

# PatternPro® Error Detector

## PED3200 and PED4000 Series Datasheet



The PED3200 and PED4000 series programmable error detectors offer effective multi-channel BER for stressed receiver testing of data communications designs. Now available with the choice of AC or DC coupled inputs, as well as full or half-rate clock inputs.

### Key performance specifications

- Data rate range:
  - PED3200 series: 3 Gb/s to 32 Gb/s
  - PED4000 series: 4 Gb/s to 40 Gb/s

### Key features

- Available with 1 or 2 input channels (independent data on each channel)
- PRBS and user defined patterns
- High input sensitivity and bandwidth
- AC or optional DC coupled differential data inputs
- Half rate AC coupled clock input standard; full rate clock input option is available
- Auto-adjustment or manual adjustment of data to clock phase and threshold
- Auto-synchronization to input pattern
- PC GUI software:
  - Remote instrument control
  - Bathtub and Contour Analysis
  - JTOL measurements
  - J2/J9 measurements
- Front panel touch screen GUI or USB TMC computer control

### Applications

- 25 Gb/s testing for 100G Ethernet
- 32 Gb/s DPQPSK testing
- Semiconductor and component testing
- Design validation and production testing
- Transmitter testing and validation up to 40 Gb/s

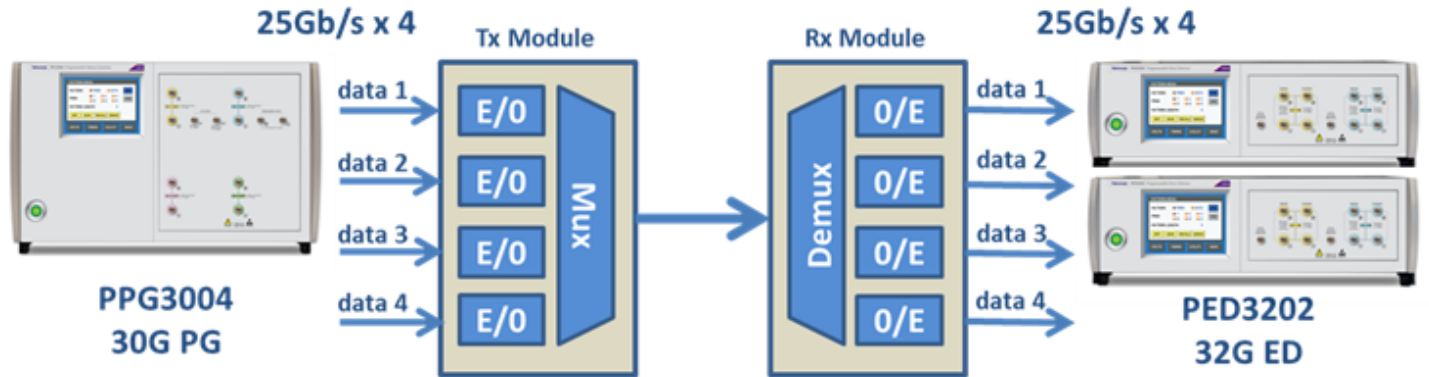
### Product description

The Tektronix PED line of high sensitivity and high bandwidth error detectors offer single and two-channel standalone configurations capable of BER measurement at data rates up to 40 Gb/s. The PED products support either PRBS or user-defined data patterns, with simple to use automatic or manual alignment of input clock and data, and pattern synchronization. The PED product makes an ideal companion for the Tektronix PPG pattern generator product family.

The PED line of error detectors are offered in two data input configurations:

- The DC coupled input option can be used either as AC or DC coupled as long as the resulting input falls within the allowed voltage window of -0.6 to 0.2 V. A DC threshold output is provided and, when connected to the unused /data input, allows operation with single ended data input signals.
- The AC coupled input option allows larger amplitude AC coupled inputs and has built-in differential and single ended programmable threshold adjustments.

Also, either half rate or full rate clock options are available.



100G Ethernet four lane end-to-end test using PED3200 series error detector and PPG3000 series pattern generator

## Specifications

All specifications apply to all models unless noted otherwise.

### Data input

#### Data rate

<b>Range (PED3200)</b>	3 Gb/s to 32 Gb/s
<b>Range (PED4000)</b>	4 Gb/s to 40 Gb/s

**DC coupled input option** Ground referenced CML like input. AC coupled data input permitted within allowed voltage window.

<b>Differential amplitude</b>	25 mV to 1.0 V, typical
<b>Single-ended amplitude</b>	25 mV to 750 mV, typical
<b>Voltage window</b>	-0.6 V to +2.0 V
<b>Termination voltage</b>	0.0 V
<b>Connector</b>	2.4 mm

**AC coupled input option** AC coupled input with broadband bias tees featuring a 3 dB bandwidth of 10 kHz to >50 GHz.

<b>Differential amplitude</b>	6 mV to 1.0 V, typical
<b>Single-ended amplitude</b>	6 mV to 750 mV, typical
<b>Termination voltage</b>	0.0 V
<b>Connector</b>	2.4 mm

### Full rate clock input option

<b>Amplitude</b>	AC coupled, full rate
<b>Differential range</b>	300 mV <sub>P-P</sub> to 1.0 V <sub>P-P</sub>
<b>Single-ended range</b>	300 mV <sub>P-P</sub> to 1.0 V <sub>P-P</sub>
<b>Connector</b>	2.4 mm
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<b>Clock to data phase adjustment</b>	100 ps (-50 ps to +50 ps)

### Half rate clock input option

<b>Amplitude</b>	AC coupled, half rate
<b>Differential range</b>	300 mV <sub>P-P</sub> to 1.0 V <sub>P-P</sub>
<b>Single-ended range</b>	300 mV <sub>P-P</sub> to 1.0 V <sub>P-P</sub>
<b>Connector</b>	2.4 mm
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<b>Clock to data phase adjustment</b>	100 ps (-50 ps to +50 ps)

### Data patterns

<b>Pattern type</b>	Data (from memory) or PRBS. Length and type are individually settable on each channel.
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<b>Built-in PBRS patterns</b>	2 <sup>n</sup> -1 (n = 7, 9, 11, 15, 23, 31)
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<b>User-defined pattern depth</b>	<b>Number of channels</b>	<b>Single bit pattern resolution</b>
	1 channel	4 Mbit
	2 channels	2 Mbit

### Mechanical

<b>Front panel width (with mounting tabs)</b>	48.3 cm (19.0 in)
<b>Height</b>	13.3 cm (5.25 in)
<b>Width</b>	45.1 cm (17.75 in)
<b>Depth (rack mount)</b>	34.3 cm (13.5 in)
<b>Weight (1 channel)</b>	11.1 kg (24.5 lbs)
<b>Operating temperature</b>	0 °C to 50 °C (32 °F to 122 °F)

## Ordering information

### Models

PED3201	32 Gb/s Programmable error detector, 1 channel
PED3202	32 Gb/s Programmable error detector, 2 channels
PED4001	40 Gb/s Programmable error detector, 1 channel
PED4002	40 Gb/s Programmable error detector, 2 channels

### Options

#### Instrument options

PED3201 AC	AC coupled input option for PED3201
PED3201 DC	DC coupled input option for PED3201
PED3201 HCLK	Half rate clock input option for PED3201
PED3201 FLCLK	Full rate clock input option for PED3201
PED3202 AC	AC coupled input option for PED3202
PED3202 DC	DC coupled input option for PED3202
PED3202 HCLK	Half rate clock input option for PED3202
PED3202 FLCLK	Full rate clock input option for PED3202
PED4201 AC	AC coupled input option for PED4201
PED4201 DC	DC coupled input option for PED4201
PED4201 HCLK	Half rate clock input option for PED4201
PED4201 FLCLK	Full rate clock input option for PED4201
PED4202 AC	AC coupled input option for PED4202
PED4202 DC	DC coupled input option for PED4202
PED4202 HCLK	Half rate clock input option for PED4202
PED4202 FLCLK	Full rate clock input option for PED4202

#### Power plug options

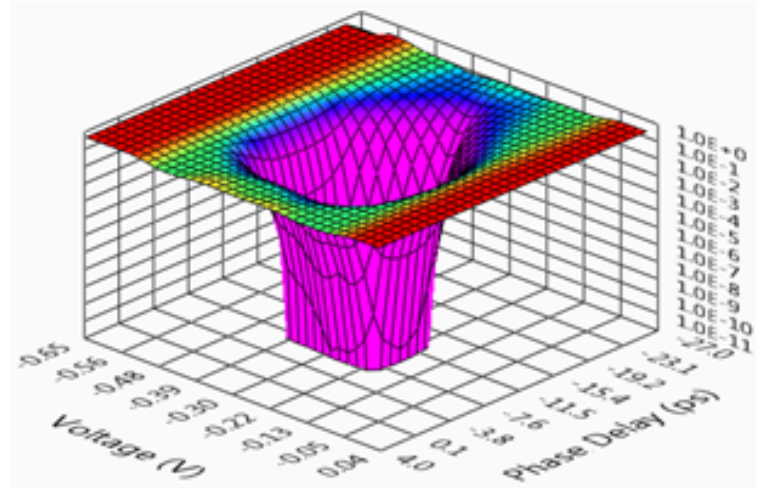
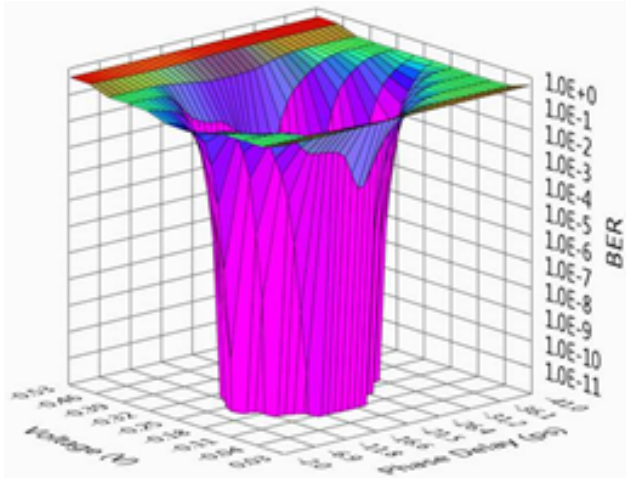
Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 110/120 V, 60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A99	No power cord

User manual

Opt. L0

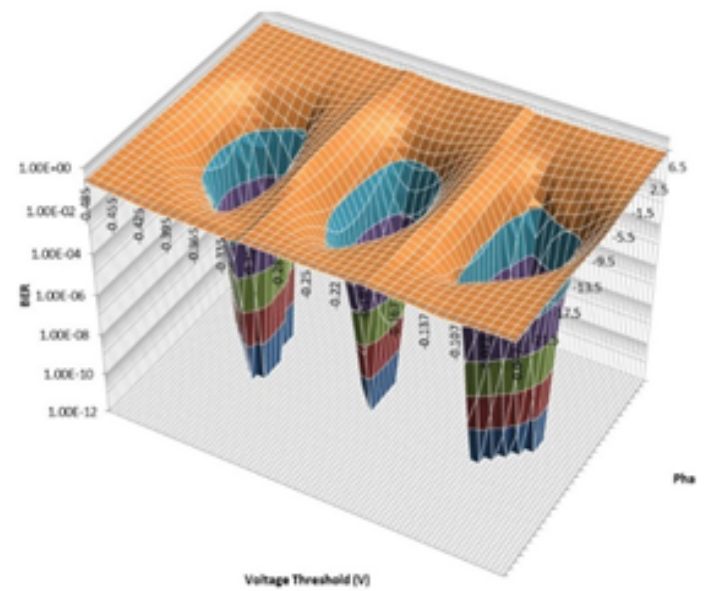
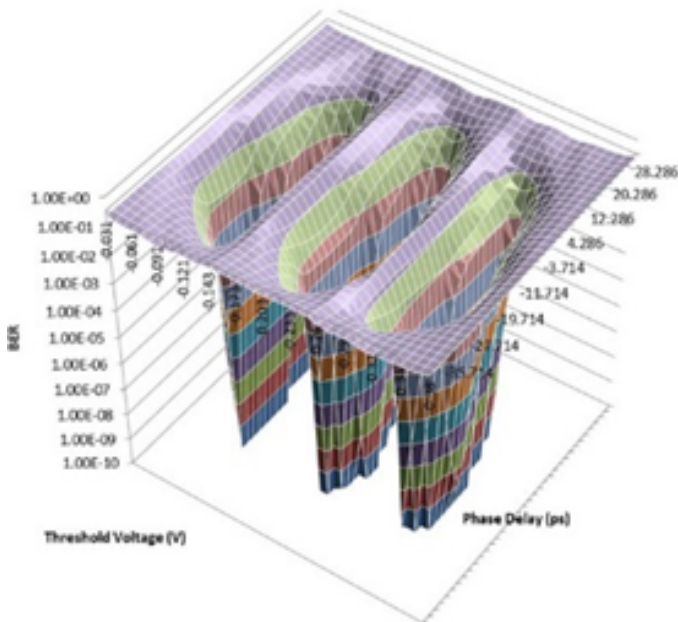
English manual

PC Software GUI and Analysis Tool



25 Gb/s and 32 Gb/s NRZ Signal Contour Analysis

A PC-based software tool for remotely controlling the instrument, gathering and saving data (such as bathtub and contour plots), and performing data systems analysis (J2/J0 and JTOL measurements) is available for use with both PED3200 and PED4000 error detectors. The tool is an executable file and is available upon request from Tektronix.



14 Gb/s and 25 Gb/s Signal Contour Analysis



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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\* European toll-free number. If not accessible, call: +41 52 675 3777

Updated 10 April 2013

**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com).

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31 Mar 2014

65W-28638-2

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