TELEDYNE LECROY
Everywhere**you**look™

PCI Express®
Validation Testing

Assure Product Quality and Minimize Time-to-Market

Key Features

- **Fully Integrated & Automated**

  Simplifies and speeds testing of new product designs for PCI Express

- **Supports PCIe 1.x, 2.0 and 3.0**

  Supports all PCI Express data rates up to and including 8 GT/s

- **Supports x1, x2, x4, x8 and x16**

  Test all lane widths to validate all possible configurations

- **Supports Both Root Complex and Endpoint Devices**

  Assure performance of all types of PCIe systems
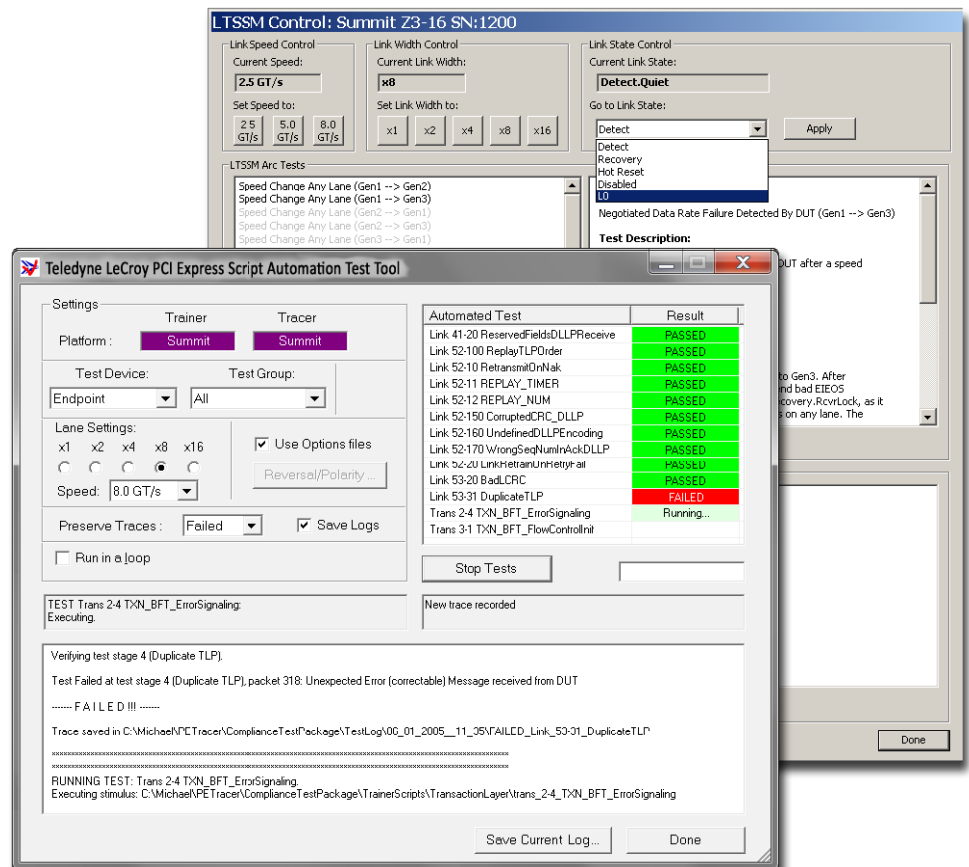
- **Over 600 Test Cases**

  Extensive validation of full performance envelope of PCIe feature set

- **Customizable Test Scripts**

  Allows for custom test development and modifications

- **Preserves Trace Data on Failure**

  Guides engineers directly to problem areas and enables fast bug fixes

PCI
EXPRESS®
PERFORMANCE
SCALABLILTY FOR THE
NEXT DECADE

Responding to the needs of PCI Express developers, Teledyne LeCroy offers a fully integrated and automated validation testing system for PCI Express root complex and endpoint devices. The PCI Express Automation Test Tool presents you with test coverage for both the Link Layer and Transaction Layer as defined by the PCI-SIG's PCIe® specifications for add-in-card and system devices. The validation scripts leverage Teledyne LeCroy's Summit™ Product Family of PCIe protocol test tools, including the Summit T3-16 Analyzer and Summit Z3-16 Exerciser to achieve the highest performance possible. Tests are available on x1, x2, x4, x8 and x16 links, and at data rates of 2.5 GT/s, 5 GT/s and 8 GT/s. The PCI Express Automation Test Tool is packaged with and available at no additional cost to users of the Summit systems.

The PCI Express Automation Test Tool allows you to:

- Prepare your add-in-card or system board to pass the certification tests from the PCI-SIG
- Display a log window that shows you the test events leading up to the pass or fail of an individual Validation test
- Identify errors, including type, and shows you where the errors occurs in the trace, and includes hyperlinks back to that trace
- Automatically run tests and save log files
- Error logs and their corresponding failure in the protocol trace are saved together for product development records
- Modify the Validation tests and generate test scenarios through the script editor

The Automated Test Application and LTSSM Test Application together support four categories of tests, including: Link Layer, Transaction Layer, Dynamic Equalization and LTSSM. A few examples of each type of test are given below.

Examples of Link Layer Test Suites

- **ReserveFieldsDLLPReceive** Test Suite `PASSED`
  Verify that the DUT ignores reserved fields in an ACK DLLP

- **UndefinedDLLPEncoding** Test Suite `PASSED`
  Verify that the DUT silently drops any DLLP with undefined encoding and no error is associated with it

- **WrongSeqNuminAckDLLP** Test Suite `PASSED`
  Verify that the DUT drops any ACK DLLP that does not have a sequence number corresponding to an unacknowledged TLP and logs a BAD DLLP error associated with the port

- **RetransmitOnNak** Test Suite `PASSED`
  Ensure that a DUT will retransmit a transaction for which a NAK has been issued

Examples of Transaction Layer Test Suites

- **TXN_BFT_Flow ControlInit** Test Suite `PASSED`
  The intent of this test is to verify that a slotted Endpoint device receiver complies with basic flow control credit

- **TXN_BFT_VCOTCSupport** Test Suite `PASSED`
  The intent of this test is to verify that slotted Endpoint devices that do not support VCs beyond the default still handle requests with non-zero TC correctly

- **TXN_BFT_Completion Timeout** Test Suite `PASSED`
  Verify Basic Completion Timer requirements of a slotted Endpoint device. The Completion Timeout timer must not expire in less than 50 µs, but it must expire if a Request is not completed in 50 ms.

- **TXN_BFT_LegacyInt** Test Suite `PASSED`
  Verify Basic INTx message support requirements of slotted Endpoint devices

Examples of Dynamic Equalization Test Suites

- **DUT_EqPhase0ToSpeed** `PASSED`
  Forces the DUT to timeout while in Phase 0 of Recovery Equalization (Z3 as Host)

- **DUT_EqPhase1ToSpeed** `PASSED`
  Forces the DUT to timeout while in Phase 1 of Recovery Equalization (Versions for Z3 as Device or Host)

- **DUT_EqPhase2ToSpeed** `PASSED`
  Forces the DUT to timeout while in Phase 2 of Recovery Equalization (Versions for Z3 as Device or Host)

- **DUT_EqPhase3ToSpeed** `PASSED`
  Forces the DUT to timeout while in Phase 3 of Recovery Equalization (Versions for Z3 as Host or Device)

Examples of LTSSM Test Arcs

- **Negotiated Data Rate Failure** `PASSED`
  The exerciser will act as if it detected a data rate failure after a speed change to Gen3 and determine if the DUT properly follows.

- **Speed Change ANY Lane** `PASSED`
  The exerciser will send a TS speed change pattern on only one lane (Lane 0) instead of all lanes as expected and determine if the DUT will perform the speed change.

- **Current Data Rate Failure (Detected by DUT)** `PASSED`
  The exerciser forces a Gen3 data rate failure to be detected by the DUT after going to recovery without a speed change and determines if the DUT properly handles the recovery.

- **Current Data Rate Failure (Detected by Exerciser)** `PASSED`
  The exerciser acts as if it detected a data rate failure after being directed to recovery and determines if the DUT properly follows.

Protecting Your Investment

Teledyne LeCroy protects your investment in our products by actively working with key test development sites to expand and update validation test suites as new standards emerge. As an example, the University of New Hampshire (UNH) is currently developing validation testing for new standards such as NVM Express, and they are developing these test suites using Teledyne LeCroy's Summit Product Family. That helps ensure that your Teledyne LeCroy products remain current and useful even as new standards are developed.

Summit Z3-16 Exerciser

Device Under Test

PCI Express Test Platform

Summit T3-16 Protocol Analyzer

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