

**Features:**

- 12 ps Falltime
- -5 V Pulse Amplitude
- Adjustable Repetition Rate
- Internally or Externally Triggered



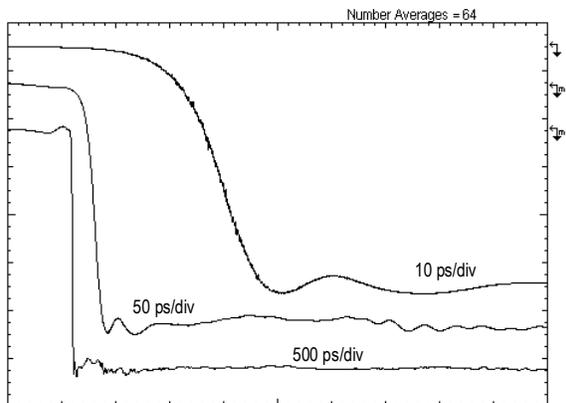
**Applications:**

- Risetime standard for testing oscilloscopes
- High resolution TDR and TDT measurements
- Impulse or step response testing of semiconductors, components, networks, etc.
- Impulse Ultra-WideBand (UWB) RADAR

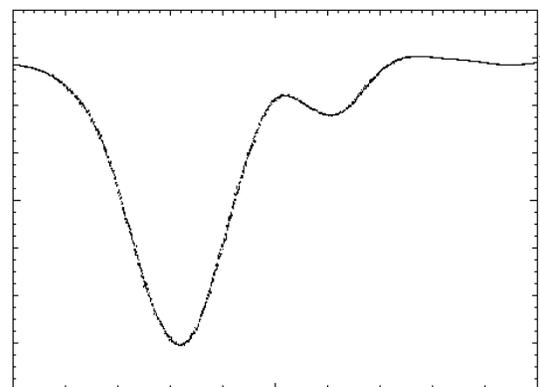
The Model 4015D Pulse Generator produces an ultra-fast pulse of -5 V with 12 ps falltime into 50Ω. The pulse is generated in a small external head that is attached to the main unit via a coaxial cable. This allows the pulse head to be directly connected where it is needed, eliminating the risetime slowing effects of interconnecting coaxial cables.

A -1.9 V, 22 ps impulse can also be generated with the 4015D by attaching the optional Model 5208 Impulse Forming Network to the pulse head output. If two 5208s are connected in cascade, a 1 V, 12.5 GHz monocycle will result. If higher power levels are required, the impulse or monocycle can be amplified by traveling wave tube amplifiers (TWTA).

**Typical Data**



**Pulse Output**  
1 V/div



**Output with Model 5208**  
**Impulse Forming Network**  
 300 mV/div, 10 ps/div

Step Pulse Parameters [1]	
Waveform	5 ns step pulse followed by 10 ns exponential decay
Falltime (10% - 90%)	12 ps typical 15 ps max.
Amplitude	5 V $\pm$ 0.5 V
Polarity	Negative
Baseline	0 V
Step Duration	5 ns
Risetime (90% - 10%)	20 ns
Precursor	< $\pm$ 0.5%
Overshoot	5%
Perturbations	$\pm$ 7%, t < 1 ns
Flatness	$\pm$ 2%, t > 1 ns
Impedance	50 $\Omega$
Spurious Pulses	$\pm$ 10%, t = 11 ns

Impulse Parameters [1, 2]	
Waveform	Impulse
Amplitude	1.9 V
Baseline	0 V
Polarity	Negative
Duration (FWHM)	22 ps
Falltime (10% - 90%)	16 ps
Risetime [3] (80% - 20%)	9 ps
Perturbations	+20%, t = 30 ps $\pm$ 6%, t < 1 ns
Baseline Flatness	$\pm$ 2%, t > 1 ns
Spurious Pulses	$\pm$ 5%, t = 11 ns

Trigger Output	
Impedance	50 $\Omega$
Amplitude	2.3 V
Duration	80 ns
Risetime	900 ps
Note: Not functional with external trigger	

External Trigger Input	
Impedance	50 $\Omega$ , DC
Coupling	AC
Slope	Positive
Amplitude	200 mV to 1 V
Signal Type	Pulse only. Works with 200 mV TDR, ECL or TTL
Risetime	< 3 ns max.
Input Repetition Rate	500 kHz max.
Max. Input	1 Vpp pulse, $\pm$ 5 V DC max.
Kickout Pulse	0.5 Vpp

General Timing	
Rep. Rate	500 KHz to 1 Hz, adjustable in 6 ranges with 10:1 vernier. Also single pulse and external trigger input.
Delay	60 ns with int. rep. rate. 14 ns with ext. trigger
Jitter (rms)	< 1 ps, 1.5 ps max.

General Specifications	
Connectors	Front panel: SMA External pulse head: input 2.92 mm; output available in 2.4 mm or 1.85 mm
Controls	Power, Rep. Rate and Vernier
AC Power	100, 117, 200 or 230 V AC, 50/60 Hz, 15 VA (60 Hz)
Operating Environment	Indoors, 0 C to 50 C, < 80%RH
Safety Certifications	Conforms to EN-061010-1 (CE mark) UL-1244 and IEC-348. Safety class I. For lab use only by qualified personnel
EMI Certifications	Conforms to EU Directive 89/336/EEC EN55011 and EN50082-1, CE mark
Calibration	Test report with waveforms included. NPL/NIST-traceable.
Warranty	One year. See Terms and Conditions of Sale for details. Exception: 30-day, one-time limited warranty on static-sensitive internal and external pulse heads.
Accessories Included	PSPL external pulse head, SMA cable, power cord, and instruction manual.
Dimensions	3.8" x 8.4" x 10.3" (9.7 x 21.3 x 26.2 cm)
Weight	8 lbs (3.6 kg), 11 lbs (5 kg) shipping

Ordering Information	
Model Number	Description
4015D-215	Pulse Generator, 2.4 mm Output
4015D-222	Pulse Generator, 2.92 mm Output
4015D-307	Pulse Generator, 1.85 mm Output

Recommended Accessories	
Model Number	Description
5208	Impulse Forming Network
5510V-302-20dB	20dB Attenuator, V Connector
5510V-302-10dB	10dB Attenuator, V Connector
5510V-302-6dB	6dB Attenuator, V Connector
5510V-302-3dB	3dB Attenuator, V Connector
5510-110-10dB	10dB Attenuator, SMA
5350-201	Resistive Power Divider, 2.4 mm

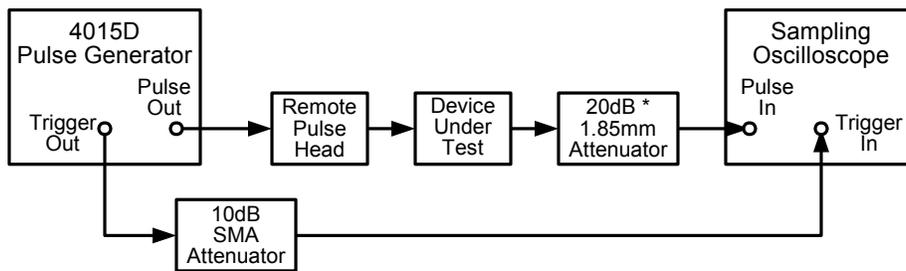
**Notes:**

[1] These are typical performance parameters as measured into 50Ω, Agilent 50 GHz digital sampling oscilloscope, and a PSPL 5510V-302-20dB, <5 ps attenuator. Only the falltime and amplitude are guaranteed to meet max/min limits. All other parameters are typical values only. Reported step pulse falltime is corrected for the risetime of the oscilloscope and attenuators by using the root sum of squares equation. Risetime and falltime corrections are not applied to the impulse data.

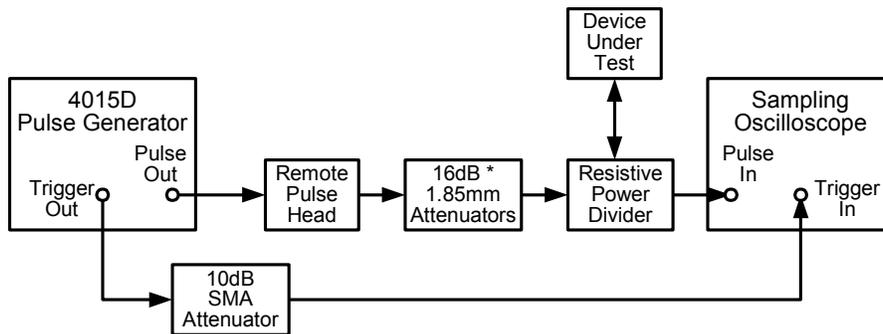
[2] These results were achieved with a Model 5208 Impulse Forming Network (may be purchased as an added accessory).

[3] 80% - 20% measurement is used to exclude the +20% perturbation from the impulse risetime measurement.

[4] **CAUTION:** The semiconductors in the external and internal pulse heads are fragile and susceptible to damage by static discharge. Use care when handling them. Always discharge cables and loads prior to connecting. These pulse heads can be damaged if an external voltage is applied. Since these items are subject to damage by the user, they have a limited 30 day warranty. If a DC voltage is present in the external circuit, use a DC blocking capacitor (for example, PSPL Model 5509-205-224) on the output of the external pulse head.



**Time Domain Transmission (TDT) Test Setup**



**Time Domain Reflectometry (TDR) Test Setup**

Note: To obtain the desired signal amplitude, attenuators may be placed before and/or after the Device Under Test.

**Note:** Please see Ordering Information for PSPL recommended accessories.