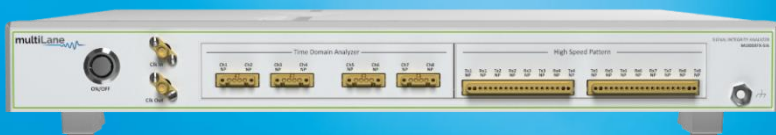


Innovation for the next generation

ML8008FX-SIA

High Density Signal Integrity Analyzer for Differential and Single Ended

SCD21 and SDD21 Capable | TDR Testing | 224Gbps Pattern Generator | Scalable



Summary

Passive high-speed copper interconnects are foundational building blocks of AI system architectures, driving a critical need for high-throughput and comprehensive signal integrity analysis. MultiLane addresses this demand with high-performance, automated solutions purpose-built for large-scale production environments. Our systems are designed to test thousands of 224Gbps differential pairs within seconds, delivering both scalability and cost-efficiency.

MultiLane's cutting-edge test platforms are fully automated and engineered for efficient, accurate, and scalable cable characterization. They deliver rapid test times, support high-density and parallel testing, and offer a low total cost of ownership (TCO) — without compromising on precision.

A key example is the ML8008FX-SIA, a flagship solution within our Signal Integrity Analyzer (SIA) family. It supports 224Gbps NRZ and PAM4 signal testing and offers robust capabilities including eye diagram measurement, skew analysis, impedance characterization, and S-parameter evaluation — making it an essential tool for validating next-gen copper interconnects.

ML8008FX-SIA

1.6T, 8x224G Signal Integrity Analyzer

Introduction

The ML8008FX-SIA is a next-generation Signal Integrity Analyzer engineered for high-throughput, cost-effective testing of 224G passive and linear active copper interconnects, all while ensuring a low Total Cost of Ownership (TCO).

This ultra-fast, purpose-built instrument is optimized for validating switch-based Flyover Cables, DACs, ACCs, Backplane Cartridges, and Cable Trays. It can operate as a standalone benchtop solution or be scaled by linking multiple units to enable high-density, multi-terabit validation. Designed for flexibility, the system also allows for quick connector changeovers across various interconnect types.

Backed by a powerful software suite, the ML8008FX-SIA supports simultaneous, multi-channel analysis, delivering Precise eye-diagram measurements, Impedance profiling, Insertion and return loss, Crosstalk analysis

Together, these capabilities make the ML8008FX-SIA a vital solution for efficient, high-volume copper validation in modern production environments.

Key Features

- High-resolution TDT Single-Ended and Differential measurements
- Modular & Scalable 8 Diff. Channels system per instrument
- Optimized for High Volume Manufacturing
- Extremely fast throughput
- Fast Changeover across connector types

Use Cases

- Passive High Density Backplane Cartridges, Cable Trays, and Cables assemblies, Near ASIC Fly-over assemblies
- DAC and ACC Cables
- Linear pluggable Optics (LPO)

Signal Integrity Analyzer Parameters

S-parameters

- Common Mode Conversion
- Return loss
- Insertion loss
- Crosstalk

Time Domain parameters

- Impedance Profile Measurement
- Eye Measurements
- Jitter
- Skew
- 7 ps Rise Time (on the edge of the instrument's connector)

Transmit Parameters

- Supports Gray coding.
- 21-tap linear FFE
- Multi-pattern capable
- 224Gbps, 112Gbps ... 25Gbps

Receive Parameters

- DFE Equalization & Reflection Canceler (RC)
- 15-FFE Taps monitor
- Independent PLL per lane
- Error-detection
- LOS indicators
- Up to 37 dB Equalization Capabilities

Function	Measurements
S - Parameter	SCD21
	Single Ended and Differential Insertion Loss (SDD21, S21)
	SDD11 & SDD22
	Crosstalk NEXT & FEXT
	ICN
	COM (v3.1)
	Insertion Loss Deviation (ILD)
Eye Diagram	Eye Height & Eye Width
	Rise time & Fall time
	Jitter
TDR	Impedance Profile
	Skew (intra and Inter pair skew)
BER	Real time BER
	Loss of RX lock (LOS)

Specifications

Parameters		Specifications
Time Domain Analyzer		
Signaling Mode		PAM-4 & NRZ
Intrinsic Jitter		230 fs RJ rms
Max Input Amplitude		600 mV SE and 1200 mV Diff
ADC Resolution		14 bits
Noise Floor		1.5 mVrms
Channel Bandwidth		3dB BW is at 52GHz 10dB BW is at 73GHz
Input Connector		2x 1x4 SMPX
TDR Pulse Rise Time		7 ps
Input Channel Coupling		AC Coupled
Pattern Capture		Up to PRBS-16
Memory Depth		34 M Samples/Channel
Input Impedance		50 Ω Single Ended, 100 Ω Differential
High Speed Pattern		
Bit Rates		NRZ: 24 to 28Gbit/s; 50Gbit/s to 56Gbit/s and 100Gbit/s to 120Gbit/s PAM4: 24 to 28Gbaud; 50Gbaud to 56Gbaud and 100Gbaud to 120Gbaud
Patterns		PRBS 9/11/13/15/16/23/31/13Q, SSFQ, User Defined
Differential TX Amplitude		0-800 mVpp
TX Amplitude Adjustment		Steps of 1 mV
Equalizing Filter Resolution		1000 steps
Equalizing Filter Spacing		1 UI
Random Jitter RMS ¹		<300fs
Coding		Gray coding supported
Error Detector Input Range (RX)		50 – 800 mV Differential
Connector		1x16 SMPS
Diff Input Return Loss		Better than 10 dB
Input Impedance		50 Ω
Clock Characteristics		
Input Clock Range		100 MHz to 4.4GHz
Clock Output	Reference Clock	156.25 MHz
	Monitor Clock	A divider by 16, 32, 64 and 128
Input Clock Amplitude		800 – 1600 mV Single Ended
Environmental		
Specification Valid at Room Temperature Range		18 to 30 C
Operating Temperature Range		0 to 45 C
Storage Temperature Range		0 to 70C
Power Requirements		12V DC, 9.5A

Measurements Based on Setup Connections

A **differential pair** is a **pair of electrical conductors** (wires or PCB traces) that carry equal and opposite signals. This technique improves noise immunity and signal integrity, which is critical in high-speed communication. A **lane** refers to a **full duplex communication path**, consisting of one differential pair for transmitting (TX) and one for receiving (RX).

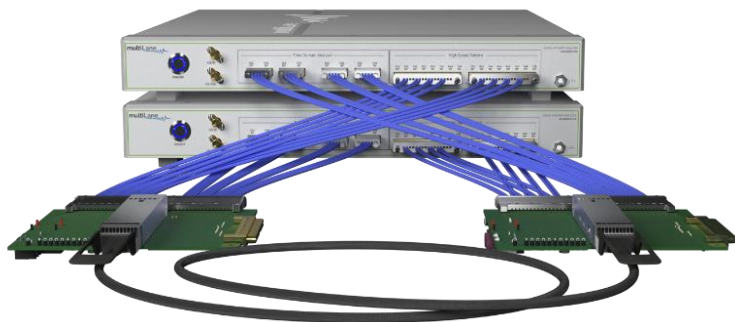


Figure 1: 2x ML8008FX-SIA for differential testing of a 16 pairs DUT

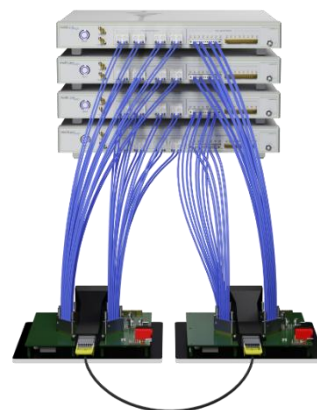


Figure 2: 4x ML8008FX-SIA for Differential and Single ended testing of 16 pairs DUT

Number Of Units Needed to Test				
	8 Differential Pairs DUT	16 Differential Pairs DUT	32 Differential Pairs DUT	64 Differential Pairs DUT
Differential Mode Connections Setup	1	2	4	8
Single Ended Connections Setup	2	4	8	16

In differential mode, high-speed signals are transmitted using two wires that carry equal and opposite signals. These two wires (a differential pair) are treated as one signal path.

- One pair of wires connects the generator's differential output to the DUT's differential input.
- Another pair connects the DUT's differential output to the analyzer's differential input.
- Each differential path requires two wires and uses one differential channel on the analyzer.
- This setup keeps the signal balanced and helps reduce noise and interference.

In single-ended (SE) mode, each wire in the differential pair is treated as a separate signal.

- One wire from the DUT output is connected to the analyzer's positive input, and the other wire to a second channel's negative input.
- The unused (complementary) ports of both analyzer channels are terminated with 50 ohms.
- This allows each side of the signal to be measured individually.
- Because each wire needs its own channel, SE testing requires twice as many analyzer channels as differential testing for the same number of signal paths.

Measurements	Differential Mode Connections	Single Ended Connections
Differential Insertion Loss	SDD21	SDD21
Differential Return Loss	SDD22	SDD22
Differential Impedance	yes	yes
Diff to common IL	no	SCD21
Diff to common RL	no	no
ILD	yes	yes
Common Mode Impedance	no	no
Common Mode RL	no	no

Ordering Information

Option	Description
ML8008FX-SIA	224G Signal Integrity Analyzer
3YW	Total 3-year warranty
CAL	Single factory calibration
3YWC	Total 3-year warranty with 3 annual factory calibrations

Recommended Accessories

Part Number	Description
MLCC-SMPXBFC18-F06330C-4SMPXBFC14TRP01-ML00	Coaxial Cable assembly, 1x8 SMPX Blind-Mate (F) to Four 1x4 SMPX (F) TRP Single ended, Flexible 063, Customized length
MLCC-SMPXBFC14TRP01-F06330C1-185MSTLPB-ML00	Coaxial Cable assembly, 1x4 SMPX (F) TRP Single ended to 1.85mm LP type B (M), Flexible 063, Customized length 1
MLCC-SMPXBFC14TRP01-F06330C2-185MSTLPB-ML00	Coaxial Cable assembly, 1x4 SMPX (F) TRP Single ended to 1.85mm LP type B (M), Flexible 063, Customized length 1
MLCC-SMPXBFC14TRP00-F063075-185MSTLPB	Coaxial Cable assembly, 1x4 SMPX (F) TRP to 1.85mm LP type B (M), Flexible 063, 30cm
MLCC-SMPXBFC116-F063075-185MSTLPB	Coaxial Cable assembly, 1x16 SMPX (F) to 1.85mm LP type B (M), Flexible 063, 30cm
ML4064-MCB-224-NPI	1.6T OSFP MCB, SMPS cables are not included

Please contact us at sales@multilaneinc.com.

This equipment contains ESD sensitive components and may become damaged when contacted with an electrostatic charge. To prevent equipment damage, please use proper grounding techniques.

