch	Keithley S46-6666A (optional)
Test Fixture	Crescent Heart Software Test Fixture TF-SATA-NE-ZP
DUT	A SATA Drive to test

Connect the equipments as shown in the following diagram:



Setup diagram for Drive PHY-TSG-OOB test suite

PHY01 - Unit Interval-Gen1 Test

To verify that the Unit Interval of the SATA Drive transmitter is within the conformance limit, follow these steps:

NOTE. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer to Figure 3 for the Host connection diagram.

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select **Drive** as the device type.
- 2. Select the PHY-TSG-OOB as the Test Suite and SATA Gen1 as the version.
- 3. Select PHY01 Unit Interval-Gen1 option.
- 4. Enter the DUT ID in the DUT field.
- 5. If you want to verify the test setup before running the test(s), click Show Schematic.

1	TekEx	press Serial ATA Co	mpliance Solution (Untitled)*		
E	ile ⊻iev	v Tools <u>H</u> elp			
			DUT: DUT001	Run	Stop
T	Select	Acquire Analyze Report			
		Select Device	Select Test Suite	Version	
				Version	
	0	Cable	PHY-TSG-00B	SATA Gen 1 🗸	
	۲	Drive	O RSG-RMT	SATA dent	
	Ŭ		0		
	0	Host	○ R×-T×		
					Less
		Drive : I	PHY-TSG-OOB SATA Gen 1		
	Select	TestName		^	Configure
		00801-008 Signal Detection Thre	eshold-Gen 1		
		00802-UI During 008 Signaling			
		OOB03-COMINIT_RESET and CO	MWAKE Transmit Burst Length		Show MOI
		OOB04-COMINIT_RESET Transmi	t Gap Length	Shi	ow Schematic
		00805-COMWAKE Transmit Gap	Length		W Schemate
		00B06-COMWAKE Gap Detection	Windows		
		00B07-COMINIT Gap Detection W	/indows		Select All
		PHY01-Unit Interval-Gen 1			
		PHY02-Frequency Long Term Stab	ility	Sei	lect Required
		PHY03-Spread-Spectrum Modulation	on Frequency		Deselect All
		PHY04-Spread-Spectrum Modulation	on Deviation	× •	
				Т	ektronix [.]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

NOTE. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.

- 7. You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive transmitter tests, click **Show MOI** in the Select panel.
- 8. Click Apply to apply the new settings for the selected test. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

1	Configure		×					
	Configuration for Drive : PHY-TSG-00B SATA Gen 1							
	Parameter	Value	~					
	RF Switch	MODEL SYSTEM 46 (TCPIP::192.158.96.183::INSTR)						
	Signal Source	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)	_					
	Real Time Scope	TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)						
	BIST-L initialization by	Auto						
	Set scope scale, resolution and sampling rate	Automatically						
	Horizontal scale for PHY-TSG BIST-L acquisition (us/div)	4						
	Resolution for PHY-TSG BIST-L acquisition (ps/pt)	20						
	Horizontal scale for initial OOB validation (us/div)	2						
	Resolution for initial OOB validation (ps/pt)	80						
	Sampling rate for initial OOB validation (Gs/s)	12.5						
	Toop	Prove the sector						
	Configuratio	on for PHY01-Unit Interval-Gen 1						
	Acquire Analyze Limits Comments							
	Parameter	Value						
	JIT3 setup file name	TekExpress_PHY01.ini						
(Compliance Mode Compliance Settings User Defined Mode Restore	Apply	ose					

9. Click Run to run the selected tests.

10. The Acquire panel shows the status of the waveform acquisition.

TekExpress Serial ATA	Compliance Solution (Untitled)*		
e ⊻iew Tools <u>H</u> elp				
Select Acquire Analyze Repo	_	DUT: DUT001	Run	Stop
	Drive : PHY-TSG-0)OB SATA Gen 1		
Status	Acquisition	Test		
To Be Started	HFTP-Gen 1	PHY01-Unit Int	erval-Gen 1	
				Less
Select Acquisition Source		Status Messages		
Use PreRecorded Waveform Files	1/21/2008 11:52 AM::Found. Value is:	3.		
Cose Prehectoreed waveform Pries 1/21/2008 11:52 AM::Initializing Tekscope- TCPIP::192.158.96.133: vxi0,1:INSTR 1/21/2008 11:52 AM::Generating SATA Report				~
Acquire step by step	1/21/2008 11:52 AM::Generating SAT	A Report		~
Show Acquire Parameters	1/21/2008 11:52 AM::Generating SAT	A Report		~
	1/21/2008 11:52 AM::Generating SAT	AReport		

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

🚿 TekExpress Serial ATA Compliance Solution (test1)*		
<u> Eile View Iools Help</u>		
Select Acquire Analyze Report	DUT: DUT001	Pause Stop
Drive : PHY-TSG-0	DOB SATA Gen 1	
Test Name	Status	
PHY01-Unit Interval-Gen 1	Analyzing Pattern: HFTP-Gen 1	
		Less
Status Messa 11/21/2007 10:54 AM::Analyzing Pattern: HFTP-Gen 1	ages	Display Status
11/21/2007 10:54 AM::Writing command "RST 11/21/2007 10:54 AM::Writing command "RST 11/21/2007 10:54 AM::PHY01 Results for HFTP-Gen 1	<u> </u>	Auto Scroll
11/21/2007 10:54 AM::PHY01 Hesuits for HF1P-Gen 1 11/21/2007 10:54 AM::Unit Interval in ps=0 11/21/2007 10:54 AM::PHY01 Results for HFTP-Gen 1		Clear All
		Save Status
		Tektronix [•]

12. After the tests complete, a report is generated and displayed in the Report panel.

	ss Serial A	TA Comp	nance soru	ition (screen	ishots)-										
⊻jew	Tools H	(elp													
										DUT	DUT001				Run Stop
										DUI	001001				Hun Stop
elect	Acquire	Analyze	Report												
			L												
							Daine - F	'HY-TSG-OOB S/							view ScoreCard
							01146.1	111-130-000 5/	17 4011						
															^
-		-													1
16	ektro	DNIX													
Enab	oling Innova	ation						PI	HY-TSG-0	DOB Test	Report				
		UUT ID:	DUT001					Device Type:	Drive	-					Versi
		Date/Time:1	1/21/2007 15	5:58			Overal	Execution Time:	1 Min					UUT Con	npliant for TSG Te
															Overall Test Res
															overall fest kes
						Test Detail	8	т	est Limits		Measured				
										Limit					
		Test Nan			ern Name	Interface Speed	Measurement Details	Limit1	Limit2	Compare String		Units	Test result	Compliance Mode	Test Executio Time
20.00.12			lie												
РНУО)1-Unit Interv	al-Gen 1		HETP	, ,	1.5Gb/s	Unit Interval in ps	666.4333	670.233	apitt	666.6244645	ps	Pass	Yes	t Min
рнуо	11-Unit Interv	al-Gen 1		HETP	<u>,</u>	1.50b/s	Unit Interval in ps	666.4333	670.233	SPOTLT	666.6244645	89	Pass	Yes	ji Min
				HELD	>	1.50b/s	Unit Interval in ps	666.4333	670.233	ayətilit	666.6244645	20	Pass	Yes	<u>þ Mn</u>
Config	01-Unit Interv guration Para ral Paramete	ameters		HELD	>	1.50b/s	Unit Interval in ps	666.4333	670.233	ayətilit	686.6244645	20	Pass	<u>Yes</u>	<u> Mn</u>
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name	e 1	Yakue	Unit Interval in ps	666.4333	670.233	ayonun	666.6244645	59	Pass	Yes	<u>h Min</u>
Config Gener Param	guration Para	ameters rs		Name BIST	e		Unit Interval in ps	666.4333	670.233	sportur	606.6244645	59	Pass	Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST- Intial	e -L Ization by	Yalue Auto	Unit Interval in ps	666.4333	670.233	sportur	606.6244645	ps	Pass	Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST- Intial	e -L Izotion by Ty BIST-L	Yakue	Unit Interval in ps	666.4333	670.233	sportur	606.6244645	20	Pass	Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST	e -L Ization by ty BIST-L e	Yalue Auto	Unit Interval in ps	666.4333	670.233	şpi <u>t</u> r	606.6244645	29	Pass	Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Nam Bist hitiai Vorin Mode DUTi (H94-	e -L Izotion by ty BIST-L = Input -0T+)	Value Auto Always	Unit Interval in ps	666.4333	670.233	goiLt	666.6244645	29	Pass	Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST- Infala Node DUTI (HR+ com	e -L Ization by ty BIST-L e	Value Auto Always	Unit Interval in ps	666.4333	670.233	goit r	656.5244645	ps	peos	[Yes	ţ Mn
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by fy BIST-L s Input .0T+) sected to	Yalue Auto Always Relay A	Unit Interval in ps	666.4333	670.233	goit <u>r</u>	865.5244649	ps	Peos	<u>Yros</u>	
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by Y BIST-L 9 PIST-PIST-PIST-PIST-PIST-PIST-PIST-PIST-	Yalue Auto Always Relay A	Unit Interval in ps	666.4333	670.233	goit r	665.5244649	ps	Peos	<u>Yros</u>	ţ Mn >>
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by Y BIST-L 9 PIST-PIST-PIST-PIST-PIST-PIST-PIST-PIST-	Yalue Auto Always Relay A		666.4333	670.233	april r	805.5244649	ps	Peos	<u>Yros</u>	
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by Y BIST-L 9 PIST-PIST-PIST-PIST-PIST-PIST-PIST-PIST-	Yalue Auto Always Relay A	Und Inderval In po	666,4333	670.233	april r	865.5244649	ps	Peos	<u>Yros</u>	
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by Y BIST-L 9 PIST-PIST-PIST-PIST-PIST-PIST-PIST-PIST-	Yalue Auto Always Relay A	Und inferval in pp	666,4333	670.233	april r	865.5244649	ps	Peos	<u>Yros</u>	
Config Gener Param	guration Pare ral Paramete neter Type	ameters rs		Name BIST hritial Vorin DUTT HR+R conn RF S	e -L Ization by Y BIST-L 9 PIST-PIST-PIST-PIST-PIST-PIST-PIST-PIST-	Yalue Auto Always Relay A	Lind Inderval In po	666,4333	670.233	april r	869.5244649	ps	Peos	<u>Yres</u>	

You can save the report using File > Save Report As option.

TSG02 - Rise-Fall Time-Gen1 Test without RF Switch

To verify that the Rise/Fall time of the SATA Drive transmitter is within the conformance limits, follow these steps:

NOTE. Refer to schematic for connection diagram without the RF Switch.

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select **Drive** as the device type.
- 2. Select PHY-TSG-OOB as the Test Suite and SATA Gen1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. Select the TSG02 Rise-Fall Time-Gen1 option.
- 5. If you want to verify the test setup before running the test(s), click Show Schematic.

76	TekEx	press Serial A	TA Co	mpliance Solution (Untitle	ed)*	
E	ile ⊻iev	v Tools <u>H</u> elp				
				DUT: DUTC	001	Run Stop
Γ	Select	Acquire Analyze	Report			
		Select Device		Select Test Suite		Version
	0	Cable		PHY-TSG-00B		
	۲	Drive		O RSG-RMT	SATA	.Gen 1 💌
	Ŭ			0		
	0	Host		○ Rx-Tx		
						Less
			Drive : F	HY-TSG-00B SATA Gen 1		
	Select	TestName			1	Configure
		PHY02-Frequency Long	g Term Stab	lity		
		PHY03-Spread-Spectru	m Modulatic	n Frequency		Show MOI
		PHY04-Spread-Spectru	m Modulatio	n Deviation		Show MUI
		TSG01-Differential Outp	out Voltage-I	Gen 1-Option 1		Show Schematic
		TSG01-Differential Outp	out Voltage-I	Gen 1-Option 2		
		TSG02-Rise-Fall Time-G	ien 1			
		TSG03-Differential Skev	v-Gen 1			Select All
		TSG07-TJ at Connector	r, Clock to D	ata, fBAUD-10		Select Required
		TSG08-DJ at Connecto	r, Clock to D	ata, fBAUD-10		Scieder Hequired
		TSG09-TJ at Connector	r, Clock to D	ata, fBAUD-500		Deselect All
		TSG10-DJ at Connecto	r, Clock to E	ata, fBAUD-500		×
						Tektronix [*]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

NOTE. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.

- 7. You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive transmitter tests, click **Show MOI** in the Select panel.
- **8.** To run the test without using RF Switch, choose the **Do not use** option from the drop-down list for the RF switch parameter in the Configure panel.

	🕫 Configure 🛛 🗙									
	Con	figuration for Drive :	PHY-TSG-OOB SATA G	en 1						
	Parameter		Value		^					
	RF Switch		Do not use							
	Signal Source			PIP::192.158.96.183::INSTR)						
	Real Time Scope		Do not use							
	BIST-L initialization by		Auto							
	Set scope scale, resolution and sampling rate		Automatically							
	Horizontal scale for PHY-TSG BIST-L acquisition (us	/div)	4							
	Resolution for PHY-TSG BIST-L acquisition (ps/pt)		20							
	Horizontal scale for initial OOB validation (us/div)		2							
	Resolution for initial OOB validation (ps/pt)		80							
	Sampling rate for initial OOB validation (Gs/s)		12.5							
Į.	000		First time such							
	C	onfiguration for TSGO	3-Differential Skew-Ger	11						
Γ	Acquire Analyze Limits Comments									
	Acquire Type	Parameter		Value						
		Horizontal scale (us/div)		10						
	HFTP-Gen 1	Resolution (ps/pt)		40						
		Horizontal scale (us/div)		10						
	MFTP-Gen 1	Resolution (ps/pt)		40						
L										
0	Compliance Mode Compliance	Settings								
C	User Defined Mode									
	Coser Delined Mode Restor	e		Apply	se					

9. Click Apply to apply the new settings for the selected test and click Close.

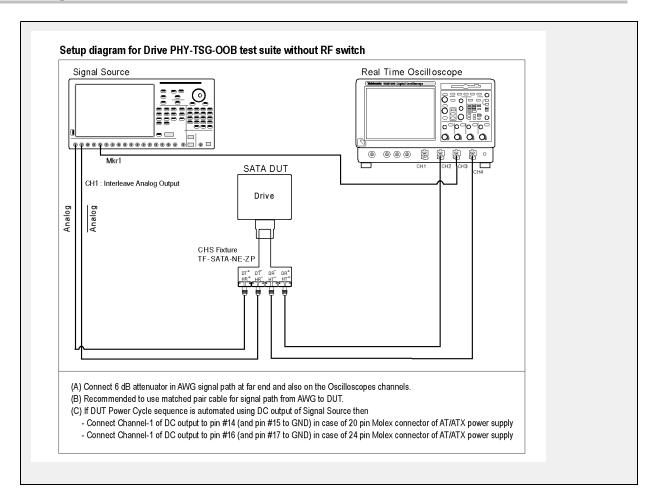
10. Click Run to run the selected tests.

11. The Acquire panel shows the status of the waveform acquisition.

ile <u>V</u> iew <u>T</u> ools <u>H</u> elp	olution (test1)*		
ile <u>V</u> iew <u>T</u> ools <u>H</u> elp			
	D	UT: DUT001 Pause	Stop
Select Acquire Analyze Report			
	Drive : PHY-TSG-00B SA	TA Con 1	
Status	Acquisition	Test	1
Acquiring SE and Diff signals	HFTP-Gen 1	TSG02-Rise-Fall Time-Gen 1	
	·		
			Less
			Less
			Less
SelectAcquisition Source	S	tatus Messages	Less
Use PreRecorded Waveform Files	S 11/21/2007 11:10 AM::Writing comman 11/21/2007 11:10 AM::Saving waveforr	tatus Messages d-TRIG:A:EDGE:SOURCE CH2 m X:\Serial ATA\Untitled Session\DUT001\20071121 110	
Use PreRecorded Waveform Files	S 11/21/2007 11:10 AM::Writing comman 11/21/2007 11:10 AM::Saving wavefor 11/21/2007 11:10 AM::Acquired	tatus Messages d-TRIG:A:EDGE:SOURCE CH2	→
Use PreRecorded Waveform Files	S 11/21/2007 11:10 AM::Writing comman 11/21/2007 11:10 AM::Saving waveforr	tatus Messages d-TRIG:A:EDGE:SOURCE CH2 m X:\Serial ATA\Untitled Session\DUT001\20071121 110	
Use PreRecorded Waveform Files	S 11/21/2007 11:10 AM::Writing comman 11/21/2007 11:10 AM::Saving wavefor 11/21/2007 11:10 AM::Acquired	tatus Messages d-TRIG:A:EDGE:SOURCE CH2 m X:\Serial ATA\Untitled Session\DUT001\20071121 110	→
Use PreRecorded Waveform Files Acquire Step By Step	S 11/21/2007 11:10 AM::Writing comman 11/21/2007 11:10 AM::Saving wavefor 11/21/2007 11:10 AM::Acquired	tatus Messages d-TRIG:A:EDGE:SOURCE CH2 m:X:Serial ATA\Untitled Session\DUT001\20071121_110 Differential, HFTP_G1_Drive_10_50_UK1	→

🚿 TekExpress Serial ATA Compliance Solution (test1)*		
<u>File Vi</u> ew <u>T</u> ools <u>H</u> elp		
Select Acquire Analyze Report	DUT: DUT001	Pause Stop
Drive : PHY-TSG	OOB SATA Gen 1	
Test Name	Status	
TSG02-Rise-Fall Time-Gen 1	Analyzing Pattern: HFTP-Gen 1	
		Less
Status Messa 11/21/2007 11:10 AM::Started TSG02	_	🔽 Display Status
11/21/2007 11:10 AM::Starting Test: TSG02-Bise-Fall Time-Gen 1		Auto Scroll
11/21/2007 11:10 AM::Analyzing Pattern: HFTP-Gen 1 11/21/2007 11:10 AM::Writing command-"RST 11/21/2007 11:10 AM::Evaluating Result Based on Rise Time	×	Clear All
		Save Status
		Tektronix .

Te	kExpress Seri	al ATA Comp	liance Solu	tion (screenshots)*											. 0
Ele	View Iools	Help													
										DUT001			_		~
									DUT	001001				Run	Stop
2	ielect Acquin	e Analyze	Report												
	noqui	o mayeo	Hopott												
														16CC	
				Drive : PHY-TSG-00B SATA Gen 1 View ScoreCard									0		
										^					
	Tekt	ronix													E
		/						HY-TSG-C	OB Test	Report					
	Enabling In	novation								Report					_
		UUT ID:	DUT001				Device Typ	e: Drive	_						lersi
			11/21/2007 1	5-28		Ouer	II Execution Tim						uut c	ompliant for TS	G T
		Daterrinte	11/21/2007 1			04012	III EXecution mit		-				0010	ompliancion	
														Overall Test	Res
					*			*		Measured					_
					Test Deta	lis		Test Limits	Limit	Measured					
					Interface	Measurement			Compare				Complianc	e TestExe	cutic
		Test Na	me	Pattern Name	Speed	Details	Limit1	Limit2	String		Units	Test result	Complianc Mode	Tim	
	TSG02-Rise-I	Fall Time-Gen 1		HETP	1.5Gb/s 1.5Gb/s	RiseTime in ps		00 21	3GTLT 3GTLT	134.274324 133.0137527	ps	Pass Pass	Yes	1 Min	
				pr 19	n.50b/s	Fall Time in ps		00 24	JULI	133.0137527		Pass			_
	Configuration														
1	General Para			hteres											
	Parameter Ty Common Para			Name BIST-L	Value Auto	-									
	- Committee Para			Initialization by											
				Verify BIST-L	Always	1									
				Mode DUT Input	Data a	-									
				(HR+:DT+)	Relay A										
				connected to		1									
	<			RF Switch on		1									>
1	1														
														Tek	tronix [.]
															/



OOB01 - OOB Signal Detection Threshold-Gen1 Test

To verify that the OOB Signal Detection Threshold of the SATA Drive receiver is within the conformance limits, follow these steps:

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select **Drive** as the device type.
- 2. Select PHY-TSG-OOB as the Test Suite and SATA Gen1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. Select the OOB01 OOB Signal Detection Threshold Gen1 option.
- 5. If you want to verify the test setup before running the test(s), click Show Schematic.

TekEx	press Serial A	TA Cor	npliance Solution (Un	titled)*			
ile ⊻iew	/ Tools <u>H</u> elp						
			DUT:	DUT001		Run	Stop
Select	Acquire Analyze	Report					
	Select Device		Select Test Suite		Ve	ersion	
0	Cable		PHY-TSG-00B				
			0.000.000		SATA Ge	n1 👻	
•	Drive		RSG-RMT				
0	Host		◯ Bx-Tx				
							Less
<u> </u>							
		Drive : P	HY-TSG-OOB SATA Gen 1				
Select	TestName				^	Config	gure
	00801-008 Signal De	tection Thre	shold-Gen 1				
	00B02-UI During 00B	Signaling					
	00B03-COMINIT_RESI	ET and CON	1WAKE Transmit Burst Length		=	Show	MUI
	00B04-COMINIT_RESI	ET Transmit	Gap Length		-	Show Sc	hematic
	00B05-COMWAKE Tra	ansmit Gap L	ength			0.10.11.00	nomalio
	00B06-COMWAKE Ga	p Detection \	Windows				
	00807-COMINIT Gap [Detection Wi	ndows			Selec	st All
	PHY01-Unit Interval-Ger	n1					
	PHY02-Frequency Long	g Term Stabil	ity			Select R	equired
	PHY03-Spread-Spectru	m Modulation	n Frequency			Desele	act All
	PHY04-Spread-Spectru	m Modulation	n Deviation		~	Deseit	JOC MIL
						Tek	tronix [.]

- 6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.
- 7. If you want to change the parameters, choose **User Defined Mode.** The message reports that the changes made to a test may no longer be compliant.

- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive receiver tests, click **Show MOI** in the Select panel.
- 9. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

	Con	nfiguration for Drive :	PHY-TSG-00B SA	ATA Gen 1		
Parameter			Value		^	
IF Switch			MODEL SYSTEM	46 (TCPIP::192.158.96.183::INSTR)		
ignal Source			AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)			
leal Time Scope			TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)			
IST-L initialization by			Auto			
et scope scale, resolution and samplin	ng rate		Automatically			
lorizontal scale for PHY-TSG BIST-L a	acquisition (us	:/div)	4			
esolution for PHY-TSG BIST-L acquis	sition (ps/pt)		20			
lorizontal scale for initial OOB validatio	on (us/div)		2			
esolution for initial OOB validation (ps	:/pt)		80			
ampling rate for initial OOB validation	. (Gs/s)		12.5			
inn			The data and		~	
	Configura	ation for OOB01-OOB	Signal Detection	Threshold-Gen 1		
Acquire Analyze Limits						
Acquire Analyze Limits	Comments	1				
Acquire Type	Comments	Parameter		Value	^	
	Comments	Parameter Sampling rate (Gs/s)		1	^	
	Comments		70 	Value		
	Comments	Sampling rate (Gs/s)		Value 1.25		
Acquire Type		Sampling rate (Gs/s) Resolution (ps/pt)	, tker wfm (div)	Value 1.25 800		
		Sampling rate (Gs/s) Resolution (ps/pt) Horizontal position (%)		Value 1.25 800 50		
Acquire Type		Sampling rate (Gs/s) Resolution (ps/pt) Horizontal position (%) Vertical position for mar		Value 1.25 800 50 0		

10. Click Run to run the selected tests.

11. The application automatically switches to the Acquire panel showing the waveform acquisition status.

	Compliance Solution (Untitled)	
e ⊻iew Tools <u>H</u> elp		
	DUT: DUT001	Run Stop
Select Acquire Analyze Report		
	Drive : PHY-TSG-00B SATA Ger	1
Status	Acquisition	Test
To Be Started	COMINIT/COMRESET/COMWAKE-No respon	00801-008 Signal Detection Threshold-Gen
To Be Started	COMINIT/COMRESET/COMWAKE-Response	00801-008 Signal Detection Threshold-Gen
		Less
Select Acquisition Source		
Select Acquisition Source	Status Messag	
Use PreRecorded Waveform Files	Status Messag 1/21/2008 12:13 PM::Found, Value is: 3. 1/21/2008 12:13 PM::Initializing Tekscope-TCPIP::192	es
Use PreRecorded Waveform Files	Status Messag 1/21/2008 12:13 PM::Found. Value is: 3. 1/21/2008 12:13 PM::Initializing Tekscope-TCPIP::192 1/21/2008 12:13 PM::Generating SATA Report	es
Use PreRecorded Waveform Files	Status Messag 1/21/2008 12:13 PM::Found, Value is: 3. 1/21/2008 12:13 PM::Initializing Tekscope-TCPIP::192	es
Use PreRecorded Waveform Files	Status Messag 1/21/2008 12:13 PM::Found. Value is: 3. 1/21/2008 12:13 PM::Initializing Tekscope-TCPIP::192 1/21/2008 12:13 PM::Generating SATA Report	es

ss Serial A	TA Complia	nce Solution (Test)*				
Tools	Help						
				DUT: DUT001		Pause	Stop
Acquire	Analyze	Report					
Drive : PHY-TSG-00B SATA Gen 1							
Name				Status			
1-00B Sigr	nal Detection	Threshold-Gen 1	l	Analysing COMINIT/(COMRESET/COMWA	KE-Response	
							Less
0010444	M::Corrobing	for parameter: A		ages			Status
108 10-44 A	M::Found Va	lue is: crst02-3a2	10-6v awa			Maio 31	croll
JU8 10:44 A	M::Calling pat	ternAnalyzer with	the following arguments:	"1" "0" "Gen1" "X:\Sei	al ATA\Untitled Sessi	🔁 🛛 Clear	All
					<u> </u>		
						Save S	tatus
						Te	ktronix [,]
	Tools Acquire Name 1-008 Sign 08 10:44 A	Tools Help Acquire Analyze Name 1:00B Signal Detection 10B 10:44 AM::Searching	Tools Help Acquire Analyze Report Name 1:00B Signal Detection Threshold-Gen 1:00B Sig	Acquire Analyze Report Drive : PHY-TSG- Name 1:00B Signal Detection Threshold-Gen 1 Status Mess 108 10:44 AM:Searching for parameter: AWG file. Status Mess 108 10:44 AM:Searching for parameter: AWG file.	Tools Help DUT: DUT: Acquire Analyze Report Drive : Drive : Drive : PHY-TSG-ODB SATA Gen 1 Name Status 1-00B Signal Detection Threshold-Gen 1 Analysing COMINIT/C 1-00B Signal Detection Threshold-Gen 1 Analysing COMINIT/C Status Message DIT 44 AM::Searching for parameter: AWG file. Status Messages	Tools Help DUT: DUT001 Acquire Analyze Report Drive : PHY-TSG-OOB SATA Gen 1 Name Status 1:00B Signal Detection Threshold-Gen 1 Analysing COMINIT/COMRESET/COMWA 1:00B Signal Detection Threshold-Gen 1 Analysing COMINIT/COMRESET/COMWA Status Messages 1:0010 10:44 AM::Searching for parameter: AWG file. Status Messages 1:0010 10:44 AM::Searching for parameter: AWG file.	Tools Help DUT: DUT: DUT: Acquire Analyze Report Drive : PHY-TSG-00B SATA Gen 1 Name Status 100B Signal Detection Threshold-Gen 1 Analysing COMINIT/COMRESET/COMWAKE-Response Status Messages 08 10:44 AM::Searching for parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching for parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Auto Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Satus Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Satus Satus Messages 08 10:44 AM::Searching parameter, AWG file. ✓ Satus Satus Messages 08 10:44 AM::Searching parameter, A

ect Acq	quire A	nalyze	Report						DUT:	DUT001				Run	Stop
							Drive : Ph	IY-TSG-OOB SA	TA Gen 1					V	'iew ScoreCard
Tek	tro	nix	,												<u>^</u>
Enabling	Innovatio	in						PH	Y-TSG-O	OB Test R	eport				
		UUT ID:0	/2/2008 10:4				0	Device Type: Drive							Vers
	Dat	e/mile:	7272006 10.4	N			Overall Execution Time:1 Min							Overall Test Res	
															Overall rest Ker
		Test Nan	ne	Pi	ttern Name		s Measurement Details	Limit1	Test Limits Limit2	Limit Compare String	Measured	Units	Test result	Compliance Mode	Test Executio Time
00801-00	08 Signal I	Detection	Threshold-G	en 1 O	MINIT/COMR esponse	1.5Gb/s			0	0EQ	0	NA	Pass	Yes	1 Min
				0 -h	MNIT/COMR presponse	1.5Gb/s			0	0EQ	0		Pass		
								1		1					
Configurati		eters]								
General Pa Parameter				N	me	Value	-								
Common Pi	arameters			ini	ST-L ialization by	Auto	_								- *
	_			_	_										<u>.</u>

Test Fixture

DUT

PHY-TSG-OOB Equipment Setup:Host

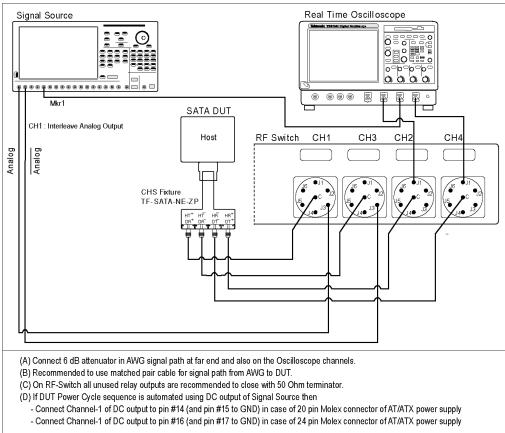
Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	Tektronix DPO/DSA 72004, DPO/DSA 71604, DPO/DSA 71254, TDS6154C, and TDS6124C
	 For Gen1-only testing, the following oscilloscopes are also acceptable: DPO/DSA 70804 or TDS6804B
RF Switch	Keithley S46-6666A

A SATA Host to test

Crescent Heart Software test fixture, TF-SATA-NE-ZP

You need the following equipment to set up the application:

Connect the equipments as shown in the following diagram:



Setup diagram for Host PHY-TSG-OOB test suite

TSG03 - Differential Skew-Gen 2 Test

To verify that the differential skew of the SATA Host transmitter is within the conformance limits, follow these steps:

NOTE. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer to <u>Figure 4</u> for the Drive connection diagram.

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select Host as the device type.
- 2. Select PHY-TSG-OOB as the Test Suite and SATA Gen2 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. Select the TSG03 Differential Skew-Gen2 option.
- 5. If you want to verify the test setup before running the test(s), click Show Schematic.

7é	TekEx	press Serial ATA C	ompliance Solution (Untitled)*		
E	ile ⊻iev	v Tools <u>H</u> elp			
			DUT: DUT001	F	Run Stop
ſ	Select	Acquire Analyze Report			
		Select Device	Select Test Suite	Version	
	0	Cable	PHY-TSG-00B		
	0	Drive	O RSG-RMT	SATA Gen 2	~
		Host	O Bx-Tx		
		11030	0.000		Less
					Less
		Host :	PHY-TSG-00B SATA Gen 2		
	Select	TestName		~	Configure
		PHY03-Spread-Spectrum Modula	tion Frequency		
		PHY04-Spread-Spectrum Modula	tion Deviation		
		TSG01-Differential Output Voltag	e-Gen 2-Option 1		Show MOI
		TSG01-Differential Output Voltag	e-Gen 2-Option 2		Show Schematic
		TSG02-Rise-Fall Time-Gen 2			Show Schematic
		TSG03-Differential Skew-Gen 2			
		TSG04-AC Common Mode Voltag	e		Select All
		TSG05-Rise-Fall Imbalance			
		TSG06-Amplitude Imbalance			Select Required
		TSG07-TJ at Connector, Clock to	Data, fBAUD-10		D 1 1 1
		TSG08-DJ at Connector, Clock to	Data, fBAUD-10	~	Deselect All
					Tektronix [,]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

NOTE. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.

- 7. You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive transmitter tests, click **Show MOI** in the Select panel.
- 8. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

V	🛿 Configure				X						
	Configuration for Host : PHY-TSG-00B SATA Gen 2										
	Parameter		Value		^						
	RF Switch		MODEL SYSTEM 46 (T	CPIP::192.158.96.183::INSTR)							
	Signal Source		AWG7102 (TCPIP::192.	158.96.133::vxi0,2::INSTR)	-						
	Real Time Scope		TDS6154C (TCPIP::192	.158.96.133::vxi0,1::INSTR)							
	BIST-L initialization by		Auto								
	Set scope scale, resolution and sampling rate		Automatically								
	Horizontal scale for PHY-TSG BIST-L acquisition	(us/div)	4								
	Resolution for PHY-TSG BIST-L acquisition (ps/p)	20								
	Horizontal scale for initial OOB validation (us/div)		2								
	Resolution for initial OOB validation (ps/pt)		80								
	Sampling rate for initial OOB validation (Gs/s)		12.5								
I	Joon		Principal and								
		Configuration for TSG)3-Differential Skew-Ge	n 2							
	Acquire Analyze Limits Commen	ts									
	Acquire Type	Parameter		Value							
	HFTP-Gen 2	Horizontal scale (us/div)	4							
	HFIP-Gen 2	Resolution (ps/pt)		20							
	MFTP-Gen 2	Horizontal scale (us/div)	4							
	Mrir-uen z	Resolution (ps/pt)		20							
1											
0	Ocompliance Mode	e Settings									
O Longuarde Mode Apply Close											

9. Click Run to run the selected tests.

⊻iew Tools <u>H</u> elp			
	DU'	T: DUT001 Ru	in Sti
lect Acquire Analyze Repo	t		
Status	Host : PHY-TSG-OOE Acquisition	Test	
o Be Started	HFTP-Gen 2	TSG03-Differential Skew-Gen 2	2
o Be Started	MFTP-Gen 2	TSG03-Differential Skew-Gen 2	
			Less
			Less
Select Acquisition Source	Sta	atus Messages	Less
Select Acquisition Source	Sta 1/21/2008 12:19 PM::Generating SATA F	atus Messages Report	
-	Sta	atus Messages Report oport	
Use PreRecorded Waveform Files	Sta 1/21/2008 12:19 PM::Generating SATA F	atus Messages Report	

10. The Acquire panel shows the status of the waveform acquisition.

🚿 TekExpress Serial ATA Compliance Solution (screenshots	s)*	
<u>Eile V</u> iew <u>I</u> ools <u>H</u> elp		
Select Acquire Analyze Report	DUT: DUT001	Pause Stop
Host : Pl	HY-TSG-OOB SATA Gen 2	
TestName	Status	
TSG03-Differential Skew-Gen 2	Analyzing Pattern: HFTP-Gen 2	
		Less
	: Messages	🗹 Display Status
11/21/2007 2:39 PM::Writing command-SELECT:REF1? 11/21/2007 2:39 PM::RECALL:WAVEform 'X: Serial ATA/Unitited S 11/21/2007 2:39 PM::Writing command-DELEte:WAVEform Ref2	Session\DUT001\20071121_143218\HFTP_G2_Drive_	Auto Scroll Clear All Save Status
		Tektronix

	al ATA Compli	ance Solution	(screenshots)*										
⊻jew <u>I</u> ools	Help												
												_	
								DUT	DUT001				Run Stop
elect Acquire	e Analyze	Report											
					Host : P	HY-TSG-OOB S	ATA Gen 2					V	/iew ScoreCard
							^						
Tekt	ronix [.]												
Enabling Inn	novation					F	PHY-TSG-	DOB Test	Report				
	UUT ID:D		_			Device Type	: Drive	-					Vers
	Date/Time:1	1/21/2007 14:41	_		Overa	II Execution Tim	e:1 Min	_				UUT Con	upliant for TSG T
													Overall Test Re:
				Test Detai	18		Test Limits		Measured				
				Interface	Measurement			Limit Compare				Compliance	Test Executio
	Test Nam		Pattern Name	Speed	Details	Limit1	Limit2	String		Units	Test result	Mode	Time
TSG03-Differe	ential Skew-Gen	2		3.0Gb/s	Differential Skew in ps			OLT	16.50300793	ps	Pass	Yes	1 Min
			MFTP-Gen 2	3.0Gb/s	Differential Skew In ps		20	OLT	18.0180544		Pass]	
					in pa								
Configuration R]								
1			Name	Value	-								
General Param Parameter Typ	oe			Auto	1								
General Param Parameter Typ Common Param			BIST-L	P ^{alo}									
Parameter Typ			initialization by		-								
Parameter Typ			Initialization by Verify BIST-L Mode	Always	_								
Parameter Typ			Initialization by Verify BIST-L										×
Parameter Typ			Verify BIST-L Mode DUT Input	Always									>
Parameter Typ			Verify BIST-L Mode DUT Input	Always	- - -								>
Parameter Typ			Verify BIST-L Mode DUT Input	Always	-								
Parameter Typ			Verify BIST-L Mode DUT Input	Always	- - -								

OOB06 - COMWAKE Gap Detection Windows Test

To verify that the COMWAKE Gap Detection Windows of the SATA Host receiver is within the conformance limits, follow these steps:

NOTE. All the cables must be deskewed before performing this measurement.

- 1. Select Host as the device type.
- 2. Select PHY-TSG-OOB as the Test Suite and SATA Gen1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. Select the OOB06 COMWAKE Gap Detection Windows option.
- 5. If you want to verify the test setup before running the test(s), click Show Schematic.

🚿 TekEx	press Serial A	ATA Co	mpliance Solution (Unti	tled)*		
Eile ⊻iev	w Tools <u>H</u> elp					
			DUT: DU	JT001	В	lun Stop
Select	Acquire Analyze	Report				
	Select Device		Select Test Suite		Version	
0	Cable	-	PHY-TSG-00B			
0	Drive		O RSG-RMT	SATA	.Gen 1	~
	Host		O Bx-Tx			
•	Host		O BX-IX			
						Less
		Host : P	HY-TSG-OOB SATA Gen 1			
Select	TestName				^	Configure
	00801-008 Signal D	etection Thre	shold-Gen 1			
	00B02-UI During 00B) Signaling				
	00B03-COMINIT_RES	SET and COI	WWAKE Transmit Burst Length			Show MOI
	00B04-COMINIT_RES	GET Transmit	Gap Length			Show Schematic
	00805-COMWAKE Tr	ansmit Gap l	.ength			Show Schematic
	OOB06-COMWAKE Ga	ap Detection	Windows			
	00807-COMINIT Gap	Detection W	indows			Select All
	PHY01-Unit Interval-Ge	en 1				
	PHY02-Frequency Lon	ng Term Stab	lity			Select Required
	PHY03-Spread-Spectru	um Modulatic	n Frequency			Deselect All
	PHY04-Spread-Spectru	um Modulatio	n Deviation		~ L	DUSCICUTAII
						Tektronix [,]

- **6.** Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.
- 7. If you want to change the parameters, choose User Defined Mode. The message reports that the changes made to a test may no longer be compliant.

- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive receiver tests, click **Show MOI** in the Select panel.
- **9.** Click **Apply** to apply the new settings for the selected test. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

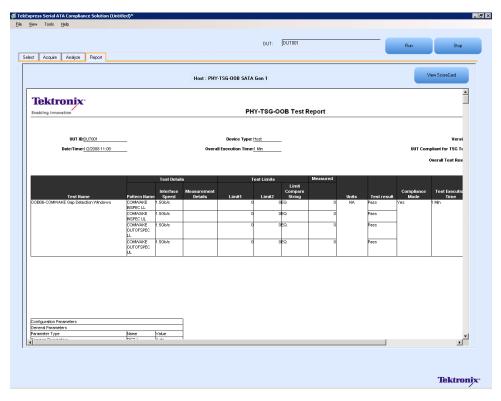
🚿 Configure				×
Cor	nfiguration for Host : I	PHY-TSG-OOB SA	TA Gen 1	
Parameter		Value		^
RF Switch		MODEL SYSTEM	46 (TCPIP:: 192.158.96.183:: INSTR)	
Signal Source		AWG7102 (TCPIP:	::192.158.96.133::vxi0,2::INSTR)	_
Real Time Scope		TDS6154C (TCPIP::192.158.96.133::vxi0,1::INSTR)		
BIST-L initialization by		Auto		
Set scope scale, resolution and sampling rate		Automatically		
Horizontal scale for PHY-TSG BIST-L acquisition (us.	/div)	4		
Resolution for PHY-TSG BIST-L acquisition (ps/pt)		20		
Horizontal scale for initial OOB validation (us/div)		2		
Resolution for initial OOB validation (ps/pt)		80		
Sampling rate for initial OOB validation (Gs/s)		12.5		
000		The data and		
Configu	ration for 00806-CO₩	WAKE Gap Detec	ction Windows	
Acquire Analyze Limits Comments]			
Acquire Type	Parameter		Value	^
			1.25	
	Sampling rate (Gs/s)		800	_
	Resolution (ps/pt) Horizontal position (%)		50	_
			0	_
COMWAKE INSPECILL	Vertical position for mark		0	_
	Vertical position for math	n wrm (div)	U Channel 2	~
1.5				
Compliance Mode Compliance	Settings			
O User Defined Mode Restor	e		Apply Close	

10.Click Run to run the selected tests.

11. The application automatically switches to the Acquire panel showing the waveform acquisition status.

k	DUT: DU	JT001 Run Stop
ect Acquire Analyze Repo	t	
	Host : PHY-TSG-OOB SA	TA Gen 1
Status	Acquisition	Test
To Be Started	COMWAKE INSPEC LL	00806-COMWAKE Gap Detection Windows
To Be Started	COMWAKE INSPEC UL	00B06-C0MWAKE Gap Detection Windows
To Be Started	COMWAKE OUTOFSPEC LL	00806-COMWAKE Gap Detection Windows
To Be Started	COMWAKE OUTOFSPEC UL	00806-COMWAKE Gap Detection Windows
		Less
		Less
Select Acquisition Source		Less Messages
Select Acquisition Source	Status 1/21/2008 12:25 PM::Found. Value is: 3.	Messages
Use PreRecorded Waveform Files	Status 1/21/2008 12:25 PM::Found. Value is: 3, 1/21/2008 12:25 PM::Initializing Tekscope-TC	Messages PIP::192.158.96.133::vxi0.1::INSTR
·	Status 1/21/2008 12:25 PM::Found. Value is: 3.	Messages PIP::192.158.96.133::vxi0,1::INSTR

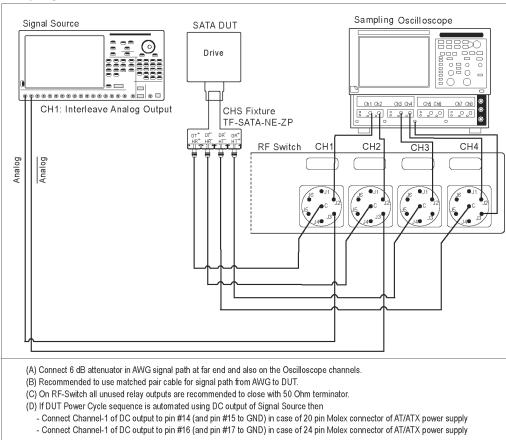
🚿 TekExpress Serial ATA Compliance Solution (Untitled)*	
<u>Eile V</u> iew Tools <u>H</u> elp	
Select Acquire Analyze Report	DUT: DUT001 Pause Stop
Host : PHY-TSG	OOB SATA Gen 1
TestName	Status
00B06-COMWAKE Gap Detection Windows	Analysing COMWAKE INSPEC LL
	Less
Status Mess	
1/2/2008 11:07 AM::Searching for parameter: AWG file. 1/2/2008 11:07 AM::Found. Value is: cwke02:3g-6x.awg. 1/2/2008 11:07 AM::Calling patternAnalyzer with the following arguments:	
	Tektronix



Rx-Tx Equipment Setup: Drive

Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Sampling Oscilloscope	Tektronix CSA/TDS/DSA 8200 with two 80E04 modules
RF Switch	Keithley S46-6666A
Test Fixture	Crescent Heart Software Fixture TF-SATA-NE-ZP
SMA Cables	Five pair of matched SMA Cables – 179-4944-00 or equivalent
	One SMA cable to connect to trigger input
	One SMA barrel adapter
Attenuators	Two 6 dB attenuators
DUT	A SATA Drive to test

Connect the equipments as shown in the following diagram:



Setup diagram for Drive RXTX test suite

Rx01 - Pair Differential Impedance test

To verify that the Pair Differential Impedance of the SATA Drive receiver is within the conformance limits, follow these steps:

NOTE. This test is applicable for both Drive and Host devices. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer to Figure 5 for Host connection diagrams.

- 1. Select Drive as the device type.
- 2. Select RX-TX as the Test Suite and SATA Gen 1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select the Rx-01 Pair Differential Impedance option.

1	TekEx	press Serial ATA Co	ompliance Solution (Untitled)*	
E	le ⊻iev	v Tools <u>H</u> elp		
			DUT: DUT001	Run Stop
Г	Select	Acquire Analyze Report		
		Select Device	Select Test Suite	Version
	0	Cable	O PHY-TSG-00B	
	-			SATA Gen 1 🛛 👻
	۲	Drive	○ RSG-RMT	
	\circ	Host	⊙ B×-T×	
				Less
		Drive :	Rx-Tx SATA Gen 1	
	Select	TestName		Configure
		Rx-01 - Pair Differential Impedance	9	
	무	Rx-02 - Single-Ended Impedance		Show MOI
	\square	Rx-06 - Differential Mode Return L Tx-01 - Pair Differential Impedance		
	H	Tx-02 - Single-Ended Impedance		Show Schematic
		Tx-06 - Differential Mode Return L	282	
				Select All
				Select Required
				Deselect All
				Tektronix [,]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

NOTE. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.

- 7. You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* document for information on how to configure the drive receiver tests, click **Show MOI** in the Select panel.
- 8. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

	Configuration for D	rive : Rx-Tx SATA	Gen 1	
Parameter		Value		1
Sampling Scope		CSA8200 (TCPIP:	192.158.96.233::INSTR)	
Signal Source		AWG7102 (TCPIP	::192.158.96.133::vxi0,2::INSTR)	
RF Switch		MODEL SYSTEM	46 (TCPIP::192.158.96.183::INSTR)	
BIST-L Initialization by		Auto		
Deskew Method		Manual		
Acquire Reference Waveform		Auto		
Horizontal Scale (ps)		500		
Horizontal Scale - Deskew (ps)		3000		
Horizontal Scale - Wide Window (ps)		10000		
Internal Clock		Auto		~
Dealt Dealt Real Transit Clear (200	.ln			
Cc	nfiguration for Rx-01	- Pair Differential I	mpedance	
Acquire Analyze Limits Comments				
Acquire Type	Parameter		Value	
	Record Length		4000	
	Average		300	
TDR Differential	Rise Time (ps)			
	Deskew Mode			
	Horizontal Scale Acq			
) Compliance Mode Compliance	e Settings			

9. Click **Run** to run the selected tests.

10. The Acquire panel shows the waveform acquisition status.

TekExpress Serial ATA Compliance	Solution (Untitled)*	
ile <u>V</u> iew <u>T</u> ools <u>H</u> elp		
Select Acquire Analyze Repo	DUT: DUT0	01 Pause Stop
	Drive : Rx-Tx SATA Gen 1	
Acquisition	Test	WaveFormFile
TDR Differential	Rx-01 · Pair Differential Impedance	C:\Documents and Settings\ssampath\My Doc C\Documents and Settings\ssampath\My Doc
		Less
		<u> </u>
SelectAcquisition Source	Status Me	ssages
 Use PreRecorded Waveform Files Acquire Step By Step 	12/7/2007 4:13 PM::Searching for parameter: Ave 12/7/2007 4:13 PM::Searching for parameter: Ave 12/7/2007 4:13 PM::Found. Value is: 300.	rage
Show Acquire Parameters		
,		Tektronix

🌾 TekExpress Serial ATA Compliance Solution (Untitled)*		
<u>Eile View Iools H</u> elp		
Select Acquire Analyze Report	DUT: DUT001 Pause Stop	
Drive : Rx-Ta	s SATA Gen 1	-
TestName	Status	1
Rx-01 - Pair Differential Impedance	Executing matlab script	
Status Mess.		
12/7/2007 4:13 PM::Executing Filter Command: C:\Program Files\TekAppl	ications\IConnect Evaluation\Program Files\IC	
12/7/2007 4:13 PM::Performing Z-Line operation on files X:\Serial ATA\Ür 12/7/2007 4:13 PM::Executing Z-Line Command: C:\Program Files\TekAp		
	Tektron	jx.

iew Tools				on) (Rx01_Comp_DSA8200)							
						DUT: DUTC	101			Run	Stop
ct Acquire	Analyze	Report									
				Driv	re : Rx-Tx SATA	Gen 1					View ScoreCard
Tekt	ronix			Te	ektronix	Compliand	e Auto	mation F	- ramew	/ork	
Enabling Inn	ovation					Rx/T	x Test Repo	ort			
		: DUT001		-		Device Type :			-		
	Date/Time	: 3/5/2008 12:51		-	0	verall Analysis Time :	<1 Min		-		UUT Compliant fe Overall
								Test Limits			
SI. No.		Test Name		Measurement details	Units	Measured Value	Limit 1	Limit 2	Compare String	Test Result	Compliance Mode
51. 110.		reschame		Minimum Maximum	ohms	100	85 85	115	GELE	Pass	mode
1	Rx-01 - Pair	Differential Im	pedance	2ns measurement point	ohms	106 103	85	115	GELE	Pass Pass	Yes
Grad	iguration Para		1				1				
Coni	eneral Param	eters			Name	N/L					
					BIST-L Initializ	Value Auto					
Parameter					Deskew Meth Acquire Refer	Auto Auto	-				
						500	1				
					Horizontal Sca		1				
					Horizontal Sca Horizontal Sca	3000	1				>
Parameter				ill.			1				>
Parameter											>

Tx02 - Single-Ended Impedance test

To verify that the Single-Ended Impedance of the SATA Drive transmitter is within the conformance limits, follow these steps:

- 1. Select Drive as the device type.
- 2. Select RX-TX as the Test Suite and SATA Gen 1 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select the Tx-02 Single-Ended Impedance option.

🚿 TekExpress S	erial ATA Con	npliance Solution (Untitle	i)*				
Eile ⊻iew Tools	Help						
		DUT: DUT001		Run Stop			
Select Acquire	Analyze Report						
Select De	evice	Select Test Suite	Ve	rsion			
🔿 Cable		O PHY-TSG-00B					
 Drive 		O RSG-RMT	SATA Ger	n1 💌			
- The second sec		-					
O Host		● Rx-Tx					
				Less			
	Drive : Bx-Tx SATA Gen 1						
Select Test Nam	e			Configure			
	r Differential Impedance						
	gle-Ended Impedance			Show MOI			
	erential Mode Return Los:	3		Show MUI			
	r Differential Impedance			Show Schematic			
	gle-Ended Impedance						
Tx-06 - Diffe	erential Mode Return Loss			Select All			
				JOIGUT MI			
				Select Required			
				Deselect All			
				Tektronix [,]			

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

NOTE. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.

7. You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the drive transmitter tests, click **Show MOI** in the Select panel. 8. Click Apply to apply the new settings for the selected test. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

	Configuration for Drive	e : Rx-Tx SATA Gen 1	
Parameter		Value	1
Sampling Scope	1	CSA8200 (TCPIP::192.158.96.233::INSTR)	
Signal Source	1	AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)	
RF Switch		MODEL SYSTEM 46 (TCPIP::192.158.96.183::INSTR)	-
BIST-L Initialization by	1	Auto	
Deskew Method		Manual	
Acquire Reference Waveform	1	Auto	
Horizontal Scale (ps)	!	500	
Horizontal Scale - Deskew (ps)		3000	
Horizontal Scale - Wide Window (ps)		10000	
Internal Clock		Auto	
	oninguration for TX-02	Single-Ended Impedance	
Acquire Analyze Limits Comments		Single-Ended Impedance	
Acquire Analyze Limits Comments		Value	
	Parameter	Value	
	Parameter Record Length	Value 4000	
Асquire Туре	Parameter Record Length Average	Value 4000 300	
Асquire Туре	Parameter Record Length Average Rise Time (ps)	Value 4000 300 40 Even	
Асquire Туре	Parameter Record Length Average Rise Time (ps) Deskew Mode	Value 4000 300 40 Even	
Асquire Туре	Parameter Record Length Average Rise Time (ps) Deskew Mode Horizontal Scale Acquisitio	Value 4000 300 40 Even	

9. Click **Run** to run the selected tests.

10. The application automatically switches to the Acquire panel. The waveform acquisition status is displayed in this panel.

🚿 TekExpress Serial ATA Compliance	Solution (Untitled)*	
<u>File View T</u> ools <u>H</u> elp		
Select Acquire Analyze Repo	DUT: DUTO	01 Pause Stop
	Drive : Rx-Tx SATA Gen 1	
Acquisition	Test	WaveFormFile
MFTP-TDR Single Ended	Tx-02 - Single-Ended Impedance	C:\Documents and Settings\ssampath\My Doc C:\Documents and Settings\ssampath\My Doc C:\Documents and Settings\ssampath\My Doc C:\Documents and Settings\ssampath\My Doc
		Less
SelectAcquisition Source	Status Mes	******
Use PreRecorded Waveform Files Acquire Step By Step Show Acquire Parameters	12/7/2007 4:19 PM::Copying files for test: RX-01 12/7/2007 4:19 PM::Copying DUT file Src: C:\Doc	_
		Tektronix

🚿 TekExpress Serial ATA Compliance Solution (Untitled)*	
<u>File Vi</u> ew <u>T</u> ools <u>H</u> elp	
Select Acquire Analyze Report	DUT: DUT001 Pause Stop
Drive : Rx-Tx	SATA Gen 1
TestName	Status
Tx-02 - Single-Ended Impedance	Executing matlab script
	Less
Status Messa	
12/7/2007 4:19 PM::Executing Filter Command: C:\Program Files\TekAppl 12/7/2007 4:19 PM::Performing Z-Line operation on files X:\Serial ATA\Ur 12/7/2007 4:19 PM::Perceuting Z-Line Command: C:\Program Files\TekAp	ications\IConnect Evaluation\Program Files\IC A
	Tektronix

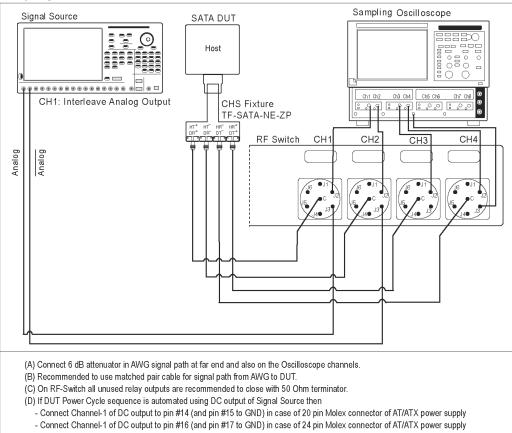
ct Acquire Analyze Report							Run	Stop
	Driv	ve : Rx-Tx SATA	Gen 1					View ScoreCard
Tektronix [®] Enabling Innovation	T	ektronix	Compliand Rx/T	x Test Repo		ramew	/ork	
UUT 10 : <u>DUT001</u> Date/Time : <u>365/2008 13:11</u>	_	o	Device Type : verall Analysis Time :					UUT Compliant fo Overall
SL. No. Test Name 1 Tx-02 - Single-Ended Impedance	Measurement details Minimum (+) Minimum (-)	Units ohms ohms	Measured Value 47.1 47.5	Limit 1 40 40	Test Limits Limit 2 0 0	Compare String GT GT	Test Resul Pass Pass	Compliance Mode Yes
Configuration Parameters				1				
General Parameters		Name BIST-L Initializ Deskew Meth Acquire Refer	Value Auto Auto Auto					
		Horizontal Sca Horizontal Sca Horizontal Sca	3000			1		>

You can save the report using File > Save Report As option.

Rx-Tx Equipment Setup: Host

Resource	Model Supported				
Signal Source	Tektronix AWG7102 (Option 6)				
Sampling Oscilloscope	Tektronix CSA/DSA/TDS 8200 with two 80E04 modules				
RF Switch	Keithley S46-6666A				
Test Fixture	Crescent Heart Software Fixture TF-SATA-NE-ZP				
SMA Cables	Five pair of matched SMA Cables – 179-4944-00 or equivalent				
	One SMA cable to connect to trigger input				
	One SMA barrel adapter				
Attenuators	Two 6 dB attenuators				
DUT	A SATA Host to test				

Connect the equipments as shown in the following diagram:



Setup diagram for Host RXTX test Suite

Rx03 - Differential Mode Return Loss

To verify that the Differential Mode Return Loss of the SATA Host receiver is within the conformance limits, follow these steps:

NOTE. This test is applicable for both Drive and Host devices. The test procedure is identical for both drive and host except for a change in the connection diagram. Refer to Figure 6 for Drive connection diagrams.

- **1.** Select **Host** as the device type.
- 2. Select **RX-TX** as the Test Suite and SATA Gen 2 as the version.
- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select Rx03 Differential Mode Return Loss option.

🚿 Т	ekEx	press Serial A	FA Compliance Solution	(Untitled)*		
Eile	⊻iev	/ Tools <u>H</u> elp				
				DUT: DUT001	Run	Stop
S	elect	Acquire Analyze	Report			
Γ.		Select Device	Select Test Su	lite	Version	
	0	Cable	O PHY-TSG-00B			
	0	Drive	RSG-RMT	SATA	A Gen 2 💌	
	۲	Host	• Bx-Tx			
	•	nost				
						Less
						-
			Host : Rx-Tx SATA Gen 2			
	Select	TestName			Confi	igure
		Rx-03 - Differential Mode				
		Rx-04 - Common Mode F			Show	MOL
		Rx-05 - Impedence Balar				MOI
		Tx-03 - Differential Mode			Show So	chematic
		Tx-04 - Common Mode F				
		Tx-05 - Impedance Balar	Ce		Selec	et All
					Select R	required
					Desele	ect All
					Tek	tronix [.]

- **6.** Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.
- 7. If you want to change the parameters, choose User Defined Mode. The message reports that the changes made to a test may no longer be compliant.

Ŵ	Configure									
	Configuration for Host : Rx-Tx SATA Gen 2									
Γ	Parameter		Value		^					
	Sampling Scope		CSA8200 (TCPIP::192.158	.96.233::INSTR)						
	Signal Source		AWG7102 (TCPIP::192.158.96.133::vxi0,2::INSTR)							
	RF Switch		MODEL SYSTEM 46 (TCF	PIP::192.158.96.183::INSTR)	=					
	BIST-L Initialization by		Auto							
	Deskew Method		Manual							
	Acquire Reference Waveform		Auto							
	Horizontal Scale (ps)		500							
	Horizontal Scale - Deskew (ps)		3000							
	Horizontal Scale - Wide Window (ps)		10000							
	Internal Clock		Auto							
I	Dealt Dealt Gas Transit Clash (450		1							
	Confi	guration for Rx-03 - I	Differential Mode Return	Loss						
Γ	Acquire Analyze Limits Comments	1								
	Acquire Type	Parameter		Value						
		Record Length	4	4000						
		Average	1	300						
	TDR Differential	Rise Time (ps)	4	40						
		Deskew Mode	(Odd						
		Horizontal Scale Acquis	ition (ps)	1000						
		9.0	20.							
ł										
0	Compliance Mode Compliance S	Settings								
(User Defined Mode Restor	•		Apply Close						

- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the host receiver tests, click **Show MOI** in the Select panel.
- 9. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**
- 10. Click Run to run the selected tests.
- **11.** The application automatically switches to the Acquire panel. The status of the waveform acquisition is displayed in this panel.

TekExpress Serial ATA (Compliance Solution (l	Intitled)*	
<u>E</u> ile ⊻iew Tools <u>H</u> elp			
Select Acquire Analyze Repo		IT: DUT001	Run Stop
	Host : Rx-Tx SATA	Gen 2	
Status	Acquisition	Test	
To Be Started	TDR Differential	Rx-03 - Differentia	I Mode Return Loss
			Less
Select Acquisition Source		atus Messages	
Use PreRecorded Waveform Files	1/21/2008 1:53 PM::Searching for para 1/21/2008 1:53 PM::Searching for para		
Acquire Step By Step	1/21/2008 1:53 PM::Searching for para	neter: Time between retries (second	», s)
Show Acquire Parameters	1/21/2008 1:53 PM::Found. Value is: 2		~
,			Tektronix

🚿 TekExpress Serial ATA Compliance Solution (Untitled)*		
<u> Eile Vi</u> ew <u>T</u> ools <u>H</u> elp		
Select Acquire Analyze Report	DUT: DUT001 Pause	Stop
Host : Rx-Tx	SATA Gen 2	
TestName	Status	
Rx-03 - Differential Mode Return Loss	Executing matlab script	
Status Messa		itatus
12/7/2007 4:23 PM::Searching for parameter: Maximum frequency (GHz). 12/7/2007 4:23 PM::Found, Value is: 5.	Auto Scr	
12/7/2007 4:23 PM::Pound: Value is: 5. 12/7/2007 4:23 PM::Executing S-Parameter command: "C:\Program Files\	TekApplications\IConnect Evaluation\Program	1
	Save Sta	itus
, <u> </u>	Tel	ctronix.

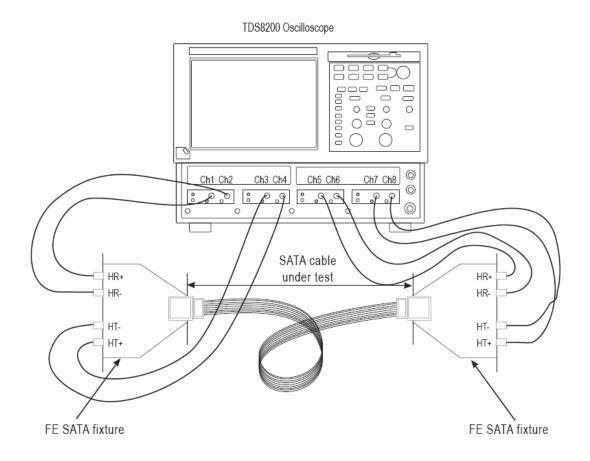
🚿 TekExpress Serial ATA Compliance Solution (Untitle	d)*		
<u>File View T</u> ools <u>H</u> elp			
	DUT: DUT001		Run Stop
Select Acquire Analyze Report			
Select Acquire Analyze Report			
н	ost : Rx-Tx SATA Gen 2		View ScoreCard
Tektronix	Tektro	nix Con	npliance A
Enabling Innovation			Tx/Rx Test
UUT ID: <u>DUT001</u> Date/Time: <u>12/7/2007 16:23</u>	Device Type Overall Execution Time		
SI. No. Test Name	Measurement details	Units	Measured Value
	Min @ Freq: 150MHz-300MHz	dB	-0.0544
	Min @ Freq: 300MHz-600MHz	dB	-0.0121
	Min @ Freq: 600MHz-1.2GHz	dB	0.0363
	Min @ Freq: 1.2GHz-2.4GHz	dB	-0.0113
1 Rx-03 - Differential Mode Return Loss	Min @ Freq: 2.4GHz-3.0GHz	dB dB	0.115
RX-03 - Dillerential Mode Return Loss	Min @ Freq: 3.0GHz-5.0GHz	μB	0.369
			~
			>
1			Tektronix [,]

You can save the report using File > Save Report As option.

SI Equipment Setup

Model Supported
Tektronix CSA/DSA/TDS 8200 with four 80E04 modules
Two Crescent Heart Software Fixture TF-SATA-FE-ZP
Four pairs of matched SMA Cables 179-4944-01 or equivalent
Two SMA barrel adapters
A SATA Cable to test

Connect the equipment as shown in the following diagram:



SI-02 - Cable Absolute Differential Impedance test on a SATA Cable

To run an SI test on a SATA Cable to conformance standards defined by SATA-IO Interoperability, follow these steps:

NOTE. This test is applicable only for SATA cables.

- 1. Select Cable as the device type.
- 2. Select SI as the Test Suite.

NOTE. There will be no test suite version for a SI test.

- **3.** Enter the DUT ID in the DUT field.
- 4. If you want to verify the test setup before running the test(s), click Show Schematic.
- 5. Select a SI-02 Cable Absolute Differential Impedance option.

1	TekEx	press	Serial	ATA Co	mpliance S	Solution (Un	titled)*			
Ei	le ⊻iev	N Too	ols <u>H</u> elp							
						DUT:	DUT001		Run	Stop
Г	Select	Acquire	Analyze	Report						
Ľ		Select	Device		Se	lect Test Suite		Ve	rsion	
	۲	Cable		-	 SI 					
	0	Delas							*	
	0	Drive								
	\bigcirc	Host								
										Less
ľ										
				Cable : S	51					
	Select	Test N							Config	ure
			fated Connec Cable Absolute	· ·						
	H		able Absolute		Inpedance				Show I	мог
			Common Mode	-						
		SI-05 - D)ifferential Rise	Time					Show Sch	iematic
		SI-06 - I	ntra-Pair Skew	1						
			nsertion Loss						Select	All
			Differential to I		osstalk				Select Re	auired
		SI-09 - I	nter Symbol In	terference						
									Deseler	et All
1									Tek	tronix [.]

6. Click **Configure** to configure the test parameters. Observe that the default settings are in Compliance mode.

7. If you want to change the parameters, choose **User Defined Mode.** The message reports that the changes made to a test may no longer be compliant.

	Value CSA8200 (TCP 3 20 Manual Auto 20 2000 3000 3000 rtf or SI-02 - Cable Absolute Differ	PP::192.158.96.159::gpib0,1::INSTR)	
lumber of retries for instrument ID errors ime between retries (seconds) teskew Method cquire Reference Waveform forizontal Scale (ps) forizontal Scale - Deskew (ps) forizontal Scale - Wide Window (ps) Configuration for	3 20 Manual Auto 20 2000 3000		
ime between retries (seconds) teskew Method Locquire Reference Waveform forizontal Scale (ps) forizontal Scale - Deskew (ps) forizontal Scale - Wide Window (ps) Configuration fo	20 Manual Auto 20 2000 3000	rential Impedance	
teskew Method .cquire Reference Waveform Iorizontal Scale (ps) Iorizontal Scale - Deskew (ps) Iorizontal Scale - Wide Window (ps) Configuration for	Manual Auto 20 2000 3000	rential Impedance	
cquire Reference Waveform Iorizontal Scale (ps) Iorizontal Scale - Deskew (ps) Iorizontal Scale - Wide Window (ps)	Auto 20 2000 3000	rential Impedance)
lorizontal Scale (ps) lorizontal Scale - Deskew (ps) lorizontal Scale - Wide Window (ps)	20 2000 3000	rential Impedance	
lorizontal Scale - Deskew (ps) lorizontal Scale - Wide Window (ps)	2000 3000	rential Impedance]
Iorizontal Scale - Wide Window (ps)	3000	rential Impedance	_)
Configuration for	L III	rential Impedance	1
Configuration fo		rential Impedance	J
Acquire Analyze Limits Comments			
	ameter	Value	
	rd Length	4000	
Avera		128	_
	ontal Scale - Acquisition (ps)	500	
	Rise Time(High) ps	70	
	Rise Time(Low) ps	55	
<			>
Compliance Mode Compliance Setting	gs		

- **8.** You can configure any test to help you analyze measurement results. To refer to the *Serial ATA Interoperability Program* MOI document for information on how to configure the cable tests, click **Show MOI** in the Select panel.
- 9. Click Apply to apply the new settings for the test selected. If you want to restore the default settings, click **Restore.** To close the dialog box, click **Close.**

10. Click Run to run the selected tests.

11. The application automatically switches to the Acquire panel. This shows the status of the waveform acquisition.

ekExpress Serial ATA Compliance So	ution (Untitled)*		
le <u>V</u> iew Tools <u>H</u> elp			
	D	UT: DUT001	Pause Stop
Select Acquire Analyze Repo	t		
	Cable : SI		
Status	Acquisition	Test	1
Acquiring reference waveforms without fi	ture. TDR Differential	SI-02 - Cable A	bsolute Differential Impedance
			Less
SelectAcquisition Source		Status Messages	
Use PreRecorded Waveform Files	12/12/2007 12:41 PM::Configure TDF	Step - Channel: 1 Polarity: 0 Unit: 0) State: 1
Acquire Step By Step	12/12/2007 12:41 PM::Set TDR prese 12/12/2007 12:41 PM::Configure TDR	Step - Channel: 2 Polarity: 1 Unit: () State: 1
Show Acquire Parameters	12/12/2007 12:41 PM::Set Channel D	isplayed - Channel: 2 State: 0	•
			Tektronix

12.On completion of the acquisition, the application switches to the Analyze panel. This panel shows the status of the analysis.

🌠 TekExpress Serial ATA Compliance Solution (Untitled)*		_ 🗆 🗡
<u>Eile Vi</u> ew Tools <u>H</u> elp		
	DUT: DUT001 Pause	Stop
Select Acquire Analyze Report		
Cable : SI		
TestName	Status	
SI-02 - Cable Absolute Differential Impedance	Z-Line analysis	
		Less
Status Me 12/12/2007 12:50 PM::Searching file with the pattern - CH1-CH2		olay Status
12/12/2007 12:50 PM Performing Z-Line operation on files X-Serial AT		o Scroll
12/12/2007 12:50 PM::Executing Z-Line Command: C:\Program Files\T	ekApplications\IConnect Evaluation\Program File	ear All
	Sav	e Status
	1	ektronix [,]

13. After the tests run successfully, a report is generated and displayed in the Report panel.

Cable : 51 Cable : 51 Control Compliance Automation Framework SI - Cable Test Report WIT ID: : [U1001 Device Type :	ct Acquire Analyze Report				DU	r: DUT00	I			Run	Stop
SI - Cable Test Report UPT 10: : [UT001 Date Time : : : : : : : : : : : : : : : : : : :	c Acquire Analyze Nepox		Cable	e : SI						(View ScoreCard
UUT 10 : <u>5U/001</u> Deter Time : <u>3462000 11:00</u> Deter Time : <u>41 Mon</u> Deter	Tektronix	Tek	tron	ix Cor				n Fram	ework		
Date Time: 3442000 11:03 Overall Analysis Time: Overall Est Result Image: Status Statu	Enabling innovation				SI-Ca	Die Test R	epon				
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Test Name Measurement Details Unit Maintum Linit Compare Linit Compare Status Compare Linit <											
Test Reme Measurement Details Unit % Minimum Limit % Limit % <th></th> <th></th> <th></th> <th>Actual</th> <th>Result</th> <th></th> <th>Test Limit</th> <th></th> <th>-</th> <th></th> <th></th>				Actual	Result		Test Limit		-		
2022 - Cable Absolute Differential Ingestance DIG - CH4 (Tx - Side A) International International Parameters Contiguration Contiguration Contigura	Test Name	Measurement Details				Limit 1	Limit 2		Test result		
Careful Desenders Arender Type Name Value Value Value Value Value	SI-02 - Cable Absolute Differential Impedance					90	110	GELE	PASS	Yes	<1 Min
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Careful Destinates Type Name Value											
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Desteven Method Acquire Reference Waveform Auto Horrcontal Scole (ps) 20	General Parameters										
Horizontal Scale (ps) 20	Parameter Type										
		Horizontal Scale (ps)	20								
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You can save the report using File > Save Report As option.

Deskewing Real Time Oscilloscopes

Related Topics

Manual Deskew Procedure for Sampling Oscilloscopes

The following procedure is used for deskewing direct input SMA channels on a real time oscilloscope.

NOTE. This deskew method is applicable for RSG-RMT and PHY-TSG-OOB test suites.

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

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

There are sometimes significant differences in the skew between two TCA-SMA adapters. If you find that a system requires a very large correction, it might be better to find a pair of TCA-SMA adapters that match each other better.

Manual Deskew Procedure for Sampling Oscilloscopes

Mixed Mode TDR Channel Alignment with Independent TDR Source

This deskew procedure uses an independent acquisition source and assumes availability of two TDR sampling modules (80E04, 80E08, or 80E10). You can also deskew with one TDR (80E04, 80E08, or 80E10), and one dual sampling module (80E03 or 80E09). It aligns both samplers and TDR steps allowing you to measure mixed mode S-parameters. The procedure starts with the alignment of the samplers and concludes with alignment of the acquisition channels.

The following equipment is required:

- One sampling oscilloscope mainframe (TDS8000, TDS/CSA/DSA8200).
- Two TDR sampling modules (80E04, 80E08, or 80E10).
- Four matched SMA cables.
- One SMA barrel (female-to-female) adaptor. Click <u>here</u> to view the picture.



Equipment required to perform mixed mode deskew procedure. The wrist strap is important for ESD protection and a calibrated torque wrench is recommended to protect the connectors and to get good repeatability.

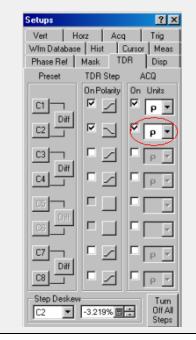
Click the links below to get details on them.

Align the acquisition channels to the ends of the cables.

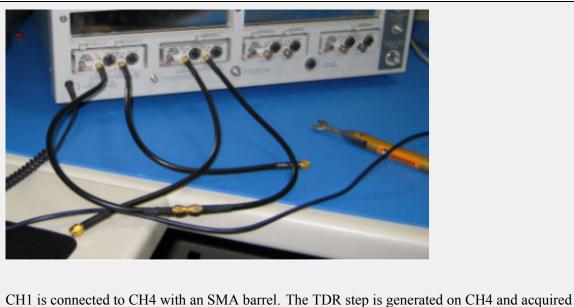
The purpose of this step is to set the samplers on each channel so that an input into the open end of each cable arrives at the sample gate at precisely the same time. This step compensates for cable and sampler differences. CH1 through CH3 are aligned using CH4 as an independent TDR source. Then, CH4 is aligned with respect to CH3 using CH1 as the independent source. The following deskew procedure is to be performed in *rho* mode.

The "rho" can be selected from the TDR menu of the Setups dialog. Follow the below steps to get to the rho mode:

- 1. Select the Setups menu from the Oscilloscope main menu.
- 2. Click the TDR tab.
- 3. Select ρ option from the drop-down list.

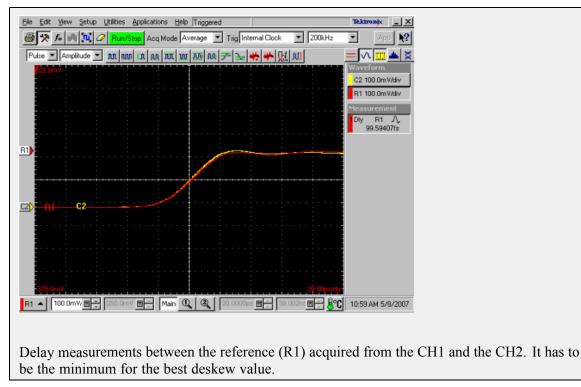


- 1. Connect SMA cables to the sampling modules of the oscilloscope. For the best results, ensure that the SMA cables used in the measurements have approximately the same quality and length (matched within 20 ps).
- 2. Connect channel 1 and channel 4 with SMA barrel, activate TDR step on channel 4 and acquire using channel. Click <u>here</u> to see the figure.



using CH1.

- **3.** Adjust the horizontal position and scale to get the rising edge on screen with good resolution (20 ps/div). Record length should have a maximum of 4000 points.
- 4. Save channel one (CH1) waveform as a reference trace. CH2 and CH3 will be aligned with respect to it.
- 5. Connect CH2 to the CH4 using SMA barrel, and display CH2 on the screen.
- 6. Turn on the delay measurement to measure the time difference between the rising edge on the reference trace and the rising edge of CH2 as shown <u>here</u>.



- 7. Adjust the channel deskew value in the Vertical menu of the Setups dialog box until a delay value within 1 ps is achieved.
- 8. Repeat step 5 through step 7 for the CH3.
- **9.** Once, the acquisition of CH1 through CH3 is aligned, use the same method to align CH4. Generate a new reference by using the step of CH1 and acquiring it on CH3. Connect CH3 to CH1 with the SMA barrel.

10. Repeat step 5 through step 7 for the CH4 using acquired reference from CH3.

Now, all four acquisition channels have been deskewed within 1 ps.

Match TDR step generators.

The purpose of this step is to adjust the TDR pulses so that they arrive at the ends of the cables at precisely the same time. The deskew has to be performed separately for odd and even TDR steps when 80E04 modules are used. This section describes only odd mode TDR step deskew. The following deskew procedure has to be performed in *rho* mode:

- **1.** Disconnect the SMA barrel and turn on TDR pulses of the appropriate polarity for each channel (CH1 and CH2). Use the differential TDR preset selection to activate odd mode.
- 2. Adjust the horizontal position and scale so that the pulses are visible on the screen as they arrive at the ends of the cables. (Use the Average mode and vectored display, and set the time scale to 20 ps/div).
- 3. Turn on the delay measurement to measure the time difference between the two pulse edges.
- **4.** Adjust the *Step Deskew* in the TDR menu to minimize the time difference between the CH1 and CH2 pulses. You might want to use the **Fine** button to reduce the increment of deskew as shown here.

Elle Edit View Setup Utilities Applications Help Triggered Tektronix
Acq Mode Average Trig Internal Clock 200kHz App
Pulse Amplitude Int and Int AR Int Int AM IN IN AM IN Vert Horz Acq Trig
2.500 W/m Database Hist Cursor Meas C1.500 DmoHily
Phase Ref Mask TDR Disp Cr Socomputer Preset TDR Step ACQ C2 500.0mp/div
On Polarity On Units Teasurement
2,500 Deskew Turn 500 Deskew 01 (2) ▼ -3.219% □ 1/36 AM 5/6/2007
C1 🔺 500.0mp/ 🕮 🕂 10.0p 🗃 🕂 Main 🔍 🌊 IC2 🔽 -3.219% 🔠 Steps 1:36 AM 5/8/2007
Differential TDD stan dashares The share of CU1 and CU2 are aligned within 200 fr
Differential TDR step deskew. The channels CH1 and CH2 are aligned within ~300 fs.

- 5. Repeat step 1 through step 4 for CH3 and CH4, and save the instrument setup.
- 6. Repeat step 1 through step 5 in even mode if desired.

The instrument should now be set up to accurately make differential or common mode TDR measurements.

Deskew parameters for RxTx

RxTx Default Deskew Parameters Settings

The default settings of deskew parameters in the **Configure** panel are found to be optimal for deskew with short length cable and test setup without RF switch. The default values are as follows:

- Horizontal Scale (ps): 50
- Horizontal Scale Deskew (ps): 1000
- Horizontal Scale wide window (ps): 3000

RxTx Deskew Parameters Settings with Long Cable and/or RF Switch

If you are using long cable and/or an using RF switch in RxTx setup, then following values are recommended. You can change these values by selecting the **Configure** panel from the RxTx suite and the parameters that are located in the upper half of the configure table.

- Horizontal Scale (ps): 500
- Horizontal Scale Deskew (ps): 3000
- Horizontal Scale wide window (ps): 10000

About Overriding Acquire Parameters

This section is applicable for the test suites that require a real time ocilloscope (for example, test suites like PHY-TSG-OOB or RSG-RMT). The TekExpress application supports various oscilloscope models for SATA compliance testing and not all the oscilloscope models can support the same acquire parameters (combination of record length, horizontal scale and resolution). For such test suites, TekExpress allows you to either "Automatically" apply correct acquire parameters settings or manually specify them. (This option is available in "Configure" panel of corresponding test suite with option name "Set oscilloscope scale, resolution and sampling rate"). When "Automatically" is selected, the application ignores the acquire parameters you specified. If you need to specify your own acquire parameters, then you must specify the name "Set oscilloscope scale, resolution and sampling rate" option to "Manually" in "Configure" panel of corresponding test suite.

Acquire parameters with "Automatically" option

This option will be applicable for the following oscilloscope models only. If any other oscilloscope model is found, the application will automatically use the parameters specified by you while executing the test sequence.

- Supported TDS models: TDS6154C, TDS6124C, and TDS6804B
- Supported DPO/DSA models: DPO/DSA70804, DPO/DSA71254, DPO/DSA71604, and DPO/DSA72004.

For supported oscilloscope models, the following acquire parameters would be applied automatically during test sequence execution depending on the type of acquisition.

	TDS6154C, TDS6124C, TDS6804B			DPO/DSA70804, DPO/DSA71254, DPO/DSA71604, DPO/DSA72004		
Acquisition Type	Scale (µs/div)	Resolution (ps/pt)	Sampling rate (Gs/s)	Scale (µs/div)	Resolution (ps/pt)	Sampling rate
BISTL validation for RSG/RMT	10	25		10	20	
BISTL validation for PHY/TSG	4	25		4	20	
Initial OOB validation	2	100	10	2	80	12.5
HFTP *	40	25		40	40	
HFTP-Gen 1	10	50		10	40	
HFTP-Gen 2	4	25		4	20	
LBP-Gen 1	10	50		10	40	
LBP-Gen 2	4	25		4	20	
LFTP-Gen 1	10	50		10	40	
LFTP-Gen 2	4	25		4	20	

	TDS6154C,	TDS6124C, TDS68	04B		DPO/DSA70804, DPO/DSA71254, DPO/DSA71604, DPO/DSA72004		
Acquisition Type	Scale (μs/div)	Resolution (ps/pt)	Sampling rate (Gs/s)	Scale (μs/div)	Resolution (ps/pt)	Sampling rate	
MFTP-Gen 1	10	50		10	40		
MFTP-Gen 2	4	25		4	20		
COMINIT and COMWAKE	10	50	20	10	40	25	
COMINIT INSPEC	200	800	1.25	200	800	1.25	
COMINIT INSPEC	200	800	1.25	200	800	1.25	
COMINIT INSPEC	200	800	1.25	200	800	1.25	
COMINIT OUTOFSPEC LL	200	800	1.25	200	800	1.25	
COMINIT OUTOFSPEC UL	200	800	1.25	200	800	1.25	
CO- MINIT/COMRE- SET/COMWAKE-No response	200	800	1.25	200	800	1.25	
CO- MINIT/COMRE- SET/COMWAKE- Response	200	800	1.25	200	800	1.25	
Comwake Inspec Ll	200	800	1.25	200	800	1.25	
COMWAKE OUTOFSPEC LL	200	800	1.25	200	800	1.25	
COMWAKE OUTOFSPEC UL	200	800	1.25	200	800	1.25	
COMRESET	4	50	20	4	40	25	
COMWAKE	10	50	20	10	40	25	

* Long record length for Gen1 SSC and Gen2 SSC

Acquire Parameters with "Manually" Option

It is important that you carefully specify the correct combination of horizontal scale and resolution depending on the oscilloscope model. If an incorrect combination of horizontal scale and resolution is specified then the test execution sequence is terminated, displaying incorrect parameter set status message.

An example of status message is as shown:

10/3/2007 10:29 AM::Writing command-HORIZONTAL:RECO 2500000

10/3/2007 10:29 AM::Set record length to-2000000

The following procedure describes how to manually identify a working combination of horizontal scale, resolution and record length for a given oscilloscope:

- 1. Open the Talker Listener utility of the TekVISA on the oscilloscope.
- 2. Apply default settings on the oscilloscope by clicking **Default setup** on the oscilloscope panel front panel.
- 3. Use the oscilloscope front panel to disable CH1 and enable CH2 and CH4.
- 4. In the Talker Listener utility, enter HORI:RECO <record length> (for example, HORI:RECO 200000) and click Write.
- 5. Verify that the oscilloscope has applied the record length that you specified in step 4. If yes, continue with step 6 else repeat steps 2 through 4 with another record length.
- 6. In the Talker Listener utility, enter HORI:SCALE <horizontal scale> (for example, HORI:SCALE 10E-06) and click Write.
- 7. Verify that the oscilloscope has applied the horizontal scale that you specified in step 6 and also verify that the record length set in step 4 is not changed. If this condition is met, then you have identified a working combination of Acquire parameters. If this condition is not met, then repeat steps 2 through 6 with another combination of Acquire parameters.

The above step will help identify the correct combination of horizontal scale and record length. If you wish to find combination of horizontal scale and resolution follow the same procedure as above and find the resolution using the following mathematical expression.

```
Resolution = Record Length / (10 * horizontal scale)
```

Using the Pattern Generation Utility to Test Receivers

Related Topics
<u>Calibration Procedure</u>

The Pattern Generation is a utility that generates a controlled jittered waveform for performing the RSG (Receiver Signal Gain) and RMT (Receiver Margin Testing) testing for the DUT receiver. This utility uses a direct synthesis approach where required amounts of jitter components are added to the frame composite. These patterns are injected to DUT using the Arbitrary Waveform Generator 7000 series with option 6, Test fixture and matched pair cables.

Use the Calibration process (as outlined in the MOI) to set the calibrated amplitude level, Random Jitter, Periodic Jitter (Optimal amplitude value of) jittered frequency (which is tuned to meet the nominal Total Jitter specified) are the inputs for the pattern generation utility.

It's recommended to do the calibration process for each pattern generation of interest.

For the RMT tests, there is a need to test the DUT over a range of frequencies. The calibration has to be carried out at these frequencies for exact results.

Inputs to the Pattern Generation Utility

The Pattern Generation Utility is an Executable and requires you to input the following parameters (in this order). You need to provide below inputs and there are not default values.

- 1. The path of the Frame composite pattern IW4Gen1R10FCP2AnewLBP.txt for Gen1 and IW4Gen2R8FCP2AnewLBP for Gen2. This pattern is very specific for the utility and has known characteristics such as 10 characters per line.
- 2. The speed of the DUT such as usage model Gen1/Gen2.
- **3.** Calibrated voltage swing for the utility. This is usually calculated using the 6 db attenuators at the end of the match cables. You can refer the amplitude calibration process to measure calibrated amplitude level.
- **4.** The calibrated Random Jitter (Rj). You can refer to the calibration procedure for more details on how to calculate the Rj value for this setup. Rj has to specified in ps RMS.
- **5.** Periodic Jitter (Pj) component as frequency in Hz. You can specify the frequency value between 0 to 300 MHz as 'Start'e6 and 'Stop'e6. The start should be less than the stop otherwise the utility shows an error.
- 6. The Pj increment is in steps of 1 MHz (step given as "xxe6") and the higher range is 300 MHz.
- 7. The Total jitter (Tj specified in Unit Interval (UI)) range is 0 to 1.2 UI. You have to specify the start and stop separately as 'Start' and 'Stop' without the 'UI' unit. The start should be less than the stop otherwise the utility will show an error.
- **8.** The Tj values. These values increase in the following steps as per the Serial ATA standard. The predefined steps are 0.01, 0.02, 0.03, 0.05 and 0.1.
- **9.** The Amplitude Periodic jitter. You have to make sure that the amplitude periodic jitter used in the utility to generate pattern of interest (for example 10 MHz 0.45 UI) has to result in nominal Tj value

0.45 UI. This is done by means of trial and error by recording the Tj at the output of the JIT3 Analysis – Advanced software. Please refer to the MOI calibration procedure for more details.

Output from the Pattern Generation Utility

The generated jittered waveform is available in the Frame composite pattern file path with file name as <Jitter Frequency>-MHz-<TJ>UI.wfm. <Example Pj from 100 MHz to 105 MHz and Tj= 0.45 UI: The sample file name output format is 100-MHz-0.45UI.wfm. The five AWG patterns are generated from 100 MHz to 105 MHz.

Batch file usage

To get familiar with the usage of Serial ATA Pattern Generation Utility, an example_01.bat file is provided in the location C:\SataPatternGenerationUtility after the installation.

The following are the steps to use the batch file example:

- 1. Double-click the Example_01.bat file.
- **2.** The batch file gets launched and you can observe the input parameters on DOS command prompt that is taken by the utility.
- 3. The jittered waveforms are generated and saved at location C:\SataPatternGenerationUtility.

Calibration Procedure

Related Topics
<u>Using Pattern Generation Utility to Test Receivers</u>

To generate jittered waveforms for RSG test, the complete calibration procedure has to be followed. Whereas, in case of generating jittered patterns for RMT test, only Random jitter calibration is required. Calibration can be carried out using the JIT3 Analysis - Advanced software.

Click any of the following jitter-related measurements to see its definition:

Random Jitter Calibration

A reference Gen1 and Gen2 MFTP waveform with zero jitter (MFTP-Rj-Cal.wfm) is provided at c:\SataPatternGenerationUtility\Gen1MFTP folder to verify the calibration of Random jitter (Rj). Before verifying the Rj calibration, perform an SPC calibration on the Tektronix oscilloscope hosting the Advanced JIT3 Analysis software and perform a D/A channel calibration on the Arbitrary Waveform Generator (AWG) to compensate for the instrument's environmental conditions.

Rj is specified to be 0.18 UI PtP @ 7 Sigma or 4.285 ps RMS for Gen2 signaling rates and correspondingly 8.57 ps for Gen1 signaling rates.

NOTE. The Rj found in the Tektronix AWG MFTP pattern has been digitally synthesized and is a truncated Gaussian distribution with the 4.7 Sigma crest factor.



As illustrated in the red circled area of the preceding figure, ensure that the averaged RJ is nominally reading 4.285 ps RMS \pm 4% allowable variation 4.11 ps < Nominal Value < 4.45 ps. Analyze 16E6 contiguous points per measurement, and 3 runs will typically converge on an averaged RJ close to 4.285 ps. For Gen1 rates the nominal variation of Rj would be within 8.22 < Nominal Tj Value < 8.9. Jitter magnitudes in excess of these values should result in recalibration of the AWG.

If the measured value in JIT3 results does not match with nominal Rj value 4.285 ps $\pm 4\%$ then random jitter component has to be varied as the input to the utility.

Perform this iteration until Rj value is close enough to nominal value specified.

Tj Calibration

Run the Pattern Generation utility using the IW4Gen1R10FCP2AnewLBP.txt for Gen1 and IW4Gen2R8FCP2AnewLBP.txt for Gen2 text patterns available at c:\SataPatternGenerationUtility\. With calibrated random jitter value and optimal value of the Amplitude of jittered frequency, generate a XX-MHz -0.45UI.wfm waveform. Analyze this waveform using JIT3 Advanced software.

J3 EI	e <u>M</u> easurements	<u>R</u> esults <u>P</u>	lot <u>L</u> og <u>U</u> tility	/ <u>H</u> elp	TD	SJIT3 Jitter Ar	nalysis 📃 🗙
	stics Min/Max Mear	vStdDev TIE					Plots
	Measurement	Sources		Jitter Components	Current Acq	Averaged	Select View
1 >	Data TIE1	M1	_	Random (RMS)	4.5110ps	4.5110ps	
2 >	Data PLL TIE1	M1	-	Deterministic (Pk-Pk)	98.562ps	98.562ps	Measure
3 >	Rise Time1	M1		Periodic	86.266ps	86.266ps	Run/Stop Single
02				Duty Cycle	3.8009ps	3.8009ps	
4 >	Fall Time1	M1	_	Data Dependent (ISI)	8.4945ps	8.4945ps	Ar Catri
6 >			— I	Total @ BER (Pk-Pk)	150.17ps	150.17ps	Clear New Acq
6 >			-	Eye Opening @ BER	0.5495UI	0.5495UI	123 Yes
02	L			L.			12.30 105
vienu: R	esults->TIE:RiDi-BE	2					Status : Ready

Observe the averaged Total @ BER (Pk-Pk) Jitter value after three acquisitions. Adjust the amplitude of jittered frequency value input so as to get the nominal value of Tj. The nominal accuracy of a calibrated system will provide 0.45 UI Tj conformance within 4% of nominal error. The observed jitter for Gen2 signaling Tj should nominally be 149.9 ps of Tj \pm 4% allowable variation. 144 ps < Nominal Tj Value < 155.8 ps. Jitter magnitudes in excess of these values should result in recalibration of the AWG.

For Gen1 rates, the nominal variation of a nominal value of Tj would be within 288 < Nominal Tj Value < 312 ps.

If the measured value in the JIT3 results does not match with nominal Tj value 144 ps < Nominal Tj Value < 155.8 ps then vary the amplitude of the periodic jitter component as the input to the utility.

Perform this iteration till Tj value is close enough to the nominal specified.

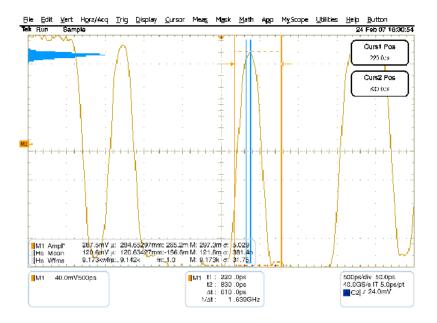
Amplitude Calibration

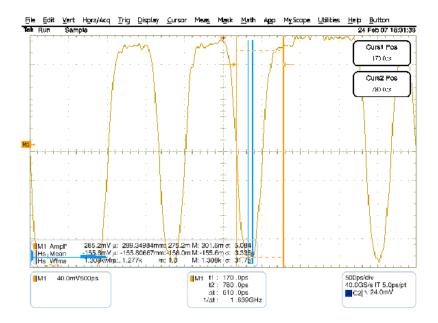
Signal amplitude conformance requires that Gen1 and Gen2 signaling not exceed 600 mV or 750 mV ptp and be within 5% of a target minimum amplitude of 325 mV and 275 mV respectively. Fine adjustment may be performed by adjusting the Vertical amplitude setting on the AWG's CH1 output. The minimum amplitude measurements are performed on both 212141 (negative pulse) and 413 (positive pulse) RL patterns.

Refer to the SATA specifications (Serial ATA Revision 2.5 27-October-2005) on LBP based amplitude measurements.

The minimum amplitude over a 1 UI epoch is the two consecutive bits at the string of a four or more consecutive bits, which is not a representative LBP pattern but is the minimum value in Framed Composite (Pre-ECN18) pattern.

A 0.45 UI to 0.55 UI Histogram is setup on the two lone bits of interest from which the difference of the mean values is computed to obtain the lone pulse amplitudes.





Transition Time Validation

Make sure the Rise and Fall time is in the nominal range of < 100 ps. This can be verified using the JIT3 application with same setup files used for Jitter calibration/validation. Rise and Fall time measurements allow you to validate that the transition rate does not exceed 100 ps 20/80.

001						TDSJIT3 Jitter Ar	nalysis 🔔 🗙
All Statistics	Min/Max Mean/StdDev T	E:RJDJ - BER					Plats
	Measurement	Sources	Population	Mean	StdDev		Select View
	Data TIE1	M1	1012474	-127.88fs	29.984ps		
All	Data PLL TIE1	M1	1012474	-129.51fs	30.393ps		Measure
Acqs	Rise Time1	M1	507839	108.31ps	5.8361ps		Run/Stop Single
Current Acq	Fall Time1	M1	507838	106.33ps	5.5801ps		A K
Acq							Clear New Acq
		ļ.					123 Yes
Menu: Results	->Mean/Std Dev						Status : Ready

After the completion of calibration process, Calibrated Voltage swing required in the jittered waveform, Calibrated Random Jitter, Optimal value for Amplitude of jittered frequency are available and can be used for generating waveforms for RSG and RMT tests.

Setting User Option for SATA DUT Power Cycle Method

TekExpress SATA offers three methods that you can choose from for power cycle operation of SATA DUTs during the test sequence. You also have an option to fully customize the DUT power cycle operation automation sequence. Following are the options for defining the SATA DUT power cycle method:

- Manual Power Cycle
- Power Cycle using AWG DC output to control AT/ATX power supply (default setting)
- User specified TestStand sequence

For more details on how to use and configure these options, refer to the <u>DUT-PowerCycle.txt</u> file located under ICP folder of TekExpress installed folder location.

Note: Read and use this file very carefully.

Lines with # prefix are considered comments.

This file defines the way SATA DUT Power Cycle operation is performed during test automation.

The first line in this TXT file that does not have # charater defines the SATA DUT Power Cycle operation.

This line should contain one of following keywords (without quotes).

"Manual", "AWG", "User Defined GPIB", "User Defined TestStand Steps".

If anything other than above valid keyword is found then Manual method overrides.

"Manual" : This assumes manual operation of power cycle.

"AWG" : This assumes AT/ATX power supply is controlled through DC output of AWG.

Connect Channel-1 of DC output to pin #14 (and pin #15 to GND) in case of 20 pin Molex connector of AT/ATX power supply.

Connect Channel-1 of DC output to pin #16 (and pin #17 to GND) in case of 24 pin Molex connector of AT/ATX power supply.

"User Defined GPIB" : This assumes a user defined sets of GPIB commands are defined.

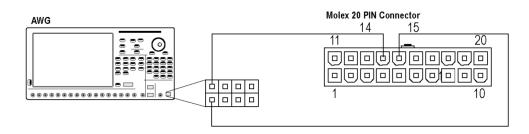
in lines following the valid keyword "User Defined GPIB". (This feature is not active).

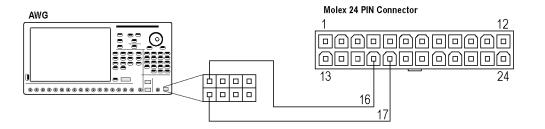
"User Defined TestStand Steps" : This assumes the power cycle steps are defined in "UserDefinedTurnOFF" & "UserDefinedTurnON" sequence of "ICP_DUT-PowerSupply.seq" file.

AWG

=

Delete this line and start GPIB commands from here onwards, each line assumed to be one command, you need to take care of complete sequencing from VI_open till VI_close.





About Programmatic Interface

Related Topics Server and Client Proxy Objects

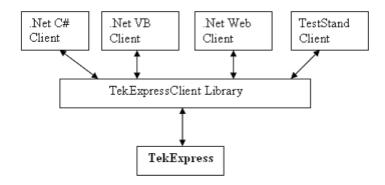
The Programmatic interface allows you to seamlessly integrate the TekExpress test automation application with the high-level automation layer. This also allows you to control the state of TekExpress application running on a local or a remote PC. Following operations can be performed using the programmatic interface exposed by TekExpress:

- Query DUT ID
- Set DUT ID
- SaveSession
- RecallSession
- Run the TekExpress execution
- Stop the TekExpress execution
- Query execution status
- Transfer result files

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 on 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:

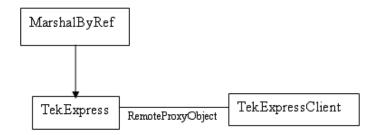
A client UI has to be developed to access the interfaces exposed through the server. This client needs to load TekExpressClient.dll to access the interfaces. Once the TekExpressClient.dll is loaded, the client UI can call the specific functions to run the operations requested by the client. Once the client is up and running, it has to 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 (TekExpressRemoteInterface), "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.

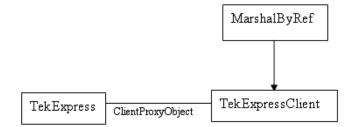
For example,

//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.

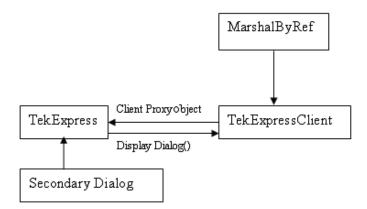
Click here to see examples.

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

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

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

Connect()

Connect(string ipAddress, out string clientID)

This method connects the client to the server. The client provides the ip address of the server to connect to the server. The server provides a unique clientId when the client is connected to it.

Parameters

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.
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

Return Value

Value that suggests the status if the connection was established or an error occured. The return value is an object that can be a boolean value, returning true or a string, returning the error message.

Example

try {

```
IPAddress[] hostIPAddr = Dns.GetHostAddresses(Dns.GetHostName());
```

```
// Connect to the remoter Server
```

```
remoteObject.Connect(hostIPAddress, clientInterface, out clientID);
```

```
return true;
```

```
}
catch (Exception error)
{
   return error;
```

}

Comments

The server has to 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. Each client will get a unique id.

Disconnect()

Disconnect(string id)

This method disconnects the client from the server it is connected to.

Parameters

Name	Туре	Direction	Description
id	String	IN	Identifier of the client that is performing the remote function.

Return Value

Integer value that suggests the status of the operation after it has been performed.

1 - Success

-1 - Failure

Example

try { string returnVal = UnlockServer (clientId); remoteObject.Disconnect (clientId); return 1; }

Comments

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

LockSession()

LockSession(string id)

This method locks the server. The client has to call this method before running any of the remote automations. The server can be locked by only one client.

Parameters

Name	Туре	Direction	Description
id	String	IN	Identifier of the client that is performing the remote function.

Return Value

String value that suggests the status of the operation after it has been performed.

Example

```
if (locked)
```

return "Session has already been locked!";

```
returnVal = remoteObject.LockSession(clientId);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
{
```

```
locked = true;
```

```
return "Session Locked...";
```

}

Comments

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 has to 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.

UnlockSession()

UnlockSession(string id)

This method unlocks the server from the client. The client id of the client to be unlocked has to be provided.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.UnlockSession(clientId);
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
{
    locked = false;
    return "Session Un-Locked...";
}
```

Comments

When the client is disconnected, it is automatically unlocked.

SetTimeOut()

SetTimeOut (string id, string time)

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote function.
time	string	IN	The time in seconds which refers to the timeout period.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
if (ClientId == ClientID)
{
    if (locked == true)
    {
        tempTime = Int32.Parse(time);
    }
    if (tempTime < 0)
        return "Enter a valid Timeout Period";
    else
    {
        timeout = tempTime;
        return "Timeout Period Changed";
    }
}</pre>
```

Comments

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.

GetTimeOut()

GetTimeOut (string id)

Parameters

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

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
if (ClientId == ClientID)
{
    ResetTimer();
    return timeOut.ToString();
}
```

Comments

The timeout period is a positive integer.

GetDutId()

GetDutId(string id, string dutId)

This method gives the DUT id of the current set-up.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
dutld	string	OUT	The DUT id of the set-up.

Return Value

String that gives the timeout period (in seconds) of the client.

Example

```
returnVal = remoteObject.GetDutId(clientId, out id);
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
{
    return id;
}
```

else

return CommandFailed(returnVal);

Comments

The dutId is an OUT parameter whose value is set after the server processes the request.

ChangeDutId()

ChangeDutId(string id, string dutName)

This method changes the DUT id of the set-up. The client has to provide a valid DUT id.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
dutName	string	IN	The new DUT id of the set-up.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
If (dut Id.Length <=0 && locked == true)</pre>
```

return "Enter a valid DUT-ID";

```
returnVal = remoteObject.ChangeDutId(clientId, dutId);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

return "DUT Id Changed...";

else

return CommandFailed(returnVal);

Comments

If the dutName parameter is null, the client is prompted to provide a valid DUT id.

SaveSession()

SaveSession(string id, string name)

Saves the current session. The name of the session is provided by the client.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
name	string	IN	The name of the session being saved.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.SaveSession(clientId,sessionName);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Session Saved...";
```

else

```
return CommandFailed(returnVal);
```

Comments

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. Instead SaveSessionAs can be used.

SaveSessionAs()

SaveSessionAs(string id, 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.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
name	string	IN	The name of the session being saved.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.SaveSessionAs(clientId,sessionName);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Session Saved...";
```

else

```
return CommandFailed(returnVal);
```

Comments

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.

RecallSession()

RecallSession(string id, string name)

Recalls a saved session. The name of the session is provided by the client.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
name	string	IN	The name of the session being recalled.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.RecallSession(clientId,sessionName);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Session Recalled...";
```

else

```
return CommandFailed(returnVal);
```

Comments

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

Run()

Run(string id)

Runs the setup. Once the server is set up and is configured, it can be run remotely using this function.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.Run(clientId);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

return "Run started...";

else

```
return CommandFailed(returnVal);
```

Comments

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

Stop()

Stop(string id)

Stops the run operation.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing
			the remote funtion.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.Stop(clientId);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Stopped...";
```

else

```
return CommandFailed(returnVal);
```

Comments

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

QueryStatus()

QueryStatus(*string* id, *out string[*] status)

This method gives the status of the run as messages. The status messages are generated once the run is started.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
status	string array	OUT	The list of status messages generated during run.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.QueryStatus(clientId, out statusMessages);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Status updated...";
```

else

return CommandFailed(returnVal);

Comments

The status messages are updated periodically after the run begins. The status is an out parameter which is set when the server processes the request.

TransferReport()

TransferReport(string id, string filePath)

This method transfers the report generated after the run. The report contains the summary of the run. The client has to provide the location where the report is to be saved at the client-end.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
filePath	string	IN	The location where the report has to be saved in the client.

Return Value

String that suggests the status of the operation after it has been performed.

Example

```
returnVal = remoteObject.TransferReport(clientId);
```

```
if ((OP_STATUS)returnVal == OP_STATUS.SUCCESS)
```

```
return "Transferred...";
```

else

return CommandFailed(returnVal);

Comments

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

CheckSessionSaved()

CheckSessionSaved(string id, out bool saved)

This function is called when a check is to be made to know if the current session is saved.

Parameters

Name	Туре	Direction	Description
id	string	IN	Identifier of the client that is performing the remote funtion.
saved	bool	OUT	Boolean which represents if the current session is saved.

Return Value

Void

Example

```
if (clientId == ClientID)
{
    returnVal = remoteObject.IsSessionSaved(id,out saved);
}
```

Comments

The saved parameter gives the boolean value suggesting if the current session is saved or not. This is used as a check in SaveSession() and SaveSessionAs() Functions.

ErrorCodes

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

The values of OP_STATUS are as follows:

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

Example

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

TestStand - Sequence Editor [Edit] - [C:\VExamplesU E File Edit View Execute Debug Configure Source Control		pressClientTS.seq	[Read Only]]		- = ×
L 🖻 🖬 X 🛍 📾 💡 🕒 Ə Ə Ə (P) 🍱 "O 👔		A 🕄			
Main Setup Cleanup Parameters Locals	View: 📘 MainS	equence			✓ 4 × 4 ×
Step	Description	Flow Properties	Requirements	Comment	
IXI Cal Executable	\\TekExpress SATA.exe				
🏂 Waiting for application to launch					
🔀 Wait	TimeInterval(15)			Wait for the TekEx	
🕮 Is app launched successfully	"TekExpress"	Post Action			
Vi Connect	Action, Create TekExpressClient.Client; Call Te			Connect to the ser	
🏂 Lock the sever so that other client object will have read only					
July Locking the server	"Locking server"				
10 LockServer	Action, Call TekExpressClient.Client.LockServer			Lock Server to bloc	
🚊 Demonstrating - Time Out feature of the client					
Cet TimePeriod	Action, Get TekExpressClient.Client.TimeOut			Gets the Time Out	
뾘 Show default time out	"Default timeout"				
Now setting user specified timeout	"Setting user specified timeout"				
👽 Set TimePeriod	Action, Call TekExpressClient.Client.SetTimeOut			Sets the Time-out	
📓 Wait	TimeInterval(Parameters.TimeOut + 2)			Wait for the time p	
IN Notice the change in UI after lock timesout	"Timeout"				
🖆 Time Period Elapsed - Server unlocked. Lock server to execut					
🏂 Need to lock the server again since it timed out					
10 LockServer	Action, Call Tel/ExpressClient.Client.LockServer			Lock Server to bloc	
👽 Set TimePeriod	Action, Call TekExpressClient.Client.SetTimeOut			Sets the Time-out	
🛃 Demonstrating Save/Recall Session					
10 GetDUTID	Action, Call TekExpressClient.Client.GetDutId			Checking if DUT-id	
Show default DUT ID	"DUT ID"				
10 SetDUTID	Action, Call TekExpressClient.Client.SetDutId			Change the DUT id	
10 SaveSession	Action, Call TekExpressClient.Client.SaveSession			Saves the current	
卿 Notice the saved session	"Session save"				
1 SaveSessionAs	Action, Call TekExpressClient.Client.SaveSessio			Saves the current	
卿 Notice the saved As	"Session save"				
RecalSession	Action, Call TekExpressClient.Client.RecallSession			Recall the saved s	
A Notice the recalled session	"Session save"				
http://www.commonstrating.com/					
🕮 Run stop demo	"Run/Stop"				
10 Run	Action, Call TekExpressClient.Client.Run			Run TekExpress re	
📓 Wait	TimeInterval(30)			Wait for the run to	
10 Stop	Action, Call TekExpressClient.Client.Stop			Transfer the repor	
의 Demo ends	"Demo ends"				
10 Disconnect	Action, Call TekExpressClient.Client.Disconnect			Disconnect the Ser	
<end group=""></end>					
					No Steps Selected Number of Steps: 3
lt i				User: administrator	Model: none

Instrument Connectivity

Related Topics
User Interface
TestStand Runtime Engine Installation

If the instrument(s) are displayed in TekVISA Instrument Manager but not in the TekExpress Instrument Bench, check the following:

- Only those instruments that respond to *idn? and *opt? queries successfully, are displayed in Instrument Bench.
- Ensure that VXI-11 Server is running on the instruments.

If Instrument initialization fails during test sequence execution, do the following:

It is observed that GPIB communication with instrument over Tek-VISA layer is not initialized if in TekVISA Instrument manager the search criteria is turned-off even if valid instrument is connected in the network. It is necessary to turn ON the respective search criteria by opening the TekVISA Instrument manager.

User Interface

Related Topics

Instrument Connectivity TestStand Runtime Engine Installation

The Acquire tab is disabled.

For a selected test suite, the test is performed on a live acquisition. If test(s) such as PHY-TSG-OOB can be performed on pre-acquired waveforms, this tab is active.

TestStand Run time Engine Installation

Related Topics
Instrument Connectivity
User Interface

Managing multiple versions of TestStand installed on the system.

TekExpress installs TestStand version 3.5 runtime engine. If you have versions other than 3.5, while working with TekExpress, ensure that the version shipped with TekExpress is active. You can do so by clicking Start > Programs > National Instruments > TestStand 3.5 > TestStand Version Selector.

* TestStand Version Selector		
Current Active Version: 3.5 ⊢ Select Version		
Installed TestStand versions: 3.5 3.0 3.5 U:\Program Files\National Instruments\TestSt	Make Active	
	<u>E</u> xit	

Test Limit is Single Sided

Related Topics
Instrument Connectivity
TestStand Runtime Engine Installation
User Interface

The test limit is single sided but report shows second value and value is shown as 0.

If the test limits are single sided for limits such as GT(>) Greater than, LT(<) Less than; then the second value is by default 0 and is ignored by test automation script. In such cases, while analyzing the report the second value should be ignored.

Report shows as NAN

Related Topics

Instrument Connectivity TestStand Runtime Engine Installation User Interface Test Limit is Single Sided

Some of the result values in the report are shown as NAN.

NAN is IEEE definition for "Not a Number". The possible causes are as follows:

- The captured pattern (HFTP, MFTP, LFTP, LBP waveform files) for the analysis does not contain a valid pattern.
- The NAN value is commonly seen in TSG measurements when LFTP pattern is required for analysis but the captured pattern is not true LFTP.
- The NAN value can be seen in the final reports if a test algorithm does not successfully evaluate a result due to one or more reasons listed above.

For trouble shooting, you can analyze the captured waveform using pattern analyzer utility which is available in TekExpress\ACP folder. The patternAnalyzer.exe need to be run from MS DOS prompt and takes the following command line argument:

patternAnalyzer.exe <InterfaceSpeed> <WaveformFile> <OutputTXTfile> where,

InterfaceSpeed should be specified as either Gen1 or Gen2.

waveform file is complete waveform file path.

OutputTXTfile is output text file path.

For example, patternAnalyzer.exe "Gen2" "X:\Serial ATA\SavedSession\DUT001\20080206_185914\BISTL_HFTP_G2_Drive_DW2_Diff.wfm" "X:\results.txt". Open the contents of X:\results.txt to see the results.

Shortcut Keys

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

Table 10: Keyboard shortcut keys

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

Error Codes for TekExpress

The following table lists the error codes for the application. Most of the errors require that you restart the system.

Table 11: Error codes and Description

Error Code	Description	
<10000	TestStand generated error.	
10001 - 11000 – Data Manager related errors		
10001	Insufficient Data. The Record could not be inserted. The following fields are empty or have insufficient data.	
10002	Could not retrieve the record. The specified index is not valid.	
11001 - 14000 – ICP related errors		
11001	Operation mode is not set as specified.	
11002	SetUp file Error: Specified SetUp file is not set.	
11003	Operation state is not set as specified.	
11004	Specified waveform is not loaded into channel memory.	
11005	Specified channel is not enabled.	
11006	Interleave State could not be set to off.	
12001	Operation State is not set to required value.	
12002	Display state is not set to required value.	
12003	Horizontal Scale is not set to required value.	
12004	Vertical scale is not set to required value.	
12005	Vertical Position is not set to required value.	
12006	Deskew is not set to specified value.	
12007	Out of Range Error-RunTime Error Message.	
14001 - 18000 – SCP related errors		
14001	Timeout Error: Application could not be activated.	
14002	JIT3 Application is already running.	
14003	Cannot activate JIT3 application. Someother application is running on Scope.	
14004	Error recalling the specified setup.	
14005	Error setting the specified Sequencer State.	
14006	Error in closing the Application.	
14007	Error loading the default setup.	

Index

Α

About menu, 24 About TekExpress, 15 Acquire parameters, 33 Automatically option, 109 Manually option, 110 supported oscilloscopes, 109 Acquire Parameters, 29 Acquire source options, 33 Activating License, 10 Amplitude Calibration, 117 Analyze Parameters, 29 Application Summary, 15 Applying RF switch state, 23 Attenuation values, 23

В

Batch file, 114 Batch file usage, 114 Before clicking Run, 12

С

Calibration Procedure, 115 Calibration process, 113 Client, 125 Compliance mode, 28 Configure button, 26 Controlling the Server, 126

D

Data Storage, 40 Debug deskew utility, 22 Default Directory Usage, 8 Deskew, 22 Real Time Oscilloscopes, 102 Sampling Oscilloscopes, 103 Deskew parameters for RxTx, 108 Deskew values, 23 Directory Structure, 8

TekExpress[™] Serial ATA Automated Compliance Solutions

dongle, 16 DUT power cycle operation, 121

Ε

Equipment Setup Cable SI, 96 Drive PHY-TSG-OOB, 59 Drive RSG-RMT, 42 Drive RxTx, 82 Host RSG-RMT, 50 Host RxTx, 91 SI, 96 Error Codes, 154 Exiting the Application, 17

F

Features, 5 File Name Extensions, 9

G

General parameters, 28 Generating jittered waveforms, 115 Global Controls, 18

Inputs to Pattern Generation Utility, 113 Instrument Bench, 21 Instrument Bench menu, 31 Instrument discovery, 31 Instrument initialization, 149 Interface, 125 Interface commands ChangeDutId, 137 Connect, 130 Disconnect, 131 GetDutId, 136 GetTimeOut, 135 LockSession, 132 RecallSession, 140 Run, 141 SaveSession, 138 SaveSessionAs, 139 SetTimeOut, 134 Status, 143 Stop, 142 TransferReport, 144 UnlockSession, 133 Interface error codes, 146

J

Jitter related measurements, 115

Κ

Key Features, 15

L

Log File, 20

Μ

Manual Power Cycle, 121 Mapping My TekExpress folder, 12 Match samplers, 104 Match TDR pulses, 106 Menus File, 19 Help, 24 Tools, 21 View, 20 My TekExpress, 40 My TekExpress folder, 12

Ν

Naming convention SI test suite waveforms, 35 Naming Convention RXTX test suite waveforms, 34 NAN, 152 Non VISA resources, 22

0

Output from Pattern Generation Utility, 114 Overriding Acquire parameters, 109 Overview, 15

Ρ

Parameters to configure, 28 Pattern Generation Utility, 113 Power Cycle using AWG DC output, 121 Prerecorded waveform files, 33 Programmatic Interface, 125 Progress of Analysis, 37 Proxy Object Client, 127 Remote, 127

R

Random Jitter Calibration, 116 Reactiving License, 10 Reading Attenuation values, 23 Reading Deskew values, 23 Recent Sessions, 19 Record Length, 111 Reference waveforms, 34 Related Documentation, 2

Report NAN, 152 Report panel overview, 39 Resizing the Application, 17 Restoring Deskew values, 23 Retrieved Instruments, 22 RF switch state, 23 RMT test on drive, 47 RMT test on host, 56 RSG test on SATA drive, 44 RSG02 test on host, 52 Run Run button, 18 Run button, 18

S

Safety Summary, v SATA devices, 25 Save Report, 19 Session, 19 Select panel, 25 Selecting acquisition source, 33 Selecting Connected Instruments, 32 Server, 125 Session folder, 40 Setting User Configuration, 121 Shortcut Keys, 153 Show Acquire Parameters, 34 Show MOI button, 26 Show Schematic button, 26 Signal Path Compensation (SPC), 102 Single Sided, 151 SMA Barrel Adapters, 103 Software version, 24 Starting the Application, 16 System Requirements, 7

Т

TDR pulses, 106 Technical Support, 3 TekVISA Instrument Manager, 31 Test Fixture, 6 Test Limit Single Sided, 151 Test Limits, 30 Test Parameters, 29 Test Related Files, 40 Test Suite, 26 Test suite waveforms. 34 Test(s) Configure, 28 Report, 39 Select, 25 TestStand Client example, 147 TestStand sequence, 121 Tj Calibration, 117 Transition Time Validation, 119 TroubleShooting Instrument Connectivity, 149 TestStand Run-time Engine Installation, 150 User Interface, 149

U

Untitled Sesssion, 12 USB dongle, 16 Use of prerecorded waveform for analysis, 33 User defined mode, 28

V

View Scorecard, 39 Viewing Connected Instruments, 31