Innovation for the next generation

# ML4070-QSFP

4-Lane | 8.5-15 & 21-30 Gbps/lane| QSFP28 Transceiver Test Set |

VSR Trace length Margining | Power Supply Margining | PS Noise Margining | Bit Rate Margining | Bathtub Curve Measurement | Eye Contour Measurement | Receiver Sensitivity |

## Summary

MultiLane's ML4070-QSFP is a transceiver margin test fixture for QSFP+/QSFP28 transceiver testing. This set has numerous features yet is designed specially for the speedy production testing of Go/No Go applications.

# ML4070-QSFP

## QSFP28 Transceiver Test Set

### Introduction

The ML4070-QSFP is a state-of-the-art transceiver test set specifically designed for quick production testing of Go/No Go applications. It features Pulse Pattern Generators and Error Detectors as well as QSFP host control circuitry with power supply noise injection capability. The ML4070 displays 3 QSFP ports for 0 dB and 9 dB trace loss as well as for loopback. A full set of APIs and a production GUI enable quick one-button measurements and automatic report generation.
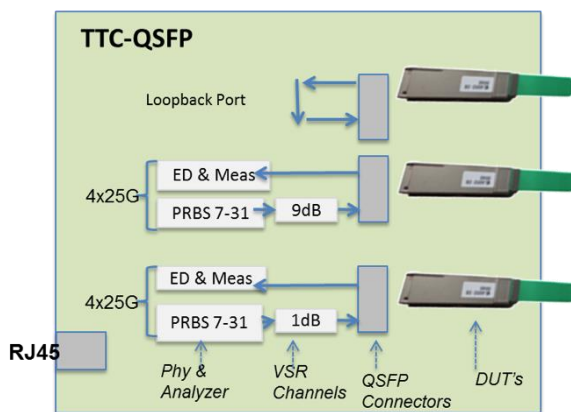


### Key Features

- High Operation 0 to 70°C
- DUT Voltage Margining 3.1 to 3.6V
- DUT Power Supply Noise Margin
- DUT Current Draw Measurement
- DUT State Machine Interface and MSA configuration
- BER graphs as a function of (PS voltage, PS noise, Bit Rate ±100ppm
- MSA Compatible QSFP MCB
- Eye Contour measurements
- Pre-emphasis tolerance Testing

- GUI and API control
- Sample aperture jitter below 60 fs

### S21 & S11 Characteristics of the 9dB Port
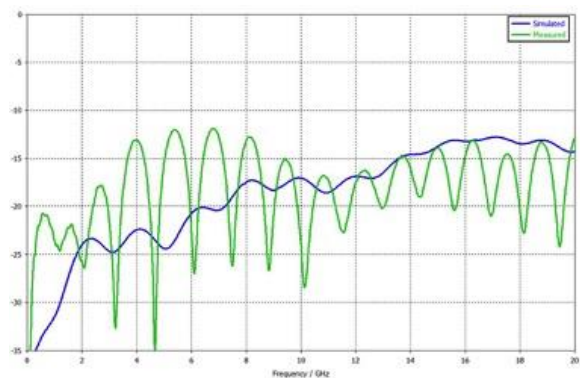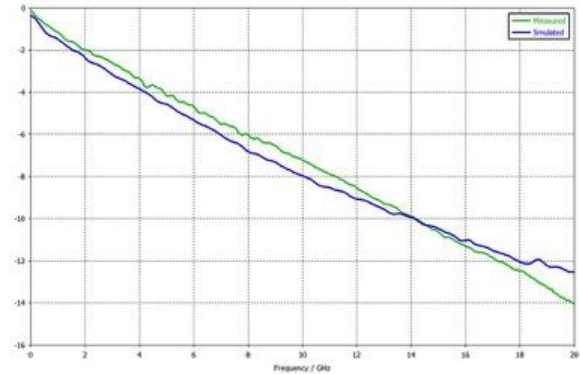




### ML4070 BERT GUI

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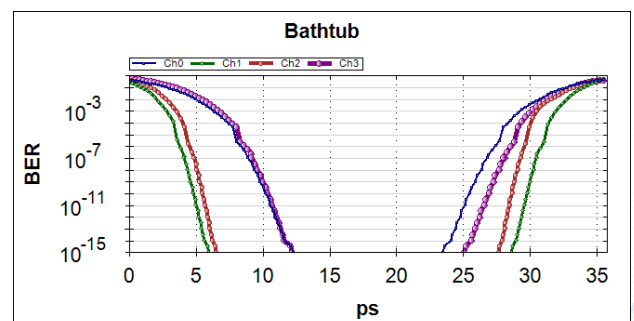- Provides multiple and single layouts of bathtub and eye contour
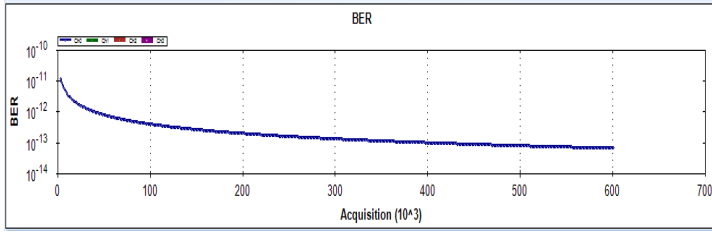


Figure 1: Bathtub curve

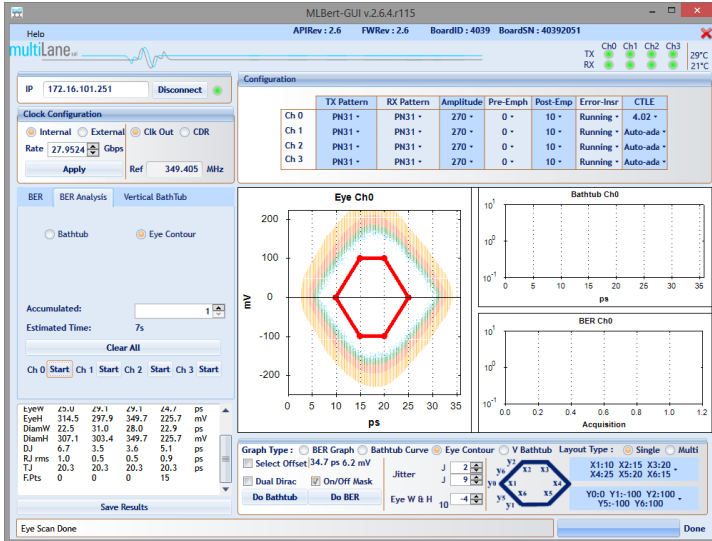**Figure 2: BER curve for one channel with 1 error inserted at the MSB and LSB respectively**
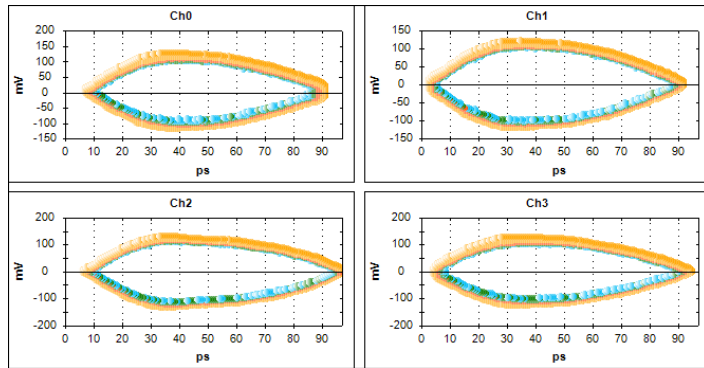


**Figure 3: Single layout of Contour for one channel**



**Figure 4: Multiple layouts of eye contour for four channels**

## Electrical Specifications

| Parameter | ML4070 |
| --- | --- |
| Bit Rate | 8.5-15 &21-30Gbps |
| Pattern | PRBS 7, 9, 15, 23, 31, and User Defined Pattern 16 bits@10G & 40 bits@25G |
| TX Amplitude Differential | 200-800mV |
| TX Amplitude Adjustment | 200 mV/step |
| Pre-Emphasis | 6dB |
| Pre-Emphasis Resolution | 20 steps |
| Equalizing Filter Spacing | - |
| Total Jitter pk-pk @10G | 10 ps (typical) |
| Total Jitter pk-pk @25G | 12 ps (typical) |
| Rise/Fall Time (20–80%) @25G | 17 ps |
| Sinusoidal Phase Modulation | - |
| Sinusoidal Jitter Frequency | - |
| Random Jitter in Phase Modulation | - |
| Output Return Loss up to 10GHz | < -15 dB |
| Output Return Loss (16-25GHz) | < -8dB |
| TX Skew Control Range | - |
| Lane to Lane Skew Resolution | - |
| Error Detector Input Amplitude | 110-1050 mVpp @11G, 1200 mVpp @25G |
| Error Detector Maximum Input | 1200mV Diff |
| Error Detector Input Sensitivity | 30 mVpp @ 10.3125G / 50 mVpp @ 28G |
| Phase Scan Resolution | 7 bits |
| Vertical Scan Resolution | 8 bits |
| Input CTLE Dynamic Range | 10dB |
| Reference Clock Output | Rate/32 for 8.5-15G and Rate/80 for 21-30G |
| Reference Clock Output Amplitude | 550-850 mVpp |
| Reference Clock Input | Rate/32 for 8.5-15G and Rate/80 for 21-30G |
| Reference Clock Input Amplitude | 300-1900 mVpp |
| Clock Data Recovery | Rate/N (user selectable from 8 and 16) |
| Power Requirement | 12 V dc, 40 W max |

## Mechanical Dimensions

The ML4070-QSFP is a benchtop instrument that fits in a 19-inch 2U rack. Two ML4070-QSFPs arranged side by side take up one 2U slot in your rack. MultiLane also supplies the needed brackets.

## Ordering Information

| Option | Description |
| --- | --- |
| ML4070-QSFP | QSFP28 Compliance Tester |

Please contact us at sales@multilaneinc.com.