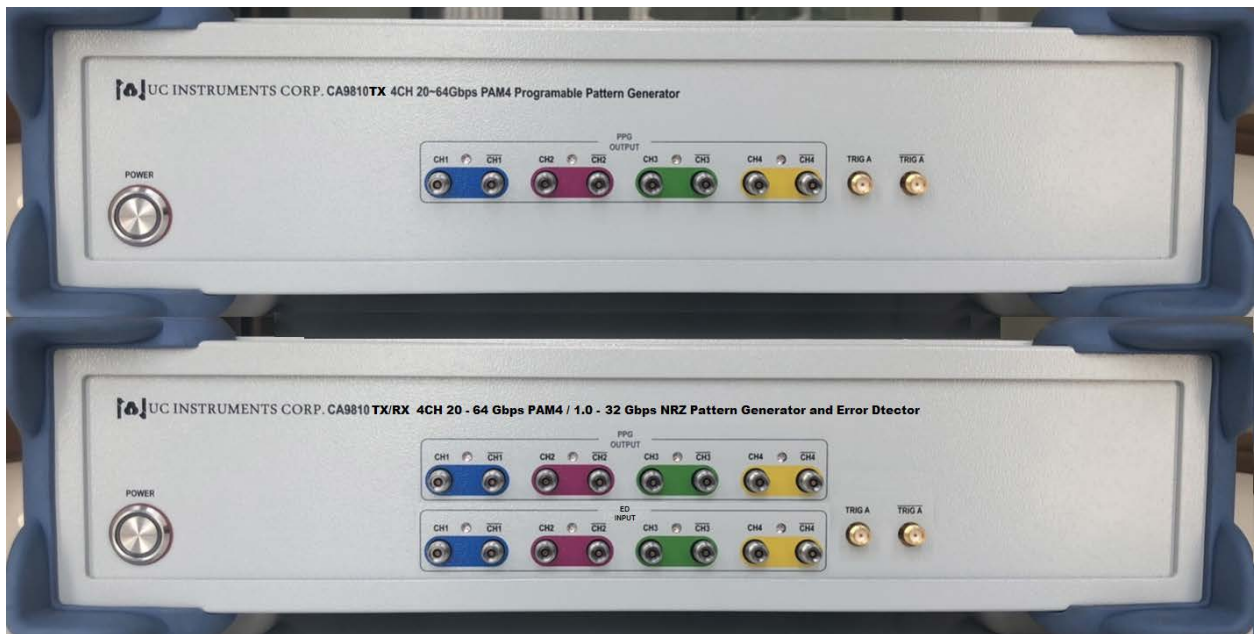


CA9810-TX/CA9810-TXRX 4 Channel 20.0 ~ 64.0 Gb/s PAM4 and 1.0 ~ 32.0 Gb/s NRZ Programmable Pattern Generator and Error Detector

Technical Specification V4.20

July, 2019



 UC INSTRUMENTS CORP.

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CA9810-TX/CA9810-TXRX 4 Channel 20.0 ~ 64.0 Gb/s PAM4 and 1.0 ~ 32.0 Gbps NRZ Programmable Pattern Generator and Error Detector

(Ver 4.20)

The UC INSTRUEMNTS CA9810-TX/ CA9810-TXRX 4 Channel 20.0 ~ 64.0 Gb/s PAM4 and 1.0 ~ 32.0 Gbps NRZ programmable pattern generator and Error Detector is a high performance, flexible and cost effective 4 channel PAM4 generator that can operate from 20.0 Gb/s to 64.0 Gb/s each Channel. 4 channel 64.0 Gb/s make it total up to over more than 240/480 Gb/s testing capacity.

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.

The CA9810-TX/CA810-TXRX 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 CA9810-TX/CA9810-TXRX can be used for compliance testing of Ethernet, Fiber Channel, Data-com, Infiniband, PCIE, SONET and proprietary link standards.

Features

- Four channel 1.0 ~ 32.0 Gbps NRZ signal and 20.0 ~ 64.0 Gb/s PAM4 signal generator
- Four channel 1.0 ~ 32.0 Gbps NRZ/PAM4 Error Detector
- Typical J_{RMS} of 1 ps and J_{PP} of 6 ps
- PRBS 2⁷, 9, 15, 23, 31
- Internal clock synthesizer
- Adjustable clock output
- External clock input
- TX level 100 to 1000 mV PPDIFF
- RX sensitivity 25 mV
- Pre and Post cursor emphasis (6 dB)
- TX squelch
- Programmable clock fixed pattern
- Burst error insertion
- USB 2.0 controlled
- API command set
- Stand alone configuration available
- Small size 377mm W×91mm H×460mmD

Applications

- Multi-lane serial data channels signal integrity characteristic
- 200G/400G CFP2, CFP4, QSFP28 PAM4 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 for compliance testing of Ethernet, Fiber Channel, Infiniband, PCIE, SONET and proprietary link standards

Specification

TX Specification

Model Number	CA9810-TX	CA9810-TXRX
Output Port Adaptor	2.92 mm Female	2.92 mm Female
Output Channel Clock Frequency	0.5GHz - 17GHz	0.5GHz - 17GHz
Standard NRZ Output Pattern Rate	1.0 Gbps – 34.0 Gbps	1.0 Gbps – 34.0 Gbps
PAM4 Output Rate	20Gbps - 62 Gbps	20Gbps - 62 Gbps
Reference Clock Input	50MHz to 400MHz, single Channel 600mV±200mV@50Ω	50MHz to 400MHz, single Channel 600mV±200mV@50Ω
Random Jitter	≤10mUI RMS, ≤300fs@28Gbps	≤10mUI RMS, ≤300fs@28Gbps
Total Jitter	≤0.30UI	≤0.30UI
(Duty-free ratio) DCD	≤0.02UI	≤0.02UI
Deterministic Jitter	≤0.15UI	≤0.15UI
Rise/Fall Time	≤ 14ps(typ)	≤ 14ps(typ)
Single Ended Output	11mV-600mV(Adjustable)	11mV-600mV(Adjustable)
Differential Out put	22mV-1200mV(Adjustable)	22mV-1200mV(Adjustable)
Polarity Reversal	Support	Support
Post-cursor 1	0-5.7 dB 20 variable levels	0-5.7 dB 20 variable levels
Post-cursor 2	0-2.1 dB 8 variable levels	0-2.1 dB 8 variable levels
Pre-cursor 1	0-3.9 dB 14 variable levels	0-3.9 dB 14 variable levels
Coupling	AC	AC
Impedance Output	Choose from 100 ohm or 85 ohm difference	Choose from 100 ohm or 85 ohm difference
Clock Pattern	CLK, CLK_DIV2, CLK_DIV4, CLK_DIV8, CLKDIV_16, CLKDIV_32	CLK, CLK_DIV2, CLK_DIV4, CLK_DIV8, CLKDIV_16, CLKDIV_32
PRBS Pattern	PRBS7, PRBS9, PRBS15, PRBS23, PRBS31	PRBS7, PRBS9, PRBS15, PRBS23, PRBS31
PAM4 Support Pattern	JP03A, JP03B, Linearity, PRBS7Q, PRBS9Q, PRBS10Q, PRBS13Q, PRBS15Q, PRBS23Q, PRBS31Q, QPRBS13	JP03A, JP03B, Linearity, PRBS7Q, PRBS9Q, PRBS10Q, PRBS13Q, PRBS15Q, PRBS23Q, PRBS31Q, QPRBS13
Customized Pattern	128bit Customer Setting	128bit Customer Setting
Dynamic Data Rate Change	Support	Support

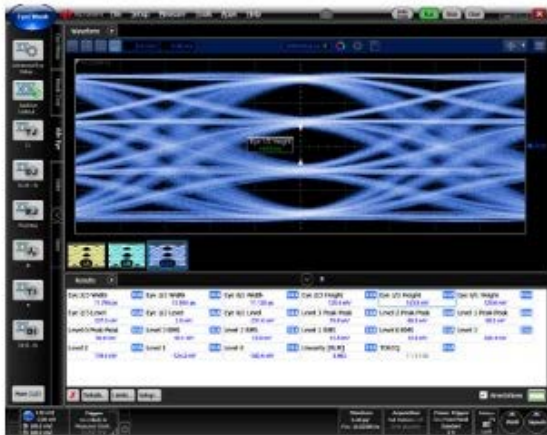
RX Specification

Model Number	CA9810-TX	CA9810-TXRX
Input Port Adaptor	N/A	2.92 mm Female
Data Rate	N/A	1Gbps– 34GbpsNRZ, 20Gbps-56Gbps PAM4
Input Data signal	N/A	NRZ or PAM4
Maximum Differential Voltage Input	N/A	1.2V
Input Sensitivity	N/A	25mV
Impedance Input	N/A	100 ohm or 85 ohm
Pattern Type	N/A	PRBS7, PRBS9, PRBS10, PRBS13, PRBS15, PRBS23, PRBS31, PRBS7Q, PRBS9Q, PRBS10Q, PRBS13Q, PRBS15Q, PRBS23Q, PRBS31Q Error Detector
Input equalization	N/A	Auto tuning or manual tuning
CDR input data rate	N/A	1Gbps– 34GbpsNRZ, 20Gbps-56Gbps PAM4
Data Input running length	N/A	120 bit running length
CDR recovered clock output	N/A	Support. Half-rate recovered clock output on CH2
CDR recovered data output	N/A	Support. Full-rate recovered data output on CH1

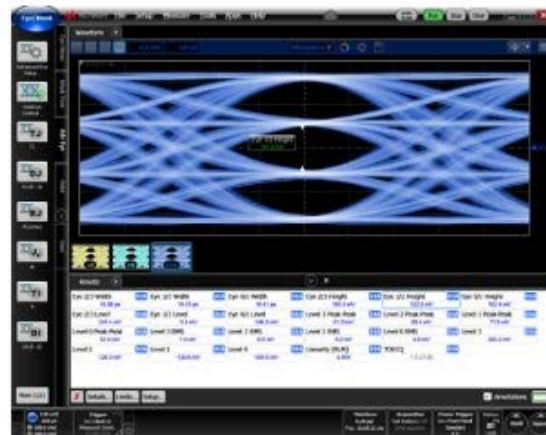


Typical PAM4 and NRZ Eye Diagram

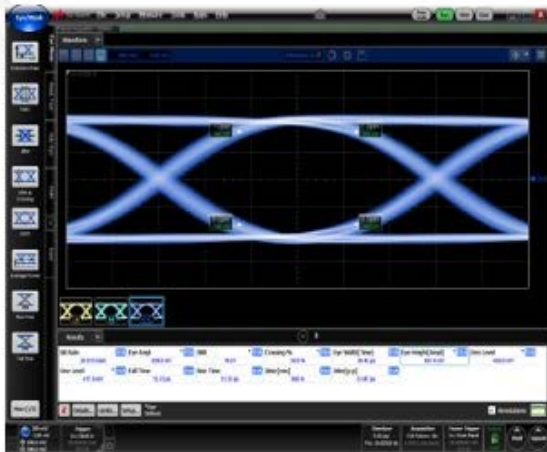
PAM4 62 Gbps Eye Diagram (PRBS9)



PAM4 53.125 Gbps Eye Diagram (PRBS9)



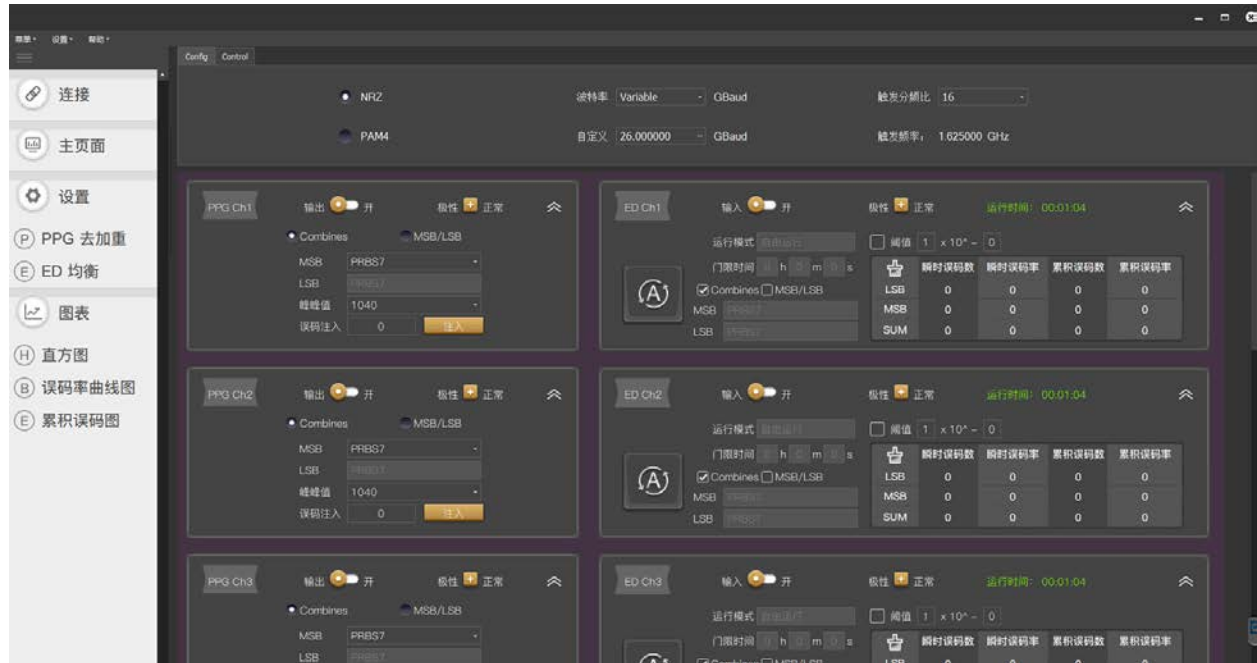
NRZ 28 Gbps Eye Diagram (PRBS9)



NRZ 25 Gbps Eye Diagram (PRBS9)



CA9810 PAM4/NRZ Signal Generator Computer Control GUI



Contact Information

UC INSTRUMENTS CORP.

3652 Edison Way

Fremont, CA 94538

USA

Tel: 1-510-366-7353

Fax: 1-510-795-1795

www.ucinstruments.com

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