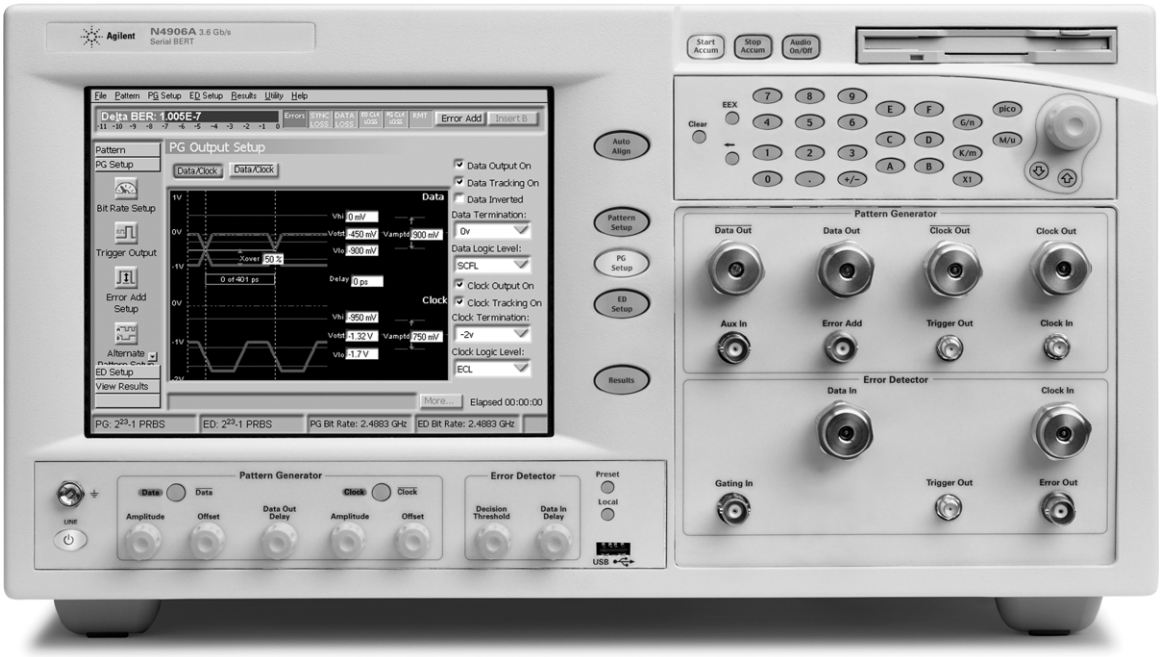
Agilent
N4906A Serial BERT 3.6 Gb/s
Bit Error Ratio Tester

Technical Specifications



General features

Internal hard disk
For local storage of user patterns and data
Removable storage
MS-DOS® compatible 3.5" Superdrive (accepts 1.4 Mbyte HD disks & 120 Mbyte SuperDisks™)
Data entry
Touch-sensitive display, numeric keypad with up/down arrows, analogue feel position controls, or provided USB keyboard and mouse if desired.
Display
Internal 8" (diagonal) backlit LCD touch-screen
Interfaces
GPIB (IEEE 488), LAN ("10 Base T" Ethernet) for printing and file transfer, Parallel/Centronics printer port, external VGA output.

On-line help
Context-sensitive On-Line help is included. Operation, programming and quick-start guides are also included and supplied on MS-Windows® compatible CD-ROM.

Accessories supplied

USB compatible keyboard; mouse; stylus; Quick Start Manual on paper; Quick Start Card.

MS-Windows® compatible CD-ROM containing "PDF" files of Operating, Quick-Start, and Programming guides.

Power Cord; 6x APC-3.5 connector savers (female to female); 6x 50 Ω APC-3.5 (male) terminations, 3x 1 metre SMA (male to male) cables.

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Pattern Generator

Pattern generator parameters

Operating frequency

Operating frequency
50 MHz to 3.6 GHz with external clock (optional)
50 MHz to 3.0 GHz with internal clock source

Internal clock source

Frequency range
50 MHz to 3.0 GHz
Frequency accuracy
±20 ppm

Test patterns

2^N-1 PRBS
2^{31}-1, 2^{23}-1, 2^{15}-1, 2^{10}-1, 2^7-1
2^N PRBS
2^{23}, 2^{15}, 2^{10}, 2^7
Variable mark density
1/8, 1/4, 1/2, 3/4, 7/8
User defined patterns
Variable length patterns from 1 to 8 Mbits
Alternating patterns
Change between two equal length user patterns, each up to 4 Mbits long. Changeover is synchronous with the end of a pattern, under the control of the front panel or the Auxiliary Input.
Error add
Single, continuously variable between $1x10^{-2}$ and $1x10^{-9}$, and user specified bursts of errors.
Pattern editor
Fully flexible pattern editor included with “cut”, “copy” and “paste” functions.

Pattern Generator
Input/Output Specifications

Data and $\overline{\text{Data}}$ outputs
Data and $\overline{\text{Data}}$ outputs are independently settable

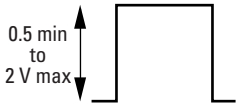
Format: NRZ
Polarity: Normal or Inverted
Amplitude: 0.5 to 2 V in 10 mV steps
Offset: See figure below. 10 mV resolution.
Data outputs on/off: 'Off' goes to high impedance state
Supported terminations:
0 V (LVTTL, SCFL, etc.), –2 V (ECL), +1.3 V (3.3 V PECL), AC-coupled
Jitter (pk-pk): < 20 ps, < 12 ps typical (w/internal source)
Transition time (10–90%): < 42 ps, < 30 ps typical (25C)
Variable crossover: Supported
Clock/data delay range: 0–1 bit period or 10 ns, whichever is less. 1 ps resolution.
Interface: DC-coupled 50 Ω reverse terminated, APC-3.5 connector

Clock and $\overline{\text{Clock}}$ outputs
Clock and $\overline{\text{Clock}}$ outputs are independently settable

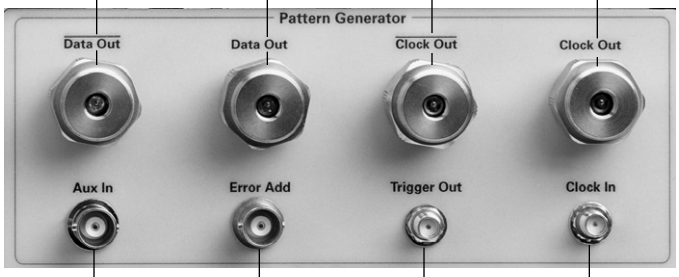
Amplitude: 0.5 to 2 V in 10 mV steps
Offset: See figure below.
10 mV resolution.
Clock outputs on/off: 'Off' goes to high impedance state
Supported terminations:
0 V (LVTTL, SCFL, etc.), –2 V (ECL), +1.3 V (3.3 V PECL), AC-coupled
Transition time (10–90%): < 42 ps, < 35 ps typical (25C, 3 GHz)
Interface: DC-coupled 50 Ω reverse terminated, APC-3.5 connector

Intrinsic Clock to data delay is constant at all frequencies.

Data/$\overline{\text{Data}}$/Clock/$\overline{\text{Clock}}$ Amplitudes and Offsets



Termination:	–2 V	0 V	+1.3 V
Maximum High Level:	0 V	2.5 V	2.5 V
or			
Minimum Low Level:	–3 V	–3 V	–3 V



Auxiliary input
This has two functions.
1. Blanks the data outputs to allow the user to create bursts of data
2. If in Alternating Pattern mode, used to change between 'A' and 'B' patterns

Minimum pulse width: 128 clock periods
Interface: TTL compatible, 50 Ω BNC female connector

Clock input
Allows connection of an external clock source in order to extend the operating range of the instrument. Recommended clock sources are the Agilent E4422B and the 83752A.

Frequency range: 50 MHz to 3.6 GHz
Amplitude range: +3 dBm to –3 dBm
Interface: SMA female 50 Ω, DC coupled to 0 V

Error add input
This allows injection of single errors by an external pulse generator into the transmitted test pattern synchronous with the rising edge of the pulse

Minimum pulse width: 128 clock periods
Interface: TTL compatible, 50 Ω BNC female connector

Trigger output
Provides a pulse to trigger a communication analyzer etc. It has two modes:
1. Divided Clock mode: pulses at 1/8th of the clock rate.
2. Pattern mode: pulse at a settable bit position within the pattern.

Min.pulse width: (Pattern mode) 64 bits
Output levels: High –0.3 V, Low –0.8 V
Interface: 50 Ω SMA female

Error Detector

Error detector parameters

Operating frequency
50 MHz to 3.6 GHz.
Test patterns
As specified for Pattern Generator
Auto-align
Includes synchronizing, data polarity, clock/data align, clock invert, 0/1 threshold center.
Data in delay
Manual Data In Delay/Auto Clock-Data Align
Threshold setting
Manual set, Average DC level set, Auto 0/1 center
Synchronization
Manual, Automatic, Burst, Capture. Sync threshold adjustable from 10^{-1} to 10^{-9}.

Results

Accumulated measurements may be run once, repetitively or manual start/stop.
Delta (instantaneous) BER always available.

Accumulation

Time
Accumulate for periods from 1 second to 100 days
Errors
Until at least 10/100/1000 errors
Bits
$10E^{7}$ to $10E^{15}$ bits

Results are logged periodically to the hard disk for later export (in 'CSV' format) and analysis in a PC spreadsheet program.

Result displays

Results are displayed under the following headings.

Delta BER results
Delta Error Ratio, Delta Error Count, Graph of BER vs Time
Accumulated results
Bit Count, Error Ratio, Error Count, Errored One Count, Errored Zero Count, Error Free Seconds, Errored Seconds, Elapsed Accumulation Time, Sync Loss Seconds, Power Loss Seconds, Graph vs Time
Burst mode results
Burst Duty Cycle, Burst Sync Ratio, Total Burst Count, BAD Burst Count
Eye results
Eye Width, Eye Height, Eye Voltage Center value, Eye Time Center value, Delta Error Ratio at Eye Center on completion of Autoalign

Audible error indicator

Selectable to indicate Isolated Errors, Delta Error Ratio, Errors above user-defined threshold. On/Off Volume Control. Audible pitch changes, with higher pitch corresponding to higher BER.

Error Detector
Input/Output Specifications

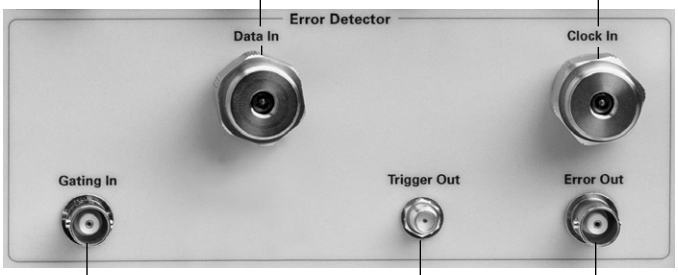
Data input

Polarity: Normal or Inverted
Input amplitude: 0.1 to 2 V (typical)
Threshold range: +3 to –3 V
Threshold resolution: 0.5 mV
Terminations: Via 50 Ω to –2 V, 0 V, +1.3 V
Data input delay range: 0–1 bit period, or 10 ns whichever is less. 1 ps resolution
Interface: DC-coupled 50 Ω, APC-3.5 female connector

Clock input

Clock Input functions—switchable termination voltages, input frequency measurement, clock invert.

Bit rate: 50 MHz to 3.6 GHz
Data sampling clock edge: Selectable Rising or Falling
Input amplitude: 0.2 to 2 V (typical)
Terminations: Via 50 Ω to –2 V, 0 V, +1.3 V
Interface: DC-coupled 50 Ω, APC-3.5 female



Gating input

This is used to inhibit error counting

Minimum pulse width: 128 clock periods
Interface: TTL compatible, BNC female connector

Error output

Provides a pulse if one or more errors have been detected within the preceding 128 bit block.

Pulse width: 64 bits
Output levels: High +2.4 V, Low +0.4 V
Interface: DC-coupled, reverse terminated BNC female connector

Trigger output

Provides a pulse to trigger a communication analyzer etc. It has two modes:

1. Divided Clock mode: pulses at 1/8th of the clock rate.
2. Pattern mode: pulse at a fixed bit position within the pattern.

Pulse width (Pattern mode): 64 bits
Output levels: High –0.3V, Low –0.8 V
Interface: 50 Ω SMA female

External parameters

Environmental

Warm-up time
30 minutes
Operating temperature range to specification
10 to 45 °C
Humidity
15 to 95% at 45 °C non-condensing

Electrical

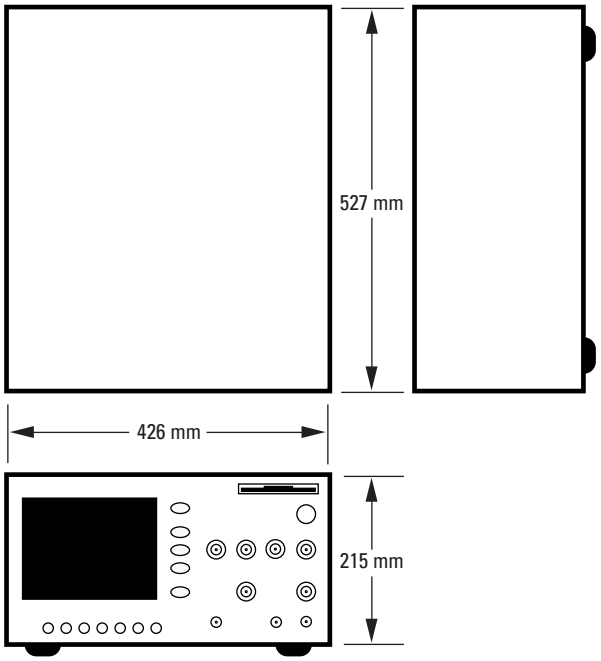
Supply voltage parameters
90 V–250 V AC, 50–60 Hz
Power consumption
< 300 W
EMC
EU EMC Directive (CE-Marked)

Support

Warranty
1 year
Calibration
2 year cycle, return to Agilent Technologies

Physical

Dimensions
426 W x 215 H x 527 D mm approx (16.8” W x 8.5” H x 20.7” D approx)



Weight
23 kg (50 lbs)

Ordering Information

❑ **N4906A Serial BERT**	Serial BERT 3 Gb/s (for 3.0 Gbit/s BER measurement and analysis with internal clock source, 3.6 Gbit/s with external clock source)
❑ **Clock Source**	Add E4422B 4.0 GHz external synthesized signal source
❑ **Option N4906A-0B1**	Hard copy programming manuals
❑ **Option N4906A-AX4**	Mounting kit for 19" rack, without handles
❑ **Option N4906A-AXE**	Mounting kit for 19" rack, including front handles

Recommended product accessories

Torque wrench:

❑ **8710-1765**	For APC 3.5 connectors

Cable:

❑ **8120-4948**	1m SMA cable

Blocking capacitor:

❑ **11742A**	45 MHz to 26.5 GHz, APC-3.5 mm

Bias network:

❑ **11612A**	45 MHz to 26.5 GHz, APC-3.5 mm

Attenuators:

❑ **Option 8493C-003**	3 dB APC 3.5 pad
❑ **Option 8493C-006**	6 dB APC 3.5 pad
❑ **Option 8493C-010**	10 dB APC 3.5 pad
❑ **Option 8493C-020**	20 dB APC 3.5 pad

Transition time convertors:

Used to slow the output waveform rise/fall times if desired. SMA male to SMA female connectors.

❑ **15435A**	150 ps output transition time
❑ **15432B**	250 ps output transition time
❑ **15433B**	500 ps output transition time
❑ **15434B**	1000 ps output transition time
❑ **15438A**	2000 ps output transition time

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