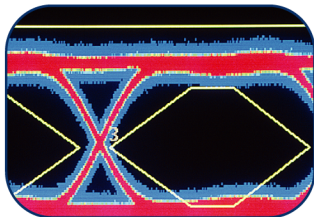


**TekExpress™ Serial ATA
Automated Compliance Solutions
Quick Start User Manual**




071-2298-01

Tektronix

**TekExpress™ Serial ATA
Automated Compliance Solutions
Quick Start User Manual**

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Contacting Tektronix

Tektronix, Inc.
14200 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

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

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

Warranty 2

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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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.

Preface

TekExpress is the Tektronix' Compliance Test Automation Framework, developed to support current and future test automation needs of customers. Developed using National Instruments' TestStand, TekExpress leverages on the capabilities of Microsoft .NET framework. It uses a highly modular architecture that enables deploying automated test solutions for various serial standards in a relatively short time. This release of TekExpress provides compliance test automation solutions for the Serial ATA Gen 1 and Gen 2 standard.

Options that are available with TekExpress Serial ATA are:

- PHY-TSG-OOB Test Suite
- RSG-RMT Test Suite
- Rx-Tx Test Suite
- TekExpress SATA Bundle for Host and Drive Test Suite
- SI Cable Tests for TekExpress SATA

Key Features

The application 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.
- All 150+ measurements, (UTD 1.2 conformant) SATA II Gen1/Gen2 MOIs.
- Single and 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 TestStand™
- Seamlessly integrate with high-level TestStand Automation Layer.

Documentation

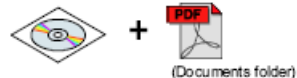
This manual describes the basic installation and operation of the TekExpress application. For more detailed information, see the online help and installation manuals. The following information is available for this product:

TekExpress Serial ATA Online Help, English 076-0096-xx



Start > Programs > Tektronix > TekExpress > TekExpress SATA > Help

TekExpress Serial ATA User Manual, English (PDF) 077-0044-xx



TekExpress Serial ATA Quick Start User Manual, English (PDF) 071-2298-xx



C:\Program Files > Tektronix > TekExpress > Documents

TekExpress Serial ATA Installation Manual, English (PDF) 071-2268-xx



Install the Application

The TekExpress application must be installed on a computer or on a Tektronix oscilloscope.

Before Installation


- Refer to the *TekExpress Serial ATA Automated Compliance Solutions Installation Manual* to find out about the prerequisites.
- Read the `Readme.txt` file on the product software DVD.

Installation

1. Close all applications.
2. Insert the product software DVD into the DVD-ROM drive of the computer or oscilloscope.
3. The installation wizard will guide you through the installation. For information on installation, refer to *TekExpress Serial ATA Automated Compliance Solutions Installation Manual*.
4. The software files will be installed in `C:\Program Files\Tektronix\TekExpress`.

Starting the Application

To start the software do one of the following:

- From the Start menu, select **Start > Programs > Tektronix > TekExpress > TekExpress SATA**.
- Double-click  on the desktop.

Closing the Application

To close the application, do either of the following:

- Select **File > Exit**.
- Click .

Using other methods to exit the application will result in abnormal termination.

Using TekExpress Application

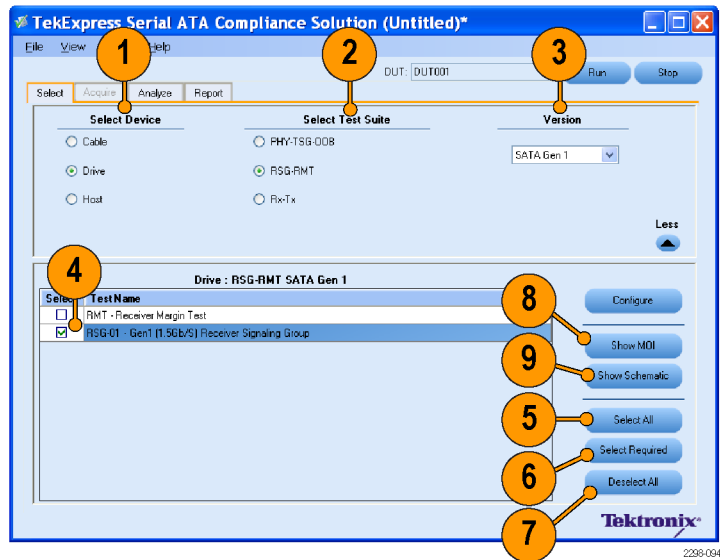
Process Flow

Follow steps 1 to 6 to select and run a test to check for compliance. Details for each of these actions are given on the following pages.

1. Select a device.
2. Select the test suite, choose the version.
3. Select the test.
4. Configure the test parameters.
5. View and select connected instruments.
6. Run the test.
7. View the progress of acquisition.
8. View the progress of analysis.
9. View and print the generated report.

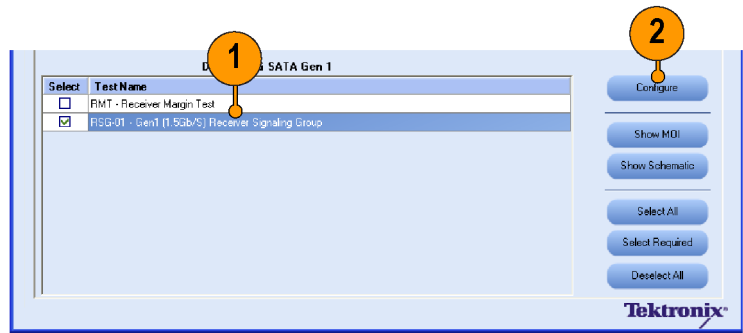
Select a Test

1. Select a Device type.
2. Select the Test Suite.
3. Choose the version of the selected test suite from the **Version** drop-down list.
4. Select the test you want to run.
You can select multiple tests from the list.
5. To select all the tests in the list, click **Select All**.
6. To select only the mandatory tests, click **Select Required**.
7. Click **Deselect All**, to disable the tests.
8. To see the Method Of Implementation of the selected test, click **Show MOI**.
9. To see the schematic diagram of the test setup, click **Show Schematic**.



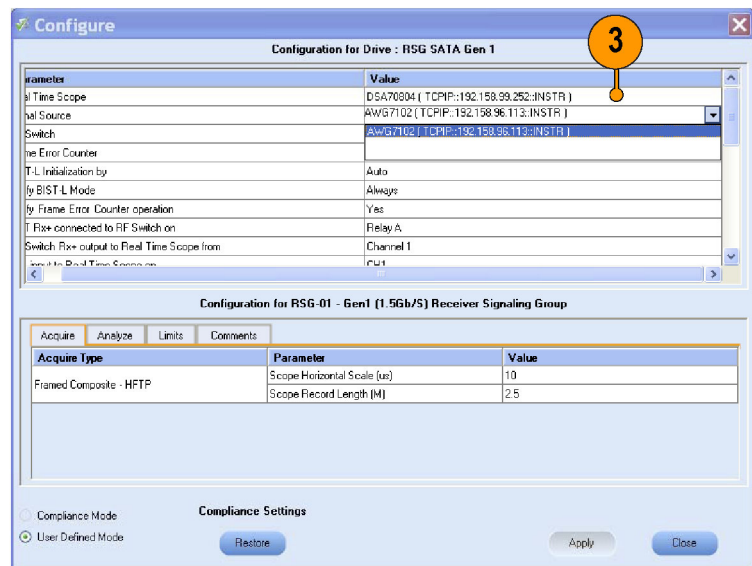
Configure the Test(s)

1. Highlight the test you want to configure by clicking the test name.
2. Click **Configure**.



2298-021

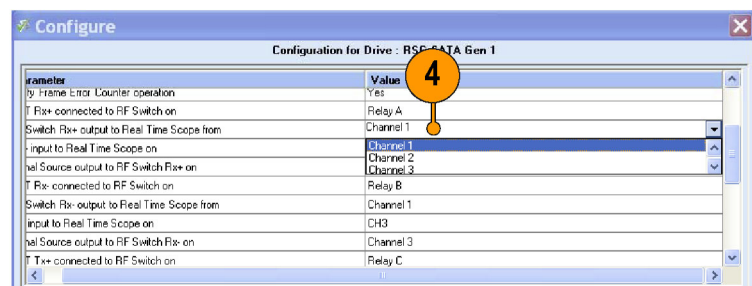
3. If multiple instruments are connected, choose the correct instrument from the drop-down list in the general parameters tab.



2298-014

4. Verify schematic related parameters such as “Channel of the Oscilloscope” and so on.

NOTE. The default setup is according to the schematic provided with the test suite.



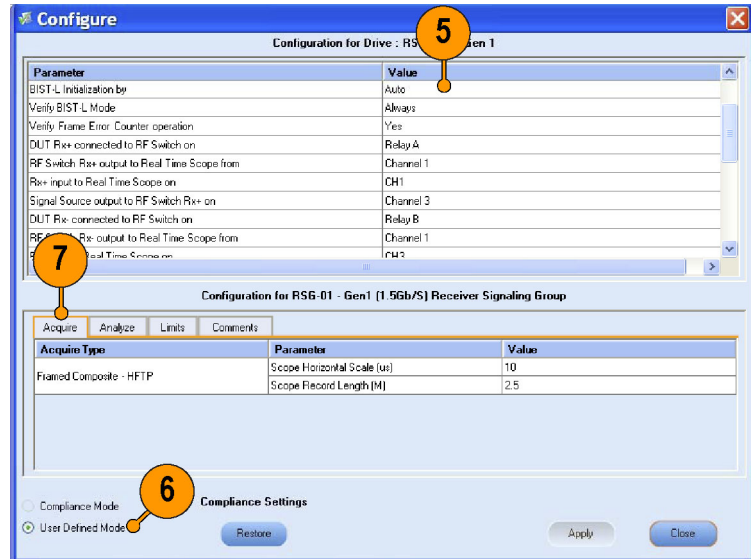
2298-016

- You can also change miscellaneous parameters such as "BIST-L Initialization by".

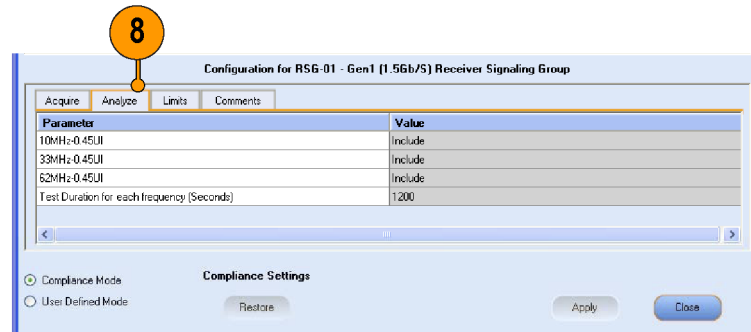
NOTE. General parameters are common to all tests, and can be edited even in the Compliance Mode. However, cells that are grayed cannot be modified in the Compliance Mode.

You can generally use the default settings in Compliance Mode.

- To configure the test parameters, select **User Defined Mode**.
- Click the **Acquire** tab to edit parameters related to acquisition.
- Click the **Analyze** tab to edit Analysis parameters.



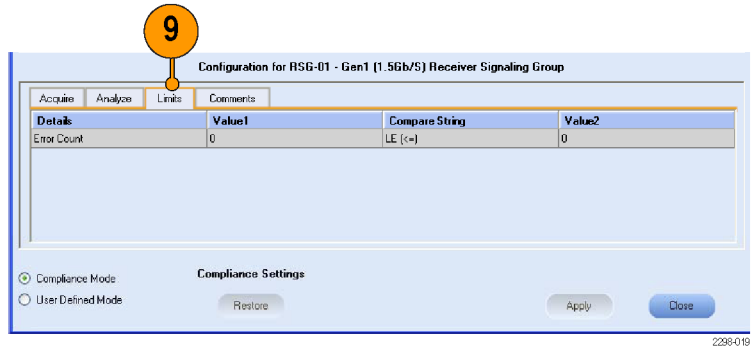
2238-015



2238-011

- View the measurement limits in the **Limits** tab.

Refer to the Online Help for various test limit comparisons.

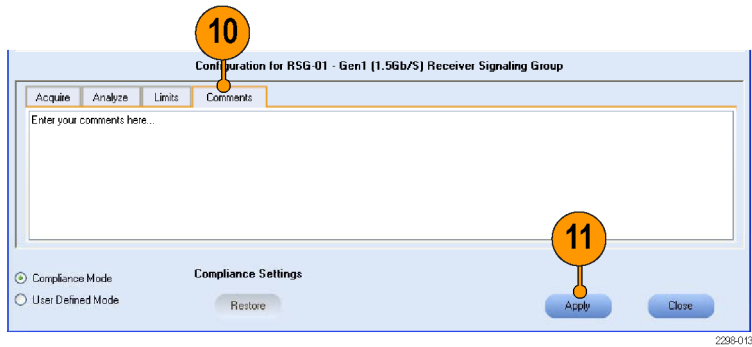


- You can enter test related comments in the **Comments** tab.

NOTE. If you want to change the settings to default, click **Restore**. This option will restore the settings to Compliance Mode.

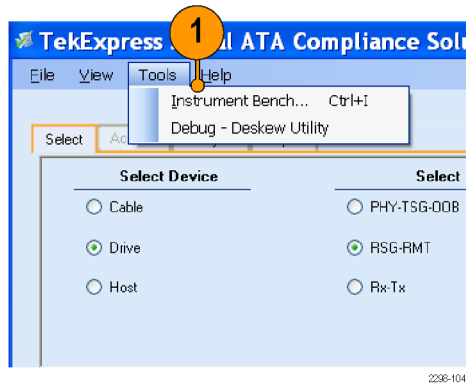
- Click **Apply**.

Use the File Menu to Save the session.

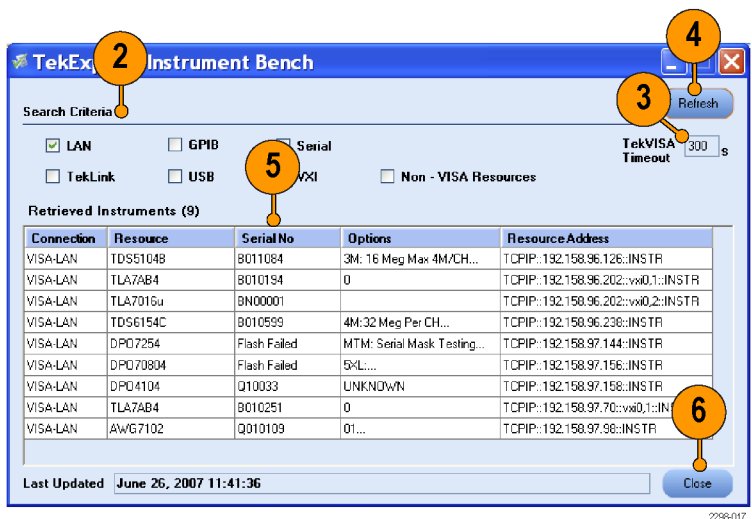


View and Select Connected Instruments

1. Click **Tools > Instrument Bench**.

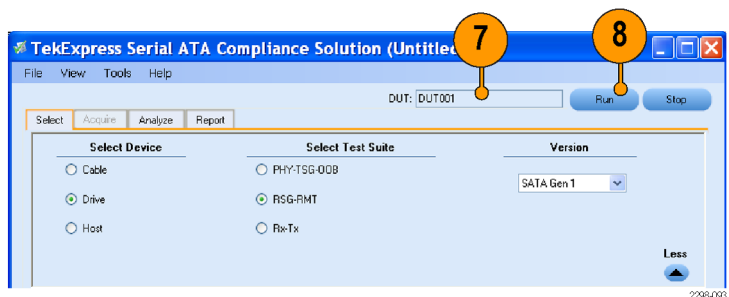


2. Select any of the **Search Criteria**.
3. Enter the time in seconds in the **TekVISA Timeout** field.
4. Click **Refresh**.
5. The results of the instrument search are displayed in the **Retrieved Instruments** table.
6. Click **Close**.



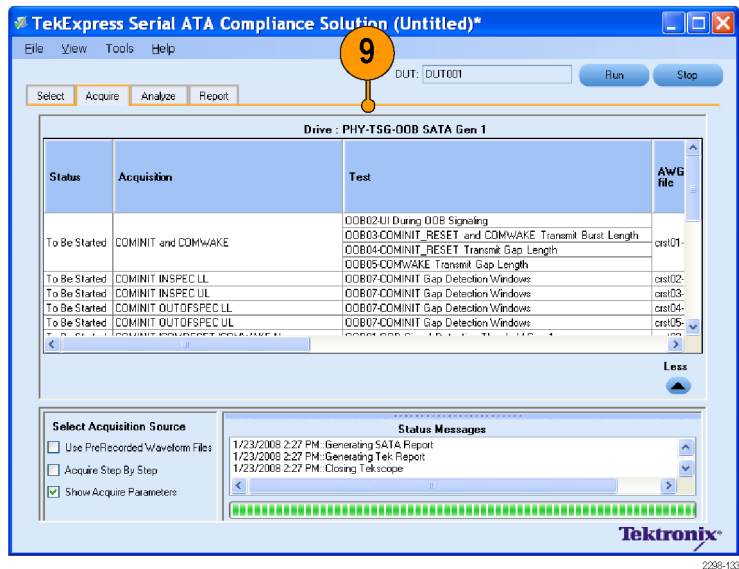
Run the Test

7. Enter the ID of the Device to be tested in the **DUT** field.
8. Click **Run** to run the test.



View the Progress of Acquisition

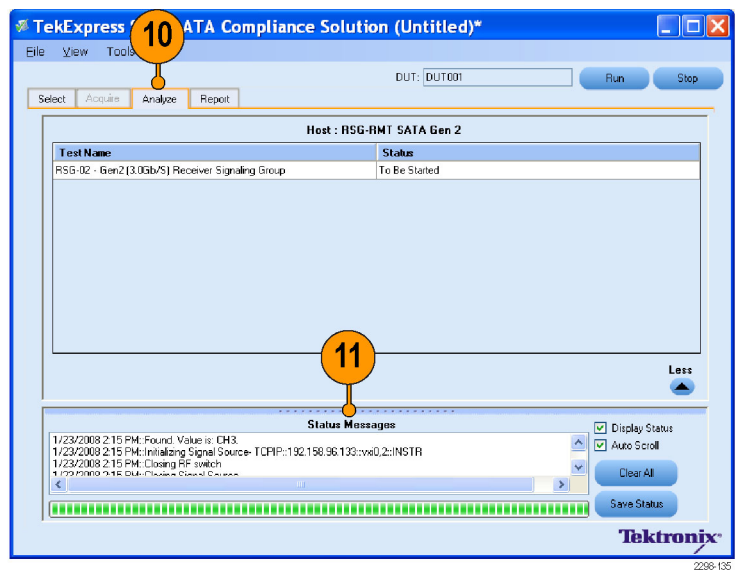
9. The Acquire panel shows the waveform acquisition details for the tests in the currently selected test suite.



2298-133

View the Progress of Analysis

10. When the tests are running, the status and progress of the tests are displayed in the **Analyze** tab. The application checks to see if the device has passed the test.
11. The Status Messages window time stamps all runtime messages and displays them.



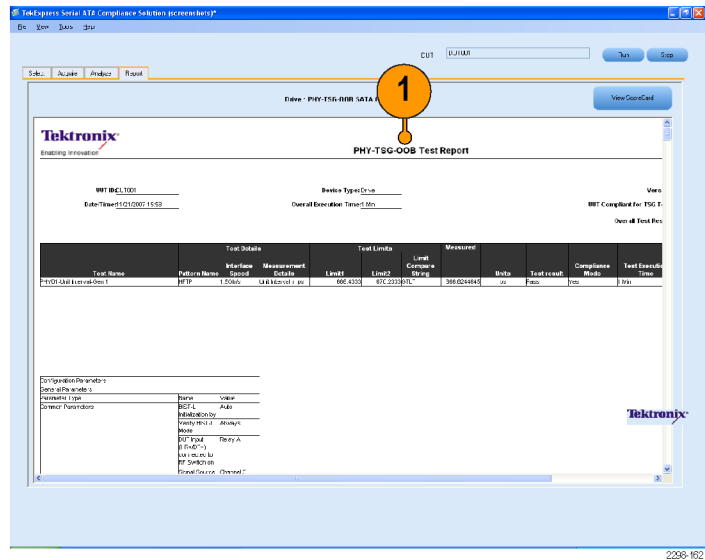
2298-135

View the Report

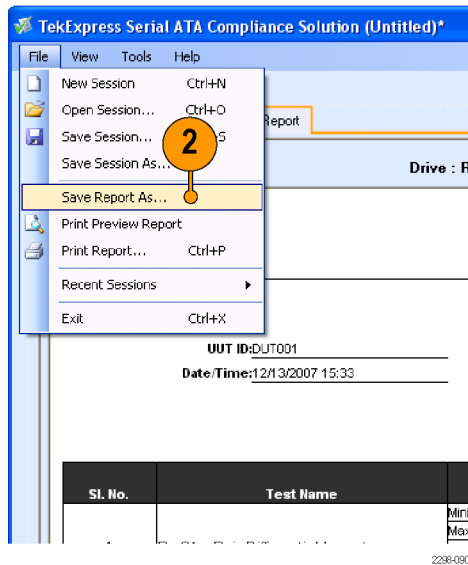
You can generate and print a detailed report as described here.

1. After you have successfully run one or more test(s), a report summary is generated in HTML format.

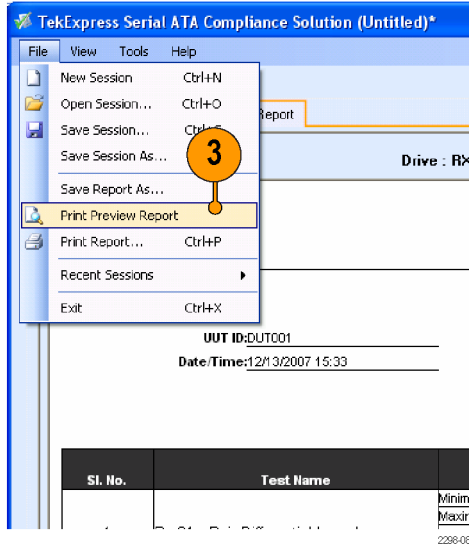
NOTE. Select “View Scorecard” to view the test result in standard specific format.



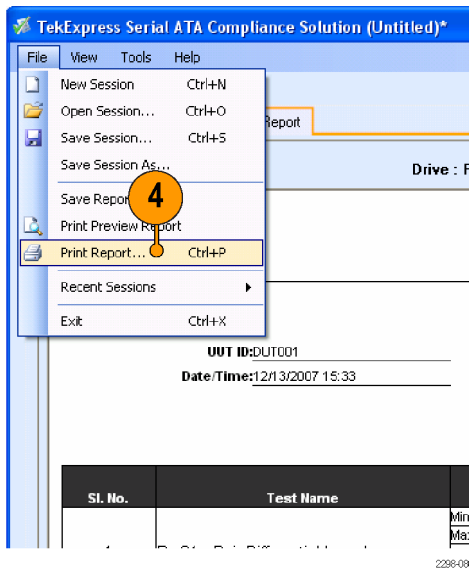
2. To save the report summary in the desired location, select **File > Save Report As**.



3. To preview the report before printing, select **File > Print Preview Report**.



4. Select **File > Print Report**.



Application Examples

RSG-RMT Suite

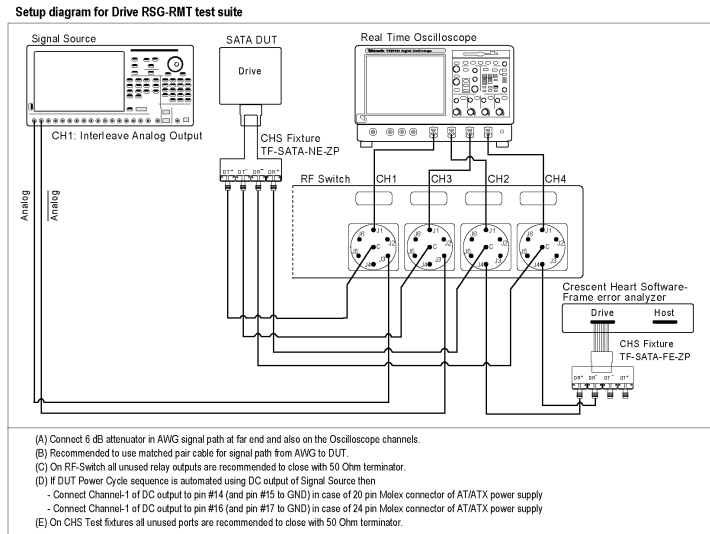
Testing RSG-01 - Gen1 (1.5 Gb/s) Receiver Signalling Group on a Drive

The following equipment is required to set up the application:

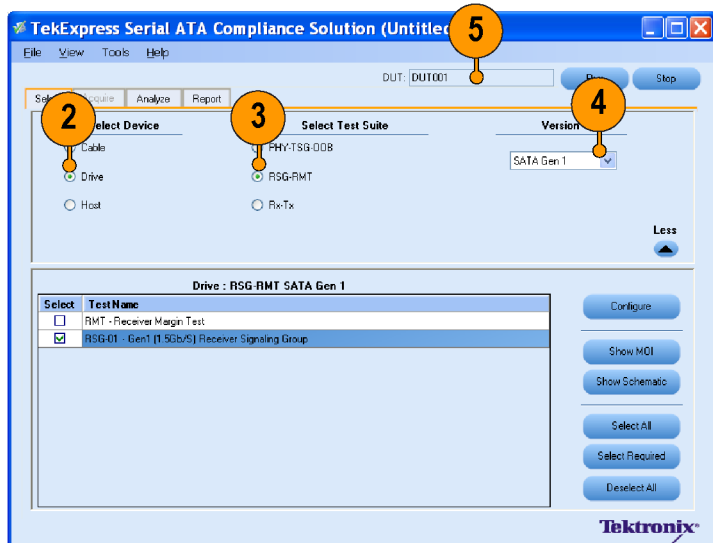
Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	<ul style="list-style-type: none"> ■ Tektronix DPO/DSA 72004, DPO/DSA 71604, DPO/DSA 71254, TDS6154C, and TDS6124C ■ For Gen1– only testing, the following oscilloscopes are also acceptable: DPO/DSA 70804 or TDS6804B
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

This test verifies that the SATA Gen1 Drive device will receive a 1.5 Gbps stressed data pattern without receive errors.

1. Connect the DUT to the equipment as shown in the connection diagram.



2. Select Drive as the device type.
3. Select RSG-RMT as the Test Suite.
4. Select SATA Gen 1 as the test suite version.
5. Enter the DUT ID in the DUT field.



2398-147

6. If you want to verify the test setup before running the tests, click **Show Schematic**.

7. Select **RSG-01 – Gen 1 (1.5 Gb/S) Receiver Signalling Group**.

NOTE. RSG-01 - Gen 1 (1.5 Gb/Sec) Receiver Signalling Group will be a compliance test which is a mandatory test.

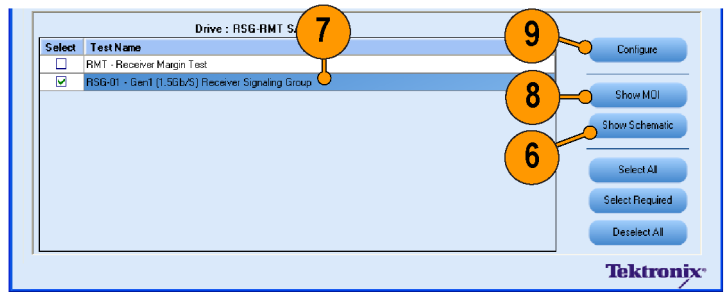
8. To view the Method of Implementation for the RSG-RMT test, click **Show MOI** in the application.

9. Click **Configure** to open the Configuration panel.

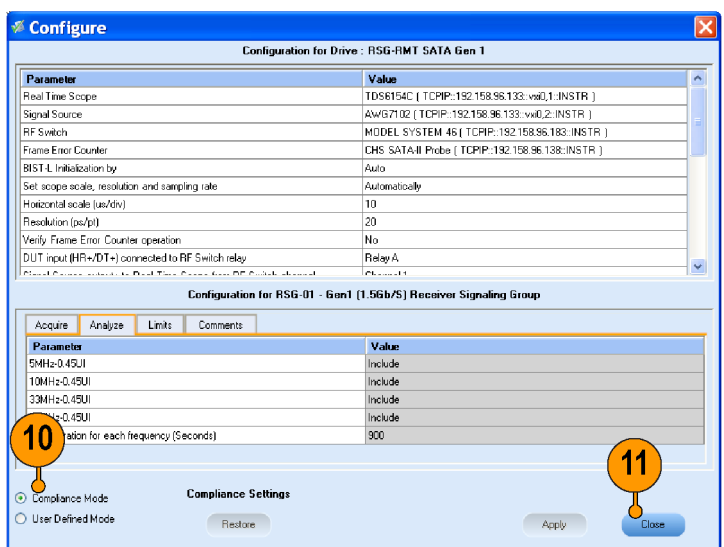
10. You can generally use the default values in the **Compliance Mode**.

11. Click **Close**.

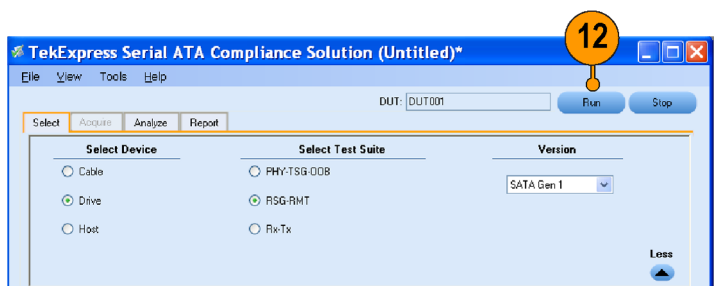
12. Click **Run** to run the test.



2238-146

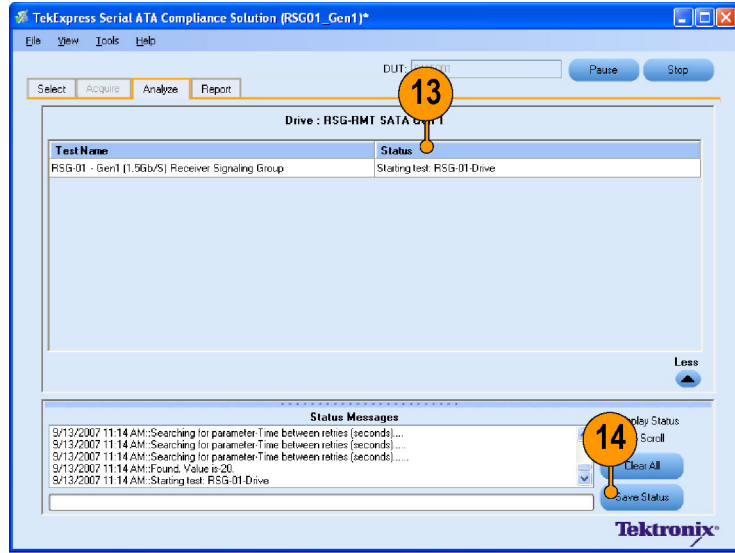


2238-146



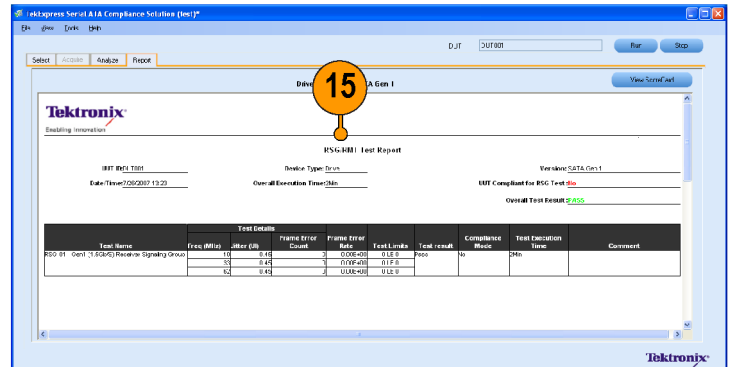
2238-146

13. Observe that only the **RSG-01 – Gen 1 (1.5 Gb/S) Receiver Signalling Group** is checked for compliance. Other tests are skipped. The status of the tests is displayed in the **Status Messages** window.
14. Click **Save Status** to save the status messages.



2238-172

15. When the tests complete, a report appears in the **Report** panel.



2238-144

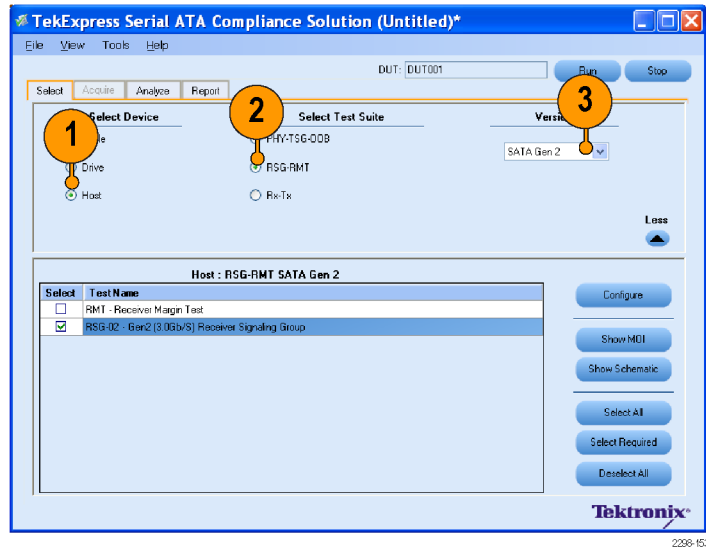
Testing RSG-02 - Gen2 (3.0Gb/s) Receiver Signalling Group on a Host

This test verifies that the SATA Host device will receive a 3.0 Gbps stressed data pattern without receive errors.

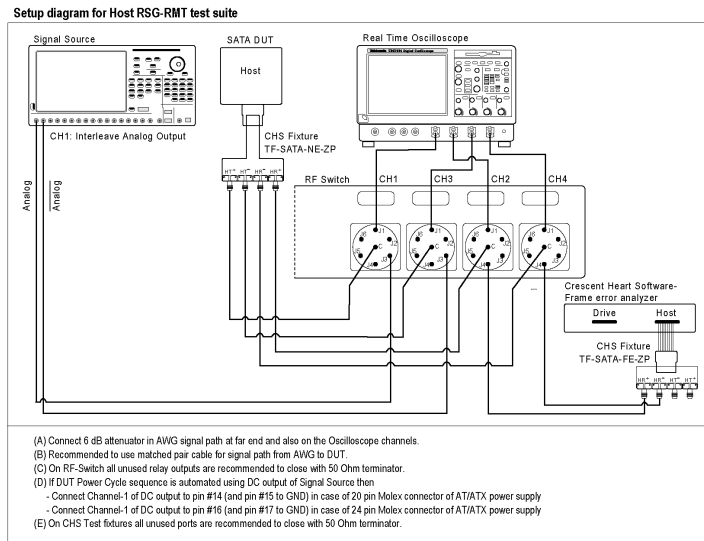
The following equipment is required to set up the application:

Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	<ul style="list-style-type: none"> ■ 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 adaptor
Test Fixture	Crescent Heart Software Fixture TF-SATA-NE-ZP, TF-SATA-FE-ZP
DUT	A SATA Host to test

1. Select **Host** as the device type.
2. Select **RSG-RMT** as the test suite.
3. Select **SATA Gen 2** as the test suite version.



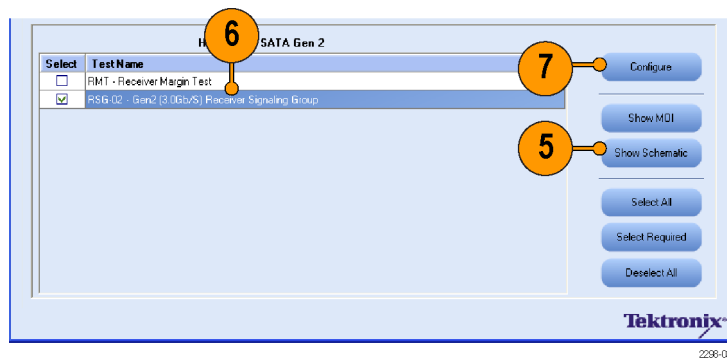
4. Connect the DUT to the equipment as shown in the setup diagram.



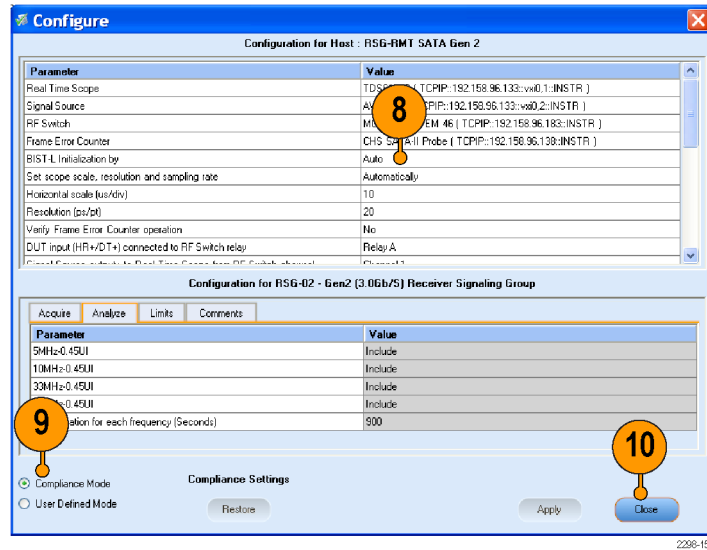
5. To verify the test setup before running the tests, click **Show Schematic**.
6. Select **RSG-02 - Gen2 (3.0 Gb/s) Receiver Signalling Group**.

NOTE. RSG-02 - Gen2 (3.0 Gb/s) Receiver Signalling Group is a compliance test.

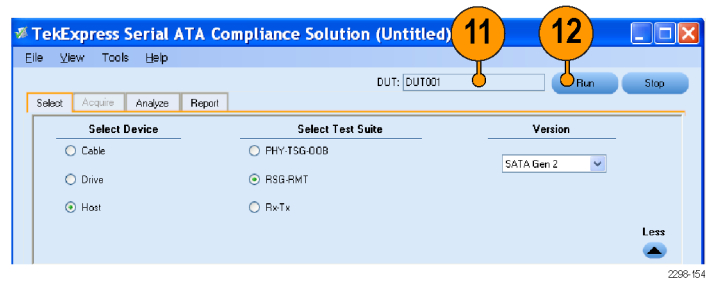
7. Click **Configure** if you want to configure the test parameters in the Configure panel.



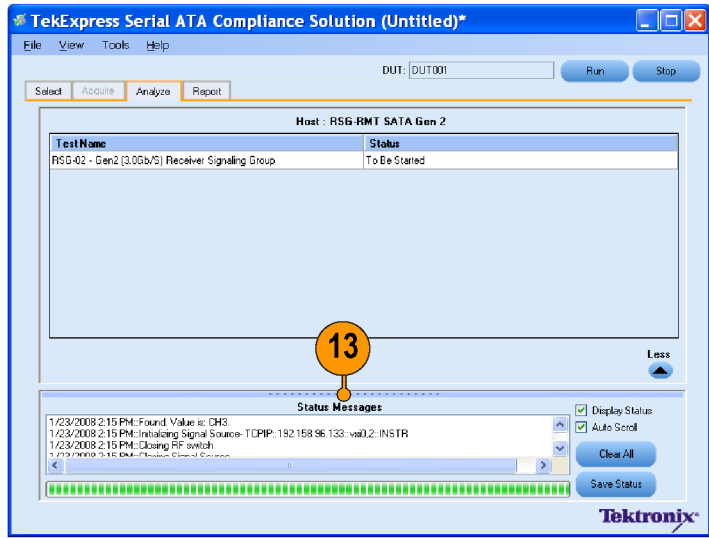
8. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.
9. You can use the default values in the Compliance mode.
10. Click **Close**.



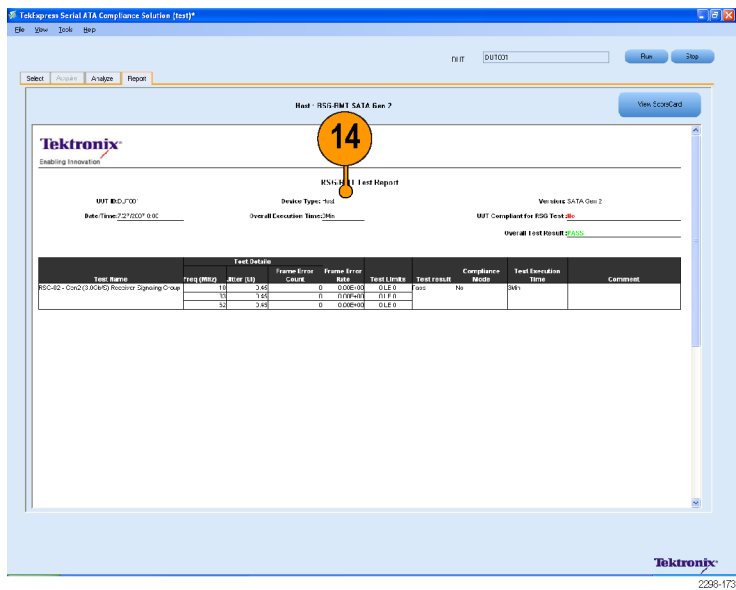
11. Enter the DUT ID in the DUT field.
12. Click **Run** to run the tests.



- Observe that only **RSG-02 – Gen 2 (3.0 Gb/S) Receiver Signalling Group** is checked for compliance. Other tests are skipped. The status of the tests is displayed under **Status Messages** window.



- After the test complete, a report appears in the **Report** panel.



PHY-TSG-OOB Suite

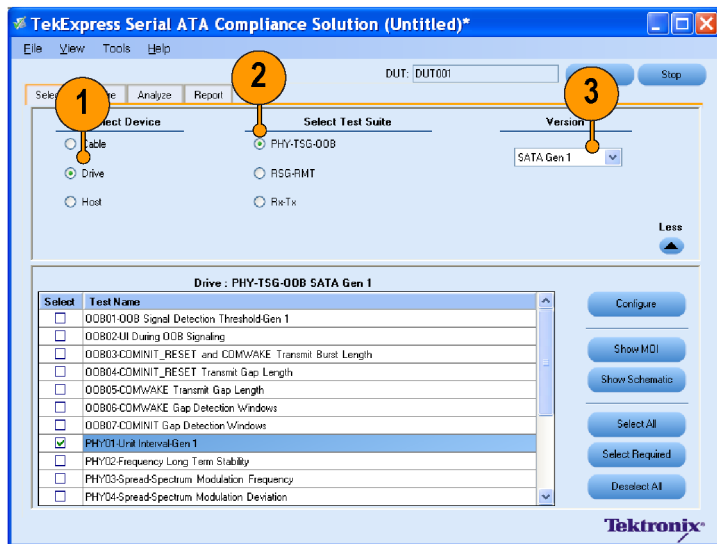
The following equipment is required to set up the application:

Resource	Model Supported
Signal Source	Tektronix AWG7102 (Option 6)
Real Time Oscilloscope	<ul style="list-style-type: none">■ 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
Test Fixture	Crescent Heart Software Test Fixture TF-SATA-NE-ZP
DUT	A SATA Drive to test

Testing PHY01 - Unit Interval Test-Gen1 on a Drive

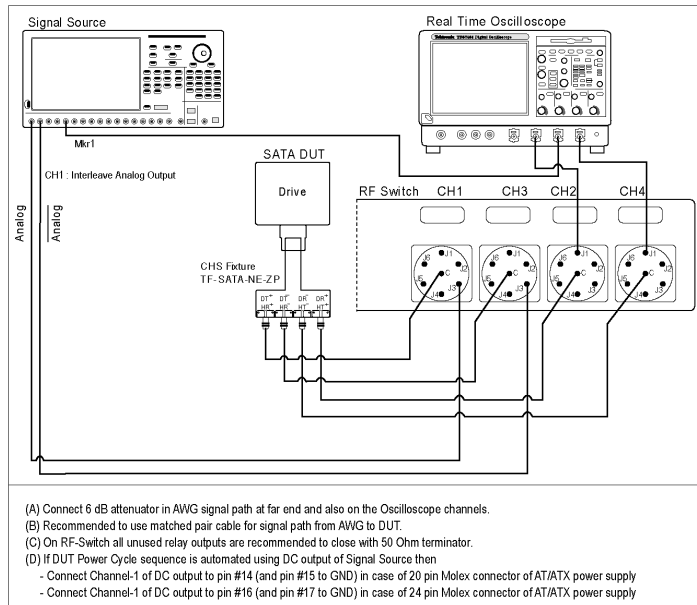
This test verifies that the Unit Interval of the SATA Drive transmitter is within the conformance limits.

1. Select **Drive** as the device type.
2. Select **PHY-TSG-OOB** as the test suite.
3. Select **SATA Gen 1** as the test suite version.

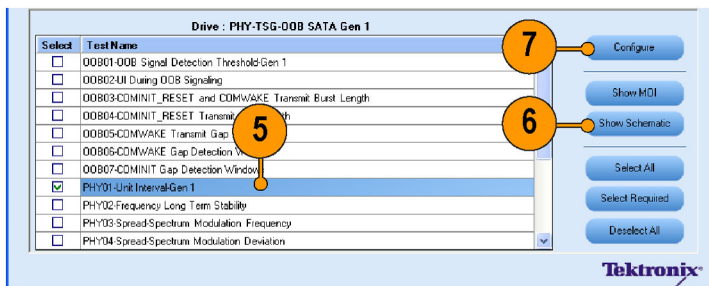


4. Connect the DUT to the equipment as shown in the setup diagram.

Setup diagram for Drive PHY-TSG-OOB test suite

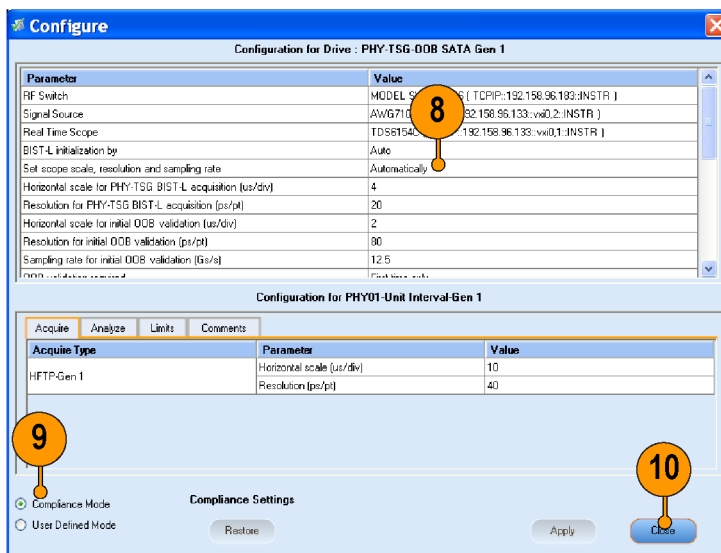


5. Select **PHY01 - Unit Interval Test - Gen 1**.
6. To verify the test setup before running the tests, click **Show Schematic**.
7. Click **Configure** if you want to configure the test parameters in the Configure panel.



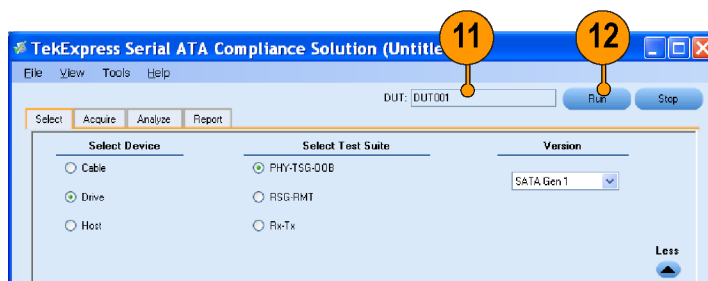
2298-085

8. 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.
9. You can use the default values in the Compliance mode.
10. Click **Close**.



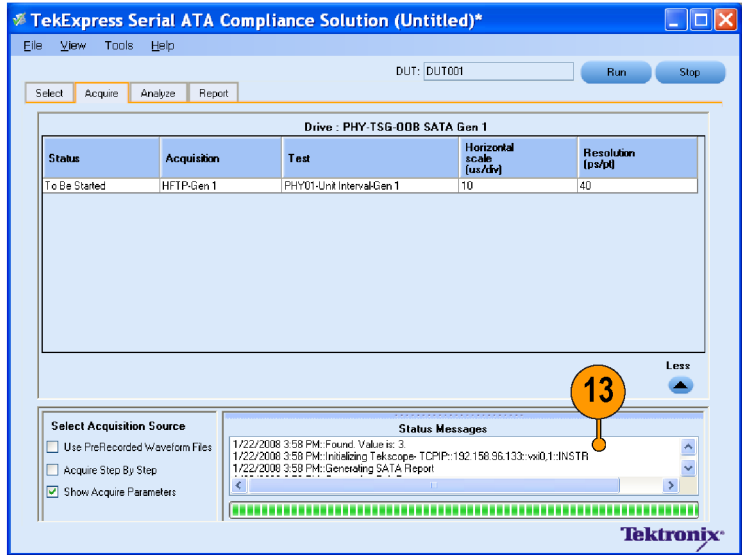
2298-083

11. Enter the DUT ID in the DUT field.
12. Click **Run** to run the tests.



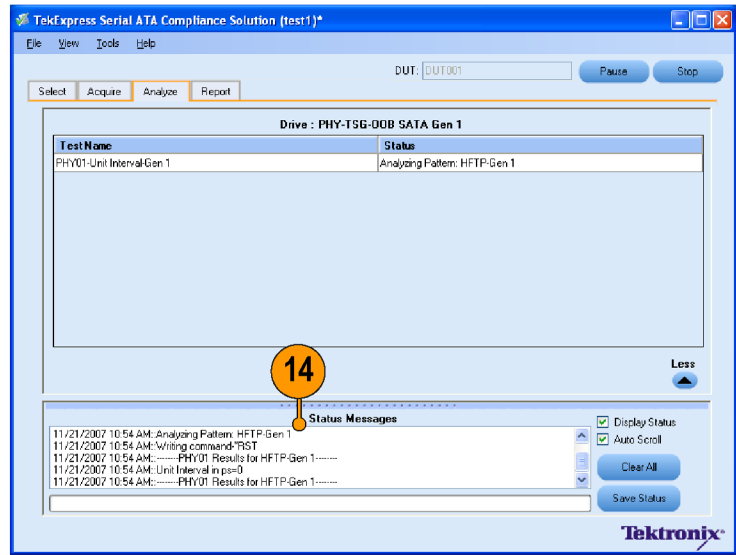
2298-100

13. The application automatically switches to the acquire panel. The status of the waveform acquisition is displayed in this panel.



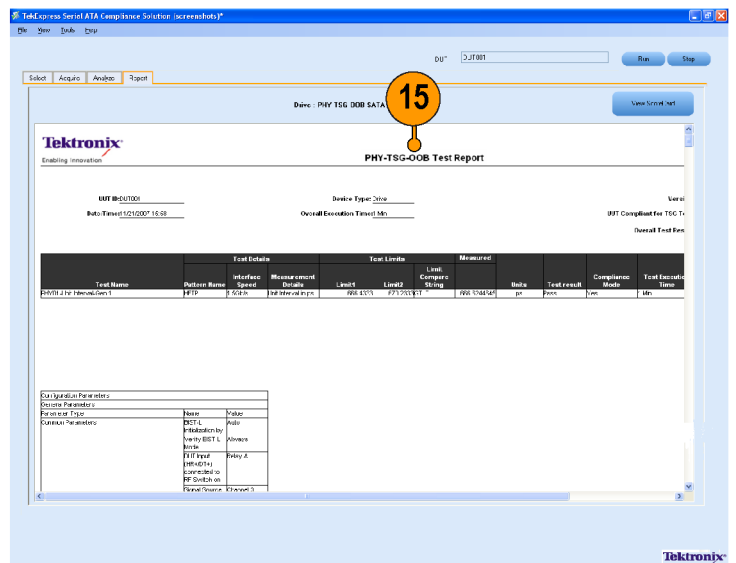
2286-076

- Observe that only **PHY01 - Unit Interval Test-Gen1** is checked for compliance. Other tests are skipped. The status of the tests is displayed under **Status Messages** window.



2238-134

- When the tests run successfully, a report appears in the **Report** panel.

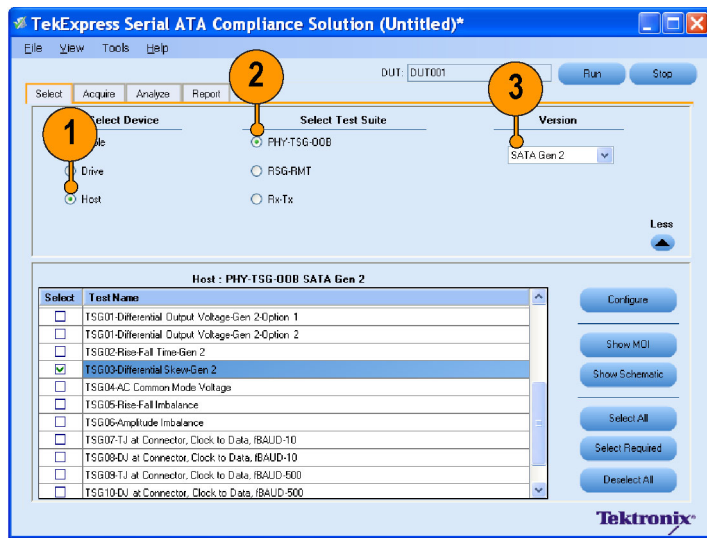


2238-143

Testing TSG03 - Differential Skew-Gen 2 on a Host

This test verifies that the differential skew of the SATA Host transmitter is within the conformance limits.

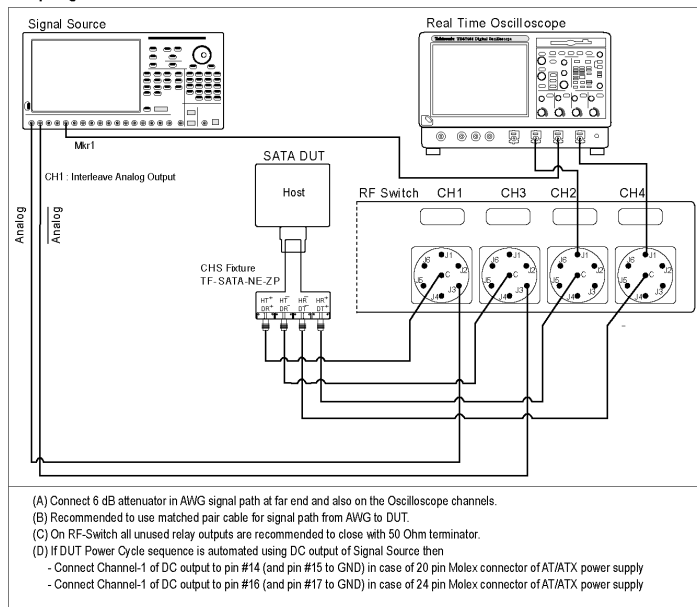
1. Select **Host** as the device type.
2. Select **PHY-TSG-OOB** as the test suite.
3. Select **SATA Gen 2** as the test suite version.



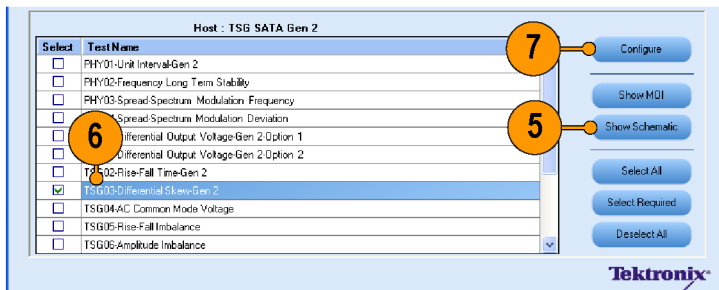
2298-126

4. Connect the DUT to the equipment as shown in the setup diagram.

Setup diagram for Host PHY-TSG-OOB test suite

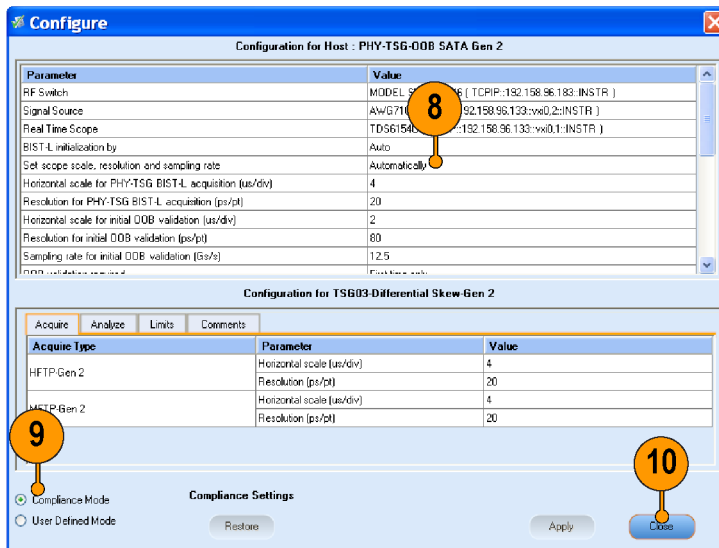


5. To verify the test setup before running the tests, click **Show Schematic**.
6. Select **TSG03 - Differential Skew-Gen 2**.
7. Click **Configure** if you want to configure the test parameters in the Configure panel.



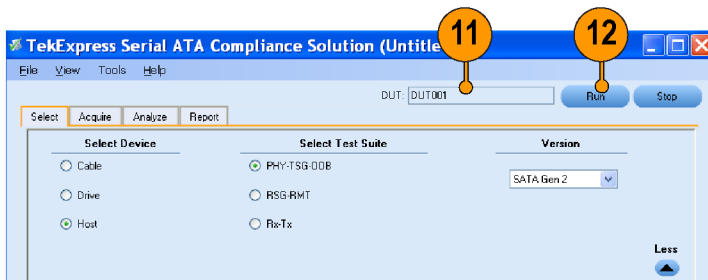
2298-057

8. The general parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.
9. You can use the default values in the Compliance mode.
10. Click **Close**.



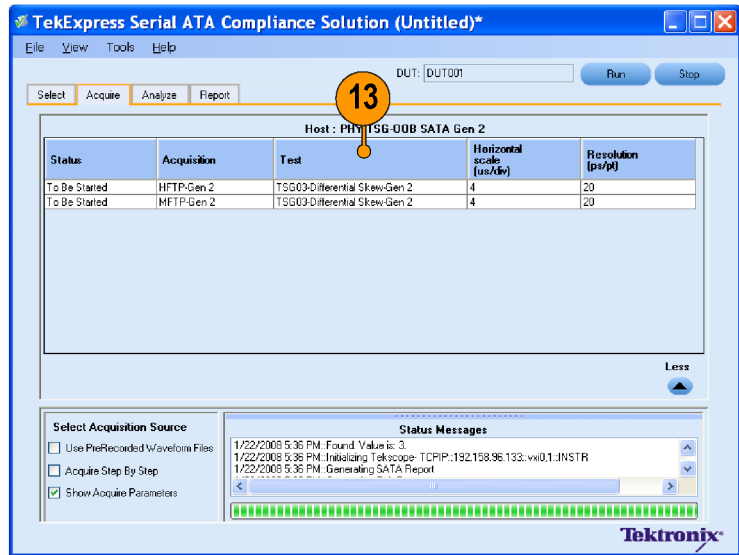
2298-094

11. Enter the DUT ID in the DUT field.
12. Click **Run** to run the tests.



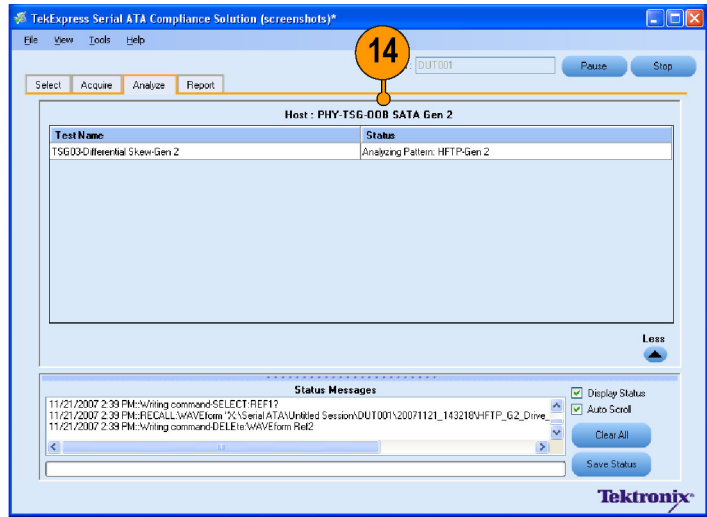
2298-101

13. Acquire panel showing the status of waveform acquisition.



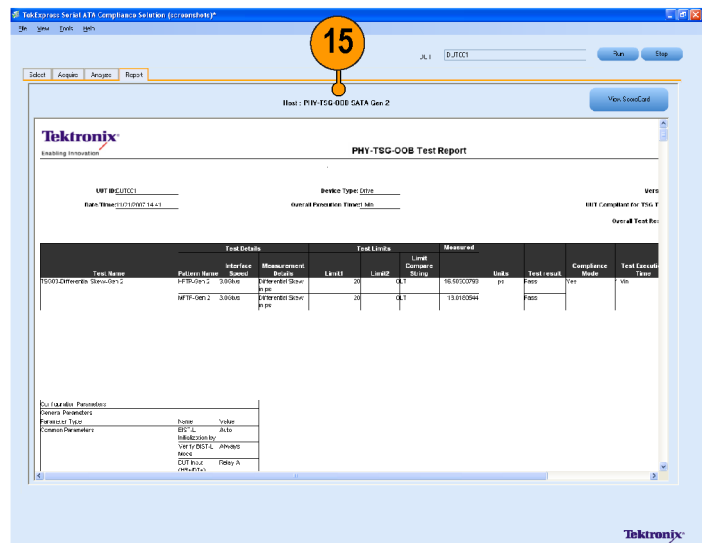
2298-077

- Observe that only **TSG03 - Differential Skew-Gen 2** is checked for compliance. Other tests are skipped. The status of the tests is displayed under **Status Messages** window.



2298-160

- When the tests run successfully, a report appears in the **Report** panel.

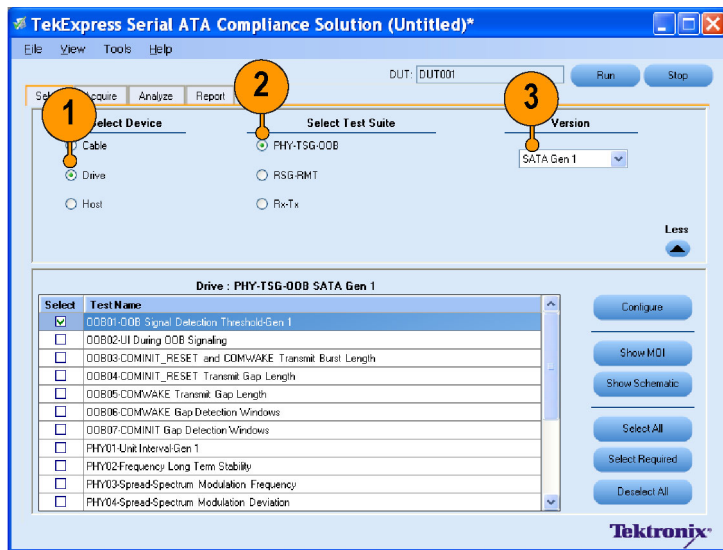


2298-157

Testing OOB01 - OOB Signal Detection Threshold-Gen1 on a Drive

This test verifies that the OOB Signal Detection Threshold of the SATA Drive receiver is within the conformance limits.

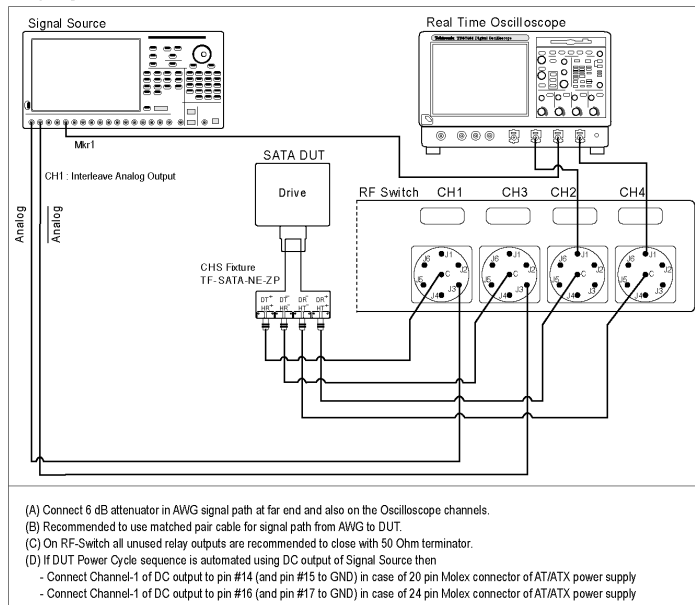
1. Select **Drive** as the device type.
2. Select **PHY-TSG-OOB** as the test suite.
3. Select **SATA Gen 1** as the test suite version.



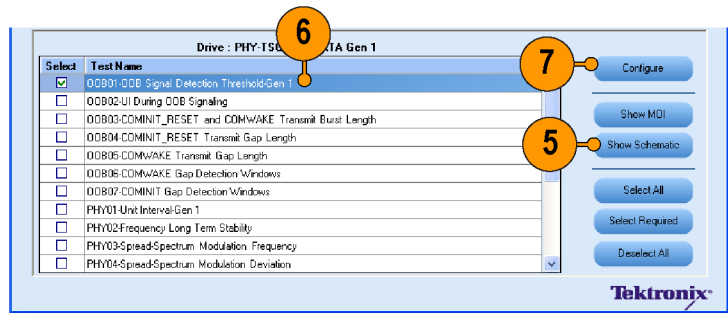
2286-140

4. Connect the DUT to the equipment as shown in the setup diagram.

Setup diagram for Drive PHY-TSG-OOB test suite

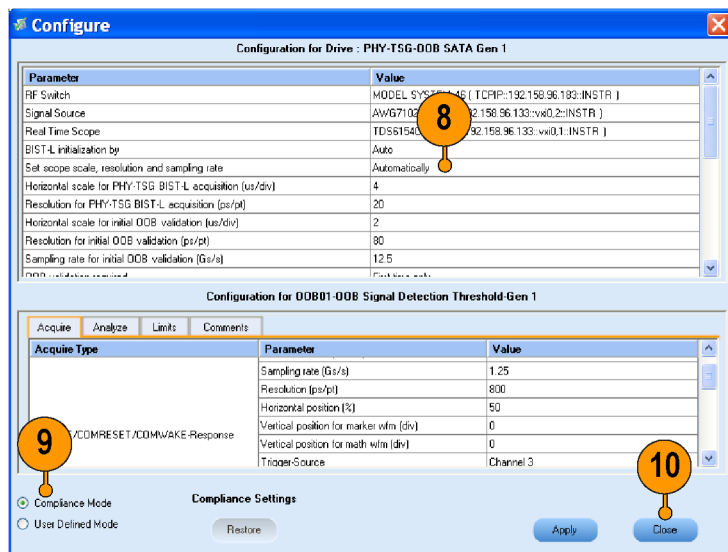


5. To verify the test setup before running the tests, click **Show Schematic**.
6. Select **O0B01 - OOB Signal Detection Threshold-Gen1**.
7. Click **Configure** if you want to configure the test parameters in the Configure panel.
8. The general parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.
9. You can use the default values in the Compliance mode.
10. Click **Close**.

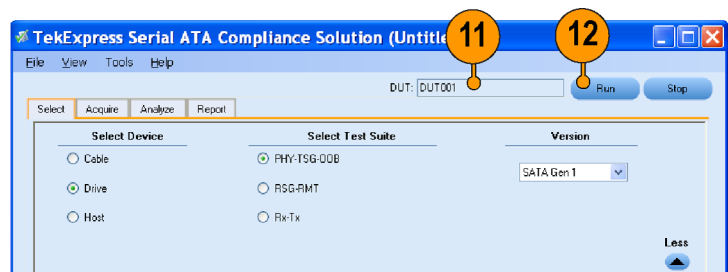


2298-142

11. Enter the DUT ID in the DUT field.
12. Click **Run** to run the tests.

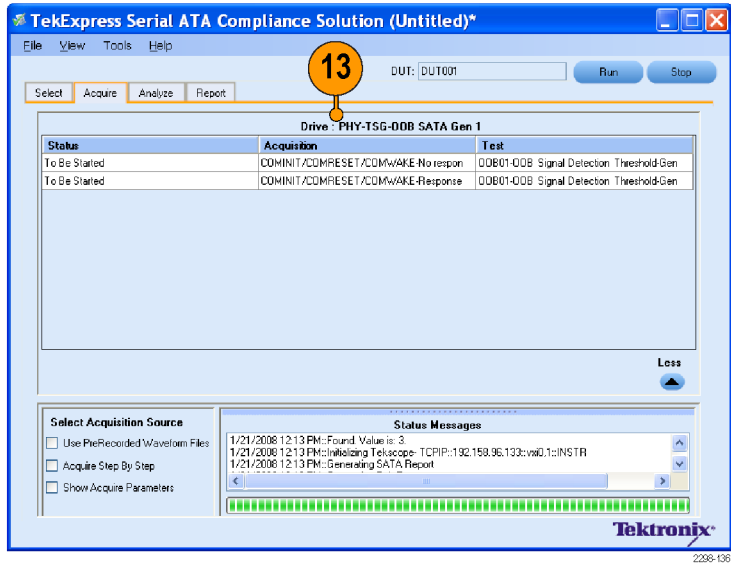


2298-138

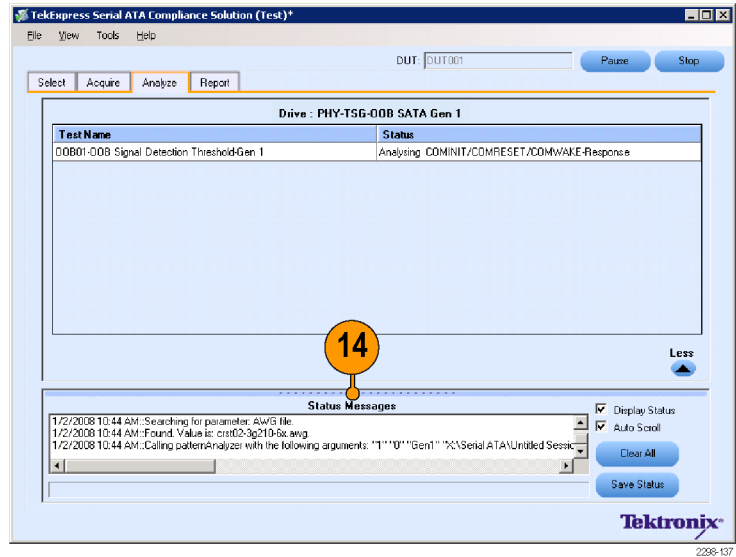


2298-141

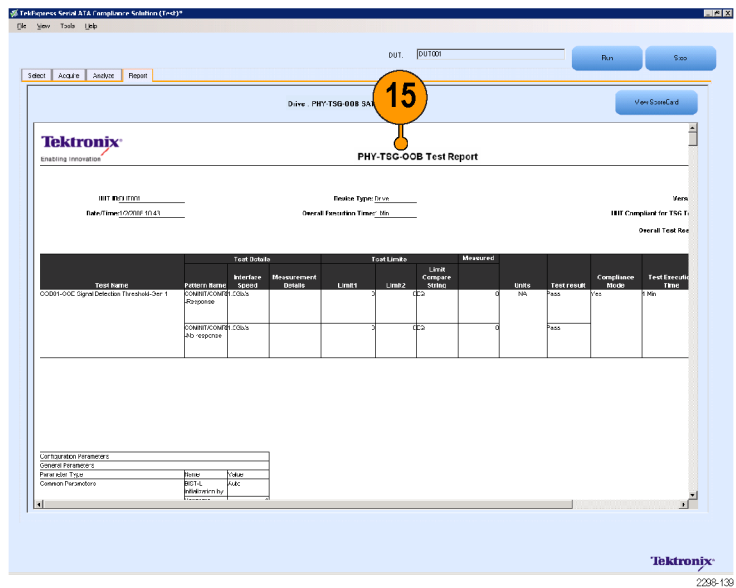
13. Acquire panel showing the status of waveform acquisition.



- Observe that only **OOB01 - OOB Signal Detection Threshold-Gen1** is checked for compliance. Other tests are skipped. The status of the tests is displayed under **Status Messages** window.



- When the tests run successfully, a report appears in the **Report** panel.



Rx-Tx Suite

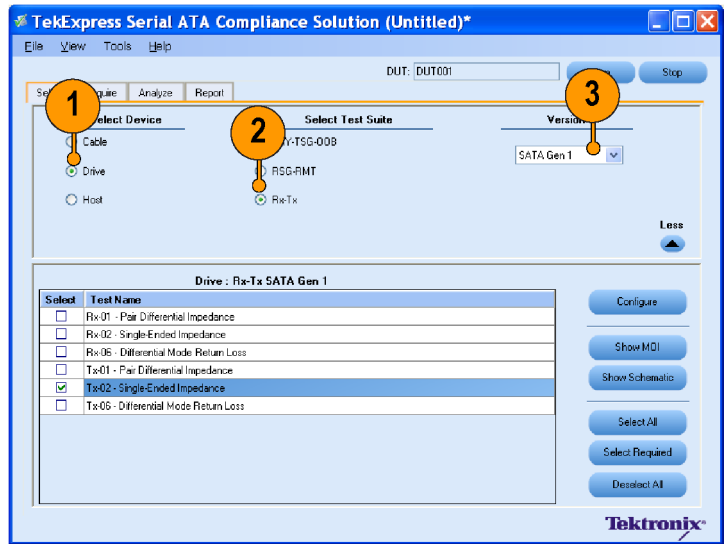
The following equipment is required to set up the application:

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	<ul style="list-style-type: none">■ Five pairs of matched SMA Cables – 179-4944-00 or equivalent■ One SMA cable to connect to trigger input■ One SMA barrel adapter
DUT	A SATA Drive to test

Testing TX02 - Single-Ended Impedance on a Drive

This test verifies that the Single-Ended impedance of a SATA drive transmitter is within the conformance limits.

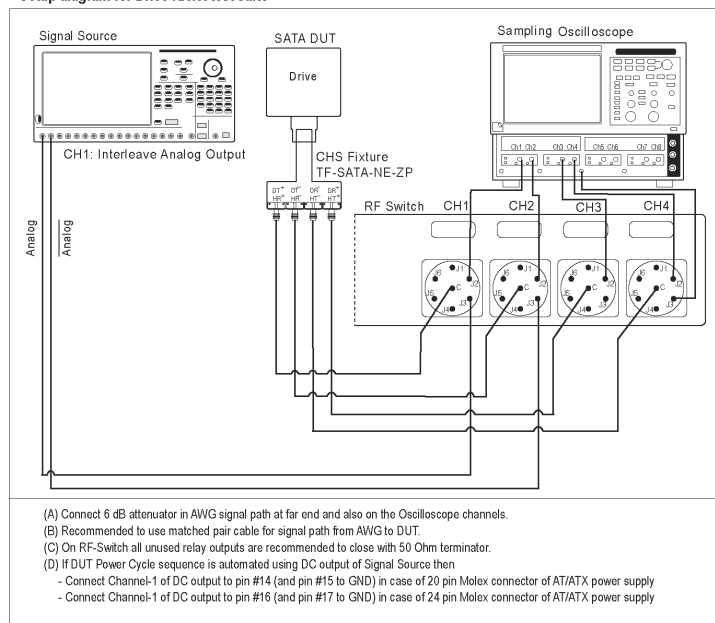
1. Select **Drive** as the device type.
2. Select **RX-TX** as the test suite.
3. Select **SATA Gen 1** as the test suite version.



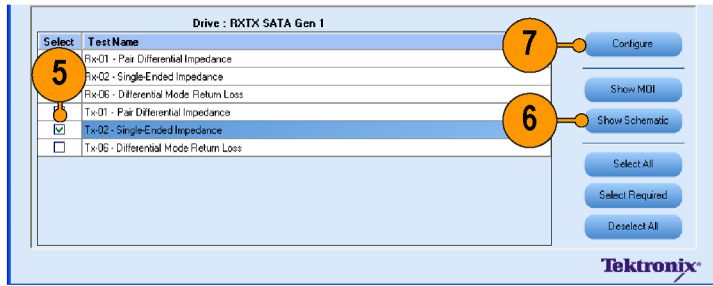
2298-009

4. Connect the DUT to the equipment as shown in the setup diagram.

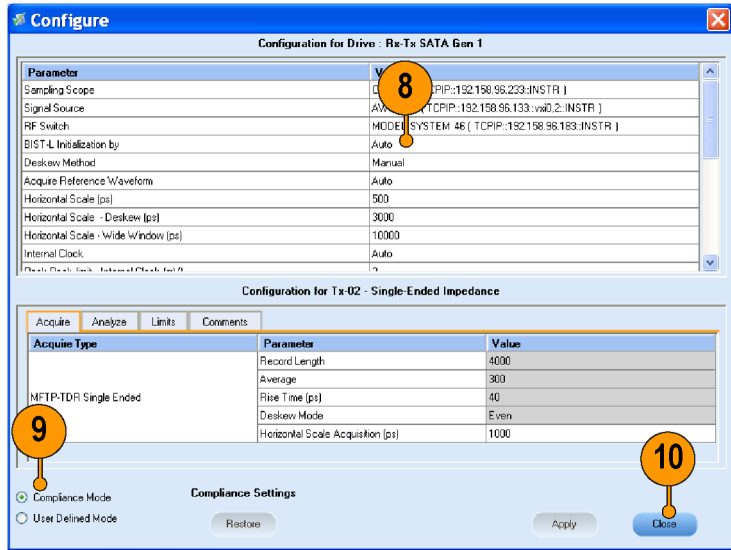
Setup diagram for Drive RXTX test suite



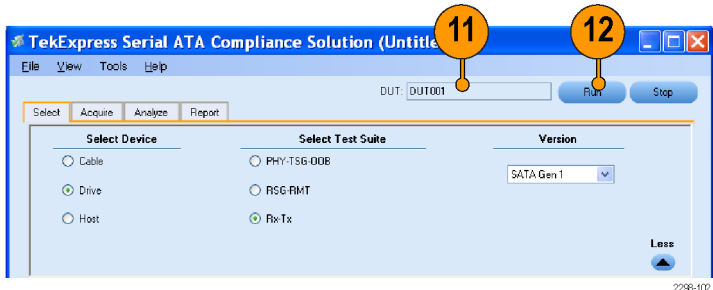
5. Select TX02 - Single-Ended Impedance
6. To verify the test setup before running the tests, click **Show Schematic**.
7. Click **Configure** if you want to configure the test parameters in the Configure panel.



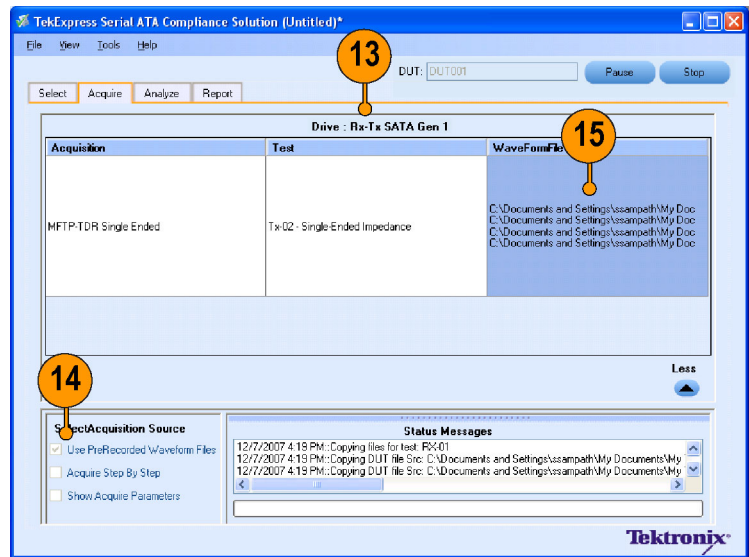
8. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.
9. You can use the default values in the Compliance mode.
10. Click **Close**.



11. Enter the DUT ID in the DUT field.
12. Click **Run** to run the tests.

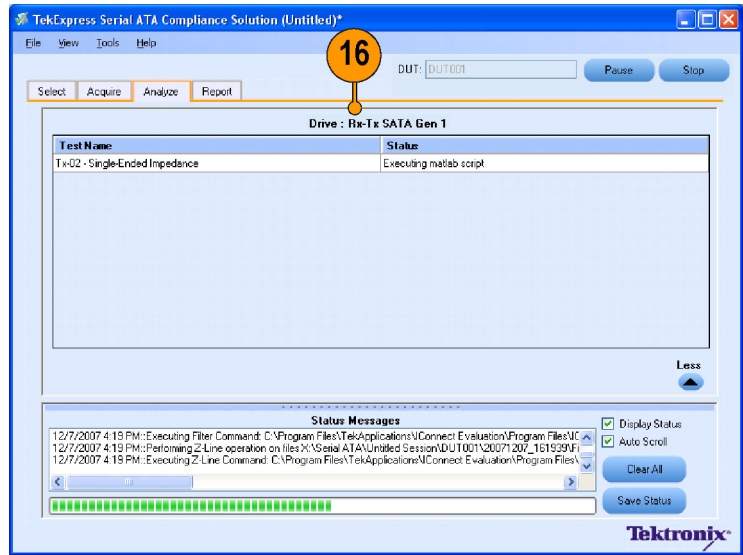


13. Acquire panel showing the status of waveform acquisition.
14. If you have selected the option **Use Pre-Recorded Waveform Files** before clicking Run, you need to browse the desired waveform file from the location where it exists.
15. The path showing the location of the sample waveform.



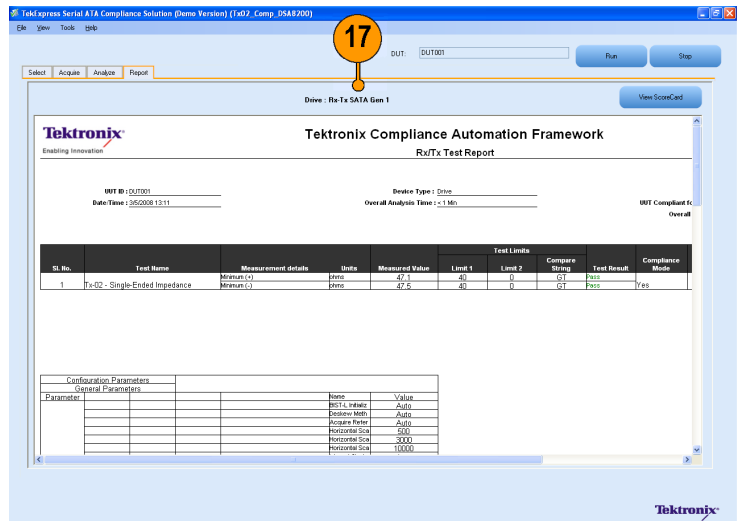
2298-109

- Observe that only **TX02 - Single-Ended Impedance** is checked for compliance. Other tests are skipped. The status of the tests is displayed under **Status Messages** window.



2288-170

- When the tests run successfully, a report appears in the **Report** panel.



2288-171

SI Suite

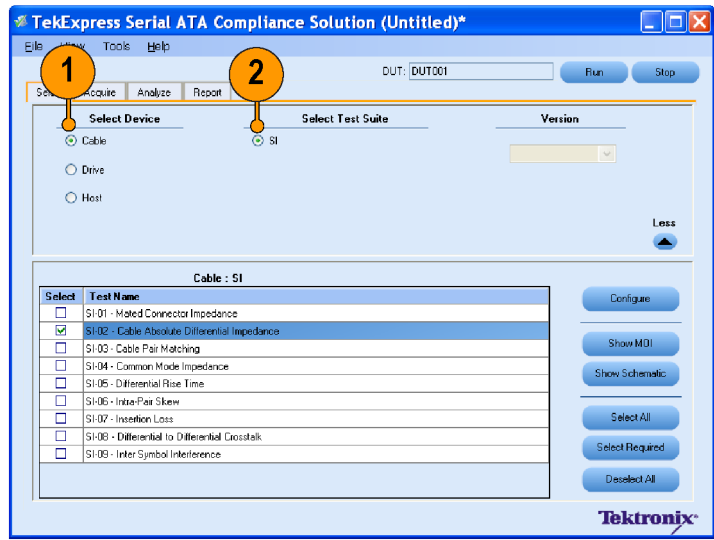
Testing SI-02 - Cable Absolute Differential Impedance on a SATA Cable

The following equipment is required to set up the application:

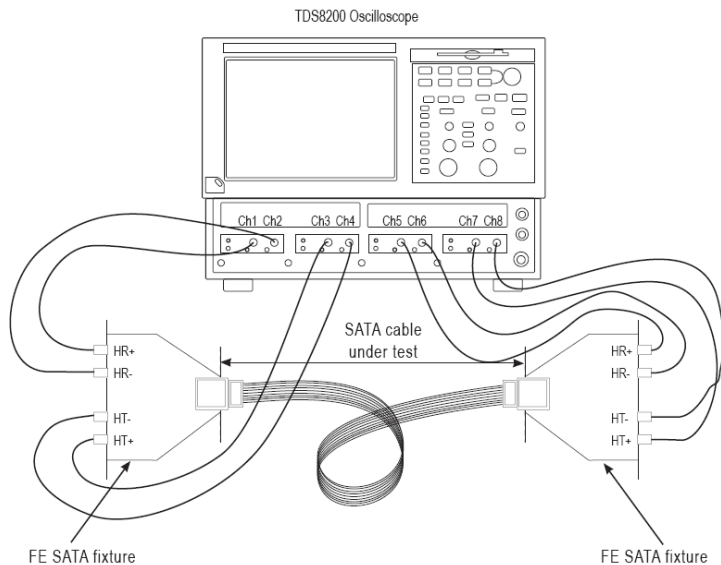
Resource	Model Supported
Sampling Oscilloscope	Tektronix CSA/DSA/TDS 8200 with four 80E04 modules
Test Fixture	Two Crescent Heart Software Fixture TF-SATA-FE-ZP
SMA Cables	<ul style="list-style-type: none">■ Four pairs of matched SMA Cables 179-4944-01 or equivalent■ Two SMA barrel adapters
DUT	A SATA Cable to test

This test verifies that the cable absolute differential impedance is within the conformance limits.

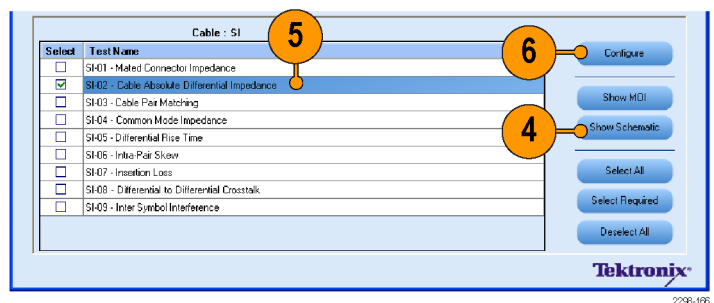
1. Select **Cable** as the device type.
2. Select **SI** as the test suite.



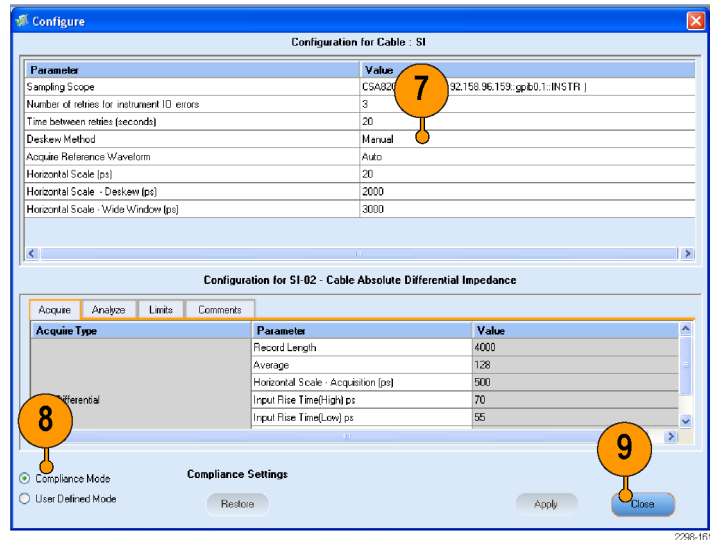
3. Connect the DUT to the equipment as shown in the setup diagram.



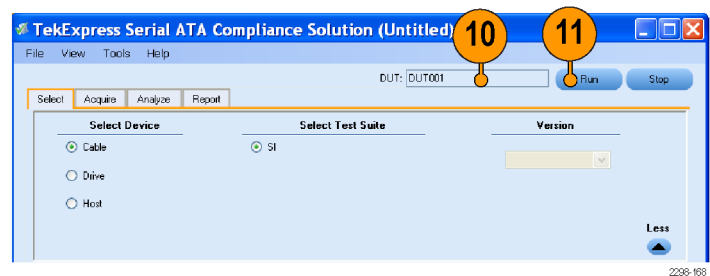
4. To verify the test setup before running the tests, click **Show Schematic**.
5. Select **SI-02 - Cable Absolute Differential Impedance**.
6. Click **Configure** if you want to configure the test parameters in the Configure panel.



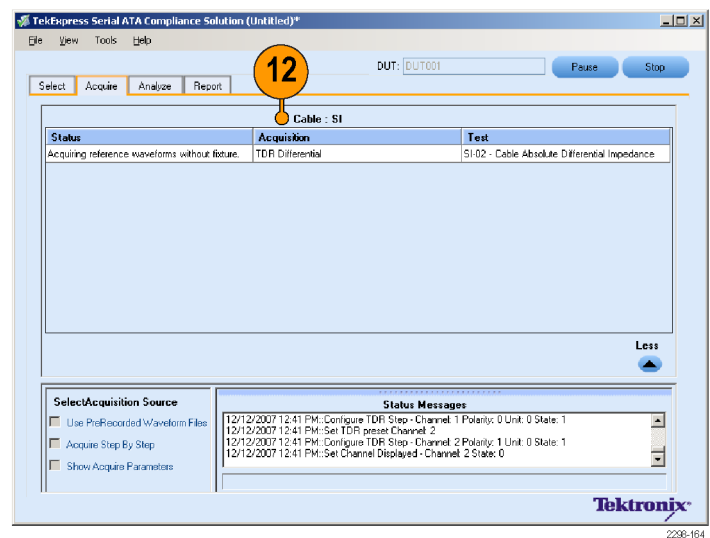
7. The parameters that are not grayed are editable. To change the instrument related values, select from the drop-down list for each of the parameters.
8. You can use the default values in the Compliance mode.
9. Click **Close**.



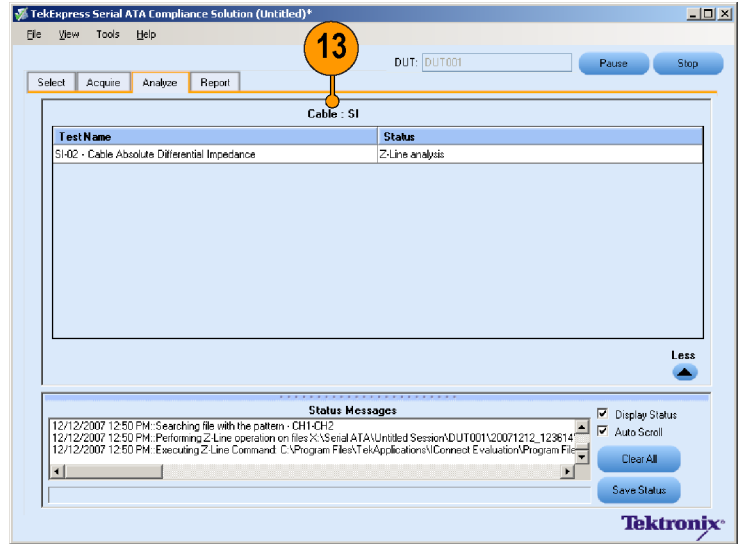
10. Enter the DUT ID in the DUT field.
11. Click **Run** to run the tests.



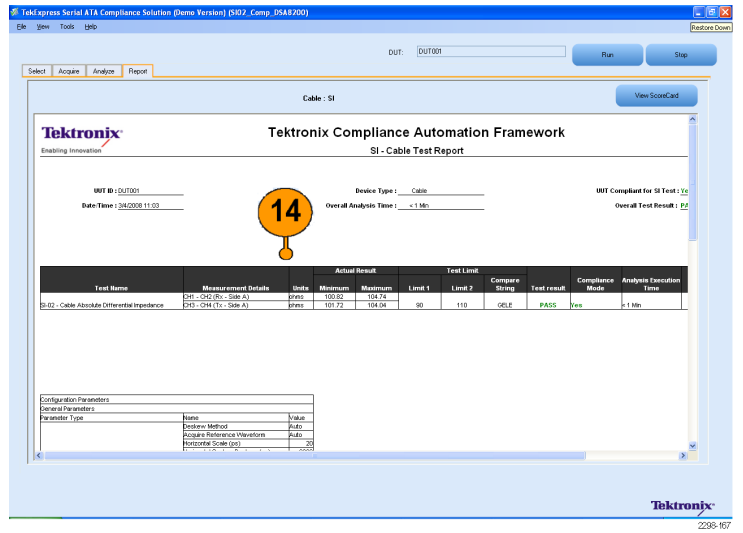
12. Acquire panel showing the status of waveform acquisition.



- Observe that only **SI-02 - Cable Absolute Differential Impedance** is checked for compliance. Other tests are skipped. The status of the tests is displayed in **Status Messages** window.



- After the tests complete, a report appears in the **Report** panel.



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