

# ULTRAVOLT MPM 1K TO 3K SERIES

## COMPACT DC TO HIGH VOLTAGE DC CONVERTERS

The UltraVolt® MPM series of proportional DC-to-DC converters provide compact, general purpose high voltage power.

### PRODUCT HIGHLIGHTS

- Unregulated proportional control outputs ranging from 1 to 3 kV DC maximum
- Single output: positive and negative polarity models
- 1.5 W maximum output power
- 12 or 24 VDC input
- Output ripple performance < 0.5% (to < 0.05% with optional shield)
- Temperature coefficient < 300 ppm/°C
- PCB-mount
- Reversed polarity and intermittent short-circuit protection
- Optional 100 VDC isolation between input and high voltage output
- Available shielded case to guard against external radiated emissions
- CE mark (LVD and RoHS)

### TYPICAL APPLICATIONS

- DC to high voltage DC bias supplies for general purpose uses
- Ink-jet printers and electrostatic separators
- Rail supplies for PMT/APD detectors and Geiger-Muller tubes
- Electron-beam deflectors and focusing optics



### AT A GLANCE

#### Maximum Output Voltage

1, 1.5, 2, or 3 kV DC

#### Maximum Output Power

1.5 W

#### Type

Single Output

#### Ripple

< 0.5%

#### Control Interface

Proportional

#### Temperature Coefficient

< 300 ppm/°C

## ELECTRICAL SPECIFICATIONS

Model <sup>1</sup>		1K Series		1K5 Series	
High Voltage Output Range (Proportional, Positive or Negative)		167 to 1000 VDC		250 to 1500 VDC	
High Voltage Outputs		Single		Single	
Input Voltage (VDC, Nominal)		12 VDC	24 VDC	12 VDC	24 VDC
Power Output (Watts, Nominal)		1.5 W		1.5 W	
DC Input					
Vin (Input Voltage) Range	VDC (positive polarity only)	0 to 12	0 to 24	0 to 12	0 to 24
Vin (Nominal)	VDC	2 to 12	4 to 24	2 to 12	4 to 24
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 0.25	< 0.13	< 0.25	< 0.13
	A @ 100% HVout, 0% LOAD	< 0.04		< 0.04	
DC Output					
HVout (Output Voltage)	VDC (positive polarity models = +HVout)	+167 to +1000	+167 to +1000	+250 to +1500	+250 to +1500
	VDC (negative polarity models = -HVout)	-167 to -1000	-167 to -1000	-250 to -1500	-250 to -1500
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	1.5		1	
Pout (Output Power)	Watts (max)	1.5		1.5	
Ripple <sup>2,3</sup>	% (% with S option)	< 0.5% (< 0.05%)		< 0.5% (< 0.05%)	
	ppm (ppm with S option)	< 5000 (< 500)		< 5000 (< 500)	
	Vpp (Vpp with S option)	< 5 (< 0.5)		< 7.5 (< 0.75)	

Model <sup>1</sup>		2K Series		3K Series	
High Voltage Output Range (Proportional, Positive or Negative)		334 to 2000 VDC		500 to 3000 VDC	
High Voltage Outputs		Single		Single	
Input Voltage (VDC, Nominal)		12 VDC	24 VDC	12 VDC	24 VDC
Power Output (Watts, Nominal)		1.5 W		1.5 W	
DC Input					
Vin (Input Voltage) Range	VDC (positive polarity only)	0 to 12	0 to 24	0 to 12	0 to 24
Vin (Nominal)	VDC	2 to 12	4 to 24	2 to 12	4 to 24
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 0.25	< 0.13	< 0.25	< 0.13
	A @ 100% HVout, 0% LOAD	< 0.04		< 0.04	
DC Output					
HVout (Output Voltage)	VDC (positive polarity models = +HVout)	+334 to +2000	+334 to +2000	+500 to +3000	+500 to +3000
	VDC (negative polarity models = -HVout)	-334 to -2000	-334 to -2000	-500 to -3000	-500 to -3000
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	0.75		0.5	
Pout (Output Power)	Watts (max)	1.5		1.5	
Ripple <sup>2,3</sup>	% (% with S option)	< 0.5% (< 0.05%)		< 0.5% (< 0.05%)	
	ppm (ppm with S option)	< 5000 (< 500)		< 5000 (< 500)	
	Vpp (Vpp with S option)	< 10 (< 1)		< 15 (< 1.5)	

<sup>1</sup> Standard product specifications shown unless noted. For 100 to 500 VDC HVout ranges, see MPM 100 to 500 series datasheet.

<sup>2</sup> Nominal ripple measured @ 100% HVout, 100% LOAD into 300 pf bypass capacitor.

<sup>3</sup> % = percent @ 100% HVout; ppm = parts per million @ 100% HVout; Vpp = VDC peak to peak @ 100% HVout.

## ELECTRICAL SPECIFICATIONS (CONTINUED)

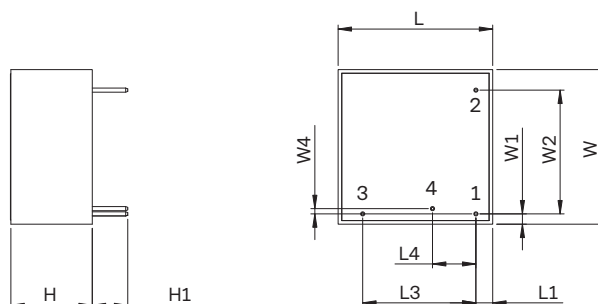
Stability and Regulation	
Stability	0.1% (1000 ppm) @ 100% HV out (after 30 min warmup interval)
	0.1% (1000 ppm) @ 100% HV out (per 8 h interval)
Line Regulation	Unregulated (proportional control)
Static Load Regulation	Typically < 10% @ 100% HV out, 0 to 100% LOAD. Max < 20%
Temperature Coefficient	300 ppm/°C (over operating temperature range)
Power-On Rise Time	< 50 msec @ 100% LOAD, < 50 msec @ 0% LOAD
	Contact factory for other options.

Environmental	
Operating Temperature Range	-10 to 60°C (14 to 140°F) ambient temperature
Storage	-40 to 85°F (-40 to 185°F) ambient temperature
Humidity	0 to 95% RH, non-condensing
Altitude	Sea level to 2000 m (6500 ft)

Regulatory	
Certifications	CE mark (LVD and RoHS)

## MECHANICAL SPECIFICATIONS

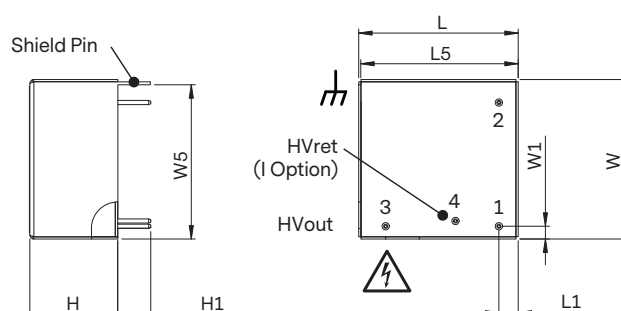
Standard Configuration



Side View

Back View

Shielded (S Option)



Dimensions		Standard		Shielded	
Key	Description <sup>1,2,3</sup>	mm	in	mm	in
L	Overall Length	38.1	1.50	39.4	1.55
L1	Case Exterior to Pin 1 (Pin 2)	4.1	0.16	4.8	0.19
L3	Pin 1 to Pin 3	27.9	1.10	27.9	1.10
L4	Pin 1 to Pin 4 (I Option)	10.7	0.42	10.7	0.42
L5	Case Exterior to Shield Ground (S Option)			38.9	1.53
W	Overall Width	38.1	1.50	39.4	1.55
W1	Case Exterior to Pin 1 (Pin 3)	2.5	0.10	3.0	0.12
W2	Pin 1 to Pin 2	30.5	1.20	30.5	1.20
W4	Pin 1 to Pin 4 (I Option)	1.3	0.05	1.3	0.05
W5	Pin 1 to Shield Ground (S Option)			38.1	1.50
H	Case Height (Max)	20.1	0.79	21.6	0.85
H1	Case Exterior to Pin 1 Tip	8.6	0.34	8.1	0.32

Construction	
Standard Case	Injection-molded plastic (Diallyl Phthalate, DAP, per ASTM-D-5948)
Optional Shield	Five-sided tinned metal case with PCB (S Option)
Labels	Static-dissipative polyester
Cooling	Natural convection and conduction
Encapsulation	Silicone-based RTV
Pins	Gold/nickel over brass (D = 1 mm, 0.040 in)
Shield Ground	Tinned metal (0.7 x 0.5 mm, 0.028 x 0.02 in)

Volumes and Weights		Standard		Shielded	
		cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>
Volume (Module Body Only)		29.1	1.8	33.5	2.0
		g	oz	g	oz
Weight		60	2.1	80	2.8

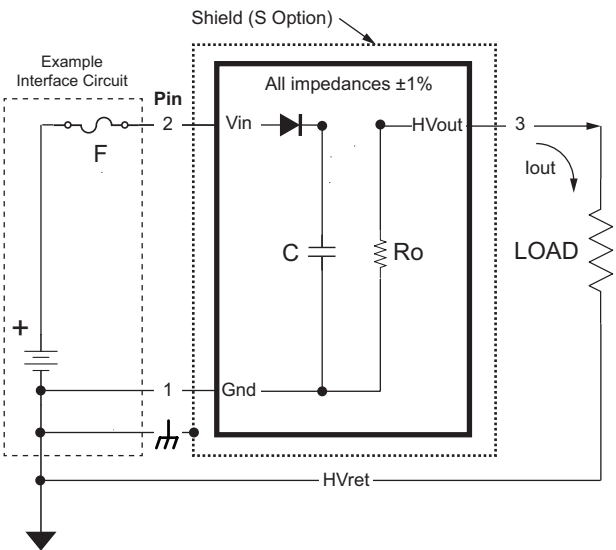
<sup>1</sup> Approximate nominal dimensions and weights for configurations shown.

<sup>2</sup> Standard case (DAP plastic) tolerances are  $\pm 1.27$  mm ( $\pm 0.050$  in). Pin-to-pin tolerances are  $\pm 0.76$  mm ( $\pm 0.015$  in).

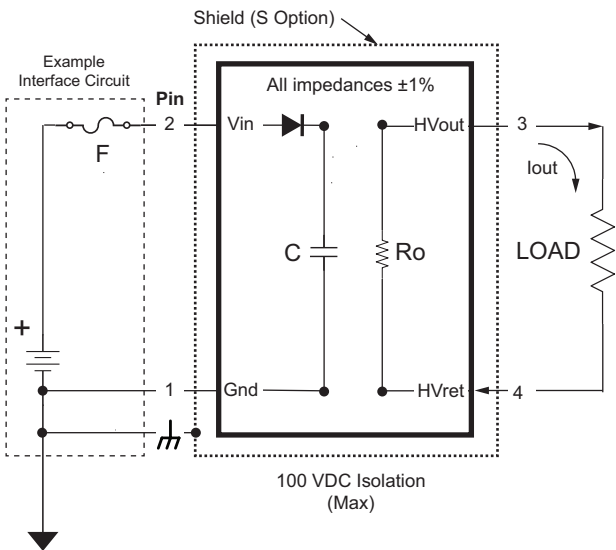
<sup>3</sup> Refer to outline drawings and 3D models for detailed information.

INTERFACE

The MPM series' high voltage output varies proportionately with input voltage. An optional interface isolates input from high voltage output, up to a maximum of 100 VDC. The shield — which helps protect the module from external radiated emissions — should be connected to ground.



Standard Interface (Non-isolated)			
Pin	Label	Type	Description
1	Gnd	Ground	DC Input Power Ground High Voltage Return
2	Vin	Input	DC Input Power
3	HVout	Output	High Voltage Output
Shield		Ground	Shield Ground



Isolated Interface (I Option, 100 VDC Max)			
Pin	Label	Type	Description
1	Gnd	Ground	DC Input Power Ground
2	Vin	Input	DC Input Power
3	HVout	Output	High Voltage Output
4	HVret	Ground	High Voltage Return <sup>1</sup>
Shield		Ground	Shield Ground

<sup>1</sup> For proper operation and safety, always route HVret signal through HVret connection.

## INTERFACE CONTROL PARAMETERS

Model		1K Series		1K5 Series	
High Voltage Output Range (Proportional, Positive or Negative)		167 to 1000 VDC		250 to 1500 VDC	
Input Voltage (VDC, Max)		12 VDC	24 VDC	12 VDC	24 VDC
Power Output (Watts, Max)		1.5 W		1.5 W	
Standard Interface (Proportional Voltage Control)					
Scale Factors <sup>1,2,3</sup>					
Positive Polarity Models	SVp (V/V) where HVout Control = SVp x Vin	83.3	41.7	125	62.5
Negative Polarity Models	SVp (V/V) where HVout Control = SVp x Vin	-83.3	-41.7	-125	-62.5
Other Interface Values					
Impedances <sup>3</sup>	Ro (HVout impedance, ±1%)	8.2 MΩ		47 MΩ	
Capacitance <sup>3</sup>	C (@ 50 VDC ±10%, 1/8 W, max)	4.7 μF		4.7 μF	

Model		2K Series		3K Series	
High Voltage Output Range (Proportional, Positive or Negative)		334 to 2000 VDC		500 to 3000 VDC	
Input Voltage (VDC, Max)		12 VDC	24 VDC	12 VDC	24 VDC
Power Output (Watts, Max)		1.5 W		1.5 W	
Standard Interface (Proportional Voltage Control)					
Scale Factors <sup>1,2,3</sup>					
Positive Polarity Models	SVp (V/V) where HVout Control = SVp x Vin	167	83.3	250	125
Negative Polarity Models	SVp (V/V) where HVout Control = SVp x Vin	-167	-83.3	-250	-125
Other Interface Values					
Impedances <sup>3</sup>	Ro (HVout impedance, ±1%)	47 MΩ		47 MΩ	
Capacitance <sup>3</sup>	C (@ 50 VDC = ±10%, 1/8 W, max)	4.7 μF		4.7 μF	

<sup>1</sup> For 12 VDC models, Vin (nominal) varies from 2 to 12 VDC. For 24 VDC models, Vin (nominal) varies from 4 to 24 VDC. Contact factory about operation below these levels.

<sup>2</sup> SVp can vary by  $\pm 10\%$  typical ( $\pm 20\%$  max) from 17 to 100% HVout @ 100% LOAD.

<sup>3</sup> See interface schematic for definition.

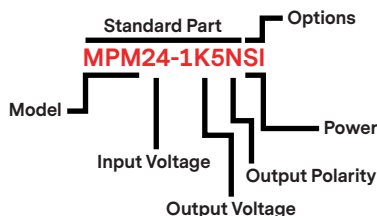
## STANDARD OPTIONS

The MPM series can be factory configured with several standard options that adapt its performance to specialized application requirements.

Option	Description
S	Six-sided shielded case consisting of tin-plated metal case and mating PCB that provides additional protection from external radiated emissions.
I	Isolation up to 100 VDC maximum between input and high voltage output. Permits use of an external resistor between HVret and ground to sense current, or an external capacitor to reduce common mode ripple.

## ORDERING INFORMATION

		STANDARD CONFIGURATION										OPTIONS	
		Electrical Performance				Standard Features						Shielded Case (6 Sides)	Module Isolation (100 VDC Max)
Standard Part		Number of High Voltage Outputs	High Voltage Output Range (HVout VDC, Proportional to Vin)	Maximum Input Voltage (Vin, VDC)	High Voltage Output Polarity	High Voltage Output Power (Pout, Watts)	Proportional Control Interface	Plastic Case (DAP)	Through-hole PCB-mount	Reversed Polarity Input and Intermittent Short-circuit Protection	300 ppm/°C Temperature Coefficient		
1K Series	MPM12-1KP	1	+167 to +1000	12	Pos	1.5	Included					S	I
	MPM12-1KN	1	-167 to -1000	12	Neg	1.5	Included					S	I
	MPM24-1KP	1	+167 to +1000	24	Pos	1.5	Included					S	I
	MPM24-1KN	1	-167 to -1000	24	Neg	1.5	Included					S	I
1K5 Series	MPM12-1K5P	1	+250 to +1500	12	Pos	1.5	Included					S	I
	MPM12-1K5N	1	-250 to -1500	12	Neg	1.5	Included					S	I
	MPM24-1K5P	1	+250 to +1500	24	Pos	1.5	Included					S	I
	MPM24-1K5N	1	-250 to -1500	24	Neg	1.5	Included					S	I
2K Series	MPM12-2KP	1	+334 to +2000	12	Pos	1.5	Included					S	I
	MPM12-2KN	1	-334 to -2000	12	Neg	1.5	Included					S	I
	MPM24-2KP	1	+334 to +2000	24	Pos	1.5	Included					S	I
	MPM24-2KN	1	-334 to -2000	24	Neg	1.5	Included					S	I
3K Series	MPM12-3KP	1	+500 to +3000	12	Pos	1.5	Included					S	I
	MPM12-3KN	1	-500 to -3000	12	Neg	1.5	Included					S	I
	MPM24-3KP	1	+500 to +3000	24	Pos	1.5	Included					S	I
	MPM24-3KN	1	-500 to -3000	24	Neg	1.5	Included					S	I





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## ABOUT ADVANCED ENERGY

Since 1981, UltraVolt® — now part of the Advanced Energy (AE) family — has perfected how power performs for its customers. For both end users and OEMs, AE's comprehensive portfolio of standard and custom high voltage components precisely match system specifications to deliver unparalleled energy, quality, and performance. Through close customer collaboration, design expertise, application insight, and world-class support, AE creates successful partnerships and enables customers to push the boundaries of innovation and stay ahead of evolving market needs.

PRECISION | POWER | PERFORMANCE



**CAUTION:**  
High Voltage

Read and understand all documentation before you install, operate, or maintain Advanced Energy high voltage power supplies. Follow all safety instructions and precautions to protect against property damage and serious or possibly fatal bodily injury. Never defeat safety interlocks or grounds.

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