

## Marketing Datasheet

# ML4039-PAM-ATE



**4-Lane 21-30 Gbaud**

**Bit Error Ratio Tester 200G**

Compatible with Verigy 93K and  
Teradyne ATE Testers

Full-fledged BERT with SMPM connectors

4 x 30G NRZ or 4 x 56G PAM4 Channels

FEC supported in PAM mode KR4 and  
scaled KP4

Vertical & Horizontal Eye Closure Scan

SNR and Histogram in PAM

Eye Contour Measurement in NRZ

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4x30G or 4x56G BERT

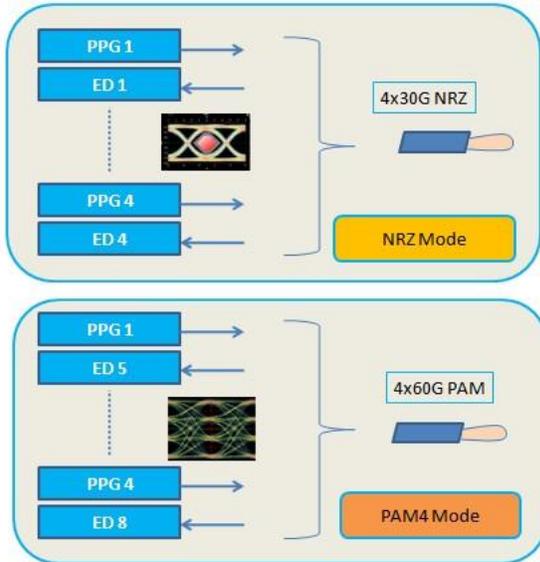


Figure 1: Two Operation Modes: NRZ or PAM4

## Summary

The ML4039-PAM-ATE is a full-feature 200G BERT that fits in the well of a Teradyne or an Avago 93000 tester. It can be configured as a four-channel PAM4 56 Gbps or 4-channel NRZ 30 Gbps lane. The ML4039-PAM-ATE has two sets of four-lane receivers, one for NRZ and one for PAM4.

The PAM receivers support FEC decoding (802.3bj KR4/scaled KP4) and BER, as well as Histogram and SNR.

The NRZ receivers support eye scan and bathtub measurements in addition to BER. The transmit power is adequate for testing up to 10km SMF links.

## Key Features

- Low cost instrument-grade BERT optimized for high speed data analysis
- Data Rates in NRZ mode 18.6 – 30 Gbps

- Ability to tune the bit rate in steps of 100 kbps and find the RX PLL locking margin
- Data Rates in PAM4 mode 42 - 60 Gbps
- Low intrinsic Jitter < 220 fs rms
- Low power consumption < 22 W
- Automated J2/J9 measurements
- API libraries compatible with Verigy93k platform
- LabView driver and Python wrapper available
- Eye Contour measurements
- Bathtub measurements
- 6 dB pre-emphasis

## Target Applications

- Production testing of transceivers
- Testing for functional and SI functionality

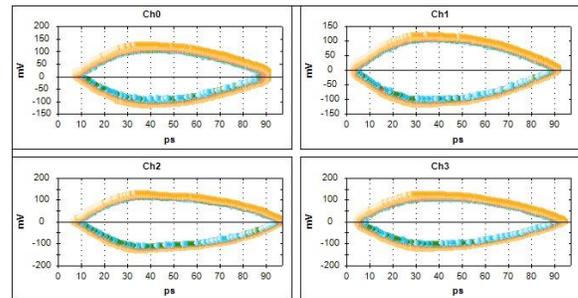


Figure 2 Eye contour measurement - 4 Channels

## ML BERT GUI

The GUI has 2 analysis modes: PAM4 and NRZ. NRZ mode features multiple and single layouts of bathtub and eye contour measurements along with jitter, eye width and eye height calculation by BER.

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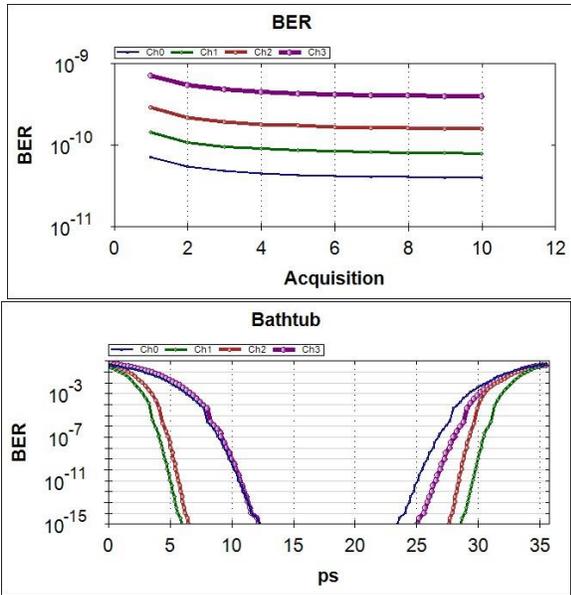


Figure 4 Bathtub curves

The PAM mode measures the vertical histogram and the SNR of PAM signals in addition to the BER.

Figure 3 Quad channel BER

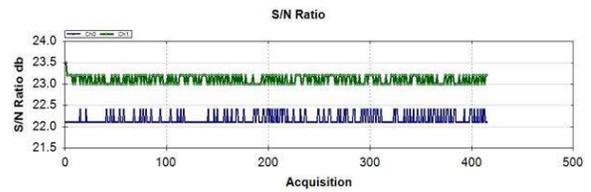


Figure 5 SNR measurement of 2 PAM4 signals

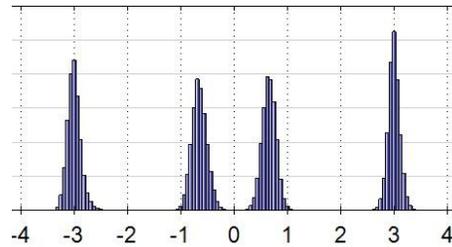


Figure 6 Vertical Histogram of the PAM signal

Electrical Specifications		
NRZ Mode PPG	Bit Rates	18.6-30 Gbps
	TX Amplitude Differential	250-800mV
	Patterns	PRBS7/9/15/23/31 or User Pattern 40 bits
	TX Amplitude Adjustment	Steps of 1 mV single-ended
	Pre-Emphasis	6dB
	Pre-Emphasis Resolution	10 steps
	Equalizing Filter Spacing	1UI
	Random Jitter RMS	220fS
	Rise/ Fall Time (20–80%)	12pS
	Output Return Loss up to 10GHz	< -15 dB
	Output Return Loss (16-25GHz)	< -10 dB
NRZ Mode ED	Error Detector Phase Margin	5 pS
	Error Detector Maximum Input	1200mV Diff

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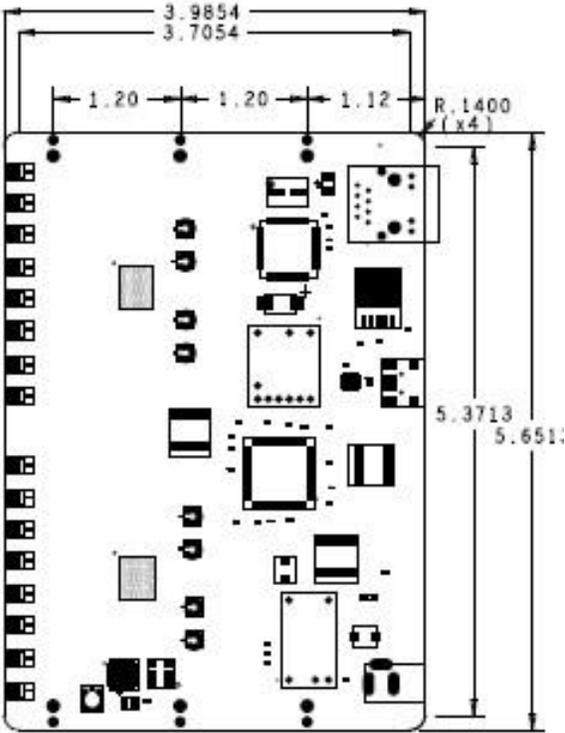
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	Input CTLE Dynamic Range	10dB
	TX/RX connectors	SMPM Connectors
	Reference clock Output	Divided clock, rate-dependent
<b>PAM4 Mode PPG</b>	Bit Rates	42-60Gbps
	TX Amplitude Differential	250-1000mV
	Patterns	PRBS7/9/11/15/23/31/Square_16/Square_32
	TX Amplitude Adjustment	Steps of 1 mV
	Pre-Emphasis	6 dB
	Pre-Emphasis Resolution	10 steps
	Equalizing Filter Spacing	1UI
	Random Jitter RMS	220 fS
	Rise/ Fall Time (20–80%)	12 / 12 pS
	Coding	Pre-coding and Grey coding supported
	FEC encoding	Scaled KP4 at 3% overhead or KR4 at 0% overhead
	Output Return Loss up to 10GHz	< -15dB
	Output Return Loss (16-25GHz)	< -10dB
<b>PAM4 Mode ED</b>	Error Detector Phase Margin	5 pS
	Error Detector input range	250 mV– 500 mV diff.
	Input CTLE Dynamic Range	10dB
	TX/RX connectors	SMPM Connectors
	Reference clock Output	Rate / 64
	Input damage level (Single ended)	AC: 600 mVpp S-E
	Input Rise / Fall Time	12 / 12 ps
	Diff. Input Return Loss	Better than 10 dB
	Vertical Resolution	12 bits
	Clock Input Range (Normal Mode)	50 - 525 MHz
	Clock Input Range (Bypass Mode)	50 - 125 MHz
	Clock Input Amplitude	200 - 1000 mV
	Input Impedance	50 Ω
	Temperature range	0-70 C
Power Requirements	3.6A @ 12V	

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Mechanical Dimensions (inch)



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