CXL Compute Express Link®

# Test and Validation Solutions

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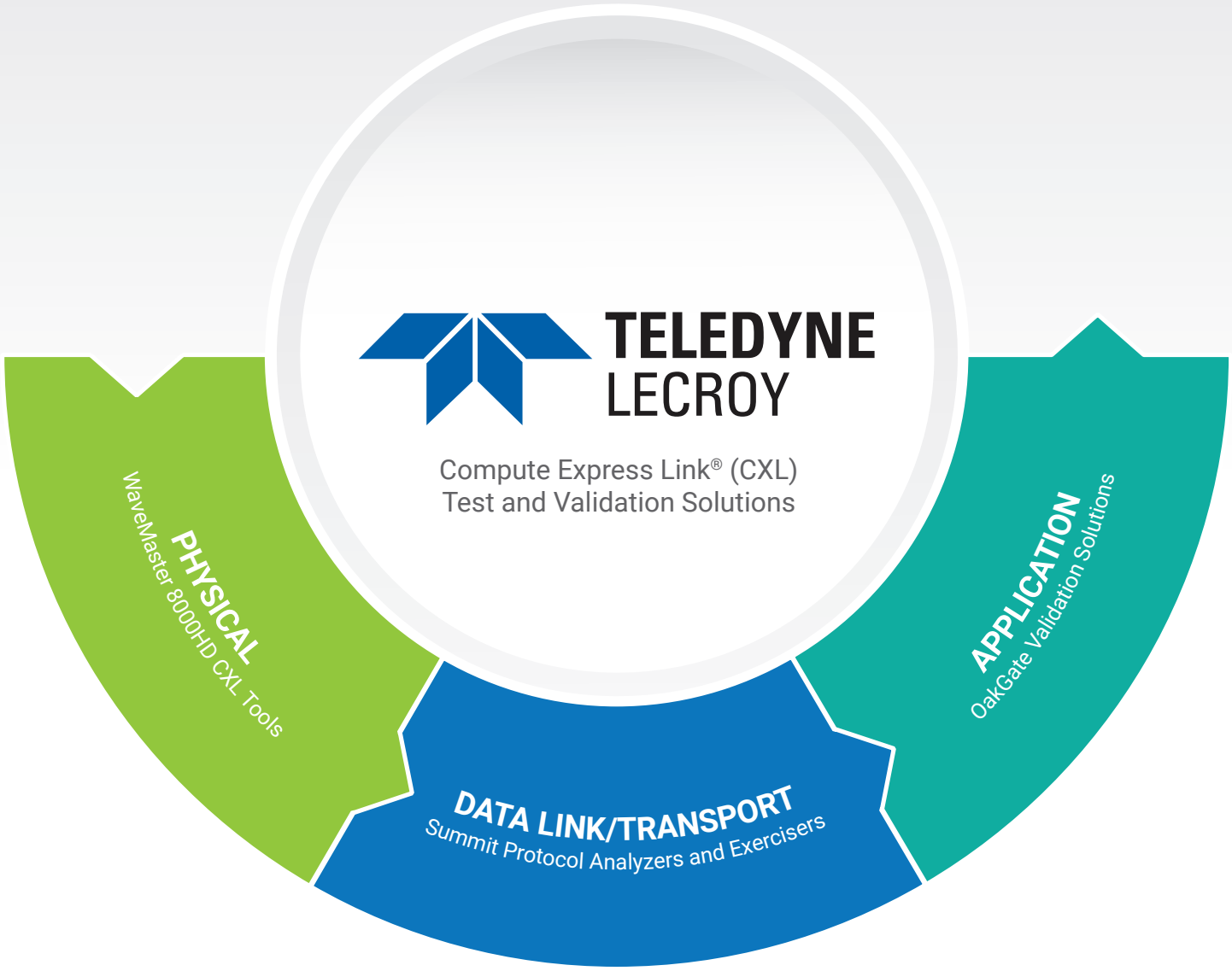


Teledyne LeCroy offers a complete portfolio of CXL Test and Validation Products that can be utilized from product design and development through product validation. Our CXL Test Products address all layers of the OSI stack, from the physical layer to the application layer.

**OakGate Validation Solutions** are the industry's first test platform to validate CXL device interoperability in a host-based system.

- Confirm feature set operates as intended
- Make certain performance is satisfactory
- Ensure devices have robust security and quality
- Validate devices handle power resets, power cycling, and measure performance

Test up to four E3 or CEM Devices Under Test at a time to help speed time to market.

**Summit Protocol Analyzers and Exercisers** are protocol test and development tools for PCI Express® and CXL. Data capture up to 64 GT/s on all link widths up to x16.

- Get useful information
- More choices of data views
- More ways to analyze data
- Custom decoding and reports

**WaveMaster 8000HD Oscilloscopes** are the only 12 bit high bandwidth oscilloscopes designed for all stages of PCI Express and CXL product development, whether first-silicon characterization, link validation over channels, or debugging across the entire the protocol stack. No other oscilloscope supports more engineering tasks with more unique tools.

- Exceptional signal characterization performance
- Unrivaled validation and debug capabilities

# WaveMaster 8000HD CXL Test Tools


For First-silicon Characterization,
Link Validation over Channels,
or Debugging Across the Entire
Protocol Stack.

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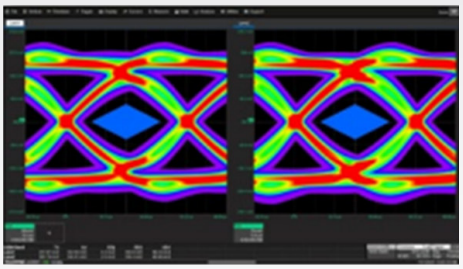
Teledyne LeCroy WaveMaster 8000HD oscilloscopes support the entire development cycle, enabling faster time-to-market. The WaveMaster 8000HD oscilloscope models offer a full set of high-speed characterization, compliance, validation, and debug tools. Competing high bandwidth oscilloscopes only support characterization and compliance tasks.

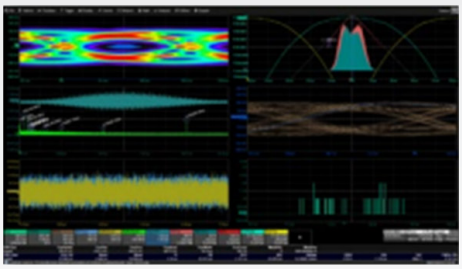
The WaveMaster 8000HD high bandwidth oscilloscope models, combined with CrossSync PHY cross-layer analysis, SDA Expert serial data analysis, and a wide variety of low-speed serial data triggers and decoders, provide more capability compared to any competing high bandwidth oscilloscope

Modern serial data technologies require an oscilloscope with class-leading performance in more ways than ever. Faster signals are driving higher bandwidth requirements. New trends towards higher-order modulations like PAM3 and PAM4 mean that oscilloscope resolution is now a critical consideration. Complex analysis methodologies demand more computing power.



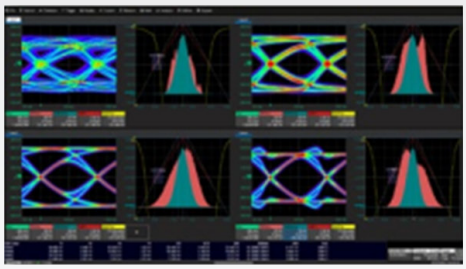
### Up to 65 GHz at 320 GS/s

WaveMaster 8000HD has the bandwidth to acquire, visualize and characterize even the fastest serial data signals. Proven Digital Bandwidth Interleaving (DBI) technology seamlessly creates a pristine 65 GHz signal path.



### 12-bit Resolution

WaveMaster 8000HD provides 12-bit resolution all the time, at all sample rates. Its combination of vertical resolution and visibility into high frequency effects enables it to capture every signal detail.



### Fast Waveform Processing

Modern serial data technologies mandate measurement methodologies that can be computationally demanding. WaveMaster 8000HD includes a class-leading PC system, so less time is spent waiting for measurements to complete.


For more information on our Industry-leading Oscilloscopes, please visit https://www.teledynelecroy.com/oscilloscope.

# Summit CXL Protocol Test Tools


For Support Development, Debug, Verification, and Compliance of both PCIe® and CXL devices.

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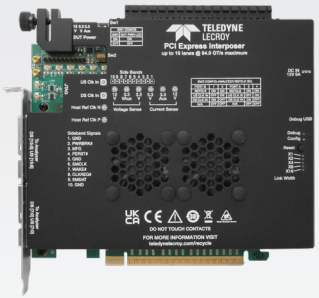
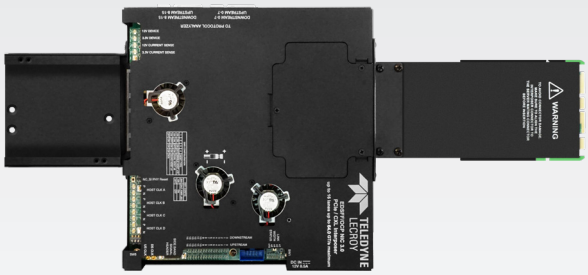
Teledyne LeCroy Summit Analyzers can exercise, emulate, capture, decode, monitor, and verify all of the various operations on the CXL link. Firmware and driver developers can use this test equipment to support development, debug, verification, and validation of both PCIe and CXL devices. The CXL standard defines three protocols that are dynamically multiplexed together: CXL.io, CXL.cache, and CXL.mem.

Flexible probing solutions allow for accurate captures across multiple form factors including Card Electromechanical (CEM), EDSFF, M.2, OCP and MCIO.



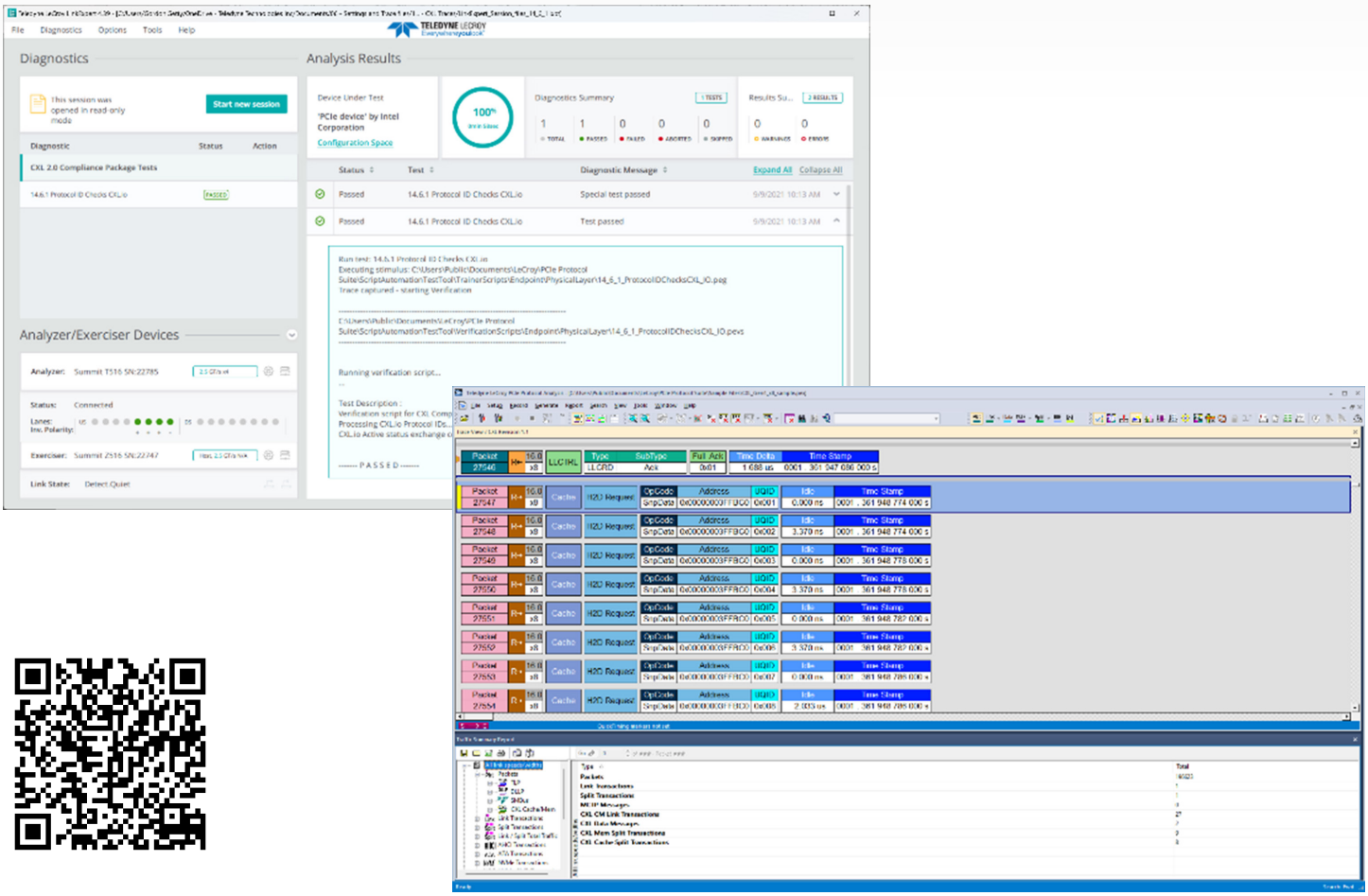
CEM



EDSFF/OCP

M.2

Powerful software tools provide quick and efficient access and processing of data on the link, in addition to Automated Compliance and Validation using Teledyne LeCroy's LinkExpert tool.




For more information on our Industry-leading Analyzers, please visit https://www.teledynelecroy.com/protocolanalyzer/cxl.

# OakGate Validation Tools


For Product Validation including Interoperability, Functionality, Power, and Performance.

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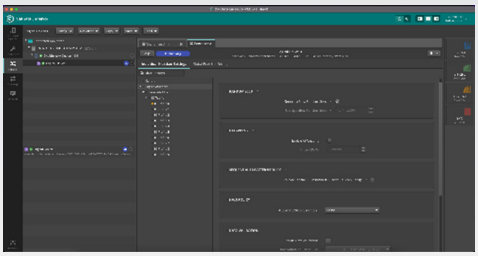
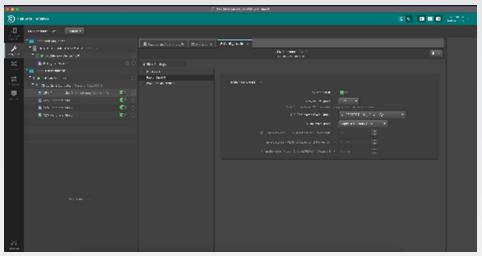
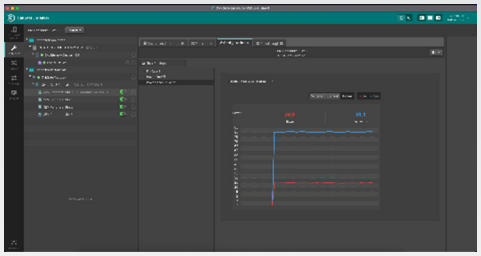
The OakGate CD240 Compute Express Link (CXL) Validation Desktop Appliance is the industry's first validation system designed to test and debug PCI Express® 5.0 CXL Memory Expansion Devices.

The CD240-G5 CXL Validation Appliance is ideal for test teams who need to validate CXL device functionality and performance in a Intel host-based test system. The CXL Validation Appliance can connect up to four (4) CEM (for add-in-cards) or four (4) EDSFF E.3 CXL memory expansion devices.

The CXL Validation Desktop Appliance is powered by the OakGate Endeavor software, the industry's first CXL-based validation testing software. The robust Endeavor software offers a broad set of testing features and capabilities. Endeavor supports a range of capabilities including traffic generation, register editing, security flows utilizing SPDM over DOE, SMBus and PCIe VDM, power control, sideband control and an interface to send passthrough commands. The CXL validation platforms also includes a python application programming interface (API).

### Device Discovery

View CXL devices that currently appear on the PCI bus. Set IP subnets and scan for the system. Includes user-based device locking.

### Product Validation

Easily generate common memory traffic profiles (reads/writes), sending protocol-specific commands. Read and Write PCIe Registers. Filter and Search Registers. Export to CSV.

### Performance Benchmarking

Benchmark consistent, true device performance. Includes ability to create graphs, charts and histograms.

### Security

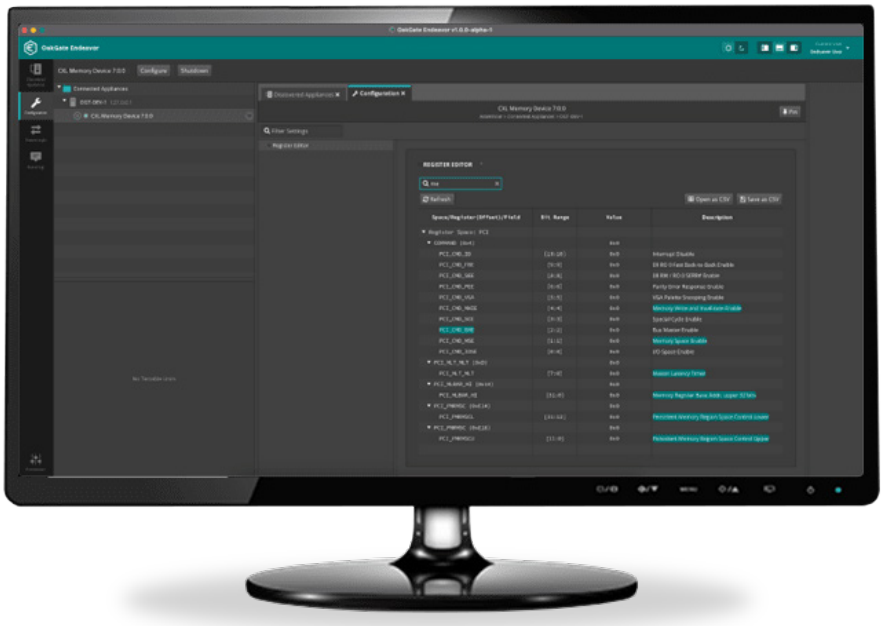
Execute built-in security flows utilizing SPDM and DOE. Support for SPDM transport layers SMBus/I2C, PCIe VDM and DOE. Send/receive mailbox commands.

### Power and Sideband Control

Power CXL devices on and off. Control Sideband PERST#, REFCLK, PWRDIS sideband signals.

### Automation

Control the Endeavor via Python API. Each Endeavor application instance automatically starts its own REST server.



For more information on our Industry-leading Validation Tools, please visit https://www.teledynelecroy.com/ssdtesting/cxl-validation-solutions.aspx.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