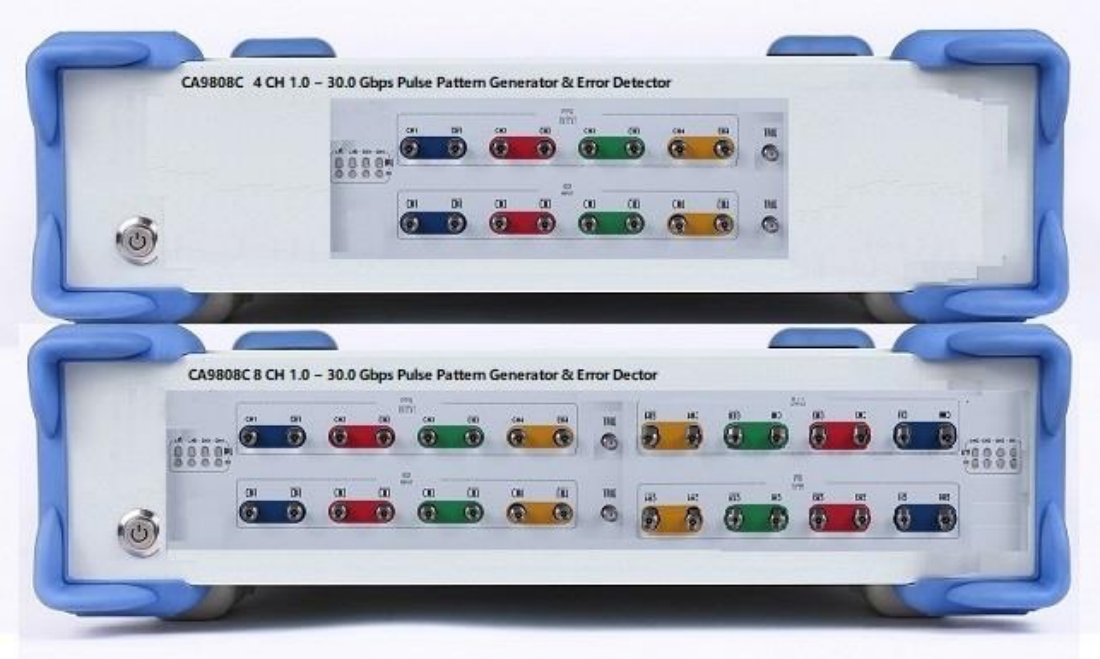
CA9808C 4/8 Channel 1.0 ~ 30.0 Gb/s Pulse Pattern Generator and Error Detector

Technical Specification V3.0

July, 2018



UC INSTRUMENTS CORP.

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CA9808C 4/8 Channel 1.0 ~ 30.0 Gb/s Pulse Pattern Generator and Error Detector

(Ver 3.00)

The UC INSTRUEMNTS CA9808C 4/8 Channel 1.0 ~ 30.0 Gb/s pulse pattern generator and error detector is a high performance, flexible and cost effective four channel Pulse Pattern Generator and Error Detector that can operate from 1.0 Gb/s to 30.0 Gb/s each Channel. 4/8 channel 30.0 Gb/s make it total up to over more than 120/240 Gb/s testing capacity. It is also a standalone Bit Error Rate test solution that incorporates an internal full rate clock synthesizer.

Its small size allows it to be placed close to the Device Under Test (DUT), it can also be placed further away using the TX driver pre and post emphasis controls features to compensate for cable and interconnect losses. It also has a non destructive, integrated eye outline capture feature along with a quick eye height and width measurement capability.

The CA9808C was designed to characterize high speed digital links during the engineering, manufacturing or installation phases of a project. Such applications could include the testing of IC's, optical components, transceivers, copper cables, back planes and interconnects. The CA9808C can be used for compliance testing of Ethernet, Fiber Channel, Data-com, Infiniband, PCIE, SONET and proprietary link standards.

Features

- Four channel NRZ PPG and ED
- 1.0 and 30.0 Gb/s
- Typical JRMS of 1 ps and JPP of 6 ps
- PRBS 2^7, 9, 15, 23, 31
- Eye monitor
- Internal clock synthesizer
- PPM offset control
- Adjustable clock output
- External clock input
- TX level 200 to 1100 mV PPDIFF
- Pre and Post cursor emphasis (6 dB)
- Cross-Point Adjustment (35 to 65%)
- TX squelch
- TX and RX polarity inversion
- Loss of signal indicator
- Programmable clock fixed pattern
- Burst error insertion
- USB 2.0 controlled
- API command set
- Stand alone configuration available
- Small size *235mm W×45mm H×310mmD*

Applications

- Multi-lane serial data channels signal integrity characteristic
- 100G/200G CFP2, CFP4, QSFP28 line cards
- Active Optical Cable (AOC), Direct Attach Cable (DAC)
- Electro-optical Transceiver Testing
- Design Validation Test (DVT) of Telecom / Data-com, Components, Modules and Systems
- High-Speed SerDes Testing & Characterization
- Installation and Maintenance Test of Network Equipment
- Testing of optical transceiver modules (SFP+, XFP, X2, Xenpak, XPAK), transponders, linecards, and subsystems
- Testing of opto-electronic components and devices (TOSA, ROSA, lasers, etc…)
- Testing of Gb/s ICs, PCBs, electronic modules, subsystems, and systems
- Serial bus and high-speed backplane design
- Installation testing and troubleshooting in optical transport networks
- Can be used forcompliance testing of Ethernet, Fiber Channel,
  Infiniband, PCIE, SONET and proprietary link standards

Specification

TX Specification

Output Port Adaptor	2.92 mm Female
Standard Output Channel Clock Frequency	0.5GHz - 17GHz
High-speed Output Channel Clock Frequency	1.25GHz - 25GHz
Standard NRZ OutputPattern Rate	1.0 Gbps – 30.0 Gbps
High-speed NRZ Output Pattern Rate	2.5Gbps - 50Gbps
PAM4 Output Rate	32 Gbps - 56 Gbps(16 Gbaud - 28 Gbaud)
Reference Clock Input	50MHz to 400MHz, single Channel 600mV±200mV@50Ω
Random Jitter	≤10mUI RMS,≤300fs@28Gbps
Total Jitter	≤0.30UI
(Duty-free ratio) DCD	≤0.02UI
Deterministic Jitter	≤0.15UI
Rise/Fall Time	<= 16ps(typ)
Single Ended Output	20mV-550mV(Adjustable)
Differential Out put	40mV-1100mV(Adjustable)
Polarity Reversal	Support
TEXQ Post-cursor 1	0-6dB 6 variable levels
TEXQ Post-cursor 2	0-6dB 6 variable levels
TEXQ Pre-cursor 1	0-6dB 6 variable levels
Coupling	AC
Impedance Output	Choose from 100 ohm or 85 ohm difference
Clock Pattern	CLK, CLK_DIV2, CLK_DIV4, CLK_DIV8, CLKDIV_16, CLKDIV_32
Random Pattern	PRBS7, PRBS9, PRBS15, PRBS23, PRBS31
PAM4 Support Pattern	JP03A, JP03B, Linearity, PRBS13, QPRBS13
Customerized Pattern	64bit Customer Setting
Output Rate DynamicallyAdjustable	Support

RX Specification

Input Port Adaptor	2.92 mm Female
Data Rate	1.0 Gbps – 30.0 Gbps
Input Code	NRZ

Maximum Differential Voltage Input	1.2V
Input Sensitivity	40mV
Impedance Input	100 ohm or 85 ohm
Pattern Input	PRBS7, PRBS9, PRBS15, PRBS23, PRBS31 Error Detector
Data Sampling Self-Calibration	Sampling Alignment Support
Pattern Synchronization	Automatic
Built-in CTLE	16 levels, automatic CTLE optimization or manual mode
Built-in DFE	8 levels, automatic DFE optimization or manual mode
Built-in CDR Input Rate	1.0 Gbps – 30.0 Gbps
Maximum Idle Code Length Input	120bit running length
CDR Clock Recovery Output	Supported, recovering 17 GHz half-speed clock via 2 output PPG channel
CDR Data Recovery Output	Supported, recovering 34 Gbps full-speed data via 1 output PPG channel

BERT Specification

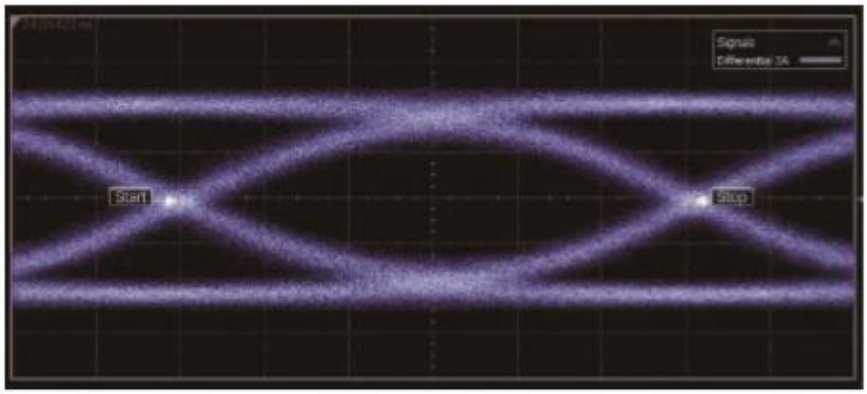
BERT Testing Function	Support. setting up waiting time or conditional bit error rate
BER Confidence	Supported
Eye Pattern Measurement	Eye Hight, eye width, Eye hight + Eye width, BER Contour
Bathtub Curve	Horizontal timing, vertical amplitude

Data rate

CA9808C can address all common standard speeds via selectable bit rates between 1.0 Gb to 30.0Gbps.

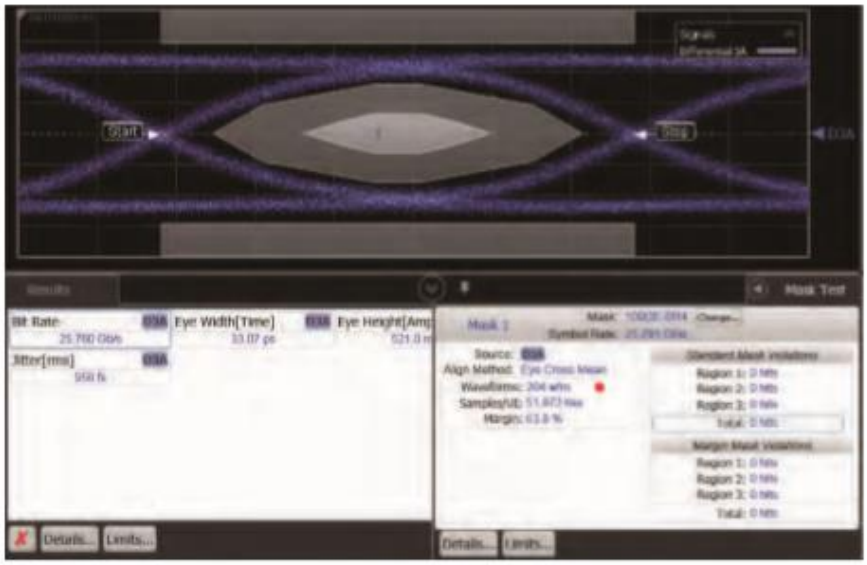
Typical Eye Diagram

33 Gbps NRZ Eye Diagram



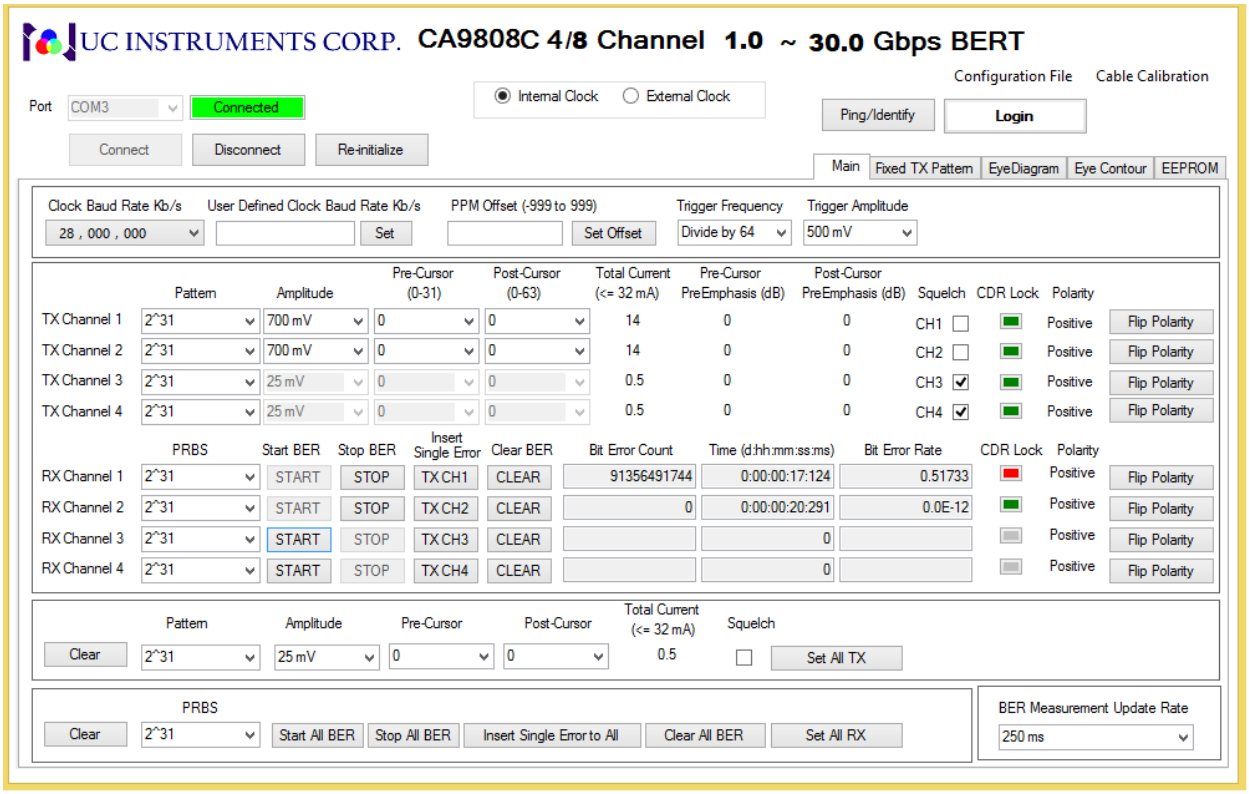
Parameter	Data
RJ	257fs
TJ@BER1E-15	7.93ps
DJ	4.49ps
PJ	1.72ps
DDJ	2.39ps
DCD	373.8fs
Eye-Width	25.92ps
Eye-Height	747mV

25.78 Gbps NRZ Eye Diagram

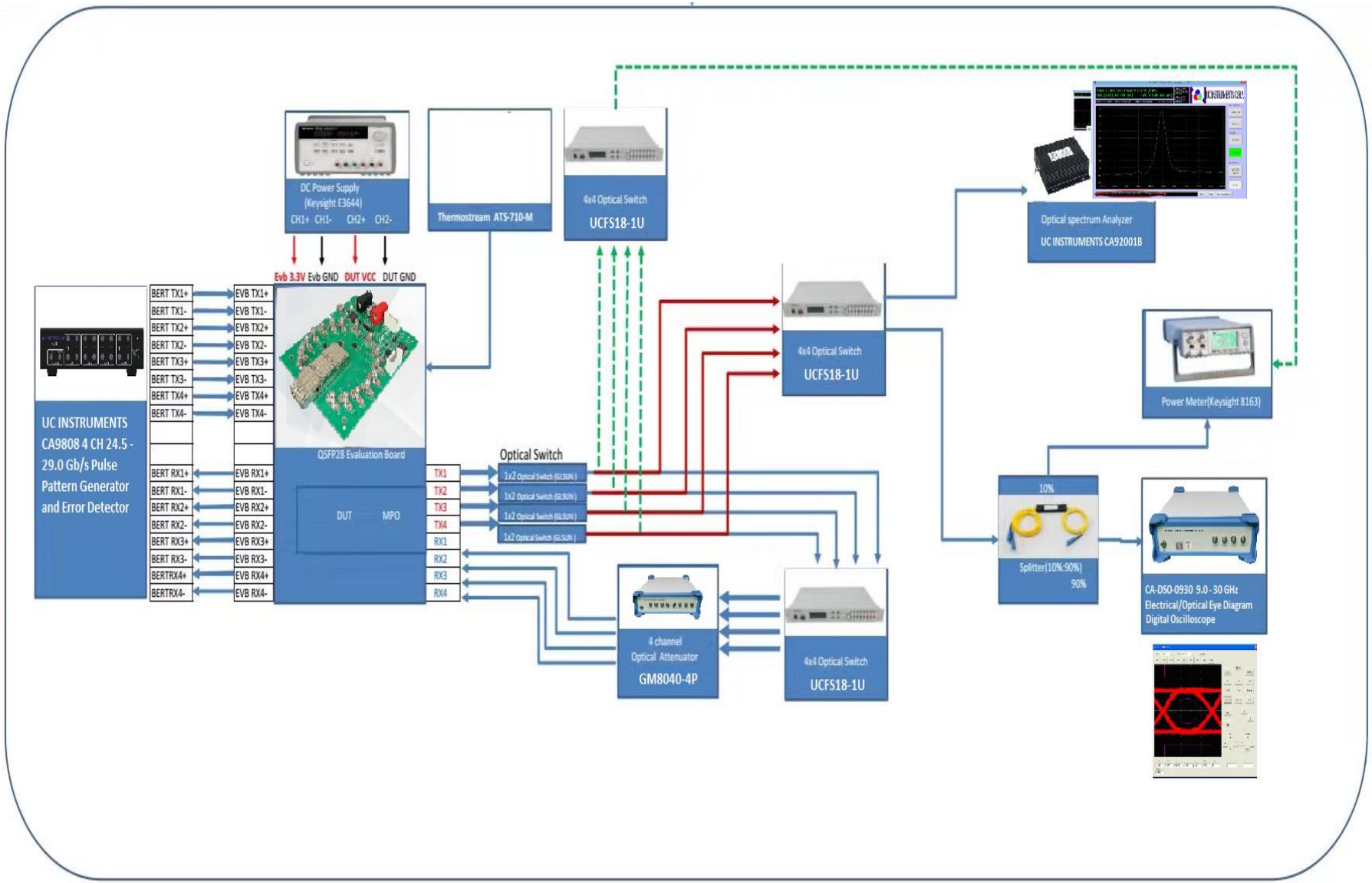


Parameter	Data
RJ	299fs
TJ@BER1E-15	9.15ps
DJ	5.51ps
PJ	2.56ps
DDJ	2.77ps
DCD	578fs
Eye-Width	32.3ps
Eye-Height	727mV

CA9808C Computer Control GUI



Typical CA9808C QSFP+ 4 X 28 Gb/s Testing System Configuration:


DC Power Supply
(Keysight E3644)
CH1+ CH1- CH2+ CH2-
Thermostream ATS-710-M
4x4 Optical Switch
UCFS18-1U
Optical spectrum Analyzer
UC INSTRUMENTS CA92001B
Evb 3.3V Evb GND DUT VCC DUT GND
UC INSTRUMENTS
CA9808 4 CH 24.5 -
29.0 Gb/s Pulse
Pattern Generator
and Error Detector
BERT TX1+
BERT TX1-
BERT TX2+
BERT TX2-
BERT TX3+
BERT TX3-
BERT TX4+
BERT TX4-
BERT RX1+
BERT RX1-
BERT RX2+
BERT RX2-
BERT RX3+
BERT RX3-
BERTRX4+
BERTRX4-
EVB TX1+
EVB TX1-
EVB TX2+
EVB TX2-
EVB TX3+
EVB TX3-
EVB TX4+
EVB TX4-
EVB RX1+
EVB RX1-
EVB RX2+
EVB RX2-
EVB RX3+
EVB RX3-
EVB RX4+
EVB RX4-
QSFP28 Evaluation Board
DUT
MPO
TX1
TX2
TX3
TX4
RX1
RX2
RX3
RX4
Optical Switch
1x2 Optical Switch (GLSUN)
1x2 Optical Switch (GLSUN)
1x2 Optical Switch (GLSUN)
1x2 Optical Switch (GLSUN)
4x4 Optical Switch
UCFS18-1U
Power Meter(Keysight 8163)
10%
Splitter(10%:90%)
90%
CA-DSO-0930 9.0 - 30 GHz
Electrical/Optical Eye Diagram
Digital Oscilloscope
4 channel
Optical Attenuator
GM8040-4P
4x4 Optical Switch
UCFS18-1U

Contact Information

United States:

UC INSTRUMENTS CORP.

3652 Edison Way

Fremont, CA 94538

USA

Tel: 1-510-366-7353

Fax: 1-510-795-1795

www.ucinstruments.com

July., 2018

72000020 V3.00

Product specifications and descriptions in this documentation subject to change without notice.