multiLane

DATASHEET

Innovation for the next generation

ML4039-JIT

4 Lane 8.5-15 & 21-30 Gbps/lane 100G Bit Error Rate Tester

Stress Signal Generation RJ/BUJ/PM-SJ/FM-SJ/RI | Vertical & Horizontal Eye Closure | Bathtub Curve Measurement | Eye Contour Measurement | Receiver Sensitivity | JTOL CAUI-4 Compliance Testing |

Summary

With the accelerated growth of hyperscale datacenters, the performance demands on Ethernet network infrastructure is increasing exponentially, and customer expectations for high-speed data throughput is at an all-time high. As a result, Bit Error Rate Testers (BERT) have become a cornerstone for physical layer testing, from qualifying bit transmission for fiber optic and copper-wire digital data transmission lines to testing signal integrity.

A BERT generates a sequence of bits through a communication channel and the received bits are then compared against the transmitted bits. A Bit Error Ratio (BER) evaluates the full end-to-end performance of a connectivity system and assures communication reliability.

The ML4039-JIT is a 4x30 Gbps BERT that supports NRZ signal generation required for 100 Gb measurements. It is ideally suited for the production testing of systems, components, and Electro-Optical Modules. It supports the required test patterns defined by IEEE and OIF. Other features include signal-to-noise ratio (SNR) and histogram measurements, as well as transmitter and receiver equalizers.

ML4039-JIT

100G BERT

Introduction

The ML4039-JIT series is a state of the art 4 Lane Pulse Pattern Generator and Error Detector with Jitter Generator & Equalizer up to 30 Gbps. It is fully featured for lab and production testing of systems, components, and Electro-Optical Modules. It has low intrinsic jitter – typically 330 fs – and features built-in jitter and interference modulators specifically designed to enable easy CAUI4 compliance testing. It is available in both benchtop and cPCI form factors.

Key Features

Transmit

- 8.5-15 and 21-30 Gbps data rate
- Low intrinsic jitter
- RJ (UUGJ)
- BUJ (UBHPJ)
- PM SJ 0.1 – 400 MHz, 100 ps max
- FM SJ 0.1 – 400 MHz, 6 UI max
- RI Gaussian noise differentially
- Automated J2/J9 measurement
- Eye contour measurement
- Bathtub measurement
- Intuitive comprehensive GUI
- Window and Linux API functions
- Repeatable traceable measurement

Receive

- BER measurement
- Receiver mask tolerance
- Automated JTOL

General

- Windows and Linux APIs
- LabVIEW, Python, C# examples
- Multiple modules can be controlled via Fast Ethernet 100 BASE-TX

Target Applications

- Interconnect testing CFP2, CFP4, QSFP28
- Backplane testing
- Interference and crosstalk testing
- Receiver sensitivity testing
- Receiver jitter tolerance testing
- Electro-Optical module testing
- Electrical stressed eye testing for 100 Gbps Ethernet, MLD/CAUI application, OIF CEI-28G-VSR, CPPI-4, CAUI-4, 32G Fiber Channel chip to module

ML BERT GUI

- Tests 4-channel BER test at the same time
- Supports BER curve
- Provides multiple and single layouts of bathtub and eye contour

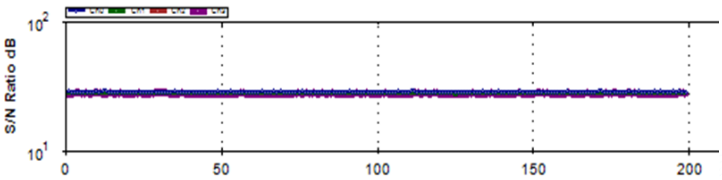

Figure 1: S/N Ratio over 200 captures

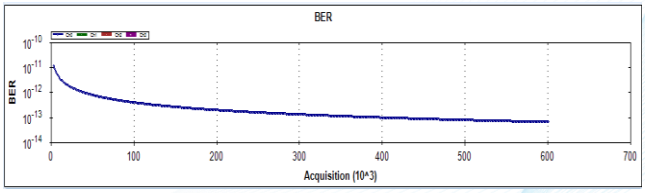

Figure 2: BER curve for one channel with 1 error inserted at the MSB and LSB respectively

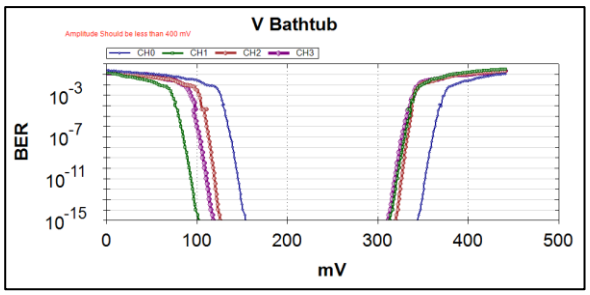

Figure 3: Multiple layouts of bathtub for four channels

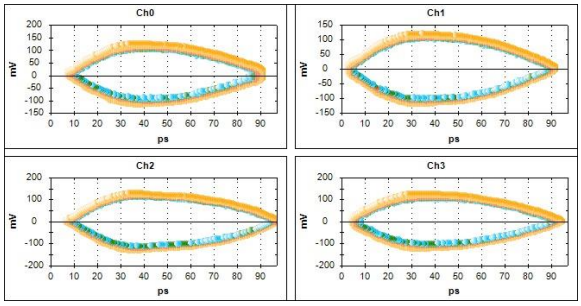

Figure 4: Multiple layouts of eye contour for four channels

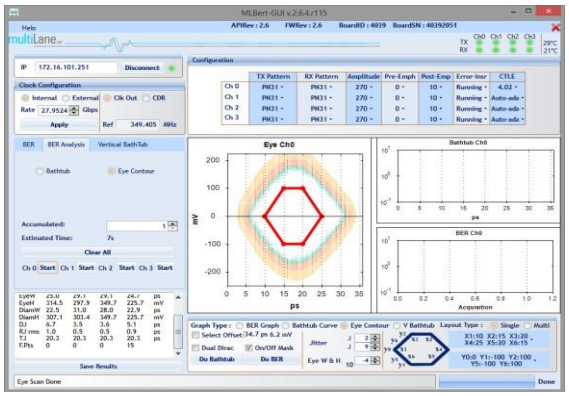

Figure 5: Single layout of Contour for one channel

Electrical Specifications

Parameter	Specifications
Bit Rate	NRZ: 8.5-15 Gbps / 21-30 Gbps
TX Amplitude Differential	100 – 2000 mVpp
Pattern	PRBS 7/9/15/23/31 User Defined Pattern 40 bits wide
TX Amplitude Adjustment	Steps of 1 mV
Pre-Emphasis	-
Pre-Emphasis Resolution	-
Intrinsic RJ	355 fs (typical)
PM-SJ injection amplitude	>90 ps (typical)
PM-SJ frequency range	0.1 – 400 MHz
FM-SJ maximum amplitude	500 ps (typical at 100 kHz)
FM-SJ maximum frequency	100 MHz
RJ range in ps rms	Up to 12 ps rms
BUJ range	>50 ps pk-pk (1.25 Gbps PRBS9 with 300 MHz LPF)
Rise/Fall Time (20–80%)	< 14 / <14 ps at 25 Gbps
Output Return Loss up to 10 GHz	-12 dB
Output Return Loss (16 – 25 GHz)	-8 dB
TX Skew Control Range	100 ps
Lane to Lane Skew Resolution	0.5 ps
Error Detector Maximum Input	1200 mV pk-pk differential
Error Detector Input Sensitivity	30 mV pk-pk at 10.3125 Gbps / 60 mV pk-pk at 25 Gbps
Eye Histogram Resolution	7 bits horizontal / 8 bits vertical
Input CTLE Dynamic Range	10 dB
Reference Clock Output	Bitrate / 8, 32 for 8.5 – 15 Gbps and bitrate / 8,80 for 21 – 30 Gbps
Reference Clock Output Amplitude	1100 mVpp
Reference Clock Input	R/32 for 8.5 – 15 Gbps and R/80 for 21 – 30 Gbps
Reference Clock Input Amplitude	300 – 1900 mVpp
TX/RX connectors	2.92 mm
Power Requirement	100 – 240 V, 0.4 A
Temperature Range	-
Weight	-
Dimensions LxWxH (cm)	30 x 22 x 9

Mechanical Dimensions

The ML4039-JIT is a benchtop instrument that fits in a 19-inch 2U rack. Two ML4039-JITs arranged side by side take up one 2U slot in your rack. MultiLane also supplies the needed brackets.

Ordering Information

Option	Description
ML4039-JIT	4 Channels 30 Gbps BERT (Benchtop or cPCI form factor)
3YW	Total 3-year warranty
CAL	Single calibration
3YWC	Total 3-year warranty + 3 annual calibrations

Recommended Accessories

Instruments	Recommended *Phase matched cable pairs*	Alternative *Phase matched cable sets*	Comments
ML4039-JIT	8x MLCBPM-2.92-30	2x MLCBPM-2.92-30-8	2.92 mm connector 2x8 channel 30 cm
ML4039-JIT	8x MLCBPM-2.92-60	2x MLCBPM-2.92-60-8	2.92 mm connector 2x8 channel 60 cm

Please contact us at sales@multilaneinc.com.