

PVM-4140 $\pm 3000V$ PULSE GENERATOR MODULE



- **0 to $\pm 3000V$ Pulse Output**
- **<25ns Rise And Fall Times**
- **<60ns to DC Pulse Width**
- **>25KHz Pulse Repetition Frequency**
- **Optimized To Drive Deflection Plates, Grids, Pockels Cells And Other Capacitive Loads**
- **Protected Against Arcs, Shorts And Load Transients**
- **Voltage And Current Monitor Outputs**
- **Economical, Modular Solid State Design**

The PVM-4140 is a compact, OEM-style pulse generator module producing fast, high voltage wave forms to 3,000V. Optimized for high impedance capacitive loads, the PVM-4140 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-4140 will optimize the performance of any system in which it is used.

The PVM-4140 generates an output voltage pulse of 3,000 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 +3000V or from ground to -3000V, and can also generate pulses originating from a DC voltage offset from ground by using both VLow and VHigh power supply inputs.

The PVM-4140 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.

Scaled internal voltage and current monitors provide a straightforward means to view the output voltage and current waveforms in real-time.

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-4140 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-4140 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-4140. The pulser is housed in an aluminum enclosure, with threaded mounting holes in the base to simplify installation and assembly in OEM applications.

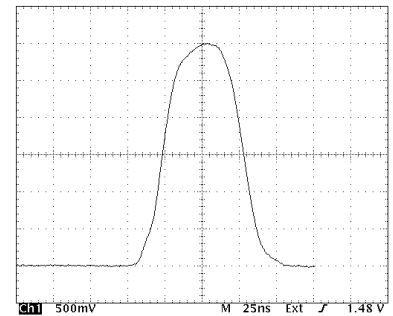
The PVM-4140 pulser is a direct-coupled, all solid-state design using air as the primary insulating medium. Its conservative design margin gives you long component life. And keeping the PVM-4140 free of potting compound or encapsulation materials makes it easy to service if a component ever does require 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-4140. 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.



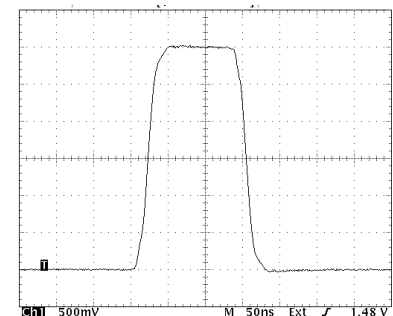
**DIRECTED
ENERGY
INCORPORATED**

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

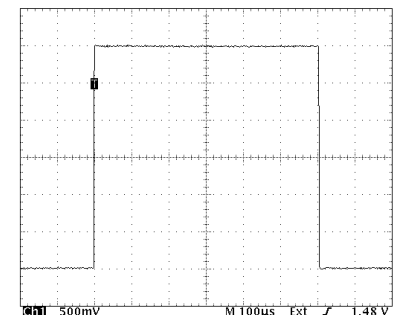
OUTPUT	
Maximum Value:	±3000 Volts ($V_{High} - V_{Low}$)
Minimum Value:	0 Volts
Means Of Adjustment:	Controlled By Power Supply Input Voltages
Pulse Rise And Fall Time:	<25ns (10% to 90%)
Pulse Width:	<60ns (typically 55ns) to DC, Controlled by Input Gate
Pulse Recurrence Frequency (PRF):	Single shot to >25KHz at 3000V continuous output, maximum limited by power dissipation ⁽¹⁾ , 5MHz Burst, Controlled by Input Gate
Max. Average Power:	50W ($V_{High} + V_{Low}$) ⁽¹⁾
Max. Duty Cycle:	Continuous
Droop:	<1%
Over/undershoot:	<5%
Throughput Delay	120ns Typical
Jitter:	<200ps shot-to-shot
Output Connector & Cable:	SHV, With 2 feet (~61cm) RG-62 (93Ω) Coaxial Cable
INPUT DC VOLTAGE +V_{IN} (V_{High})	
Absolute Max. Value:	+3000 Volts
Absolute Min. Value:	-3000 Volts
Relative Max. Value:	+3000 Volts over V _{Low} Voltage
Relative Min. Value:	+0V Over V _{Low} Voltage
INPUT DC VOLTAGE -V_{IN} (V_{Low})	
Absolute Max. Value:	+3000 Volts
Absolute Min. Value:	-3000 Volts
Input DC Connectors:	SHV, End Panel (One each for +V _{IN} and -V _{IN})
GATE	
Gate Source & Connector	TTL into 50Ω, into BNC connector on the end panel
VOLTAGE & CURRENT MONITORS	
Voltage Monitor:	1000:1 into 1 MegΩ, BNC connector
Current Monitor:	10A/V into 50Ω, BNC connector
GENERAL	
Support Power:	+24VDC To +28VDC @ 250mA Max Operating Current, 1A Starting (inrush) current
Dimensions (Excluding Connectors):	9.8" W x 10.2" L x 2" H (249mm W x 259mm L x 51mm H)
Weight (Approximate):	56 Ounces (1.6 Kilograms)
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE	



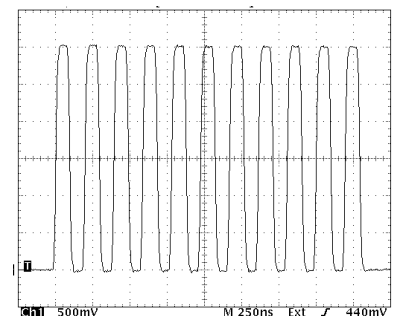
55ns Minimum Pulse Width, 3000V Output
(25ns/Div horizontal scale, 500V/Div vertical scale)



<25ns Rise & Fall Times, 3000V Output
(50ns/Div horizontal scale, 500V/Div vertical scale)



Typical Output Waveform, 3000V
(100µs/Div horizontal scale, 500V/Div vertical scale)



>5MHz Burst Frequency, 3000V Output
(250ns/Div horizontal scale, 500V/Div vertical scale)

These specifications are measured driving a 50pF load connected with 2 feet of RG-62 cable, at 3000V output. However the PVM-4140 can drive loads of a few picofarads to several hundred picofarads of capacitance, limited by its maximum power dissipation capability⁽¹⁾. At lower load capacitances and/or voltages less than 3000V, the PVM-4140 can operate at continuous pulse recurrence frequencies up to 400KHz. The PVM-4140 can also drive resistive or inductive loads, within limitations. Contact DEI for additional information and applications assistance.

⁽¹⁾ The power dissipated in the PVM-4140 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-4140, 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-4140 is 120pF, 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-4140 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.

