Semight INSTRUMENTS

800G Quad-Channel Optical Transceiver Tester

MTP8104

Datasheet V1.2

Integrated optical transceiver Bit Error Rate Tester (BERT) with field replaceable/MSA-compliant MCB, and temperature control unit based on TEC.

Applicable to the bit error analysis and Eye Diagram quality tests of 400G/800G optical transceiver under room, high and low temperature conditions.

Tailored to various industry standard pluggable transceiver packages, such as QSFP-DD, OSFP, QSFP112, etc.

Content

1 Product Description

Semight MTP8104 is a comprehensive Bit Error Rate Analysis system which integrates multi-channel Bit Error Rate Tester, multi-port MCBs to host optical transceiver, and multi-channel independent temperature control units, making it ideal for mass-produced testing of high-speed 400G/800G optical transceiver across various ambient thermal cycle settings.

Utilizing the replaceable and MSA-compliant MCB, the MTP8104 can quickly and flexibly test pluggable transceivers without the need for additional high-speed RF cables. By simply changing the replaceable MCB and accessories, the MTP8104 is tailored to various industry standard pluggable transceiver packages, such as QSFP-DD, OSFP, QSFP112, etc.

The MTP8104 offers comprehensive coverage for various testing functions, including optical module BER test, FEC analyzer, transmitter calibration, DMI information monitor, voltage/current measurement, and Vcc-bias tuner.

The integrated MCB is equipped with a appropriable TEC temperature-cycling crimping box kit. The cycling temperature range is -10 ~ +85 ℃ under no-load conditions, and -5 ~ +85 ℃ with loaded module DMI. The high-efficiency

temperature cycling test can be achieved benefiting from a water chiller with high cooling capacity.

Benefiting from its excellent signal quality (fast rise/fall time, low jitter), rich optional features (FEC analyzer, extendable data rates, etc), and high overall integration, the MTP8104 ensures strong performance and flexibility for the pre-research, design, and production testing of high-speed serial circuit products.

2 Key Features and Advantages

Flexible application

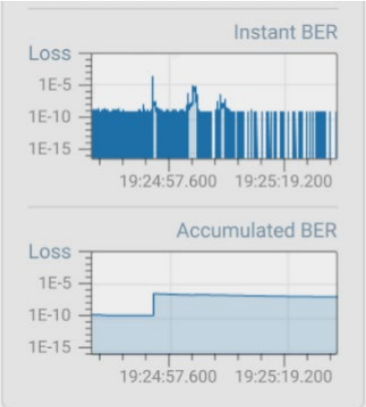
- Wide Data Rate Range: 24.33~56.4GBaud;
- Independent Control: Each channel can be independently configured with NRZ/PAM4, amplitude and equalization;
- Flexible Switching: Input and output polarities can be switched flexibly;
- Excellent Signal Quality: Rapid rise and fall time, low intrinsic jitter;
- Strong Output: Supports high-swing Output Amplitude, along with 3/7-tap pre-emphasis, Inner-Eye, and other transmission modulation;
- Rich Test Patterns: PRBS7~31Q; SSPRQ/ JP03A/ JP03B/ LIN/ Square Wave/ Custom Defined Patterns, etc;

- Versatile Trigger: Trigger output supports frequency divisions; supports software-controlled clock output switching;
- Parallel Testing: Support parallel BER/FEC/TEC control on each DUT channel by multiple ATEs;

800G Test Solution		
Model	DUT Type	DUT Amount
MTP8104	400G/800G OSFP	4
	400G/800G QSFP-DD	4

Comprehensive Capabilities

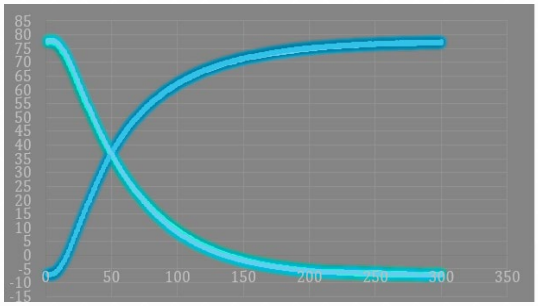
- Support PCS hardware layer's FEC error correction analyzer;
- Support signal-to-noise ratio measurement;
- Support ultra-fast and high-precision BER sampling (<10ms);
- Support multiple MSA optical module with either Built-in or external IIC dongle for CMIS test;



Ultra-fast BER sampling mode (<10ms)

Cost-effective

- Rich Accessories: Low maintenance costs like easy-replaceable MCBs;
- Flexible Configuration: Convenient configuration & replacement of accessories, which significantly reduces the overall testing cost;
- High integration: Low cost and high efficient three-temperature cycling solution with TEC;



Typical temperature cycling (-5~75, <2min)

Easy & flexible replaceable accessories

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.
- Can be remotely controlled via either Lan or USB port by invoking external APIs (LabVIEW, C#).

3 Technical Specification

TX specification

Type	Item	Description
Pattern Generator Specification	Output	Differential PAM4/NRZ
	DUT Amount	4
	Terminal	AC Coupling
	Output Impedance	100 Ω ± 10%
	Pattern	PRBS 7/9/11/13/15/23/31, PRBS7~31Q; SSPRQ, JP03A, JP03B, LIN, Square Wave, Custom Defined Pattern, etc.;
	Symbol Data Rate [1] (GBaud)	24.33/24.8832/25/25.78125/26.5625/27.89/27.95/28.05/28.125/28.2/48.66/49.7664/51.5625/53.125/56/56.25/56.4
	Frequence Accuracy	±50 ppm (typical)
	Output Amplitude (Differential)	750 mVp-p (typical) [2]
	Rise Time [3] (20–80%)	<10 ps (typical)
	Fall Time [3] (20–80%)	<10 ps (typical)
	Random Jitter [4]	<350 fs (typical)
Trigger and Clock Specification	Clock Output Amplitude	>300 mVp-p
	Output Type	AC Coupled, Single-Ended

Type	Item	Description
	Div Ratio (Adjustable)	4/8/16/32
	Trigger Output	Each slots individual trigger output

[1] Option can be added to support expansion the rates <48G.

[2] Net measurement value at the transmitter's end, default pre-emphasis/de-emphasis parameters.

[3] Tested with 53.125 Gbps NRZ signal.

[4] Tested with/after Jitter separation.

RX specification

Type	Item	Description
Error Detector Specification	Input	Differential PAM4 /NRZ
	Terminal	AC Coupled
	Input Impedance	100 Ω ±10%
	Input Range (Differential) [1]	150 ~ 750 mVp-p (typical)
	RSSI (Differential) [1]	150 mVp-p (typical)
	Pattern	PRBS 7/9/11/13/15/23/31, PRBS7~31Q, SSPRQ
	Symbol Rate (GBaud) [2]	24.33/24.8832/25/25.78125/26.5625/27.89/27.95/28.05/28.125/28.2/48.66/49.7664/51.5625/53.125/56/56.25/56.4
	Clock Mode	Built-in Clock Recovery
	Sync	Auto Sync (Level/Phase)

[1] Take care of output amplitude from DUT as the high voltage signal may damage the receiver.

[2] Option can be added to support expansion the rates <48G.

Optical transceiver testing specification

Type	Item	Description
TC Specification [1][2]	TC Mode	Contact TEC temperature control
	TC Range	-5 ~ + 85 ℃ [3]
	Stability	±1 ℃ [4]
	Accuracy	±0.1 ℃
Vcc Bias Tuner	Bias Range	2.85 ~ 3.67 V
	Step	1 mV [5]

[1] The TC efficiency might fluctuate due to factors such as the ambient temperature, the power consumption of various transceivers, the location of heat sources, and the output power of the chiller.

[2] Due to condensation by long-term low temperature use, the inner space should be circulated with dry and clean air, and periodically heated for drying.

[3] Test environment: Room temperature of 25℃, 15W module placed in a closed space to reduce heat exchange with outside; Feedbacked by DMI temperature.

[4] Perform repeat measurements of the temperature difference between the set temperature and case temperature.

[5] Measured under Semight laboratory conditions (Constant temperature at 25℃ and constant load at 12w).

Environment Specification

Item	Description
Environment	Indoor
Operating	Temperature: 0℃ to +55℃, Humidity: 30% to 80% @non-condensing
Storage	Temperature: -30℃ to 70℃, Humidity: 10% to 90%@non-condensing

Item	Description
Power Supply	Voltage Range: 100-240 VAC, Frequency Range: 50/60 Hz, Maximum Power: 2200W
Warm-up	30-minutes of warm-up and automatic calibration, with the ambient temperature variation remaining within ±3℃
Dimensions (mm) [11]	211x640x497
Weight	39.5 kg (Typical)

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

4 Accessory Equipment

Chiller Specification

Item	Description
Refrigerating Output	3 kW
Temperature control range	2℃ to +35℃
Power Supply	Voltage: 220 VAC, Frequency: 50 Hz, Maximum Power: 1450W, Maximum Current: 7.2A
Refrigerant	Dupont - Freon 22
Tank Capacity	15 L
Pump Head	10~28 m
Water Pipe	DN 15
Circulation Flow Rate	8~35 L/min

Item	Description
Noise Level	≤ 64dB(A)
Dimensions (mm)	700*470*460
Weight	65 KG

5 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
DUTs (Multiple choices)	D01	Replaceable MCB, supports QSFP-DD/QSFP
	D02	Replaceable MCB, supports OSFP
Crimping box (Multiple choices)	T01	TEC crimping component with QSFP-DD & QSFP packaging
	T02	TEC crimping component with OSFP-Finned Top packaging
	T03	TEC crimping component with OSFP-RHS packaging
	T04	TEC crimping component with OSFP-Finned Top and QSFP-DD & QSFPs packaging
	T05	TEC crimping component with OSFP-RHS and QSFP-DD & QSFPs packaging

Service (Choose one)	R3C	Extended warranty and service plan - 36 months
	R5C	Extended warranty and service plan - 60 months

6 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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