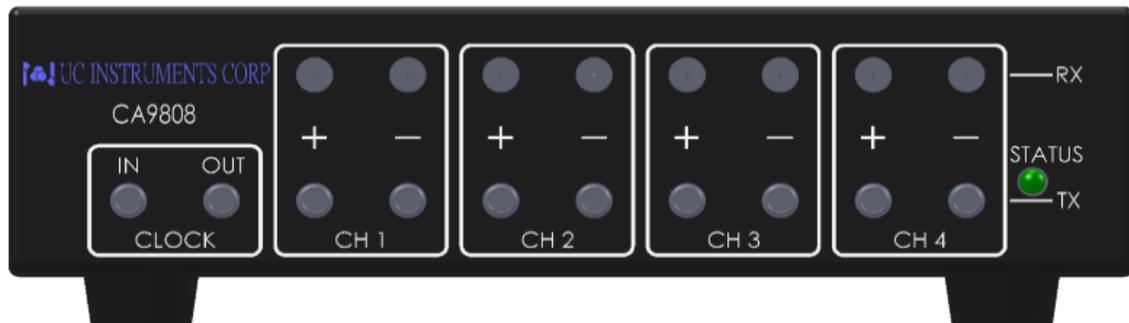


CA9808 4 Channel 24.5~ 29.0 Gb/s Pulse Pattern Generator and Error Detector

Technical Specification V1.03

July, 2016



 UC INSTRUMENTS CORP.

www.ucinstruments.com

CA9808 4 Channel 24.5 ~ 29.0 Gb/s Pulse Pattern Generator and Error Detector

(Ver 1.03)

The UC INSTRUEMNTS CA9808 4 Channel 24.5 ~ 29.0 Gb/s (100Gb/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 24.5 Gb/s to 29 Gb/s each Channel. 4 channel 29.0 Gb/s make it total up to over more than 100 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.

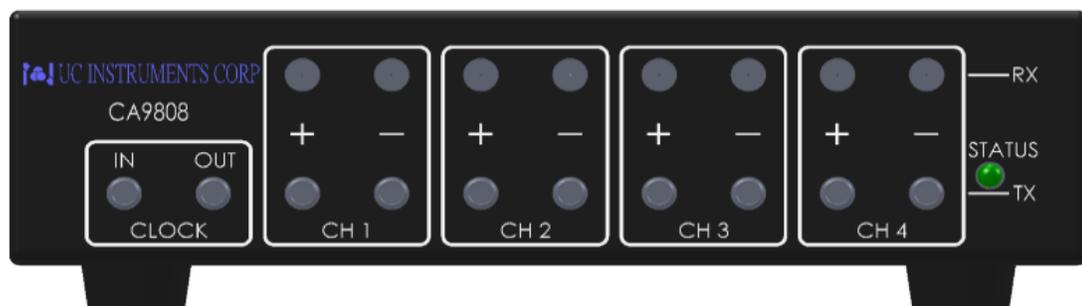
The CA9808 was designed to characterize high speed digital links during the engineering, manufacturing or installation phases of a project. Such applications could include the testing of IC's, optical components, transceivers, copper cables, back planes and interconnects. The CA9808 can be used for compliance testing of Ethernet, Fiber Channel, Data-com, Infiniband, PCIE, SONET and proprietary link standards.

Features

- Four channel NRZ PPG and ED
- 12.25-14.5 and 24.5-29 Gb/s
- Typical J_{RMS} of 1 ps and J_{PP} of 6 ps
- PRBS 2⁷, 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 216W x 51H x 216D mm

Applications

- Multi-lane serial data channels signal integrity characteristic
- 100G 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 for compliance testing of Ethernet, Fiber Channel, Infiniband, PCIE, SONET and proprietary link standards



CA9808 4 Channel 24.5 ~ 29.0 Gb/s Pulse Pattern Generator and Error Detector Testing System

Specification

Absolute Maximum Ratings	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Ts	-20	–	70	°C	
AC Voltage Range	VAC	90	–	246	VAC	
AC Voltage Frequency Range	VFREQ	47	–	63	Hz	
Data RF Voltage Input	VinData	-0.3	–	1.2	V	
Clock In Voltage Input	VinClk	0	–	1.2	V	
USB Pin Voltage	VinUSB	-0.3	–	5.5	V	
RF and Clock ESD HBM	RFesdH	-1000	–	1000	V	
RF, Clock and USB Latchup	VI	-100	–	100	mA	
USB ESD HBM	USBesdH	-2000	–	2000	V	
USB ESD CDM	USBesdC	-500	–	500	V	
Electrical Characteristics	Symbol	Min.	Typ.	Max.	Unit	Notes
Case Temperature	Tc	5	–	45	°C	
AC Supply Current	Icc	0.75	200	–	mA	
Baud Rate (NRZ format)	BR	12.25/24.5		14.5/29	Gb/s	
Baud Rate Setpoint Accuracy	BRa	-10	–	10	PPM	(Note 1)
Baud Rate PPM Offset	BRo	-999	–	999	PPM	1 PPM step size
Power On Initialization Time	Ton	–	–	15	Seconds	
Eye Phase Steps	EMp	–	–	128	Steps	.16 pS per unit
Eye Amplitude Steps	EMv	–	–	64	Steps	8 mV per unit
Note 1: Aging, Temperature and Voltage						

TX Electrical	Symbol	Min.	Typ.	Max.	Unit	Notes
CML Output (Single Ended)	VoutSE	100	–	550	mVpp	AC Coupled
CML Output (Differential)	VoutDIFF	200	–	1100	mVpp	AC Coupled
CML Output (Differential) Step Size	VoutSS	–	5	–	mVpp	
CML Output (Differential) Squelch	VoutSqu	0	–	30	mVpp	
CML Output (Rise/Fall Time)	tR, tF	–	8	–	ps	20-80%
Output Impedance (differential)	Zout	–	100	–	Ω	
Termination Mismatch	TZm	–	–	5	%	At 1 MHz
AC common mode voltage	TACcm	–	–	15	mVRMS	
Differential Return Loss	SDD22	-10	–	–	dB	.01 to 14.5 GHz
Jitter (RMS)	TJrms	–	1	–	pS	(Note 2)
Jitter (PK-PK)	TJpp	–	6	–	pS	(Note 2)
Pre-Emphasis Control	TPE	–	6	–	dB	
De-Emphasis Control	TDE	–	6	–	dB	

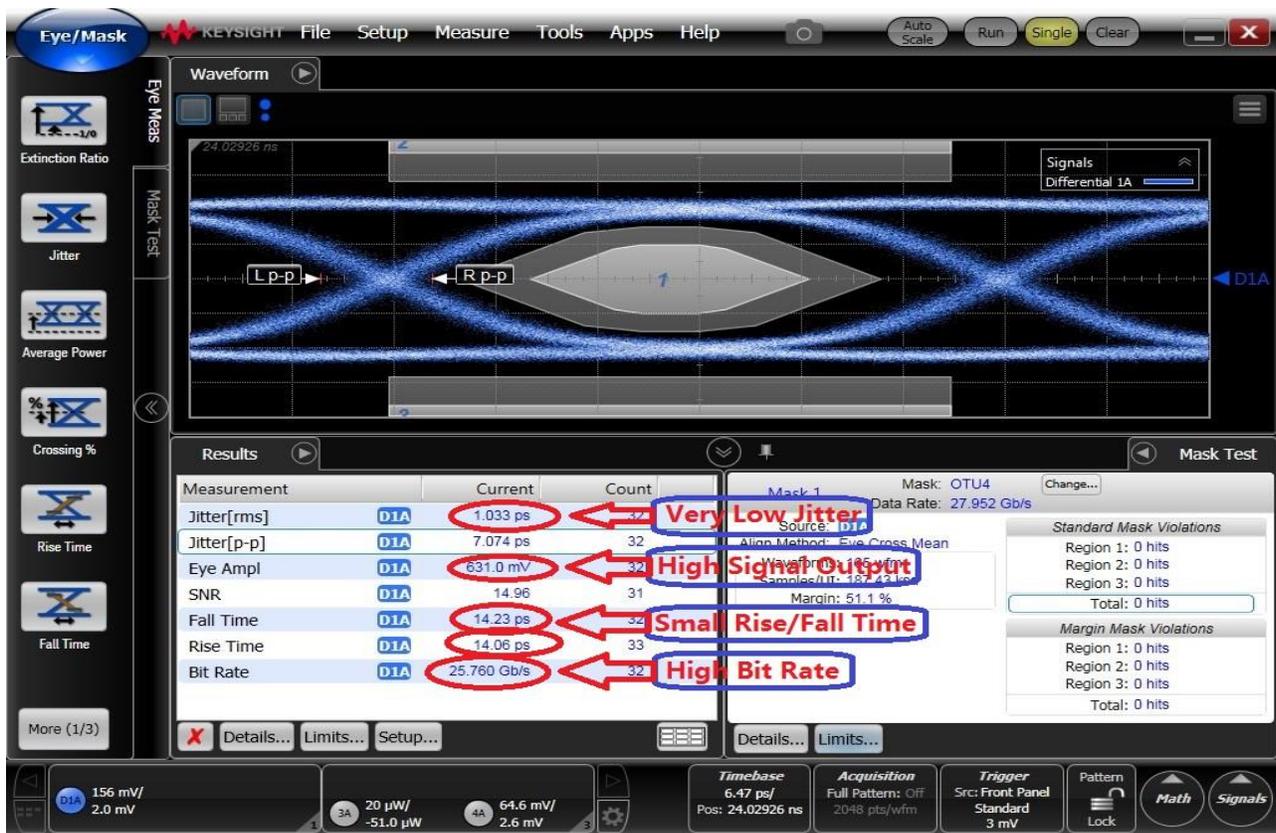
Note 2: Agilent DCA-X with 50 GHz plug-in, 23-1 PRBS pattern and 500 waveforms using a precision time base trigger

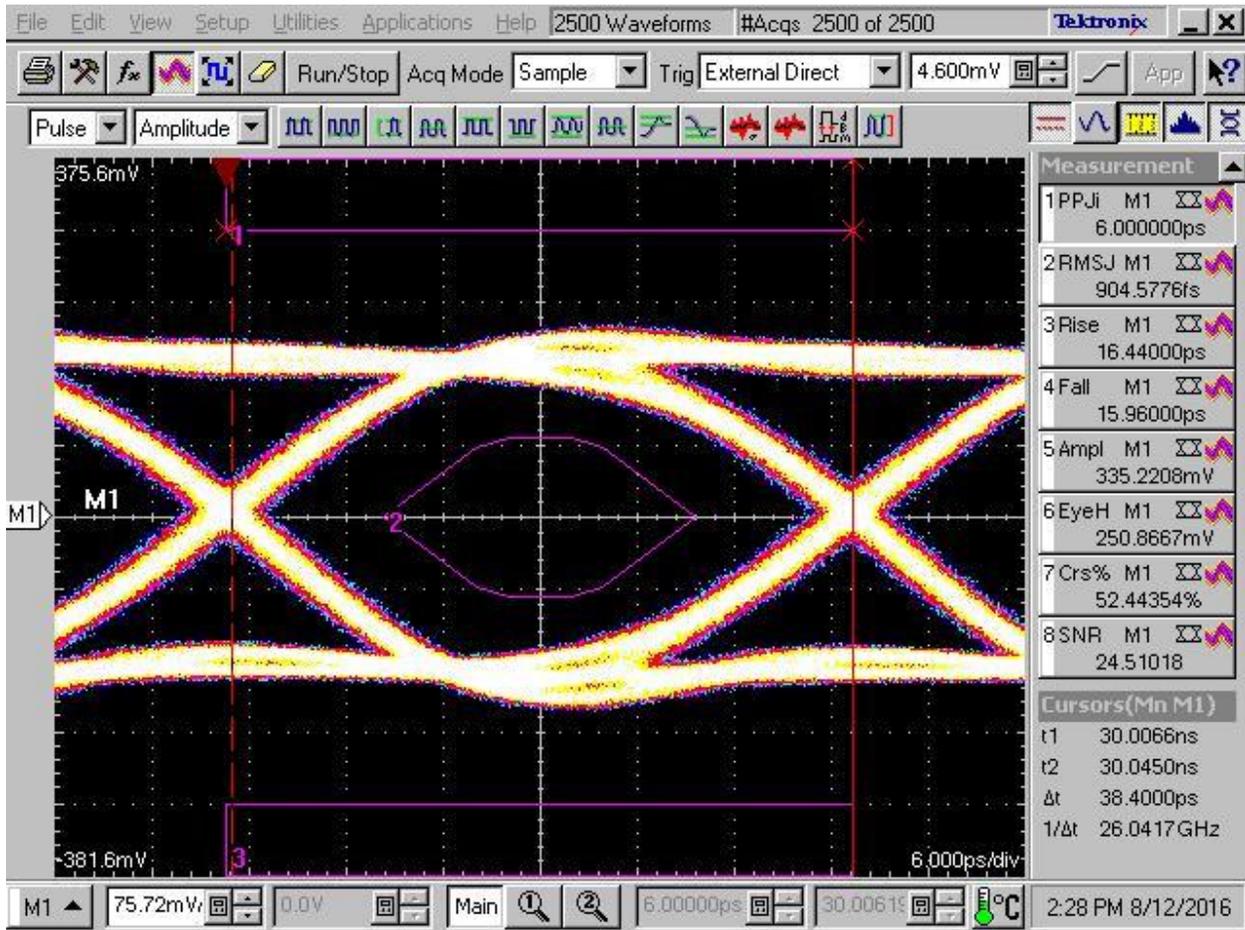
RX Electrical	Symbol	Min.	Typ.	Max.	Unit	Notes
Baud Rate Tolerance	BRT	-100	–	100	PPM	
CML Input Voltage (Single Ended)	VinSE	200	–	600	mVpp	AC Coupled
CML Input Voltage (Differential)	VinDIFF	100	–	1200	mVpp	AC Coupled
Input Impedance (Differential)	Zin	–	100	–	Ω	
Termination Mismatch	RZm	–	–	5	%	At 1 MHz
AC common mode voltage	RACcm	–	–	25	mVRMS	
Differential Return Loss	SDD11	-10	–	–	dB	.01 to 14.5 GHz
CDR Acquisition Lock Time	CDRI	–	–	500	mS	
Clock - Input	Symbol	Min.	Typ.	Max.	Unit	Notes
Frequency	CFin	156,248,438	156,250,000	156,251,562	Hz	Square wave
Single Ended Voltage Swing	CVpp	0.4	–	1.2	V	
Input Impedance	CRin	49.5	50	50.5	Ohm	AC coupled
Rise/Fall Time	CitR, CitF	–	–	1	nS	20%-80%
Duty Cycle	CDC	40	–	60	%	<1nS Tr/Tf
Random Jitter (RMS)	CRj	–	–	1	ps	12 kHz–20 MHz

Data rate

CA9808 can address all common standard speeds via selectable bit rates between 12.25 Gb/s to 14.5 Gb/s and 24.5 Gbp/s to 29.0Gbps.

Typical Output Eye Diagram





CA9808 Computer Control GUI

UC INSTRUMENTS CORP. CA9808 4 Channel 24.5 ~ 29.0 Gbps BERT Version 1.3

Port: COM3 Connected Internal Clock External Clock Configuration File Cable Calibration

Connect Disconnect Re-initialize Ping/Identify Login

Main Fixed TX Pattern EyeDiagram Eye Contour EEPROM

	Clock Baud Rate Kb/s	User Defined Clock Baud Rate Kb/s	PPM Offset (-999 to 999)	Trigger Frequency	Trigger Amplitude
	28,000,000			Divide by 64	500 mV

TX Channel	Pattern	Amplitude	Pre-Cursor (0-31)	Post-Cursor (0-63)	Total Current (<= 32 mA)	Pre-Cursor PreEmphasis (dB)	Post-Cursor PreEmphasis (dB)	Squelch	CDR Lock	Polarity
TX Channel 1	2 ³¹	700 mV	0	0	14	0	0	CH1	<input type="checkbox"/>	Positive
TX Channel 2	2 ³¹	700 mV	0	0	14	0	0	CH2	<input type="checkbox"/>	Positive
TX Channel 3	2 ³¹	25 mV	0	0	0.5	0	0	CH3	<input checked="" type="checkbox"/>	Positive
TX Channel 4	2 ³¹	25 mV	0	0	0.5	0	0	CH4	<input checked="" type="checkbox"/>	Positive

RX Channel	PRBS	Start BER	Stop BER	Insert Single Error	Clear BER	Bit Error Count	Time (d:hh:mm:ss.ms)	Bit Error Rate	CDR Lock	Polarity
RX Channel 1	2 ³¹	START	STOP	<input type="checkbox"/>	CLEAR	91356491744	0:00:00:17:124	0.51733	<input type="checkbox"/>	Positive
RX Channel 2	2 ³¹	START	STOP	<input type="checkbox"/>	CLEAR	0	0:00:00:20:291	0.0E-12	<input checked="" type="checkbox"/>	Positive
RX Channel 3	2 ³¹	START	STOP	<input type="checkbox"/>	CLEAR			0	<input type="checkbox"/>	Positive
RX Channel 4	2 ³¹	START	STOP	<input type="checkbox"/>	CLEAR			0	<input type="checkbox"/>	Positive

	Pattern	Amplitude	Pre-Cursor	Post-Cursor	Total Current (<= 32 mA)	Squelch
Clear	2 ³¹	25 mV	0	0	0.5	<input type="checkbox"/> Set All TX

	PRBS	Start All BER	Stop All BER	Insert Single Error to All	Clear All BER	Set All RX
Clear	2 ³¹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

BER Measurement Update Rate: 250 ms

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July., 2016

72000017 V1.03

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