Keysight Technologies
N4974A PRBS Generator 44 Gb/s

Data Sheet

KEYSIGHT TECHNOLOGIES

Description

The Keysight Technologies, Inc. N4974A PRBS generator 44 Gb/s is a self-contained pattern generator capable of operating at either a single fixed-frequency bit rate using the internal oscillator or operating over a wider frequency range when used with an external half-rate clock source. The N4974A PRBS generator 44 Gb/s operates from 22 to 44 Gb/s when used with an external clock or at 39.81312 Gb/s when used with the internal oscillator. The generator is also available with two more internal oscillator choices, operating at either 25.78125 or 28.0 Gb/s.

The N4974A PRBS generator 44 Gb/s source is based on custom ASICs, allowing a high degree of integration. The low parts count in the signal path minimizes the degradation of the low phase noise oscillator, providing an extremely clean eye pattern. Utilizing the internal oscillator, the generator achieves world class performance of 500 fs rms jitter, with a 500 mV output amplitude and 8 ps rise time.

Application

The N4974A PRBS generator 44 Gb/s source is designed to be used as the source for testing ultra-high speed communications components such as those used in OC 768/STM 256 applications. The 40G PRBS source is a perfect companion to a digital communication analyzer in a stimulus response measurement for 40 Gb/s components such as driver amplifiers, transimpedance amplifiers, optical modulators, and DEMUX. Other applications include backplane signal integrity testing, and cable testing.

Features

- Self-contained PRBS generator
- Built-in low jitter oscillator for 40 Gb/s, 28 Gb/s, or 25 Gb/s rates
- 22–44 Gb/s rates with external clock
- True PRBS-7, PRBS-15 and PRBS-31 patterns
- 1000 mV differential output
- Clock trigger provided for precision time base applications
- External clock input
- Pattern trigger output
- Small size (8” x 10” x 2.5”)

Figure 1. Front of N4974A PRBS generator 44 Gb/s

Figure 2. Back of N4974A PRBS generator 44 Gb/s showing the pattern control switches, clock inputs and outputs, and trigger outputs.

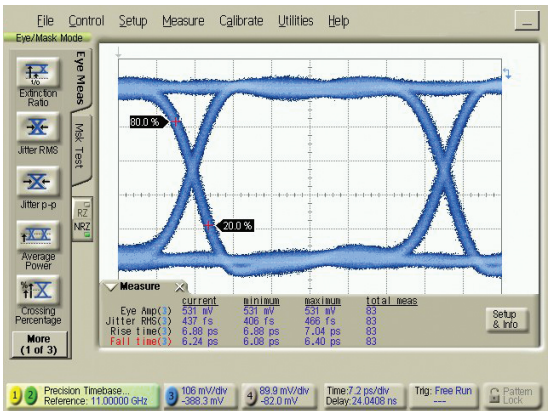

Figure 3. 22 Gb/s

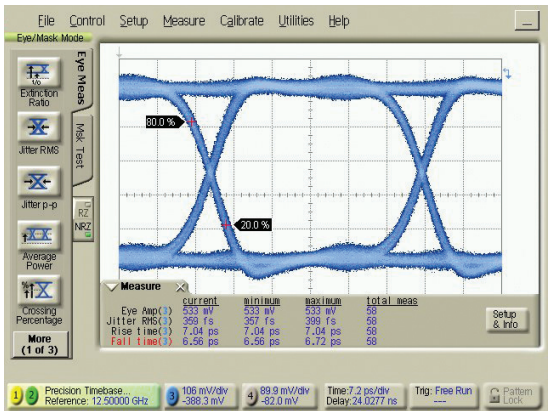

Figure 4. 25 Gb/s

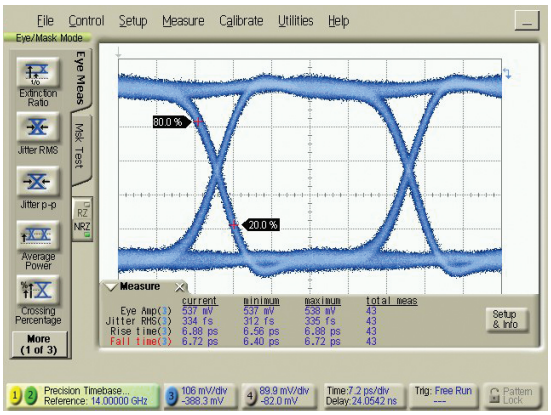

Figure 5. 28 Gb/s

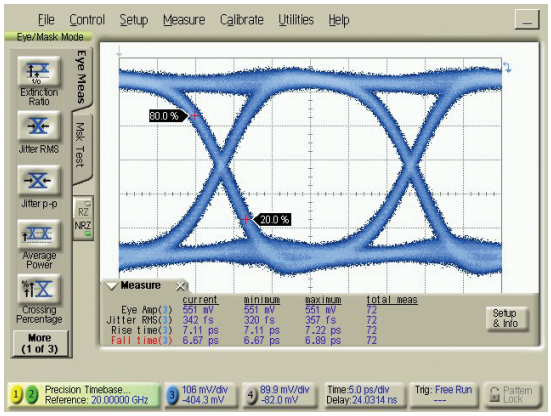

Figure 6. 40 Gb/s

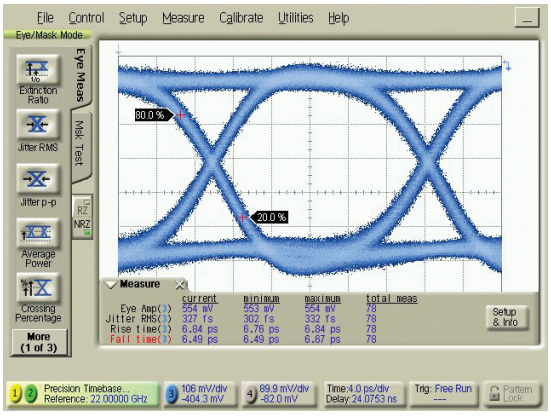

Figure 7. 44 Gb/s

N4974A PRBS generator specifications

Data output	Data rate	22 to 44 Gb/s[1] (option 001)
	PRBS patterns	2^7-1 : 1 + X^4 + X^7
		2^{15}-1 : 1 + X^{14} + X^{15}
		2^{31}-1 : 1 + X^{28} + X^{31}
	Output amplitude (single-ended)	> 500 mV p-p typical
	Output level	high: 0 V nominal
		low: –500 mV nominal
	Jitter	500 fs rms typical[2]
	Rise/fall time (20% to 80%)	8 ps typical
	Data crossover	55% typical
	Data phase adjust range	30 ps nominal
	External interface	Differential. DC coupled, 50 Ω nominal, 1.85 mm female connectors
		Note: outputs are CML and must be externally DC terminated with 50 Ω to GND.
Clock input	External half-rate clock input range	11 to 22 GHz (option 001)
	External half-rate clock input power required	+10 to +16 dBm
	External interface	Single-ended. AC coupled, 50 Ω nominal, 2.92 mm female connector
Internal clock	Internal half-rate clock frequency	Single frequency internal oscillator, specify when ordering
		Default – 19.90656 GHz (for 39.81312 Gb/s data rate)
		Option 101 – 12.890625 GHz (for 25.78125 Gb/s data rate)
		Option 102 – 14.0 GHz (for 28.0 Gb/s data rate)
	Output power	+16 dBm (4 V p-p) typical
	External interface	Single-ended. AC coupled, 50 Ω nominal, 2.92 mm female connector
Clock trigger output	Clock trigger (CLK/1) output power	Nominally –16 dB less than Clock Input power
	External interface	Single-ended. AC coupled, 50 Ω nominal, 2.92 mm female connector. Terminate if not used.
Pattern trigger output[3]	Pulse width	64 * (1/Bit_rate) e.g. at 40 Gb/s pulse width = 1.6 ns
	Repetition period	64 * (1/Bit_rate)*Pattern_length e.g. at 40 Gb/s, 2^{31}-1 pattern, period = 3.4 s
	Output amplitude	200 mV p-p typical
	External interface	Single-ended. DC coupled, 50 Ω nominal, SMA female connector

1. With an external clock
2. At ≤ 40 Gb/s.
3. Pattern trigger specified at ≤ 40 Gb/s only. Remove termination from CLK/1 output when using the Pattern Trigger.

General and mechanical parameters

Operating temperature	+10 to +40 °C
Storage temperature	–40 to +70 °C
Power requirements	42 W external AC adaptor (included) · 100 to 240 V AC, 47 to 63 Hz
Physical dimensions (W x H x D)	203 mm (8 in) x 63.5 mm (2.5 in) x 254 mm (10 in)

Regulatory standards

EMC

- Complies with European EMC Directive 2004/108/EC
- IEC/EN-61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- ICES/NMB-001

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme a la norme NMB-001 du Canada.

Ordering information

Model number	Description
N4974A-001	22 to 44 Gb/s data rate operation, internal oscillator for 39.81312 Gb/s data rate
N4974A-101	Internal oscillator for 25.78125 Gb/s data rate
N4974A-102	Internal oscillator for 28.0 Gb/s data rate

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