

Innovation for the next generation

Automated Transceiver Test Solutions

ML7007 Series Productivity Software

Compliance Testing | Transceiver Manufacturing |
Return Merchandise Authorization (RMA) |
Characterization & Validation | Failure Analysis



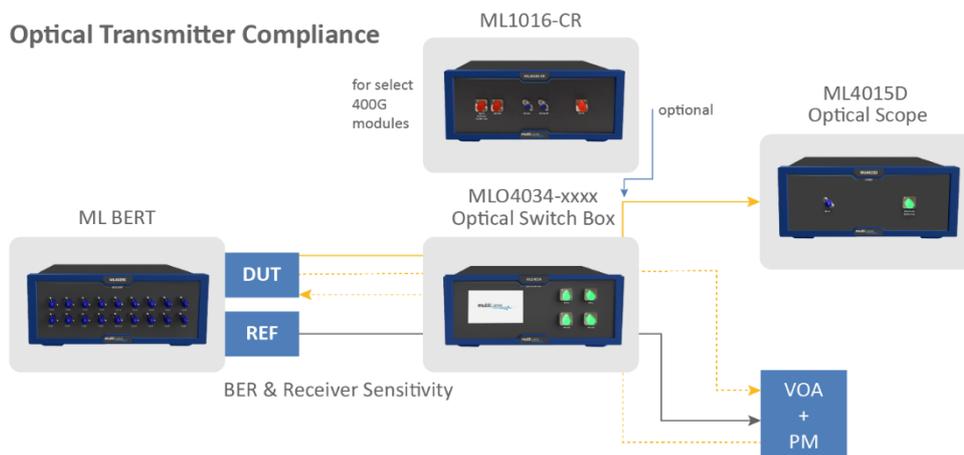
Summary

The widespread adoption of 400G is in full swing, and data centers across the world are looking to update their infrastructure as quickly and efficiently as possible. Optical transceivers play a key role in this shift, and their compliant, reliable performance is essential to a successful operation.

This rapid transition brings with it the demand for equally rapid, high-volume testing solutions for production, failure analysis, and RMA. MultiLane has risen to meet this demand with an update to our ML7007 fully automated solution series. Now available for 100G, 200G, and 400G, the ML7007 streamlines complex testing into a simple setup with the push of a button. With the ML7007, module manufacturers, test houses, systems vendors, and hyperscalers can easily keep pace with the increasing industry demand & bandwidth requirements.

Overview

The ML7007 tests both the optical transmitter parameters and bit error rate receiver sensitivity of an optical transceiver with the push of a button. The series' *Productivity* automation software controls the test equipment, executes the tests, and generates a summary test report with pass/fail information, all from a laptop and without any human intervention.



The setup enables optical compliance testing of the DUT transmitter and receiver. Transmitter testing comprises test parameters such as extinction ratio, eye diagram mask margin, and optical modulation amplitude. Additional measurements such as TDECQ for 400G modules will be available in Q1 2022. Receiver testing measures the bit error rate as a function of received optical power. In addition to using the DUT transmitter, a reference transmitter can be used for the receiver sensitivity test. The connections are made automatically using a [MLO4034-xxxx](#) Optical Switch Box. The ML7007 solution uses an optical sampling oscilloscope, the [ML4015D](#), for the optical transmitter test measurements. The [ML4070-xxxx](#) BERT host emulator margin tester provides a quick and accurate solution for receiver and transmitter characterization of SFP and QSFP28 modules. For 200G & 400G modules, MultiLane's [ML4039D](#) and [ML4079D](#) replace the ML4070-xxxx, driving both QSFP-DD and OSFP form factor modules with the help of the low-cost and user-friendly [ML4062-MCB-TR](#) and [ML4064-MCB-TR](#). The MLO4034-xxxx complements the test setup on the optical side with its integrated optical switches, power monitors and variable optical attenuators. For select 400G modules, MultiLane's [ML1016D-CR](#) supplements and enhances the setup with its crucial role as a clock recovery unit. The ML7007 Series consists of the combination of all required instruments coupled with the automation software.

The solution is intended for return merchandise authorization (RMA) testing, new supplier validation, optical transceiver characterization, failure analysis of faulty transceivers and pass/fail determination in final stages of manufacturing.

The ML7007 Series is a suitable solution for:

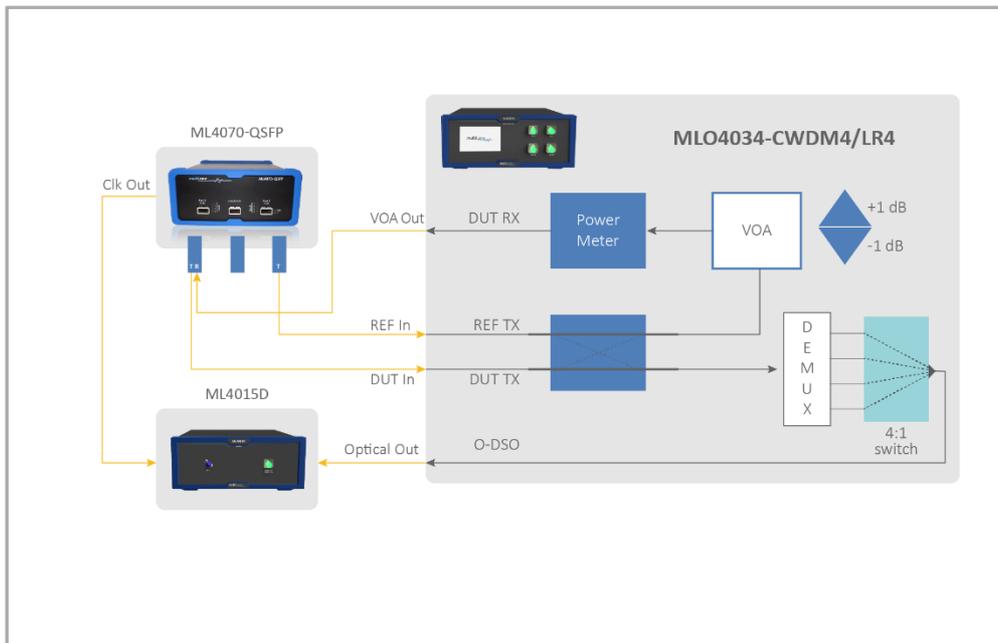
- Data center hardware equipment manufacturers
- Data center and cloud infrastructure providers
- Transceiver manufacturers and their contract manufacturers
- Value added transceiver resellers

Detailed Configuration:

This solution supports the testing of multi-wavelength transceivers, as well as parallel fiber transceivers. Single wavelength, single fiber transceivers can also be tested with the parallel fiber solution of the same fiber (single mode or multi-mode). As a result, the ML7007 supports most of the common SM and MM 10, 25, 40, 100, 200 and 400G SFP/QSFP/QDD/OSFP transceivers.

10G-100G:

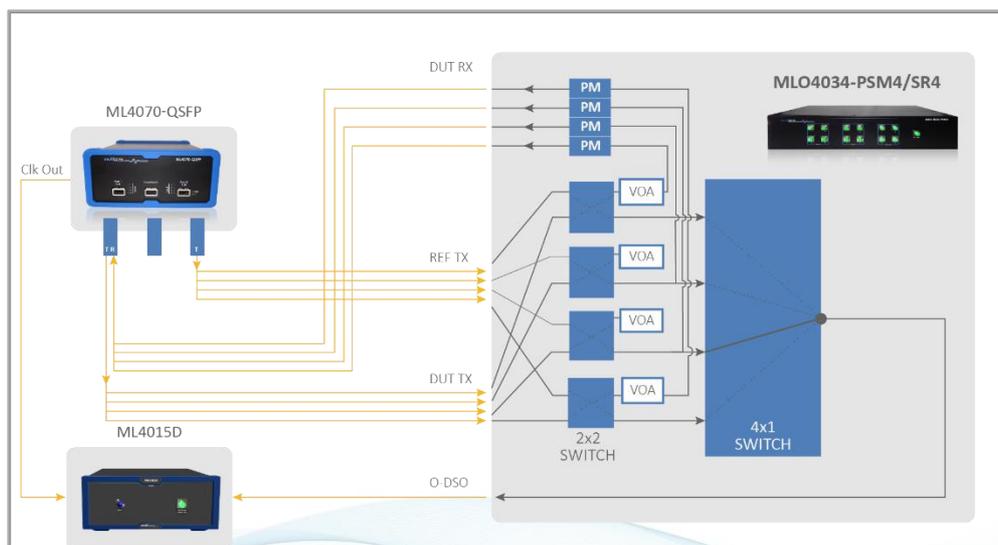
Quad Wavelength Transceivers



QSFP Transceivers

- QSFP-40G-LR4
- QSFP-40G-LRL4
- QSFP-40G-UNIV-SM
- QSFP-100G-LR4
- QSFP-100G-LRL4
- QSFP-100G-ERL4
- QSFP-100G-CWDM4

Quad and Dual Parallel Fiber Transceivers



QSFP Transceivers

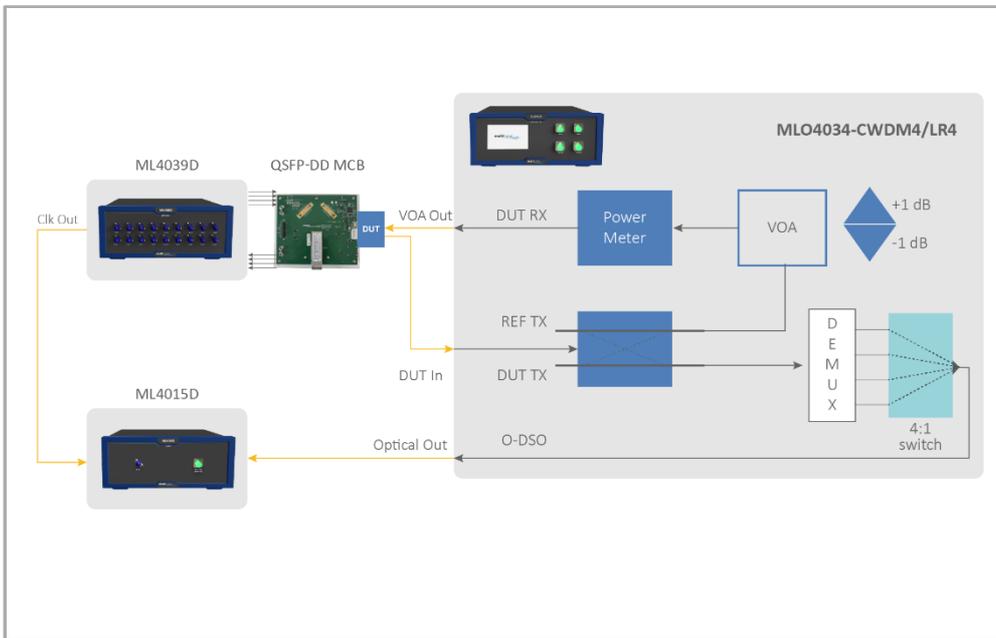
- QSFP-40G-PSM4
- QSFP-40G-PLR4
- QSFP-40G-PSM4
- QSFP-40G-XSR4
- QSFP-40G-SR4
- QSFP-100G-PSM4
- QSFP-100G-PLRL4
- QSFP-100G-SR4

SFP Transceivers

- SFP-10G-LR
- SFP-10G-LRL
- SFP-10G-SR
- SFP-10G-SRL
- SFP-25G-LR
- SFP-25G-SR

200G:

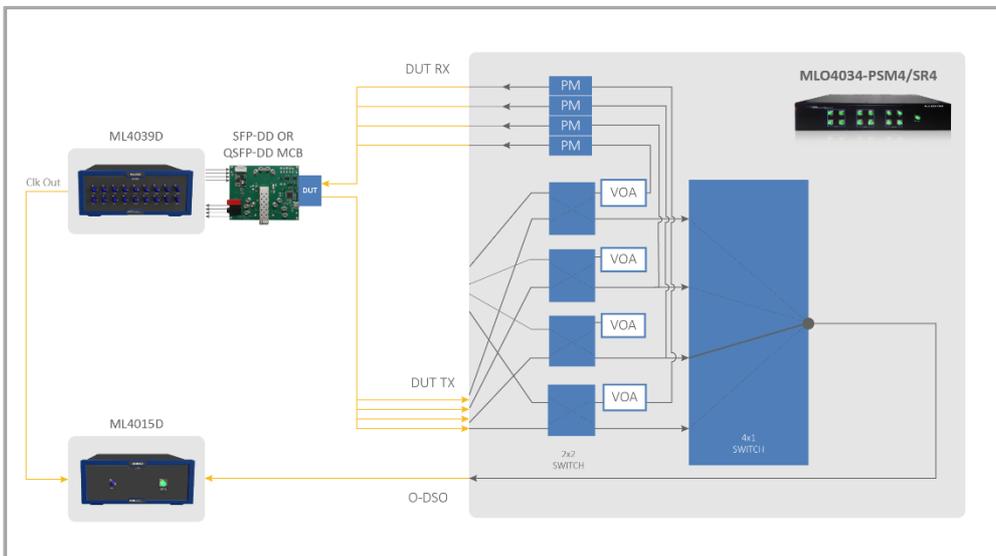
Quad Wavelength Transceivers



QSFP Transceivers

- QSFP-200G-FR4
- QSFP-200G-LR4

Quad and Dual Parallel Fiber Transceivers



QSFP Transceivers

- QSFP-200G-SR4

SFP Transceivers

- SFP-50G-MR-SR
- SFP-50G-MR-LR

DSFP Transceivers

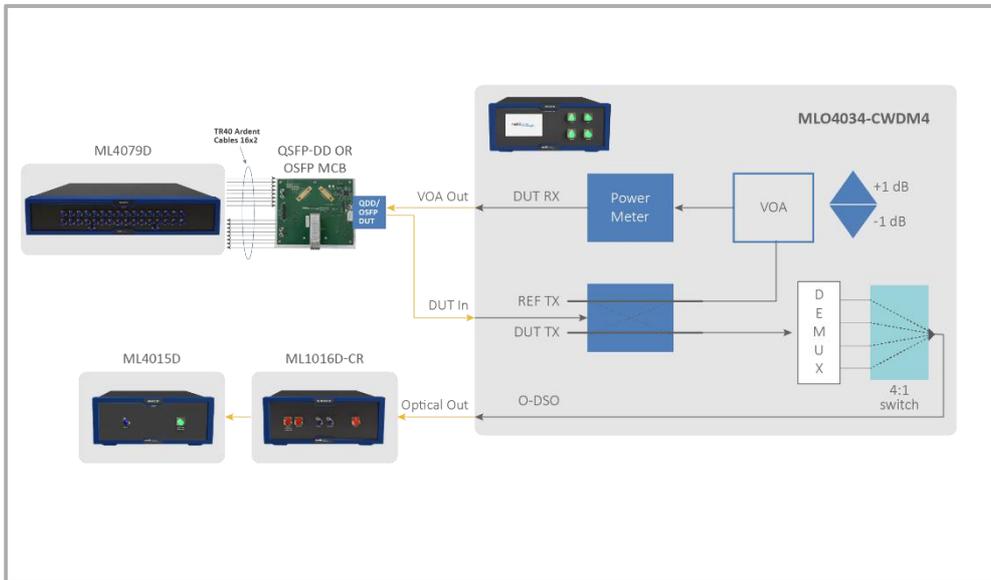
- DSFP-100G-SR2

SFP-DD Transceivers

- SDD-100G-SR2

400G:

Quad Wavelength Transceivers



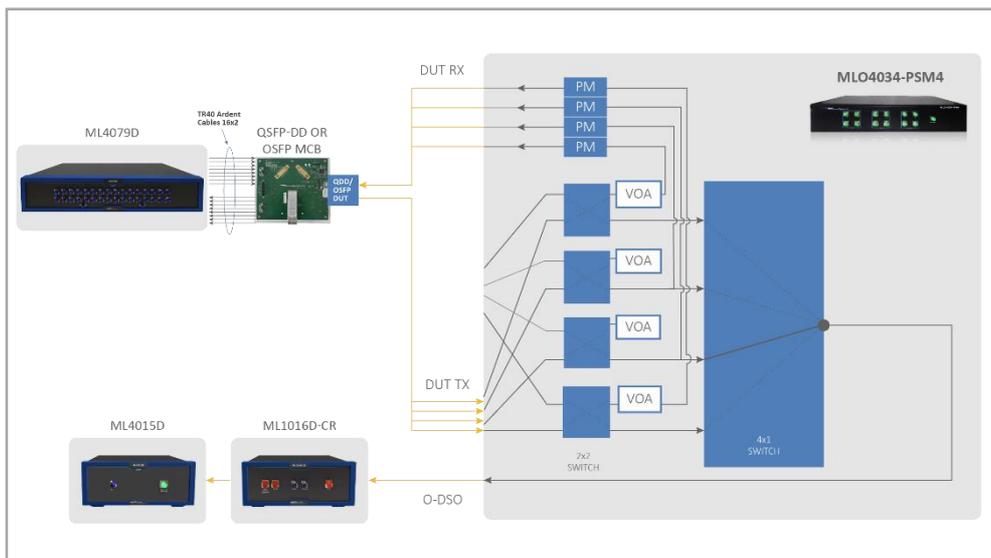
QDD Transceivers

- QDD-400G-FR4
- QDD-400G-LR4

OSFP Transceivers

- OSFP-400G-FR4
- OSFP-400G-LR4

Quad Parallel Fiber Transceivers



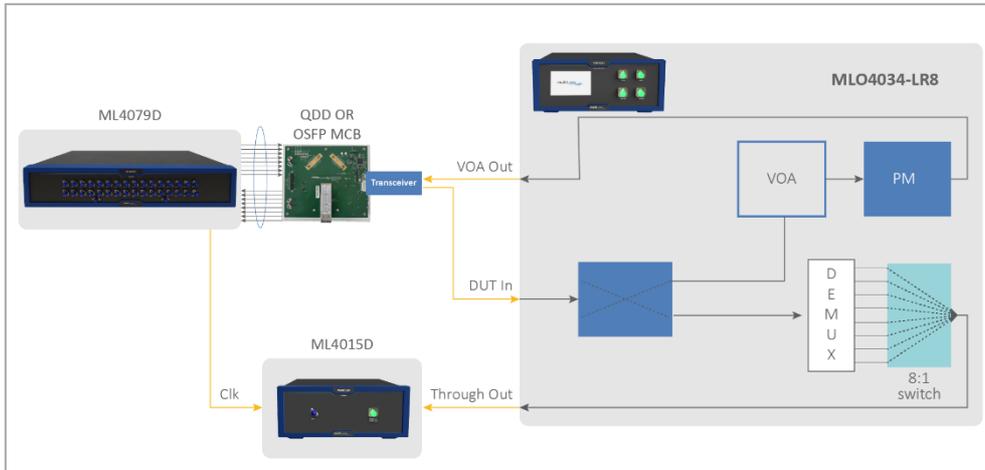
QDD Transceivers

- QDD-400G-DR4
- QDD-400G-XDR4
- QDD-400G-PLR4
- QDD-400G-XDR4-S
- QDD-400G-PLR4-S

OSFP Transceivers

- OSFP-400G-DR4
- OSFP-400G-XDR4
- OSFP-400G-PLR4
- OSFP-400G-XDR4-S
- OSFP-400G-PLR4-S

Octa Wavelength Transceivers



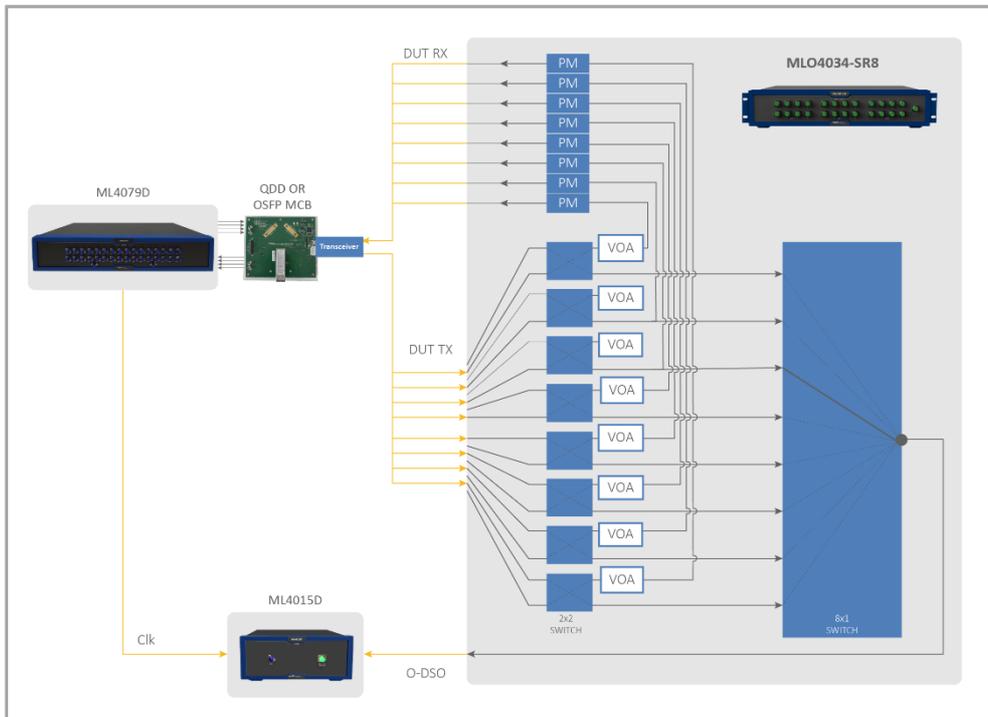
QDD Transceivers

- QDD-400G-LR8

OSFP Transceivers

- OSFP-400G-LR8

Octa Parallel Fiber Transceivers



QDD Transceivers

- QDD-400G-SR8

OSFP Transceivers

- OSFP-400G-SR8

Supported Tests - Examples

Optical Transmitter Compliance tests	BER and Receiver Sensitivity tests
OMA, AOP, ER, eye diagram, mask margin, eye width, eye height, rise/fall time	Rx sensitivity waterfall curve (BER vs. OMA)
	Pass/fail Rx sensitivity
TDECQ (Q1,2022)	DOM Accuracy

10G/25G/40G/100G

PMD / Standard	Margin Tester	Optical Scope	Optical Switch Box
SFP-10G-LR/LRL	ML4070-SFP	ML4015D-25-SM	MLO4034-PSM4
SFP-10G-SR/SRL	ML4070-SFP	ML4015D-25-MM	MLO4034-SR4
SFP-25G-LR	ML4070-SFP	ML4015D-25-SM	MLO4034-PSM4
SFP-25G-SR	ML4070-SFP	ML4015D-25-MM	MLO4034-SR4
QSFP-40G-LR4/LRL4	ML4070-QSFP	ML4015D-25-SM	MLO4034-CWDM4
QSFP-40G-UNIV-SM	ML4070-QSFP	ML4015D-25-SM	MLO4034-CWDM4
QSFP-40G-PLR4/PLRL4	ML4070-QSFP	ML4015D-25-SM	MLO4034-PSM4
QSFP-40G-PSM4	ML4070-QSFP	ML4015D-25-SM	MLO4034-PSM4
QSFP-40G-SR4/XSR4	ML4070-QSFP	ML4015D-25-MM	MLO4034-SR4
QSFP-100G-LR4/LRL4/ERL4	ML4070-QSFP	ML4015D-25-SM	MLO4034-LR4
QSFP-100G-PLRL4	ML4070-QSFP	ML4015D-25-SM	MLO4034-PSM4
QSFP-100G-SR4	ML4070-QSFP	ML4015D-25-MM	MLO4034-SR4
QSFP-100G-CWDM4	ML4070-QSFP	ML4015D-25-SM	MLO4034-CWDM4
QSFP-100G-PSM4	ML4070-QSFP	ML4015D-25-SM	MLO4034-PSM4

200G/400G

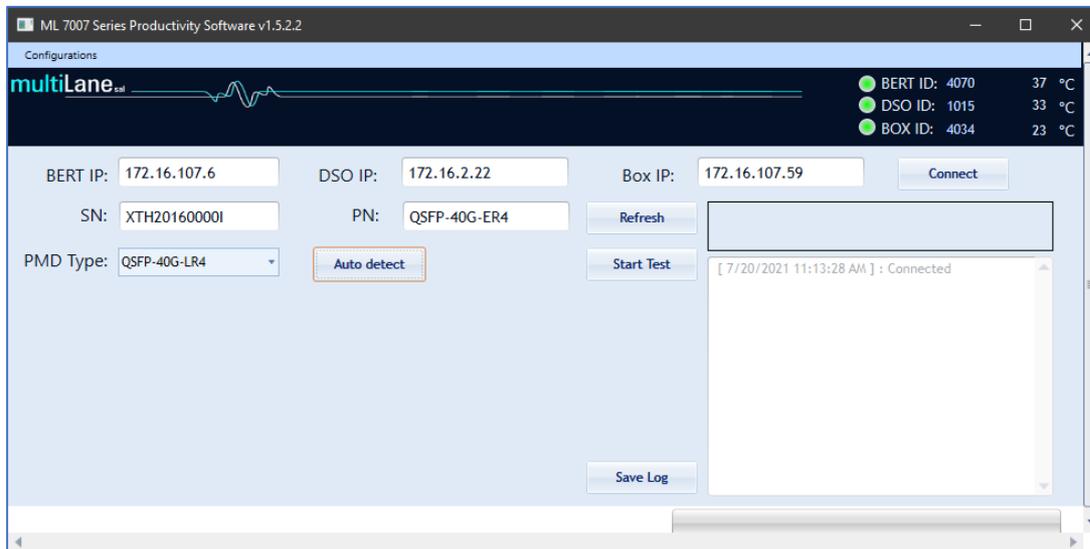
PMD / Standard	BERT	Optical Scope	Optical Switch Box	CDR	MCB
SFP-50G-MR-SR	ML4039D	ML4015D-25-MM	MLO4034-SR4	No	ML4022-MCB
SFP-50G-MR-LR	ML4039D	ML4015D-25-SM	MLO4034-PSM4	No	ML4022-MCB
DSFP-100G-SR2	ML4039D	ML4015D-25-MM	MLO4034-SR4	No	ML4022-MCB
SDD-100G-SR2	ML4039D	ML4015D-25-MM	MLO4034-SR4	No	ML4022-MCB
QSFP-200G-SR4	ML4039D	ML4015D-25-MM	MLO4034-SR4	No	ML4062-MCB-TR
QSFP-200G-FR4	ML4039D	ML4015D-25-SM	MLO4034-CWDM4	No	ML4062-MCB-TR
QSFP-200G-LR4	ML4039D	ML4015D-25-SM	MLO4034-LR4	No	ML4062-MCB-TR
QDD-400G DR4/XDR4 OSFP-400G-DR4/XDR4	ML4079D	ML4015D-25-SM	MLO4034-PSM4	Yes	ML4062-MCB-TR ML4064-MCB-TR
QDD-400G-PLR4 OSFP-400G-PLR4	ML4079D	ML4015D-25-SM	MLO4034-PSM4	Yes	ML4062-MCB-TR ML4064-MCB-TR
QDD-400G-FR4 OSFP-400G-FR4	ML4079D	ML4015D-25-SM	MLO4034-CWDM4	Yes	ML4062-MCB-TR ML4064-MCB-TR
QDD-400G-LR4 OSFP-400G-LR4	ML4079D	ML4015D-25-SM	MLO4034-CWDM4	Yes	ML4062-MCB-TR ML4064-MCB-TR
QDD-400G-SR8 OSFP-400G-SR8	ML4079D	ML4015D-25-MM	MLO4034-SR8	No	ML4062-MCB-TR ML4064-MCB-TR
QDD-400G-LR8 OSFP-400G-LR8	ML4079D	ML4015D-25-SM	MLO4034-LR8	No	ML4062-MCB-TR ML4064-MCB-TR

All standards require an option of the ML7007 Series Productivity automation software.

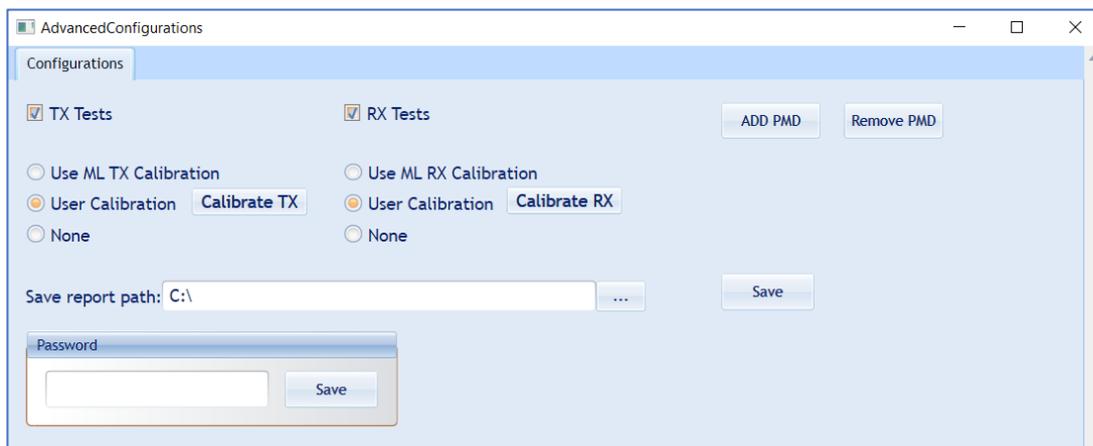
*Other standards supported upon request. Please contact sales@multilaneinc.com

Graphical User Interface

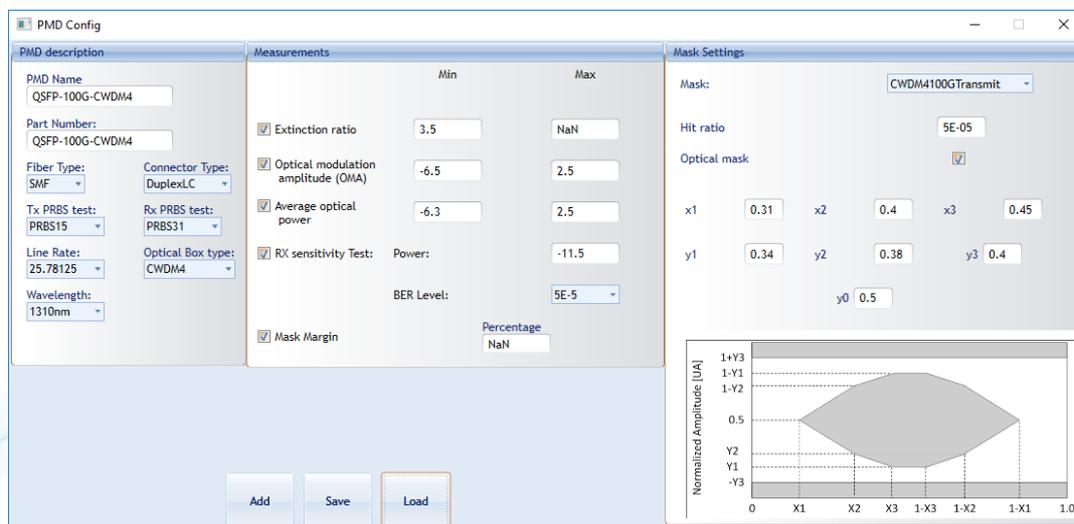
Main Window



Configuration Window



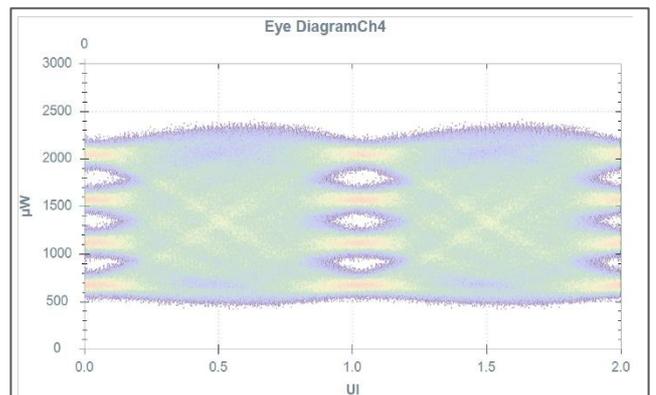
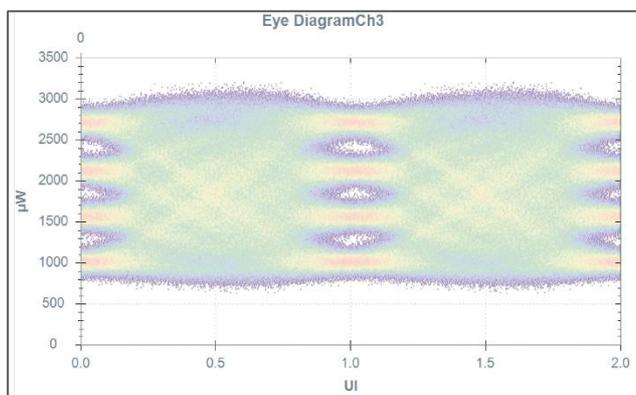
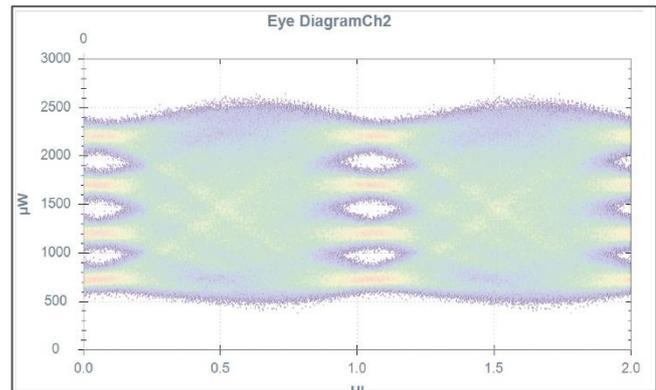
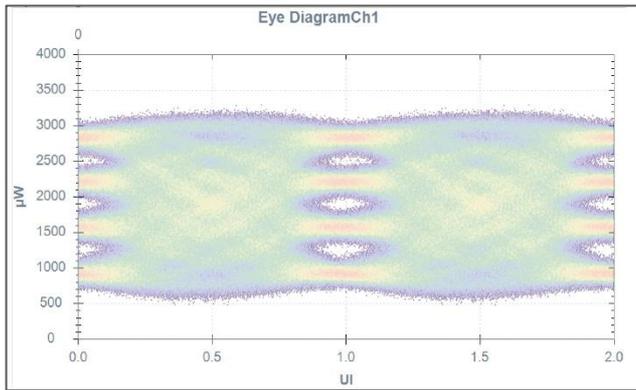
PMD Window



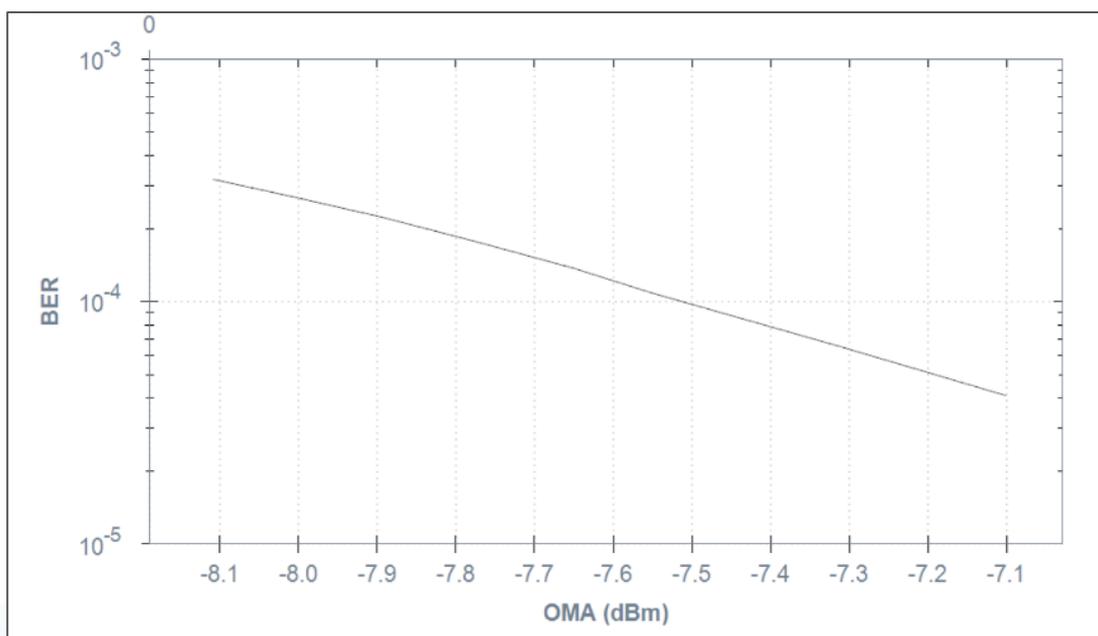
Sample Report

Test Name	Ch0	Ch1	Ch2	Ch3	Unit	Min	Max	Margin	Pass/Fail
Rise Time	23.03	23.03	21.818	21.818	ps	-	-	-	-
Fall Time	16.97	18.182	15.758	15.758	ps	-	-	-	-
TX Eye Height	263.983	433.607	275.166	442.484	uW	-	-	-	-
TX Eye Width	30.303	29.091	30.303	30.303	ps	-	-	-	-
CrossingY	383.448	653.725	423.728	642.595	UI	-	-	-	-
Crossing Percentage	50.323	50.536	52.671	50.298	%	-	-	-	-
One Level	597.075	980.926	646.654	974.398	uW	-	-	-	-
Zero Level	167.045	319.434	175.641	306.814	uW	-	-	-	-
MaskMargin	46.609	47.219	39.687	48.635	%	-	-	-	-
OMA (dBm)	-3.305	-1.364	-3.007	-1.452	dBm	-6.5	2.5	-	Pass
AOP (dBm)	-4.136	-1.847	-3.783	-1.901	dBm	-6.3	2.5	-	Pass
Extinction Ratio	5.532	4.873	5.66	5.019	dB	3.5	-	-	Pass
RX Eye Height	265.5	376.5	343.5	349.5	mV	-	-	-	-
RX Eye Width	25.257	29.767	27.061	27.362	ps	-	-	-	-
Receiver sensitivity Power (OMA)	-14.569	-15.449	-14.435	-15.378	dBm	-	-11.5	-	Pass
Receiver sensitivity Power (AOP)	-15.083	-15.524	-15.025	-15.558	dBm	-	-	-	-
Power Difference	1.173	0.998	1.076	0.734	dB	-	3	-	Pass
Power Consumption	3.153				W	-	-	-	-

Eye Diagram Plot



Waterfall Plot



Ordering Information

Please refer to the supported standards and required equipment section. The table below provides some examples.

PMD / Standard	Required equipment and software
SFP-10G-LR	ML7007-100G, ML4070-SFP, ML4015D-25-SM, MLO4034-PSM4
QSFP-40G-SR4	ML7007-100G, ML4070-QSFP, ML4015D-25-MM, MLO4034-SR4
QSFP-100G-LR4	ML7007-100G, ML4070-QSFP, ML4015D-25-SM, MLO4034-LR4
QSFP-100G-PSM4	ML7007-100G, ML4070-QSFP, ML4015D-25-SM, MLO4034-PSM4
QSFP-200G-FR4	ML7007-400G, ML4039D/ML4079D, ML4015D-25-SM, MLO4034-CWDM4, ML4062-MCB-TR
QSFP-200G-SR4	ML7007-400G, ML4039D, ML4015D-25-MM, MLO4034-SR4, ML4062-MCB-TR
QDD-400G-DR4	ML7007-400G, ML4079D, ML4015D-25-SM, MLO4034-PSM4, ML1016D-CR, ML4062-MCB-TR
OSFP-400G-LR8	ML7007-400G, ML4079D, ML4015D-25-SM, MLO4034-LR8, ML4064-MCB-TR

Application	Required Software Option
Fully automated Tx and Rx testing for transceivers up to 100G	ML7007-100G
Fully automated Tx and Rx testing for transceivers 200G 400G	ML7007-400G



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