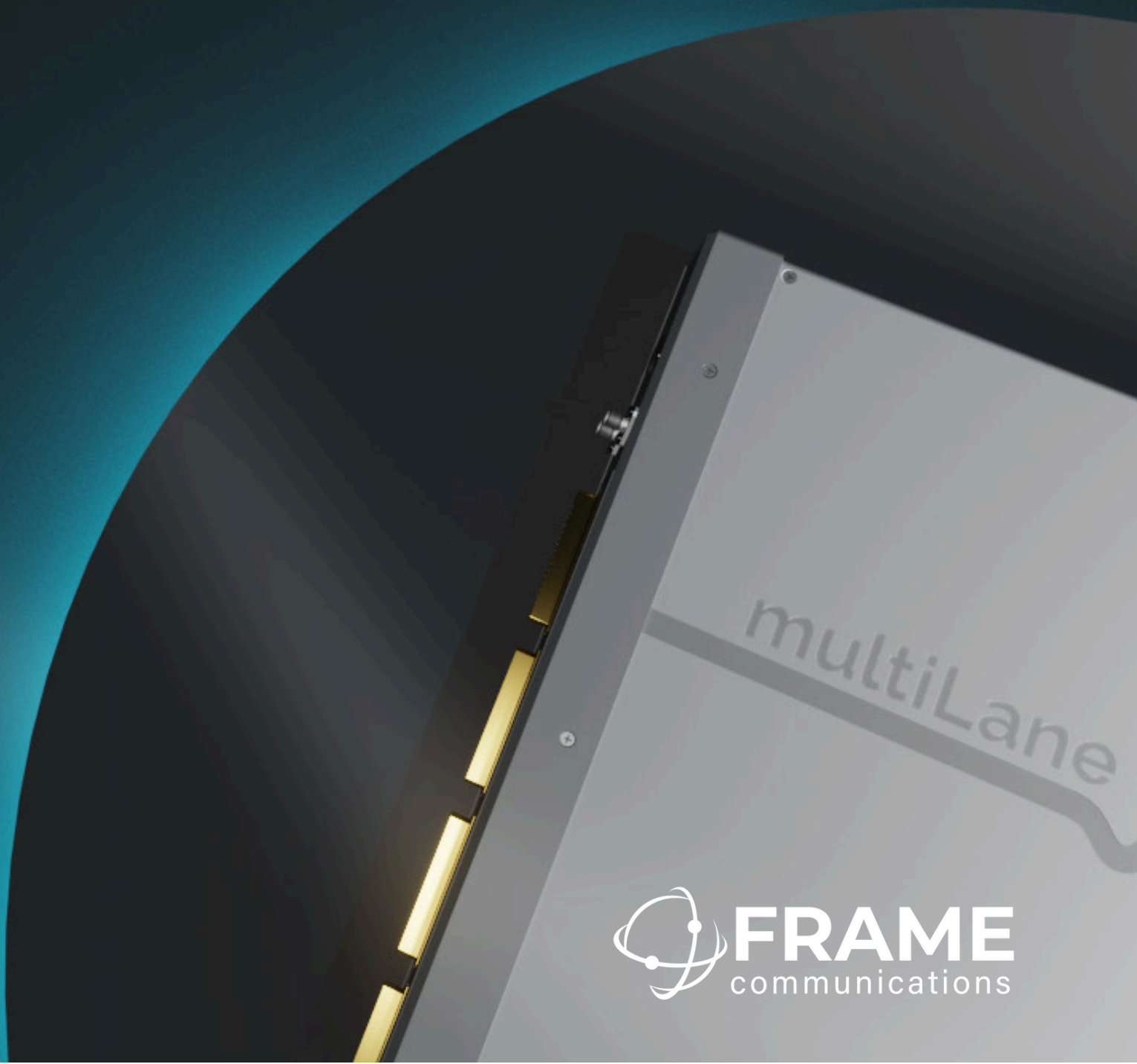
multiLane

MEASUREMENT SOLUTIONS BROCHURE | 2025



FRAME communications

Contents

Inn ovation for the Next Generation

Sinc e 2006, MultiLane has been offering high speed test and measurement equ ipment for data communications. We help chart industry evolution and accelerate the adoption of new technologies with a complete cycle support of data center test solu tions encompassing IC and transceiver characterization, host line card test, and link testing. We provide a range of form factors and architectures, from portable inst ruments, to stand-alone benchtop instruments to automated test platforms. We also assist our customer base with compliance and interoperability test services. Mu ltiLane provides leading solutions for developers, module vendors, interconnect and cable manufacturers, network installers, and data center operators with high-per formance, scalable equipment, with a comprehensive set of development solu tions for MSA and backplane connectors.

The MultiLane portfolio encompasses optical and electrical oscilloscopes, Bit Error Rate Testers (BERTs), Time Domain Reflectometers (TDR) for semiconductor wafer leve l testing, SerDes, TIAs, cable testing, and active interconnects.

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 networking and data center 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.

Next-Gen Measurement Solutions

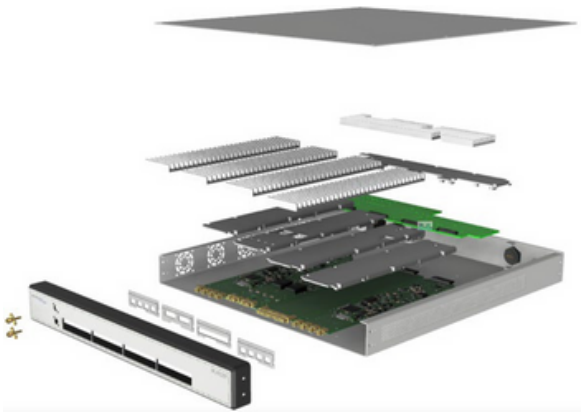
MultiWave Test Platform

Your Instrument, Your Way

The MultiWave Test Platform (MWTP) provides the perfect balance of flexibility and ease of use. The expanded enclosure allows us to offer a series of models and options, placing up to 4 MultiLane instruments as MultiWave (MW) modules into a customer-specified MWTP. The resulting instrument allows for specific user-defined testing in a fixed package, ideal for lab, rack-and-stack, ATE, and production setups, offering a range of solutions for any testing and characterization needs.

Refreshed Look and Feel

Next-gen MultiLane instruments bring with them a new look and feel for the new generation. Including the MW7004F-L 224Gbps/lane BERT.



MWTP Applications

- Post silicon Validation
- V&V Characterization
- End-of-Line Board-level test
- High-speed component manufacturing
- Field Failure Analysis
- High-density passive and active interconnect characterisation & testing

	Part Number	Description	Channels	Signal Format	Output Amplitude	Details
BERT	**MW7004F-L**	4-Lane 224G bps/lane BERT	4	PAM4/NRZ	0-800 mVpp	• Up to 120Gbaud with 106.25Gbaud; 120Gbit/s; 53.125Gbaud; 26.5625Gbaud and 25.7 8125Gbit/s • Up to 40db equaliz ation • Suitable for active and passive interconnect testing
	MW7008E-LFN	8-Lane 112Gbps/lane Long Reach BERT	8	PAM4/NRZ	0-800 mVpp	• 34 dB loss equalization • Line rates for PCIe Gen 3, 5, 6, and 7, LPO, and automotive applications • SMPS connectors
	MW7004E-SNJ	4-Lane 112Gbps/lane BERT	4	PAM4/NRZ	0-1200 mVpp	• Built in jitter and noise injection • Jitter injection up to 3x IEEE mask
DSO	**MW6004-70-E**	4-channel electrical DSO	4	70GHz	-	• SMPS connectors
	MW6004-35-E	4-channel electrical DSO	4	35GHz	-	• SMPS connectors
AWG	**MW9004E**	Differential Arbitrary Waveform Generator	4	PAM4/8/6/NRZ	-	• PPG Mode: NRZ and PAM4 • AWG Mode: A wide variety of pre-programmed waveforms.

Spe cialty Instruments

Working at the forefront of high-speed I/O innovation, MultiLane offers pre-built solutions tailored to some of the most common testing applications required by the industry. These Specialty Instruments target specific – and common – usecases, ensuring an accelerated time to market for technologies in high demand.

ML8008FX-SIA

ML8008FX-SIA – Signal Integrity Analyzer

The ML8008FX-SIA Signal Integrity Analyzer is a high-throughput tester optimized for validating passive copper solutions such as switch-based flyover cables, DACs, and backplanes. It supports a wide range of signal integrity measurements, including Sdd21, intra-pair skew (IPS), crosstalk, and common-mode measurements. With automated differential S-parameter validation, multi-channel impedance profiling, and ultra-fast testing capabilities, the ML8008FX-SIA delivers reliable results for hi gh-volum e production with a low cost of ownership. Its rapid, high-throughput performance makes it an ideal solution for demanding manufacturing environments.

ML7064E-L-UMT

UMT Applications

- RMA
- Rapid go/no go testing for LPOs, active and passive interconnect
- Quick debugging during testing, identifies issues in seconds
- Field failure analysis
- BERT validation for backplane cables

Universal ModuleTester

The MultiLane Universal Module Tester line comprises high channel count BERTs designed to validate ultra-high density backplanes/interconnects. With 64 and 128 lane count models – the ML7064E-L-UMT and ML7128E-LFX-UMT respectively – the UMT line acts as rapid, high-througput debuggers in any environment, including single-click pass/fail report generation. Equally built for a variety of interconnect testing cases, the UMT comes with replaceable daughter cards, creating a modular front panel that can be tailored to any pluggable and backplane harness.

ML7128E-LFX-UMT

	Part Number	Description	Channels	Data Format	Details
Instrument	**ML8008FX-SIA**	8-lane 224G Signal Integrity Analyzer	8	PAM4/NRZ	• Measures IPS in passive copper cables • Scalable for high-density applications
	ML7064E-L-UMT	64-lane 112G BERT Interconnect tester	64	PAM4/NRZ	• High density interconnect tester • Replaceable daughter cards for a fully customizable front panel
	ML7128E-LFX-UMT	128-lane 112G BERT Interconnect tester	128	PAM4/NRZ	• Ultra-high density interconnect tester • Replaceable daughter cards for a fully customizable front panel

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.

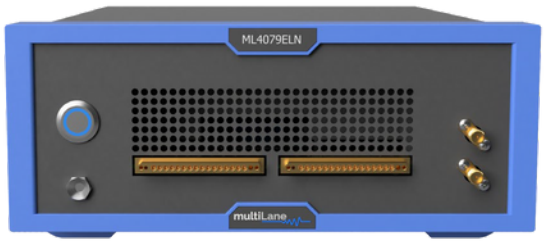
ML7004F-L Key Features

- Up to 40dB Rx Equalization Data Rates: 10 6.25; 53.125;
- 26.5625Gbaud/lane P AM4 and their derivatives
- Independent control of inner eye levels

A BERT needs to be tailored to the characteristics of the DUT.

Key considerations include:

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



ML4079ELN Key Features

- 34dB equalization on the Rx side
- Real HW FEC
- PCIe gen 3 5 6 and 7
- Ethernet Rates
- Low rates (automotive)
- Noise Injection

ML7004F-L

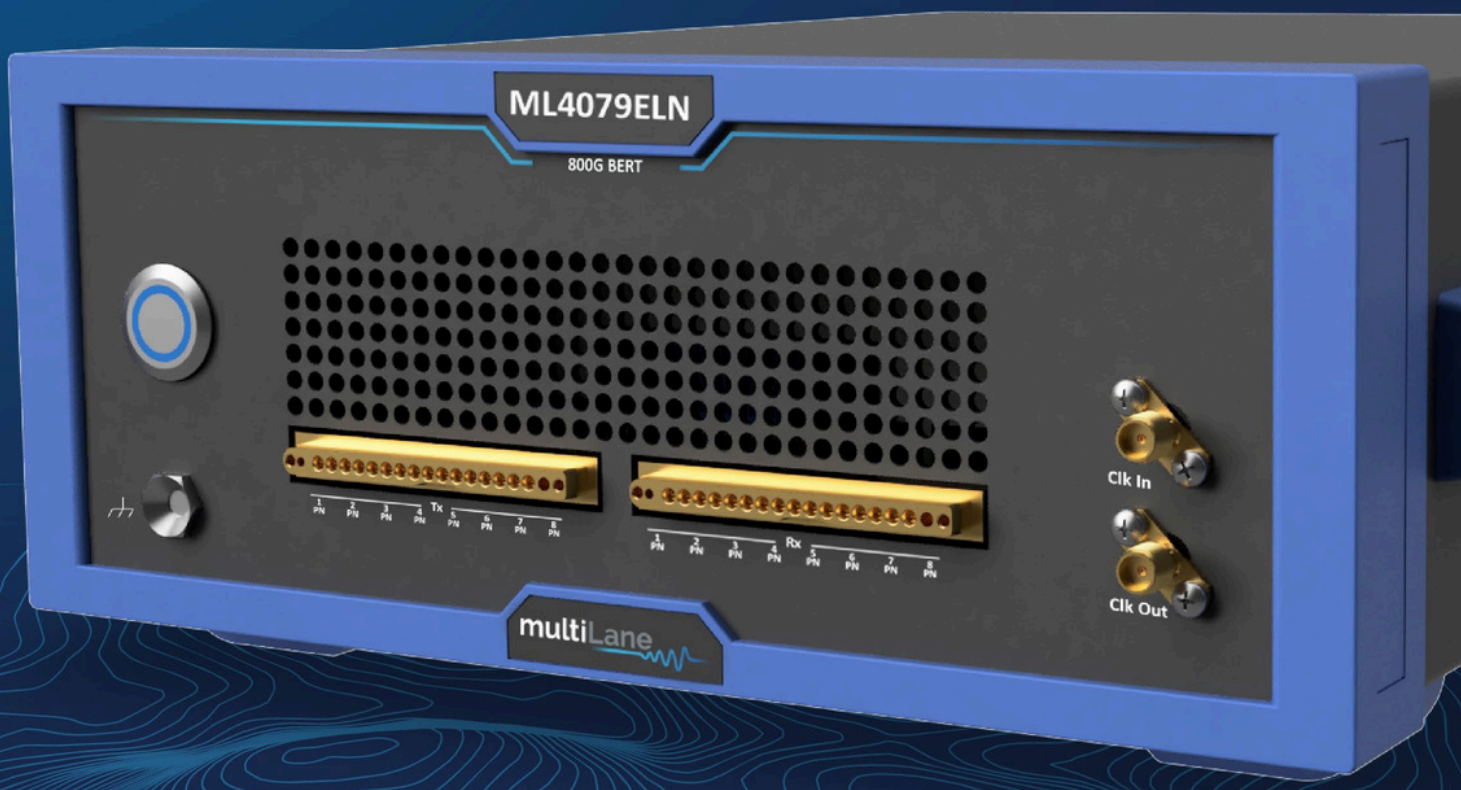
The high-speed I/O market has an urgent need for BERT validation for high-density 224Gbps/lane interconnects. The latest MultiLane BERT, the ML7004F-L, features 4 224Gbps lanes and 40 dB SerDes equalization, giving customers a head-start developing for 1.6T networks and long reach applications. The ML7004F-L is available as a standalone instrument, or a MultiWave Module, the MW 7004F-L, which can be used to create a 16-channel 224Gbps/lane BER tester for high-density 224Gbps applications.

	Part Number	Description	Channels	Data Format	Output Amplitude	Details
General Purpose BER Ts	**MW7004F-L**	4-Lane 224Gbps/lane BER T	4	PAM4/NRZ	0-800 mVpp	• 106.25; 53.125; 26.5625Gbaud/lane PAM4 • 40 dB loss equalization • SMPS connectors
	MW7008E-LFN	8-Lane 112Gbps/lane Long Reach BER T	8	PAM4/NRZ	0-800 mVpp	• 34 dB loss equalization • Line rates for PCIe Gen 3, 5, 6, and 7, LPO, and automotive applications • SMPS connectors
	MW7004E-SNJ	4-Lane 112Gbps/lane BER T	4	PAM4/NRZ	0-800 mVpp	• Built in jitter and noise injection • Jitter injection up to 3x IEEE mask
	ML4079ELN	8-Lane 66Gbd NR Z PAM4, 800G BERT, 34d B equaliz erwith PCIe gen3-5-6-7, and low-rate testing capabiliti es	8	PAM4/NRZ	0-800 mVpp	• 1G -- 66G PAM4/NRZ • 34dB equalization • Real HW FEC • Noise Injection • Ethernet, PCIe and low rates
	ML4079EN	8-Lane, 58 GBd NRZ & PAM4, 800G BERT with noise injectio n	8	PAM4/NRZ	0-1200 mVpp	• 20-29G & 36-61G PAM4/NRZ • Random and Burst Noise Injection • Random and Sinusoidal Jitter Injection
	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
	ML4039EN	4-Lane, 58 Gbd PAM4, 400G BERT with Noise Injectio n	4	PAM4/NRZ	0-800 mVp p	• 23-29 & 46-56 GBd PAM4/NRZ • Real Hardware FEC (KR4/KP4 Analysis) • Noise Injection (Crosstalk Interference) • Standard 2.4 mm connectors
	ML4039E	4-Lane, 58 GBd PAM4, 400G BER T	4	PAM4/NRZ	0-800 mVp p	• 23-29 & 46-56 GBd PAM4/NRZ • Real Hardware FEC (KR4/KP4 Analysis) • Standard 2.4 mm conn ectors
	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

	Part Number	Description	Differential Channels	Data Format	Output Amplitude	Details
General Purpose BERTs	**ML4079D**	8-Lane, 29.5 GbdNRZ & 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 Analys i s) • Standard 2.92 mm connectors
	ML4039D	4-Lane, 29.5 GBd NRZ & PAM4, 200G BERTw ith FEC estimation	4	PAM4/N RZ	0-1200 mV pp	• 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
	ML4039-BTP	Gbps NRZ, Stand Alone, 100G BERT	4	N RZ	200-800 mVp p	• 8.5-15 & 21-30 Gbps NRZ • Standard 2.92 mm connectors
	ML4039-JIT-BTP	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

ML4079ELN

The ML4079ELN is an 8-channel, 800G BERT purpose-built for long reach applications including PCIe-Gen 3, 5, 6, and 7, automotive, transceiver and data center interconnect testing. The ML4079ELN features a wide range of line rate coverage, up to 34dB equalization, built-in AWGN noise injection, and ratio level mismatch (RLM), control, providing a single platform for testing up to 8x66 GBaud. The ML4079ELN includes transmitter equalization (3 or 7 taps FFE), and receiver equalization. The ML4079ELN can provide measurements for Signal-to-Noise Ratio (SNR), histogram measurements, and Real Time BER Measurements and FEC Measurements.



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	**MW 6004-70-E**	4-channel electrical DSO	67	NA	• SMPS connectors
	MW 6004-35-E	4-channel electrical DSO	35	NA	• SMPS connectors
	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
	ML4015F-E	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

Time DomainReflectometry

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.

ML4025 F-PLS

ML4025E PLS -

Full Pulsar Setup

	Part Number	Description	Rise Time (ps)	Details
TDR	**ML4025E-PLS**	Time Domain Reflectometer (TDR)	12ps	• SMPM connectors • 4-Channel differential TDR
	ML4025F-PLS	Time Domain Reflectometer (TDR)	7ps	• SMPS connectors • 4-Channel differential TDR

ML4035

The MultiLane ML4035 is a 3 in 1 DTR, 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.

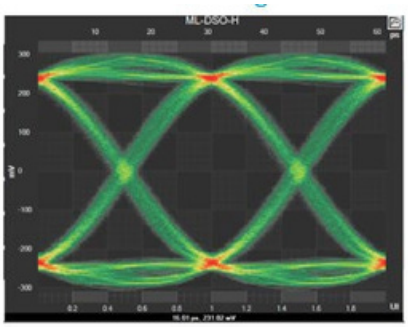
ML4035

	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

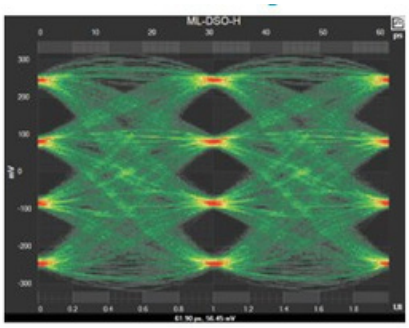
Arbitrary Waveform Generators

Arbitrary Waveform Generators (AWGs) are instruments used to produce any electrical wave form for systems under test. The MultiLane ML9004E – 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 ML9004E supports compliance PHY and protocol stress testing of MIPI C/D-PHY, MIPI M-PHY, PCIe5, USB4, and more. The ML9004E is also designed for 400G ZR Coherent module development and validation with BER and FER testing capabilities.

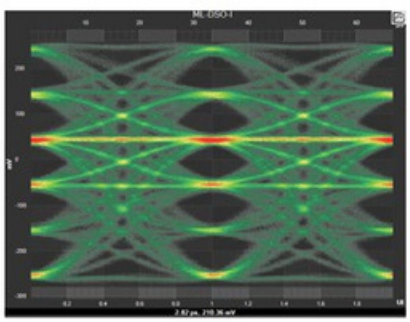
ML9004E



32.5G NRZ Signal



32.5G PAM4 Signal



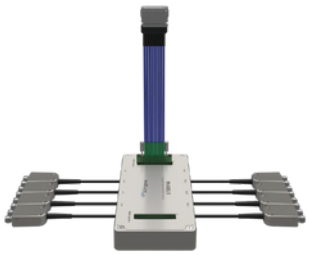
30G PAM6 Signal

	Part Number	Description	Data Format	Details
AWG	**ML9004E**	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
	MW9004E	4-channel Differential Arbitrary Wavefor m Generator, 2 Dual Channel I/Q	PAM4/8/6/NRZ	• PPG Mode: NRZ and PAM4 • AWG Mode pre-program med waveforms: Square wave, triangular Wave, sinewa ve, multi-tone, linear chirp, log chirp, sawtooth, exponential rise, exponential decay, Sinc, Lorentz, Surge, Damped Oscillation, Stairs, Serial Data, half-sine, Distorted sinewave and Gaussian

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.

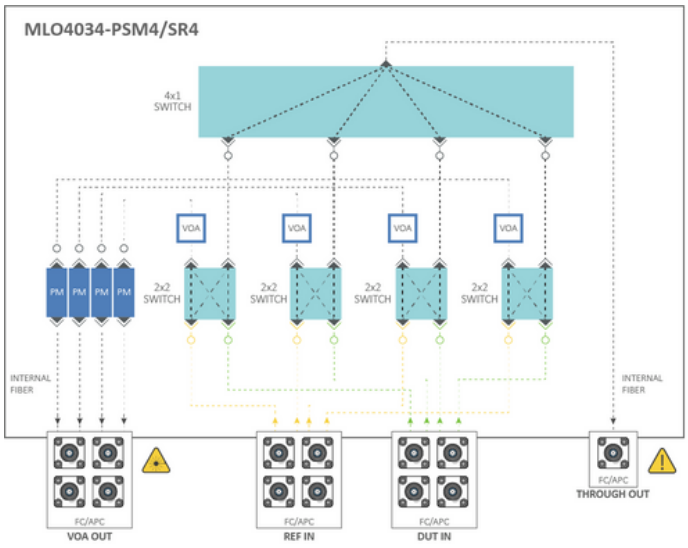
ML4081



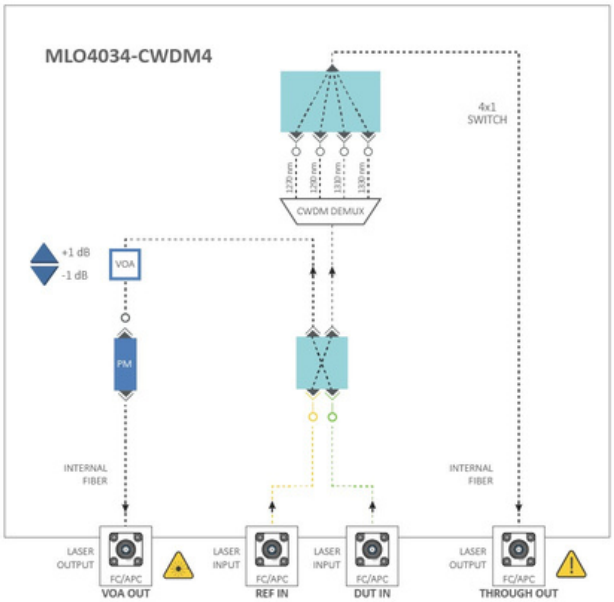
ML4081-X

	Part Number	Description	Details
AWGN	**ML4081E**	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 Routing clean and noise Add crosstalk	• 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)

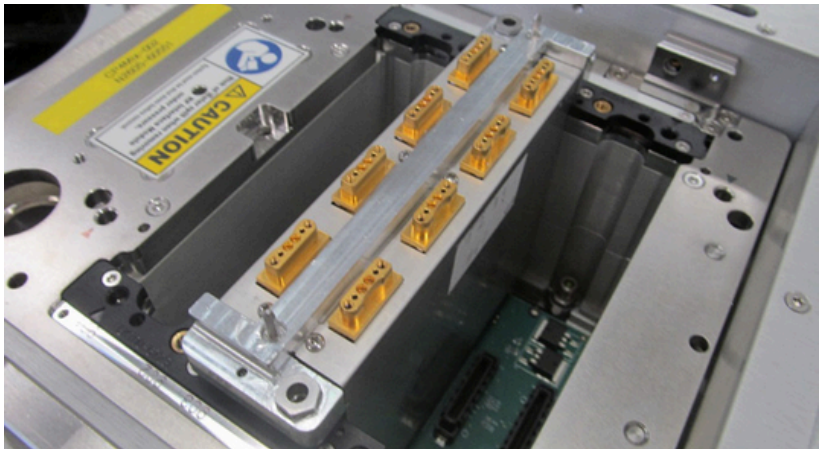
	Part Number	Description	Details
Optical Switch Boxes	**MLO4034-CWDM4**	Optical Switch Box for CWDM4	MLO4034-CWDM4, Includes Cross-point switch, VOA, Power Meter, Demux and 4:1 Switch
	MLO4034-LR4	Optical Switch Box for LR4	MLO4034-LR4, Includes Cross-point switch, VOA, Power Meter, Demux and 4:1 Switch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

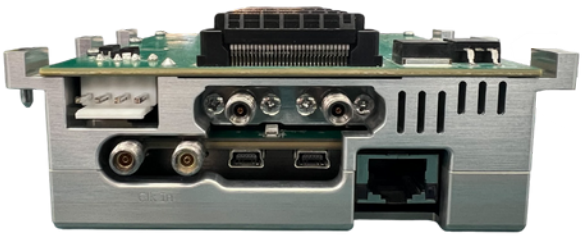
Advantest and MultiLane offer an integrated platform combining MultiLane's high-speed BERT, DSO scope, and AWG instruments with Advantest's V93000 ATE tester. This solution enhances semiconductor IC testing, supporting up to 32 differential lanes at 224 Gbps (PAM4) and 70 GHz bandwidth. The V93000 Smartest software and docking solutions are widely deployed and proven in production environments.

Key Features

- Up to 224 Gbps at-speed device testing
- Up to 96 Channels
- Cabling solution minimises insertion losses
- Water cooling features
- SMPX connectors covering a frequency range up to 110 GHz per lane
- Hard docking to wafer probes

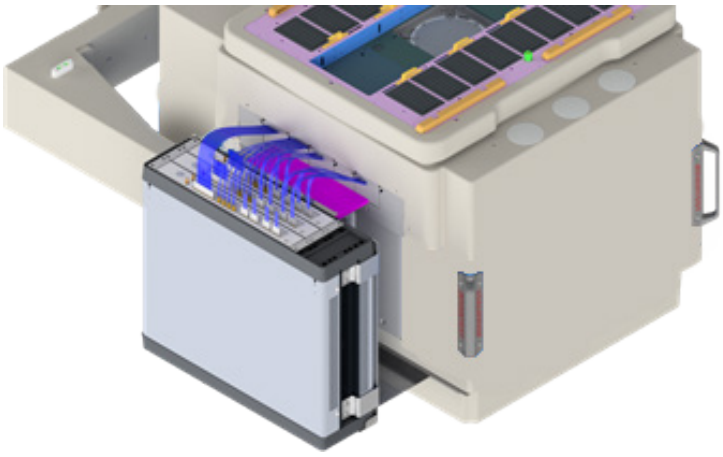


OT4025F DSO mounted is a system for wafer sort testing



OT6000 Backplane

	Part Number	Description
ATE In struments	**OT6000**	6 Slots Backplane | 12V, 15A power supply | clock cabling, UART and firmware upgrade interfaces | Ethernet connectivity | water cooling intake.
	OT4025F	4 channel 70G Hz Digital Sampling Osc illoscope
	OT4039F	4 channel224 Gbps (112 GBaud) BERT



OT93000 - MWTP system setup

The MWTP is a new module designed to integrate with the OT93000 system, enhancing its testing capabilities with advanced f eatures for better performance and flexibility. It houses BERTs, DSOs, and AWGs in the Twinning Frame under the load board, minimizing the signal path to improve signal integrity and test accuracy. The module offers a compact, cost-effective, versatile setup, reduced test time, and supports a wide range of ATE systems and instruments, all while being modular and adaptable for various configurations.

MultiLane Cable Testing Solutions

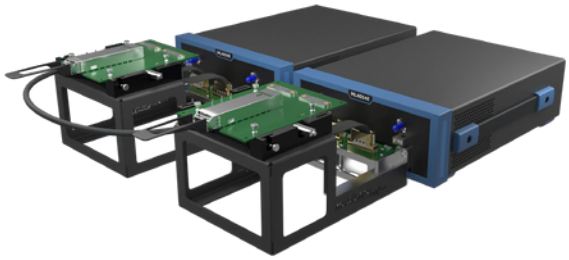
Multiport Cable Testers MultiLane passive copper testers are the fastest on the market, capturing S-parameter measurements on 16 differential lanes in seconds while providing the industry's simplest calibration procedure.

ML1105 Passive Copper Tester

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.

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.



Active Cable Tester

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.

Long Reach Interconnect Testing

The ML4079ELN's high equalization capabilities makes it the go-to solution for testing both active and passive interconnects. Users can validate BER, FEC, and push DUT limitations to their full extent, with built in noise injection.

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