

# PBT8856

8 × 56G Bit Error Ratio Tester

Version 1.7





## Product Description

Semight Instruments PBT8856 is a high-performance bit error ratio tester (BERT) applied to high-speed serial signal error rate test, which can be used for physical layer characterization and consistency test. It covers all emerging 100/200/400GbE and CEI-56G standards by virtue of support for 4-level pulse amplitude modulation (PAM4) and non-return-to-zero (NRZ) signals, as well as up to 30 Gbaud symbol rate (equivalent to 60 Gbps). It provides strong performance and flexibility guarantee for pre-research, design and production test of high-speed serial circuit product based on its excellent signal quality (fast rise/fall time, low jitter), rich functions (supporting FEC simulation analysis), flexible feature options and ultra-high overall integration. Moreover, the programmable pattern generator (PPG) can provide 3-Tap/7-Tap pre-emphasis tuner to compensate the loss of the signal in the transmission process and improve the signal quality. The bit error detector (ED) is equipped with built-in equalizer to ensure the signal integrity of the link. Moreover, the built-in fast locked clock recovery module ensures the stability of the link during the bit error test and the accuracy of the bit error test in the harsh and complex test environment.

## Key Features

- High performance 8×56 Gbps bit error ratio tester, supporting up to 8 groups of service channels Fast rising edge, low jitter;
- Support FEC simulation test analysis;
- Built-in RF switch to achieve host remote-switching trigger clock port;
- Support high power mode of PPG port output;
- Each channel can be independently configured as NRZ or PAM4;
- Support CTLE equalization on receiving end;
- Simple 3-Tap emphasis tuner with pre/main/post tap adjust and 7-tap emphasis tuner for



more detailed equalization;

- Support random/burst bit error injection and input/output polarity switching;
- Clock out supports frequency division (4-128 frequency division);
- Powerful and flexible database management function, giving assistance to research and development of in-depth analysis of data;
- The product can be flexibly programmed by calling external API (LabVIEW, C #) through Ethernet port or USB control interface;
- Supported test patterns:
  - PRBS 7/9/11/13/15/16/23/31;
  - PRBS 7~31Q;
  - SSPRQ test patter;
  - Square Wave, JP03A, JP03B, CJT, LIN;
  - User-defined test pattern (64 bits length);



## Software function

Semight Instruments PBT8856 has very intuitive and simple interface GUI in which the system can be easily configured and all channel results can be displayed. It provides FEC simulator with pre/post BER analysis and the built-in SNR indicator.

The image displays two screenshots of the Semight Instruments PBT8856 GUI. The top screenshot shows the channel configuration interface for four channels (CH1-CH4). Key features include:

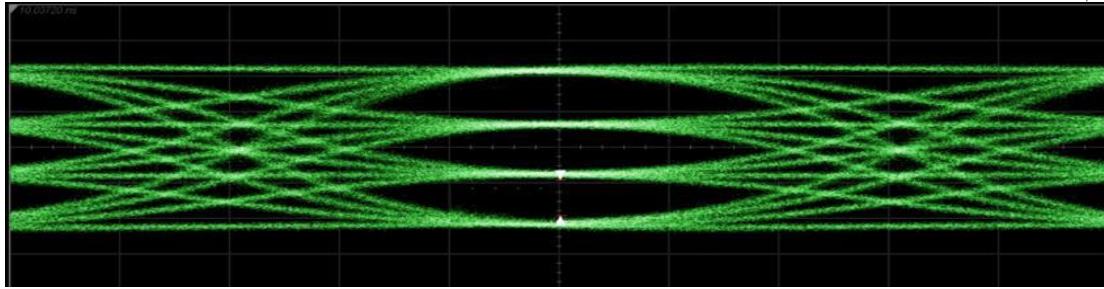
- Channel Configuration:** Each channel (CH1-CH4) has settings for PPG Pattern (PRBS16Q), ED Gating Times (10000000s), and PPG Amplitude (90 mVpp).
- Modular Type:** A dropdown menu is set to 'QSF28', with 'QSF28' and 'SFP28' options visible.
- Error Metrics:** Error Count LSB, Error Ratio LSB, Error Count MSB, and Error Ratio MSB are displayed for each channel.
- Control Elements:** Buttons for 'PPG OFF', 'STOP ED', 'CLEAR', and 'LOCK' are present. A 'High Power PG' indicator is also visible.
- Alerts:** Alerts for 'Alarm: Los of Signal' (red lock) and 'Warning: Un-Locked Signal' (yellow lock) are shown.
- Other Indicators:** 'SNR Bar' and 'Polarity Indicator' are also present.

The bottom screenshot shows the 'FEC Plot' analysis interface. Key features include:

- Plot Mode:** 'FEC Plot' is selected.
- Graph:** A line graph showing 'CodedWord Count' (log scale, 1.0e+00 to 1.0e+04) versus 'Symbol Error' (linear scale, 0 to 30).
- Table:** A table below the graph shows 'Ch/Symbol' data for 8 channels across 16 symbols.
- Control Elements:** 'LOG On/Off', 'History Data', 'Record Timer', 'Margin Alarm' (Threshold: 15), and 'Clear screen' buttons are visible.
- Margin Alarm Table:**

LN	PreBER	PostBER
1	....	....
2	3.18E-009	1.15E-009
3	....	....
4	....	....
5	....	....
6	....	....
7	....	....
8	....	....

## Technical Specifications



\*SSPRQ Pattern @26.5625 Gbaud, differential eye diagram @ Keysight DCA 1092C

<b>Pattern Generator Indicators</b>	Output type	PAM4/NRZ
	Termination	Differential 100Ω, Single-ended 50Ω; AC-coupled
	Data patterns	PRBS7/9/11/13/15/16/23/31, PRBS7~31Q
		SSPRQ, JP03A/03B, LIN, CJT, Square Wave
		User Defined Pattern (64bits length)
	Data symbol rate (Gbaud)	20.625/24.33/25/25.78125/26.5625/27.89/27.95/28.05/ 28.125/28.2/28.9/30;
	Frequency accuracy (Typ.)	±50 ppm
	Maximum output amplitude (differential)	>800 mVp-p <sup>①</sup>
		>1200 mVp-p <sup>②</sup>
	Rise time (20–80%) <sup>③</sup>	<15 ps
	Fall time (20–80%) <sup>③</sup>	<15 ps
	Random jitter <sup>④</sup>	<350 fs
	Connector	2.92 mm female, 50 Ω

① Net value of measurement on TX output, with default pre-emphasis/de-emphasis



- ② 30cm RF test cable, output measured value in "high power output" mode
- ③ Measured with 26.5625 Gbps NRZ signal
- ④ Measured after jitter separation

<b>Trigger Output Indicators</b>	Output amplitude	>300 mVp-p
	Output type	AC-coupled, Single ended
	Frequency division ratio (settable)	4/8/16/32/64/128
	Connector	2.92 mm female, 50 Ω
	Trigger output	Support RF Switch for A/B 4-Channels
	<b>Error Detector Indicators</b>	Input type
Termination type		Differential 100Ω, Single ended 50Ω; AC-coupled
Receiving amplitude (differential) <sup>①</sup>		100 ~ 1200 mVp-p
Receiving sensitivity (differential) <sup>②</sup>		100 mVp-p
Data patterns PRBS		PRBS 7/9/11/13/15/16/23/31, PRBS7~31Q;
Data symbol rate (Gbaud)		20.625/24.33/25/25.78125/26.5625/27.89/27.95/28.05/ 28.125/28.2/28.9/30;
SNR indicator		Support
Clock mode		Built-in clock recovery
Synchronization type		Auto Synchronization (level/phase)
Connector		2.92 mm female, 50 Ω



- ① Net value measurement on RX port
- ② BER might reach to E-3 level or even LOS while input signal <100 mVp-p



<b>General</b>  <b>Indicators</b>	Environment	Indoor
	Work	0°C ~ +55°C, 30% ~ 80% Relative Humidity with no condensation
	Storage	-30°C~70°C, 10%~90% Relative Humidity with no condensation
	Altitude	Operation: 0m to 2000m, Storage: 0m to 4600m
	Power	LINE: 100-240 VAC, 50/60 Hz, 50 W
	Warm-up time	10 minutes
	Dimensions (mm)	412*441*112 ( with foot pad/handle )
	Weight	Net weight 6.5 kg

## Ordering Information

PBT8856	8×56G PAM4/NRZ Bit Error Ratio Tester
Standard Accessories	USB control cable, Power cord, Software Package in U-Disk
Options	
-RFSW	Built-in RF switch which allows host remote-switching trigger clock port
-HPO	Built-in high power output mode>1,200 mVp-p pattern generator output
-FEC	FEC simulation analysis (KP4/KR4 protocol)
-EDR	Extendable Data Rate for more applications







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\*This information is subject to change without notice.