

**Features:**

- 9 ps Falltime
- Interchangeable Pulse Heads with Fixed Amplitudes of 5 V, 1.2 V, or 300 mV
- Adjustable Repetition Rate of 0.1 Hz to 1 MHz
- Internally or Externally Triggered

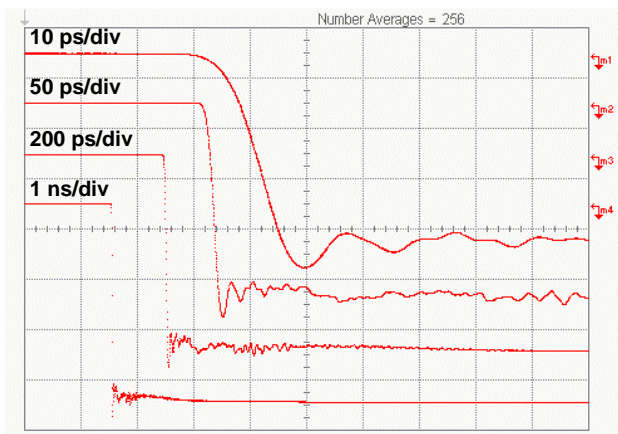


**Applications:**

- Risetime standard for testing oscilloscopes
- Impulse or step response testing of semiconductors, components, networks, etc.
- Very high resolution TDR/TDT measurements

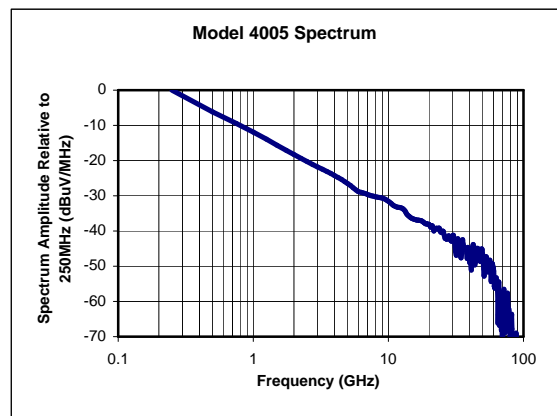
The Model 4005 Calibration Source produces an ultra-fast pulse with 9 ps falltime into an AC or DC coupled 50Ω load. The pulse is generated in an external pulse head that is attached to the main unit via a coaxial cable. This allows the pulse head to be directly connected where it is needed, eliminating the risetime slowing effects of interconnecting coaxial cables. Pulse heads are interchangeable and available with fixed pulse amplitudes of 300 mV to 5 V.

**Typical Step Pulse Data**



**Measured on Agilent 70 GHz Sampling System**

100 mV/div. Total measured falltime is 7.2 ps.



**Frequency Spectrum Calculated Using FFT**

Spectrum Amplitude calculated from 1 ns/div time domain waveform using MatLab script SpecAnalysisV2, which is available on the PSPL website.

Step Pulse Parameters [1, 2]	
Waveform	step pulse
Falltime (10% - 90%)	9 ps typical, 11 ps max.
Amplitude	Set by pulse head. -5 V max.
Polarity	Negative
Baseline	0 V
Step Duration	16 ns
Risetime (10%-90%)	70 ps
Precursor	< ±1%
Overshoot	20%
Perturbations	±8%, t < 1 ns
Flatness	±2%, t > 1 ns
Impedance	50 Ω

Trigger Output	
Impedance	50 Ω
Coupling	AC
Amplitude	400 mV
Duration	16 ns
Risetime	100 ps
Note: Not functional with ext. trigger	

External Trigger Input	
Impedance	50 Ω
Coupling	DC
Slope	Positive
Amplitude	200 mV to 2 V
Signal Type	Pulse only. Works with 200 mV TDR, PECL, CML
Risetime	< 3 ns max.
Input Repetition Rate	1 MHz max.
Max. Input	2 V <sub>pp</sub> pulse, ±2 V DC max.
Variable Trigger Level	-1 V to +1 V

General Timing	
Rep. Rate	0.1 Hz to 1 MHz. Also single pulse and external trigger input.
Delay	60 ns with internal trigger
Jitter (rms)	< 1 ps, 1.5 ps max.

General Specifications	
Connectors	Front panel: SMA, Lemo pulse head output: 1.85 mm plug
Controls	Power, Mode, Single, Enable, 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.
Accessories Included	SMA and Lemo cables, power cord, and instruction manual.
4005 Driver Dimensions	3 x 7.5 x 10 in. (7.6 x 19 x 25.4 cm)
Pulse Head Dimensions	2.25 x 1 x 3 in. (5.7 x 2.5 x 7.6 cm)
Weight	8 lbs (3.6 kg), 11 lbs (5 kg) shipping

**Notes:**

[1] These are typical performance parameters. Only the falltime is guaranteed to meet max/min limits. All other parameters are typical values only.

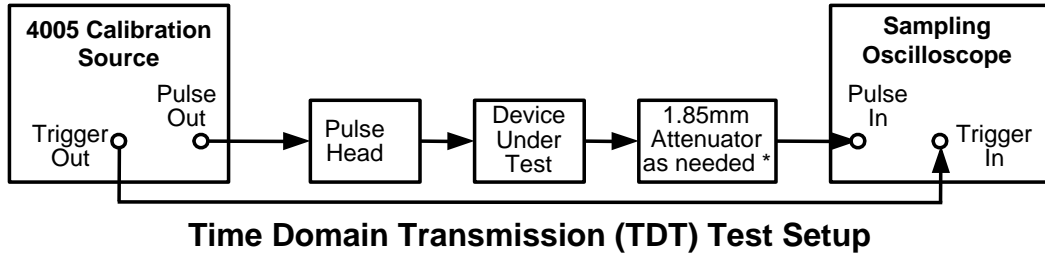
[2] The Root-Sum-of-Squares (RSS) approximation (given below) is used to extract the 4005 risetime from the total measured risetime. Note, total measured risetime includes risetime effects of the measurement instrument.

$$T_r(4005) = [ T_r^2(\text{measured}) - T_r^2(\text{system}) ]^{1/2}$$

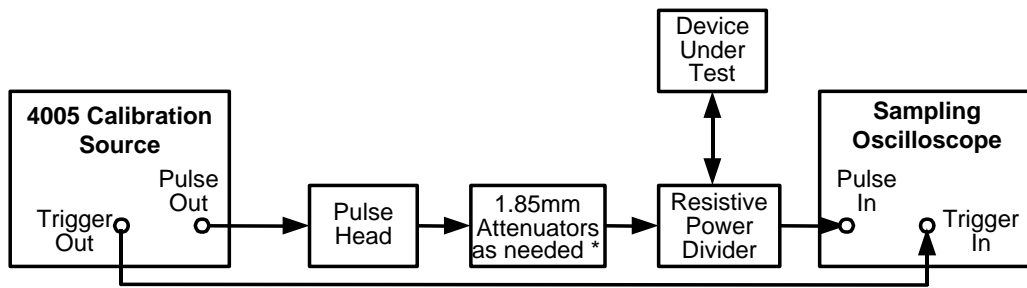
[3] **CAUTION:** The semiconductors in the external and internal pulse heads are fragile and susceptible to damage by static discharge. Use care when handling them. Always discharge cables and loads prior to connecting. These pulse heads can be damaged if an external voltage is applied. Since these items 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.

**Example TDT and TDR Set-Ups:**

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



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



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

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

Ordering Information	
Model Number	Description
4005-DRV	Calibration Source
4005PH-307-5.0V	Pulse Head, 5 V
4005PH-307-1.2V	Pulse Head, 1.2 V
4005PH-307-300MV	Pulse Head, 300 mV
Recommended Accessories	
Model Number	Description
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
5350-201	Resistive Power Divider, 2.4 mm