

MODEL 3600

IMPULSE GENERATOR

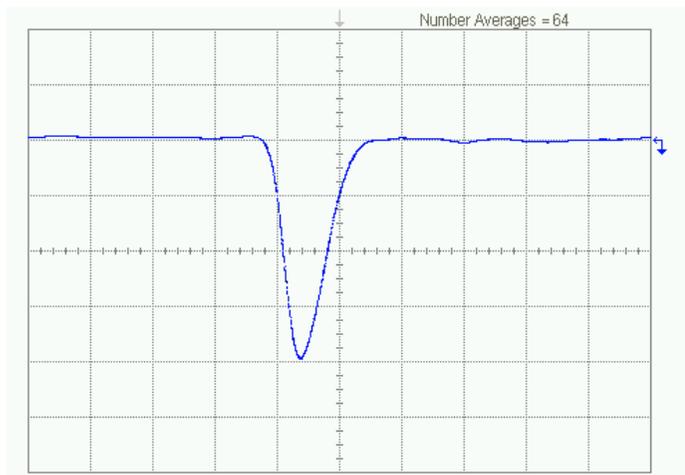
Features:

- Produces 70 ps Impulses
- – 7.5 V Impulse Amplitude
- < 100 Hz to 2.5 GHz Repetition Rate
- < 2 ps Added Jitter
- TTL Gating Function



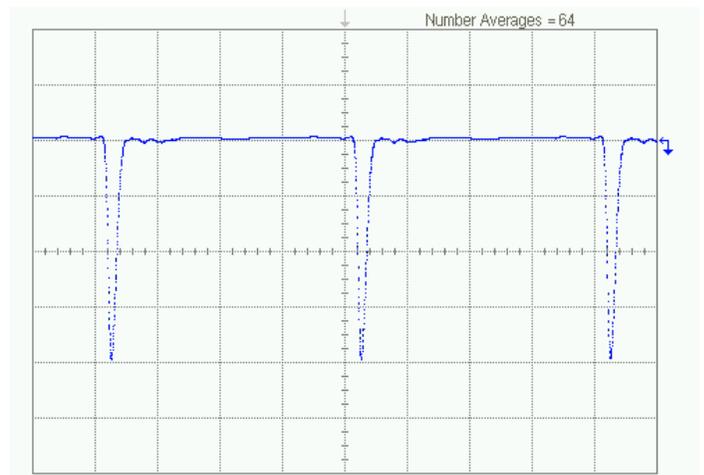
The Model 3600 Impulse Generator produces 7.5-volt, 70 ps duration impulses that are locked to a clock or sine wave input. The added jitter is less than 2 ps. The impulse train can be gated by an external TTL signal. The Model 3600 will function at repetition rates ranging from < 100 Hz to 2.5 GHz.

Typical Impulse Data



Typical Impulse Characteristics

100 ps/div, 2 V/div. The Model 3600 generated this impulse from a 0.63V square wave at 500 MHz applied to the clock input. The amplitude of the impulse is –8 V, and the duration (FWHM) is 72 ps. The added jitter of the generator is less than 1 ps.



500 MHz Impulse Train

500 ps/div, 2 V/div. The Model 3600 generated this impulse stream from a 0.63V square wave at 500 MHz applied to the clock input. These measurements were taken using an Agilent 40 GHz sampling system.

Specifications

Parameters	Units	Min	Typ	Max	Comments:
Impulse Output Characteristics¹					
Polarity					Negative
Amplitude	Volts	5.0	7.5	8.5	See Fig 3 for a plot of amplitude versus clock frequency
Duration	ps		70	100	See Fig 4 for duration versus clock frequency
Added Jitter	ps		<2		
Coupling ²			AC		
Impedance	Ω		50		
Baseline Perturbations	%		± 3.0		
Clock Input Characteristics					
Operating frequency range ⁴	MHz	200		2500	Sine wave input
Operating frequency range ⁴		<100 Hz		2500 MHz	Square wave input
Sine wave power	dBm	-6	0	+6	
Square wave voltage	Vp-p	0.25	0.63	1.25	
Square wave slew rate	V/ns	0.5			
Coupling			AC		
Impedance	Ohms		50		
Delay clock in to impulse out	ns		8.5		
TTL Gate Input Characteristics					
Output enabled (TTL High)		2.0		5.0	No connection required ³
Output disabled (TTL Low)		0.0		0.8	Short to ground
Coupling			DC		
Gate impedance	Ohms		50		

1 – Pulse parameters were measured using a Tektronix TDS8000 Sampling Oscilloscope with 80E01 50 GHz Plug-In.

2 – Impulse Output is AC-coupled; therefore, baseline will have a slight positive offset that depends on the duty cycle of the impulse.

3 – Internal pull-up to 5 volts through 10 k Ω resistor

4 – PSPL Model 5650-106-D32 Divide-by-32 Trigger Countdown is recommended for sine waves with frequencies < 200 MHz.

Absolute Limits: Exceeding these values will damage the 3600

Parameters	Units	Minimum	Maximum
Gate Input	Volts	>0	<5
Clock Input Power (Sine wave)	dBm		10
Clock Input Voltage (Square wave)	Volts		2.0
DC voltage applied to output	VDC		± 10

General Specifications

Controls	Power
Connectors	SMA Jacks for Impulse Out, Clock Input, and Gate Input
Power Required	100, 115, or 230 VAC, 50/60Hz, 14VA at 60 Hz
Operating Environment	Indoors, 0C to 50C, <80% r.h.
Calibration	Test report with waveforms is furnished. NPL/NIST traceable.
Warranty	One year
Accessories Included	Power cord and rack-mount brackets
Dimensions	17" x 16" x 3.5" (43 x 41 x 8.9 cm)
Weight	14 lbs. (6.3 kg), 19 lbs (8.6 kg) shipping

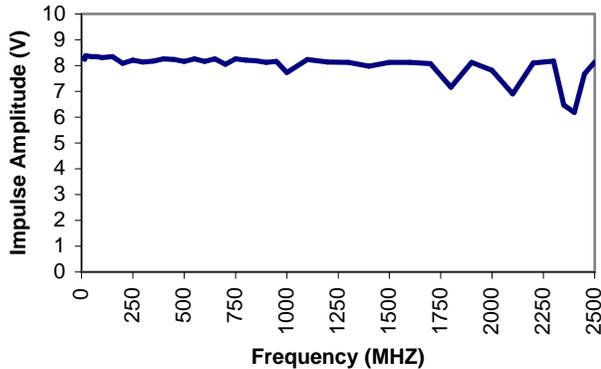


Figure 3. Model 3600 Impulse Amplitude Versus Repetition Rate

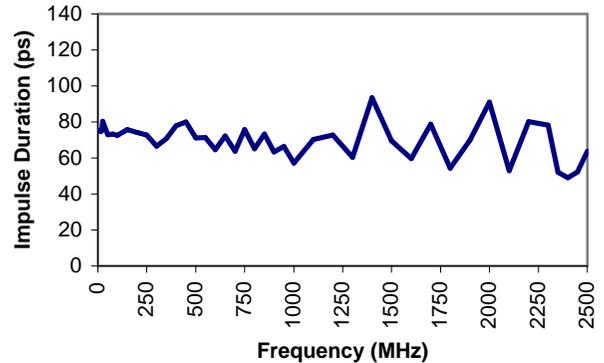


Figure 4. Model 3600 Impulse Duration Versus Repetition Rate

Increasing the Impulse Duration

A Model 5915 risetime filter may be added to the output of the Model 3600 Impulse Generator to increase the impulse duration. Adding a risetime filter will reduce the amplitude. The plot at the right shows the impulse produced when a 90 ps filter is added. The duration increases to 107 ps and the amplitude decreases to -5 V. Figures 5 and 6 show the amplitude and duration versus clock frequency for this arrangement.

Creating Positive Impulses

A Model 5100 inverting transformer may be added to the output to generate + 6.5 V impulses.

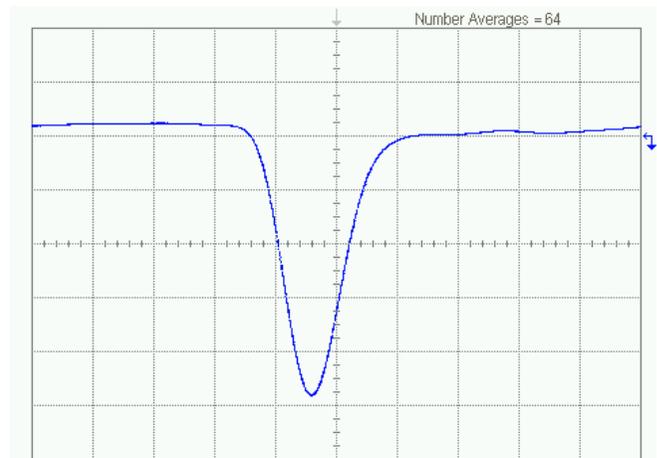


Figure 5. Model 3600 with Added 90ps Risetime Filter Impulse Amplitude Versus Repetition Rate

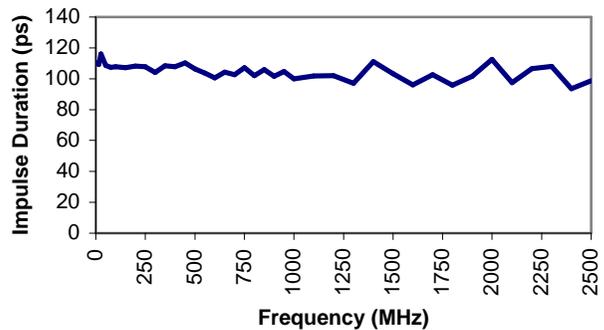
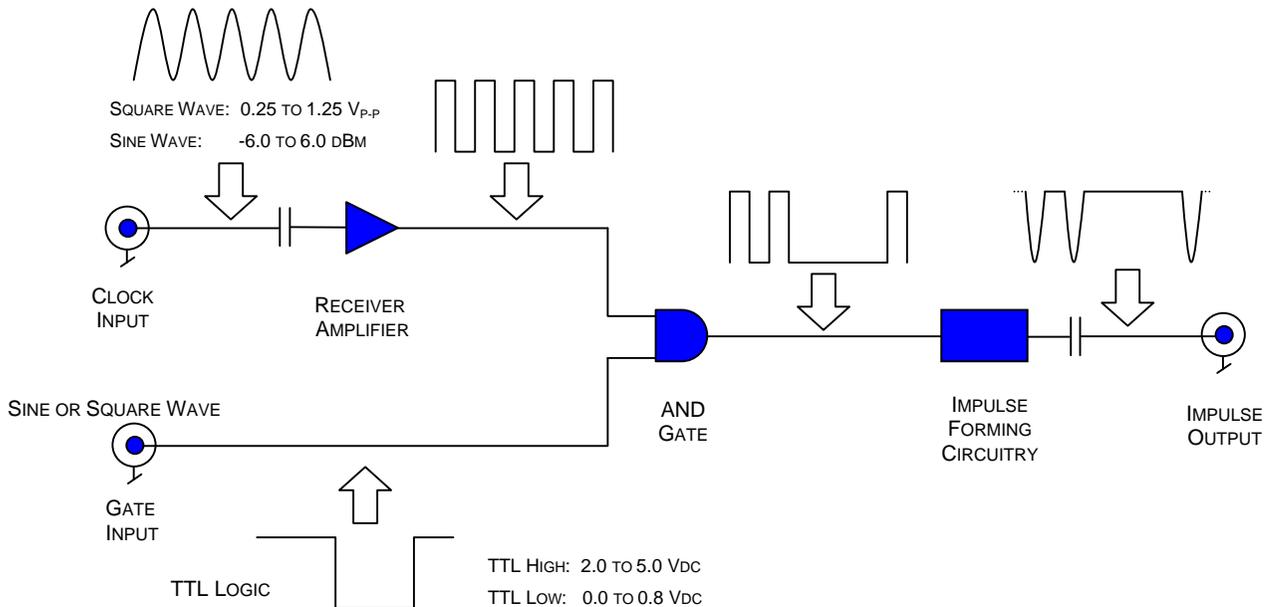
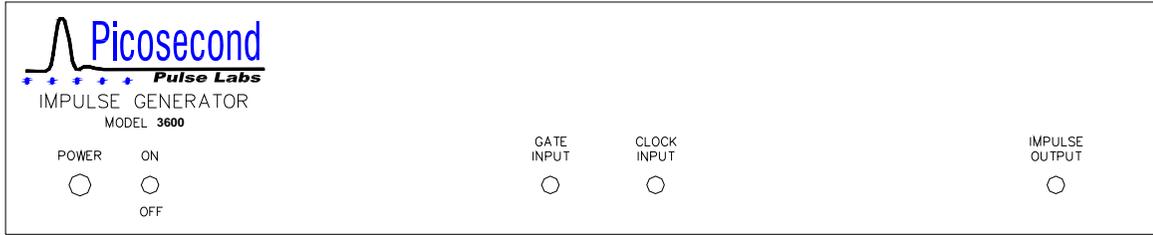


Figure 6. Model 3600 with Added 90ps Risetime Filter Impulse Duration Versus Repetition Rate



Model 3600 Theory of Operation

The Model 3600 Impulse Generator produces impulses based on two user inputs, the *Clock Input* and the *Gate Input*.

The *Clock Input* may be either a sine or square wave. It determines the pulse repetition frequency of the generator's output. The clock frequency may range from < 100 Hz to 2.5 GHz. Limit the input power to between -6.0 dBm to +6.0 dBm for a sine wave (0.25 to 1.25 V_{P-P} for a square wave). The generator triggers on the rising clock edge.

The *Gate Input* is a TTL logic signal that may be used to modulate the impulse train. Conceptually, the *Gate Input* and *Clock Input* connect to an AND gate that controls the RF section of the generator. If a TTL High (2.0 to 5.0 VDC) is applied to the *Gate Input*, the output of the generator is enabled; a TTL Low (0.0 to 0.8 VDC) will disable the output. Voltages outside the range of 0.0 to +5.0 VDC will damage the circuit. The *Gate Input* has an internal pull up to +5.0 VDC through a 10-kΩ resistor. Impulses are produced when there is no external connection to *Gate Input*.

The AND gate output drives RF circuitry that creates the impulse stream. The output of the Model 3600 Impulse Generator is AC coupled. The unit will be damaged if an external voltage with magnitude greater than 10 volts is applied to the Impulse Output connector.

Ordering Information

Model Number
3600

Recommended Accessories

5333-104	Resistive Power Divider
5650-106-D32	Divide-By-32 Trigger Countdown
5915-110-90PS	Risetime Filter for 100ps impulses
5100-100	Inverting Transformer