# 12.5 Gb/s PatternPro® Programmable Pattern Generator

## PPG1251 Series Datasheet

The Tektronix PPG1251 PatternPro® programmable pattern generator provides pattern generation for high-speed Datacom testing.

### 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

- 800 Mb/s to 12.5 Gb/s data rate range
- 250 mV to 2.0 V output amplitude
- -2.0 V to 3.0 V offset window
- 35% to 65% programmable crossing point

### Key features

- Programmable data rate, amplitude, offset, and crossing point
- Differential data, pattern trigger, clock/n, and full rate clock outputs
- Integrated programmable clock source
- PRBS and user defined patterns
- Option PPG1251 JIT includes SJ, PJ, and RJ insertion
- Front panel touch screen GUI and USB computer control

### Applications

- High Speed Serial data testing
- Semiconductor & component testing
- R&D design verification

## Product description

The Tektronix PPG1251 is a fully programmable instrument with an integrated clock source. This pattern generator features high-performance DC coupled limiting amplifiers that result in accurate, fast rise time data signals. Option PPG1251 JIT adds built-in impairments, including SJ, PJ, and RJ insertion.

# Specifications

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

## Data outputs

| | |
|---|---|
| **Amplitude** | Differential/complimentary output, Positive and negative differential outputs are independently programmable. |
| **Single-ended** | 250 mV to 2.0 V |
| **Differential** | 500 mV to 4.0 V |
| **Rise/fall time** | Scope bandwidth can impact the measured signal rise time. |
| **20 to 80%** | 17 ps, typical |
| **10 to 90 %** | 25 ps, typical |
| **Offset** | -2.0 V to +3.0 V window, programmable/adjustable |
| **Crossing point range** | 35% to 65% typical |
| **Data output jitter** | 600 fs, RMS RJ typical at 12.5 Gb/s using PRBS$2^7$-1 pattern |
| **Output impedance** | |
| **50 Ω** | Single-ended |
| **100 Ω** | Differential |
| **Termination voltage** | -2.0 to +3.3 V, programmable/adjustable |
| **Connector type** | SMA |

## Clock outputs

| | |
|---|---|
| **Full rate clock output** | AC coupled, single-ended |
| **Amplitude** | 400 $mV_{p-p}$, typical |
| **Trigger output** | Programmed as pattern trigger or clock/n |
| **Amplitude** | -600 mV to 0 V, DC coupled |
| **Connector type** | SMA |

## Data patterns

| | |
|---|---|
| **Pattern type** | Data (from memory) or PRBS |
| **Data rate** | Programmable/adjustable |
| **Range** | 800 Mb/s to 12.5 Gb/s |
| **Resolution** | 10 kb/s |
| **Accuracy** | ±5 ppm |
| **PRBS pattern lengths** | |
| **$2^7$ -1 bits** | Polynomial = $X^7 + X^6 + 1$ |
| **$2^{15}$ - 1 bits** | Polynomial = $X^{15} + X^{14} + 1$ |

## Data patterns

| | |
|---|---|
| **$2^{23}$ - 1 bits** | Polynomial = $X^{23} + X^{18} + 1$ |
| **$2^{31}$ - 1 bits** | Polynomial = $X^{31} + X^{28} + 1$ |
| **Data pattern depth** | 512 kbit |
| **Programmable error insertion** | Single bit |

## Jitter insertion option (PPG1251 JIT)

| | |
|---|---|
| **High frequency jitter insertion** | Peak-to-peak range for all sources combined. |
| **Amplitude range** | 0 to 200 $ps_{p-p}$ |
| **Built-in sine source** | Programmable from either the front panel touch screen or remote control. |
| **Frequency range** | 5 kHz to 200 MHz |
| **Amplitude range** | 0 to 200 $ps_{p-p}$ |
| **Built-in random noise source** | Programmable from either the front panel touch screen or remote control. |
| **Amplitude range** | 0 to 25 ps RMS |
| **Low frequency sine/periodic jitter** | Programmable from either the front panel touch screen or remote control. |
| **Frequency range** | 10 Hz to 1 MHz |
| **Maximum amplitude** | 100 UI @ 0 to 10 kHz, 10 UI @ 100 kHz, 1 UI @ 1 MHz |
| **Accuracy** | ±10%, typical |
| **SSC Modulation** | Programmable from either the front panel touch screen or remote control |
| **Modulation frequency** | 28 kHz to 34 kHz |
| **Frequency deviation** | 0 to 0.5% peak-to-peak |
| **Modulation type** | down/center/up spread |
| **Modulation waveform** | triangular |
| **External modulation input** | |
| **Frequency range** | Frequency range 1 kHz to 900 MHz, AC coupled, 3 dB bandwidths |
| **Amplitude range** | 0 to 200 $ps_{p-p}$ |
| **Maximum input** | 2 $V_{p-p}$ |
| **Connector type** | SMA |

## External clock inputs

| | |
|---|---|
| **Frequency range** | 6.25 GHz to 12.5 GHz |
| **Input signal** | 400 $mV_{p-p}$, typical, AC coupled |
| **Maximum input signal** | 1 $V_{p-p}$ |
| **Input impedance** | 50 Ω, AC-coupled |
| **Reference clock** | |
| **Input frequency range** | 10 MHz ±10 ppm |
| **Input signal** | 1 $V_{p-p}$, typical, 50% duty square wave |
| **Maximum input signal** | 6 $V_{p-p}$, ±10 V DC, damage threshold |
| **Input impedance** | 50 Ω, AC-coupled |

## External clock inputs

| | |
|---|---|
| **Output signal** | 1.2 $V_{p-p}$, typical, square wave |
| **Connector type** | BNC |

## Control interfaces

| | |
|---|---|
| **Front panel touchscreen GUI** | Yes, edit all instrument settings. |
| **Computer programmable interface** | USB TMC, program all instrument settings. |

## Physical characteristics

| | |
|---|---|
| **Front panel width (with mounting tabs)** | 48.3 cm (19.0 in) |
| **Height** | 13.3 cm (5.25 in) |
| **Depth (rack mount)** | 35.1 cm (13.8 in) |
| **Weight** | 11.1 kg (24.5 lbs) |
| **Operating temperature** | 0 °C to 40 °C (32 °F to 104 °F) |

# Ordering information

## Models

| | |
|---|---|
| **PPG1251** | 12.5 Gb/s programmable pattern generator, 1 channel |

## Options

### Instrument options

| | |
|---|---|
| **PPG1251 JIT** | Jitter insertion option for PPT1251 |

### 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 |
| **077-1091-xx** | Tektronix PPG1251 PatternPro® Programable Pattern Generator User Manual, PDF-only, downloadable from Tektronix.com |

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Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.

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