



INSTRUMENT BROCHURE 2021

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Innovation for the Next Generation

MultiLane has been a provider of high-speed test and measurement equipment in the data communications space for over a decade. From the early days of 10 Gigabit Ethernet to the new frontier of 800 Gigabit Ethernet and beyond, our innovative pace keeps up with the rapidly changing requirements of the industry. We provide a comprehensive portfolio of data center interconnect test solutions, encompassing cable and transceiver characterization, host line-card testing, and IC validation.

Diversity is a building block to MultiLane, so we are constantly widening the scope of form factors and architectures in our product lines to support a myriad of customer needs. Our product lines encompass portable instruments, standalone benchtop instruments and automated test equipment (ATE) platforms. We provide developers, module vendors, network installers, and data center operators with high-performance, high-value solutions to certify their designs and accelerate their deployments.

50%

Compound Annual
Growth Rate

5

International
Branches

800G

10G to 800G
Support

200

More than 200
products released

500

Over 500
customers

Product Portfolio

Comprehensively characterizing and validating a product is as important as designing one. Test solutions are at the core of our value proposition, brought to life by the feedback of tier-one equipment vendors and operators. The High-Speed I/O market depends on the agility of vendors like MultiLane to ensure cutting-edge designs can be released quickly as appetites for increased bandwidth capacity remain insatiable.



Optical
Switch Box



Optical/Electrical
DSO



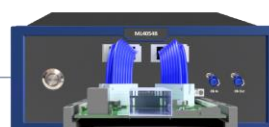
Clock Source for
Jitter Tolerance Testing



400G BERT with
Noise Injection Feature



TDR/DSO/
BERT



400G
Manufacturing



800G R&D BERT

MultiLane's nimble nature enables quick responses to customer needs with our domain expertise and proprietary solutions. Our comprehensive product offerings include optical and electrical oscilloscopes, bit error rate testers, TDR cable testers, interconnect products, and fully automated transceiver test solutions. This portfolio enables the adoption of new technologies that developers, manufacturers, and installers demand in this fast-paced industry. We understand the complexity of solutions required for physical-layer tests at these high speeds as well as the competitive economic realities of the sector. MultiLane's specialists provide solutions that meet and exceed customer expectations. We also take the pinch out of test and measurement purchases, enabling savings to be passed on to the end customer.

Instruments

BIT ERROR RATE TESTERS

Bit error rate testers (BERTs) are a foundational block of high-speed communications testing. These instruments generate a digital test pattern, typically a pseudorandom binary sequence (PRBS), which drives a device under test (DUT). The tested unit could be an optical module plugged into the faceplate of the instrument. Following the transmission through the link, the error detector in the BERT captures the signal. This setup can be used to evaluate the performance of a transmitter, receiver, or optical system. MultiLane supports general-purpose BERTs which connect through precision co-axial cables, as well as BERTs that present an MSA-compliant port for pluggables.



ML4039B

Key Features

- TX and RX equalization
- CTLE and FFE equalization
- High Resolution Error Analysis
- FEC Analysis (Emulated and Real HW Based)

A BERT needs to be tailored to the characteristics of the device under test.

Key considerations include:

- Baud rate
- Channel count
- Modulation format (e.g., NRZ, PAM4, etc.)
- Supported test patterns (e.g., PRBS15)
- Signal amplitude
- Port form factor (e.g., QSFP-DD, OSFP)

	Part Number	Description	Differential Channels	Data Format	Output Amplitude	Details
General Purpose BERTs	ML4039-BTP	100G BERT	4	NRZ	200-800 mVpp	<ul style="list-style-type: none"> 8.5-15 & 21-30 Gbps NRZ Standard 2.92 mm connectors
	ML4039B	200G BERT	4	PAM4/NRZ	0-800 mVpp	<ul style="list-style-type: none"> 7 – 28.125 GBd PAM4 1.12–1.56, 2.24-28.125 Gbps NRZ Standard 2.92 mm connectors
	ML4039-JIT-BTP	100G BERT with Jitter Injection	4	NRZ	100-2000 mVpp	<ul style="list-style-type: none"> 8.5-15 & 21-30 Gbps NRZ Jitter/receiver tolerance Standard 2.92 mm connectors
	ML4039D	200G BERT with FEC Emulation	4	PAM4/NRZ	0-1200 mVpp	<ul style="list-style-type: none"> 22-29.5 GBd PAM4 9-14.2 and 23.2-29.5 Gbps NRZ FEC Emulation (KR4/KP4 Analysis) Standard 2.92 mm connectors
	ML4039E	400G BERT with Real Hardware FEC	4	PAM4/NRZ	0-800 mVpp	<ul style="list-style-type: none"> 23-29 & 46-56 GBd PAM4/NRZ. Real Hardware FEC (KR4/KP4 Analysis) Standard 2.4 mm connectors
	ML4039EN	400G BERT with Real Hardware FEC and Noise Injection	4	PAM4/NRZ	0-800 mVpp	<ul style="list-style-type: none"> 23-29 & 46-56 GBd PAM4/NRZ Real Hardware FEC (KR4/KP4 Analysis) Noise Injection (Crosstalk Interference) Standard 2.4 mm connectors
	ML4079D	400G BERT with FEC Emulation	8	PAM4/NRZ	0-1200 mVpp	<ul style="list-style-type: none"> 9-14.3 & 22-29.5 GBd PAM4 9-14.3 and 23.2-29.5 Gbps NRZ FEC Emulation (KR4/KP4 Analysis) Standard 2.92 mm connectors
	ML4079E	800G BERT with Real Hardware FEC	8	PAM4/NRZ	0-700 mVpp	<ul style="list-style-type: none"> 23-29 & 46-56 GBd PAM4/NRZ Real Hardware FEC (KR4/KP4 Analysis) Dense M-SMPM connectors
	ML4079EN	800G BERT with Real Hardware FEC and Noise Injection	8	PAM4/NRZ	0-1200 mVpp	<ul style="list-style-type: none"> 23-29 & 46-56 GBd PAM4/NRZ Real Hardware FEC (KR4/KP4 Analysis) Noise Injection (Crosstalk Interference) Dense M-SMPM connectors

The New ML4039B

Now available with ThunderBERT, our revolutionary BERT graphical user interface.

[LEARN MORE](#)

	Part Number	Description	Differential Channels	Data Format	Output Amplitude	Details
Manufacturing BERTs	ML4054B	400G Manufacturing BERT with Real Hardware FEC	8	PAM4/NRZ	0-800 mVpp	<ul style="list-style-type: none"> 7–28.125 GBd PAM4 1.12–1.54, 2.24–6.1 & 6.6–28.125 Gbps NRZ Replaceable MSA-compliant interface Real Hardware FEC (KR4/KP4) CMIS X.X implementation testing
	ML4054B-xxx	400G adapter card for ML4054B	8	PAM4/NRZ	-	<ul style="list-style-type: none"> Used for Nx26 GBd PAM4 QSFP, QDD and OSFP options available Part number: ML4054B-QSFP, -QDD, -OSFP
	ML4054B-LP	400G BERT (Low profile version for Thermal Chamber Testing) with Real Hardware FEC	8	PAM4/NRZ	0-800 mVpp	<ul style="list-style-type: none"> Same as ML4054B Low profile version for thermal chamber compatibility (MLT8000)

	Part Number	Description	Differential Channels	Data Format	Output Amplitude	Details
Host Emulators	ML4070-SFP	SFP28 Compliance Tester, Standalone	3-port	NRZ	200-800 mVpp	<ul style="list-style-type: none"> SFP host emulator and margin tester 0-9 dB VSR Power supply margining, loopback
	ML4070-QSFP	QSFP28 Compliance Tester, Standalone	3-port	NRZ	200-800 mVpp	<ul style="list-style-type: none"> QSFP host emulator and margin tester 0-9 dB VSR Power supply margining, loopback

	Part Number	Description	Differential Channels	Data Format	Output Amplitude	Details
JTOL Clock Source	ML407-PAM	PAM4 Clock Source with Jitter Injection	1	PAM4/NRZ	Up to 1800 mVpp	<ul style="list-style-type: none"> Add-on instrument for the ML4039 BERT series Intended for multi-UI sinusoidal and random jitter generation Compatible with CLK-in port of all ML BERTs

OSCILLOSCOPES

Digital sampling oscilloscopes (DSOs) are essential tools for the characterization of a variety of active or passive DUTs. They are often used in unison with a BERT, which injects the digital test pattern into the channel before reaching the MultiLane DSO, leveraging critical measurement capabilities like jitter and eye diagram analysis.

When choose a DSO, it is important to define the “scope” of your use case. MultiLane offers single channel optical and electrical systems, as well as multi-channel electrical systems to fit a wide variety of applications. For instance, the ML4015D provides 25 GHz of optical bandwidth to sufficiently characterize optical transmitters running at 26.5625 GBd PAM4 (53.125 Gbps).



ML4015D

Key Features

- Extensive library of built-in DSP filters such as Bessel-Thomson, CTLE, DFE, FFE
- Comprehensive eye mask library
- Compact instrument with ruggedized enclosure

	Part Number	Description	Electrical bandwidth (GHz)	Optical bandwidth (GHz)	Details
DSO	ML4015D-25-SM	Single optical channel, 25 GHz, Single mode	NA	25	<ul style="list-style-type: none"> Standalone benchtop Single channel Optical wavelength 1260-1620 nm SM Deep-memory pattern capture
	ML4015D-25-MM	Single optical channel, 25 GHz, Multimode	NA	25	<ul style="list-style-type: none"> Standalone benchtop Single channel Optical wavelength 780-860 nm MM Deep-memory pattern capture
	ML4015D-40-SM	Single optical channel, 40 GHz, Single mode	NA	40	<ul style="list-style-type: none"> Standalone benchtop Single channel Optical wavelength 1260-1620 nm SM Deep-memory pattern capture
	ML4015D-E-32	Single 32 GHz electrical differential channel	32	NA	<ul style="list-style-type: none"> Standalone benchtop Single channel 2.92 mm connectors Deep-memory pattern capture

	Part Number	Description	Electrical bandwidth (GHz)	Optical bandwidth (GHz)	Details
DSO	ML4015D-E-50	Single 50 GHz electrical differential channel	50	NA	<ul style="list-style-type: none"> Standalone benchtop Single channel 2.92 mm connectors Deep-memory pattern capture
	ML4015D-E-50-24	Single 50 GHz electrical differential channel	50	NA	<ul style="list-style-type: none"> Standalone benchtop Single channel 2.4 mm connectors Deep-memory pattern capture
	ML4025-BTP-Gen2	Quad 35 GHz electrical differential channels	35	NA	<ul style="list-style-type: none"> Standalone benchtop Four channels 2.92 mm connectors Deep-memory pattern capture

TIME DOMAIN REFLECTOMETERS

MultiLane's Time Domain Reflectometer is a time-saving tool for cable testing, supporting crucial measurements like network return loss (S11), propagation loss (S21), and crosstalk analysis. Moreover, it can provide the impedance profile of an electrical channel. MultiLane provides semi-automated solutions for the testing of direct-attach cables and TIAs.

The ML4035 has truly earned the reputation of a "signal integrity swiss-army knife" as a 4 channel BERT, DSO and TDR instrument in a compact, half-rack enclosure.

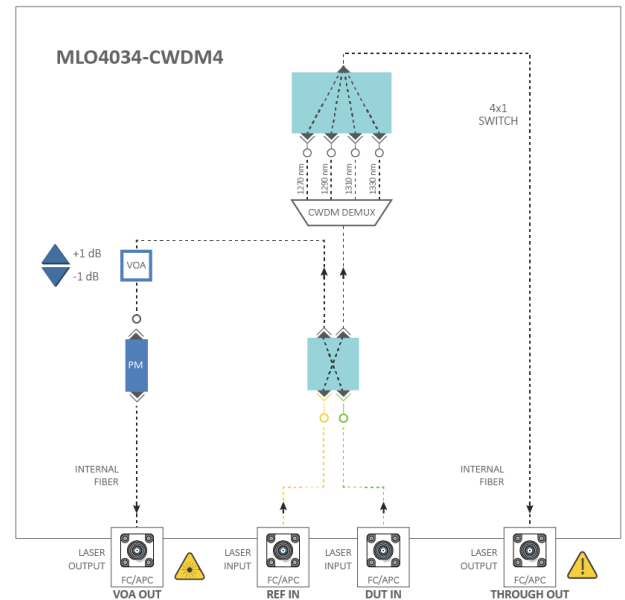


ML4035

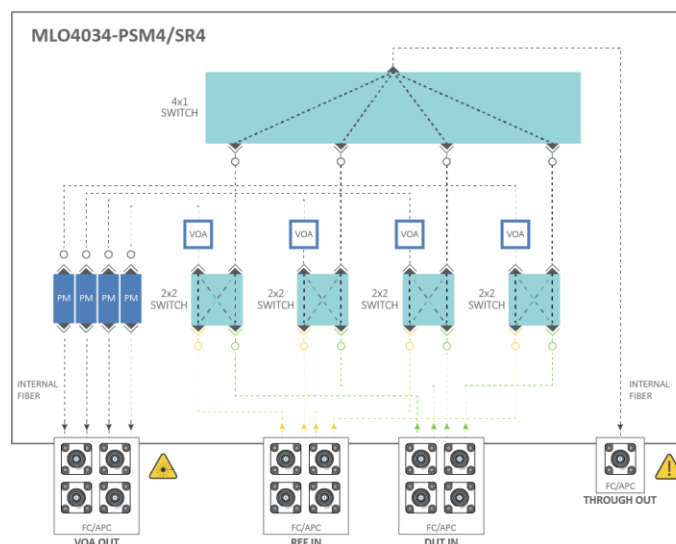
	Part Number	Description	Bandwidth (GHz)	Data Format	Details
TDR	ML4035	ML4035 Time Domain Reflectometer (TDR), BERT and DSO	35 GHz	PAM4/NRZ	<ul style="list-style-type: none"> 4 Channel 35 GHz DSO 4 Channel 56 Gb/s BERT (PPG and ED) 4 Channel True-Differential TDR/TDT Standard 2.4 mm connectors

OPTICAL SWITCH BOXES

An optical switch box is needed to measure the performance of optoelectronic components at multiple wavelengths or channels, depending on the transceiver class. This replaces a multitude of separate tools, enhancing productivity and enabling the automation of transceiver testing. The MLO4034 Optical Switch Box family incorporates WDM demultiplexers, integrated power meters, variable optical attenuators, and optical switches to form an integrated switch matrix. It enables up to four channels to be characterized at once.



Switch Box Block Diagram (WDM)



Switch Box Block Diagram (Parallel)

	Part Number	Description	Details
Optical Switch Boxes	MLO4034-CWDM4	Optical Switch Box for CWDM4	<ul style="list-style-type: none"> • WDM VOA • WDM power meter • De-multiplexer and 4x1 switch • Single mode CWDM4 wavelength grid
	MLO4034-LR4	Optical Switch Box for LR4	<ul style="list-style-type: none"> • WDM VOA • WDM power meter • De-multiplexer and 4x1 switch • Single mode DWDM wavelength grid
	MLO4034-PSM4	Optical Switch Box for PSM4	<ul style="list-style-type: none"> • 4x parallel VOAs • 4x parallel power meters • 4x1 switch • Parallel single mode 1310 nm wavelength
	MLO4034-SR4	Optical Switch Box for SR4	<ul style="list-style-type: none"> • 4x parallel VOAs • 4x parallel power meters • 4x1 switch • Parallel multi-mode 850 nm wavelength

FEATURED PRODUCT

ML4054B

The ML4054B is a fully featured 400G manufacturing BERT. It comes with a field-replaceable cabled interface to QSFP-DD, OSFP and other form factors, for optimum signal integrity and thermal testing flexibility. It also supports module CMIS validation as well as Real Hardware FEC (KP4) analysis.



CLOCK RECOVERY MODULES

Optical clock recovery modules are required when a clock signal is not present to trigger a sampling oscilloscope, or when it is recommended to use the embedded clock present in the transmit data stream. Clock recovery modules are an essential tool for transmitter signal characterization at 26 GBaud and beyond.

26 GBaud PAM4 Clock Recovery Module



ML1016D-CR

	Part Number	Description	Details
Clock Recovery Module	ML1016D-CR-53PS	<ul style="list-style-type: none"> Optical Clock Recovery Unit 26.5625 GBd PAM4 Single mode 	<ul style="list-style-type: none"> Sold with ML4015D only
	ML1016D-CR-25NS	<ul style="list-style-type: none"> Optical Clock Recovery Unit 25.78 Gbps NRZ Single mode 	
	ML1016D-CR-25NM	<ul style="list-style-type: none"> Optical Clock Recovery Unit 25.78 Gbps NRZ Multimode 	

LOOPBACK TESTER

The ML4039-LBT is a fully automated 25G/100G Loopback tester that validates the connector signal integrity and CMIS content of SFP28 and QSFP28 Loopbacks. It performs AC tests on all channels such as eye contour, bathtub curves and BER, returning a simple pass/fail condition for the viability of the loopback module under test.



ML4039-LBT-XXX

	Part Number	Description	Differential Channels	Data Format	Details
Loopback Tester	ML4039-LBT-XXX	Loopback Tester	1 (SFP28) 4 (QSFP28)	NRZ	<ul style="list-style-type: none"> Easy to use interface Used to test CMIS and signal integrity of electrical loopbacks -QSFP: 100G QSFP28 Support -SFP: 25G SFP28 Support

ATE INSTRUMENTS

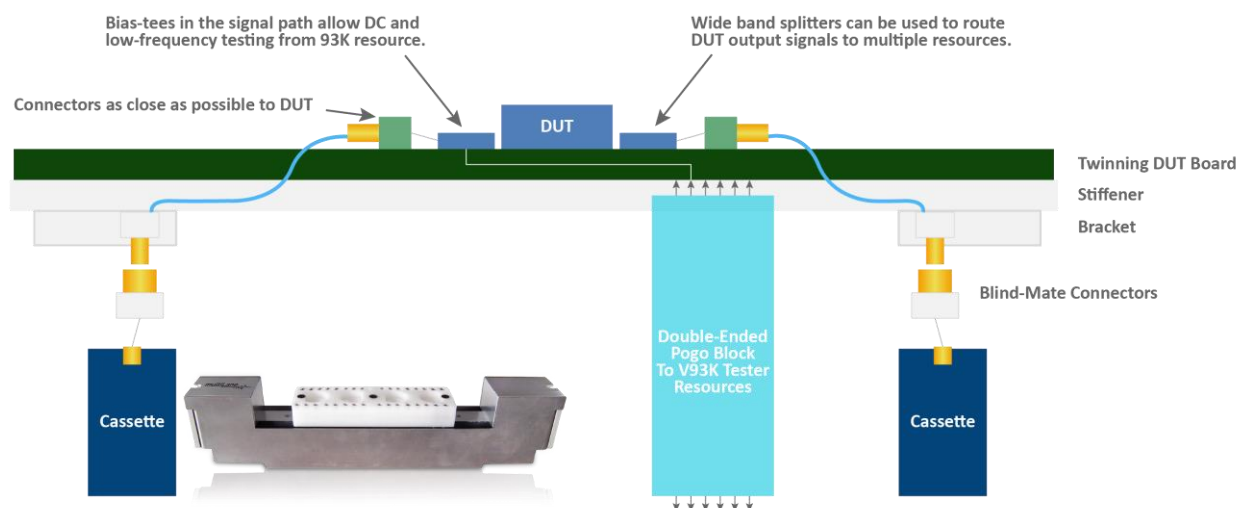
MultiLane offers high-speed, high-throughput turnkey automated test equipment solutions on the Advantest V93000 tester with at-speed I/O testing up to 112 Gbps. To minimize insertion loss, all cabling is enclosed directly below the DUT in a twinning frame that also houses up to 32 at-speed channels of MultiLane BERTs and Scopes. The Advantest SmartTest programming environment enables multisite high-volume testing with full datalogging capabilities and much faster test times than benchtop solutions. The V93000 mechanics are proven solutions for hard docking to either wafer probes or package device handlers.



AT4025

Key Features

- Up to 112 Gbps at-speed device testing
- 32 differential Tx/Rx BERT/Scope channels
- Cabling solution minimizes insertion losses
- Multisite-ready with full datalogging
- Faster test times than benchtop options
- Hard docking to package device handlers
- Hard docking to wafer probes



HSIO Signal Path

ATE Instruments	Part Number	Description	Details
	AT4025	<ul style="list-style-type: none"> 4 channel 50 GHz Digital Sampling Oscilloscope 	<ul style="list-style-type: none"> Half Cassette
	AT4039D	<ul style="list-style-type: none"> 4 channel 56 Gbps (28 GBaud) BERT 	<ul style="list-style-type: none"> Half Cassette
	AT4039E	<ul style="list-style-type: none"> 4 channel 112 Gbps (56 GBaud) BERT 	<ul style="list-style-type: none"> Half Cassette
	AT4039EML	<ul style="list-style-type: none"> 4 channel 112 Gbps (56 GBaud) BERT Single-ended high-amplitude outputs for driving EMLs 	<ul style="list-style-type: none"> Half Cassette
	AT4079B	<ul style="list-style-type: none"> 8 channel 1 – 30 GBd PAM/NRZ 	<ul style="list-style-type: none"> Full Cassette



LEGACY PRODUCTS

Due to popular demand, MultiLane continues to support and offer our [legacy product family](#) while supplies last. Please inquire with your local sales representative about availability.



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