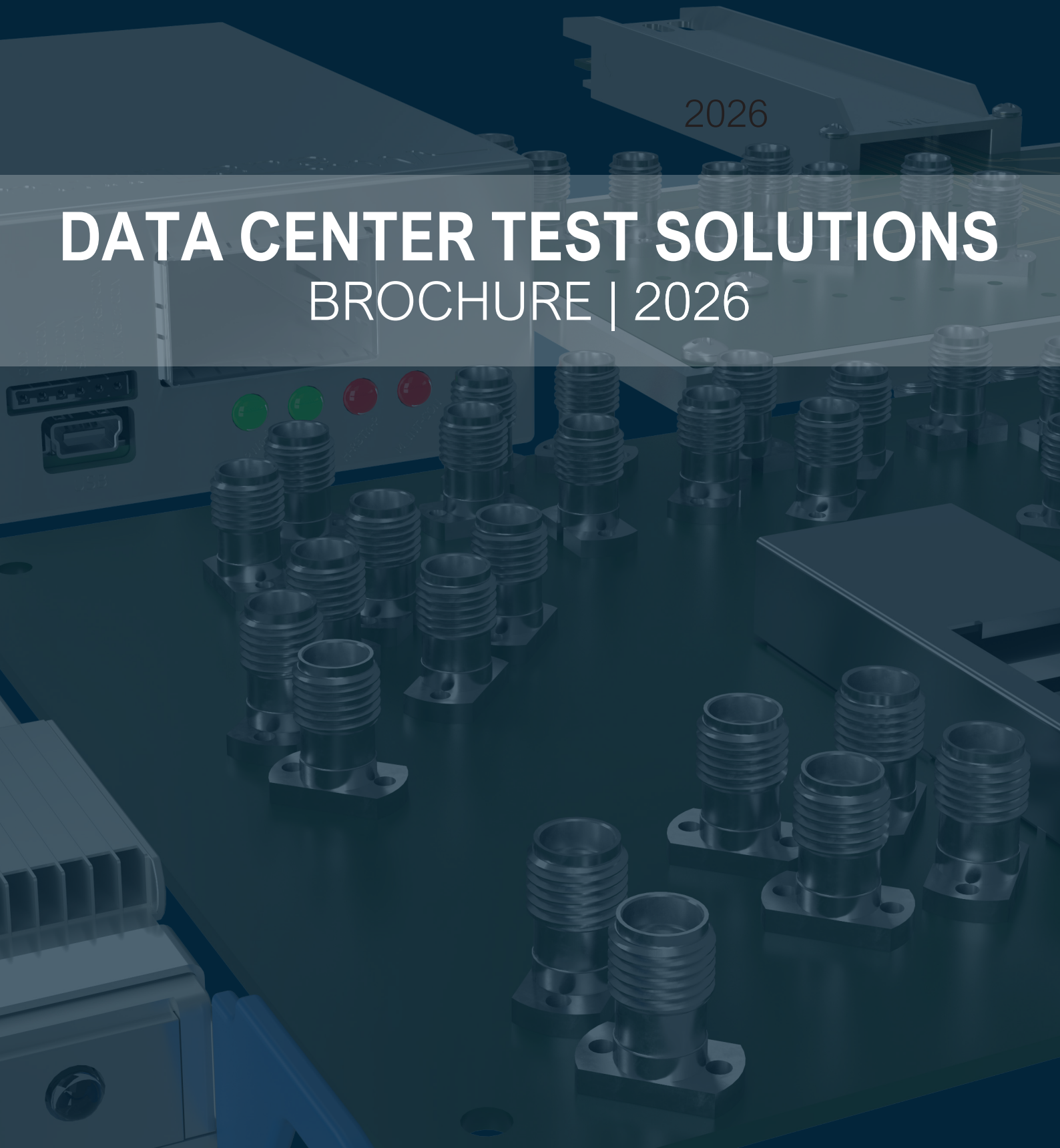
multiLane

2026

DATA CENTER TEST SOLUTIONS

BROCHURE | 2026



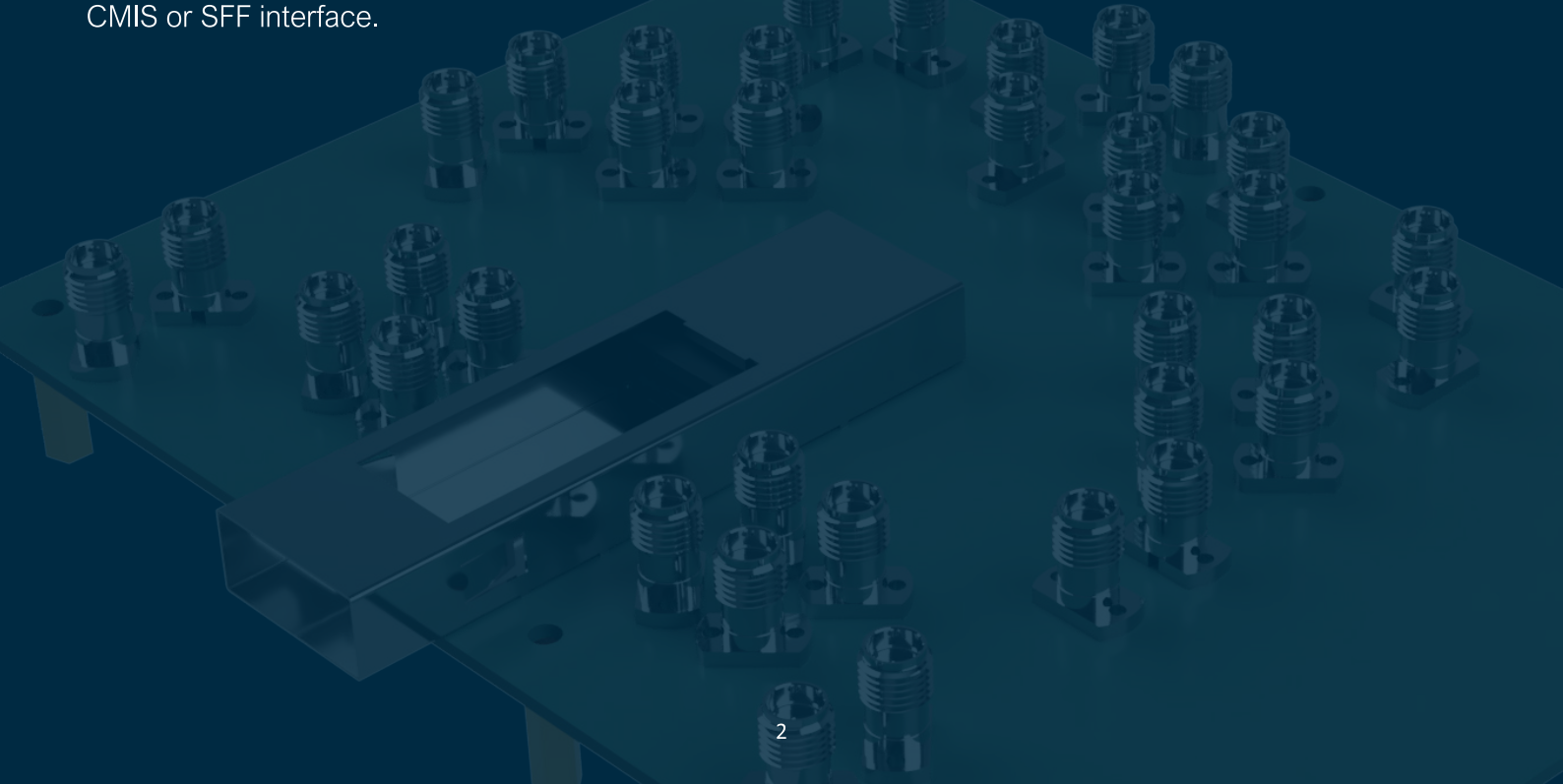
ABOUT US

Since 2006, MultiLane has been offering high speed test and measurement equipment for data communications. We help chart industry evolution and accelerate the adoption of new technologies with a complete cycle support of data center test solutions encompassing IC and transceiver characterization, host line card testing, and link testing. We provide a range of form factors and architectures, from portable instruments, to stand-alone bench top instruments to automated test platforms. We also assist our customer base with compliance and interoperability test services. We serve developers, module vendors, network installers, and data center operators with high-performance, reliable equipment at an attractive price-point. MultiLane provides leading-edge solutions for the latest data center technologies and well-established techologies, from 800G at 112Gbps/lane to industry-first 1.6T thermal testing solutions, with a comprehensive set of development solutions for MSAs ranging from SFP, DSFP, QSFP, QSFP-DD, QSFP-OO800, and OSFP800.

The MultiLane portfolio encompasses optical and electrical oscilloscopes, bit error rate testers, time domain reflectometers (TOR) for TIA and cable testing, interconnect products, as well as fully automated DAC and transceiver test solutions, and compliance test services for 100G and 800G technologies. Developers, manufacturers, and installers of these new technologies all need the wide portfolio of solutions to be able to do their jobs successfully.

DATA CENTER TEST SOLUTIONS ENABLE NETWORK EVOLUTION

The ever-increasing faceplate densities and data rates bring with them a proliferation of many different MSA form factors and standards. As such, the need for tools to ensure compliance to the relevant standards is essential. As part of MultiLane's commitment to supporting the evolution of the data center, we provide a comprehensive selection of these data center test solutions for a wide variety of standards including Module and Host Compliance Boards, Passive and Active Loopback Modules, and Analyzers for I2C CMIS and SFF state machine testing. The solutions offered in this brochure are MSA compliant and use the standard defined CMIS or SFF interface.

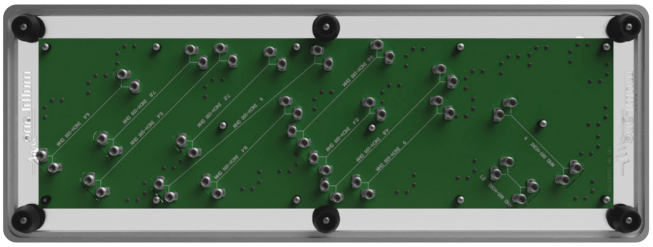


THE 1.6T ECOSYSTEM

As the race to 224Gbps/lane heats up, MultiLane stands ready to accelerate the development and adoption of this latest technology with three new products in 224Gbps Signal Integrity characterization. Taken together, these products offer a compliance and development suite to accelerate vital R&D for next-gen networks.

ML4067-224 CHANNEL EMULATION BOARD

The latest MultiLane Channel Emulation Board, the ML4067-224 provides a comprehensive set of trace paths for 224Gbps signals to test and validate responses to lossy channels. With 11 traces at 92 and another 11 traces at 100 Ohms the ML4067-224 can emulate losses which range from 4 to 30 dB at the target Nyquist frequency of 53.125 GHz. The board supports 1 mm and 1.85 mm connectors.

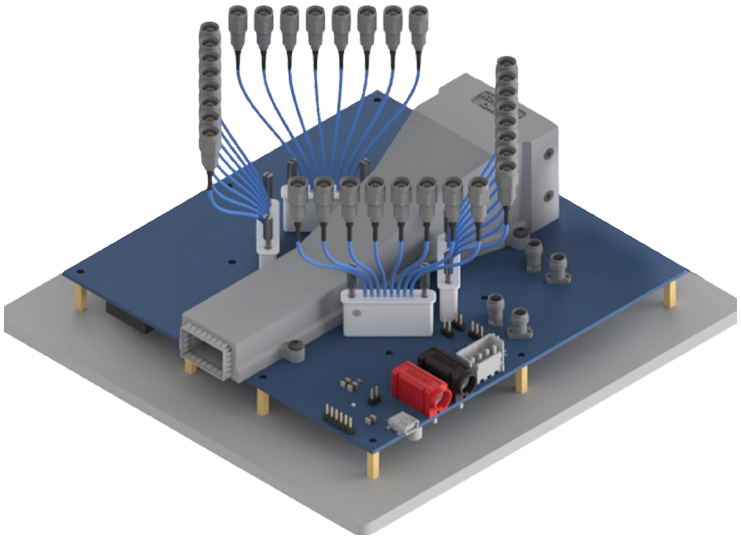


ML4067-224 Channel Emulation Board

OSFP1.6T COMPLIANCE BOARDS

OSFP1.6T Module Compliance Boards

One of the first 224Gbps/lane MCBs to market, the MultiLane OSFP 224G MCB is designed to validate next-gen pluggables with loss profiles compliant with the IEEE 802.3df, high performance SMPS connectors offering a bandwidth of up to 110GHz, and a USB interface that gives access to a CMIS GUI. The MCB provides a comprehensive approach to compliance and interoperability validation with access to full CMIS implementation in modules



ML4064-MCB-224

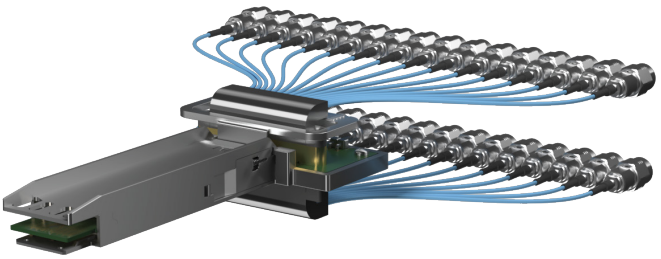
- MCB loss including the 3” SMPS cable is compliant with IEEE 802.3df
- Power pins and low speed signals are accessible via pin headers
- Ability to drive I2C from external pin headers, or connect I2C packet analyzer
- Ability to drive 3.3 V from external source for power supply margining- DSP dissipates 10W
- High performance SMPS connectors up to 110GHz
- 1x and 2x test traces available
- USB Interface giving access to CMIS GUI, providing comprehensive approach to DUT interoperability, allowing users to access full CMIS implementation in modules. APIs available.

OSFP1.6T Host Compliance Board

The MultiLane OSFP 224G Host Compliance Board (HCB), the ML4064-HCB-224, provides good SI performance as defined by the IEEE specification for accurate host characterization at 224Gbps/lane. With a narrow, cabled design to enable easy setup and crosstalk validation, the ML4064-HCB-224 is purpose built to address the challenges of streamlining the testing process without compromising that has come to define 224Gbps/lane validation.

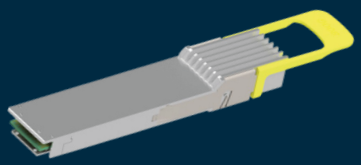
ML4064-HCB-224:

- Insertion within IEEE 802.3df parameters
- Very low Return loss up to 70 GHz
- Custom SMPS connector with 3” cables to 1.85mm or 1mm connectors
- Shell is compliant with OSFP1600 MSA and features the angled latch mechanism

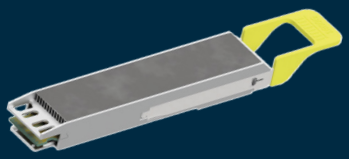


OSFP1.6T LOOPBACKS

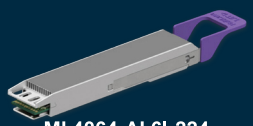
MultiLane offers both Electric and Active Loopbacks for OSFP 224G. These pluggables are designed to demonstrate host interoperability, establish a baseline performance before introducing outside variables, and run simplified debug routines to save on support cycles and FAE resources.



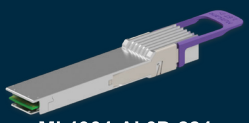
ML4064-LB2R-224



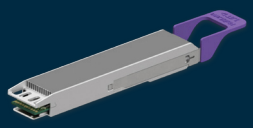
ML4064-LB2I-224



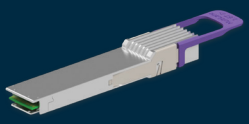
ML4064-AL6I-224



ML4064-AL6R-224



ML4064-AL7I-224



ML4064-AL7R-224

Passive Loopbacks

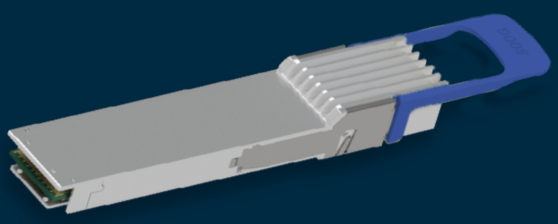
- Up to 45W power dissipation
- Available in Type2 IHS and RHS shells
- OSFP1600 compliant shell with angled latch
- Various options for various use cases : front LED, front pin header for external power, LCD
- 4 temperature sensors
- CMIS 5.x complaint with CDB
- I 2C and I3C support
- Real insertion counter
- Current sense
- Voltage Sense

Active Loopbacks

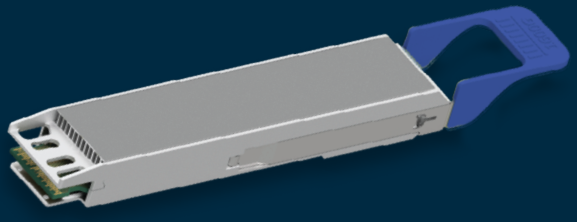
- Available in Type2 IHS and RHS shells
- OSFP1600 compliant shell with angled latch
- Available with two DSP options ALB6 and ALB7
- CMIS 5.x support with CDB, VDM, DPSM temperature sensors
- Real insertion counter
- Current sense
- Voltage Sense
- ThundertBert option
- Available from Q2 with full availability in Q3 2025

Redriver-Based Loopbacks

- 1.6T Redriver-based loopbacks to emulate Active Copper Cable applications
- Up to 40 W power dissipation
- OSFP1600 compliant shell
- Front LED
- Temperature, current, and voltage sensors
- CMIS 5.x compliant with CDB
- I2C and I3C support
- Real insertion counter



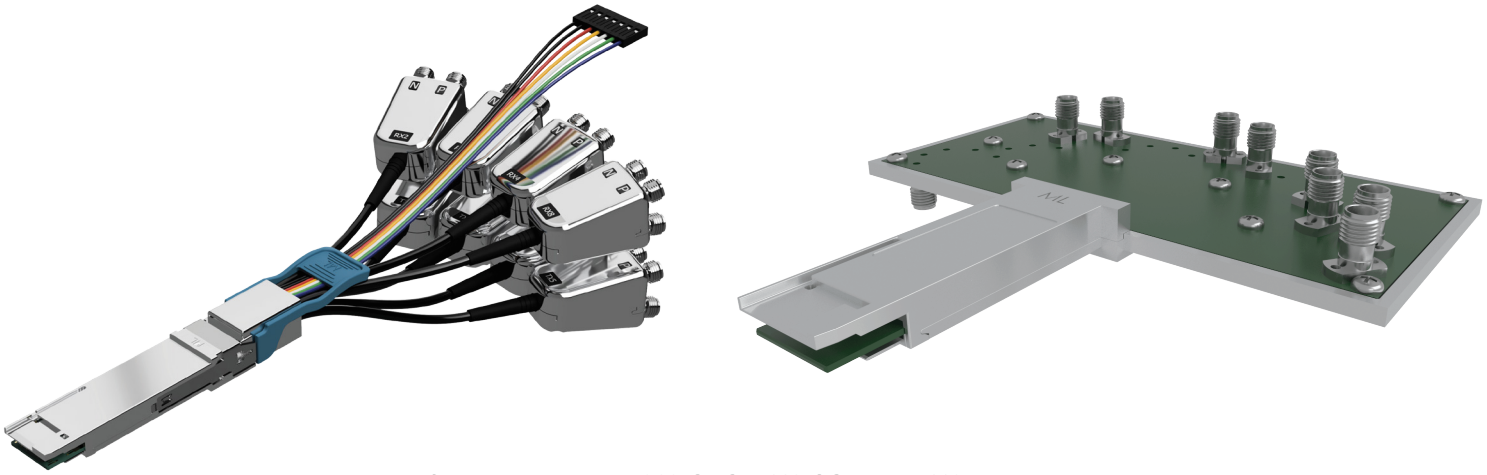
ML4064-RL1R-224



ML4064-RL1I-224

HOST COMPLIANCE BOARDS

A host compliance board is a breakout fixture that can be plugged into the system host side and provides access to the host electrical input and output signal (TP1a, TP4a compliance test points). It is a passive structure for optimum signal integrity. See graph for typical insertion loss performance.



Left to Right: The ML4062-CHCB-112 QSFP-DD 112 cable based HCB and the ML4064-HCB-112 OSFP 112 HCB

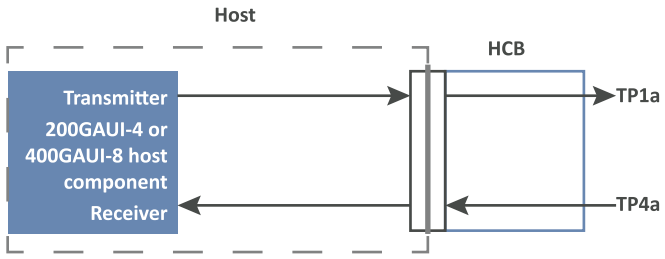
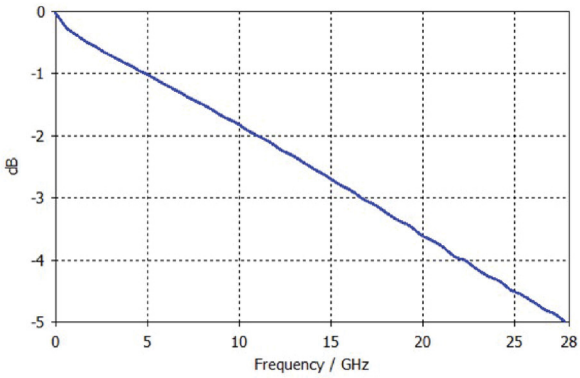


Figure 120E-5—Host 200AUI-4 or 400GAUI-8 C2M compliance points

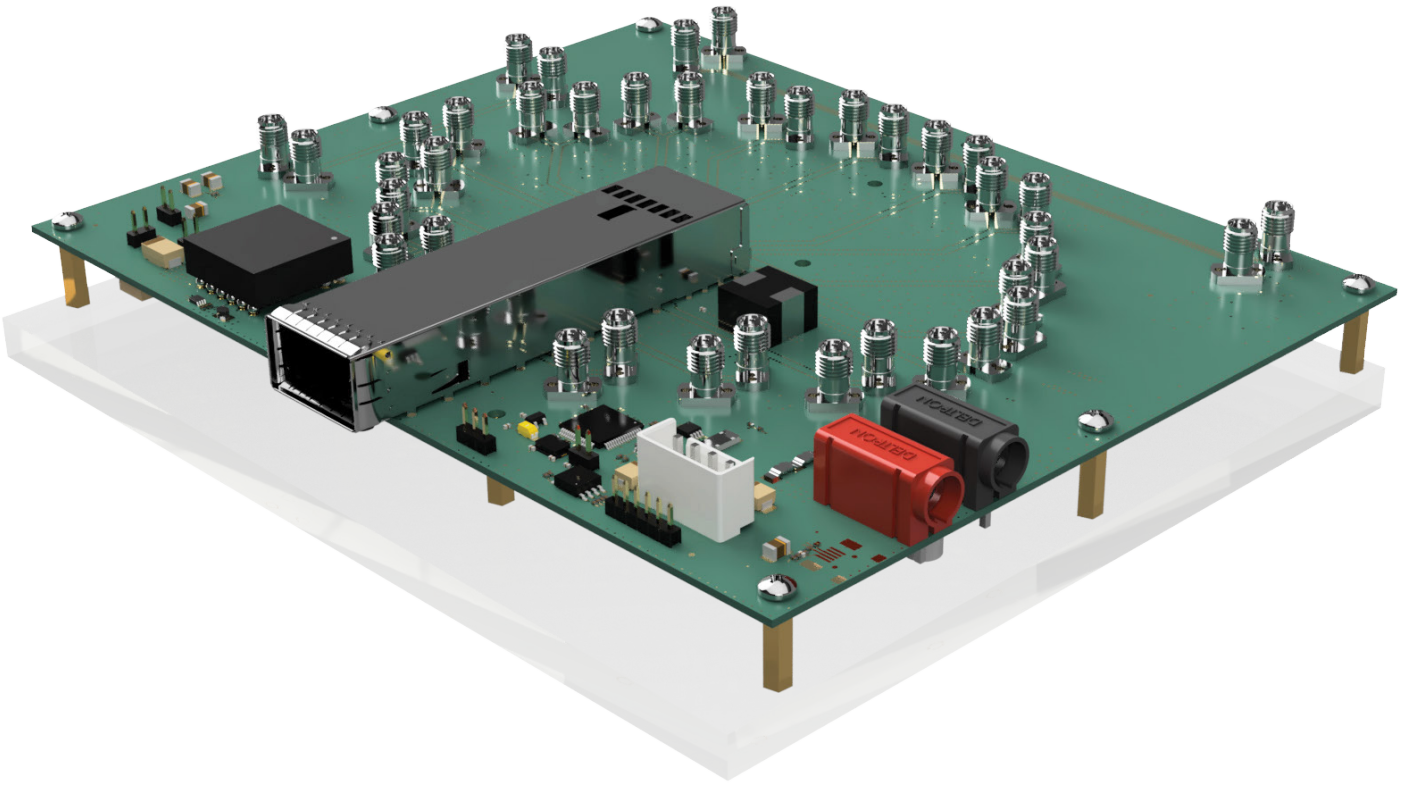
Reference: 802.3bs spec, section Annex 120E, p253



Insertion loss OSFP HCB ML4064-HCB

MODULE COMPLIANCE BOARDS

MultiLane's Module Compliance Boards (MCBs) can be used with any form of pluggable in their respective form factor. They serve to validate the compliance, signal transmission, and any other feature the pluggable has. They can also test and monitor module thermal capability, as well as provide stress testing.
The Module Compliance Boards are accompanied with a comprehensive CMIS or sff user interface.
The UI includes, but is not limited to:
- I2C Access and R/W
- Customizable memory maps and access to module EEPROM
- Temperature, voltage, and current monitoring



ML4064-MCB-112

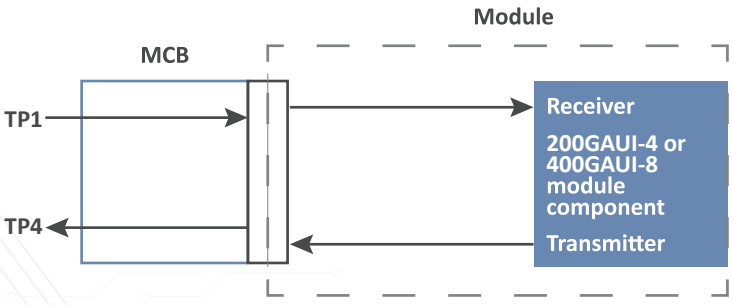
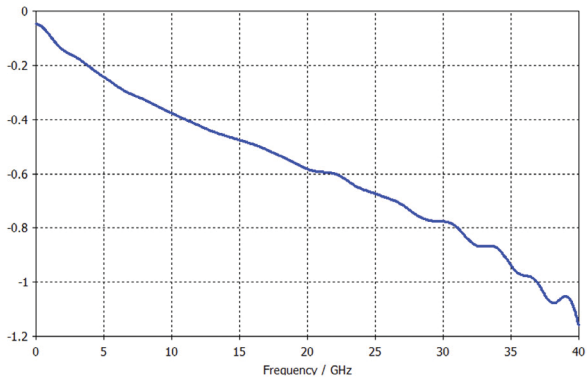


Figure 120E-6–Module 200AUI-4 or 400GAUI-8 C2M compliance points

Reference: 802.3bs spec, section Annex 120E, p253



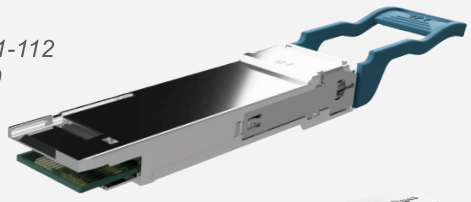
ML4041K-56 Insertion Loss

LOOPBACK MODULES

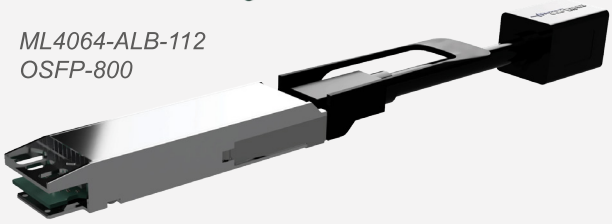
Active Loopbacks

The move to 800G brings with it a paradigm shift in loopback design. The complex characterization techniques required for host ports at 8x112Gbps necessitate the advent of a new generation of loopbacks to address these challenges. MultiLane's Active Loopbacks are DSP-based modules designed specifically to account for these complex characterization techniques, while also covering established requirement – loopback capabilities, CMIS interoperability, and thermal management – for host port testing.

ML4062-ALB1-112
QSFP-DD800

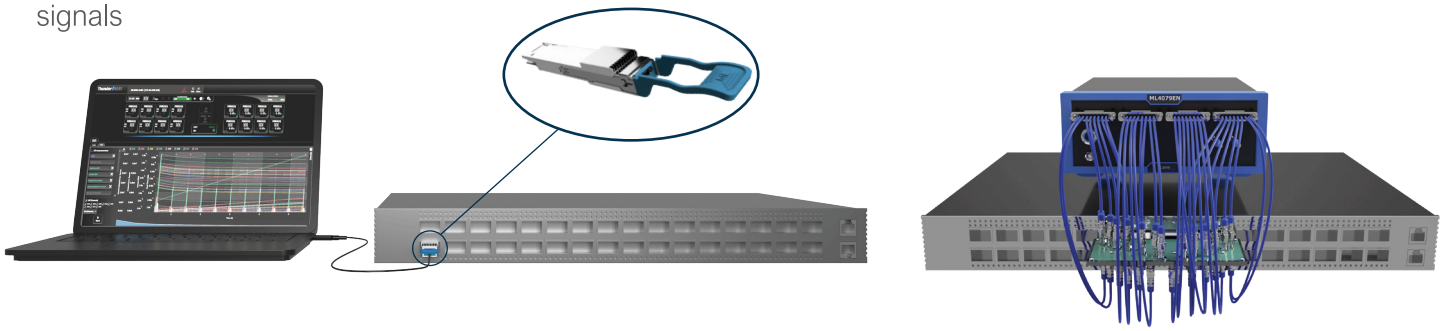


ML4064-ALB-112
OSFP-800



Key Features

- Available for QSFP-DD (ML4062-ALB-112) and OSFP (ML4064-ALB-112)
- Multi-Vendor DSP support
- VSR Support
- PRBS Generator
- BER/ SNR Diagnostics
- Gray Mapping supported
- FIR taps supported
- 800G DSP enables retiming and equalization of host signals
- CMIS Compatible Configuration and EEPROM
- Communication via USB-C, I2C or ethernet
- Programmable MSA memory pages and custom memory maps
- Separate daughter card for configurable power spots, dissipating up to 19W
- DSP dissipates 10W
- Two temperature sensors, voltage sensor
- Additional feature: ThunderBERT GUI



ML4062-ALB-112-TB (right) characterizing a host port with ThunderBERT GUI. Equivalent to a full BERT benchtop setup (right)

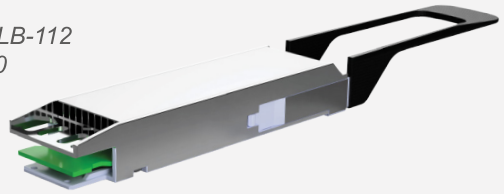
While all Active Loopbacks are CMIS 5.0 compliant, they can also be enhanced with MultiLane's signature ThunderBERT GUI, resulting in a first-of-its-kind combination of instrument and module that can take the place of a full benchtop setup for host port testing. These ThunderBERT enabled ALBs – ALB-TBs – allow for distinct, separate Tx and Rx checking, making use of the ALB's full BER/SNR diagnostics and a PRBS generator through a much faster and more detailed GUI. With instrument-grade measurements packaged in a module's casing – a change in form factor akin to going from a desktop to a laptop – MultiLane's ALB-TBs can serve as benchtop replacements in development, speed up testing during production, and can even act as a field debugging tool post deployment.

LOOPBACK MODULES

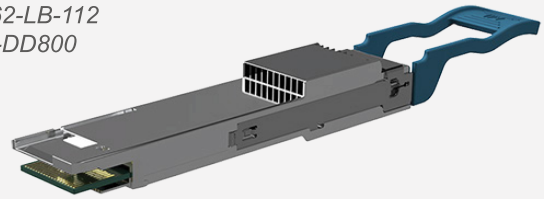
Passive/Thermal loads

Loopback modules are packaged in a standard MSA housing compatible with its respective ports. Transmit data from the host is electrically routed - internal to the loopback module - to the receive data outputs and back to the host. These modules act as thermal loads and have programmable power dissipation. This provides a cost-effective means to exercise system ports during R&D validation, production testing, and field testing. Some modules are thermal load only and do not have the high-speed loopback routing of signals and are used to solely test the thermal and power loading of a system.

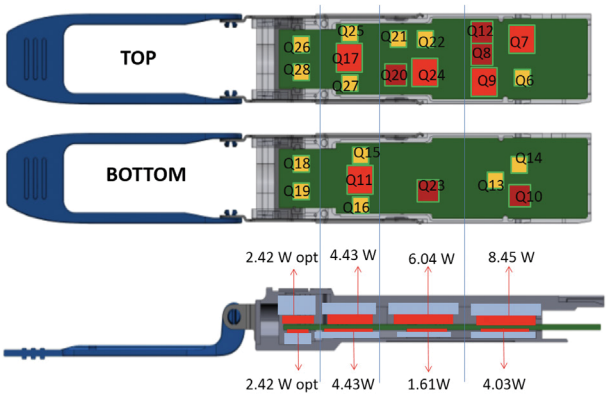
ML4064-LB-112
OSFP800



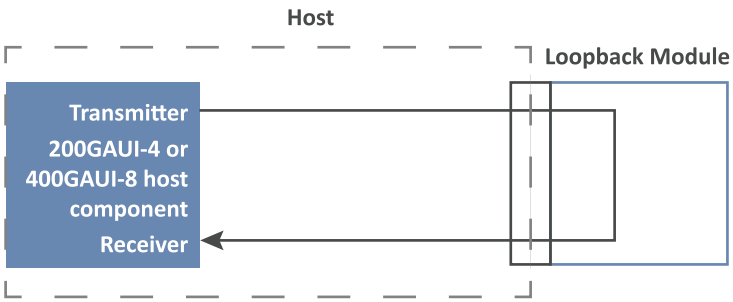
ML4062-LB-112
QSFP-DD800



The power dissipation of the loopbacks is programmable, and the thermal loads emulate the costlier optical transceivers' thermal profiles. Below is an example of the power dissipation elements inside the loopback.



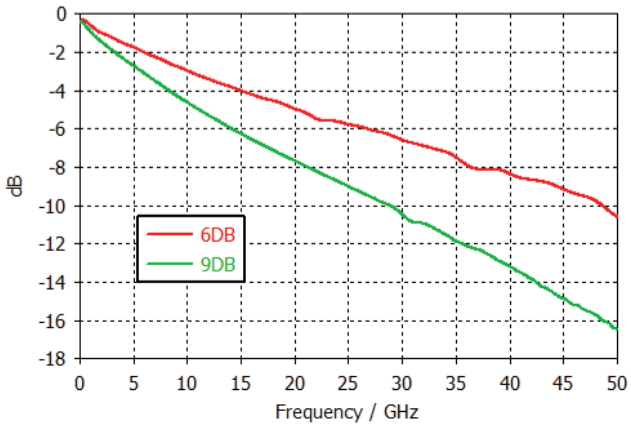
ML4062-S-TL QSFP-DD 400G power dissipation elements

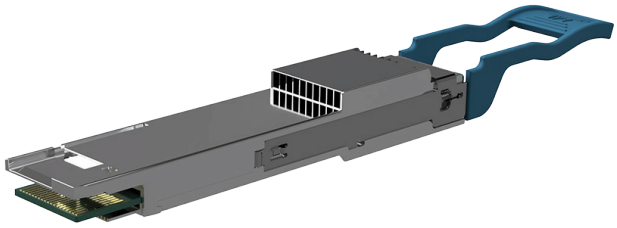


LOOPBACK MODULES

Loss Target Loopbacks

MultiLane provides Loss Target Loopbacks with an attenuation of 9 dB.



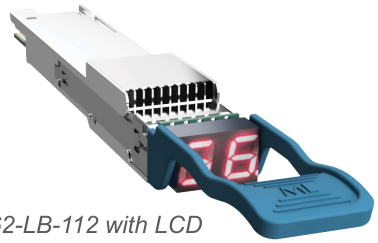


ML4062-LB2a-9dB

Smart Loopbacks

As the global leader in Data Center test solutions, we have adopted the term ‘smart loopbacks’ to emphasize the rich and powerful feature set that is being offered in these loopbacks. Smart loopbacks enable testing beyond the regular thermal loading and signal integrity validation, and support a variety of features crucial for firmware validation of new host designs:

- Fully programmable MSA memory pages
- Low speed signal status indicators
- Edge detection of control signals
- Raising alarm signals to any desired state
- LCD monitor to report real-time diagnostics



ML4062-LB-112 with LCD

MultiLane offers full customization of loopbacks to meet your specific testing needs. This includes setting the location and magnitude of thermal loads on the PCB itself, defining specific register content across memory map pages, and even forcing precise insertion loss/return loss impairments along the loopback traces.

Switch with all ports being tested at once

ADAPTERS AND ANALYZERS

NEXUS ANALYZER

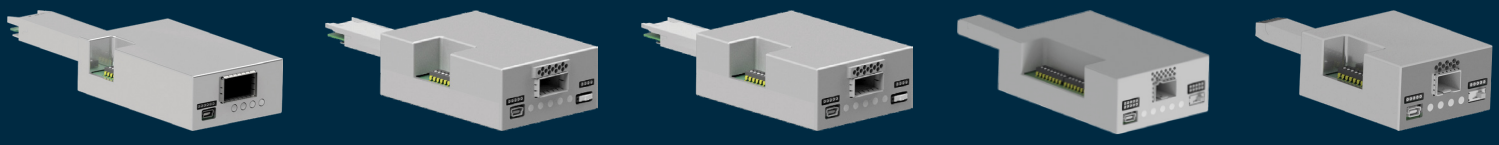
As new CMIS standards are developed and adopted, with a wide variety of SFF and CMIS specs available, CMIS testing becomes increasingly complex and time consuming. The MultiLane Nexus Analyzer is a direct response to this complexity, designed with speed and simplicity at its core. A CMIS/SFF debug tool for interoperability testing and CMIS/SFF failures, the Nexus Analyzer is equipped with a full feature sweep implemented in its GUI.

The Nexus Analyzer is used as a verification tool to validate the CMIS/SFF implementation, with a CMIS/SFF register sweep, state machine and data path state machine testing, I2C R/W commands and packet analysis, included in the product's features.

Capable of running a full system debug in minutes, with pinpoint accuracy on interoperability issues from either the module or host side, the Nexus Analyzer acts as a dramatic accelerant to CMIS adoption across the industry.

The product includes a port extender which connects low speed signals from the host to the plugged module while providing a probing interface at the same time. It also implements SI traces capable of 112G/lane, to connect the TX and RX paths from the host port to the plugged transceiver in the adapter.

Mating onto the adapter through a set of pin headers, the Analyzer gives access to the Nexus GUI with the capabilities to troubleshoot the interoperability between the system and the pluggable. Features include data path state machine testing, a full CMIS/SFF register sweep, I2C communication packets capturing and measurement of voltage and inrush current. The Nexus Analyzer is available in SFP, SFP-DD, QSFP-DD, and OSFP form factors.



OSFP *QSFP-DD* *QSFP* *SFP-DD* *SFP*

Adapter

800G Adapter Key Features:
- SI traces and connector support 112G rates
- Support up to 30W modules
- Current and temperature sensor
- Module power ripples and inrush current measurement
- Detection of power spikes during module state transitions
- Probing interface for Vcc and GND pins
- External I2C
- Dip switch to choose low-speed signal source: internal/external
- Available in all SFF/CMIS form factors

Analyzer

800G Analyzer Key Features:
- Voltage sensor
- ePPS signal validation
- 1 MHz I2C
- Probing interface for low-speed signals
- External control for any low-speed signal:
  -INT/RST
  -LPW/PRS
  -SDA
  -SCL
- LEDs for control/alarm signal status
- USB port for PC connection to use GUI or API features
- Available in all SFF/CMIS form factors

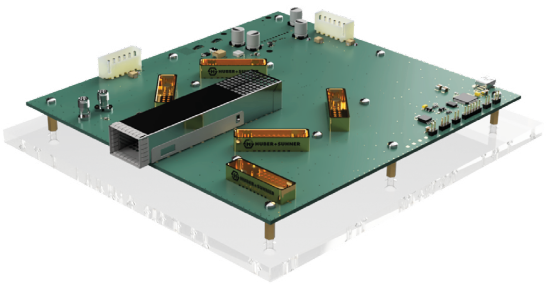
OSFP-XD

MultiLane offers a comprehensive set of OSFP-XD solutions, from thermal loads and controller boards, to test fixtures, to loopbacks, enabling confident development and accelerated deployment for up to 16x112Gbps/lane systems.

OSFP-XD Module Compliance Board

MultiLane's work to accelerate the OSFP-XD ecosystem goes beyond just thermal management. Module Compliance Boards, Host Compliance Boards, and Loopbacks are all already in development.

MultiLane's upcoming OSFP-XD MCBs, the ML4064-XD-MCB-112-MXPM70, offer a means of testing 16x112Gbps OSFP-XD pluggables. The board is already compliant with the insertion loss requirements of CEI-56G-VSR-NRZ and IEEE 802.3ck..

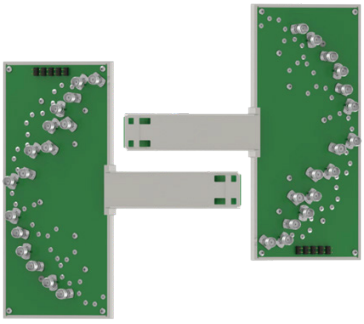


ML4064-XD-MCB-112-MXPM70

OSFP-XD Host Compliance Board

ML4064-XD-HCB1/2-112 Key Features

- Compliant with IEEE802.3ck and CEI-56G-VSR-NRZ
- Built with high performance PCB Material
- High performance signal integrity traces
- Same low Insertion Loss for all channels
- HCB1 supports 8x112G TX and RX lanes
- HCB2 supports 8x112G TX and RX lanes
- High speed signals accessible through 2.4-mm or 1.85-mm connectors



ML4064-XD-HCB1-112 ML4064-XD-HCB2-112

OSFP-XD Loopback

Building on the strong MultiLane OSFP-XD portfolio, the MultiLane OSFP-XD loopback, the ML4064-XD-LB is designed to provide rapid, confident host port characterization and validation for OSFP-XD ports up to 1.6T.

ML4064-XD-LB

- 6 independent power spots dissipating up to 60W
- Type 1 OSFP-XD shell
- Up to 112Gbps/lane
- Low insertion loss
- CMIS 5.2 Compatible Configuration and EEPROM
- Programmable MSA memory pages
- Custom memory maps
- I2C Interface
- Voltage sensor
- Insertion counter
- Temperature Monitor and alarms warning
- Cut-off temperature preventing module overheating
- Front LED indicator

ML4064-XD-LB Loopback

Thermal Emulation | ML4064-XD-CNT & ML4064-XD-TL

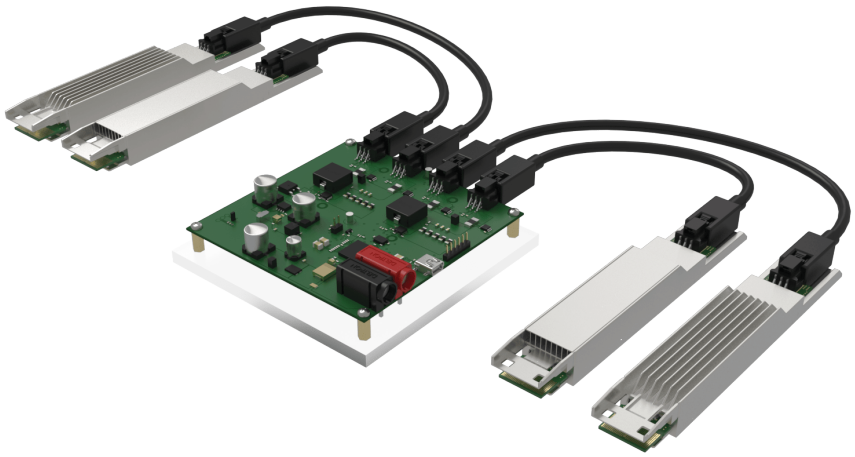
MultiLane's Thermal Load and Controller Board – the ML4064-XD-TL and ML4064-XD-CNT – provide a versatile tool for testing the anticipated 45 W heat dissipation required by the 1.6T generation. Configurable power spots on the thermal load allows for a variety of internal combinations to be tested for both transceiver emulation and cooling solutions. Up to 4 Thermal Loads can be controlled using the ML4064-XD-CNT Controller Board, allowing for multiple configurations to be tested at once for a total of 176 W.

ML4064-XD-TL Key Features

- Total heat dissipation of 44 W using 11 power spots
- 16 power spots of 4 W each for flexible thermal configurations
- 7 temperature sensors to help monitor the
- Available with 2A, 2B, 2C, or 2D heatsinks

ML4064-XD-CNT Key Features

- Tests up to 4 Thermal Loads simultaneously
- Supports 176 W of dissipation at once
- Power configuration setting through GUI
- Exportable temperature monitoring on all attached modules
- I2C R/W Tab to read/write to the TL EEPROM
- Load/Save MSA for full access to TL EEPROM



Four ML4064-XD-TL thermal loads plugged into the ML4064-XD-CNT thermal controller board

CHANNEL EMULATION BOARDS

MultiLane's Channel Emulation Boards simulate lossy signals allowing vendors to characterize their designs for a variety of real-world environments. The ML4067 features a variety of carefully designed differential test traces, this passive test accessory adds precise ISI (inter-symbol interference) in order to calibrate or stress test DSPs, modules, gearboxes or other relevant systems in real-life environments. The channel emulation board is available to support 112Gbps/lane and 224Gbps/lane, ML4067-112 and ML4067-224, respectively.

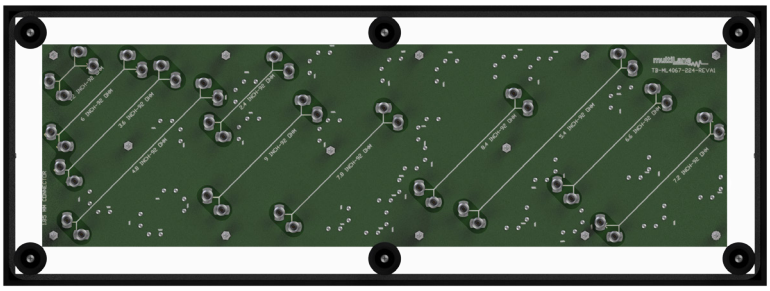
ML4067-112-18/24 Key Features

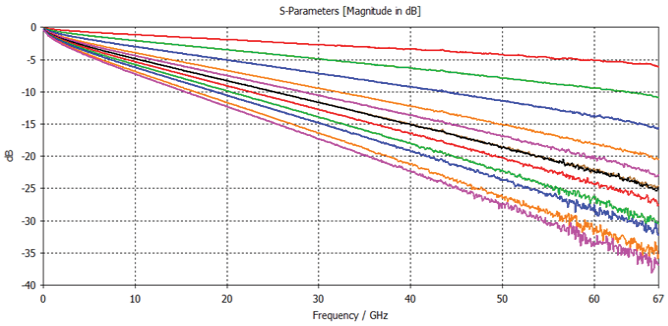
- 13 trace paths
- Loss from 2 dB to 24 dB with a 2 dB increment
- Target Nyquist frequency of 26 GHz
- 100 ohms and 93 ohms differential traces
- Available in 1.85-mm or 2.4-mm connectors

ML4067-112-24/18

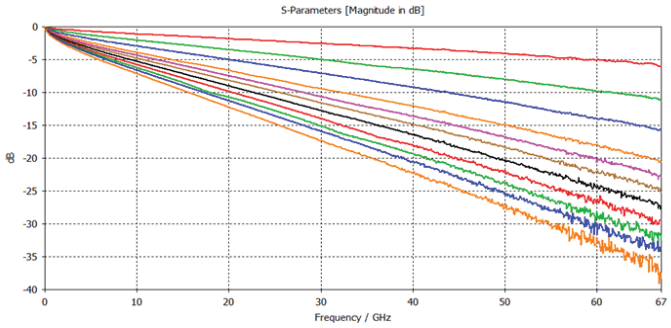
ML4067-224 Key Features

- 11 trace paths
- Loss from 3 dB to 25 dB
- Target Nyquist frequency of 53 GHz
- 100 ohms and 93 ohms differential traces
- Available in 1-mm or 1.85-mm connectors





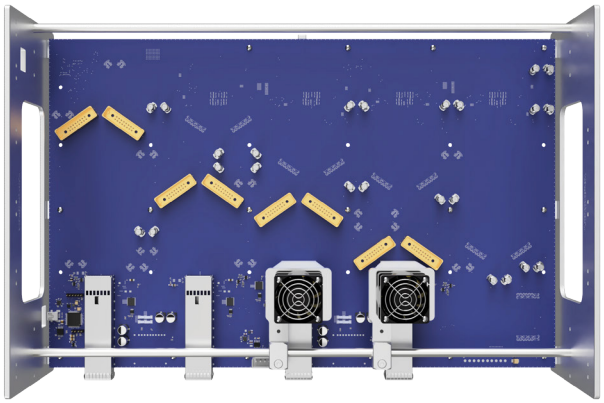
100 Ohms Insertion Loss



92 Ohms Insertion Loss

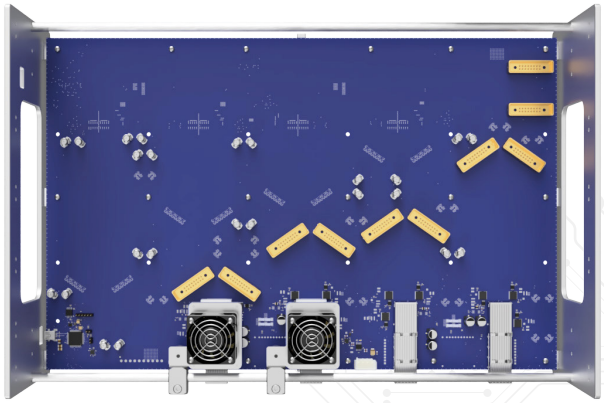
ML4067-OSFP-112 Key Features

- Host Emulator
- Includes 4 OSFP ports, with different loss profiles that can be used to emulate short host channels and long host channels
- Terminated by MXPM70 connectors
- Each port supports up to 30W
- Host side monitoring capabilities per port (voltage and current monitoring)
- Accompanied by a GUI which provides direct access to transceiver characterization
- Provides monitoring interface for two DUTs simulvbvtaneously
- Includes cooling fixtures and fans for DUT
- Four loss profiles at 25Ghz from OSFP connector to MXPM70 connectors: 3db, 6db, 7.3db, 12db



ML4067-QDD-112 Key Features

- Host Emulator
- Includes 4 QSFP-DD ports, with different loss profiles that can be used to emulate short host channels and long host channels
- Terminated by MXPM70 connectors
- Each port supports up to 30W
- Host side monitoring capabilities per port (voltage and current monitoring)
- Accompanied by a GUI which provides direct access to transceiver characterization
- Provides monitoring interface for two DUTs simultaneously
- Includes cooling fixtures and fans for DUT
- Four loss profiles at 25Ghz from QSFP-DD connector to MXPM70 connectors: 3db, 6db, 7.3db, 12db



Revision No.	Last Modified
0.7	September 2025

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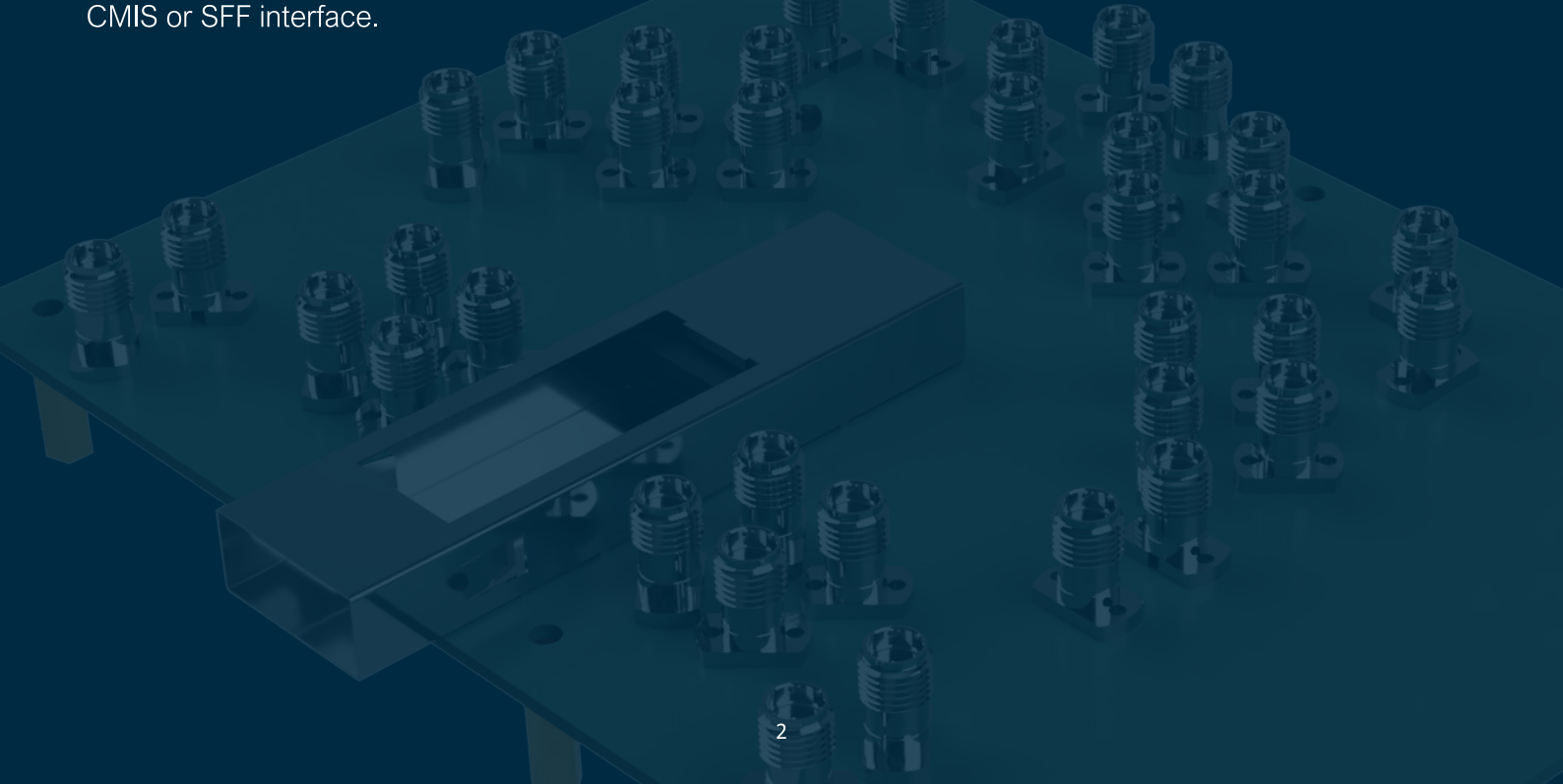
ABOUT US

Since 2006, MultiLane has been offering high speed test and measurement equipment for data communications. We help chart industry evolution and accelerate the adoption of new technologies with a complete cycle support of data center test solutions encompassing IC and transceiver characterization, host line card testing, and link testing. We provide a range of form factors and architectures, from portable instruments, to stand-alone bench top instruments to automated test platforms. We also assist our customer base with compliance and interoperability test services. We serve developers, module vendors, network installers, and data center operators with high-performance, reliable equipment at an attractive price-point. MultiLane provides leading-edge solutions for the latest data center technologies and well-established techologies, from 800G at 112Gbps/lane to industry-first 1.6T thermal testing solutions, with a comprehensive set of development solutions for MSAs ranging from SFP, DSFP, QSFP, QSFP-DD, QSFP-OO800, and OSFP800.

The MultiLane portfolio encompasses optical and electrical oscilloscopes, bit error rate testers, time domain reflectometers (TOR) for TIA and cable testing, interconnect products, as well as fully automated DAC and transceiver test solutions, and compliance test services for 100G and 800G technologies. Developers, manufacturers, and installers of these new technologies all need the wide portfolio of solutions to be able to do their jobs successfully.

DATA CENTER TEST SOLUTIONS ENABLE NETWORK EVOLUTION

The ever-increasing faceplate densities and data rates bring with them a proliferation of many different MSA form factors and standards. As such, the need for tools to ensure compliance to the relevant standards is essential. As part of MultiLane's commitment to supporting the evolution of the data center, we provide a comprehensive selection of these data center test solutions for a wide variety of standards including Module and Host Compliance Boards, Passive and Active Loopback Modules, and Analyzers for I2C CMIS and SFF state machine testing. The solutions offered in this brochure are MSA compliant and use the standard defined CMIS or SFF interface.

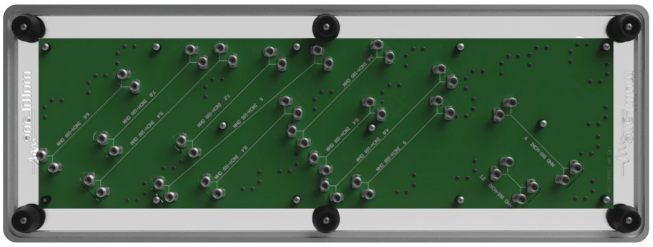


THE 1.6T ECOSYSTEM

As the race to 224Gbps/lane heats up, MultiLane stands ready to accelerate the development and adoption of this latest technology with three new products in 224Gbps Signal Integrity characterization. Taken together, these products offer a compliance and development suite to accelerate vital R&D for next-gen networks.

ML4067-224 CHANNEL EMULATION BOARD

The latest MultiLane Channel Emulation Board, the ML4067-224 provides a comprehensive set of trace paths for 224Gbps signals to test and validate responses to lossy channels. With 11 traces at 92 and another 11 traces at 100 Ohms the ML4067-224 can emulate losses which range from 4 to 30 dB at the target Nyquist frequency of 53.125 GHz. The board supports 1 mm and 1.85 mm connectors.

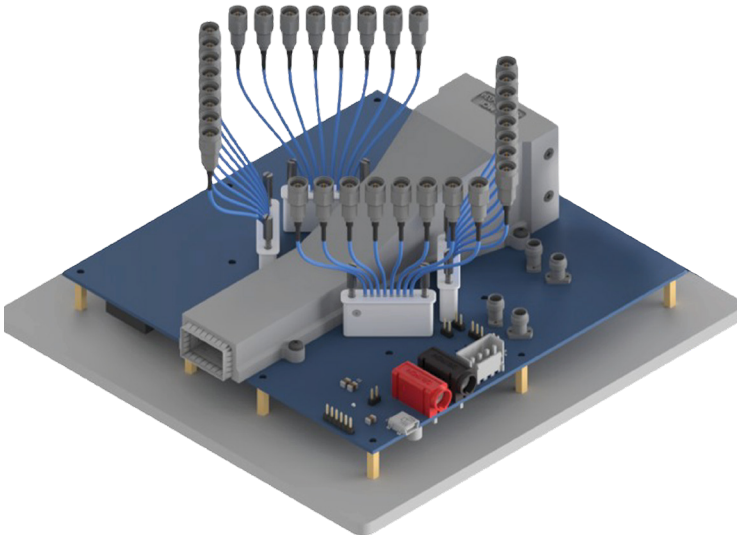


ML4067-224 Channel Emulation Board

OSFP1.6T COMPLIANCE BOARDS

OSFP1.6T Module Compliance Boards

One of the first 224Gbps/lane MCBs to market, the MultiLane OSFP 224G MCB is designed to validate next-gen pluggables with loss profiles compliant with the IEEE 802.3df, high performance SMPS connectors offering a bandwidth of up to 110GHz, and a USB interface that gives access to a CMIS GUI. The MCB provides a comprehensive approach to compliance and interoperability validation with access to full CMIS implementation in modules



ML4064-MCB-224

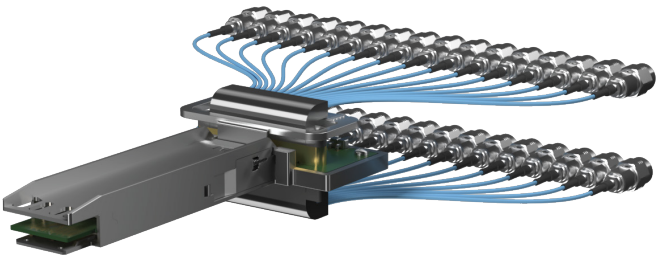
- MCB loss including the 3” SMPS cable is compliant with IEEE 802.3df
- Power pins and low speed signals are accessible via pin headers
- Ability to drive I2C from external pin headers, or connect I2C packet analyzer
- Ability to drive 3.3 V from external source for power supply margining- DSP dissipates 10W
- High performance SMPS connectors up to 110GHz
- 1x and 2x test traces available
- USB Interface giving access to CMIS GUI, providing comprehensive approach to DUT interoperability, allowing users to access full CMIS implementation in modules. APIs available.

OSFP1.6T Host Compliance Board

The MultiLane OSFP 224G Host Compliance Board (HCB), the ML4064-HCB-224, provides good SI performance as defined by the IEEE specification for accurate host characterization at 224Gbps/lane. With a narrow, cabled design to enable easy setup and crosstalk validation, the ML4064-HCB-224 is purpose built to address the challenges of streamlining the testing process without compromising that has come to define 224Gbps/lane validation.

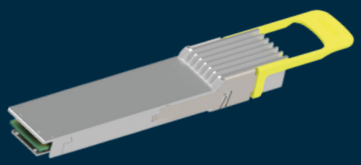
ML4064-HCB-224:

- Insertion within IEEE 802.3df parameters
- Very low Return loss up to 70 GHz
- Custom SMPS connector with 3” cables to 1.85mm or 1mm connectors
- Shell is compliant with OSFP1600 MSA and features the angled latch mechanism

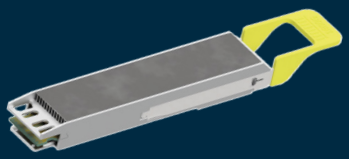


OSFP1.6T LOOPBACKS

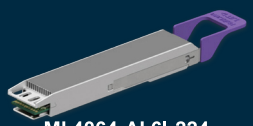
MultiLane offers both Electric and Active Loopbacks for OSFP 224G. These pluggables are designed to demonstrate host interoperability, establish a baseline performance before introducing outside variables, and run simplified debug routines to save on support cycles and FAE resources.



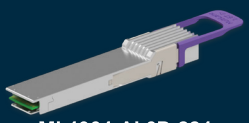
ML4064-LB2R-224



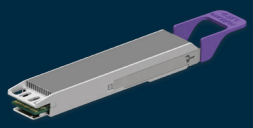
ML4064-LB2I-224



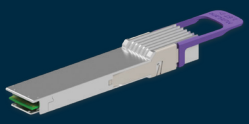
ML4064-AL6I-224



ML4064-AL6R-224



ML4064-AL7I-224



ML4064-AL7R-224

Passive Loopbacks

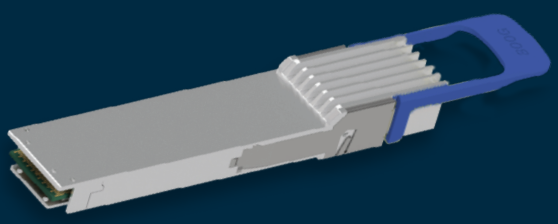
- Up to 45W power dissipation
- Available in Type2 IHS and RHS shells
- OSFP1600 compliant shell with angled latch
- Various options for various use cases : front LED, front pin header for external power, LCD
- 4 temperature sensors
- CMIS 5.x complaint with CDB
- I 2C and I3C support
- Real insertion counter
- Current sense
- Voltage Sense

Active Loopbacks

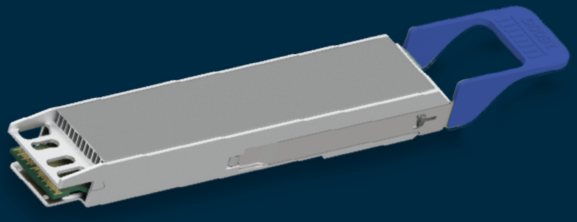
- Available in Type2 IHS and RHS shells
- OSFP1600 compliant shell with angled latch
- Available with two DSP options ALB6 and ALB7
- CMIS 5.x support with CDB, VDM, DPSM temperature sensors
- Real insertion counter
- Current sense
- Voltage Sense
- ThundertBert option
- Available from Q2 with full availability in Q3 2025

Redriver-Based Loopbacks

- 1.6T Redriver-based loopbacks to emulate Active Copper Cable applications
- Up to 40 W power dissipation
- OSFP1600 compliant shell
- Front LED
- Temperature, current, and voltage sensors
- CMIS 5.x compliant with CDB
- I2C and I3C support
- Real insertion counter



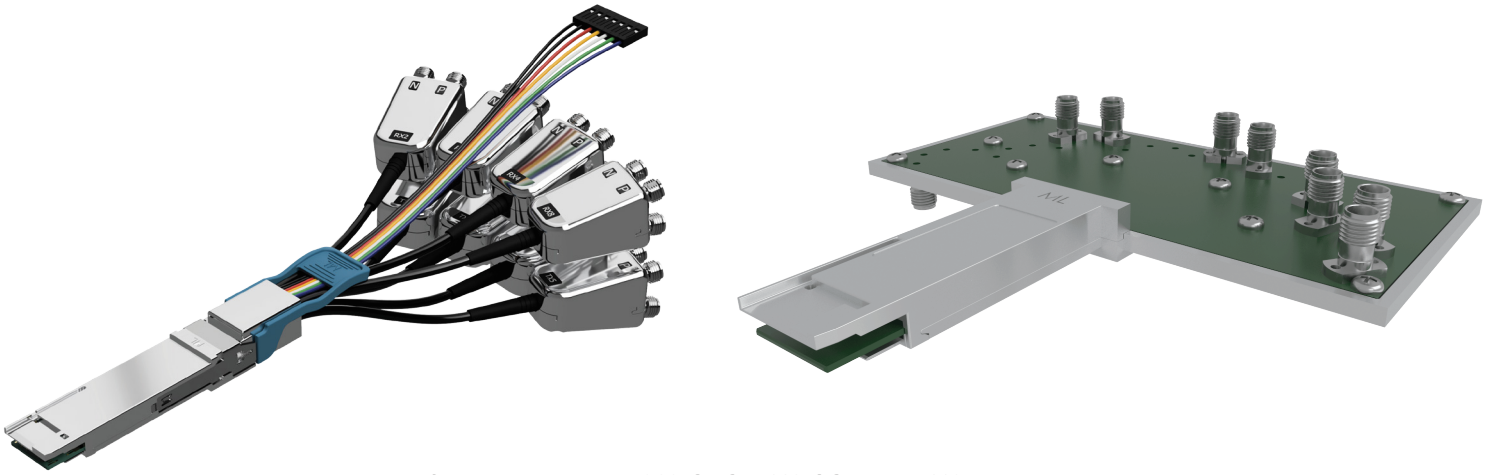
ML4064-RL1R-224



ML4064-RL1I-224

HOST COMPLIANCE BOARDS

A host compliance board is a breakout fixture that can be plugged into the system host side and provides access to the host electrical input and output signal (TP1a, TP4a compliance test points). It is a passive structure for optimum signal integrity. See graph for typical insertion loss performance.



Left to Right: The ML4062-CHCB-112 QSFP-DD 112 cable based HCB and the ML4064-HCB-112 OSFP 112 HCB

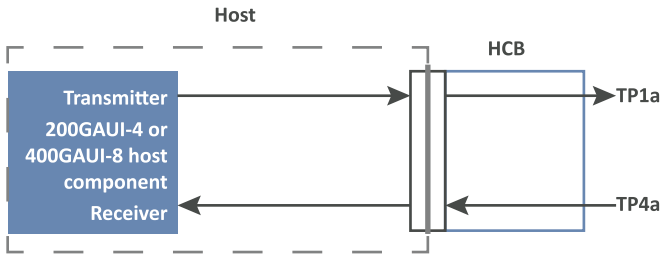
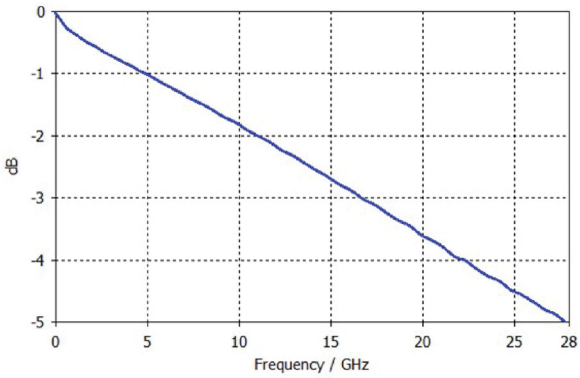


Figure 120E-5—Host 200AUI-4 or 400GAUI-8 C2M compliance points

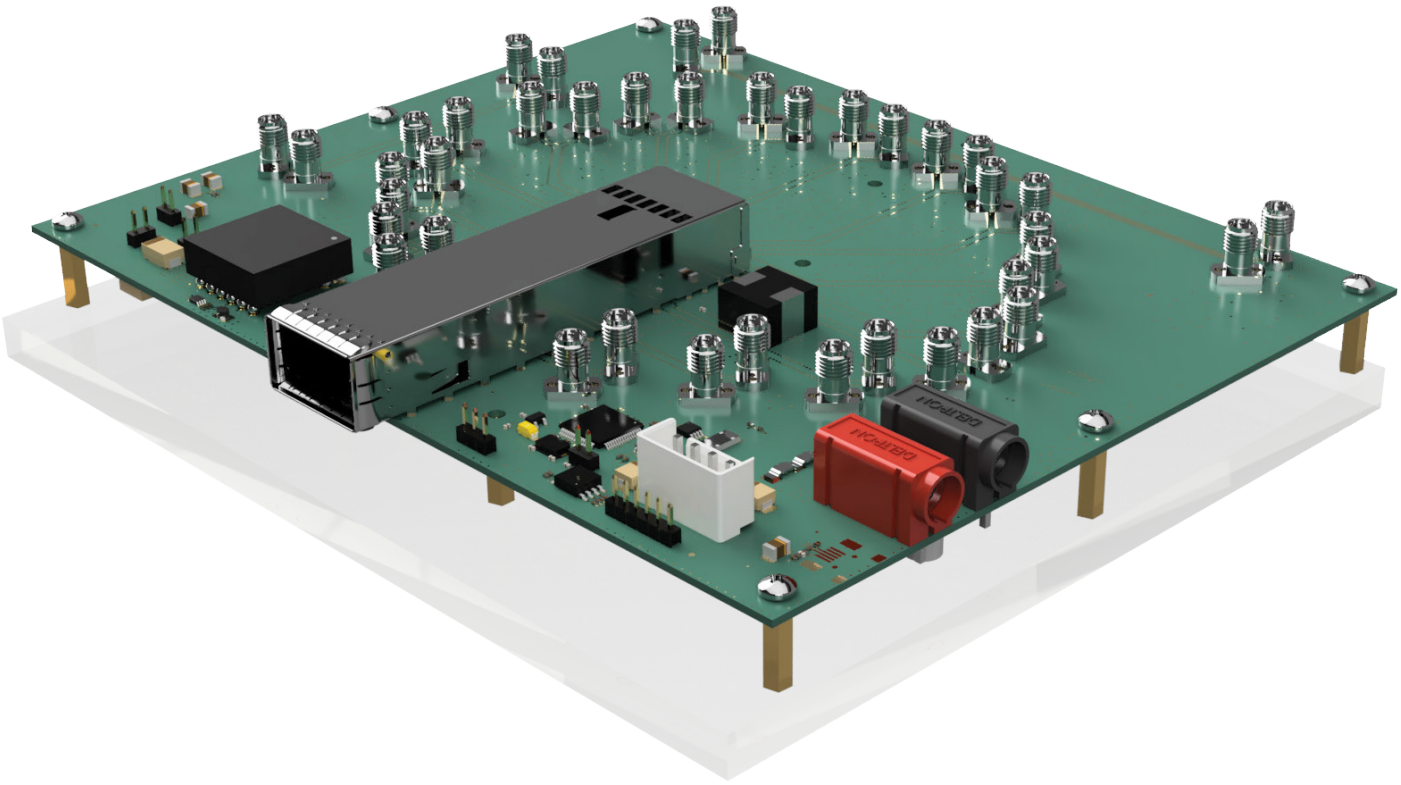
Reference: 802.3bs spec, section Annex 120E, p253



Insertion loss OSFP HCB ML4064-HCB

MODULE COMPLIANCE BOARDS

MultiLane's Module Compliance Boards (MCBs) can be used with any form of pluggable in their respective form factor. They serve to validate the compliance, signal transmission, and any other feature the pluggable has. They can also test and monitor module thermal capability, as well as provide stress testing.
The Module Compliance Boards are accompanied with a comprehensive CMIS or sff user interface.
The UI includes, but is not limited to:
- I2C Access and R/W
- Customizable memory maps and access to module EEPROM
- Temperature, voltage, and current monitoring



ML4064-MCB-112

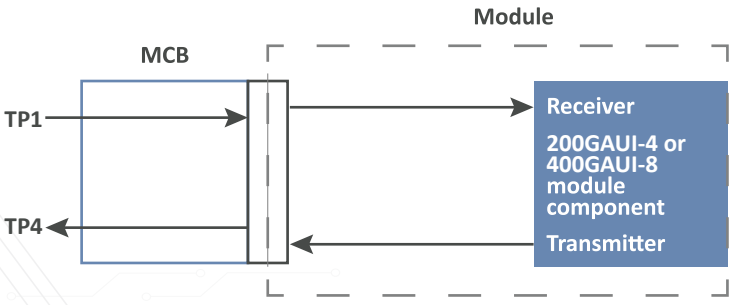
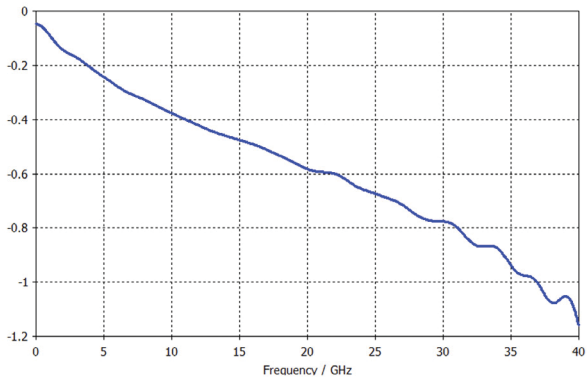


Figure 120E-6–Module 200AUI-4 or 400GAUI-8 C2M compliance points

Reference: 802.3bs spec, section Annex 120E, p253



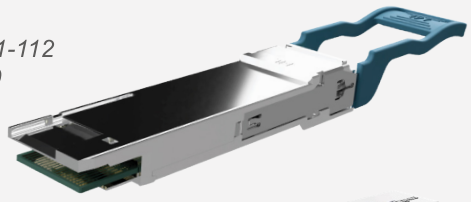
ML4041K-56 Insertion Loss

LOOPBACK MODULES

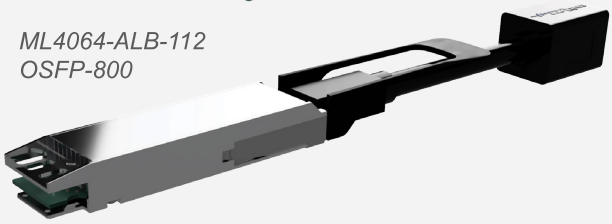
Active Loopbacks

The move to 800G brings with it a paradigm shift in loopback design. The complex characterization techniques required for host ports at 8x112Gbps necessitate the advent of a new generation of loopbacks to address these challenges. MultiLane's Active Loopbacks are DSP-based modules designed specifically to account for these complex characterization techniques, while also covering established requirement – loopback capabilities, CMIS interoperability, and thermal management – for host port testing.

ML4062-ALB1-112
QSFP-DD800

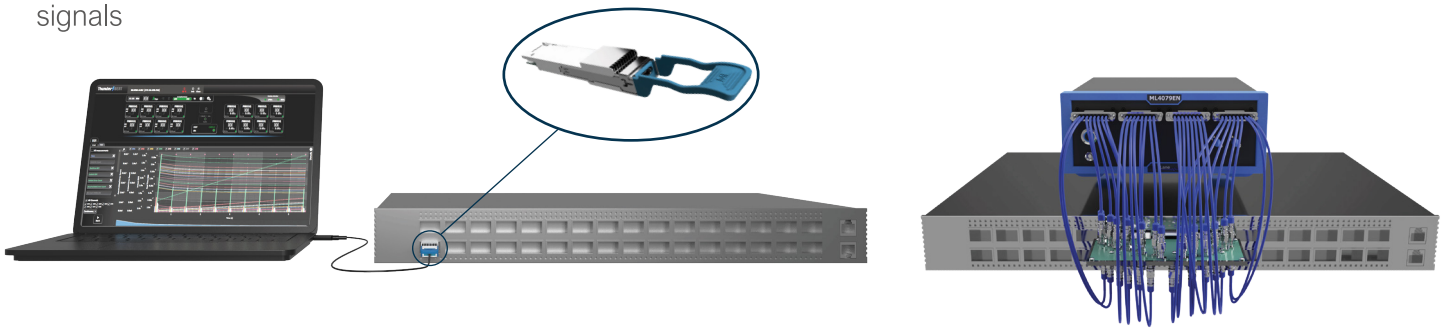


ML4064-ALB-112
OSFP-800



Key Features

- Available for QSFP-DD (ML4062-ALB-112) and OSFP (ML4064-ALB-112)
- Multi-Vendor DSP support
- VSR Support
- PRBS Generator
- BER/ SNR Diagnostics
- Gray Mapping supported
- FIR taps supported
- 800G DSP enables retiming and equalization of host signals
- CMIS Compatible Configuration and EEPROM
- Communication via USB-C, I2C or ethernet
- Programmable MSA memory pages and custom memory maps
- Separate daughter card for configurable power spots, dissipating up to 19W
- DSP dissipates 10W
- Two temperature sensors, voltage sensor
- Additional feature: ThunderBERT GUI



ML4062-ALB-112-TB (right) characterizing a host port with ThunderBERT GUI. Equivalent to a full BERT benchtop setup (right)

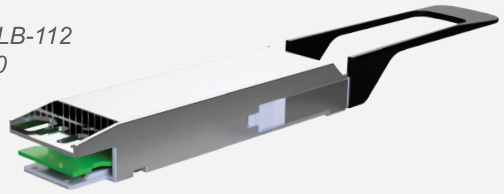
While all Active Loopbacks are CMIS 5.0 compliant, they can also be enhanced with MultiLane's signature ThunderBERT GUI, resulting in a first-of-its-kind combination of instrument and module that can take the place of a full benchtop setup for host port testing. These ThunderBERT enabled ALBs – ALB-TBs – allow for distinct, separate Tx and Rx checking, making use of the ALB's full BER/SNR diagnostics and a PRBS generator through a much faster and more detailed GUI. With instrument-grade measurements packaged in a module's casing – a change in form factor akin to going from a desktop to a laptop – MultiLane's ALB-TBs can serve as benchtop replacements in development, speed up testing during production, and can even act as a field debugging tool post deployment.

LOOPBACK MODULES

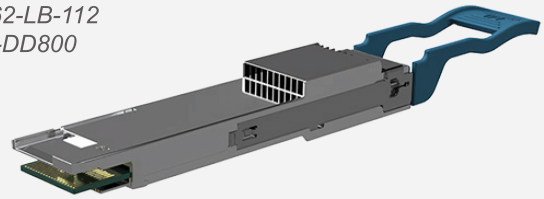
Passive/Thermal loads

Loopback modules are packaged in a standard MSA housing compatible with its respective ports. Transmit data from the host is electrically routed - internal to the loopback module - to the receive data outputs and back to the host. These modules act as thermal loads and have programmable power dissipation. This provides a cost-effective means to exercise system ports during R&D validation, production testing, and field testing. Some modules are thermal load only and do not have the high-speed loopback routing of signals and are used to solely test the thermal and power loading of a system.

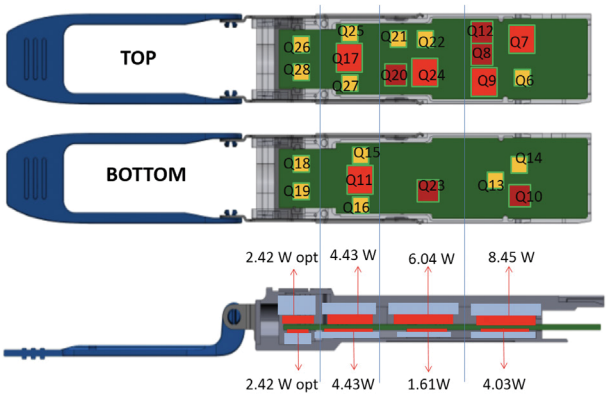
ML4064-LB-112
OSFP800



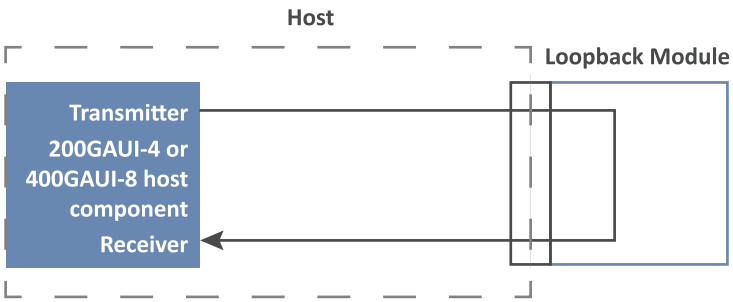
ML4062-LB-112
QSFP-DD800



The power dissipation of the loopbacks is programmable, and the thermal loads emulate the costlier optical transceivers' thermal profiles. Below is an example of the power dissipation elements inside the loopback.



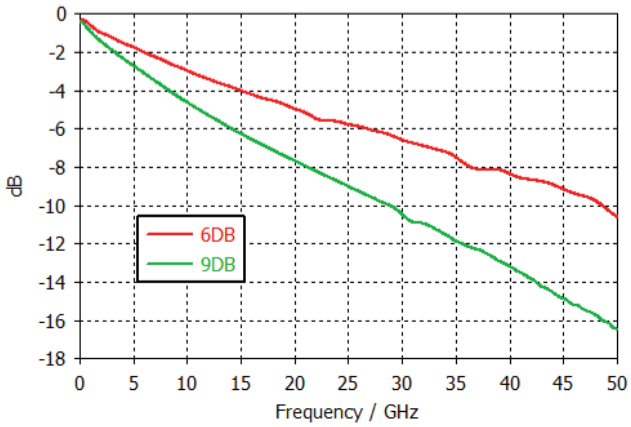
ML4062-S-TL QSFP-DD 400G power dissipation elements

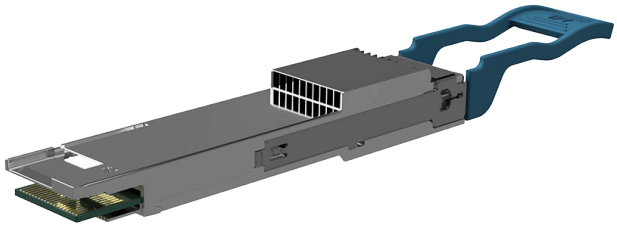


LOOPBACK MODULES

Loss Target Loopbacks

MultiLane provides Loss Target Loopbacks with an attenuation of 9 dB.



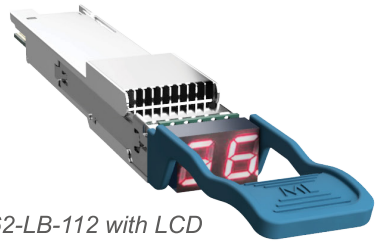


ML4062-LB2a-9dB

Smart Loopbacks

As the global leader in Data Center test solutions, we have adopted the term ‘smart loopbacks’ to emphasize the rich and powerful feature set that is being offered in these loopbacks. Smart loopbacks enable testing beyond the regular thermal loading and signal integrity validation, and support a variety of features crucial for firmware validation of new host designs:

- Fully programmable MSA memory pages
- Low speed signal status indicators
- Edge detection of control signals
- Raising alarm signals to any desired state
- LCD monitor to report real-time diagnostics



ML4062-LB-112 with LCD

MultiLane offers full customization of loopbacks to meet your specific testing needs. This includes setting the location and magnitude of thermal loads on the PCB itself, defining specific register content across memory map pages, and even forcing precise insertion loss/return loss impairments along the loopback traces.

Switch with all ports being tested at once

ADAPTERS AND ANALYZERS

NEXUS ANALYZER

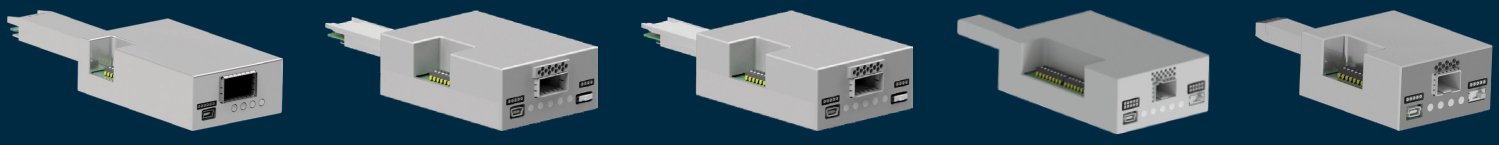
As new CMIS standards are developed and adopted, with a wide variety of SFF and CMIS specs available, CMIS testing becomes increasingly complex and time consuming. The MultiLane Nexus Analyzer is a direct response to this complexity, designed with speed and simplicity at its core. A CMIS/SFF debug tool for interoperability testing and CMIS/SFF failures, the Nexus Analyzer is equipped with a full feature sweep implemented in its GUI.

The Nexus Analyzer is used as a verification tool to validate the CMIS/SFF implementation, with a CMIS/SFF register sweep, state machine and data path state machine testing, I2C R/W commands and packet analysis, included in the product's features.

Capable of running a full system debug in minutes, with pinpoint accuracy on interoperability issues from either the module or host side, the Nexus Analyzer acts as a dramatic accelerant to CMIS adoption across the industry.

The product includes a port extender which connects low speed signals from the host to the plugged module while providing a probing interface at the same time. It also implements SI traces capable of 112G/lane, to connect the TX and RX paths from the host port to the plugged transceiver in the adapter.

Mating onto the adapter through a set of pin headers, the Analyzer gives access to the Nexus GUI with the capabilities to troubleshoot the interoperability between the system and the pluggable. Features include data path state machine testing, a full CMIS/SFF register sweep, I2C communication packets capturing and measurement of voltage and inrush current. The Nexus Analyzer is available in SFP, SFP-DD, QSFP-DD, and OSFP form factors.



OSFP *QSFP-DD* *QSFP* *SFP-DD* *SFP*

Adapter

800G Adapter Key Features:
- SI traces and connector support 112G rates
- Support up to 30W modules
- Current and temperature sensor
- Module power ripples and inrush current measurement
- Detection of power spikes during module state transitions
- Probing interface for Vcc and GND pins
- External I2C
- Dip switch to choose low-speed signal source: internal/external
- Available in all SFF/CMIS form factors

Analyzer

800G Analyzer Key Features:
- Voltage sensor
- ePPS signal validation
- 1 MHz I2C
- Probing interface for low-speed signals
- External control for any low-speed signal:
  -INT/RST
  -LPW/PRS
  -SDA
  -SCL
- LEDs for control/alarm signal status
- USB port for PC connection to use GUI or API features
- Available in all SFF/CMIS form factors

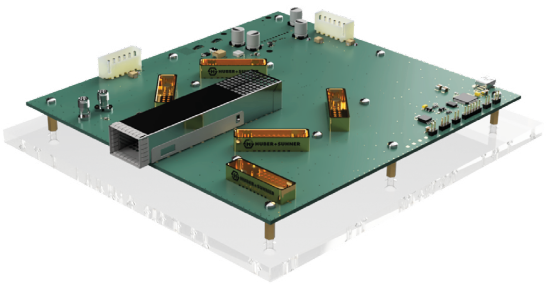
OSFP-XD

MultiLane offers a comprehensive set of OSFP-XD solutions, from thermal loads and controller boards, to test fixtures, to loopbacks, enabling confident development and accelerated deployment for up to 16x112Gbps/lane systems.

OSFP-XD Module Compliance Board

MultiLane's work to accelerate the OSFP-XD ecosystem goes beyond just thermal management. Module Compliance Boards, Host Compliance Boards, and Loopbacks are all already in development.

MultiLane's upcoming OSFP-XD MCBs, the ML4064-XD-MCB-112-MXPM70, offer a means of testing 16x112Gbps OSFP-XD pluggables. The board is already compliant with the insertion loss requirements of CEI-56G-VSR-NRZ and IEEE 802.3ck..

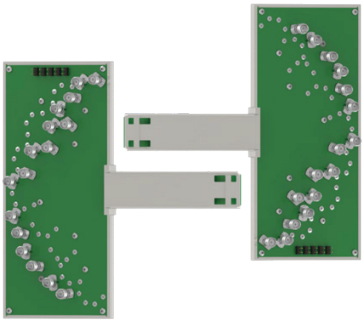


ML4064-XD-MCB-112-MXPM70

OSFP-XD Host Compliance Board

ML4064-XD-HCB1/2-112 Key Features

- Compliant with IEEE802.3ck and CEI-56G-VSR-NRZ
- Built with high performance PCB Material
- High performance signal integrity traces
- Same low Insertion Loss for all channels
- HCB1 supports 8x112G TX and RX lanes
- HCB2 supports 8x112G TX and RX lanes
- High speed signals accessible through 2.4-mm or 1.85-mm connectors



ML4064-XD-HCB1-112 ML4064-XD-HCB2-112

OSFP-XD Loopback

Building on the strong MultiLane OSFP-XD portfolio, the MultiLane OSFP-XD loopback, the ML4064-XD-LB is designed to provide rapid, confident host port characterization and validation for OSFP-XD ports up to 1.6T.

ML4064-XD-LB

- 6 independent power spots dissipating up to 60W
- Type 1 OSFP-XD shell
- Up to 112Gbps/lane
- Low insertion loss
- CMIS 5.2 Compatible Configuration and EEPROM
- Programmable MSA memory pages
- Custom memory maps
- I2C Interface
- Voltage sensor
- Insertion counter
- Temperature Monitor and alarms warning
- Cut-off temperature preventing module overheating
- Front LED indicator

ML4064-XD-LB Loopback

Thermal Emulation | ML4064-XD-CNT & ML4064-XD-TL

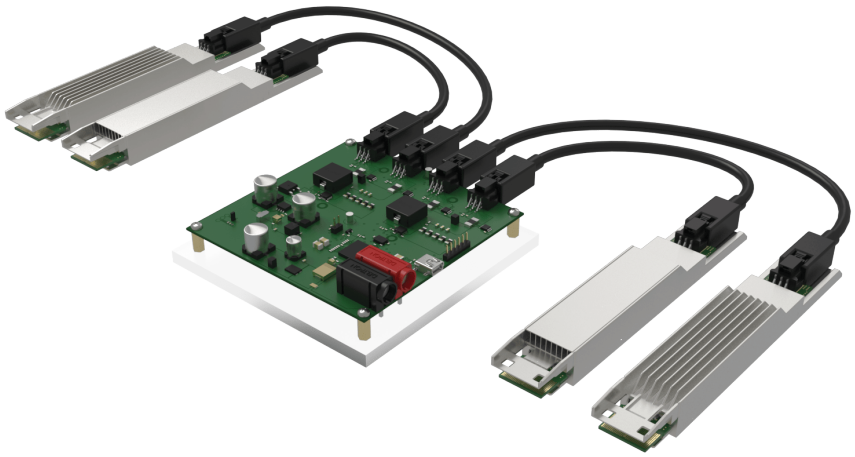
MultiLane's Thermal Load and Controller Board – the ML4064-XD-TL and ML4064-XD-CNT – provide a versatile tool for testing the anticipated 45 W heat dissipation required by the 1.6T generation. Configurable power spots on the thermal load allows for a variety of internal combinations to be tested for both transceiver emulation and cooling solutions. Up to 4 Thermal Loads can be controlled using the ML4064-XD-CNT Controller Board, allowing for multiple configurations to be tested at once for a total of 176 W.

ML4064-XD-TL Key Features

- Total heat dissipation of 44 W using 11 power spots
- 16 power spots of 4 W each for flexible thermal configurations
- 7 temperature sensors to help monitor the
- Available with 2A, 2B, 2C, or 2D heatsinks

ML4064-XD-CNT Key Features

- Tests up to 4 Thermal Loads simultaneously
- Supports 176 W of dissipation at once
- Power configuration setting through GUI
- Exportable temperature monitoring on all attached modules
- I2C R/W Tab to read/write to the TL EEPROM
- Load/Save MSA for full access to TL EEPROM



Four ML4064-XD-TL thermal loads plugged into the ML4064-XD-CNT thermal controller board

CHANNEL EMULATION BOARDS

MultiLane's Channel Emulation Boards simulate lossy signals allowing vendors to characterize their designs for a variety of real-world environments. The ML4067 features a variety of carefully designed differential test traces, this passive test accessory adds precise ISI (inter-symbol interference) in order to calibrate or stress test DSPs, modules, gearboxes or other relevant systems in real-life environments. The channel emulation board is available to support 112Gbps/lane and 224Gbps/lane, ML4067-112 and ML4067-224, respectively.

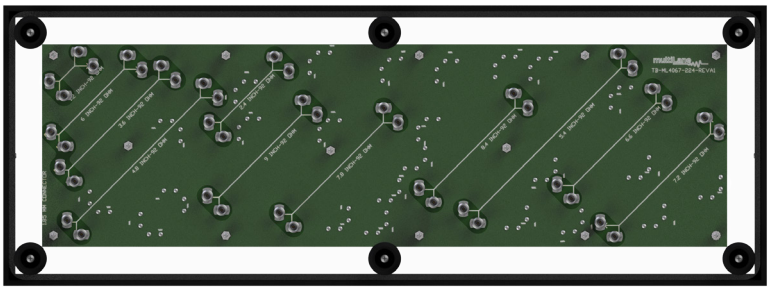
ML4067-112-18/24 Key Features

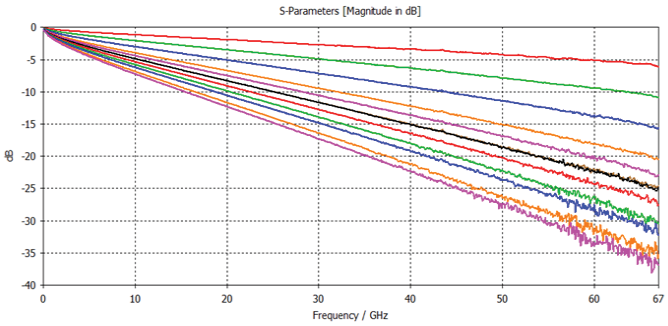
- 13 trace paths
- Loss from 2 dB to 24 dB with a 2 dB increment
- Target Nyquist frequency of 26 GHz
- 100 ohms and 93 ohms differential traces
- Available in 1.85-mm or 2.4-mm connectors

ML4067-112-24/18

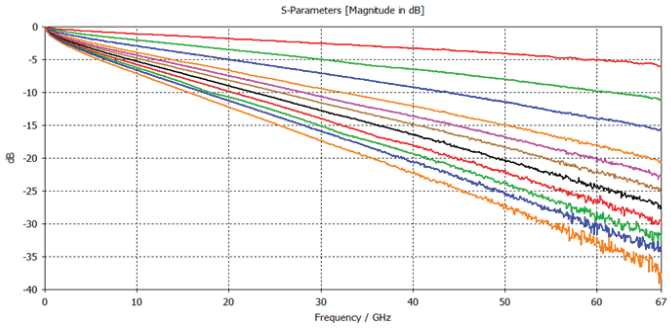
ML4067-224 Key Features

- 11 trace paths
- Loss from 3 dB to 25 dB
- Target Nyquist frequency of 53 GHz
- 100 ohms and 93 ohms differential traces
- Available in 1-mm or 1.85-mm connectors





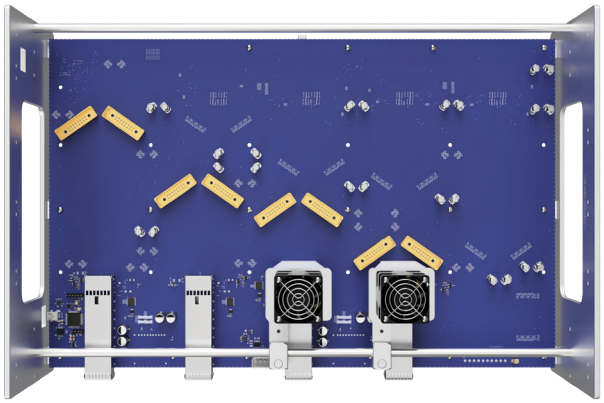
100 Ohms Insertion Loss



92 Ohms Insertion Loss

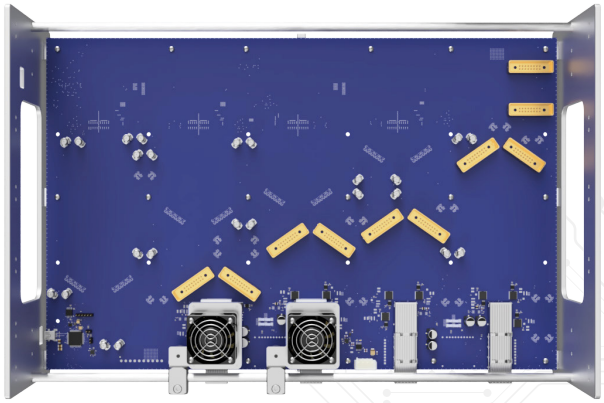
ML4067-OSFP-112 Key Features

- Host Emulator
- Includes 4 OSFP ports, with different loss profiles that can be used to emulate short host channels and long host channels
- Terminated by MXPM70 connectors
- Each port supports up to 30W
- Host side monitoring capabilities per port (voltage and current monitoring)
- Accompanied by a GUI which provides direct access to transceiver characterization
- Provides monitoring interface for two DUTs simulvbvtaneously
- Includes cooling fixtures and fans for DUT
- Four loss profiles at 25Ghz from OSFP connector to MXPM70 connectors: 3db, 6db, 7.3db, 12db



ML4067-QDD-112 Key Features

- Host Emulator
- Includes 4 QSFP-DD ports, with different loss profiles that can be used to emulate short host channels and long host channels
- Terminated by MXPM70 connectors
- Each port supports up to 30W
- Host side monitoring capabilities per port (voltage and current monitoring)
- Accompanied by a GUI which provides direct access to transceiver characterization
- Provides monitoring interface for two DUTs simultaneously
- Includes cooling fixtures and fans for DUT
- Four loss profiles at 25Ghz from QSFP-DD connector to MXPM70 connectors: 3db, 6db, 7.3db, 12db



Revision No.	Last Modified
0.7	September 2025

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