Semight INSTRUMENTS

800G Bit Error Ratio Tester

PBT8812/PBT8812B

Datasheet V1.16

High performance 8×112 Gbps bit error ratio tester;

Applicable to the bit error analysis and Eye Diagram quality tests of 400G/800G optical transceivers;

Support PCS layer's FEC error correction analyzer;

Content

1 Overview

Semight PBT8812/PBT8812B is a high-performance Bit Error Ratio tester (BERT) which can be used for physical layer characterization and consistency test. It covers 400/800GbE and CEI-112G standards by virtue of support for 4-level pulse amplitude modulation (PAM4) and non-return-to-zero (NRZ) signals, as well as up to 58 Gbaud symbol rate.

Benefiting from its excellent signal quality (fast rise/fall time, low jitter), rich optional features (FEC analyzer, extendable data rates, etc), it ensures strong performance and flexibility for the pre-research, design, and production testing of high-speed serial circuit products.

The programmable pattern generator (PPG) can provide 3-Tap/4-Tap/7-Tap FIR tuner to compensate the loss of the transmission signal. The bit error detector (ED) is equipped with built-in equalizer to ensure the signal integrity of the link. Moreover, the built-in clock recovery circuit ensures the stability and the accuracy of the bit error testing in the harsh and complex test environment.

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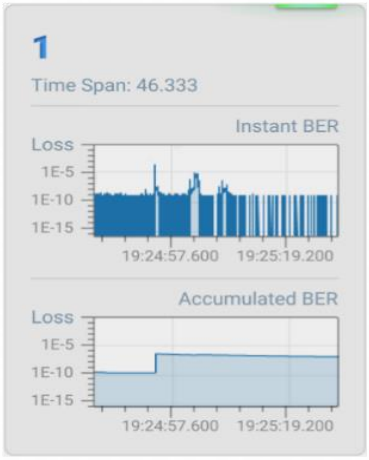
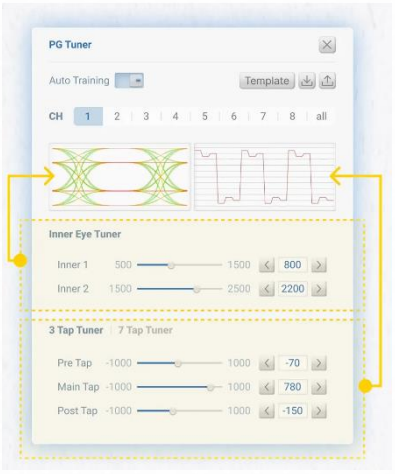
2 Key Features and Advantages

Key Features

- Data Rate: 24.33~59.37 Gbaud (PBT8812); 24.33~57.8 Gbaud (PBT8812B);
- SNR measurement at RX signal;
- Support ultra-fast and high-precision BER sampling (<10ms);
- Independent Control: Each channel can be independently configured with NRZ/PAM4, amplitude and equalization;
- Flexible Switching: Input and output polarities can be switched flexibly;
- Provides 3/4/7-tap FIR tuner, and Inner-Eye tuner with independent control on each PAM4 level;
- Rich Test Patterns: PRBS7~31Q; SSPRQ /JP03A /JP03B /LIN /Square Wave/Custom Defined Patterns, etc;
- Supports software-controlled MON Clock output port switching;



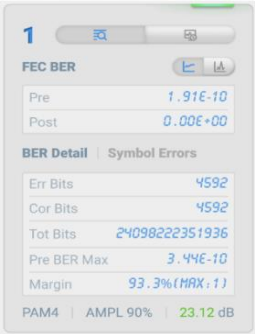
Ultra-fast BER sampling mode (<10ms)



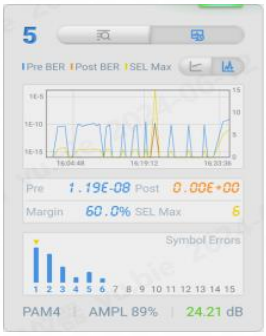
PG Tuner

Comprehensive Capabilities

- PCS layer of RS-FEC analyzer with Pre/Post BER statistic and Margin alarm;
- Support Histogram (PBT8812) & SNR measurement;



FEC Pre/Post BER



Symbol Error Statistic

Excellent Signal Quality

- Rapid rise and fall time; low intrinsic jitter;
- Good RX sensitivity as low as <100mV;

SSPRQ Pattern @53.125 Gbaud, differential eye diagram

Fully Match ATE Application Scenarios

- With powerful and flexible database management capabilities, it aids in the in-depth analysis of data for research and development purposes.
- Support multiple ATE hosts;
- Can be remotely controlled via either Lan or USB port by invoking external APIs (LabVIEW, C#).

3 Technical Specification

TX specification

Type	Item	PBT8812	PBT8812B
Pattern Generator	Output	Differential PAM4 / NRZ	
	Terminal	AC Coupling, 1.85 mm female connector	
	Impedance	100 Ω ± 10%	
	Test Patterns	PRBS7/9/11/13/15/16/23/31; PRBS7Q/9Q/11Q/13Q/15Q/16Q/23Q/31Q;	PRBS7/9/11/13/15/23/31; PRBS7Q/9Q/11Q/13Q/15Q/23Q/31Q;
		SSPRQ，JP03A，JP03B，LIN，Square Wave	
		Custom Defined Pattern (32 Symbols)	

Type	Item	PBT8812	PBT8812B
	Symbol Data Rate [1] (Gbaud)	24.33/24.8832/25/25.78125 /26.5625/27.89/27.95/28.05 /28.125/28.2/28.9/30/48.66 /49.7664/51.5625/53.125/56 /56.25/56.4/57.8/58/58.125 /59.37;	24.33/24.8832/25/25. 78125/26.5625/27.89/ 27.95/28.05/28.125/2 8.2/28.9/ 48.66/49.7664/50/50. 135/51.5625/53.125/5 6/56.25/56.4/57.8;
	Frequence Accuracy	*±50 ppm (typical)*	
	Output Amplitude [2] (Differential)	700 mVp-p	1000 mVp-p
	Rise Time [3] (20–80%)	<10 ps	
	Fall Time [3] (20–80%)	<10 ps	
	Random Jitter	<350 fs	
MON CLK	Clock Output Amplitude	>300 mVp-p	
	Terminal (Single-end)	AC Coupled，2.92 mm female connector	
	Div Ratio (Adjustable)	4/8/16/32	
	Trigger Output	Built-in RF Switch to switch clock output	

[1] Option EDR can be added to support more data rates.

[2] Net measurement value at the transmitter end with default fir setting.

[3] Tested with 53.125 Gbps NRZ signal.

RX specification

Type	Item	PBT8812	PBT8812B
Error Detector	Input	Differential PAM4 / NRZ	
	Terminal	AC Coupling, 1.85 mm female connector	
	Impedance	100 Ω ± 10%	
	Input Range (Differential) [1]	Max.700 mVp-p	Max.1000 mVp-p
	Sensitivity (Differential) [2]	100 mVp-p	80 mVp-p
	Test Patterns	PRBS7/9/11/13/15/16/23/31; PRBS7Q/9Q/11Q/13Q/15Q/16Q/23Q/31Q;	PRBS7/9/11/13/15/23/31; PRBS7Q/9Q/11Q/13Q/15Q/23Q/31Q;
	Symbol Data Rate (Gbaud) [3]	24.33/24.8832/25/25.78125/26.5625/27.89/27.95/28.05/28.125/28.2/28.9/30/48.66/49.7664/51.5625/53.125/56/56.25/56.4/57.8/58/58.125/59.37;	24.33/24.8832/25/25.78125/26.5625/27.89/27.95/28.05/28.125/28.2/28.9/48.66/49.7664/50/51.5625/53.125/56/56.25/56.4/57.8;
	Clock Mode	Built-in Clock Recovery	

[1] High voltage signal may damage the receiver.

[2] BER might reach to E-3 level or even LOS while input signal <sensitivity level.

[3] Option EDR can be added to support more data rates.

Advanced Features

Feature	Type	PBT8812	PBT8812B
FEC Analyzer	Analyzer Type	PCS layer RS-FEC, with scramble idle pattern	
	Combine Mode (KP4/KR4)	2x400G	8x100G / 4x200G / 2x400G 8x50G / 4x100G / 2x200G
	Frame Loss Ratio	Supported	

Feature	Type	PBT8812	PBT8812B
	Margin Alarm	Supported	
RX Histogram		Supported	Not Supported
RX SNR		Supported	
High-Res BER Sampling [1]		Supported	
LPO Testing Mode		Not Supported	Supported
Guard Mode [2]		Not Supported	Supported
Multiple ATEs Remote [3]		Not Supported	Supported

[1] Support ultra-fast and high-precision BER sampling (<10ms);

[2] The mode where GUI could run in parallel with host ATE;

[3] The mode where each serve lane can work independently with ATEs;

Environment Specification

Item	Description	
	PBT8812	PBT8812B
Environment	Indoor	
Operating	Temperature: 0℃ to +55℃, Humidity: 30% to 80% @non-condensing	
Storage	Temperature: -30℃ to 60℃, Humidity: 10% to 90%@non-condensing	
Power Supply	Voltage Range: 100-240 VAC, Frequency Range: 50/60 Hz, Maximum Power: 250W	
Warm-up	10-minutes of warm-up and automatic calibration, with the ambient temperature variation remaining within ±3℃	

Item	Description	
Dimensions (mm)	412x441x112	373x441x112
Net Weight	6.5 kg	7.8 kg

* Dimensions and weight may vary depending on the configuration of different options.

4 Ordering Information

Option Type	Option ID	Remarks
FEC	FEC	Integrated FEC analyzer, offering a graphical analysis interface as well as data management capabilities
Ext Data Rate	EDR	Extended protocol rates, refer to the specifications for details
Service (Choose one)	R3C	Extended warranty and service plan - 36 months
	R5C	Extended warranty and service plan - 60 months

5 Warranty Terms

Number	Item	Description	Period
1	Mainframe Warranty Period	Free of Charge during the warranty period (excluding static electricity or human damage)	12 months
2	Calibration Period	Return to the factory for calibration or bring the calibration system for on-site calibration	24 months

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