PG-2 fast rise time pulse generator

- 30 ps rise time (27 ps typical), 10-90%
- 1000 mV amplitude, 50% duty cycle
- 10 MHz repetition
- Separate trigger output
- USB powered

VOLTATIVE

DESCRIPTION

The PG-2 pulse generator creates a 50% duty cycle square wave pulse train where the positive-going edges have a 10-90% rise time of 30 ps (picoseconds) or less, with a typical rise time of 27 ps.

These fast edges are useful for a variety of purposes, including bandwidth characterization of oscilloscopes, time-domain 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	

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]		27 ps	30 ps
Duty cycle			50%	
Pulse frequency			10 MHz	
Pulse frequency tolerance		-1 ppm	+/- 500 ppb	+1 ppm
Jitter (relative)	Relative to trigger output zero-crossing point		0.6 ps RMS[b]	2.5 ps RMS
Jitter (absolute)	Referencing the signal output alone, without regard to the trigger		<3.9 ps RMS[b]	
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			10%	25%
Settling time	To within ≤1% of long-term average amplitude (25-35 ns post-edge)		5 ns	
Output impedance			50 Ω	
Coupling			DC	
Output port	Tight-tolerance (26.5 GHz bandwidth) type		SMA female	
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 Power In port (labeled "USB-C") 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).

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.

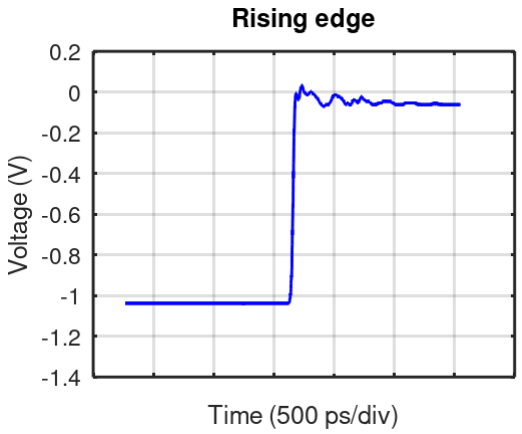
The length and type of coax and number of adapters between the Signal Out port and the measurement instrument may negatively affect the signal rise time. If possible, directly connect the Signal Out port to the input port of the instrument without any coax between them.

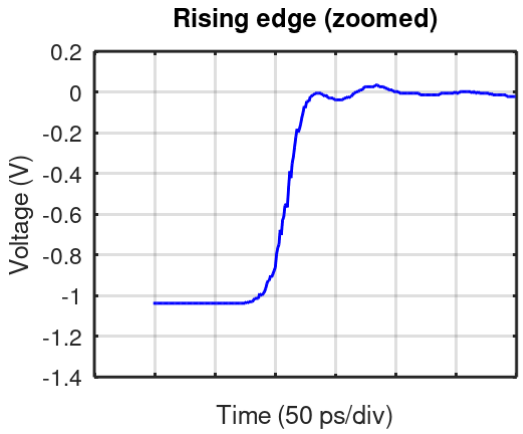
Signal Out is DC coupled and has a DC offset of approximately -500 mV (into 50 Ω). Ensure that the instrument connected to this port can handle a non-zero DC offset safely.

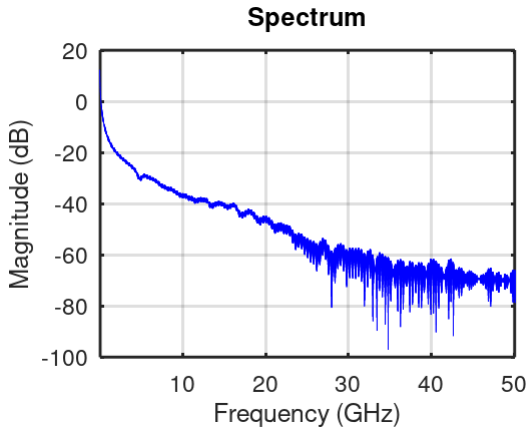
ESD CAUTIONS

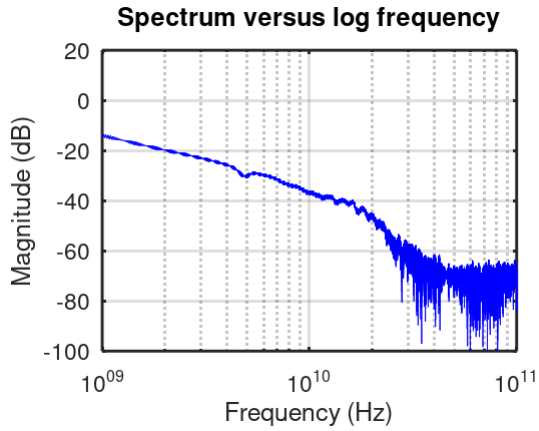
Static-sensitive device. Observe standard electronics-lab precautions for handling. Keep trigger and signal outputs capped when not in use.

TYPICAL RESPONSES









All response chart data collected using pre-production PG-2 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.

PHOTOS