LeCroy

Ethernet Test Solutions
QPHY-ENET

*1000Base-T Mode 1 Mask Test Result*

Key Features

- **Compliant with IEEE 802.3-2005 and ANSI INCITS 263-1995 (R2000) Standards (1000Base-T, 100Base-TX, 10Base-T)**

- **Simple and easy-to-use automated testing and reporting**

- **The LeCroy test fixture (TF-ENET-B) supports complete range of compliance tests without a probe**

- **Built-in Power Splitter for disturbing signal test**

- **Mask testing**

- **"No TX TCLK DUT" support**

- **Common mode voltage test**

QPHY-ENET is a software option package that performs electrical compliance testing for 1000Base-T, 100Base-TX, and 10Base-T standards with LeCroy's QualiPHY automated test and report software.

Select the compliance tests from the QualiPHY menu and the tests will automatically execute, prompting the user with instructions and connection diagrams.

When the tests are complete, QualiPHY will generate a test report in PDF, HTML, or XML formats. Jitter and pulse mask tests are performed with automatic waveform alignment, and all test results feature
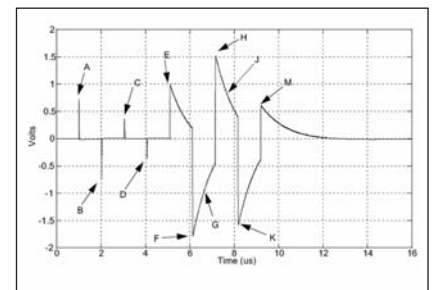
1000Base-T Test Transmitter Test Mode 1 Waveform

pass/fail indicators corresponding to the standard being tested. 10Base-T pulse mask testing is also supported, using the supplied compliance mask.

LeCroy's test fixture provides all three standard test loads and conditions as described in the IEEE and ANSI specifications.

QualiPHY

Compliance Testing for 1000Base-T, 100Base-TX, and 10Base-T Standards
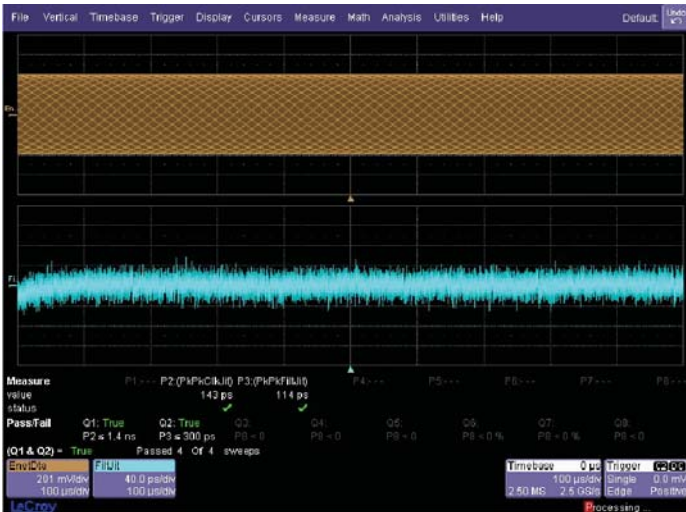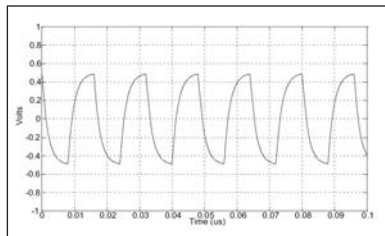

Figure 1: *1000Base-T Mode 2 Test*

1000Base-T Test Master Jitter Test

Figure 1 shows an input signal (Figure 1: upper), and a jitter track (Figure 1: lower) which is a plot of jitter value vs. time.

Example of Transmitter Test Modes 2 and 3 Waveform

The measurement result is shown under the grid. Mode 3 Slave Jitter test is also supported in the package.
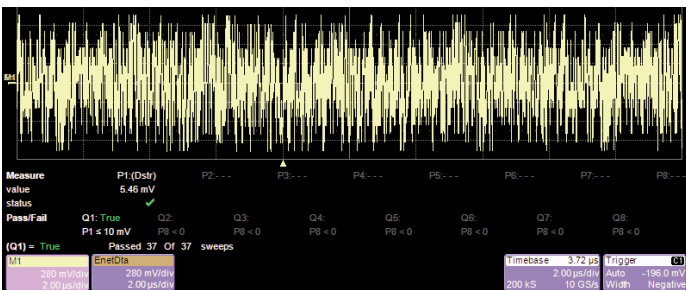

Figure 3: *100Base-TX twisted pair active output interface mask test result.*

100Base-TX and 10Base-T Tests in QPHY-ENET Sotware Package

The QPHY-ENET software package also supports 100Base-TX and 10Base-T tests as defined by IEEE 802.3-2005 and ANSI INCITS 263-1995 (R2000). Figure 3 shows a 100Base-TX Mask test result.

Figure 2: *1000Base-T Mode 4 Test*

1000Base-T Test Mode 4

The Transmitter Distortion test is shown in Figure 2. The distortion test measures the error in the signal under test relative to an ideal waveform generated by a mathematical model of the PAM-5 coded signal. A 20.833 MHz disturbing signal, at a level of 5.4 V (2.7 V at the DUT input), can be added. The test uses a high degree of averaging in order to accommodate the 10mV resolution test requirement.

Figure 4: *10Base-T DOV External Mask Test*

10Base-T Differential Output Voltage Mask Test

Figure 4 shows the 10Base-T Differential Output Voltage Mask test. The test is defined as the absolute value of the peak differential voltage measured into a 100 ohm termination. The mask test evaluates the pulse shape.
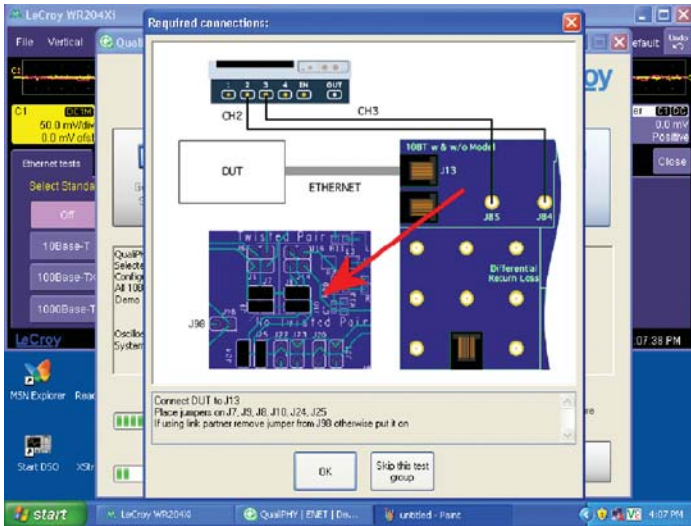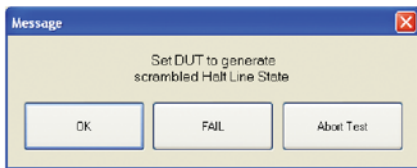
Figure 5: Connection Diagram and Message Box

Figure 7: Compliance Test Items Setup and Pre-set Test Procedures Menu

Figure 6: Message Box

Ethernet tests require many test setups and connections. QualiPHY makes it very easy to setup and perform the tests through the use of instructive connection diagrams and message boxes as shown in Figures 5 and 6. The message box under the connection diagram instructs the user how to change jumper pins in order to do the test. Message boxes pop up when test signal needs to be changed by the user.

Figure 7 shows Ethernet test items and pre-set test configurations. Test items can be selected from the configuration menu. Users can create customized test sequences by copying the existing configuration and editing. (Users cannot modify pre-set test configurations.)

After the test, the QPHY-ENET software package will generate a test result report as shown in Figure 8. Reports can be generated in HTML, PDF, and XML formats.

Each measurement is marked as either Pass or Fail in a summary table. Further information, such as related screen dumps showing the waveform at the time of test, can be found in the Detail section of the report.

Reports give all the relevant information on the instrumentation used to do the compliance test.
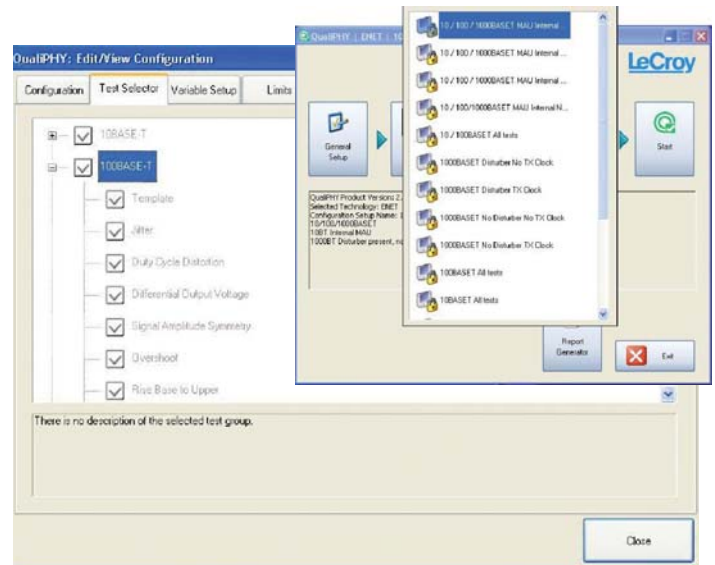

Figure 8: ENET Test Results Report

Specifications and Ordering Information

TF-ENET-B

TF-ENET-B is required to test all 3 standards (10/100/1000Base-T). All signal connections to the digital oscilloscope use SMA cables in order to avoid any influence from additional circuits such as probes. The test fixture is designed to include –3 dB power splitter for disturbing signal tests in the 1000Base-T. The kit includes 50 ohm terminators (6), 6" Ethernet cable (1) to connect to the DUT, SMA cables (2), and BNC to SMA adapters (2).

TF-ENET-B: Ethernet test fixture equipped with SMA connection for high signal fidelity. *SMA cable and adapter included with fixture.

Specifications

1000BASE-T
– MODE 1: PDOV, DROOP, PULSE MASK
– MODE 2: MASTER JITTER
– MODE 3: SLAVE JITTER
– MODE 4: TRANSMITTER DISTORTION
– COMMON MODE OUTPUT VOLTAGE

100BASE-TX
– UTP DIFFERENTIAL OUTPUT VOLTAGE
– OVERSHOOT
– SIGNAL AMPLITUDE SYMMETRY
– RISETIME BASE TO UPPER
– FALLTIME UPPER TO BASE
– RISETIME LOWER TO BASE
– FALLTIME BASE TO LOWER
– RISE/FALL TIME SYMMETRY
– DUTY CYCLE DISTORTION
– JITTER
– TWISTED-PAIR ACTIVE OUTPUT INTERFACE TEMPLATE

10BASE-T
– PEAK DIFFERENTIAL OUTPUT VOLTAGE
– HARMONICS
– INTERNAL/EXTERNAL MAU NORMAL
– INTERNAL/EXTERNAL MAU INVERTED
– 100 OHM: TP_IDL & LINK PULSE*
– LOAD 1: TP_IDL & LINK PULSE*
– LOAD 2: TP_IDL & LINK PULSE*
– OUTPUT TIMING JITTER*
– 8.0BT OUTPUT TIMING JITTER*
– 8.5BT OUTPUT TIMING JITTER*
– COMMON MODE OUTPUT VOLTAGE

*WITH & WITHOUT TWISTED-PAIR MODEL

Ordering Information

Recommended System Configuration

10Base-T, 100Base-TX and 1000Base-T
All WaveMaster Series Oscilloscopes
All SDA Series Serial Data Analyzers
All DDA Series Disk Drive Analyzers
WavePro 7100, 7200, 7300, including "A" Models
WaveRunner 6100, 6200, including "A" Models
WaveRunner 104Xi, 204Xi, including MXi Models

10Base-T and 100Base-TX
WaveRunner 62Xi, 64Xi, 44Xi, including MXi Models
WaveRunner 6050 including "A" Models

LeCroy
1-800-5-LeCroy
www.lecroy.com

**Local sales offices are located throughout the world.
To find the most convenient one visit www.lecroy.com**

Product Description	Product Code
Ethernet Application Software	QPHY-ENET*
10/100/1000Base-T Compliance Test Fixture	TF-ENET-B
2 x 18 inch SMA to SMA Cable	ENET-2CAB-SMA018†
2 x BNC to SMA Adapter	ENET-2ADA-BNCSMA†
2 x 36 inch SMA to SMA Cable	ENET-2CAB-SMA036

*TF-ENET-B required.   † Included with TF-ENET-B.

Customer Service
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