

# D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T

Conformance test application software

## Introduction

The Keysight Technologies, Inc. D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T compliance test application provides a fast and effortless way to test, debug and characterize your 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Ethernet designs. The Keysight D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software for Infiniium real-time oscilloscopes saves you time and money by automating the task of performing compliance measurements. The tests performed by the software are based on the IEEE 802.3-2018 clause 113 (25GBASE-T), clause 55 (10GBASE-T) and IEEE 802.3-2018 clause 126 (5 GBASE-T, 2.5GBASE-T) specifications. Performing these tests gives you confidence in your design. The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software helps you execute a wide subset of the conformance tests using an oscilloscope, spectrum analyzer and vector network analyzer. The test application offers a user- friendly setup wizard and a comprehensive report that includes margin analysis.

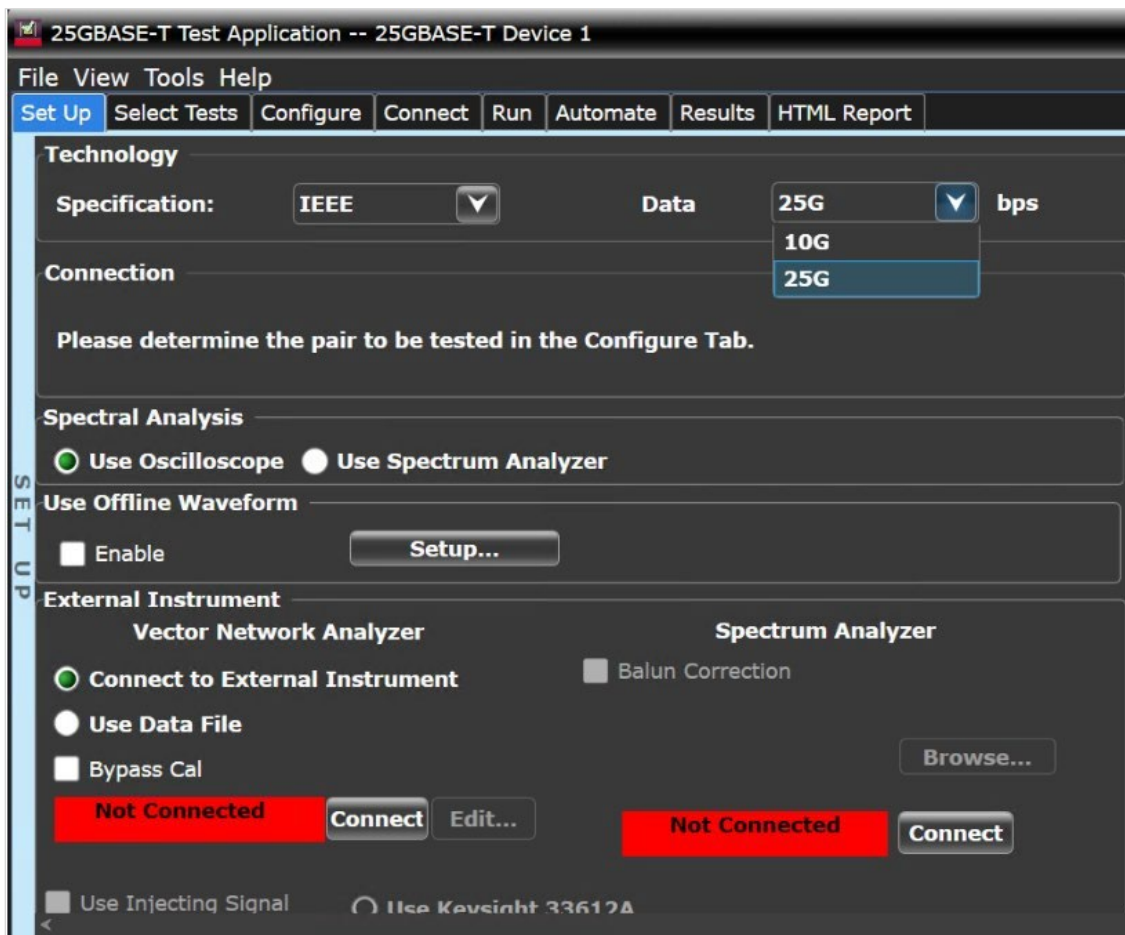


## Transform complexity into simplicity

- Complete coverage of the 25GBASE-T transmitter electrical specifications as described in clause 113.5.3 of IEEE 802.3-2018
- Complete coverage of the 10GBASE-T transmitter electrical specifications as described in clause 55.5.3 of IEEE 802.3-2018.
- Complete coverage of the NBASE-T and MGBASE-T transmitter electrical specification as described in the IEEE clause 126.5.3 of IEEE 802.3-2018
- Accurate return loss testing performed with a supported Keysight vector network analyzer.
- Automated measurement setup and programming of oscilloscope, spectrum analyzer and vector network analyzer for increased accuracy, time-savings and repeatability.
- Automated test engine with extremely user-friendly interface, allowing you to set up instruments and select and configure tests to be run, resulting in a comprehensive report of test results with margin analysis.
- With the D90103BQC 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software, you can use the same oscilloscope you use for everyday debugging to perform automated testing and margin analysis.

# D90103BQC Conformance Test Application Software Saves You Time

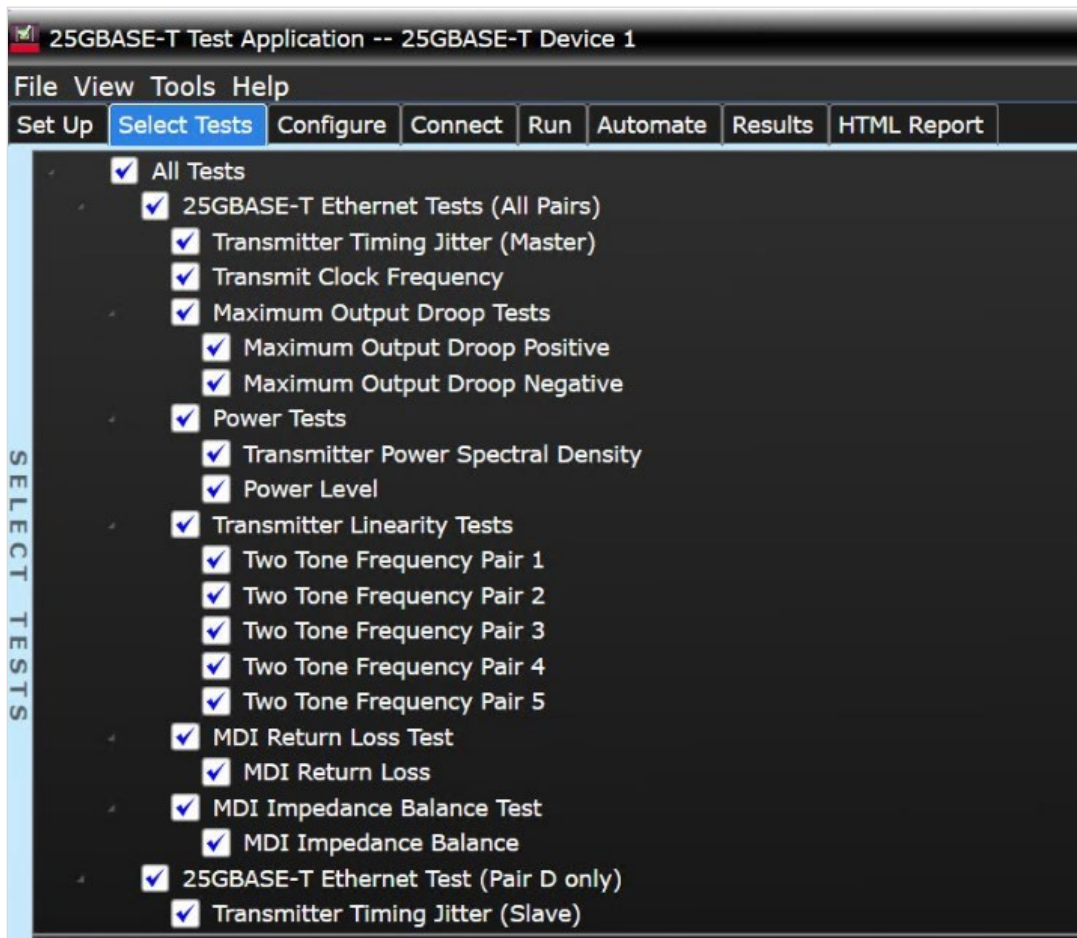
The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software saves you time by setting the stage for automatic execution of IEEE 802.3-2018 clause 55 (10GBASE-T) and IEEE 802.3-2018 clause 126 (5GBASE-T, 2.5GBASE-T) electrical tests. Part of the difficulty of performing 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 conformance test application software does much of this work for you. The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software 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 test specification.



**Figure 1.** The clean interface of the setup page enables you to quickly make decisions and perform functions that affect the testing task. This is where you select the specification and speed of the device under test and set up your additional instruments.

## Easy test definition

The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software extends the ease-of-use advantages of Keysight's Infiniium oscilloscopes to testing IEEE 802.3-2018 clause 55.5.3 (10GBASE-T) and IEEE 802.3-2018 clause 126.5.3 (5GBASE-T, 2.5GBASE-T) 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 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.

The following clauses are included in the D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software:

<b>25GBASE-T Standard reference</b>	<b>Description</b>
IEEE 802.3-2018 Subclause 113.5.3.1	Maximum output droop
IEEE 802.3-2018 Subclause 113.5.3.2	Transmitter linearity
IEEE 802.3-2018 Subclause 113.5.3.3	Transmitter timing jitter
IEEE 802.3-2018 Subclause 113.5.3.4	Transmitter power spectral density (PSD) and power level
IEEE 802.3-2018 Subclause 113.5.3.5	Transmit clock frequency
IEEE 802.3-2018 Subclause 113.8.2.1	MDI return loss
IEEE 802.3-2018 Subclause 113.8.2.2	MDI impedance balance

<b>10GBASE-T Standard reference</b>	<b>Description</b>
IEEE 802.3-2018 Subclause 55.5.3.1	Maximum output droop
IEEE 802.3-2018 Subclause 55.5.3.2	Transmitter linearity
IEEE 802.3-2018 Subclause 55.5.3.3	Transmitter timing jitter
IEEE 802.3-2018 Subclause 55.5.3.4	Transmitter power spectral density (PSD) and power level
IEEE 802.3-2018 Subclause 55.5.3.5	Transmit clock frequency
IEEE 802.3-2018 Subclause 55.8.2.1	MDI return loss
IEEE 802.3-2018 Subclause 55.8.2.2	MDI impedance balance

<b>10GBASE-T Standard reference</b>	<b>Description</b>
IEEE 802.3-2018 Subclause 126.5.3.1	Maximum output droop test positive/negative
IEEE 802.3-2018 Subclause 126.5.3.2	Transmitter linearity tests
IEEE 802.3-2018 Subclause 126.5.3.3	Transmitter timing jitter
IEEE 802.3-2018 Subclause 126.5.3.4	Transmitter power spectral density (PSD) and power level
IEEE 802.3-2018 Subclause 125.5.3.5	Transmit clock frequency
IEEE 802.3-2018 Subclause 126.8.2.1	MDI return loss
IEEE 802.3-2018 Subclause 126.8.2.2	MDI impedance balance

# Configurability and Guided Connection

The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software provides flexibility in your test setup. The application lets you define controls for critical test parameters such as signaling rate, clock recovery 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 conformance application guides you to make connection changes with hookup diagrams when the tests you select require it.

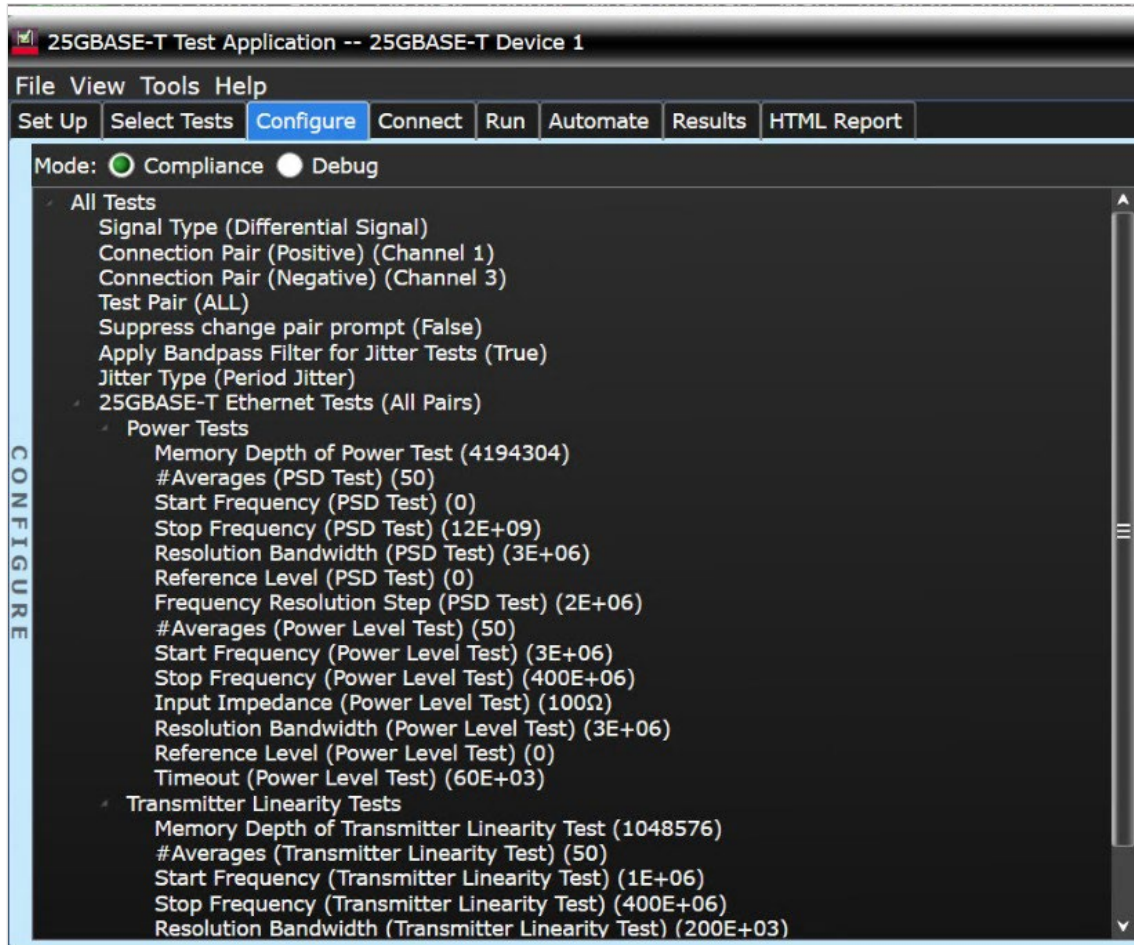
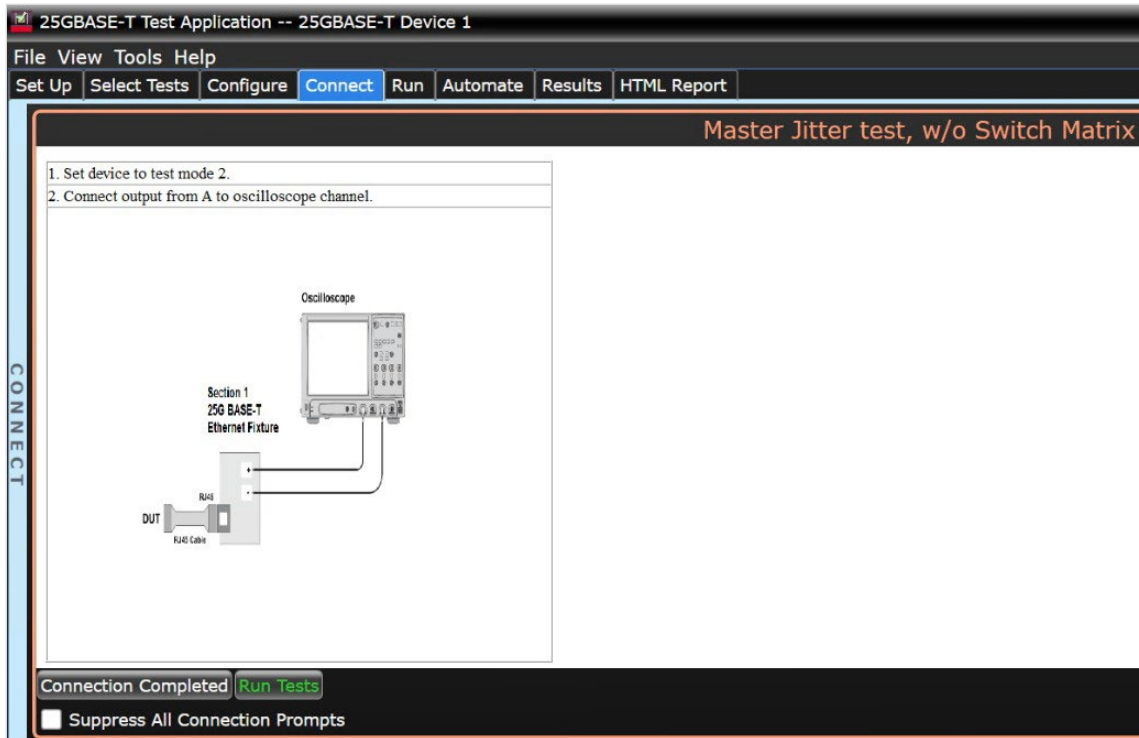


Figure 3. To set up tests, you define the device to test, its configuration, and how the oscilloscope is connected to it.



**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 D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software 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 IEEE 802.3-2018 clause 55.5.3 (10GBASE-T), IEEE 802.3-2018 clause 126.5.3 (5GBASE-T, 2.5GBASE-T) and MGBASE-T-TI100-R (5GBASE-T, 2.5GBASE-T) specifications.

## Test Report

**PASS**

Test Configuration Details	
<b>Application</b>	
Name	D90103BQC 25GBASE-T Test
Version	0.99.9027.0
<b>Device Description</b>	
Technology Spec	IEEE
Technology Rate	25G
Spectral Analysis	Use Oscilloscope
VNA Connection	Connect to External Instrument
Disturber Source	Use Keysight 33612A
<b>Test Session Details</b>	
Infiniium SW Version	11.10.00202
Infiniium Model Number	MXR608A
Infiniium Serial Number	US12345678
Debug Mode Used	No
Compliance Limits	Standard
Last Test Date	2021-06-04 17:38:18 UTC +08:00

## Summary of Results

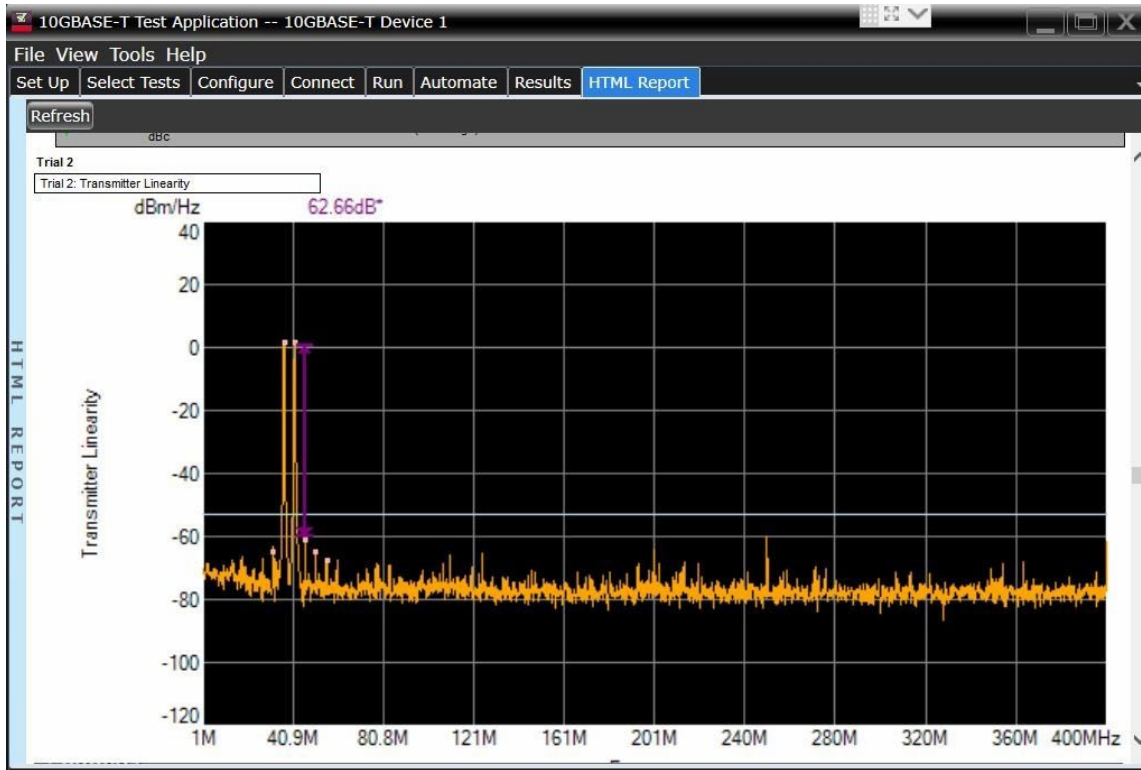
Test Statistics	
Failed	0

**Figure 5.** The IEEE802.3bs/cd conformance test application software results screen shows a summary of the tests performed, pass/fail status, and margin. Hyperlinks direct you to the more details of that test.



# Thorough Performance Reporting

The D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software 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 D90103BQC 25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T Conformance Test Application Software is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 6.30 or higher.

Data rates	Minimum bandwidth	Minimum channels	Compatible oscilloscopes
2.5Gb/s 5Gb/s 10Gb/s 25Gb/s	6 GHz	2	MXR608A, MXR604A

## Ordering Information

Model number	Description	Note
D90103BQC	25GBASE-T, 10GBASE-T, NBASE-T and MGBASE-T conformance test application software	Required
D9020ASIA	Advanced signal integrity software (EQ, InfiniiSim Advanced)	Optional
D9020JITA	EZJIT complete - Jitter and vertical noise analysis software	Required

## Example of Hardware Configuration

Model number	Description	Note
MXR608A	6 GHz, 8 channel Infiniium MXR-Series oscilloscope	1

## Fixture and Accessories

Model number	Description	Note
(Wilder Technologies) ETH-TPA-RJ45CAT8-P	Ethernet IEEE 25GBASE-T/40GBASE-T RJ-45 (8P8C) TPA plug test adapter (ETH-TPA- RJ45CAT8-P)	1
U7237A	10GBASE-T transmitter electrical test fixture for MGBASE-T and NBASE-T	1 (if not using above CAT8 Fixture)
11667L	DC to 2 GHz power splitter with BNC connector	1
11667B	DC to 26.5 GHz power splitter with SMA connector	1

Note: Pick just one of the splitters above for transmitter nonlinear distortion test.

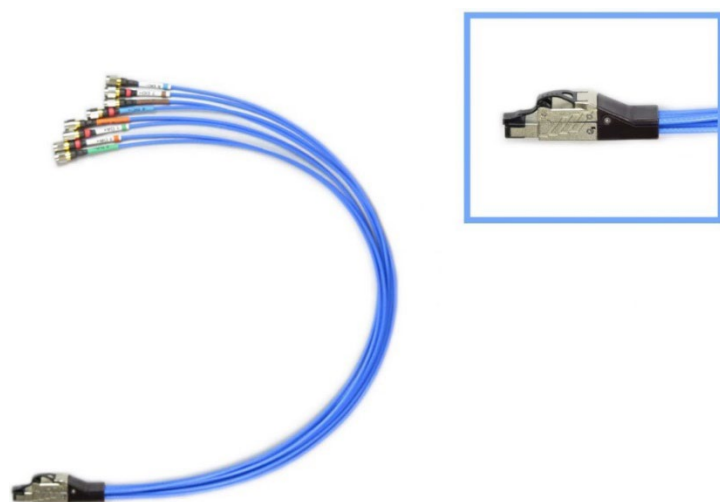
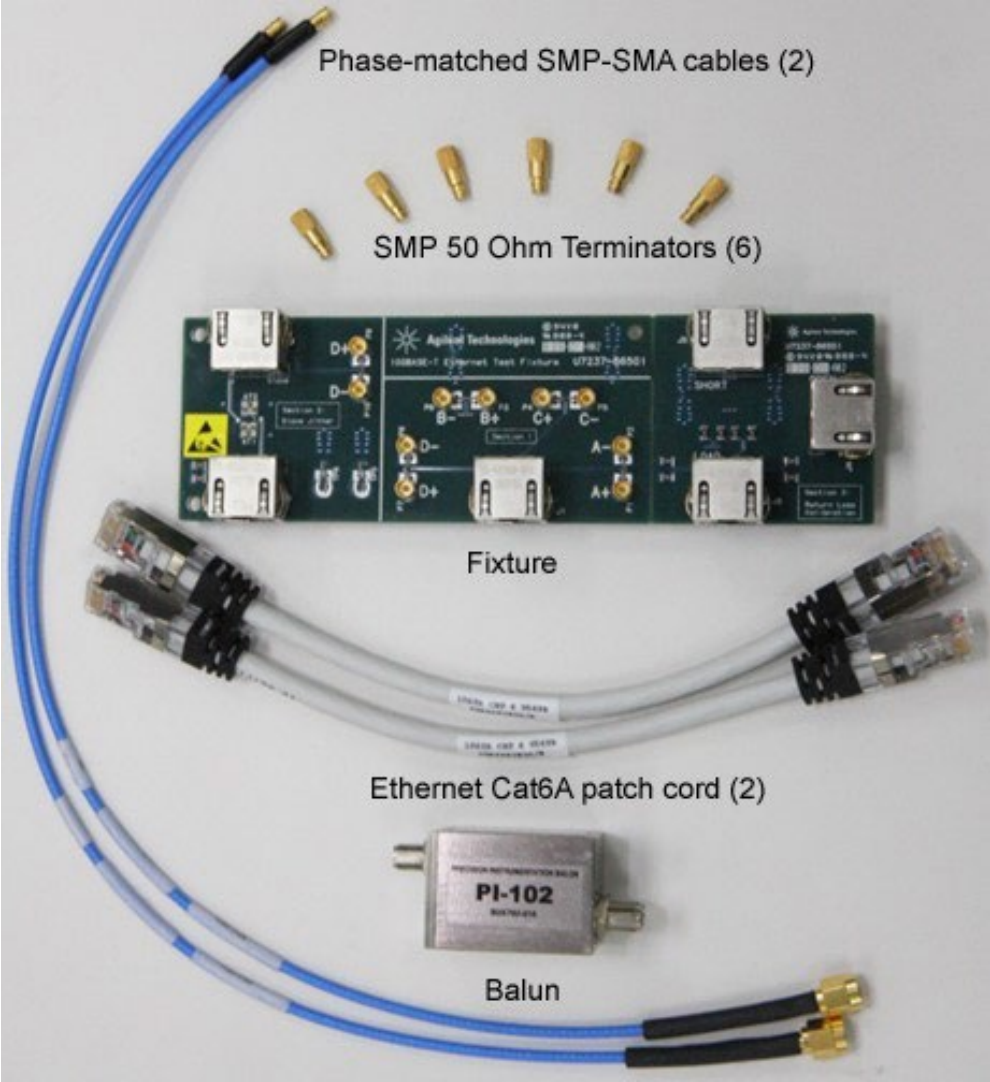


Figure 7. The Wilder Technologies: ETH-TPA-RJ45CAT8-P is the recommended test interconnect for use with 25GBASE-T applications.



**Figure 8.** The Legacy U7237A fixture kit includes all the required accessories to make both electrical and return loss measurements.

# 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.

**Time-based** – Time-based 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 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.

# 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.

Time-based licenses include a software support subscription through the term of the license.

## Selecting your license:

**Step 1** Choose your software product (e.g. S1234567A).

**Step 2** Choose your license term: perpetual or time-based.

**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.

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