multiLane

DATA CENTER TEST SOLUTIONS

Development Kits

Innovation for the Next Generation

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QSFP-DD OSFP QSFP SFP SFP-DD

MODULE TESTING KITS:

400G and 800G Module Testing Kits target module vendors: transceivers, DAC Cables, any form of pluggable, which need to be validated within a certain set of standards.
Module Testing Kits contain the following items: Module Compliance Boards, Analyzers, and loopbacks.

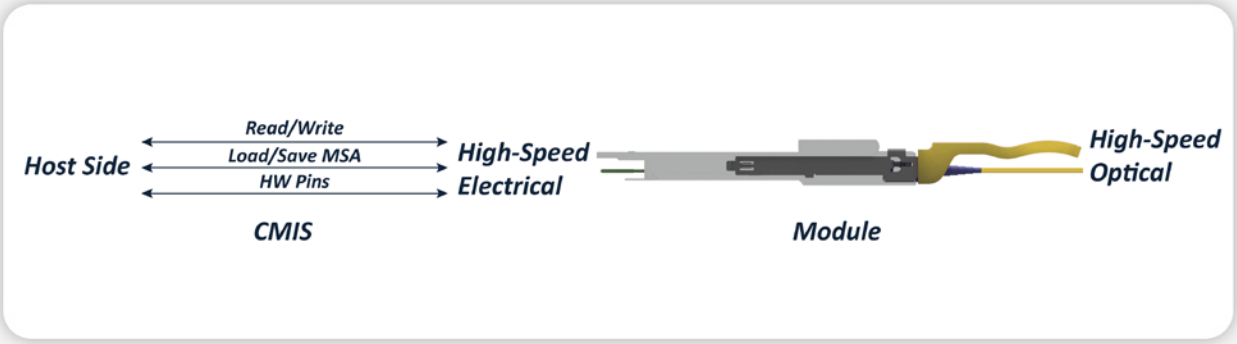
Module Compliance Boards:

These boards are 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 are also used to test the thermal capability of modules, as well stress testing them to evaluate their output.

The Module Compliance Boards are accompanied with a comprehensive user interface.

ML has developed a CMIS interface for QSFP-DD and OSFP products, while SFP, SFP-DD and QSFP have their own specific 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



Adapters and Analyzers: (ML4066 & ML4066-ANA)

Once the compliance of the module is validated, after making sure a clean input signal is followed by a clean output, and after confirming the I2C communication, the module vendor can take a closer look in analyzing the communication between their host, and module.
The adapter and analyzer are two boards which mate onto each other with a set of pin headers, and are accompanied with their own CMIS UI, with the objective to and abilities to:

- Analyze I2C communication in 3 different modes
- State Machine Testing
- Access to the low speed and control signals
- VCC monitoring
- Access to module EEPROM, as well as customizable memory maps
- Monitor and visualize I2C transactions and operations.

Loopbacks:

A loopback will loop the TX port back to the RX port. It also emulates the thermal capability of a transceiver. Every loopback is equipped with power spots, which dissipate a specific amount of power. They are also equipped with temperature sensors. A module vendor can use the loopback to validate his test setup and to prepare their environment before inserting in and testing their module.

PORT TESTING KITS:

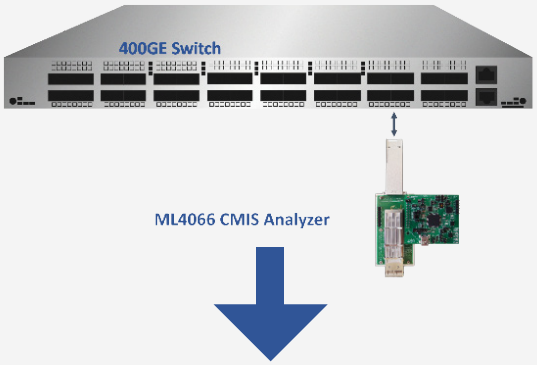
400G and 800G Port Testing Kits target system and host vendors: they are used to validate and test every port within their host, from the port signal integrity to signal transmission, our port testing kits are there to help validate the overall system from the host side.
Port Testing Kits contain the following items: Host Compliance Boards, Adapters and Analyzers, and loopbacks.

Host Compliance Boards:

Host Compliance Boards or Breakout Boards, test the electrical paths of devices like switches, routers, or transponders. They ensure that the output signal of the host is clean enough.

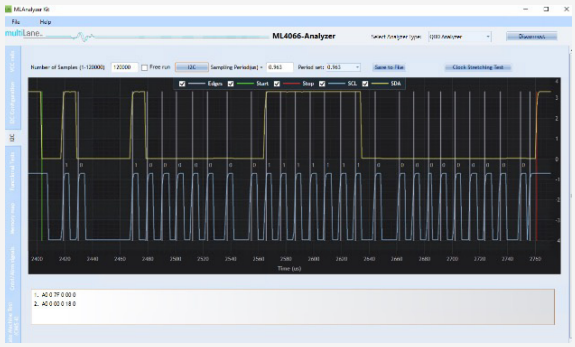
Adapters and Analyzers: (ML4066 & ML4066-ANA)

Once the electrical paths of the system host ports are validated, the host vendor can take a closer look in analyzing the communication between their host, and module.



The adapter and analyzer are two boards which mate onto each other with a set of pin headers, and are accompanied with their own CMIS UI, with the objective to and abilities to:

- Analyze I2C communication in 3 different modes
- State Machine Testing
- Access to the low speed and control signals
- VCC monitoring
- Access to module EEPROM, as well as customizable memory maps
- Monitor and visualize I2C transactions and operations.



Loopbacks:

A loopback will loop the TX port back to the RX port. It also emulates the thermal capability of a transceiver. Every loopback is equipped with power spots, which dissipate a specific amount of power. They are also equipped with temperature sensors.
Within their system, a system vendor will need a loopback to help validate their ports. A loopback allows you to confirm the validity of a port, by looping back the signal to itself. It will also set up the host to the correct environment with its' power dissipation and monitoring capabilities. Validating the link

Active Loopbacks:

With the industry moving towards higher speeds, high loss ports require retiming to recover links.
The Active Loopback is a DSP-based loopback module, which enables the retiming and equalization of host port signals. Its features include and are not limited to:

- PRBS Generator and Detector (BER Test)
- Validate port performance with an active device, equipped with better and improved performance.
- Advanced mode: TB
    - The Active Loopback supports our full BERT GUI (Bit Error Rate Tester GUI), for advanced BER, equalization and CMIS testing.

COMPLIANCE TESTING KITS:

112G/ lane Compliance testing made easier with our ML Compliance testing Kits consisting of:

- Module Compliance Boards
- Host Compliance Boards
- Loopbacks

Module Compliance Boards:

These boards are 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 are also used to test the thermal capability of modules, as well stress testing them to evaluate their output.

In compliance testing, the MCB is used to test transceivers against certain standards. The MCB can also be connected to any instrument you wish to use in the full compliance test such as Bit Error Rate Tester (BERT), or a digital oscilloscope.

The MCB'S CMIS GUI is also used to read/write to the module EEPROM and configure the power settings, as well as validating the module's memory map compliance.

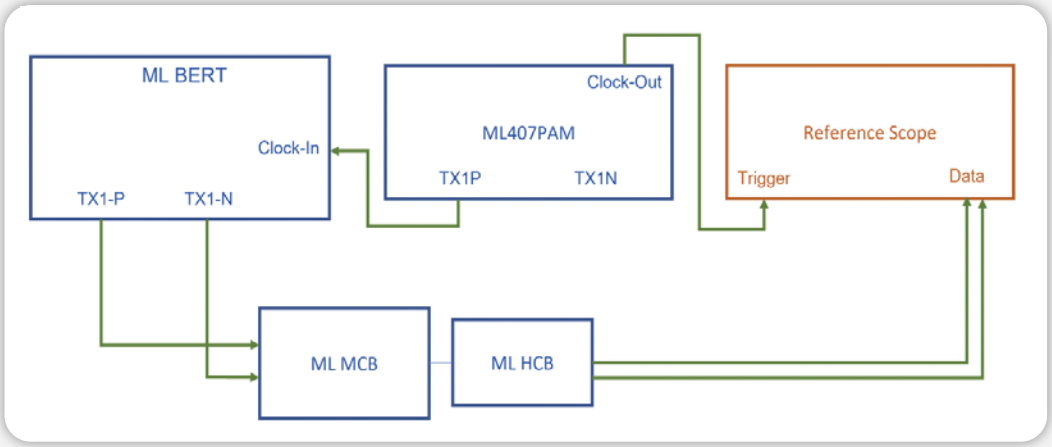
The MCB is used to test the BER, to provide an eye diagram, and to perform any other test needed.

Host Compliance Boards:

Host Compliance Boards or Breakout Boards, test the electrical paths of devices like switches, routers, or transponders. They ensure that the output signal of the host is clean enough.

In compliance testing, the HCBs are used for calibration purposes: before beginning with the test, users calibrate the whole set up in reference to the standards. This is done before inserting and testing the DUT in question.

The HCBs are also used to validate the TX of port and allows you to drive a stressed input signal to the RX side of the port.



Calibration Test Setup

Loopbacks:

A loopback will loop the TX port back to the RX port. It also emulates the thermal capability of a transceiver. Every loopback is equipped with power spots, which dissipate a specific amount of power. They are also equipped with temperature sensors. A host vendor can use the loopback to validate his system and to prepare their environment before inserting in and testing other modules.

QSFP-DD

Module Testing

MLDCTS-QDD-Kit1: 400G

MLDCTS-QDD-Kit2: 800G

Port Testing

MLDCTS-QDD-Kit3: 400G

MLDCTS-QDD-Kit4: 800G

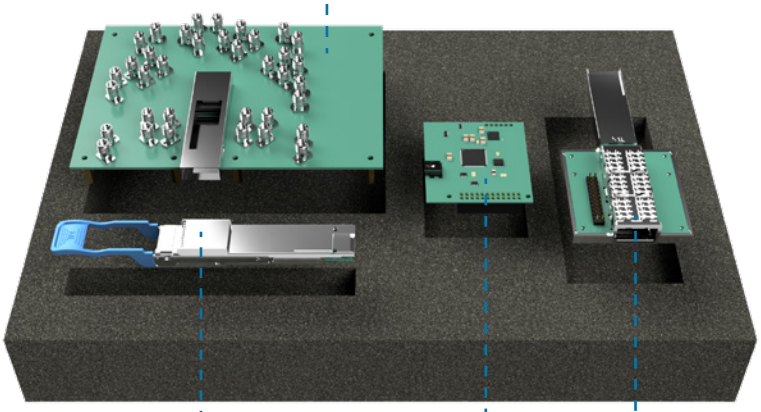
Compliance Testing

MLDCTS-QDD-Kit5: 800G

MLDCTS-QDD-KIT1: 400G

ML4062-MCB:

- Supports 8x28G NRZ and 8x56G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 2.92-mm K connectors to QSFP-DD host connector
- On-board LEDs display MSA output alarm states
- On-board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface



ML4062-TL2a:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell and latching mechanism
- Ten power spots, dissipating up to 23.4W
- Four temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine

ML4066-QDD-ANA:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

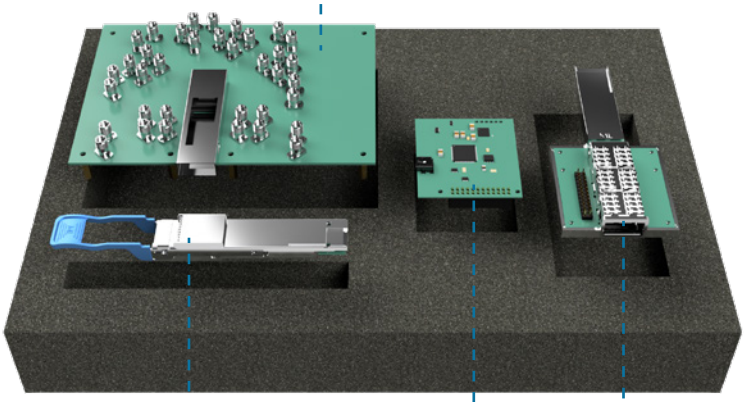
ML4066-QDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-QDD-KIT2: 800G

ML4062-MCB-112:

- Supports 8x56G NRZ and 8x112G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to QSFP-DD112 host connector.
- On-board LEDs display MSA output alarm states
- On-board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface



ML4062-LB-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell and latching mechanism
- Four power spots, dissipating up to 16W
- Four temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine

ML4066-ANA-QDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

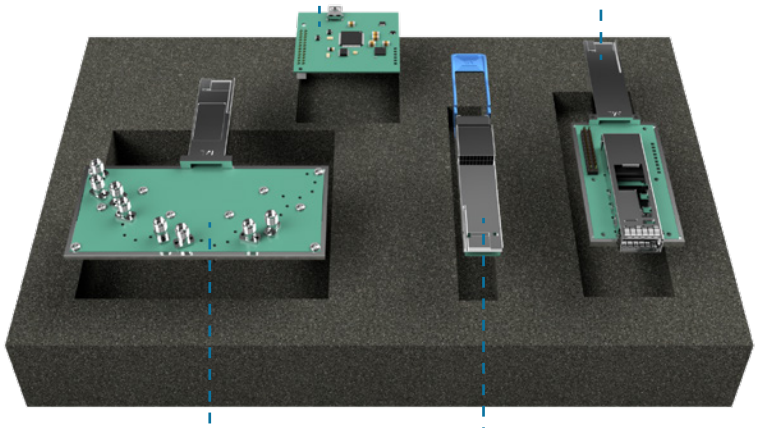
ML4066-QDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-QDD-KIT3: 400G

ML4066-QDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

ML4062-HCB1/2:

- Supports 4x28G NRZ and 4x56G PAM4
- High Performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels HCB1: Ch1, Ch2, Ch3, Ch4
- 4 channels HCB2: Ch5, Ch6, Ch7, Ch8

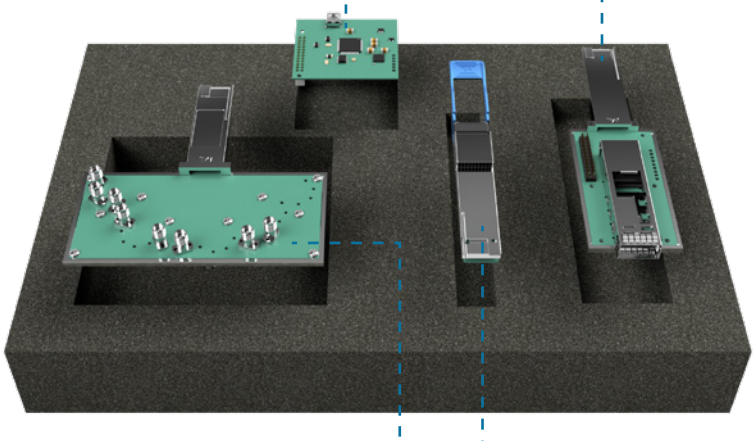
ML4062-TL2a:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell and latching mechanism
- Ten power spots, dissipating up to 23.4W
- Four temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine

MLDCTS-QDD-KIT4: 800G

ML4066-QDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

ML4062-HCB1/2-112:

- Supports 4x56G NRZ and 4x112G PAM4
- High Performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels HCB1: Ch1, Ch2, Ch3, Ch4
- 4 channels HCB2: Ch5, Ch6, Ch7, Ch8

OPTIONAL: ML4062-ALB1-2A/B-112:

- Retiming and equalizing capabilities available
- MSA Compliant shell with latching mechanism
- Two temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine
- Advanced mode: ThunderBert
  - Advanced BER testing
  - Advanced equalization
  - Advanced CMIS testing

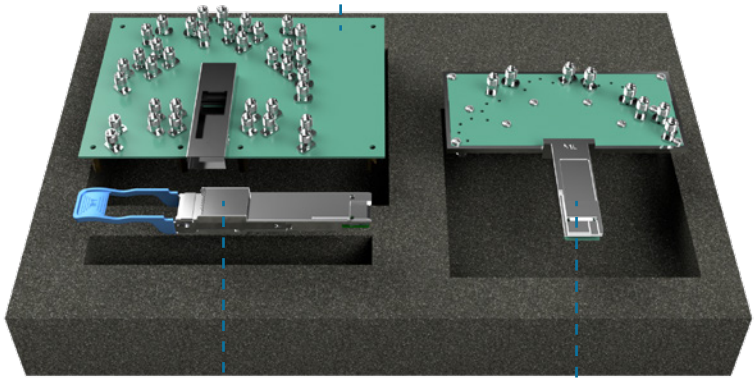
ML4062-LB-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell and latching mechanism
- Four thermal spots, dissipating up to 16W
- Four temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine

MLDCTS-QDD-KIT5: 800G

ML4062-MCB-112:

- Supports 8x56G NRZ and 8x112G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to QSFP-DD112 host connector
- On-board LEDs display MSA output alarm states
- On-board buttons/jumpers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface



ML4062-LB-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell and latching mechanism
- Four thermal spots, dissipating up to 16W
- Four temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine

ML4062-HCB1/2-112:

- Supports 4x56G NRZ and 4x112G PAM4
- High Performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels HCB1: Ch1, Ch2, Ch3, Ch4
- 4 channels HCB2: Ch5, Ch6, Ch7, Ch8

OSFP

Module Testing

MLDCTS-OSFP-Kit6: 400G

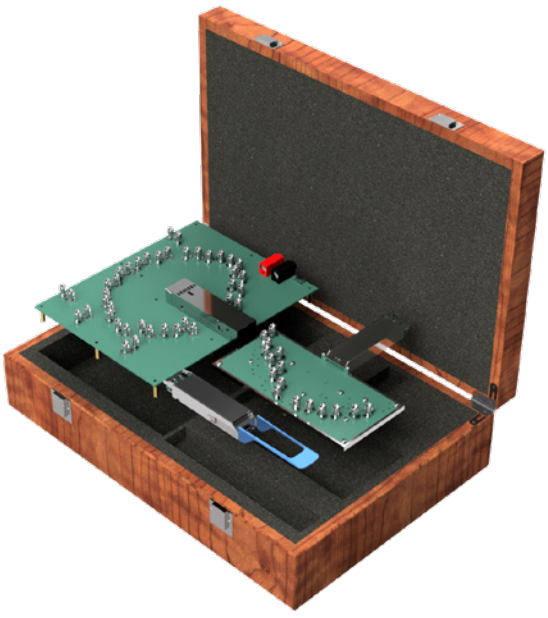
MLDCTS-OSFP-Kit7: 800G

Port Testing

MLDCTS-OSFP-Kit8: 400G

MLDCTS-OSFP-Kit9: 800G

Compliance Testing

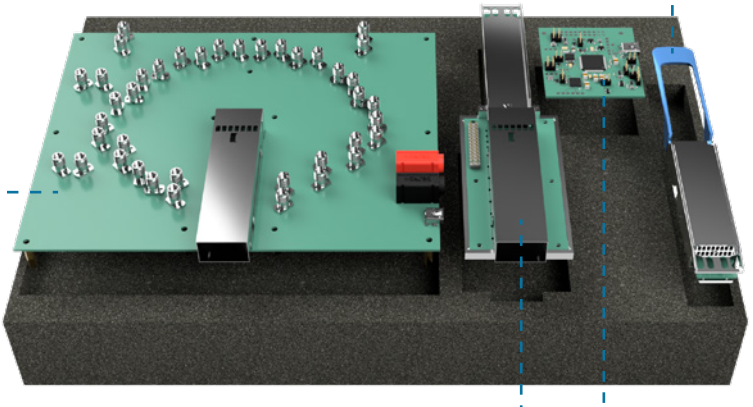


MLDCTS-OSFP-Kit10: 800G

MLDCTS-OSFP-KIT6: 400G

ML4064-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Nine thermal spots, dissipating up to 16W
- Two temperature sensors
- I2C Terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA Memory Map with programmable new pages
- CMIS compliant state machine



ML4064-MCB:

- Supports 8x28G NRZ and 8x56G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.92-mm or 2.4-mm K connectors to OSFP host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4066-OSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

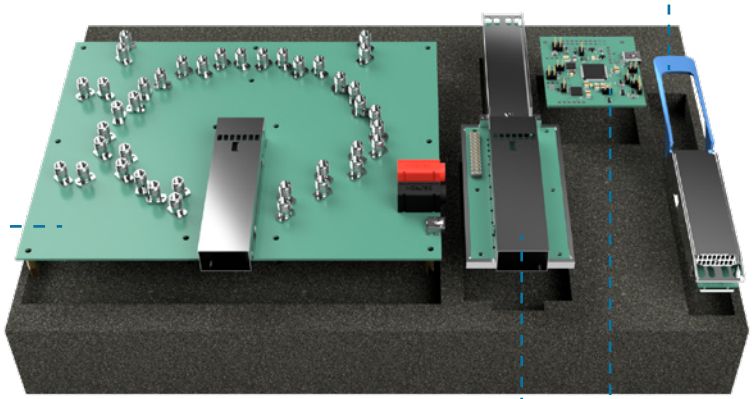
ML4066-ANA-OSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

MLDCTS-OSFP-KIT7: 800G

ML4064-LB-112:

- Loops back TX & RX with good performance SI Traces
- MSA Compliant Shell with latching mechanism
- Four thermal spots, dissipating up to 17.5W
- Two temperature sensors
- I2C Terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA Memory Map with programmable new pages
- CMIS compliant state machine



ML4064-MCB-112:

- Supports 8x56G NRZ and 8x112G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to OSFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4066-OSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

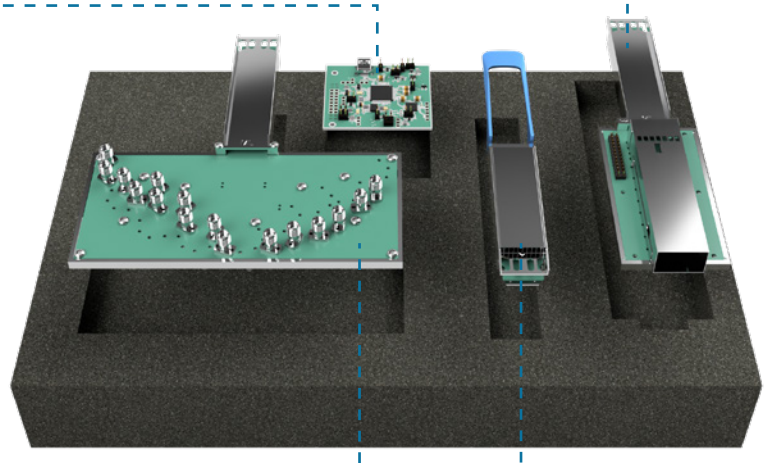
ML4066-ANA-OSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

MLDCTS-OSFP-KIT8: 400G

ML4066-OSFP:

- Low insertion loss PCB traces
- Power pins and low speed signals are accessible via pin headers
- Ability to drive I2C and Is signals from external pin headers, or connect I2C packet analyzer
- Ability to drive 3.3 V from external source for power supply margining
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-OSFP:

- Windows based GUI and API Library, USB interface
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC measurement capability
- I2C Analyzer, I2C stressing
- Functional tests
- CMIS state machine test

ML4064-HCB:

- Supports 8x28G NRZ and 8x56G PAM4
- High performance signal integrity traces
- All 8 channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 8 channels: 8 TX and the corresponding 8 RX

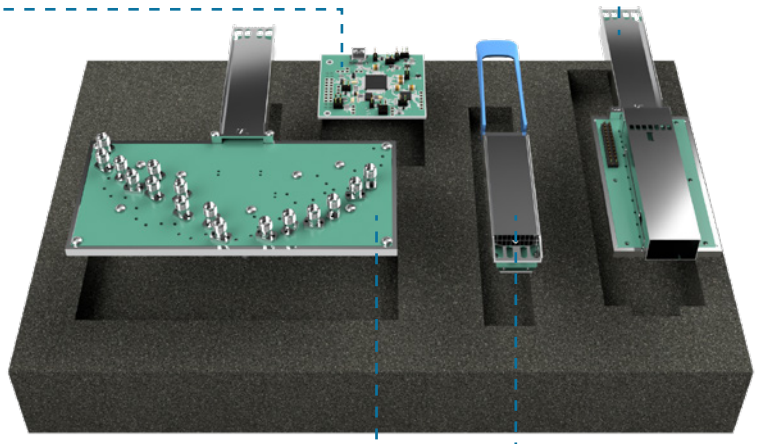
ML4064-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Nine thermal spots, dissipating up to 16W
- Two temperature sensors
- I2C Terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA Memory Map with programmable new pages
- CMIS compliant state machine

MLDCTS-OSFP-KIT9: 800G

ML4066-OSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-OSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- CMIS state machine test

OPTIONAL: ML4064-ALB2-112:

- Retiming and equalizing capabilities available
- MSA Compliant shell with latching mechanism
- Two temperature sensors
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- CMIS compliant state machine
- Advanced mode: ThunderBert
  - Advanced BER testing
  - Advanced equalization
  - Advanced CMIS testing

ML4064-HCB-112:

- Supports 8x56G NRZ and 8x112G PAM4
- High performance signal integrity traces
- All 8 channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 8 channels: 8 TX and the corresponding 8 RX

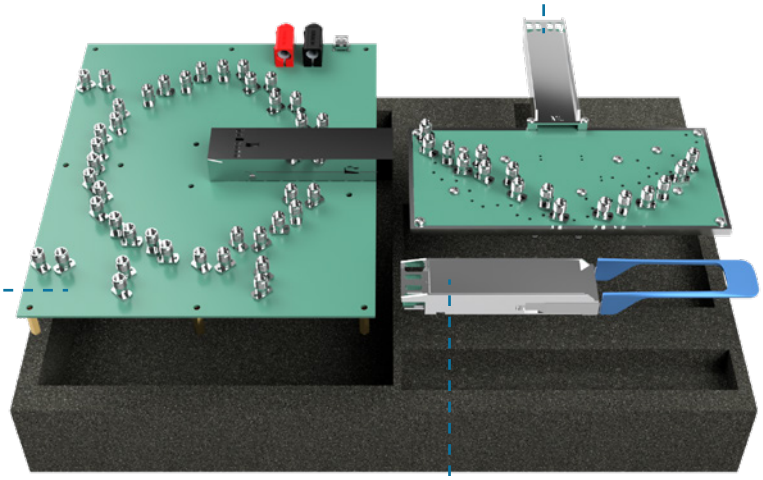
ML4064-LB-112:

- Loops back TX & RX with good performance SI Traces
- MSA Compliant Shell with latching mechanism
- Four thermal spots, dissipating up to 17.5W
- Two temperature sensors
- I2C Terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA Memory Map with programmable new pages
- CMIS compliant state machine

MLDCTS-OSFP-KIT10: 800G

ML4064-HCB-112:

- Supports 8x112G
- High performance signal integrity traces
- All 8 channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 8 channels: 8 TX and the corresponding 8 RX



ML4064-MCB-112:

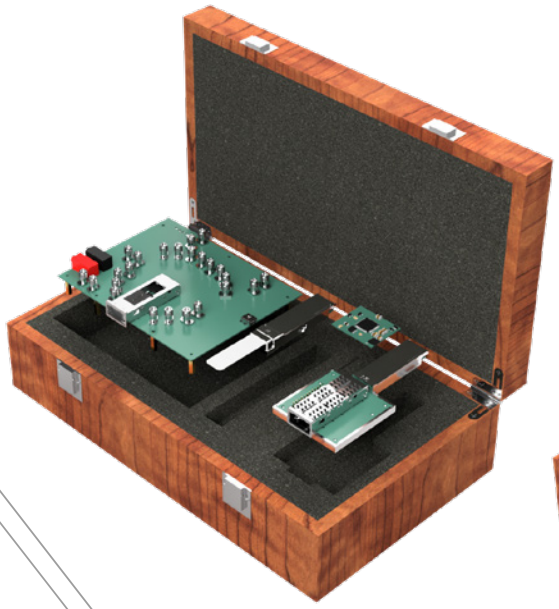
- Supports 8x56G NRZ and 8x112G PAM4
- All 8 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to OSFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4064-LB-112:

- Loops back TX & RX with good performance SI Traces
- MSA Compliant Shell with latching mechanism
- Four thermal spots, dissipating up to 17.5W
- Two temperature sensors
- I2C Terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA Memory Map with programmable new pages
- CMIS compliant state machine

QSFP

Module Testing



MLDCTS-QSFP-Kit11: 200G

MLDCTS-QSFP-Kit12: 400G

Port Testing

MLDCTS-QSFP-Kit13: 200G

MLDCTS-QSFP-Kit14: 400G

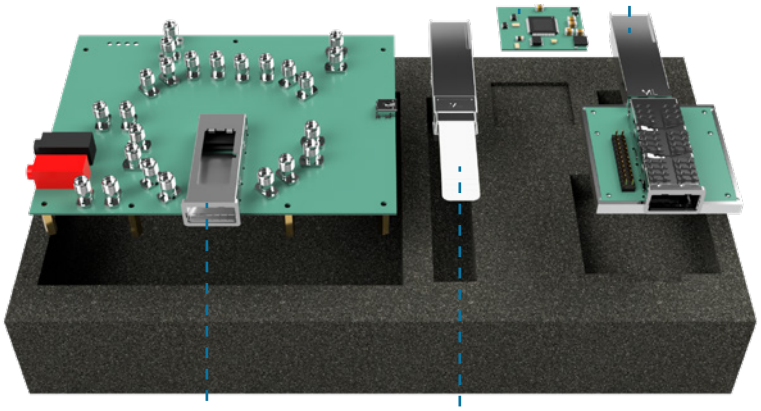
Compliance Testing

MLDCTS-QSFP-Kit15: 400G

MLDCTS-QSFP-KIT11: 200G

ML4066-QSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF/CMIS state machine test

ML4041K-MCB:

- Supports 4x28G NRZ and 4x56G PAM4
- All 4 channels come with matching trace length
- High performance signal integrity traces from 2.92-mm K connectors to QSFP host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

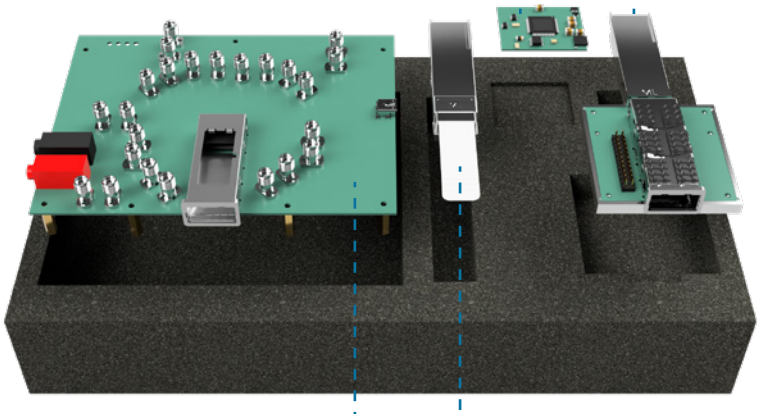
ML4002-56:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Three power spots, dissipating up to 5 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF/CMIS Compliant state machine

MLDCTS-QSFP-KIT12: 400G

ML4066-QSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF/CMIS state machine test

ML4041-MCB-112:

- Supports 4x56G NRZ and 4x112G PAM4
- All 4 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to QSFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

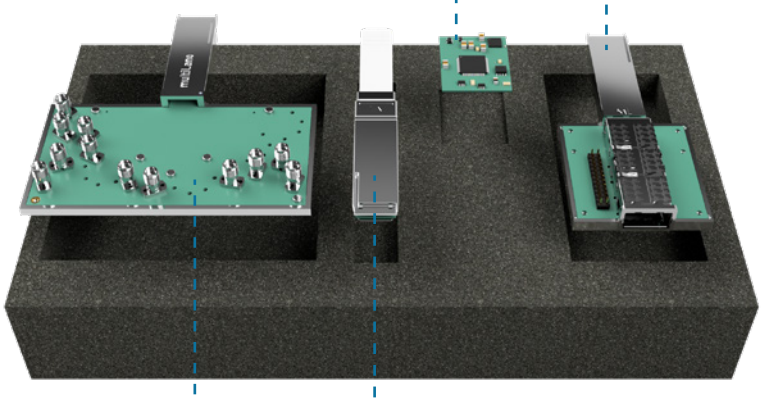
ML4002-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Three power spots, dissipating up to 7 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF/ CMIS Compliance

MLDCTS-QSFP-KIT13: 200G

ML4066-QSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF/CMIS state machine test

ML4020K-HCB:

- Supports 4x28G NRZ and 4x56G PAM4
- High performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels: 4 TX and the corresponding 4 RX

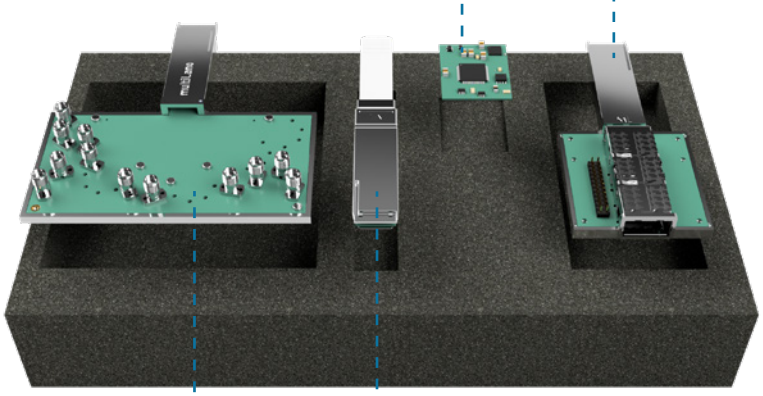
ML4002-56:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Three power spots, dissipating up to 5 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF/CMIS Compliant state machine

MLDCTS-QSFP-KIT14: 400G

ML4066-QSFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement



ML4066-ANA-QSFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF/CMIS state machine test

ML4020-HCB-112:

- Supports 4x56G NRZ and 4x112G PAM4
- High performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels: 4 TX and the corresponding 4 RX

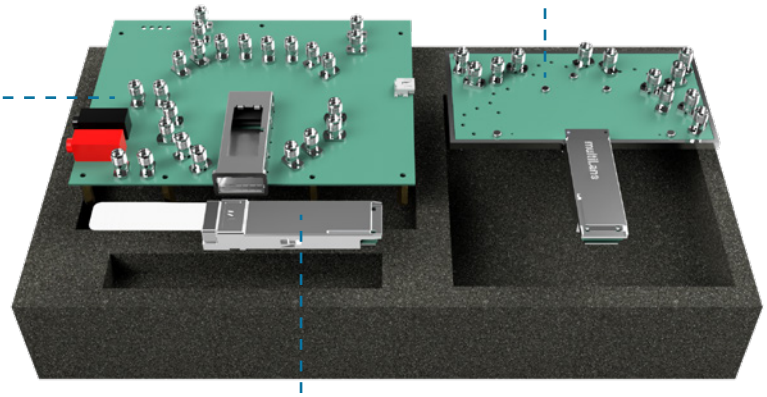
ML4002-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Three power spots, dissipating up to 7 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF/CMIS Compliant state machine

MLDCTS-QSFP-KIT15: 400G

ML4020-HCB-112:

- Supports 4x56G NRZ and 4x112G PAM4
- High performance signal integrity traces
- All channels come with matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 4 channels: 4 TX and the corresponding 4 RX



ML4041-MCB-112:

- Supports 4x56G NRZ and 4x112G PAM4
- All 4 channels come with matching trace length
- High performance signal integrity traces from 2.4-mm or 1.85-mm connectors to QSFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4002-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA Compliant shell with latching mechanism
- Three power spots, dissipating up to 7 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF/CMIS Compliant state machine

Module Testing

MLDCTS-SFP-Kit16: 50G

MLDCTS-SFP-Kit17: 100G

Port Testing

MLDCTS-SFP-Kit18: 50G

MLDCTS-SFP-Kit19: 100G

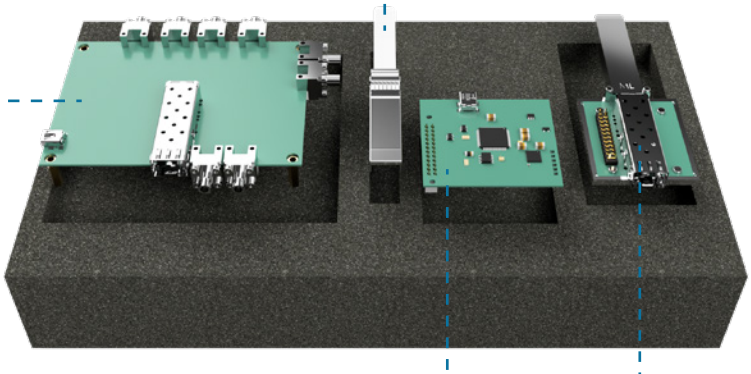
Compliance Testing

MLDCTS-SFP-Kit20: 100G

MLDCTS-SFP-KIT16: 50G

ML4026-28-0db:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Six power spots, dissipating up to 2W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF Compliant state machine



ML4024-MCB:

- Supports 28G NRZ
- Channel comes with matching trace length
- High performance signal integrity traces from 2.92-mm connector to SFP host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4066-ANA-SFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF state machine test

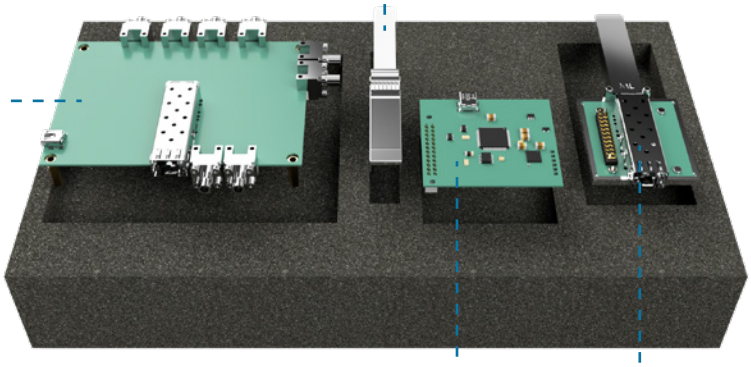
ML4066-SFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-SFP-KIT17: 100G

ML4026-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Two power spots, dissipating up to 2W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF Compliant state machine



ML4024-MCB-112:

- Supports 56G NRZ and 112G PAM4
- Channel comes with matching trace length
- High performance signal integrity traces from 1.85-mm or 2.92-mm connector to SFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4066-ANA-SFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF state machine test

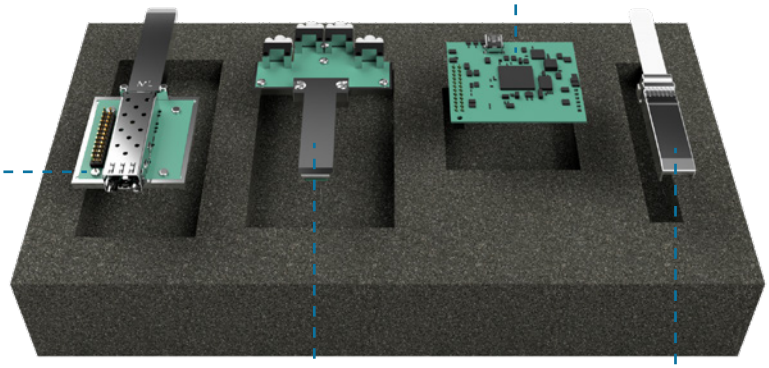
ML4066-SFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-SFP-KIT18: 50G

ML4066-ANA-SFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF state machine test



ML4066-SFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

ML4023-HCB:

- Supports 28G NRZ
- High Performance signal integrity traces
- Matching trace length
- High speed signals accessible through 2.92-mm K connectors
- 1 channel: TX and the corresponding RX

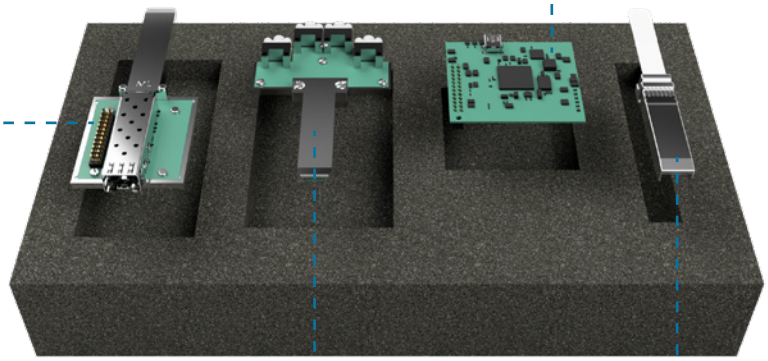
ML4026-28-0db:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Six power spots, dissipating up to 2W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF Compliant state machine

MLDCTS-SFP-KIT19: 100G

ML4066-ANA-SFP:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- SFF Compliance



ML4066-SFP:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

ML4023-HCB-112:

- Supports 56G NRZ and 112G PAM4
- High performance signal integrity trace
- Matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors to SFP112 host connector
- 1 channel: TX and the corresponding RX

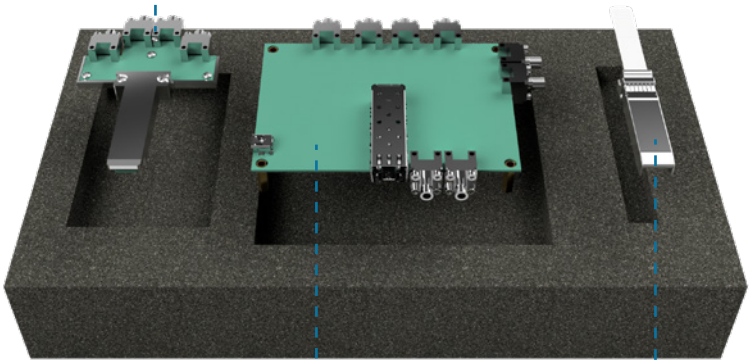
ML4026-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Two power spots, dissipating up to 2W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF Compliant state machine

MLDCTS-SFP-KIT20: 100G

ML4023-HCB-112:

- Supports 56G NRZ and 112G PAM4
- High performance signal integrity trace
- Matching trace length
- High speed signals accessible through 2.4-mm or 1.85-mm connectors
- 1 channel: TX and the corresponding RX



ML4024-MCB-112:

- Supports 56G NRZ and 112G PAM4
- TX and RX channel comes with matching trace length
- High speed signals accessible through 1.85-mm or 2.92-mm connectors to SFP112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User friendly GUI, USB interface

ML4026-112:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Two power spots, dissipating up to 2W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- SFF Compliant state machine

SFP-DD

Module Testing

MLDCTS-SFPDD-Kit21: 100G

MLDCTS-SFPDD-Kit22: 200G

Port Testing

MLDCTS-SFPDD-Kit23: 100G

MLDCTS-SFPDD-Kit24: 200G

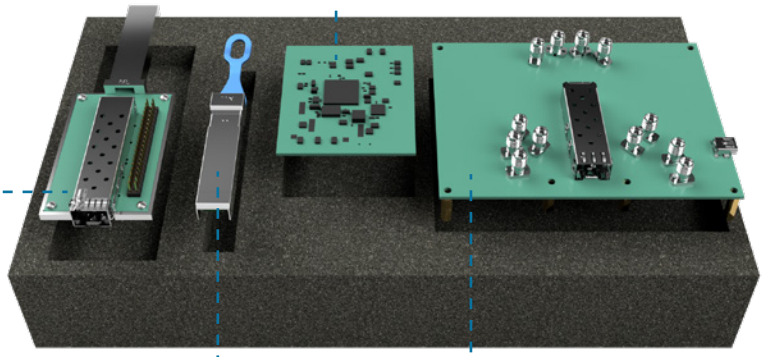
Compliance Testing

MLDCTS-SFPDD-Kit25: 200G

MLDCTS-SFPDD-KIT21: 100G

ML4066-ANA-SFPDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- MIS/CMIS state machine test



ML4066-SFPDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

ML4022-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Four power spots, dissipating up to 4.96 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- MIS/CMIS Compliant state machine

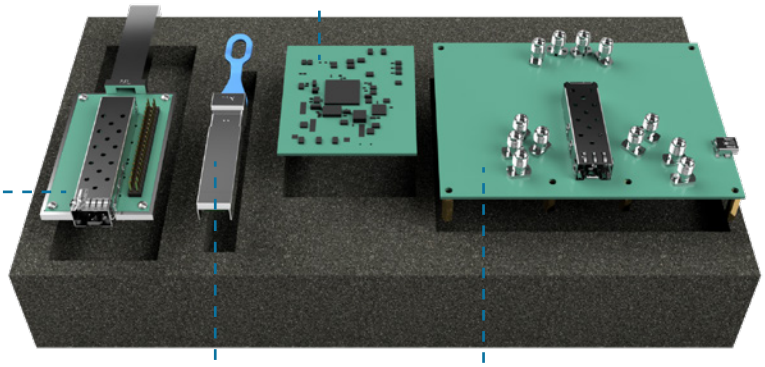
ML4022-MCB:

- Supports 2x28G NRZ and 2x56G PAM4
- All channels come with matching trace length
- High speed signals accessible through 1.85-mm or 2.92-mm connectors to SFP-DD host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User Friendly GUI and USB interface

MLDCTS-SFPDD-KIT22: 200G

ML4066-ANA-SFPDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- MIS/CMIS state machine test



ML4066-SFPDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

ML4022-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Four power spots, dissipating up to 4.96 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- MIS/CMIS Compliant state machine

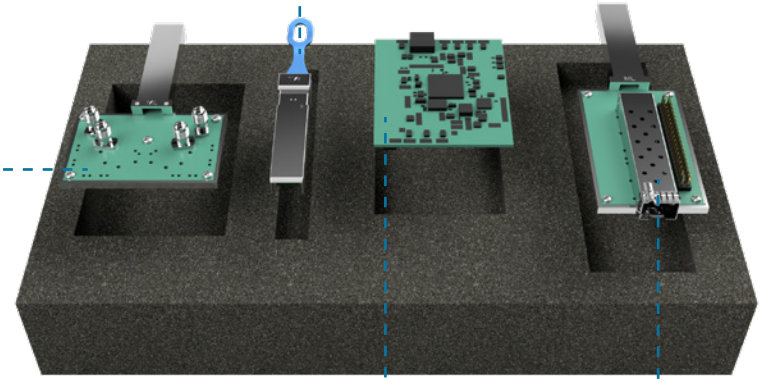
ML4022-MCB-112:

- Supports 2x56G NRZ and 2x112G PAM4
- All channels come with matching trace length
- High performance signal integrity traces from 2.4-mm connectors to SFP-DD112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User Friendly GUI and USB interface

MLDCTS-SFPDD-KIT23: 100G

ML4022-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Four power spots, dissipating up to 4.96 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- MIS/CMIS Compliant state machine



ML4022-HCB:

- Supports 2x28G NRZ and 2x56G PAM4
- High Performance signal integrity traces
- High-speed signals accessible through 2.92-mm K connectors
- 2 channels: 2 TX and the corresponding 2 RX

ML4066-ANA-SFPDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- MIS/CMIS state machine test

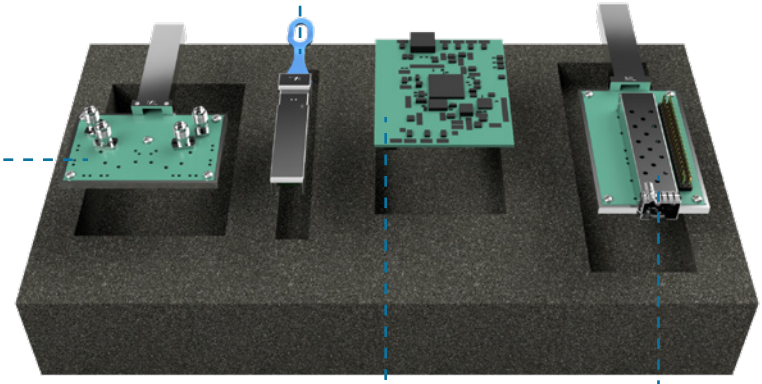
ML4066-SFPDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-SFPDD-KIT24: 200G

ML4022-LB:

- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Four power spots, dissipating up to 4.96 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- MIS/CMIS Compliant state machine



ML4022-HCB-112:

- Supports 2x56G NRZ and 2x112G PAM4
- High Performance signal integrity traces
- High-speed signals accessible through 2.92-mm K connectors
- 2 channels: 2 TX and the corresponding 2 RX

ML4066-ANA-SFPDD:

- USB Interface
- Windows based GUI and API Library
- Detection and measurement of host pull up + pull down resistors on low-speed signals
- VCC spectral noise analysis
- I2C Analyzer
- Functional tests
- MIS/CMIS state machine test

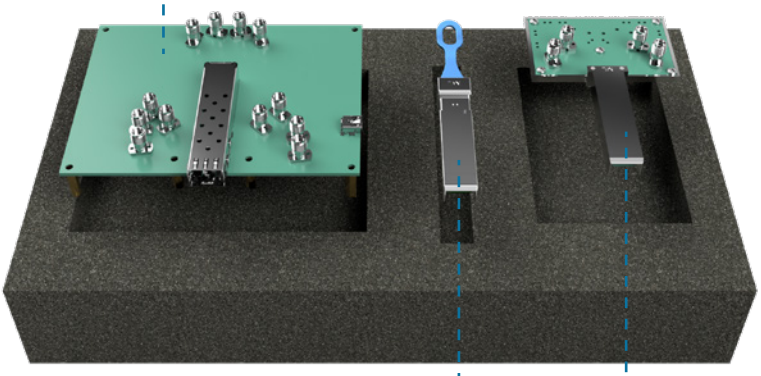
ML4066-SFPDD:

- Low insertion loss PCB traces
- 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
- Ability to break 3.3 V power from Host to module allowing voltage and current measurement

MLDCTS-SFPDD-KIT25: 200G

ML4022-MCB-112:

- Supports 2x56G NRZ and 2x112G PAM4
- All channels come with matching trace length
- High performance signal integrity traces from 2.4-mm connectors to SFP-DD112 host connector
- On board LEDs display MSA output alarm states
- On board pin headers for MSA I/O control signals and I2C interface
- User Friendly GUI and USB interface



ML4022-LB:

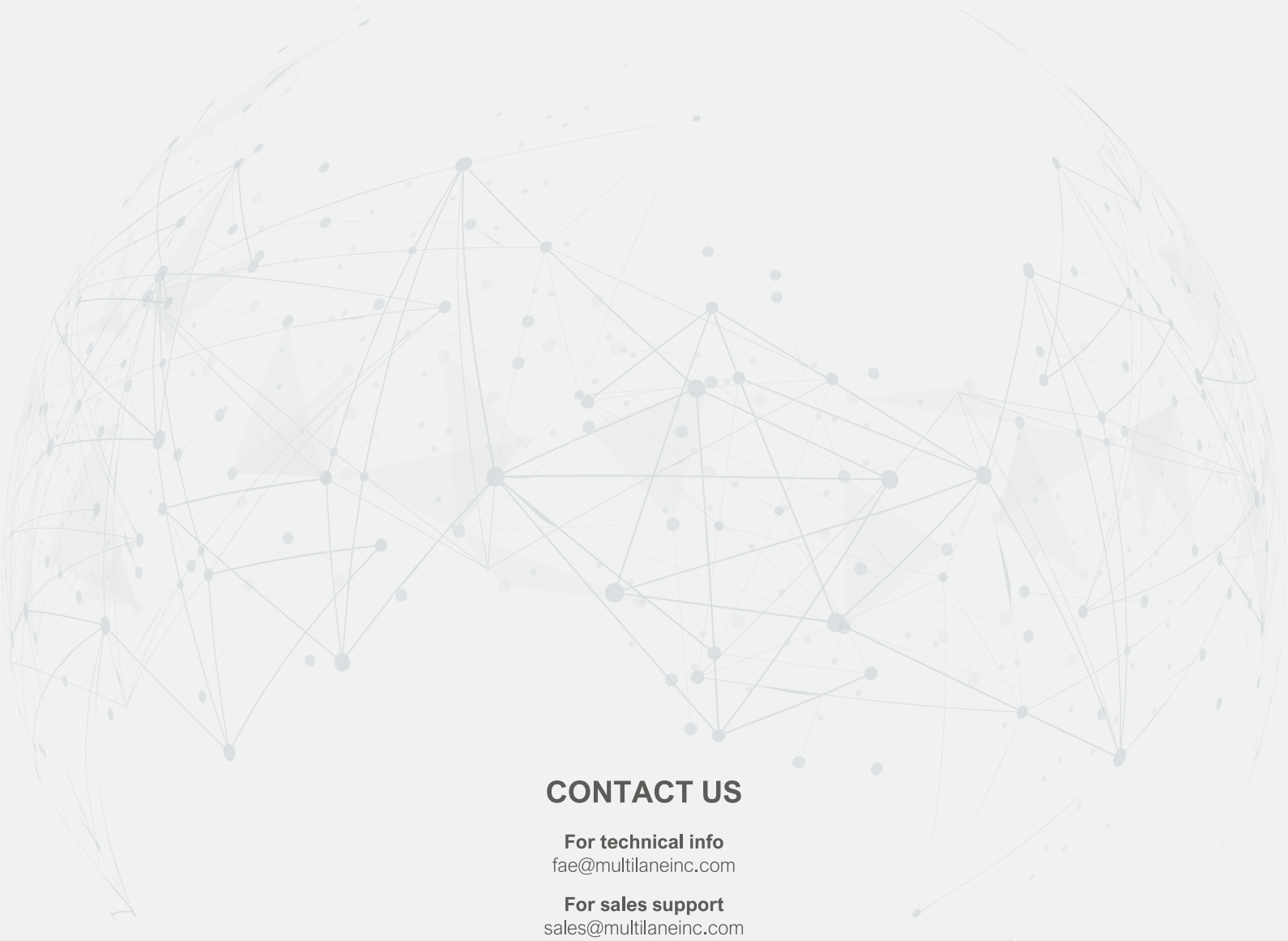
- Loops back TX & RX with good performance signal integrity traces
- MSA compliant shell with latching mechanism
- Four power spots, dissipating up to 4.96 W
- One temperature sensor
- I2C terminated by microcontroller, I2C slave compliant with MSA
- Implements MSA memory maps with programmable new pages
- MIS/CMIS state machine test

ML4022-HCB-112:

- Supports 2x56G NRZ and 2x112G PAM4
- High Performance signal integrity traces
- High-speed signals accessible through 2.92-mm K connectors
- 2 channels: 2 TX and the corresponding 2 RX

multiLane

Innovation for the Next Generation



CONTACT US

For technical info
fae@multilaneinc.com

For sales support
sales@multilaneinc.com

North America

48521 Warm Springs Blvd.
Suite 310
Fremont, CA 94539, USA
+1 510 573 6388

Worldwide

Houmal Technology Park
Askarieh Main Road Houmal,
Lebanon
+961 81 794 455

Asia

7th Floor-2, No. 156, Section 2,
Dongda Road, North District,
Hsinchu City 300, Taiwan (R.O.C.)
+886 3 5744 591

UAE

Building 4WA, Office 420
Dubai Airport Freezone Authority,
Dubai, UAE
+971 4 548 7 547