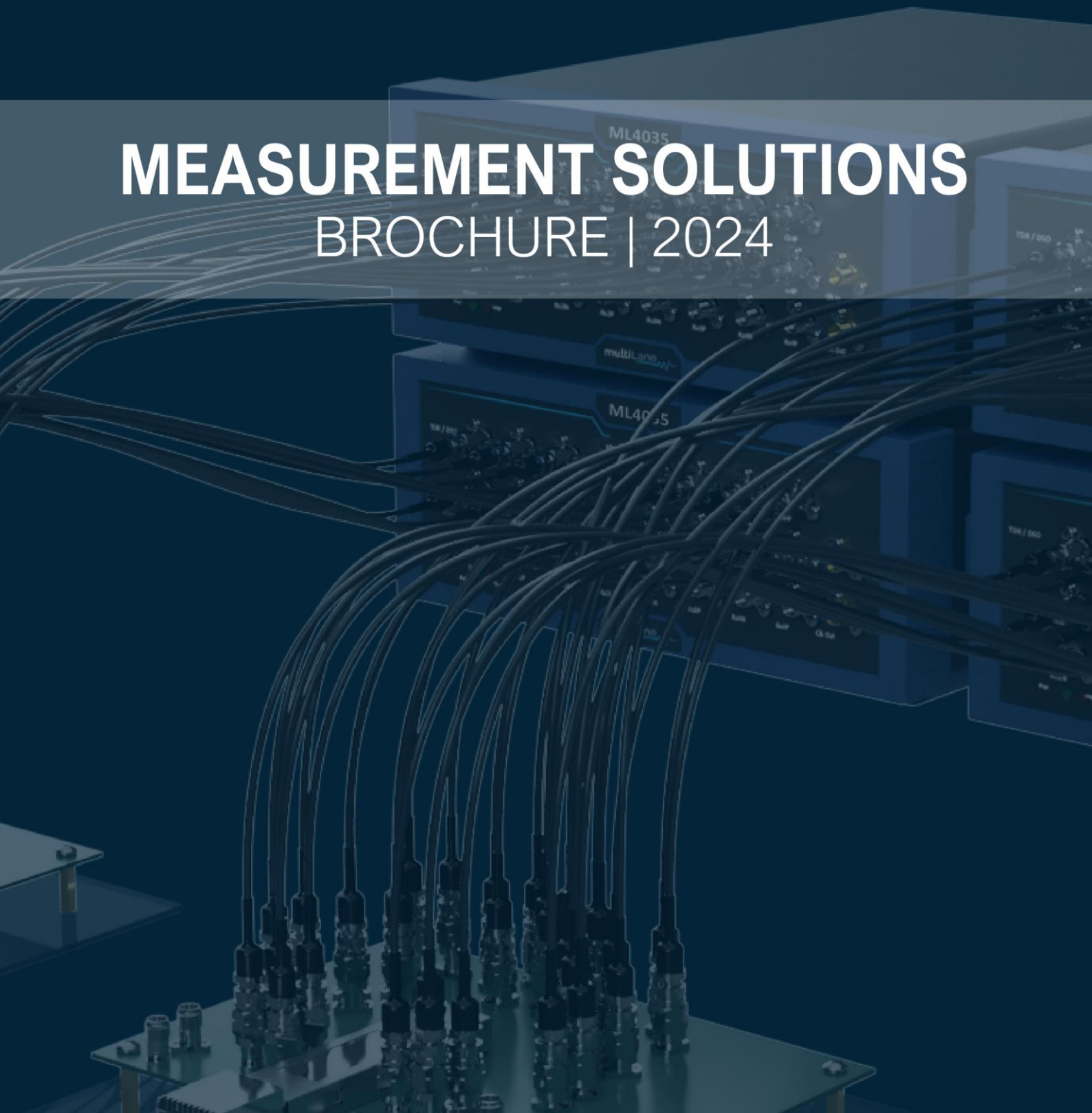
multiLane

MEASUREMENT SOLUTIONS

BROCHURE | 2024



Contents

Innovation for the Next Generation

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 test, and link testing. We provide a range of from factors and architectures, from portable instruments, to stand-alone benchtop 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, scalable equipment. MultiLane provides leading-edge solutions for the latest date center technologies, with a comprehensive set of development solutions for MSAs ranging from SFP, DSFP, QSFP, QSFP-DD, QSFP-DD800, OSFP800, and OSFP-XD.

The MultiLane portfolio encompasses optical and electrical oscilloscopes, Bit Error Rate Testers (BERTs), Time Domain Reflectometers (TDR) for TIA and cable testing, interconnects, as well as fully automated DAC and transceiver test solutions, and compliance test services, serving developers, manufacturers, and installers across the HSIO industry.

5
International Branches

200
More than 200 products released

500
Over 500 customers

Product Portfolio

Test solution instrumentation is a core value proposition at MultiLane, 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.

MultiLane's agility enables us to quickly respond to customer needs with our domain expertise and proprietary technology. 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 high-end, scalable, solutions that meet and exceed customer expectations.

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) and/or square wave, which drives a device under test (DUT). 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 built directly into the instrument. The resulting signals' eye diagrams can be viewed by connecting a Digital Sampling Oscilloscope (DSO) to the setup.

Key Features

- Jitter and noise injection capabilities
- Real-hardware FEC
- 8x112 Gbps/lane BERT
- M-SMPM cables

A BERT needs to be tailored to the characteristics of the DUT.
Key considerations include:

- Baud rate
- Number of channels
- Modulation format (e.g., NRZ, PAM-4, etc.)
- Test pattern (e.g., PRBS15)
- Signal amplitude
- Port type (e.g., QSFP-DD)
- Form factor (e.g., portable, chassis, etc.)

	Part Number	Description	Channels	Data Format	Output Amplitude	Details
General Purpose BERTs	**ML4039-BTP**	4-Lane, 25 Gbps NRZ, Stand Alone, 100G BERT	4	NRZ	200-800 mVpp	• 8.5-15 & 21-30 Gbps NRZ • Standard 2.92 mm connectors
	ML4039B	4-Lane, 1.12-29 GBd NRZ & PAM4, (Gen 2), 200G BERT	4	PAM4/NRZ	0-800 mVpp	• 7 – 28.125 GBd PAM4 • 1.12–1.56, 2.24-28.125 Gbps NRZ • Standard 2.92 mm connectors
	ML4039-JIT-BTP	4-Lane, 25 Gbps NRZ, 100G BERT with Jitter Generation	4	NRZ	100-2000 mVpp	• 8.5-15 & 21-30 Gbps NRZ • Jitter/receiver tolerance • Standard 2.92 mm connectors
	ML4039D	4-Lane, 29.5 GBd NRZ & PAM4, 200G BERT with FEC estimation	4	PAM4/NRZ	0-1200 mVpp	• 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	4-Lane, 58 GBd PAM4, 400G BERT	4	PAM4/NRZ	0-800 mVpp	• 23-29 & 46-56 GBd PAM4/NRZ • Real Hardware FEC (KR4/KP4 Analysis) • Standard 2.4 mm connectors
	ML4039EN	4-Lane, 58 Gbd PAM4, 400G BERT with Noise Injection	4	PAM4/NRZ	0-800 mVpp	• 23-29 & 46-56 GBd PAM4/NRZ • Real Hardware FEC (KR4/KP4 Analysis) • Noise Injection (Crosstalk Interference) • Standard 2.4 mm connectors
	ML4079D	8-Lane, 29.5 Gbd NRZ & PAM4. 400G BERT	8	PAM4/NRZ	0-1200 mVpp	• 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	8-Lane, 58 GBd NRZ & PAM4, 800G BERT	8	PAM4/NRZ	0-700 mVpp	• 23-29 & 46-56 GBd PAM4/NRZ • Real Hardware FEC (KR4/KP4 Analysis) • Dense M-SMPM connectors
	ML4079EN	8-Lane, 58 GBd NRZ & PAM4, 800G BERT with noise injection	8	PAM4/NRZ	0-1200 mVpp	• 20-29G & 36-61G PAM4/NRZ • Random and Burst Noise Injection • Random and Sinusoidal Jitter Injection

	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	• 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 implementation testing
	ML4054B-xxx	400G adapter card for ML4054B	8	PAM4/NRZ	-	• 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	• Same as ML4054B • Low profile version for thermal chamber compatibility (MLT8000)
	ML4054E	8-Lane, 58 GBd NRZ & PAM4, 800G BERT with noise injection	8	PAM4/NRZ	0-1200 mVpp	• 20-29G & 36-61G PAM4/NRZ • Random and Burst Noise Injection • Random and Sinusoidal Jitter Injection • Integrated MCB for rapid pluggable testing

ML4079EN

The MultiLane flagship BERT, the ML4079EN is designed to account for the critical considerations at 8x112Gbps/lane: device resilience in the face of signal disruption. Fitted random Noise insertion, jitter injection capabilities that exceed the IEEE specifications by up to 3 times, and real-hardware KP4 FEC the ML4079EN allows for an accurate picture not only of device performance under stress, but precise breaking points to allow users the clearest understanding of just how resilient their designs will be in the field.

Oscilloscopes

Digital sampling oscilloscopes (DSOs) are essential tools for the characterization of a variety of active or passive DUTs. They are often used in conjunction 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 choosing 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.

Key Features

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

MultiLane scopes can be equipped with built-in clock recovery modules to ensure a synchronous trigger for each measurement and eliminate excessive jitter from the signal.

	Part Number	Description	Electrical bandwidth (GHz)	Optical bandwidth (GHz)	Details
DSO	**ML406B** 	Single channel electrical DSO	70	NA	• Compact form factor • Phase based trigger • Low Intrinsic Noise
	ML4015E-OPT	Single channel optical DSO	35	25	• Deep-memory pattern capture • Single Mode or Multimode available
	ML4015E-OPT-SM42	Single Channel Optical DSO	35	42	• Single Mode only
	ML4015-OPT-BBR25G	Single Channel Optical DSO	35	25	• Broadband Receiver • Single mode and Multimode support
	ML4015E-E-35	Single Channel Electrical DSO	35	NA	• 2.92 mm connectors
	ML4015E-E-70	Single Channel Electrical DSO	70	NA	• 2.4 mm or 1.8 mm connectors

Clock Data Recovery

Clock Data Recovery (CDR) modules work in tandem with DSOs, eliminating excess jitter from measurements. A necessity at 28 GBaud PAM4 signaling and above, CDRs ensure a synchronous trigger between the signal by regenerating or providing the clock from the original signal.

ML1016E-CR

	Part Number	Description	Data Rate (GBaud)	Details
CDR	**ML1016E-OPT-53**	Optical CDR	53	• Selectable recovered clock divide ratio
	ML1016E-E-53	Electrical CDR	53	• Selectable recovered clock divide ratio

PON Testing

The ML4003BX-BTP features a built-in Optical DSO and an Electrical DSO with CDR, a BERT capable of running in Loopback Mode, and options for an external clock. The ML4003BX-BTP is designed for both production and R&D testing for GPON, EPON, receiver sensitivity, backplane, and data center interconnect testing. The ML4003BX-BTP is available either as a benchtop instrument or a cPCI configuration to fit into a chassis or rack.

ML4003BX-BTP Benchtop

ML4003BX-BTP cPCI

	Part Number	Description	Bandwidth (GHz)	Data Format	Details
G-PON	**ML4003BX-BTP**	G-PON, E-PON backplane, receiver sensitivity, and DCI tester	35 GHz	NRZ	• 32 GHz Electrical DSO with CDR • 32 GHz Optical DSO • Real-HW filters for 1G, 2G, and 10G • 2.92 mm k-connectors • Built-in SFP port

Time Domain Reflectometry

Pulsar

MultiLane Pulsar is a 4-channel Time Domain Reflectometry analyzer that simplifies troubleshooting by providing full SI insights, enabling the detection of impedance mismatches, discontinuities, and skew measurements. Pulsar is designed with scalability for parallel measurements and optimized for high-throughput, making it ideal for testing high-density ports.

MultiLane Pulsar

	Part Number	Description	Bandwidth (GHz)	Data Format	Details
TDR	**Pulsar**	Time Domain Reflectometer (TDR)	35	PAM4/NRZ	• SMPM connectors • 4-Channel differential TDR • 4-Channel DSO

ML4035

The MultiLane ML4035 is a 3 in 1 TDR, BERT and DSO optimized for NRZ and PAM4 eye measurements, S-parameters evaluation and impedance profile characterization to provide full SI insights and optimize troubleshooting. It enables simultaneous testing on four channels and serves various applications such as cables and connectors testing, PCB testing and multiport host characterization.

The ML4035 is a high-throughput instrument, providing the fastest testing times in the industry to best serve high scale production.

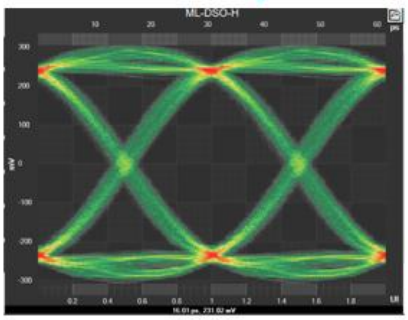
ML4035

	Part Number	Description	Bandwidth (GHz)	Data Format	Details
TDR	**ML4035**	ML4035 Time Domain Reflectometer (TDR)	35 GHz	PAM4/NRZ	• 4 Channel 35 GHz DSO • 4 Channel 56 GBd BERT (PPG and ED) • 4 Channel True-Differential TDR/TDT • Standard 2.4 mm connectors

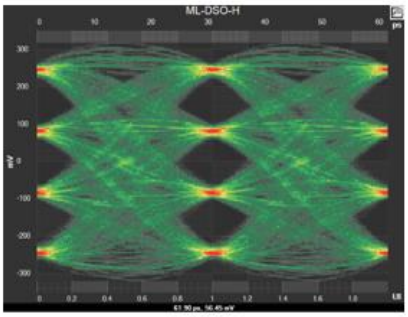
Arbitrary Waveform Generators

Arbitrary Waveform Generators (AWGs) are instruments used to produce any electrical wave form for systems under test. The MultiLane ML4100L-AWG – the company's most advanced AWG to date – offers high-speed SerDes transceiver and amplifier validation, with Rx jitter tolerance testing. A versatile instrument, the ML4100L-AWG supports compliance PHY and protocol stress testing of MIPI C/D-PHY, MIPI M-PHY, PCIe5, USB4, and more. The ML4100L-AWG is also designed for 400G ZR Coherent module development and validation with BER and FER testing capabilities.

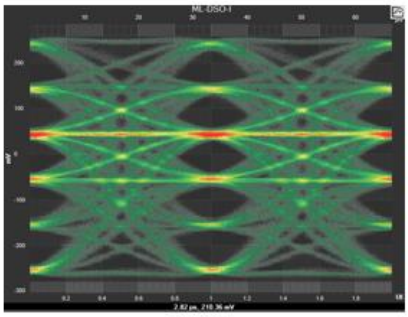
ML4100L-AWG



32.5G NRZ Signal



32.5G PAM4 Signal



30G PAM6 Signal

	Part Number	Description	Data Format	Details
AWG	**ML4100L-AWG**	4-channel Differential Arbitrary Waveform Generator	PAM4/8/6/NRZ	• 4 Channel 35 GHz DSO • 4 Channel 56 GBd BERT (PPG and ED) • 4 Channel True-Differential TDR/TDT • Standard 2.4 mm connectors

AWGN Injection

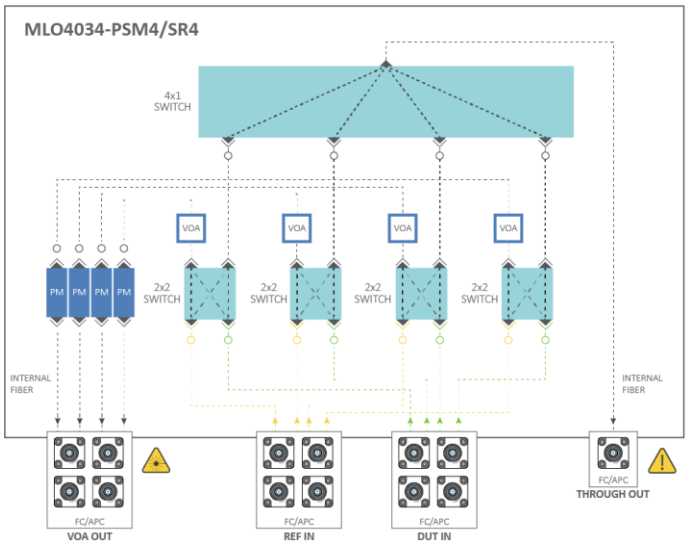
A dedicated AWGN injector and Pick-off Tee board, respectively, the ML4081 and ML4081-X are designed to highlight the effects of noise on both a signal's BER and eye diagram. Used in a setup with a BERT, a clean signal is passed through the ML4081-X, where the ML4081 injects random noise. The resulting lossy signal is then routed to an awaiting DSO for the eye diagram, and looped back into the BERT to check the effect on the BER. The ML4081/ML4081-X are ideal for use in BIST applications for ATE, margin testing services, or PCIe BIST test applications.

ML4081

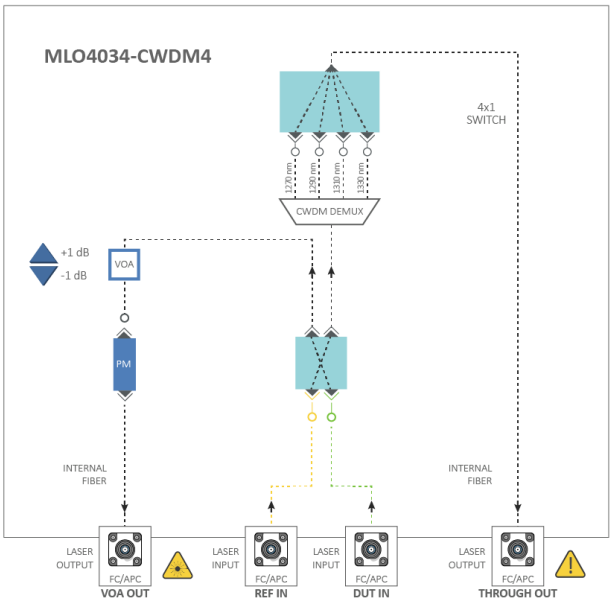
	Part Number	Description	Details
AWGN	**ML4081**	AWGN Generator	• Crest Factor >5 • 4 differential or 8 single ended channels • Programmable Bandwidth 1-30 GHz • Amplitude -30 dBm to -2 dBm • Programmable Spectral Shaping • Calibrated Amplitude accuracy 2 % • Amplitude noise resolution 0.3 Db • 2.4 dB Noise flatness to 30 GHz
	ML4081-X	Pick-off tee board	• 8 or 16 differential Lanes • Routing for both clean and Noisy Signals • Creates a defined stress source for receivers under test

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 (Parallel)

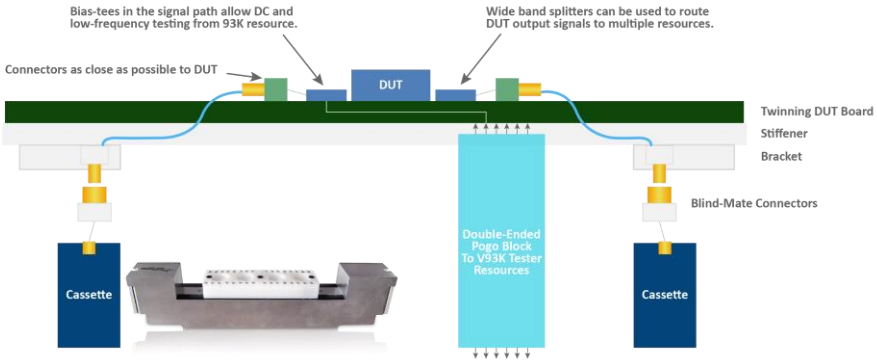


Switch Box Block Diagram (WDM)

	Part Number	Description	Details
Optical Switch Boxes	**MLO4034-CWDM4**	Optical Switch Box for CWDM4	MLO4034-CWDM4, Includes Cross-point switch, VOA, Power Meter, Demux and 4:1 Switch
	MLO4034-LR4	Optical Switch Box for LR4	MLO4034-LR4, Includes Cross-point switch, VOA, Power Meter, Demux and 4:1 Switch
	MLO4034-PSM4	Optical Switch Box for PSM4	MLO4034-PSM4, Includes 4x Cross-point switch, 4x VOAs, 4x Power Meters and 4:1 Switch
	MLO4034-SR4	Optical Switch Box for SR4	MLO4034-SR4, Includes 4x Cross-point switch, 4x VOAs, 4x Power Meters and 4:1 Switch

ATE Instruments

MultiLane has partnered with leading ATE providers to codesign high-speed, high-throughput turnkey automated test equipment solutions with at-speed I/O testing up to 112 Gbps. MultiLane has demonstrated the viability of production level wafer testing with successful measurements taken at 28 GBd and 56 GBd PAM4. Our ATE solutions bring our same benchtop signature eye for accurate, scalable solutions, reconfigured to fit into the popular industry SOC tester platforms.



HSIO Signal Path

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

	Part Number	Description
ATE Instruments	**AT4025**	4 channel 50 GHz Digital Sampling Oscilloscope
	AT4039E	4 channel 112 Gbps (56 GBaud) BERT
	AT4079B	8 channel 1-30 GBd PAM4/NRZ
	AT4080	4 channel arbitrary waveform generator for 1-64 GBaud

MultiLane Cable Testing Solutions

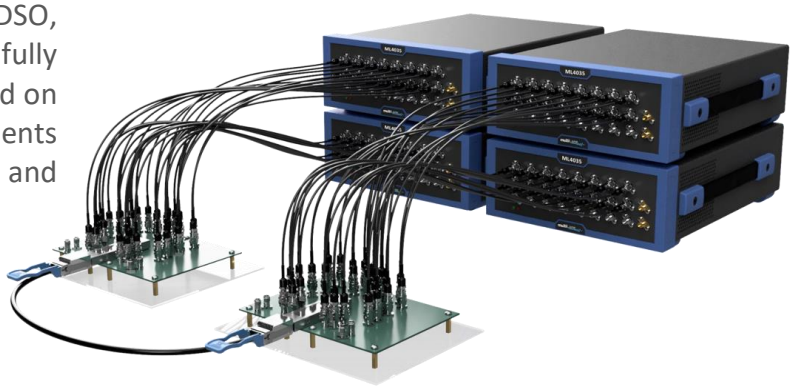
Multiport Cable Testers

MultiLane cable testers are the fastest on the market, capturing S-parameter measurements on 16 differential lanes in seconds while providing the industry's simplest calibration procedure.

Optimized for high-volume manufacturing, incoming inspection, RMA, and high-density backplane cables, our multiport cable testing solutions are scalable to over 64 ports.

Making full use of our 3 in 1 BERT, TDR, and DSO, the ML4035, the user-friendly setup can be fully automated to generate a pass/fail report based on time and frequency domain measurements including insertion loss, return loss, crosstalk, and TDR.

More information here.



ML1105 Passive Copper Tester

Active Copper Testers

MultiLane covers the full range of active copper testing, with redriver and retimer solutions for Active Copper Cables (ACC) and Active Electrical Cables (AEC) respectively. Our AEC testing is fully HiWire compliant, using our ML4054E 800G BERTs for real hardware pre- and post-FEC measurements and CMIS validation.

Our ACC solution – which uses our ML4035 3 in 1 BERT, TDR, and DSO – is the fastest on the market, capturing S-parameter measurements on 16 differential lanes in seconds, while providing the industry's simplest calibration procedure. All our active cable solutions include fully automated pass/fail report generation, BER, eye diagram, and S-parameter/crosstalk testing, making them ideal for R&D, manufacturing, and RMA.

More information here.

Active Cable Tester

Legacy Products

MultiLane continues to offer legacy products due to popular demand, while supplies lasts. Please inquire with your local sales representative about availability.

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