

# Keysight Technologies

## N4970A PRBS generator 10 Gb/s

Data Sheet



## Key Features

- Internal fixed-frequency clock source
- Wide operating range, from 50 Mb/s to 12.5 Gb/s
- RMS jitter ~ 1.0 ps
- Fast rise/fall times ~ 25 ps
- Small size – 3.5" x 3.5" x 1"
- Multiple output patterns:  $2^7$ ,  $2^{10}$ ,  $2^{15}$ ,  $2^{23}$ ,  $2^{31}$
- Multiple mark ratios: 1/2, 1/4, 1/8
- Differential outputs

## Description

The N4970A PRBS generator 10 Gb/s is a self contained 10 Gb/s pseudo random bit sequence (PRBS) generator. The N4970A PRBS generator 10 Gb/s can be configured to use an external clock source allowing operation from 50 Mb/s to 12.5 Gb/s. Five different PRBS pattern lengths and three mark density ratios are available via user selectable jumpers. Differential data outputs provide signal levels via the front panel SMA connectors. The N4970A PRBS generator 10 Gb/s' small size, measuring just 3.5 x 3.5 x 1.0", allows for close placement to the device under test.

## Application

The N4970A PRBS generator 10 Gb/s can be used as a digital source for stimulus/response measurements of high speed logic devices. Characterizing waveform distortion of high speed telecommunication components is simplified with the source's low jitter and fast rise/fall times. Production environments can take advantage of the source's simple interface, low power consumption and small size.

## N4970A PRBS Generator specifications

Description	
Data rate	0.5 to 12.5 Gb/s <sup>1</sup>
External clock input rate	0.5 to 12.5 GHz
External clock input power required	+10 dBm (2 V p-p) typical < 1.0 GHz +3 dBm (890 mV p-p) typical ≥ 1.0 GHz
Internal clock rate	Single frequency internal oscillator, specify when ordering Default 10.0 GHz Option 301 – 10.66423 GHz Option 302 – 10.51875 GHz Option 303 – 11.09573 GHz Option 304 – 9.95328 GHz Option 305 – 10.709225 GHz Option 306 – 10.3125 GHz
Internal clock output power	600 mV p-p nominal
Divided clock output	Clock rate/16
Divided clock output power	600 mV p-p nominal
PRBS patterns	$2^n - 1$ , n=7, 10, 15, 23, 31
Mark space density	1/2, 1/4, 1/8
Data output amplitude (single-ended) <sup>2</sup>	> 300 mV p-p typical > 750 mV p-p typical (Option 010)
Data output jitter	1.0 ps rms typical <sup>2</sup>
Data output rise/fall time (20% to 80%)	< 25 ps typical
Data output external interface	Differential. AC coupled, 50 Ω nominal, female SMA

1. With an external clock
2. At the internal clock rate

## Typical measurement setup

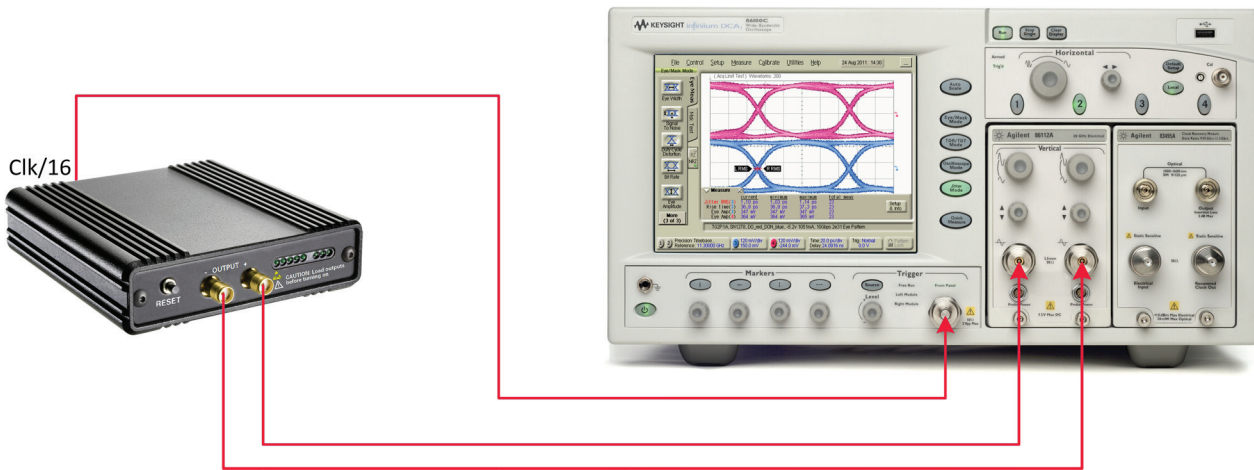


Figure 1. EYE quality measurement setup using the N4970A PRBS generator 10 Gb/s and oscilloscope

## Typical output waveforms

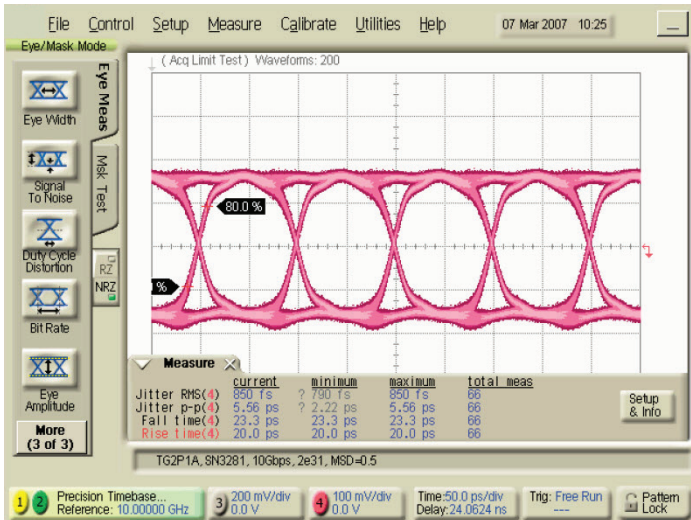


Figure 2. 10 Gb/s, 231-1 PRBS pattern, mark density 1/2

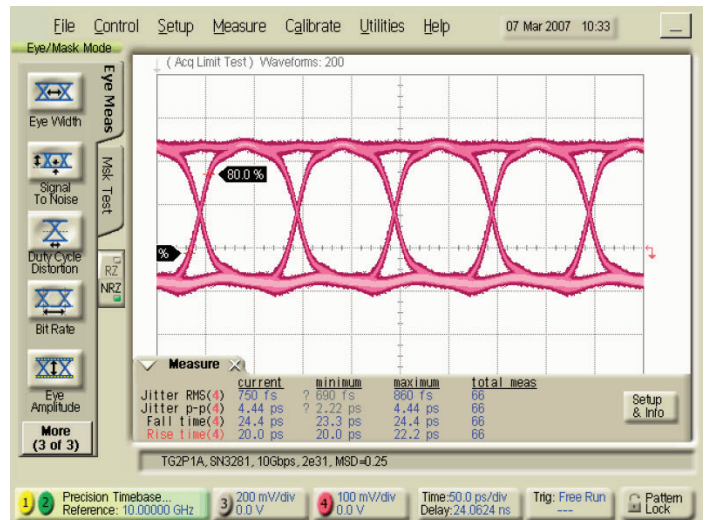


Figure 3. 10 Gb/s, 231-1 PRBS pattern, mark density 1/4

## N4970A Front/Rear panel

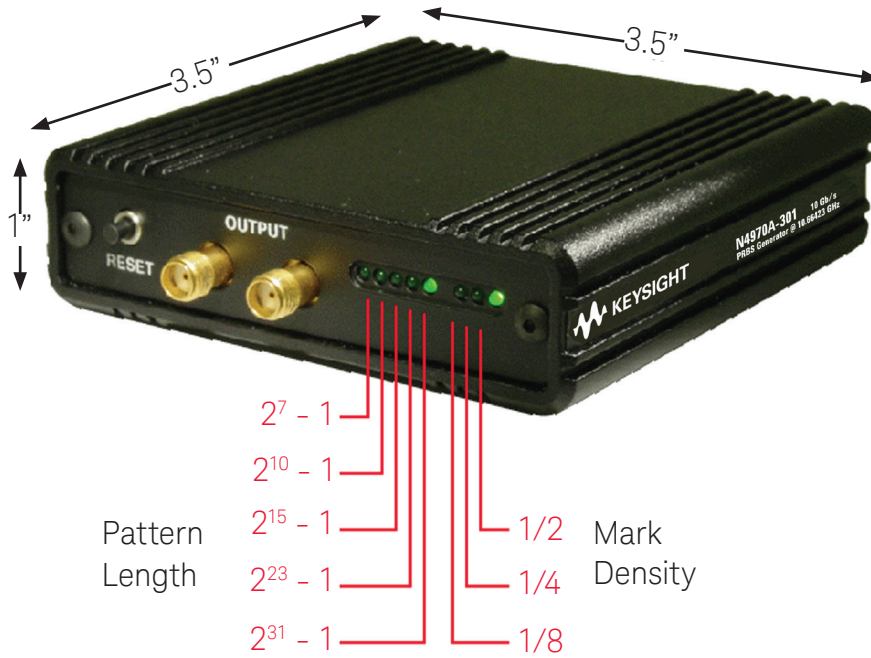


Figure 4. N4970A PRBS generator 10 Gb/s front panel outputs and LED annunciators

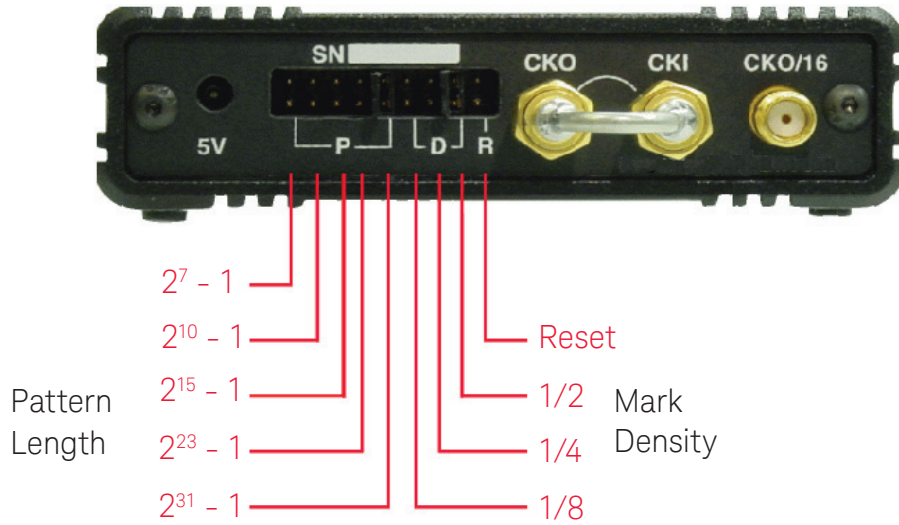


Figure 5. N4970A PRBS generator 10 Gb/s rear panel inputs and controls

## 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, 50 to 60 Hz, 0.6 A
Physical dimensions	Width: 3.5", Height: 1", Depth: 3.5"

## 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

N4970A PRBS generator 10 Gb/s includes 1-year warranty  
N4970A PRBS generator Option 010, extended amplitude range  
N4970A PRBS generator Option 301 - 10.66423 GHz  
N4970A PRBS generator Option 302 - 10.51875 GHz  
N4970A PRBS generator Option 303 - 11.09573 GHz  
N4970A PRBS generator Option 304 - 9.95328 GHz  
N4970A PRBS generator Option 305 - 10.709225 GHz  
N4970A PRBS generator Option 306 - 10.3125 GHz

## Warranty and Calibration Service

For warranty and calibration service information, contact your local authorized Keysight distributor or Keysight sales department.

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