

10GBASE-T Test Solutions

QPHY-10GBASE-T
TF-10GBASE-T



Key Features

- Automated and easy-to-use solution for IEEE802.3-2008 10GBASE-T compliance testing
- Complete physical layer test package including the required test fixture and cables
- Supports all PMA Transmitter Tests
 - Transmitter Max Output Droop
 - Transmitter Linearity
 - Transmitter Timing Jitter, Master and Slave
 - Transmitter Clock Frequency
 - Transmitter Power Spectral Density
 - Transmitter Power Level
- Supports MDI Return Loss Test with Teledyne LeCroy SPARQ Network Analyzer
- Compatible with Teledyne LeCroy WaveMaster 8 Zi-A, LabMaster 9 Zi-A and LabMaster 10 Zi oscilloscopes

QPHY-10GBASE-T automated compliance solution adds to the QPHY-SFI and QPHY-10GBASE-KR solutions for complete 10G Ethernet systems test coverage.

Automated and Easy-to-Use

The QPHY-10GBASE-T automated compliance test software performs electrical compliance testing of the Physical Media Attachment (PMA) for a 10GBASE-T Ethernet PHY based on IEEE802.3-2008 requirements, including transmitter and MDI return loss tests.

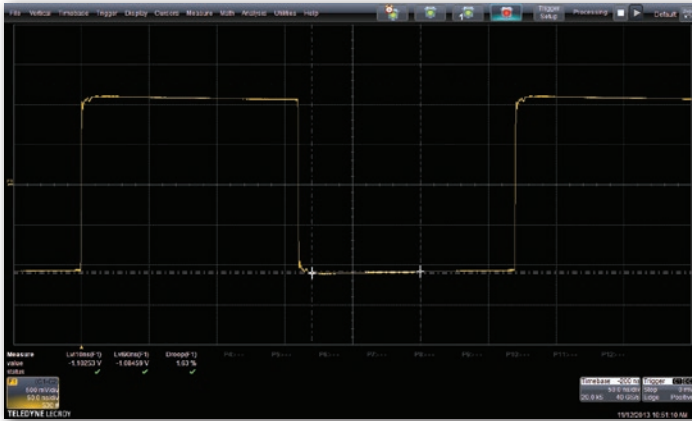
QPHY-10GBASE-T uses the QualiPHY compliance test software package. The QualiPHY test script provides connection diagrams to ensure the proper setup for the required measurements, automates the oscilloscope and network analyzer for performing these measurements, and provides a comprehensive report of the results including screenshots. These capabilities make QPHY-10GBASE-T an all-inclusive test suite that meets the needs of 10GBASE-T transceiver compliance testing.

Complete Electrical Compliance Test

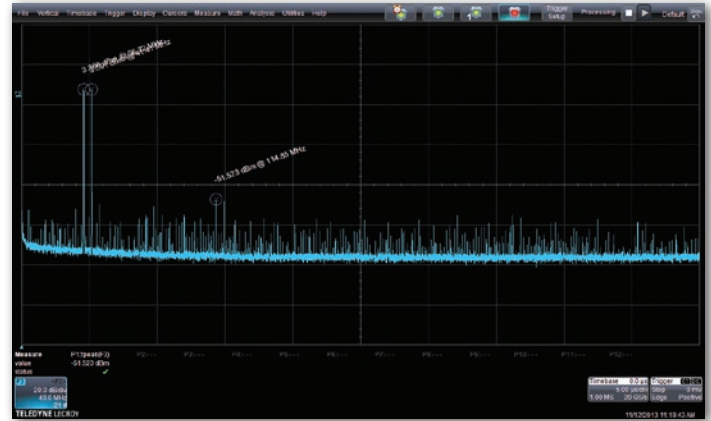
The complete 10GBASE-T compliance test package will perform all electrical transmitter compliance tests as defined in section 55.5.3 of the IEEE 802.3-2008 PMA transmitter specifications. The following transmitter tests are included in the QualiPHY solution: Maximum Output Droop, Linearity, Timing Jitter (Master and Slave), Transmit Clock Frequency, Power Spectral Density and power level. The TF-10GBASE-T fixture kit complete test package includes the required test fixture, cables, balun and calibration structures.

Teledyne LeCroy oscilloscopes are ideal for 10GBASE-T compliance measurements, and even more importantly, for debugging compliance failures. With Teledyne LeCroy's extensive software tools, engineers can quickly find the root cause of 10GBASE-T transmitter problems.

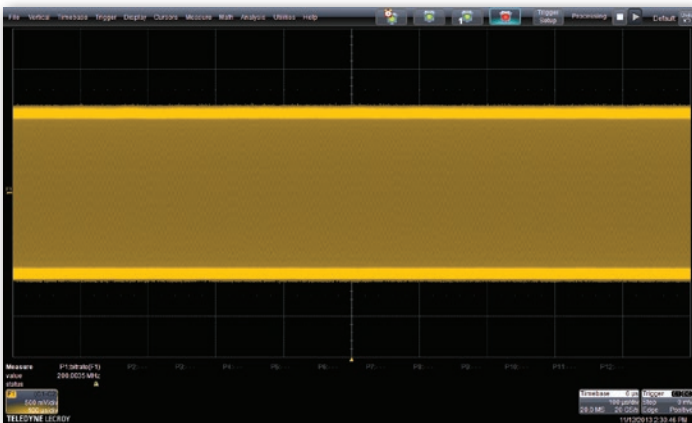
COMPREHENSIVE 10GBASE-T TEST COVERAGE



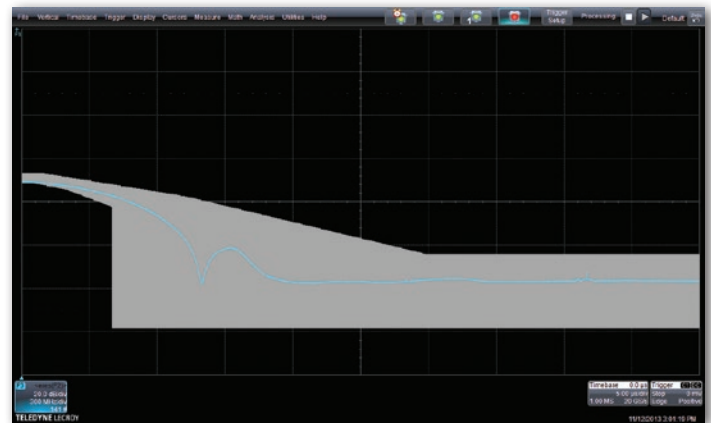
Transmitter Output Droop – The output droop is calculated on both rising and falling edges. Droop magnitude is determined by measuring the average slope of the top/bottom levels, between 10 and 90 ns after rising/falling edges. To pass, the % droop must be less than 10%.



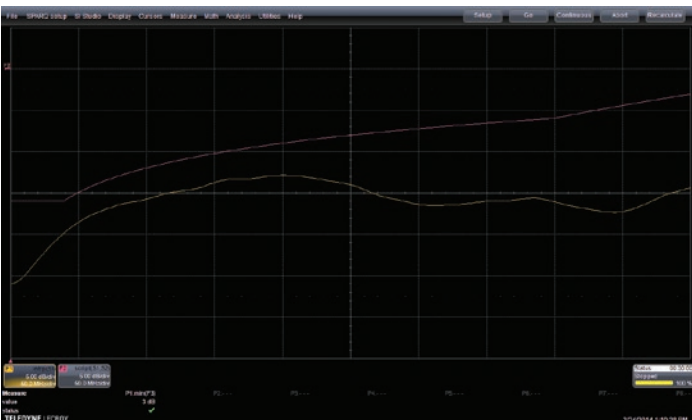
Transmitter Linearity – The linearity is determined by measuring the spurious-free dynamic range (SFDR) while in test mode 4. The spectrum of the signal is compared to the spectral line of the tone. To pass, the SFDR must exceed the limits defined in the standard.



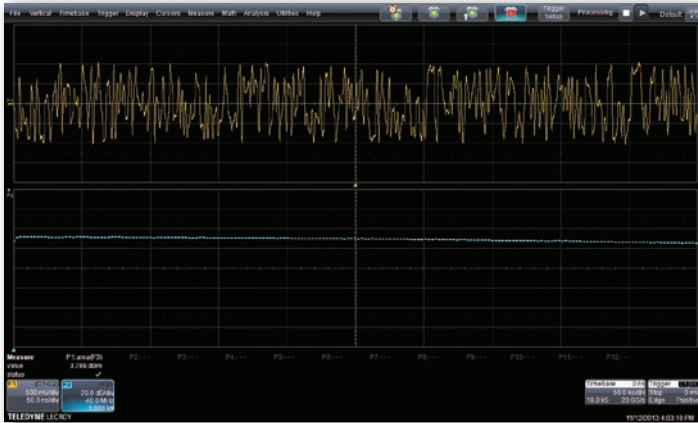
Transmitter Clock Frequency – The bitrate of the 200 MHz test mode 2 signal is calculated to determine if it passes the test limit of +/- 50 ppm.



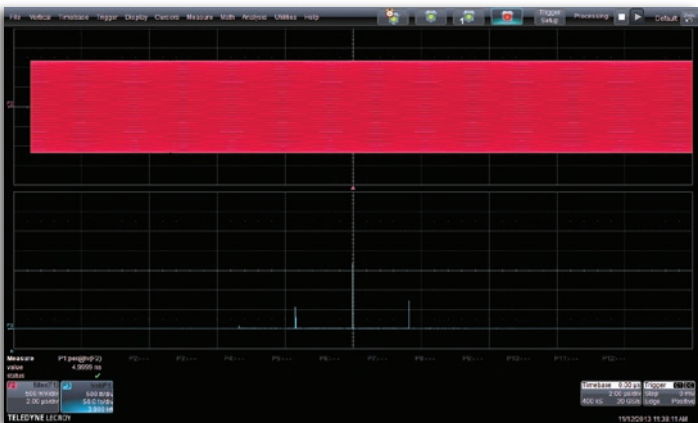
Transmitter Power Spectral Density (PSD) – The power spectral density (PSD) of the test mode 5 signal is compared to the mask defined in the spec. Pass-fail mask testing is used to determine if all points are within the mask.



MDI Return Loss Test – The return loss for each differential pair is measured using a SPARQ series network analyzer with the Device Under Test (DUT) in test mode 5 using a balun to output the differential signal. Results are properly referenced using the SPARQ's second-tier calibration capability.



Transmitter Power Level – The transmitter power level is determined by calculating the integrated power of the test mode 5 signal, from 0 to 400 MHz. The result is compared to the requirement that the level be between 3.2 and 5.2 dBm.



Transmitter Jitter Timing (Master and Slave) – Separate tests are performed measuring the transmitter timing jitter for both Master and Slave. The tests calculate the σ of the period of the clock signals output from the DUT when configured for Master or Slave testing. The tests pass if the standard deviation is less than 5.5 ps.

QualiPHY

QualiPHY is designed to reduce the time, effort, and specialized knowledge needed to perform compliance testing on high-speed serial buses.

- Guides the user through each test setup
- Performs each measurement in accordance with the relevant test procedure
- Compares each measured value with the applicable specification limits
- Fully documents all results
- QualiPHY helps the user perform testing the right way—every time!




10GBase-T Test Report

Overall result: Pass

DUT:	10GBT-DUT1
Comment:	
Time of session start:	03/19/2014 18:33:18
Operator:	
Temperature:	0° C
Standard in use:	10GBase-T

Run1:	2014/03/19 18:33:25
Time of run:	All Tests
Configuration in use:	Default
Limits in use:	
Oscilloscope Name:	LCRY0505N56765 Model: SDA8302-A
Oscilloscope Serial #:	LCRY0505N56765
Computer:	LCRY0505N56765
Oscilloscope firmware version:	0.7.4.0 (Build 198504)
QualiPHY core version:	7.3.2 (Build 1000001)

QualiPHY script version:	0.119
Stylesheet version:	1.2.0.6

Summary Table

Pass	Run #	Test	Measurement	Current Value	Test Criteria
✓	1	1	Drop - positive_Pair A	1.419 %	X < 10.000 %
✓	1	1	Drop - negative_Pair A	1.592 %	X < 10.000 %
✓	1	1	Drop - positive_Pair B	1.353 %	X < 10.000 %
✓	1	1	Drop - negative_Pair B	1.527 %	X < 10.000 %
✓	1	1	Drop - positive_Pair C	1.898 %	X < 10.000 %
✓	1	1	Drop - negative_Pair C	1.892 %	X < 10.000 %
✓	1	1	Drop - positive_Pair D	1.537 %	X < 10.000 %
✓	1	1	Drop - negative_Pair D	1.893 %	X < 10.000 %
✓	1	2	Transmitter Linearity SFDR 36.7188MHz, 141.400MHz, Pair A	55.050 dBm	X == 54.500 dBm
✓	1	2	Transmitter Linearity SFDR 78.8062MHz, 104.600MHz, Pair A	54.138 dBm	X == 50.346 dBm
✓	1	2	Transmitter Linearity SFDR 139.8444MHz, 141.400MHz, Pair A	54.494 dBm	X == 45.449 dBm

Compliance Reports contain all of the tested values, the specific test limits and screen captures. Compliance Reports can be created as HTML, PDF or XML.

Network Analysis using the SPARQ

The QPHY-10GBASE-T software package utilizes the SPARQ Series network analyzer to measure the return loss of each differential pair. The SPARQ connects to either the oscilloscope or user's PC via USB, and runs PC-based software to perform the necessary calibration and measurements. SPARQ is the ideal instrument for characterizing multi-port devices common in signal integrity applications at fraction of the cost of traditional methods, and is available with either 2, 4, 8 or 12 ports.

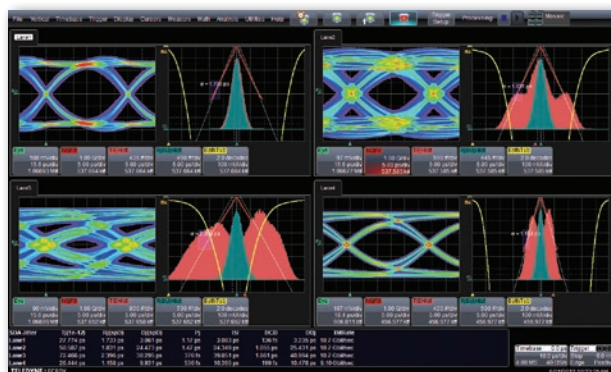


SPARQ is ideal for:

- Compliance testing
- Design validation
- Development of measurement-based simulation models
- PCB testing
- Portable measurement requirements

Advanced Debug Capability

If a compliance failure is found, Teledyne LeCroy offers a variety of packages which help find the root cause quickly and easily. The SDAIII-CompleteLinQ serial data analysis package has the ability to perform eye, jitter and noise measurements on 4 lanes simultaneously, and is fully integrated into the oscilloscope application software.



TF-10GBASE-T Text Fixture

The TF-10GBASE-T test fixture breaks out the A, B, C and D pairs from the 10GBASE-T CAT6 cable to SMA connectors. Included is a fixture for performing the appropriate calibration of the SPARQ Network Analyzer, including different SHORT, OPEN and LOAD structures. The kit includes matched cables and a balun for the return loss test.



ORDERING INFORMATION

Product Description

10GBASE-T Compliance Software
10GBase-T Compliance Test Fixture

Product Code

QPHY-10GBASE-T
TF-10GBASE-T

Recommended Oscilloscopes

WaveMaster 8 Zi-A Series Oscilloscopes
LabMaster 9 Zi-A Series Oscilloscopes
LabMaster 10 Zi Series Oscilloscopes

Customer Service

Teledyne LeCroy oscilloscopes and probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years and our probes are warranted for one year.

This warranty includes:

- No charge for return shipping
- Long-term 7-year support
- Upgrade to latest software at no charge



1-800-5-LeCroy
teledynelecroy.com

Local sales offices are located throughout the world.
Visit our website to find the most convenient location.