

# PatternPro<sup>®</sup> 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. Available with full or half rate clock inputs.

### Notice to EU customers

This product is not updated to comply with the RoHS 2 Directive 2011/65/EU and will not be shipped to the EU. Customers may be able to purchase products from inventory that were placed on the EU market prior to July 22, 2017 until supplies are depleted. Tektronix is committed to helping you with your solution needs. Please contact your local sales representative for further assistance or to determine if alternative product(s) are available. Tektronix will continue service to the end of worldwide support life.

### 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

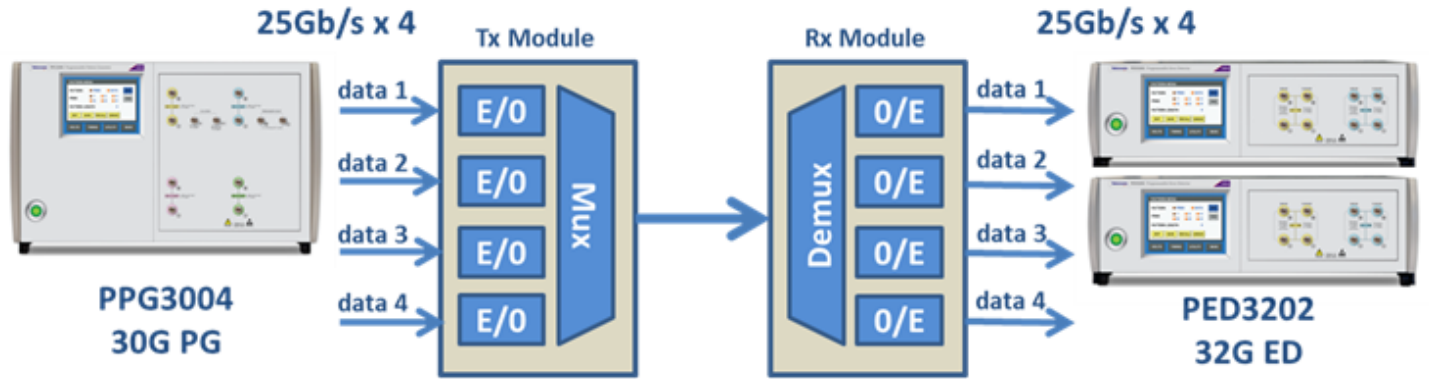
- High input sensitivity and bandwidth
- Auto-adjustment or manual adjustment of data to clock phase and threshold
- Auto-synchronization to input pattern
- PC GUI software:
  - Remote instrument control
  - Bathtub and Contour Analysis
  - JTOL measurements
  - J2/J9 measurements
- Front panel touch 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.



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

## Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

### Data input

**Data rate**

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

**Data input**

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

Differential amplitude	6 mV to 1.0 V <sub>p-p</sub>
Single-ended amplitude	6 mV to 750 mV <sub>p-p</sub>
Termination voltage	0.0 V
Input impedance	50 Ω
Connector	2.4 mm

ESD sensitivity	250 V, Human body model (HBM)
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### Sampling point set points

**Eye edge BER threshold**

Range	1e-1 to 1e-11
Resolution	1e-1

**Sync BER threshold**

Range	1e-1 to 1e-8
Resolution	1e-1

### Full rate clock input option

Amplitude	AC coupled, full rate
Differential range	300 mV <sub>P,P</sub> to 1.0 V <sub>P,P</sub>
Single-ended range	300 mV <sub>P,P</sub> to 1.0 V <sub>P,P</sub>
Connector	2.4 mm
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Clock to data phase adjustment	100 ps (-50 ps to +50 ps)
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ESD sensitivity	1000 V, Human body model (HBM)

### Half rate clock input option

Amplitude	AC coupled, half rate
Differential range	300 mV <sub>P,P</sub> to 1.0 V <sub>P,P</sub>
Single-ended range	300 mV <sub>P,P</sub> to 1.0 V <sub>P,P</sub>
Connector	2.4 mm
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Clock to data phase adjustment	100 ps (-50 ps to +50 ps)
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ESD sensitivity	1000 V, Human body model (HBM)

### Data patterns

Pattern type	Data (from memory) or PRBS. Length and type are individually settable on each channel.
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#### PRBS pattern lengths

2 <sup>7</sup> - 1 bits	Polynomial = X <sup>7</sup> + X <sup>6</sup> + 1
2 <sup>9</sup> - 1 bits	Polynomial = X <sup>9</sup> + X <sup>5</sup> + 1
2 <sup>11</sup> - 1 bits	Polynomial = X <sup>11</sup> + X <sup>9</sup> + 1
2 <sup>15</sup> - 1 bits	Polynomial = X <sup>15</sup> + X <sup>14</sup> + 1
2 <sup>23</sup> - 1 bits	Polynomial = X <sup>23</sup> + X <sup>18</sup> + 1
2 <sup>31</sup> - 1 bits	Polynomial = X <sup>31</sup> + X <sup>28</sup> + 1

User-defined pattern depth	Number of channels	Single bit pattern resolution
	1 channel	4 Mbit
	2 channels	2 Mbit

### Mechanical

Front panel width (with mounting tabs)	48.3 cm (19.0 in)
Height	13.3 cm (5.25 in)
Width	45.1 cm (17.75 in)
Depth (rack mount)	34.3 cm (13.5 in)

## Mechanical

Weight (1 channel)	11.1 kg (24.5 lbs)
Operating temperature	0 °C to 40 °C (32 °F to 104 °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 HCLK	Half rate clock input option for PED3201
PED3201 FLCLK	Full rate clock input option for PED3201
PED3202 HCLK	Half rate clock input option for PED3202
PED3202 FLCLK	Full rate clock input option for PED3202
PED4001 HCLK	Half rate clock input option for PED4001
PED4001 FLCLK	Full rate clock input option for PED4001
PED4002 HCLK	Half rate clock input option for PED4002
PED4002 FLCLK	Full rate clock input option for PED4002

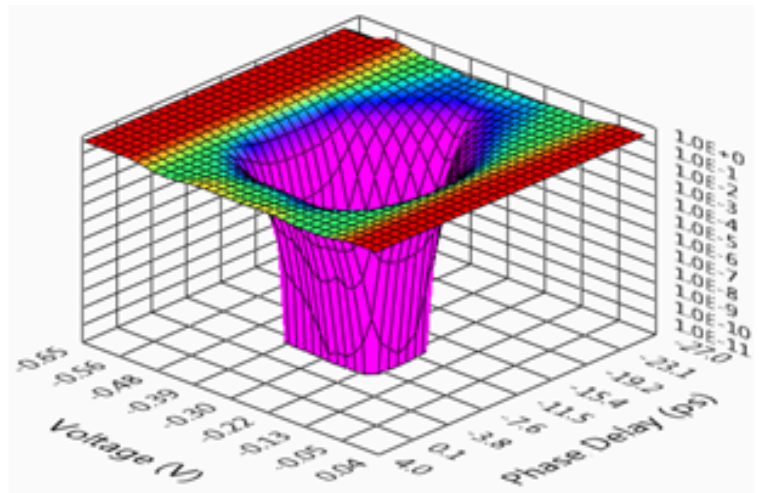
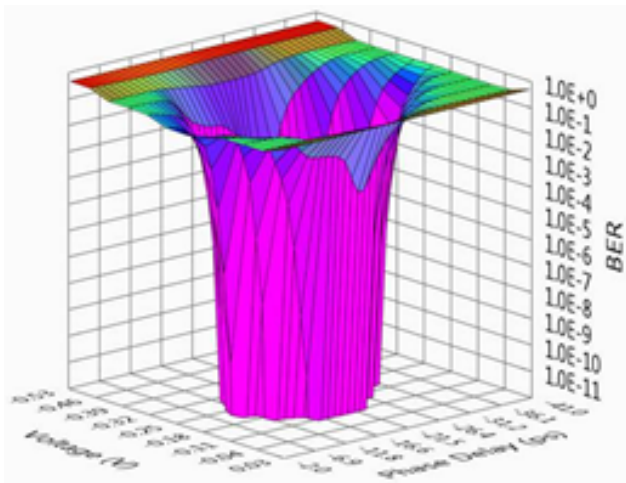
#### Power plug options

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, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A99	No power cord

### Manuals

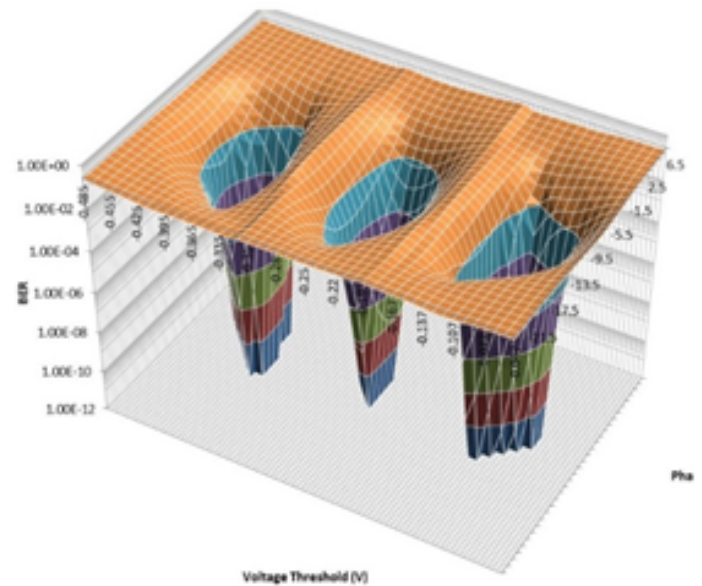
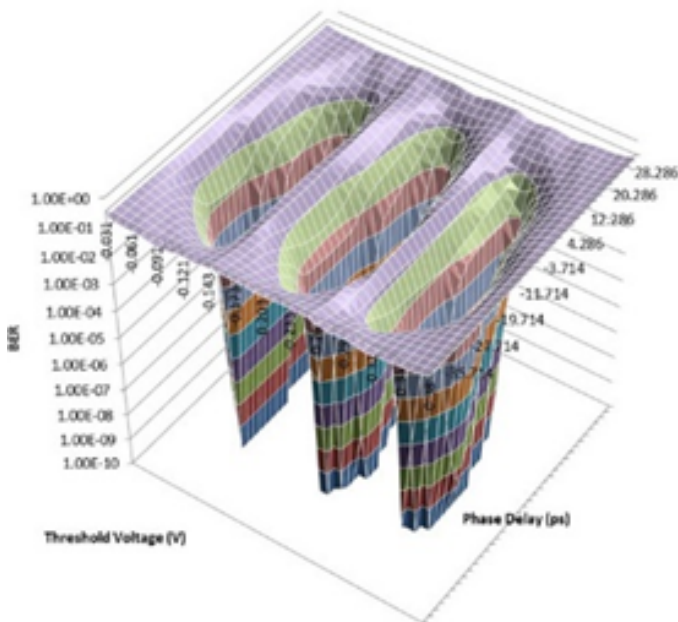
071-3413-xx	Printed PPG/PED Installation & Safety Instructions
077-1095-xx	PED3200/PED4000 Series Programmable Error Detector User Manual, PDF-only, downloadable from Tektronix.com

### 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/J9 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 PAM4 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

**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.tek.com](http://www.tek.com).

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