PG-3 ultra-fast rise time pulse generator

- 20 ps rise time (19 ps typical), 10-90%
- 1000 mV amplitude, 50% duty cycle
- 10 MHz repetition
- Separate trigger output
- USB powered



DESCRIPTION

The PG-3 pulse generator produces a 50% duty cycle square wave pulse train where the positive-going edges have a 10-90% rise time of 20 ps (picoseconds) or less, with a typical rise time of 19 ps.

These ultra-fast edges are useful for a variety of purposes, including bandwidth characterization of oscilloscopes, timedomain reflectometry (TDR), and ultra-wideband (UWB) sources.

The high amplitude (1000 mVpp, typical) helps to keep the signal above the noise in even the most demanding applications. The 10 MHz repetition rate and low jitter enable rapid and reliable measurements even with sampling oscilloscopes.

SPECIFICATIONS

DC characteristics

| Parameter | Notes | Minimum | Typical | Maximum |
|-----------------------|---------|---------|---------|---------|
| Supply voltage | Via USB | 4.8 V | 5 V | 5.5 V |
| Current drain | Via USB | | | 300 mA |
| Operating temperature | | 0 °C | 25 °C | 40 °C |
| Storage temperature | | -20 °C | | 60 °C |

Trigger

Conditions: The trigger and signal output are both connected to individual 50 Ω loads, 25 °C ambient, 5 V supply voltage, 30 minute warmup

| Parameter | Notes | Minimum | Typical | Maximum |
|------------------|-----------------|---------|---------|---------|
| Amplitude | Into 50 Ω | | 1 Vpp | |
| Rise/fall time | 10%-90% voltage | | 400 ps | |
| Output impedance | | | 50 Ω | |
| Output port | | | SMA | |
| Coupling | | | AC | |

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Fast-rise-time output signal

Conditions: The trigger and signal output are both connected to individual 50 Ω loads, 25 °C ambient, 5 V supply voltage, 30 minute warmup

| Parameter | Notes | Minimum | Typical | Maximum |
|-------------------|------------------------------|----------|--------------------------|------------|
| Rise time | 10%-90% voltage ^a | | 19 ps | 20 ps |
| Duty cycle | | | 50% | |
| Pulse frequency | | | 10 MHz | |
| Pulse frequency | | -1 ppm | +/- 500 ppb | +1 ppm |
| tolerance | | | | |
| Jitter (relative) | Relative to trigger output | | 0.6 ps RMS ^b | 2.5 ps RMS |
| | zero-crossing point | | | |
| Jitter (absolute) | Referencing the signal | | <3.9 ps RMS ^b | |
| | output alone, without | | | |
| | regard to the trigger | | | |
| High level | After settling | -100 mV | 0 mV | +100 mV |
| Low level | After settling | -1100 mV | -1000 mV | -900 mV |
| Amplitude | Peak-to-peak | 900 mV | 1000 mV | 1100 mV |
| Overshoot | | | 20% | 30% |
| Settling time | To within ≤1% of long- | | 5 ns | |
| | term average amplitude | | | |
| | (25-35 ns post-edge) | | | |
| Output impedance | | | 50 Ω | |
| Coupling | | | DC | |
| Output port | Mechanically and | | 2.92mm female | |
| | electrically compatible | | | |
| | with SMA connectors | | | |
| Edge shape | | | Gaussian | |

^a Referenced to the short-term average top and bottom of the pulse (2 ns before and after the rising edge) ^b Calculated

PORTS

There are three ports on the pulser: USB-C Power In, Trigger Out, and Signal Out.

USB-C Power In

The USB-C port is located on the same end of the pulse generator as the Trigger Out port. Connect a USB-C cable (not included) to this port and to any USB power source, such as a stand-alone wall adapter, a port on another lab instrument, or a computer. The use of a USB-C to USB-A cable is acceptable.

Trigger Out

The Trigger Out port signal is a square wave synchronized to the Signal Out port output and has a similar amplitude, but its rising and falling edges are slower than those of the Signal Out signal. Unlike the Signal Out port, it is AC coupled. The Trigger Out port is primarily intended for use with sampling oscilloscopes, which require a separate trigger signal (unlike "real time" oscilloscopes, which can trigger on and observe the same signal).

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The delay between the rising edge of the Trigger Out signal and the rising edges of the Signal Out signal is very stable, but those rising edges are not concurrent. Stated differently, the phase of the Trigger Out signal relative to the Signal Out signal is fixed but non-zero.

Signal Out

The Signal Out port emits a fast-rise-time square wave. It is back-terminated to 50 Ω to limit reflections, but for best results the load should also be at 50 Ω .

The length and type of coax and number of adapters between the Signal Out port and the measurement instrument may negatively affect the signal rise time. If possible, directly connect the Signal Out port to the input port of the instrument without any coax between them.

Signal Out is DC coupled and has a DC offset of approximately -500 mV (into 50 Ω). Ensure that the instrument connected to this port can handle a non-zero DC offset safely.

ESD CAUTIONS

Static-sensitive device. Observe standard electronics-lab precautions for handling. Keep trigger and signal outputs capped when not in use.

TYPICAL RESPONSES



All response chart data collected using a pre-production PG-3 pulse generator connected directly to a Tektronix SD-32 50 GHz sampling head attached to a Tektronix 11801C sampling oscilloscope. Spectrum plots are for a single isolated rising edge.

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