

N4951B 17/32 Gb/s Pattern Generator Remote Head with 5 Tap De-Emphasis



Features

- Integrated 5-tap de-emphasis
- Tap weight calculation tool
- Integrated amplitude control
- Full data rate pattern generator
- Compatible with the N4960A Serial BERT 17/32 Gb/s

Description

The new Keysight Technologies, Inc. N4951B pattern generator de-emphasis options add integrated 5-tap de-emphasis (1 pre-cursor, 3 post cursors) to the pattern generator remote head operating up to 32 Gb/s. The new de-emphasis options are available in 17 Gb/s and 32 Gb/s versions. The de-emphasis head provides designers with the signal pre-distortion capability required for transmitter emulation when characterizing receivers, backplanes, and systems.

De-emphasis tap weight computation is incorporated into the N4980A Multi-instrument BERT software. It allows the user to easily calculate tap weights from a frequency response measurement or simulation s-parameters.

N4951B-D17/-D32 Pattern Generator 5 Tap De-Emphasis

Remote Head Specifications

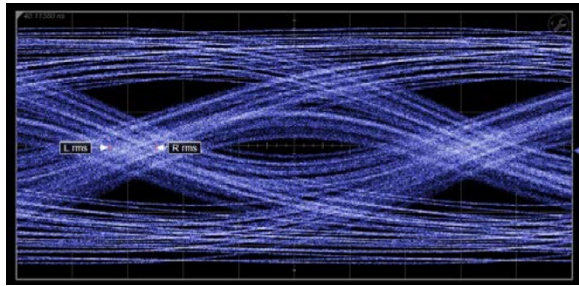
| | |
|---------------------------|--|
| Configuration | Remote mountable head operates with N4960-CJ0/N4960-CJ1 controller |
| Data Rate Range | |
| N4951B-D32 | 5 to 32 Gb/s |
| N4951B-D17 | 4 to 17 Gb/s |
| Data Rate Resolution | 2 kb/s |
| Pattern selection | |
| PRBS (hardware generated) | $2^n - 1$, $n = 7, 9, 10, 11, 15, 23, 29, 31, 33, 35, 39, 41, 45, 47, 49, 51$ |
| Telecom/Datacom | K28.3, K28.5, K28.7, CJPAT, CJTPAT, CRPAT, JSPAT, JTSPAT |
| Clock | $\div 2, \div 4, \div 8, \dots, \div 64$. $\div 2 = 0101$, $\div 4 = 0011, \dots$, $\div 64 = 32 \text{ 0's followed by } 32 \text{ 1's}$ |
| User | 1 bit to 8 Mb. |
| Pattern Invert | Available for all patterns |
| Error Injection | Single or uniform rate |
| Error Injection Rates | 10^{-n} , $n = 3, 4, 5, 6, 7, 8, 9$ |
| Output Configuration | Differential. May be operated single end without unused output terminated into 50 Ω . AC Coupled with internal bias tee. |
| Output Connectors | Type 2.4 mm female |
| Output Amplitude | 300 mV (p-p) to 1.5 V (p-p), single ended |
| De-emphasis | |
| Configuration | 5-tap: pre-cursor, post-cursor 1, post-cursor 2, post-cursor 3 |
| Pre-cursor | 0 to +30 dB ¹ |
| Post-cursor 1 | 0 to -30 dB ¹ |
| Post-cursor 2 | -30 to +30 dB ¹ |
| Post-cursor 3 | -30 to +30 dB ¹ |
| Offset Voltage Range | -2 V to +2 V. Offset range limited by Termination Voltage |
| Termination Voltage Range | -2 V to +2 V. Termination range limited by Offset Voltage |
| Rise/fall time (20-80%) | <15 ps nominal ² |
| Jitter ^{2, 3} | <700 fs rms nominal |
| Indicators | Ch ID – connected to N4960A channel Atten – error condition occurred and logged in Error Log On – data output on |

1. Cursor amplitudes are specified relative to the preceding cursor e.g. post-cursor 1 amplitude is relative to the main cursor amplitude; post-cursor 2 amplitude is relative to post-cursor 1; post-cursor 3 amplitude is relative to post-cursor 2; pre-cursor amplitude is relative to post-cursor 3.

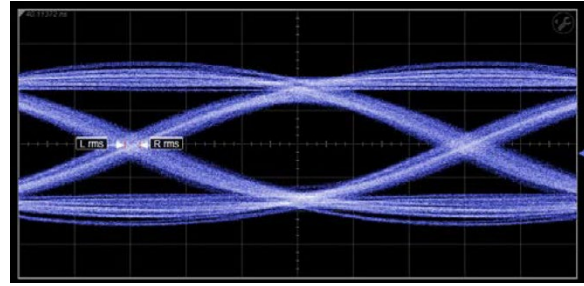
2. At 28 Gb/s.

3. Jitter rms is measured at on an eye diagram from 86100A DCA with 70 GHz remote heads and precision timebase, N4960A driven with external clock e.g. E8257D.

Example of a 28 Gb/s signal passing through 8 inch of printed circuit board trace



No de-emphasis



De-emphasis equalization applied

Simplify tap weight computation

The N4980A Multi-instrument BERT software includes a powerful de-emphasis tap weight computation tool that simplifies the process of computing tap weights, reducing the time required to a few seconds. Starting from a measured or simulated s-parameter file, the software calculates the minimum tap values necessary to create the ideal compensation filter response. The user can specify which tap configurations to optimize, so different solutions with different combinations of pre- and post-cursors is available. Once the data has been analyzed, the software tool converges on the FIR implementation with the optimal fit, which is displayed along with the target response. A measurement cursor provides the error magnitude between the target and realized filter functions at any frequency the user selects. When the user is satisfied with the results, a single click loads the computed tap weights into the N4951B-D17/-D32 pattern generator head.



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