TELEDYNE LECROY
Everywhereyoulook™

Summit™ 4.0 Family

T416 Protocol Analyzer
Z416 Protocol Exerciser
PCIe® 4.0 Test Platform
PXP-400 Test Platform

Product Development Support for PCI Express® 4.0!

Product Capabilities

- PCIe storage protocols Supported
  - ✓ NVM Express
  - ✓ SATA Express
  - ✓ NVMe-MI
- Accurate data capture
  - ✓ 100% data captures
  - ✓ Up to x16 @ 16 GT/s
- Deep memory buffer
  - ✓ Up to 128 GB depth
- SMBus support
- Exerciser
  - ✓ x1 to x16 link width
  - ✓ Data rates to 16 GT/s
  - ✓ Powerful scripting
  - ✓ Lane reversal
  - ✓ Auto-polarity
  - ✓ Lane scrambling
  - ✓ Error injection
  - ✓ Host/Device emulation
- Protocol analysis
  - ✓ x1 to x16 link width
  - ✓ LTSSM display
  - ✓ CATC Trace™ views
  - ✓ Spreadsheet view
  - ✓ Trace Expert™ analysis
- Test fixtures
  - ✓ Verification Load Board (VLB)
  - ✓ Verification Base Board (VBB)
- Test platform
  - ✓ x1 to x16 link width
  - ✓ Data rates to 16 GT/s

Key Features

- **Find errors fast**
  - ✓ One button error check
  - ✓ Fast upload speed
  - ✓ Large trace memory
  - ✓ Powerful triggering/filtering
- **See and understand the traffic**
  - ✓ Get useful information
  - ✓ More choices of data views
  - ✓ More ways to analyze data
  - ✓ Verification Script Engine included

Summit T416

The Summit T416 PCI Express (PCIe) 4.0 Protocol Analyzer is a high-end analyzer that offers important analysis features for new Gen4 application development. While sharing application compatibility with the previous protocol analyzer platforms, the Summit T416 can record traces at speeds of 2.5, 5.0, 8.0 and 16.0 GT/s. Capturing is performed by connecting a Gen4 interposer to the Device Under Test (DUT). Interposers are offered in lane widths of x1, x4, x8 and x16. Know that your data is accurate through reliable and complete decodes of Transaction Layer Packets (TLPs), Data Link Layer Packets (DLLPs), and all primitives for PCI Express for all lane widths. Setting up and taking a trace is simple to do without the worry of extra plugin platforms or complex networking issues.

Intuitive Views

The Summit T416 for PCI Express 4.0 utilizes the CATC Trace™, Spreadsheet View, LTSSM State View, Bit Tracer View and other focused views to assist users in analyzing how PCI Express protocol components work together in diagnosing problems. These various interfaces help find errors fast by using the powerful triggering, filtering and error reporting. View meaningful reports about performance and protocol behavior in real time, and post captured traffic. No matter what trace view is used, the user will find it powerful and an intuitive expert software system, embedding detailed knowledge of the protocol hierarchy and intricacies as defined in the protocol specification. Graphical displays have been optimized for fast and easy navigation through a captured traffic session. Users are alerted as violations are detected at all levels of the protocol layering, and can easily drill down o areas of interest or collapse and hide fields that are not relevant. Protocol data can be viewed in several ways from logical to chronological, and by events unique to PCI Express.

All Teledyne LeCroy protocol analysis tools feature a hierarchical display of protocol traffic summaries, detailed error reports, powerful scripting, and the ability to create user-defined test reports, which allow developers to troubleshoot intricate problems and finish their projects on time. Users of Teledyne LeCroy systems appreciate the rich library of decodes and analysis capabilities that are available on all of Teledyne LeCroy's PCIe test tools.

The Summit T416 is up to the challenge by offering decoding for storage protocols like NVM Express and SATA Express. DataCenter monitoring technology such as NVMe-MI and out-of-band SMBus signaling which is decoded and synchronized with PCI Express can be analyzed for data integrity issues. If IO virtualization is important SRIOV and MRIOV is also decoded and analyzed.

Want go get down to the byte level and see traffic just before and after deskew. BitTracer™ software option records the bytes exactly as they come across the link, allowing debugging of PHY layer problems and combining the features of a logic analyzer format with a decoded protocol analyzer format.

PXP-400 Test Platform

Teledyne LeCroy's PCIe 4.0 Test Platform for provides a convenient, powerful and flexible system (occupying two standard CEM slots on the backplane) for emulating PCIe devices.

The PXP-400 Test Platform allows the Summit Z416 to also act as a host system, enabling extensive protocol-level testing of PCIe devices. For use as a host emulator, the Summit Z416 is plugged into one of the PCIe x16 slots on the PXP-400 and connected to the power source, then the device under test (DUT) is plugged into the alternate PCIe x16 slot with slot power provided to the DUT by the test platform.

Summit Z416

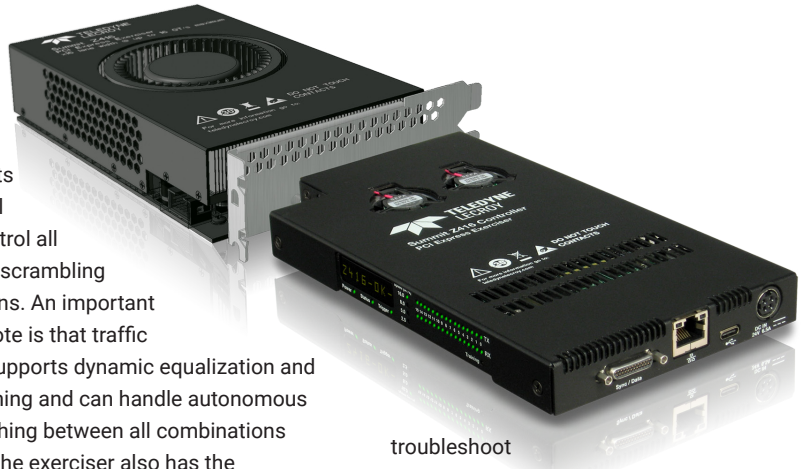
The Summit Z416 Exerciser is Teledyne LeCroy's latest generation PCIe 4.0 protocol exerciser, leveraging years of experience in providing advanced protocol test tools to the PCI Express community. Supporting traffic generation at data rates of 16.0 GT/s with lane widths up to 16 lanes, the system is designed for developers who need a protocol test system supporting the PCI Express 4.0 specification. In addition to traffic generation, the system also supports protocol analysis capability, featuring the industry-standard CATC Trace as well as a wide variety of other traffic displays and data reports. The Summit Z416 supports full traffic generation and device/host emulation, as well as providing the industry a platform for development of standardized compliance test suites. In addition the system provides error injection functions to enable developers to test error recovery routines important to reliable interoperability of PCI Express 4.0 products.

Typical Applications

The Summit Z416 is a critical test and verification tool to assist engineers in development, debug and validation of their PCIe designs (including early stage power-on testing). Because of its rich programmable environment, scripting can be used for full interoperability testing, improving the reliability of systems. The Summit Z416 can emulate either PCIe root complexes or device endpoints, allowing new designs to be tested against known standards.

A Wealth of Features

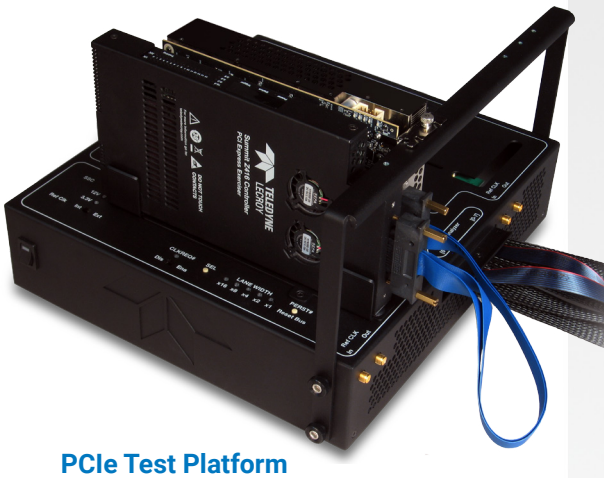
Intuitive software controls blend sophisticated traffic generation and analysis capability with ease-of-use, allowing test suites to be rapidly customized to meet specific test requirements. One feature that helps troubleshoot PCIe links is the ability to fully exercise the Link Training & Status State Machine (LTSSM) transitions. The powerful scripting language also allows for the creation of Transaction Layer Packets (TLPs) and Data Link Layer Packets (DLLPs) at PCIe 4.0 data rates of 16 GT/s. Flow Control and ACK/NAK's policies and structures can be defined and generated under user control. Features addressing LTSSM structures include providing bustraffic to emulate all the states of the LTSSM from the Detect state, to the L0 state and maintaining the L0 state between the host and device. The exerciser also supports lane reversal and can control all polarity and scrambling configurations. An important feature to note is that traffic emulation supports dynamic equalization and Skip EQ training and can handle autonomous speed switching between all combinations of speeds. The exerciser also has the capability to perform error injection for training sequences, as well as standard traffic, both at the packet level and on a per lane basis.



Packet fields not explicitly specified by the user are generated automatically (such as packet numbering and CRCs). The configuration space can be emulated for any device including endpoints, bridges and switches. Support for all PCIe 4.0 data rates allows the Summit Z416 to produce test cases that test the device's ability to auto-negotiate data rates with other devices. In addition, the ability of the Summit Z416 to produce a wide variety of programmed traffic allows the user to introduce controlled error conditions. As an example, a trace file captured in the analyzer can be exported and used as the basis for a test script, with selected programmed errors introduced at critical stages to test the device's ability to recognize and recover from error conditions. This allows for detailed testing of simple error recovery and complex multiple error conditions, creating more resilient products that perform well even under less than ideal conditions.

Protocol Analysis Included

The Summit Z416 can also support up to sixteen (16) lanes of protocol analysis. Using its high speed trace memory (up to 8 GB), the Summit Z416 can monitor, capture, decode and analyze PCIe protocols with data rates up to 16.0 GT/s (Gen4). The application display is highly configurable and can be modified to most users' debugging styles. Many features are available including a hierarchical display, protocol traffic summaries, detailed error reports, timing calculators, bus utilization graphs, and the ability to create userdefined test reports allowing developers to troubleshoot intricate problems and finish their projects on time. PCIe storage decodes such as NVMe, SATA Express (AHCI and ATA), SCSI Express (PQI and SOP), TCG (Trusted Computing Group), Precision Time Measurement (PTM) and virtualization decodes such as Single and Multi-Root I/O Virtualization (SRIOV and MRIOV) as well as Address Translation Services (ATS) are available to broaden its capabilities to many different industry segments.



PCIe Test Platform

Teledyne LeCroy's PCI Express 4.0 Test Platform for the Summit Z416 Protocol Exerciser provides a convenient, powerful and flexible test platform for PCI Express devices at data rates up to 8.0 GT/s and link widths up to x16. The Test Platform allows the Summit Z416 Exerciser to act as a host system, enabling extensive protocol-level testing of PCIe devices. In addition, there is a complete PCIe 4.0 x16 protocol analyzer interposer built into the platform, with an attached custom high speed serial cable.

PCI EXPRESS® PERFORMANCE SCALABILITY FOR THE NEXT DECADE

PCIe Interposer for Summit T416

The Teledyne LeCroy PCI Express Interposer provides a simple and easy-to-use way to probe Gen4 PCI Express traffic between a host and PCIe® add-in card. The interposer assures reliable data transmission while providing 100% capture of all data traffic flowing through the PCIe CEM slot interface. Connecting the interposer to a Teledyne LeCroy Summit Gen4 analyzer allows decoding and display of data flowing in both directions and across all lanes, and will display data traffic using the industry-standard CATC Trace™ data display, along with a wide range of traffic and error reports.

Specifications

Host Machine Minimum Requirements	Microsoft Windows® 10, Windows 8.1, or Windows 7; 2 GB of RAM; Storage with at least 200 MB of free space for the installation of the software and additional space for recorded data; display with resolution of at least 1024x768 with at least 16-bit color depth; USB 2.0 port and/or 100/1000baseT Ethernet; For optimal performance, please refer to our recommended configuration in the product documentation.
Recording Memory Size	Summit Z416 Protocol Analyzer: Up to 8 GB Summit T416 Protocol Analyzer: Up to 128 GB
Data Rates Supported	2.5 GT/s, 5.0 GT/s, 8.0 GT/s and 16.0 GT/s (PCI Express 4.0)
Ports	Summit T416 Protocol Analyzer: DS and US reference clock inputs, USB Type B connector, Trigger in and out, 1GBe ethernet port, Sync in/out port Summit Z416 Slot Interposer: Connector to Controller, x16 PCIe Edge Connector (to connect to DUT— requires two CEM-socket space in backplane) Summit Z416 Controller: Connector to Interposer, USB Type-C, 1000BASE-T Ethernet, Sync/Data, DC Power (from supplied adapter)
Display Panel	Summit T416 Protocol Analyzer: 122x32 Pixel Graphic diplay Summit Z416 Protocol Analyzer: Eight character alphanumeric display
LEDs	Power LED, Status LED, Trigger LED, Four Data Rate LEDs (2.5 GT/s, 5.0 GT/s, 8.0 GT/s, 16.0 GT/s), 32 Activity LEDs (2 per lane—Tx/Rx—for 16 lanes), Training LED
Dimensions and Weight	Slot Interposer: 100 x 198 x 170 mm (3.9” x 7.8” x 6.7”), 1.4 Kg (3 lb) Summit Z416 Controller: 114 x 19 x 207 mm (4.5” x 0.76” x 8.15”), 1.0 Kg (2 lb) Summit T416 Protocol Analyzer: 114 x 19 x 207 mm (16.99 “ x 3.45” x14.35”)
Power Requirements	100-240 VAC, 50-60 Hz, 230W
Environmental	Operating: 0 to 55°C (32 to 131°F) Non-operating: -20 to 80°C (-4 to 176°F) Humidity: 10 to 90% non-condensing

Ordering Information

Product Description	Product Code
Summit T416 (licensed as a Gen4 x16 analyzer at 8GB, no probes or cables)	PE090AAA-X
G4x16 Interposer (includes G4x16 Interposer Card and (4) four high speed connector cables)	PE122UIA-X
Summit Z416 (licensed as a Gen4 x16 exerciser, supports host and device emulation, PCIe Gen 4 Test Platform required for Gen4 add-in card testing) [Other license options also available}	PE090AGA-X
PCIe Gen 4 Test Platform	PE053UEA-X
VLB (Verification Load Board)	PE118UIA-X
VBB (Verification Base Board)	PE119UIA-X

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 are our probes are warranted for one year. This warranty includes no charge for return shipping, long-term 7 year support and upgrade to latest software at no charge.

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

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