

## PVM-4150 $\pm 1500V$ PULSE GENERATOR MODULE



- 0 to  $\pm 1500V$  Pulse Output
- <25ns Rise And Fall Times
- <60ns to DC Pulse Width
- >75KHz Pulse Repetition Frequency
- Optimized To Drive Deflection Plates, Grids And Other Capacitive Loads
- Protected Against Arcs, Shorts And Load Transients
- Economical, Modular Solid State Design

The PVM-4150 is a compact, OEM-style pulse generator module producing fast, high voltage wave forms to 1,500V. Optimized for driving high impedance capacitive loads, the PVM-4150 is well suited for driving extraction grids and deflection plates for electrostatic modulation of particle beams in time-of-flight mass spectrometers and accelerators. Its robust and versatile design also makes it well suited for pulsing or gating power tube grids, Pockels cells and Q Switches, acoustic transducers, microchannel plates, photomultiplier tubes and image intensifiers. The exceptional pulse fidelity of the PVM-4150 will optimize the performance of any system in which it is used.

The PVM-4150 will generate an output voltage pulse of 1500 volts with rise and fall times less than 25ns, with very flat voltage pulses to DC into a capacitive load. It can generate singled-ended output pulses from ground to +1500V or from ground to -1500V, and can also generate pulses originating from a DC voltage offset from ground by using both VLow and VHigh power supply inputs.

The PVM-4150 requires user-supplied +24VDC to +28VDC support power, a TTL gate signal, a high voltage DC power supply and optional DC offset supply inputs. The output pulse width and frequency are controlled by the gate signal. The pulse output voltage is controlled by the amplitude of the input DC power supplies.

The pulser is a half-bridge (totem pole) design, offering equally fast pulse rise and fall times, low power dissipation, and virtually no over-shoot, under-shoot or ringing. The PVM-4150 has over-current detection and shut-down circuitry to protect the pulse generator from potential damage due to arcs and shorts in the load or interconnect cable.

Unlike some competing solid state switches, the PVM-4150 incorporates all control and protection logic circuitry, energy storage and output network. It can be connected directly to the load, and does not require series or shunt resistors, impedance matching networks between the pulser and the load, or additional energy storage (capacitor banks). All of this is taken care of within the PVM-4150. The pulser is housed in an aluminum enclosure, with threaded mounting holes in the base to simplify installation and assembly in OEM applications.

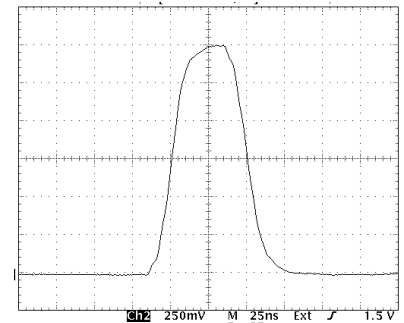
The PVM-4150 pulser is a direct-coupled, all solid-state design using air as the primary insulating medium. Its conservative design margin gives you long component life. And keeping the PVM-4150 free of potting compound or encapsulation materials makes it easy to service if a component ever does require replacement. Some competing products are potted, and must be replaced if they fail. But compactness and durability are not all you get in the PVM-4150. Inherent in the design is exceptional pulse fidelity with virtually no ringing, over-shoot or under-shoot, high average power handling capability, and protection against arcs, shorts and load transients in a reliable, economical module.



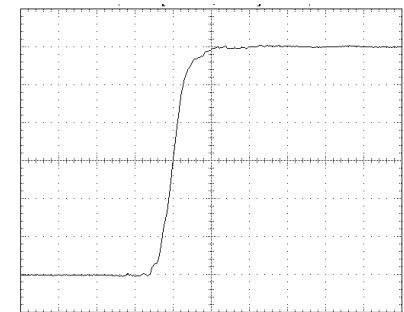
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**SPECIFICATIONS** (All specifications measured into a 50pF load connected with 2 feet (~0.6m) of RG-62 (93Ω) coaxial cable)

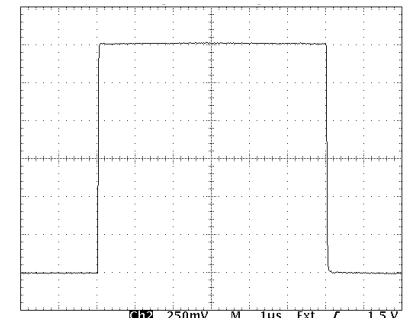
<b>OUTPUT</b>	
Maximum Value:	±1500 Volts ( $V_{High} - V_{Low}$ )
Minimum Value:	0 Volts
Means Of Adjustment:	Controlled By Power Supply Input Voltages
Pulse Rise And Fall Time:	<25ns, typically <20ns (10% to 90%)
Pulse Width:	<60ns (typically 50ns) to DC, Controlled by Input Gate
Pulse Recurrence Frequency (PRF):	Single shot to 75KHz at 1500V output, 1MHz maximum limited by power dissipation <sup>(1)</sup> , 5MHz Burst, Controlled by Input Gate
Max. Average Power:	50W ( $V_{High} + V_{Low}$ ) <sup>(1)</sup>
Max. Duty Cycle:	Continuous
Droop:	<1%
Over/undershoot:	<5%
Throughput Delay	114ns Typical
Jitter:	<1ns shot-to-shot
Output Connector:	SHV, End Panel
Output Cable:	RG-62 (93Ω) Coaxial Cable, 2 feet (~61cm) long
<b>INPUT DC VOLTAGE +<math>V_{IN}</math> (<math>V_{High}</math>)</b>	
Absolute Max. Value:	+1500 Volts
Absolute Min. Value:	-1500 Volts
Relative Max. Value:	+1500 Volts over $V_{Low}$ Voltage
Relative Min. Value:	+0V Over $V_{Low}$ Voltage
Input Connector:	SHV, End Panel
<b>INPUT DC VOLTAGE -<math>V_{IN}</math> (<math>V_{Low}</math>)</b>	
Absolute Max. Value:	+1500 Volts
Absolute Min. Value:	-1500 Volts
Input Connector:	SHV, End Panel
<b>GATE</b>	
Gate Source:	External
Gate Input:	TTL into 50Ω
Connector:	BNC, End Panel
<b>GENERAL</b>	
Support Power:	+24VDC To +28VDC @ 250mA Max Operating Current, 1A Starting (inrush) current
Dimensions (Excluding Connectors):	6" W x 12" L x 2" H (152mm W x 305mm L x 51mm H)
Weight (Approximate):	40 Ounces (1.13 Kilograms)
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE	



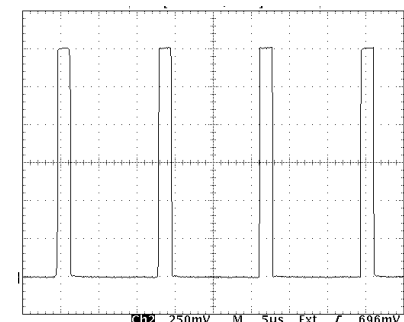
**50ns Minimum Pulse Width, 1500V Output**  
(25ns/Div horizontal scale, 250V/Div vertical scale)



**<19ns Rise Time, 1500V Output**  
(25ns/Div horizontal scale, 250V/Div vertical scale)



**Typical Output Waveform, 1500V**  
(1µs/Div horizontal scale, 250V/Div vertical scale)



**>75KHz Frequency, 1500V Output**  
(5µs/Div horizontal scale, 250V/Div vertical scale)

These specifications are measured driving a 50pF load connected with 2 feet of RG-62 cable, at 1500V output. However the PVM-4150 can drive loads of a few picofarads to several hundred picofarads of capacitance, limited by its maximum power dissipation capability<sup>(1)</sup>. At lower load capacitances and/or voltages less than 1500V, the PVM-4150 can operate at continuous pulse recurrence frequencies up to 1MHz. The PVM-4150 can also drive resistive or inductive loads, within limitations. Contact DEI for additional information and applications assistance.

<sup>(1)</sup> The power dissipated in the PVM-4150 when driving a capacitive load is defined by the formula  $CV^2F$ , where C is the total load capacitance, including the capacitance of the load, interconnect cable, and the internal capacitance of the PVM-4150, V is the pulse voltage, and F is the pulse repetition frequency (or the total pulses per second). (For these calculations, the internal capacitance of the PVM-4150 is 200pF, and RG-62 cable is 13pf/foot.) Given the maximum dissipation of 50W, the maximum load capacitance, frequency and/or voltage at which the PVM-4150 can operate can be approximated using this formula. This formula also approximates the high voltage power supply requirements needed to drive a given load at a specific voltage and frequency. This formula is not applicable when driving resistive or inductive loads.

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