

CA9809 4.0 ~ 68.0 Gb/s Pulse Pattern Generator

Technical Specification V1.00

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 UC INSTRUMENTS CORP.

www.ucinstruments.com

CA9809 4.0 ~ 68.0 Gb/s Pulse Pattern Generator

(Ver 1.00)

The UC INSTRUEMNTS CA9809 4.0 ~ 68.0 Gb/s Pulse Pattern Generator pulse pattern generator and error detector is a high performance, flexible and cost effective broad band data rate covered Pulse Pattern Generator that can operate from 4.0 Gb/s to 68 Gb/s. The CA9809 can be used with existing equipment to generate higher rate bit streams for use in telecom applications up to 68 Gb/s. Broadband test systems will benefit from the low power dissipation, precision connectors, and excellent output waveform characteristics. The compact size of the equipment allows the CA9809 to be placed at the measurement plane, reducing or eliminating artifacts related to long cables.

The CA9809 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 CA9809 can be used for compliance testing of Ethernet, Fiber Channel, Data-com, Infiniband, PCIE, SONET and proprietary link standards.

Features

- Half rate clock
- High Input Sensitivity
- Wide Operating Data Rate Range, 4.0 – 68 Gb/s
- Low Output Jitter
- Low Power Consumption
- Fast Output Rise/Fall Times
- Typical JRMS of 1 ps and JPP of 6 ps
- Internal clock synthesizer
- TX level 200 to 1100 mV PPDIFF
- Pre and Post cursor emphasis (6 dB)
- Cross-Point Adjustment (35 to 65%)
- TX squelch
- Loss of signal indicator
- Programmable clock fixed pattern
- Burst error insertion
- USB 2.0 controlled
- API command set
- Stand alone configuration available

Applications

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



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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	4.0		68.0	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	

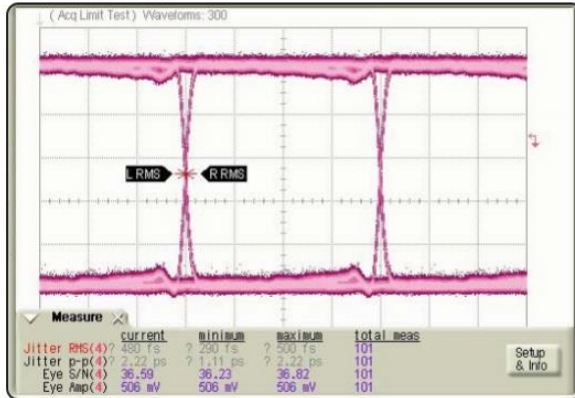
Note 2: Agilent DCA-X with 50 GHz plug-in, 23-1 PRBS pattern and 500 waveforms using a precision time base trigger

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

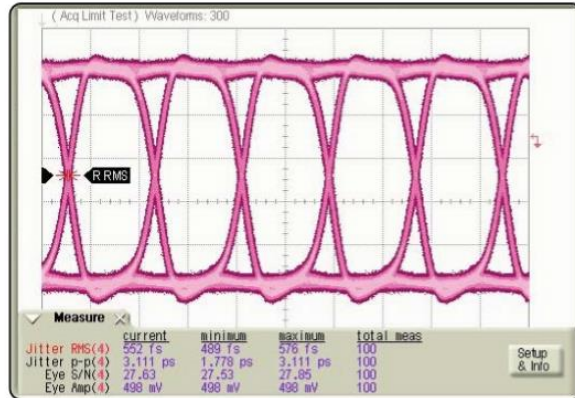
Data rate

CA9809 can address all common standard speeds via selectable bit rates between 4.0 Gb/s to 68.0Gbps.

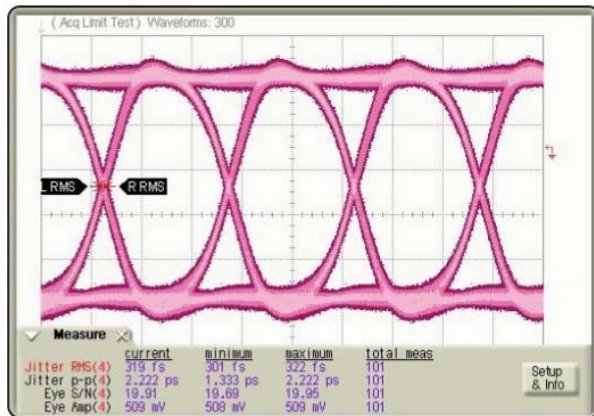
Typical Output Eye Diagram



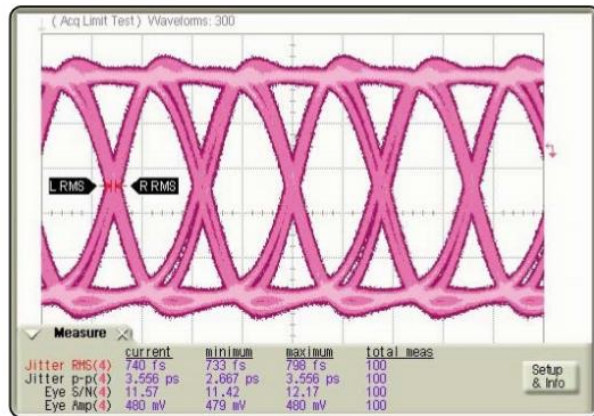
Data Output Waveform @ 5Gb/s



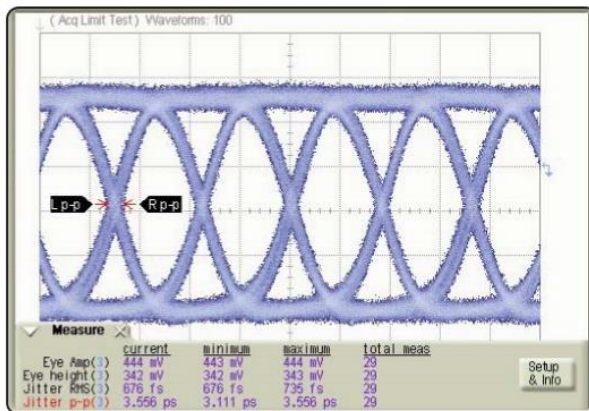
Data Output Waveform @ 28Gb/s



Data Output Waveform @ 40Gb/s



Data Output Waveform @ 56Gb/s



Data Output Waveforms @ 68 Gb/s

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