

D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support

The Keysight Technologies, Inc. D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support for Infiniium oscilloscopes provides you with an easy and accurate way to verify and debug your XAUI, 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO designs. The Ethernet electrical test software allows you to automatically execute Ethernet physical-layer (PHY) electrical tests and displays the results in a flexible report format. In addition to the measurement data, the report provides a margin analysis that shows how closely your device passed or failed each test. The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support performs a wide range of electrical tests required to meet the XAUI, 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO electrical specifications as documented in the XAUI (IEEE 802.3-2005, Clause 47), 10GBASE-CX4 (IEEE 802.3-2005, Clause 54), XAUI-based CPRI, OBSAI RP3, and Serial RapidIO standards. To meet signal quality requirements, your product must successfully pass conformance testing based on these specifications. Performing these tests gives you confidence in your design. The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support helps you execute a wide subset of the conformance tests that can be measured with an oscilloscope.



Transform complexity into simplicity

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support offers several features to simplify the validation of Ethernet designs:

- Setup wizard for quick and clear setup, configuration and test
- Wide range of XAUI, 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO electrical tests for standards conformance
- Accurate and repeatable results with Keysight Infiniium oscilloscopes
- Automated reporting in a comprehensive HTML format with margin analysis

With the D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support, you can use the same oscilloscope you use for everyday debugging to perform automated testing and margin analysis based on those electrical standards.

D9010EAPC 10GBASE-KR application software saves you time

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support saves you time by setting the stage for automatic execution of all the required electrical tests. Part of the difficulty of performing electrical tests for Ethernet transmitters is properly connecting to the oscilloscope, loading the proper setup files, and then analyzing the measured results by comparing them to limits published in the specification. The Ethernet electrical compliance test application software does much of this work for you. The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support automatically configures the oscilloscope for each test, and it provides an informative results report that includes margin analysis indicating how close your product is to passing or failing that specification.

Easy test definition

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support extends the ease-of-use advantages of Keysight's Infiniium oscilloscopes to testing XAUI, 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO designs. The Keysight automated test engine walks you quickly through the steps required to define the tests you want to make, set up the tests, perform the tests, and view the test results. A setup page enables you to quickly make decisions from the outset regarding the choice of tests and perform functions that affect the testing task. The test selections available in the following steps are then filtered according to the choices made in the setup page. While selecting tests, you can select a category of tests all at once or specify individual tests. You can save tests and configurations as project files and recall them later for quick testing and review of previous test results. Straightforward menus let you perform tests with a minimum of mouse clicks.

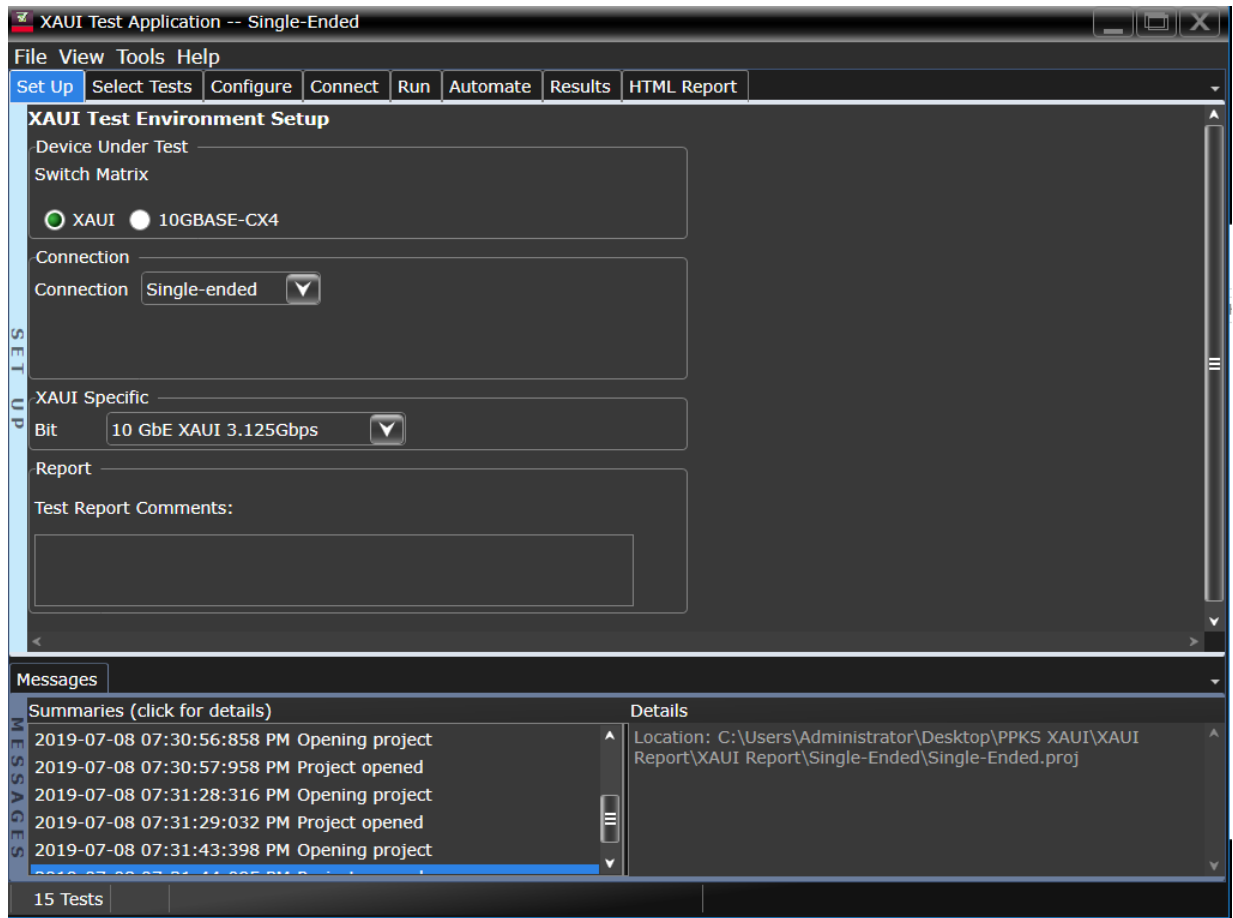


Figure 1. The clean interface of the setup page enables you to quickly make decisions and perform functions that affect the testing task.

Compliance measurement tests

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support allows you to run single or multiple tests based on your needs. Highlight a test to show more details including tests limits and references to related details of the specification. Accurate and repeatable results give you confidence in your measurements.

You can also specify the number of test trials and only stop running selected tests when the stop condition is met. The application will save the worst-case test result to help you track down the anomalies in your signals.

Tests performed

The D9010XAUC XAUI electrical validation application covers transmitter electrical parameters of XAUI and 10GBASE-CX4 devices based on the specifications from IEEE 802.3-2005. In addition, the application's debug mode allows control of parameters that can be changed to test to other XAUI-derived specifications.

The D9010XAUC also provides support for tests common to 10-gigabit Ethernet XAUI for the following standards:

- Common Public Radio Interface (CPRI) based on version 3.0 of the specification
- Open Base Station Architecture Initiative (OBSAI) Reference Point 3 (RP3) based on version 3.1 of the specification
- Serial RapidIO based on Part 6 of the RapidIO Interconnect Specification Rev. 1.3
- 10-gigabit Fibre Channel XAUI

These standards were based on the XAUI electrical interface from IEEE 802.3-2005 clause 47, with the goal that electrical designs for XAUI may be reused after suitable modification.

| Parameter | Subclause |
|---|-----------|
| Baud rate | 47.3.3 |
| Driver output amplitude Differential Single-ended | 47.3.3.2 |
| Transition time Rise-time Fall-time | 47.3.3.3 |
| Driver eye template tests Near-end Far-end | 47.3.3.5 |
| Driver transmit jitter Total jitter Deterministic | 47.3.3.5 |

Supported XAUI transmitter parameters from clause 47, IEEE 802.3-2005

| Parameter | Subclause |
|---|-----------|
| Baud rate | 54.6.3.3 |
| Differential output amplitude | 54.6.3.4 |
| Lane-to-lane amplitude difference | 54.6.3.4 |
| Differential output template | 54.6.3.6 |
| Transition time Rise-time Fall-time | 54.6.3.7 |
| Driver transmit jitter Total jitter Deterministic | 54.6.3.8 |

Supported 10GBASE-CX4 transmitter parameters from clause 54, IEEE 802.3-2005

| Standard | Baud Rate |
|--|---|
| CPRI | 614.4 MBaud 1228.8 MBaud 2457.6 MBaud 3072.0 MBaud |
| OBSAI RP3 | 768 MBaud 1536 MBaud 3072 MBaud |
| Serial RapidIO (both long and short run) | 1.25 GBaud 2.50 GBaud 3.125 GBaud |
| 10-gigabit Fibre Channel XAUI | 3.1875 GBaud |

Supported baud rates for various XAUI-based standards

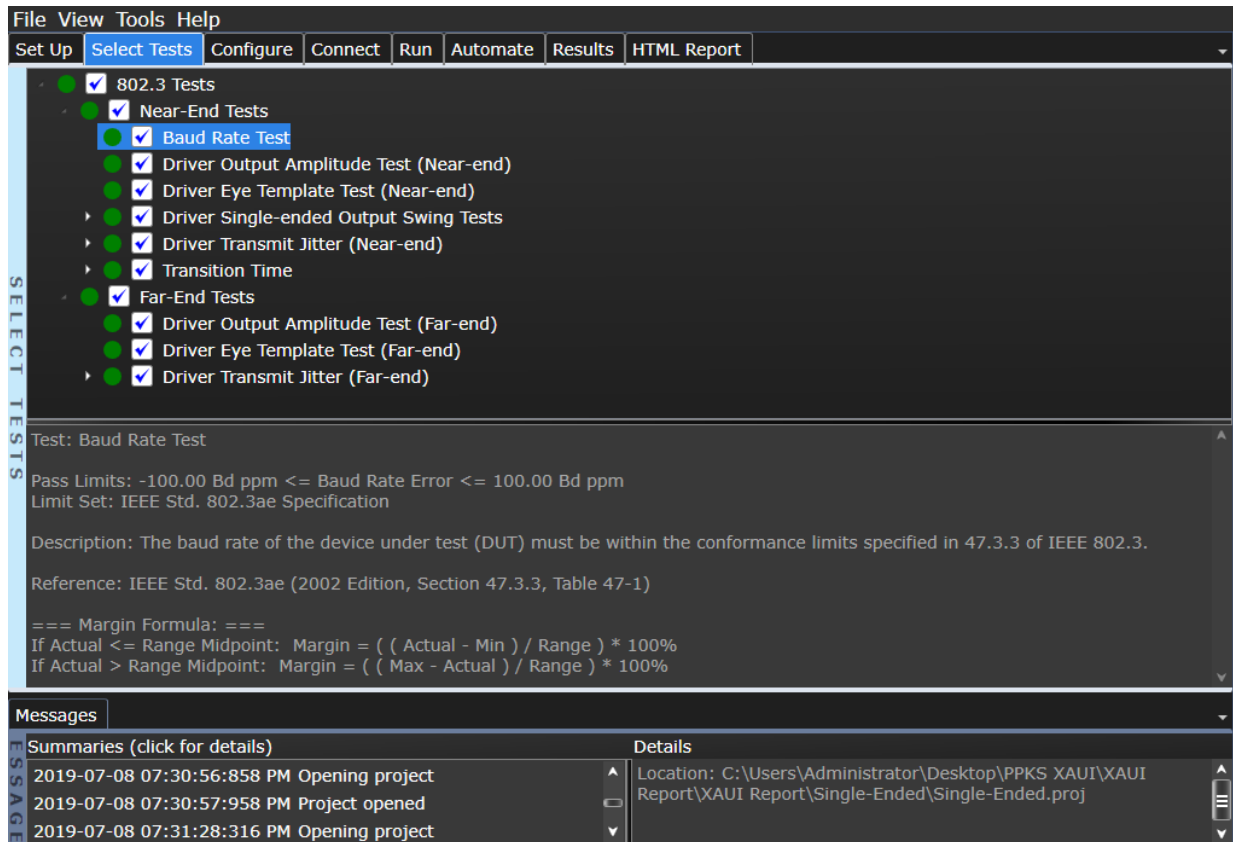


Figure 2. The Keysight automated test engine quickly guides you through selecting and configuring tests, setting up the connection, running the tests, and viewing the results. You can easily select individual tests or groups of tests with a mouse-click.

Configurability and guided connection

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support provides flexibility in your test setup. The application lets you define controls for critical test parameters such as voltage threshold values, number of waveforms used for analysis and customizable violation settings. Once you have configured the tests, the connection page will display the connection diagram for the test you have selected. The compliance application guides you to make connection changes with hookup diagrams when the tests you select require it.

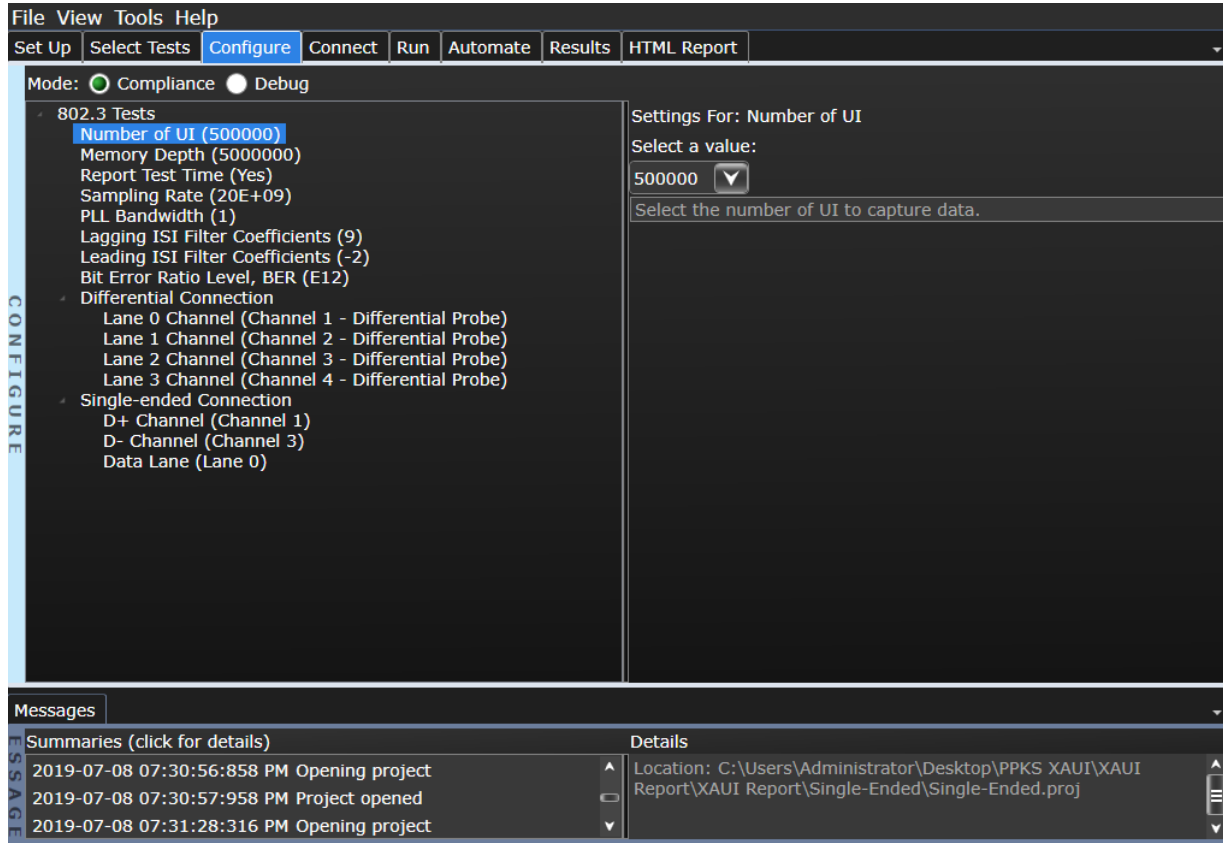
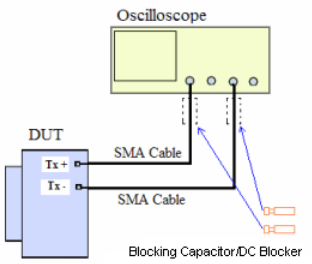


Figure 3. To set up tests, you define the device to test, its configuration, and how the oscilloscope is connected to it.

File View Tools Help
 Set Up Select Tests Configure **Connect** Run Automate Results HTML Report

Baud Rate Test

XAUI Transmitter Test Connection

| Step | Notes |
|--|--|
| 1. Connect two coaxial cables to the DUT's Lane 0. |  <p>Connection: (For DC Coupled Devices with high offset)</p> |
| 2. Connect the D+ signal to the oscilloscope CHAN1. Connect the D- signal to the oscilloscope CHAN3. | Deskew instructions can be found in the <i>Keysight D9010XAUC XAUI Electrical Validation Application</i> manual which is available via the |

Connection Completed **Run Tests** Suppress All Connection Prompts

Figure 4. When you make multiple tests where the connections must be changed, the software prompts you with connection diagrams.

Comprehensive result analysis

In addition to providing you with measurement results, the D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support provides a report format that shows you not only where your product passes or fails, but also reports how close you are to the limits specified for a test. You can select the margin test report parameter, which means you can specify the level at which warnings are issued to alert you to electrical tests where your product is operating close to the official test limit defined by the XAUI, 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO specifications.

| Test Name | Actual Value | Margin % | Pass Limits |
|--|----------------|----------|-------------------------------|
| ✓ Deterministic Jitter Test | 24 mUI | 85.9 | VALUE <= 170 mUI |
| ✓ Total Jitter Test | 63 mUI | 82.0 | VALUE <= 350 mUI |
| ✗ Differential Output Amplitude Test | 1.87 V | -167.5 | 800 mV <= VALUE <= 1.20 V |
| ✓ Baud Rate Test | -13.12 Bd ppm | 43.4 | -100.00 Bd ppm <= VALUE <= : |
| ✓ Driver Output Amplitude Test (Near-end) | 1.10 V | 37.5 | AmpMin V <= VALUE <= AmpMa |
| ✓ Driver Eye Template Test (Near-end) | 0.000 Failures | 50.0 | Zero Mask Failures |
| ✓ Driver Single-ended Output Swing Maximum Absolute Test (Tx+) | 277 mV | 88.0 | VALUE <= 2.300 V |
| ✓ Driver Single-ended Output Swing Minimum Absolute Test (Tx+) | -279 mV | 30.3 | VALUE >= -400 mV |
| ✓ Driver Single-ended Output Swing Maximum Absolute Test (Tx-) | 271 mV | 88.2 | VALUE <= 2.300 V |
| ✓ Driver Single-ended Output Swing Minimum Absolute Test (Tx-) | -286 mV | 28.5 | VALUE >= -400 mV |
| ✓ Total Jitter Test (Near-end) | 68 mUI | 80.6 | VALUE <= TJJLimit UI |
| ✓ Deterministic Jitter Test (Near-end) | 20 mUI | 88.2 | VALUE <= DJJLimit UI |
| ✓ Rise Time Test | 66.18 ps | 8.8 | RiseMin ps <= VALUE <= RiseMa |
| ✓ Fall Time Test | 65.11 ps | 7.3 | RiseMin ps <= VALUE <= RiseMa |
| ✓ Driver Output Amplitude Test (Far-end) | 1.11 V | 35.0 | AmpMin V <= VALUE <= AmpMa |
| ✓ Driver Eye Template Test (Far-end) | 0.000 Failures | 50.0 | Zero Mask Failures |
| ✓ Total Jitter Test (Far-end) | 67 mUI | 87.8 | VALUE <= TJJFLimit UI |
| ✓ Deterministic Jitter Test (Far-end) | 23 mUI | 93.8 | VALUE <= DJJFLimit UI |

Figure 5. The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support results screen shows a summary of the tests performed, pass/fail status, and margin. Clicking on a specific test also shows the test specification and a measurement waveform, if appropriate.

Thorough performance reporting

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support generates HTML reports that captures the performance, status and margins of your device under test. It also captures screenshots of critical measurements of your reference and documentation. This report is suitable for printing and sharing with your test vendors, customers and suppliers.

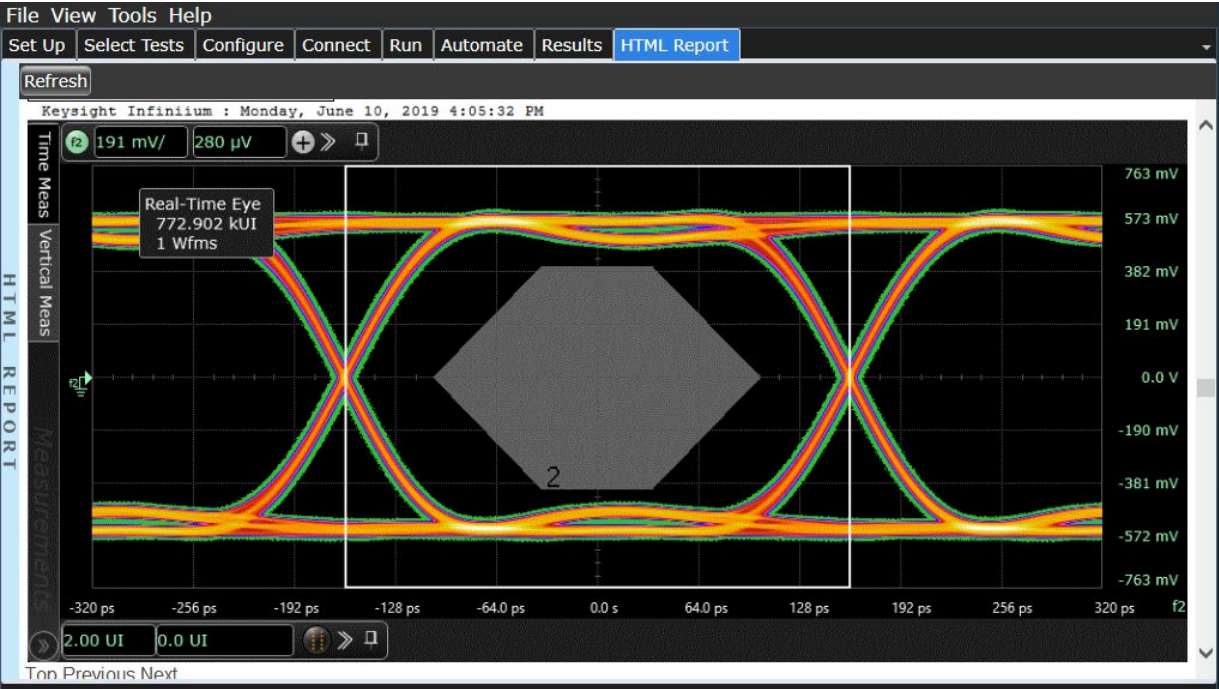


Figure 6. Additional details are available for each test, including the test limits, test description, and test results, including waveforms, if appropriate.

Recommended oscilloscope

The D9010XAUC XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 6.30 or higher.

| Data Rates | Minimum Bandwidth | Minimum Channels | Compatible Oscilloscopes |
|-------------|-------------------|------------------|----------------------------|
| 3.1875 Gbps | 13 GHz | 2 | V-Series, Z-Series and UXR |

Note: Data rates vary from 614.4 MBaud to 3.1875 GBaud based on technology. Highest data rate shown based on 10G Fibre Channel XAUI. Minimum oscilloscope bandwidth based on fastest transition times between 60 and 130 ps and available oscilloscope model based on that bandwidth.

Maximum frequency content = $0.4/\text{fastest rise or fall time (20-80\%)}$

Scope bandwidth required = 1.4x maximum signal frequency for 3% accuracy measurements

Scope bandwidth required = 1.2x maximum signal frequency for 5% accuracy measurements

Scope bandwidth required = 1.0x maximum signal frequency for 10% accuracy measurements

| Rise-Time | Recommended Bandwidth | Bandwidth of recommended Oscilloscope | Compatible Oscilloscopes |
|---------------|-----------------------|---------------------------------------|----------------------------|
| 60 ps | 10 GHz | 13 GHz | V-Series, Z-Series and UXR |
| 70 ps – 80 ps | 8 GHz | 8 GHz | S-Series |
| 90 ps | 6 GHz | 6 GHz | S-Series, MXR |

Software ordering information

| Model number | Description | Note |
|--------------|---|----------|
| D9010XAUC | XAUI Compliance Test Application Software with 10GBASE-CX4, CPRI, OBSAI, and Serial RapidIO Support | Required |
| D9020ASIA | Advanced Signal Integrity Software (EQ, InfiniiSim Advanced) | Optional |
| D9020JITA | EZJIT Complete - Jitter and Vertical Noise Analysis Software | Required |
| D9020DMBA | De-embedding Software (PrecisionProbe, InfiniiSim Basic) | Optional |

Example of hardware configuration

| Model number | Description | Quantity |
|--------------|--|----------|
| UXR0134A | 13 GHz Infiniium UXR-series oscilloscope | 1 |

Recommended accessories

Select the test accessories that best meet your signal probing requirements.

| Model number | Description |
|--------------|---|
| 1134A | 7-GHz differential probe amplifier |
| 1168A | 10-GHz differential probe amplifier |
| 1169A | 12-GHz differential probe amplifier |
| N5380A | InfiniiMax II 12-GHz differential SMA probe head and accessories |
| N5381A | InfiniiMax II 12-GHz differential solder-in probe head and accessories |
| N5382A | InfiniiMax II 12-GHz differential browser |
| E2695A | InfiniiMax 8-GHz differential SMA probe head |
| E2677A | InfiniiMax 7-GHz differential solder-in probe head and accessories |
| N5382A | InfiniiMax II 12-GHz differential browser |
| E2695A | InfiniiMax 8-GHz differential SMA probe head |
| E2677A | InfiniiMax 7-GHz differential solder-in probe head and propagation delay within 25 ps (or equivalent) |
| 11742A | DC blocking capacitor, 0.045 to 26.5 GHz, 3.5-mm (m-f) connectors |
| 54855-67604 | Precision BNC (m) to 3.5mm (f) adapter |

Third party accessories

Select the test accessories that best meet your signal probing requirements.

| Model number | Description |
|----------------------|---|
| IBNTSTCX4 | CX4 plug to SMA adapter. Orderable from W.L. Gore and Associates, Inc. www.gore.com |
| 4X-SMA-12R | 4X InfiniBand connector (SFF-8470) to SMA test adapter board. Order from Efficere Technologies www.efficere.com |
| TX/RX SignalBlade | Test card for HM-Zd (f) to SMA (f) access. Order from F9 Systems, Inc. www.F9-Systems.com |
| TX/RX BenchBlade | Test card for HM-Zd (m) to SMA (f) access. Order from F9 Systems, Inc. www.F9-Systems.com |

Flexible software licensing and KeysightCare software support subscriptions

Keysight offers a variety of flexible licensing options to fit your needs and budget. Choose your license term, license type, and KeysightCare software support subscription.

License terms

Perpetual – Perpetual licenses can be used indefinitely.

Subscription – Subscription licenses can be used through the term of the license only (6, 12, 24, or 36 months).

License types

Node-locked – License can be used on one specified instrument/computer.

Transportable – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (internet connection required).

USB Portable – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number E8900-D10).

Floating (single site) – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.

KeysightCare software support subscriptions

Perpetual licenses are sold with a 12 (default), 24, 36, or 60-month software support subscription. Support subscriptions can be renewed for a fee after that.

Subscription licenses include a software support subscription through the term of the license.



KeysightCare software support subscription provides peace of mind amid evolving technologies.

- Ensure your software is always current with the latest enhancements and measurement standards.
- Gain additional insight into your problems with live access to our team of technical experts.
- Stay on schedule with fast turnaround times and priority escalations when you need support.

Selecting your license:

- Step 1.** Choose your software product (e.g. S1234567A).
- Step 2.** Choose your license term: perpetual or subscription.
- Step 3.** Choose your license type: node-locked, transportable, USB portable, or floating.
- Step 4.** Depending on the license term, choose your support subscription duration.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

