



- **8 Voltage Ranges from 62.5V to 6kV, Fixed Negative or Positive Polarity**
- **Available Output Power Increments of 4, 20 and 30 Watts**
- **Voltage/Current Regulation with Automatic Crossover Control**
- **Voltage and Current Monitor Signals**
- **Fully Arc and Short Circuit Protected**
- **Precision +5V Reference Output**
- **Comprehensive Standard Interface**
- **CE Listed, UL Recognized and RoHS Compliant**

Form, Fit and Function Design:

UM Series of printed circuit board mountable, high voltage modules offer a form, fit and function replacement for presently available commercially made units, while providing additional features and benefits at competitive pricing. Utilizing proprietary power conversion technology and six decades of high voltage experience, these SMT based high voltage modules provide improved performance/reliability and easier system integration at a lower cost when compared to the competition.

Advanced Power Conversion Topology:

UM converters use a proprietary zero voltage switching power conversion topology providing exceptional efficiency and inherent low noise and ripple. Radiated emissions are reduced compared to conventional switching topologies, minimizing or even eliminating the need to shield the unit from adjacent circuitry.

The high voltage output is generated using a ferrite core high voltage step up transformer which feeds the output circuitry. Units at 1kV or higher utilize an arrangement of half wave Cockcroft-Walton voltage multiplier stages to obtain the specified high voltage output, while lower voltage units use a robust rectification and filter circuit.

Due to the fixed, high frequency conversion rate the output capacitance is small resulting in minimal stored energy. Through the use of generously rated surge limiting resistors and a fast acting current loop, all units are fully arc and short circuit protected.

Control and Regulation:

The actual output voltage generated is sampled via a high impedance divider to create a voltage feedback signal. A current feedback signal is created via a current sense resistor in the low end return of the high voltage output circuitry. These two accurate ground referenced feedback signals are used to precisely regulate and control the units in addition to external monitoring purposes.

Due to the UM's unique converter topology it can provide full current into low impedance loads or even a short circuit. Standard units limit at 103% of maximum rated output current.

Standard Interface:

UM Series interface provides current programming capability and positive polarity, buffered, low output impedance voltage and current monitor signals (zero to +4.64Vdc equals zero to full scale rated). A voltage programming input is provided where 0 to +4.64Vdc equals 0 to 100% of rated voltage.

Current programmability allows the user to set where the unit will current limit, anywhere from 0 to 100% of maximum rated current. This feature is beneficial where less than full output current is desired, like in the case of protecting a sensitive load.

The buffered low impedance voltage and current monitor signals can drive external circuitry directly, while minimizing loading and pickup effects. These features save the user the expense and implementation of external interface buffering circuitry while improving overall signal integrity.

This standard interface is made available via a row of 13 pins with 0.1" pin spacing. A legacy interface (7 pins on a 0.2" spacing) that is compatible with presently available commercially made units can be provided by ordering the "L" option.

Mechanical and Environmental Considerations:

The UM Series are solid encapsulated, printed circuit board mountable, plastic cased converters measuring only 2.97" X 1.5" X 0.83" (75.4mm X 38.1mm X 21.1mm). All units are encapsulated using a silicon based potting material which is considerably lighter in weight than epoxy. Two isolated, non grounded 2-56 machine screws thread into the module to securely mount it to the printed circuit board, relieving any stress on the interface pins. Mounting plates, brackets and flanged mounting options are also available

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. UL/CUL recognized, File E227588. RoHS Compliant.

SPECIFICATIONS

Input Voltage:

12Vdc for 4W, 24Vdc for 20W and 30W

Nominal Voltage Range:

11Vdc to 30Vdc for 4W, 23Vdc to 30Vdc for 20W and 30W

Input Current: (typical)

Disabled: 30mA
 No load: 90mA
 Full load:
 4 watt units: 0.5A
 20 watt units: 1.0A
 30 watt units: 1.5A

Efficiency:

80-85%, typical

Voltage Regulation:

Line: <0.01%
 Load: <0.01%

Current Regulation:

Line: <0.01%
 Load: <0.01%

Stability:

0.01% per 8 hours, 0.02% per day after 30 min. warmup

Accuracy:

2% on all programming and monitoring, except I Sense 10%

Temperature Coefficient: (typical)

Standard: 100ppm/°C
 Optional: 25ppm/°C (T Option)

Environmental:

Temperature Range:
 Operating: 0°C to 65°C case temperature
 Storage: -55°C to 85°C, non operational

Humidity:

10% to 90%, non-condensing.

Cooling:

Convection cooled, typical. 30 watt units operating at full power might require additional cooling to maintain case temperature below 65°C. Methods may include: forced air cooling, use of heat sink or metal case, etc. It is the user's responsibility to maintain the case temperature below 65°C. Damage to the power supply due to inadequate cooling is considered misuse and repairs will not be covered under warranty.

Dimensions:

2.96" L X 1.49" W X 0.81" H
 (75.2mm X 37.9mm X 20.6mm)

Weight:

4 oz. (113g), typical

UM 4W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*4	0 to 62.5V	64mA	0.030	0.028	8.8µF	1Ω	1.5V	0.5MΩ
UM0.125*4	0 to 125V	32mA	0.045	0.014	8.8µF	4.4Ω	2.75V	0.88MΩ
UM0.25*4	0 to 250V	16mA	0.034	0.017	2.2µF	20Ω	4.9V	1.50MΩ
UM0.5*4	0 to 500V	8mA	0.036	0.040	0.8µF	94Ω	10.1V	2.65MΩ
UM1*4	0 to 1KV	4mA	0.025	0.015	0.2µF	470Ω	10.75V	20MΩ
UM2*4	0 to 2kV	2mA	0.022	0.015	0.097µF	1.0KΩ	10.4V	30MΩ
UM4*4	0 to 4kV	1mA	0.019	0.017	0.012µF	9.4KΩ	11.1V	100MΩ
UM6*4	0 to 6kV	0.67mA	0.016	0.015	0.007µF	20KΩ	9.9V	150MΩ

UM 20W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*20	0 to 62.5V	320mA	0.060	0.088	8.8µF	1Ω	330mV	0.5MΩ
UM0.125*20	0 to 125V	160mA	0.067	0.044	8.8µF	4.4Ω	675mV	0.88MΩ
UM0.25*20	0 to 250V	80mA	0.035	0.019	2.2µF	20Ω	1.135V	1.50MΩ
UM0.5*20	0 to 500V	40mA	0.041	0.040	0.8µF	94Ω	2.25V	2.65MΩ
UM1*20	0 to 1KV	20mA	0.039	0.095	0.2µF	470Ω	4.35V	20MΩ
UM2*20	0 to 2kV	10mA	0.026	0.016	0.097µF	1.0KΩ	6.6V	30MΩ
UM4*20	0 to 4kV	5mA	0.023	0.028	0.012µF	9.4KΩ	6.65V	100MΩ
UM6*20	0 to 6kV	3.3mA	0.017	0.018	0.007µF	20KΩ	6.74V	150MΩ

UM 30W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*30	0 to 62.5V	480mA	0.075	0.112	8.8µF	1Ω	500mV	0.5MΩ
UM0.125*30	0 to 125V	240mA	0.075	0.056	8.8µF	4.4Ω	930mV	0.88MΩ
UM0.25*30	0 to 250V	120mA	0.055	0.031	2.2µF	20Ω	1.65V	1.50MΩ
UM0.5*30	0 to 500V	60mA	0.085	0.041	0.8µF	94Ω	3.4V	2.65MΩ
UM1*30	0 to 1KV	30mA	0.032	0.171	0.2µF	220Ω	6.5V	20MΩ
UM2*30	0 to 2kV	15mA	0.031	0.112	0.097µF	470Ω	9.85V	30MΩ
UM4*30	0 to 4kV	7.5mA	0.028	0.071	0.012µF	4.4KΩ	9.85V	100MΩ
UM6*30	0 to 6kV	5mA	0.020	0.051	0.007µF	9.4KΩ	10.0V	150MΩ

Note: Total ripple is the sum of the low frequency and high frequency ripple. Grayed text indicates Legacy interface signals.

STANDARD INTERFACE

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return/HV return
1A	Signature Resistor	Unique Identifying resistor connected to ground
2	+ Power Input	+12Vdc or +24Vdc power input
2A	N/C	
3	I Sense	See I Sense text and tables
3A	I Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
4A	V Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
5	Signal Ground	Signal Ground
5A	I Pgm	0 to 4.64Vdc = 0 to 100% rated output. Zin > 47kΩ Leave open for preset current limit @103% of rated output current
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin > 1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin > 100kΩ Leave open if pin 6A (VPgm) is used for programming
6A	V Pgm	0 to 4.64Vdc = 0 to 100% rated voltage. Zin > 100kΩ Leave open if pin 6 (remote adjust) is used for programming
7	+5V Reference Output	+5Vdc ±0.5%, 50ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E. Out Monitor	10:1 ratio for models below 1kV, 100:1 ratio for models 1kV and above. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance
10	HV Output	HV Output
11	HV Output	HV Output

Grayed out signals are provided for backward legacy compatibility and their use is not required

Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

Standard Interface Connections

Seventeen (17) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting. See mechanical drawing for location and spacing details.

Programming and Monitor Signals

Voltage and current programming is done via positive polarity, high input impedance, 0 to 4.64Vdc signals. Voltage and current monitors are positive polarity, buffered low output impedance 0 to 4.64Vdc signals.

I Mon

The I Mon signal is a true output current monitoring signal. All internal offsets due to feedback divider currents have been compensated for.

Signature Resistor

A unique identifying signature resistor for each type of unit is connected from Pin 1A to ground. Details if desired are available upon request.

Legacy Interface Connections

Eleven (11) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting. See mechanical drawing for location and spacing details.

I Sense Signal

The I Sense signal polarity is opposite of the output polarity of the module. This signal is protected via a transorb and provided via a series connected 47k isolation resistor. Internal HV dividers create a small, linear offset voltage on the I sense signal that can be compensated for.

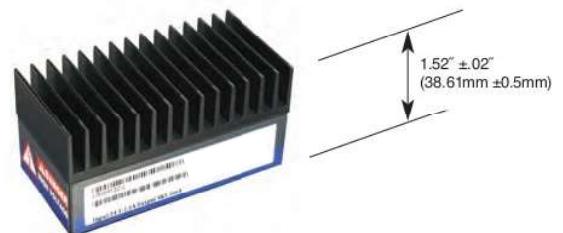
Adhesive Backed Heat Sink

UM modules are provided with an uninstalled top mounted adhesive backed heat sink. Label removal is not required if the customer elects to install and use the provided heat sink.

The UM's internal power dissipation causes a case temperature rise. If the case exceeds 65°C, the unit needs external cooling (fan or heat sink). Even if the case is below 65°C, it is prudent to keep it much lower. Like a semiconductor device; the hotter it is, the shorter the life. For every 10°C reduction of temperature the lifetime will be increased by a factor of ~2.35. The thermal resistance from internal circuitry to ambient is 8°C/watt without a heat sink (still air). This reduces to 6°C/watt with the heat sink.

Example:

Assuming ~80% efficiency for a 20 watt UM module, the 5 watts of internal power dissipation would create a 40°C rise. Using the heat sink there would be only a 30°C rise. Ultimately it is up to the user to determine what cooling method is applicable for their application, but the general recommendation is to keep the module as cool as possible.



LEGACY INTERFACE (L OPTION)

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return/HV return
2	+ Power Input	+12Vdc or +24Vdc power input
3	I Sense	See I Sense text and tables for details
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
5	Signal Ground	Signal Ground
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin > 1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin > 100kΩ
7	+5V Reference Output	+5Vdc ±0.5%, 50ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E Out Monitor	10:1 ratio for models below 1kV, 100:1 ratio for models 1kV and above. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance
10	HV Output	HV Output
11	HV Output	HV Output

Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

UM OPTIONS

C Option

Fast Rise Time Applications-

If applications demand a power supply that is optimized for fast rise time/low overshoot requirements, then the C Option should be considered. A Hysteretic control circuit is employed providing improved performance in these unique applications with higher ripple observed (1% Vpp typical). If used for capacitor charging, Capacitor Charging Questionnaire should be filled out to assure all aspects of the intended usage is understood assuring the appropriate unit is provided.

Maximum short circuit discharge rate:

$$\frac{CV^2}{2} (f) < 1 \text{ watt}$$

C = Output capacitance of unit
 C ext = External capacitance
 V = Maximum rated voltage
 f = Frequency of discharge
 I = Nominal output current
 t_R = Rise time

Typical Rise Time:

$$t_R = \frac{C + C_{ext}}{I} (V)$$

Minimum rise time is 3mS

T Option

Low Temperature Coefficient-

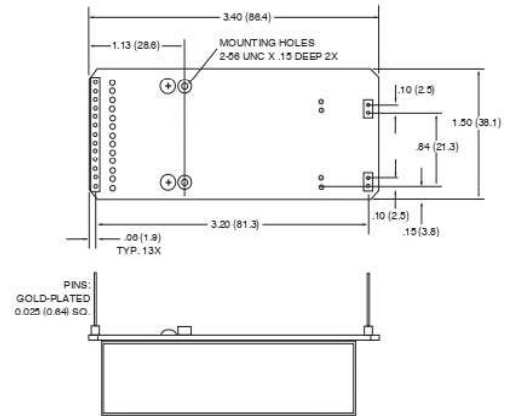
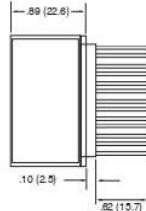
The T Option offers the UM with an improved temperature coefficient. The standard voltage feedback divider is replaced with one having a superior temperature coefficient, resulting in a unit with 25ppm/C° (typical) temperature coefficient.

PHYSICAL INTERFACING

A Option

Adapter Board-

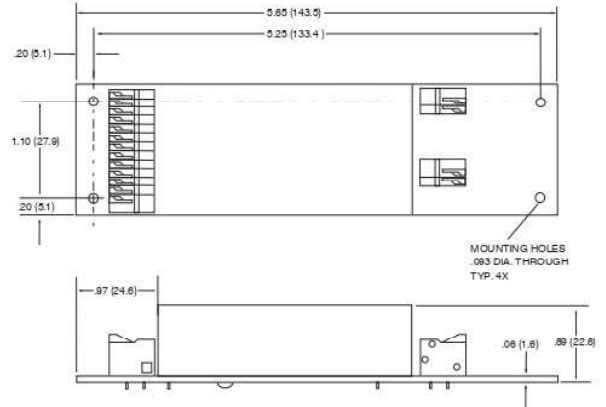
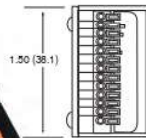
UM module can be fitted with an adapter board that will allow a drop in replacement for other commercially available modules of a physically larger size, while providing identical functionality with superior performance.



B Option

Terminal Block-

The B Option provides terminal block connections for both the customer interface and high voltage output/return. This feature can be helpful in situations where frequent wiring changes are anticipated, as in a testing or prototype environment.



SHIELDING

M Option

Mu Metal Shield-

UM modules can be fitted with an adhesive backed Mu Metal foil shield to help protect sensitive adjacent circuitry.

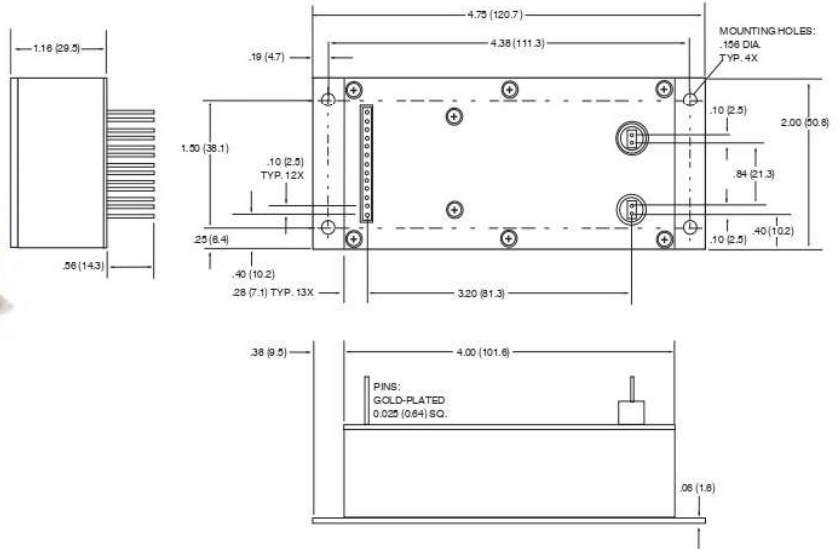


Same as standard unit.
 See page 6 of 6 for dimensional drawings

SHIELDING continued

S Option

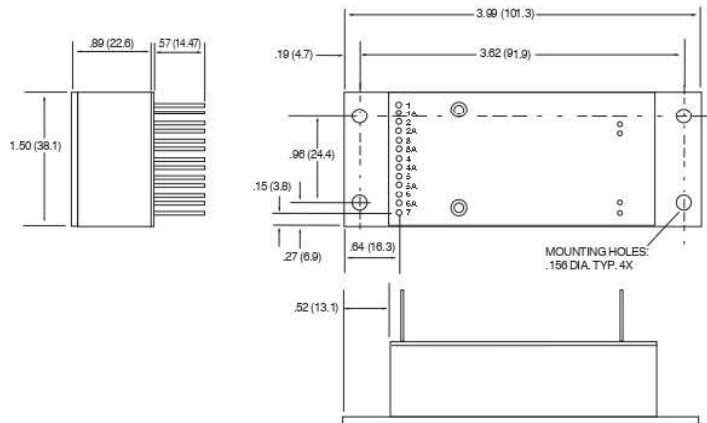
RF Tight Shielded Can-
The S Option mounts the UM module inside of a flanged RF tight aluminum can.



CHASSIS MOUNTING

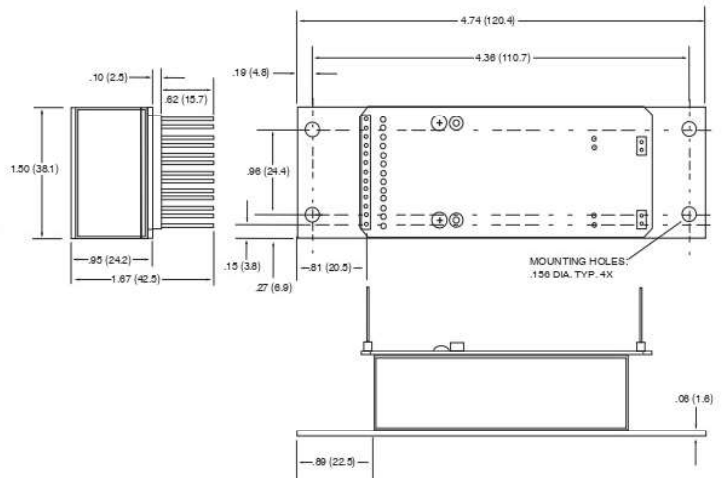
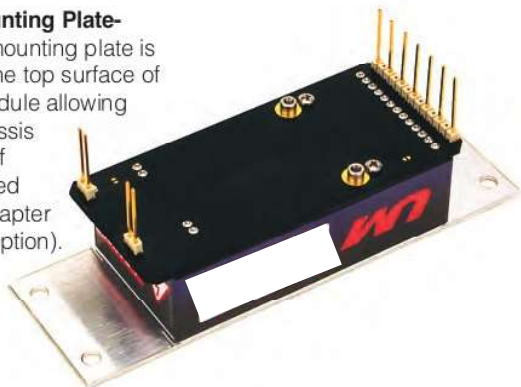
E Option

Eared Mounting Plate-
An eared mounting plate is affixed to the top surface of the UM module allowing simple chassis mounting of unit.



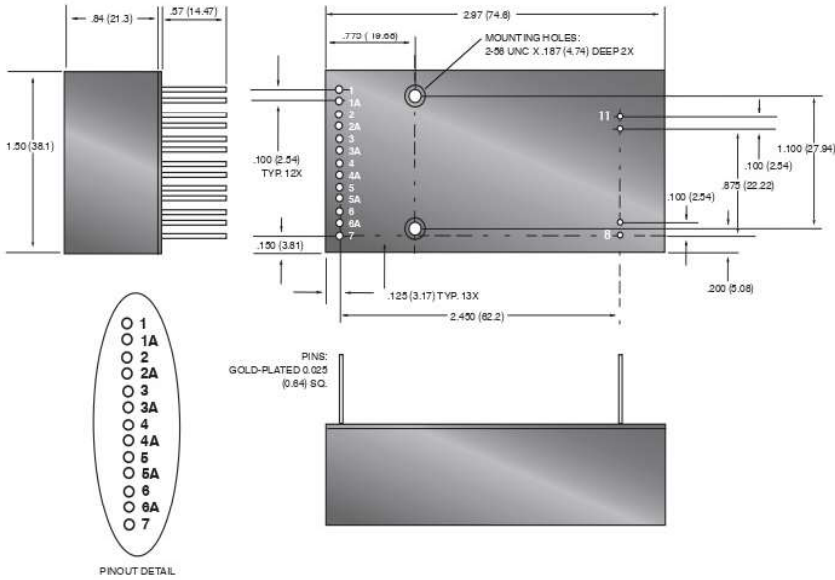
E2 Option

Eared Mounting Plate-
An eared mounting plate is affixed to the top surface of the UM module allowing simple chassis mounting of units ordered with the Adapter Board (A Option).



DIMENSIONS: in.[mm]

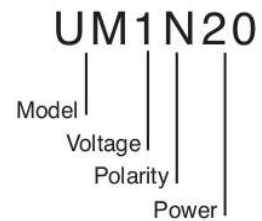
17 PIN - Standard Interface



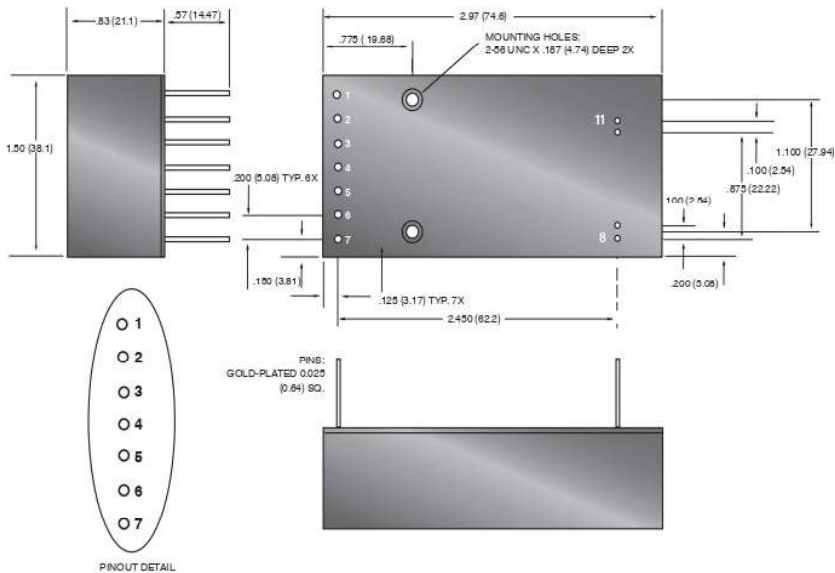
ORDERING INFORMATION

Voltage	0 to 62.5Vdc	0.062
	0 to 125Vdc	0.125
	0 to 250Vdc	0.25
	0 to 500Vdc	0.5
	0 to 1000Vdc	1
	0 to 2000Vdc	2
	0 to 4000Vdc	4
Polarity	0 to 6000Vdc	6
	Positive	P
Power	Negative	N
	Watts Output	4
	Watts Output	20
	Watts Output	30

STANDARD UNIT ORDERING EXAMPLE



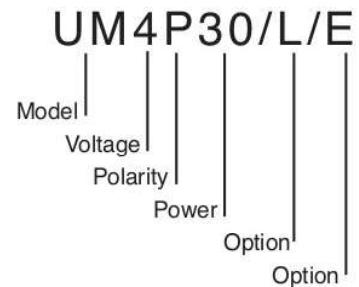
11 PIN - Legacy Interface



OPTION ORDERING INFORMATION

OPTION	OPTION CODE
Legacy Interface	L
Fast Rise Time	C
Low Temperature Coefficient	T
Adapter Board	A
Terminal Block	B
Mu Metal Shield	M
RF Tight Shielded Can	S
Eared Mounting Plate	E
Eared Mounting Plate/Adapter Board	E2

OPTION ORDERING EXAMPLE



Note: There may be some restrictions on multiple option combinations. Please contact our sales department for more details.





MPS series are a family of high voltage 10 Watt modules that provide output voltages ranging from 1kV to 30kV.

The MPS series are high performance products designed with hybrid topology of linear and switch mode power conversion techniques delivering lower noise with higher efficiency. The MPS series produces excellent ripple and stability performance specifications from a compact footprint. Additionally the MPS series features, as standard, a differential amplifier input for the voltage programming signal to improve immunity from external system noise and addressing any offset issues. Alternatively the output voltage may be pre-set by an internal potentiometer.

A fully featured remote user interface is provided via 15-pin D-type connector as standard and an optional RS-232 or RS-485 serial interface is also available.

Spellman's proprietary HV technology coupled with SMT circuitry results in an ultra compact and lightweight module that is available as either a positive or negative supply that is ideal for OEM applications.

TYPICAL APPLICATIONS

Photomultiplier Tubes	Electrostatic Printing
Electron and Ion Beams	Scintillators
Electronmultiplier Detectors	Mass Spectrometry
Microchannel Plate Detectors	Electrostatic Lenses
Nuclear Instruments	

OPTIONS

VCC	Variable Current Control
HS	High Stability
DCC 2	RS-232
DCC 4	RS-485

Note: It is not possible to supply the unit with both full HS and DCC options

- **Differential Input for Voltage Program**
- **Optional RS-232/RS-485 Control**
- **10 Watts Output Power**
- **Voltage and Current Monitors and Controls**
- **High Stability**
- **Ultra Low Ripple and Noise**
- **CE Marked and UL61010-1 Certified**

SPECIFICATIONS

Input Voltage:

+24 Vdc, ±2Vdc

Input Current:

≤1 amp maximum

Output Voltage:

9 models available from 1kV to 30kV

Output Polarity:

Positive or negative, specify at time of order

Power:

10 watts, maximum

Voltage Regulation:

Line: ≤0.001% of rated output voltage over specified input voltage

Load: ≤0.001% of rated output voltage for full load change

Current Regulation (VCC Option):

Line: ≤0.01% for 1V input voltage change under any load conditions

Load: ≤0.01% for full load to short circuit

Ripple:

See "model selection" table

Stability:

≤0.007% per hour, 0.02% per 8 hours after 1.0 hour warm up period.
 ≤0.05% per 1000 hours after 1.0 hour warm up period (HS option)

Temperature Coefficient:

≤25ppm per degree C

≤10ppm per degree C (HS option)

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -35°C to 85°C

Humidity:

20% to 85% RH, non-condensing

Cooling:

Convection cooled

Dimensions:

- 1-10kV: 1.18" H X 2.75" W X 5.12" D
(30mm x 70mm x 130mm)
- 15-20kV: 1.18" H X 2.75" W X 6.49" D
(30mm x 70mm x 165mm)
- 30kV: 1.37" H X 2.95" W X 8.47" D
(65mm x 75mm x 215mm)

Weight:

- 1-3kV: 9.88 oz. (280g)
- 5-10kV: 14.82 oz. (420g)
- 15-20kV: 22.92 oz. (650g)
- 30kV: 35.51 oz. (950g)

Interface Connector:

15 pin male D connector

Output Connector:

A captive 39.4" (1 meter) long shielded HV cable is provided

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. UL/CUL recognized, File E227588. RoHS compliant.

**MPS ANALOG INTERFACE—
15 PIN D CONNECTOR (NON-DCC UNITS)**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	Voltage Monitor Output	0 to 10Vdc=0 to 100% Rated Output, Zout =10kΩ
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
5	Voltage Program Input	0 to 10Vdc=0 to 100% Rated Output, Zin=10MΩ
6	Voltage Program Differential Amplifier Output	0 to 10Vdc=0 to 100% Rated Output, Zout =10kΩ
7	Voltage Program Differential Amplifier Input—Positive	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of rated output, diode clamped to ground, Zin =38kΩ
8	Current Monitor Output	0 to 10Vdc = 0 to 100% Rated Output, Zout =10kΩ
9	Voltage Program Differential Amplifier Input—Negative	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of Rated Output, diode clamped to ground, Zin =38kΩ
10	No Connection	No Connection
11	Current Program Input	Standard: Internally connected to provide 110% fixed current limit VCC Option: 0 to 10Vdc=0 to 100% Rated Output, Zin=1MΩ
12	Enable Input	Low = Enable, TTL, CMOS, Open Collector Compliant
13	Internal Connection	No Connection
14	Vref (/HS unit only)	+10V ultra high stability reference output. On standard units the reference voltage is available on pin 4
15	Analog Signal Ground (15kV to 20kV units)	Analog Signal Ground (No connection for (1kV to 10kV units)

**MPS ANALOG INTERFACE—
15 PIN D CONNECTOR (DCC UNITS)**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	No Connection	No Connection
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
5	No Connection	No Connection
6	No Connection	No Connection
7	No Connection	No Connection
8	No Connection	No Connection
9	No Connection	No Connection
10	No Connection	No Connection
11	No Connection	No Connection
12	Enable Input	Low = Enable, TTL, CMOS, open collector compliant
13	No Connection	No Connection
14	TxD	Transmit data (output) with respect to ground (pin 1)
15	RxD	Receive data (input) with respect to ground (pin 1)

- Notes: 1.) The DCC option operated via a simple ASCII protocol. Contact us for more information.
2.) The HS and DCC option cannot be offered together

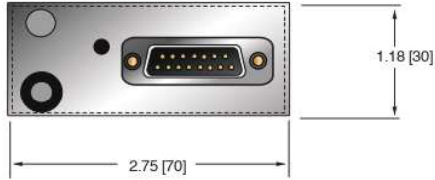
MPS SELECTION TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
MPS1*10/24	1kV	10mA	<10mV
MPS2*10/24	2kV	5.00 mA	<20mV
MPS2.5*10/24	2.5kV	4.00 mA	<25mV
MPS3*10/24	3kV	3.3mA	<25mV
MPS5*10/24	5kV	2mA	<30mV
MPS10*10/24	10kV	1mA	<50mV
MPS15*10/24	15kV	0.66mA	<100mV
MPS20*10/24	20kV	0.5mA	<150mV
MPS30*10/24	30kV	0.33mA	<250mV

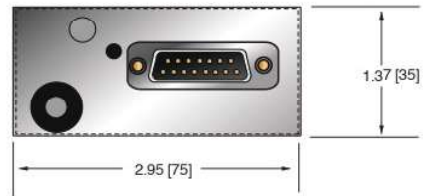
*Specify "P" for positive polarity or "N" for negative polarity. Custom units available.

DIMENSIONS: in.[mm]

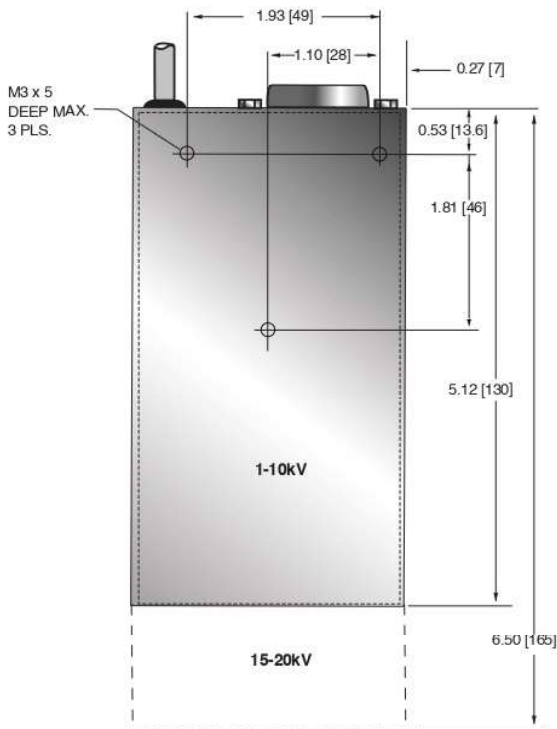
1-20kV
FRONT VIEW



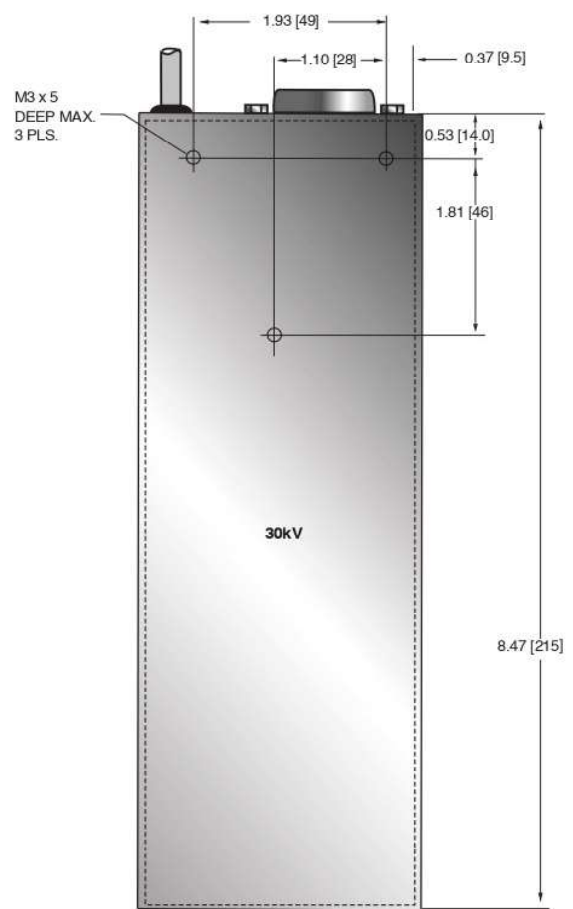
30kV
FRONT VIEW



BOTTOM VIEW



BOTTOM VIEW



SIDE VIEW



SIDE VIEW





MPD series are a family of high voltage 10 Watt modules that provide output voltages ranging from 2.5kV to 20kV.

The MPD series are high performance products designed with hybrid topology of linear and switch mode power conversion techniques delivering lower noise with higher efficiency. The MPD series produces excellent ripple and stability performance specifications from a compact footprint. The MPD series features a differential amplifier input for the voltage programming signal to improve immunity from external system noise and addressing any offset issues.

A fully featured remote user interface is provided via 15-pin D-type connector as well as RS-232/RS-485 serial interface. The unit can be full analog or full digital control defined by interface connector links.

HV technology coupled with SMT circuitry results in an ultra compact and lightweight module that is available as either a positive or negative supply that is ideal for OEM applications.

TYPICAL APPLICATIONS

Photomultiplier Tubes	Electrostatic Printing
Electron and Ion Beams	Scintillators
Electronmultiplier Detectors	Mass Spectrometry
Microchannel Plate Detectors	Electrostatic Lenses
Nuclear Instruments	

SPECIFICATIONS

Input Voltage:

+24 Vdc, ±2Vdc

Input Current:

≤1 amp maximum

Output Voltage:

5 models available from 2.5kV to 20kV

Output Polarity:

Positive or negative, specify at time of order

Power:

10 watts, maximum

Voltage Regulation:

Line: For a 1V line change 10ppm

Load: 0-100% load 10ppm

- **Extremely Compact High Performance Module**
- **Digital or Differential Analog Voltage Program**
- **Standard RS-232/RS-485 Control**
- **10 Watts Output Power**
- **Voltage and Current Monitors**
- **High Stability, Low TC**
- **Digital Oscillator Provides Ultra Low Ripple and Noise, Down to 1/f Band**

Current Limit:

110% of rated output current

Ripple:

See "drift, ripple and noise" table

Stability:

After one hour warm up period.

10ppm/hour

25ppm/8 hours

500ppm/1000 hours

Temperature Coefficient:

10ppm per degree C

Protection:

Arc and short circuit protected. Not designed to withstand continuous arcing

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -35°C to 85°C

Humidity:

20% to 85% RH, non-condensing

Cooling:

Convection cooled

Dimensions:

2.5-10kV:

1.18" H X 2.75" W X 5.12" D (30mm x 70mm x 130mm)

15-20kV:

1.18" H X 2.75" W X 6.50" D (30mm x 70mm x 165mm)

Weight:

2.5/5/10kV:

14.82 oz. (420g)

15/20kV:

22.09 oz. (650g)

Interface Connector:

15 pin male D connector

Output Connector:

A captive 39.4" (1 meter) long HRG58 shielded HV cable is provided

Regulatory Approvals:

Safety: The unit is designed to meet the requirements of EN61010-1, UL61010A-1 and CAN/CSA 22.2 No 1010.1.

EMC: As the unit is intended for incorporation into the users equipment, it is not tested as a standalone unit to meet the EMC directive. The user will need to follow sensible EMC precautions in using the unit.

MPD SELECTION TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
MPD2.5*10/24	2.5kV	4.00 mA	See table below
MPD5*10/24	5kV	2mA	See table below
MPD10*10/24	10kV	1mA	See table below
MPD15*10/24	15kV	0.66mA	See table below
MPD20*10/24	20kV	0.5mA	See table below

*Specify "P" for positive polarity or "N" for negative polarity.
Custom units available.

MPD DRIFT, RIPPLE and NOISE

Model	3mHz-30mHz	30mHz-3Hz	3Hz-30Hz	30Hz-300Hz	300Hz-30kHz	30kHz-3MHz
MPD2.5	10mV	10mV	10mV	5mV	5mV	5mV
MPD5	10mV	10mV	10mV	10mV	10mV	10mV
MPD10	20mV	20mV	20mV	20mV	20mV	20mV
MPD15	30mV	30mV	30mV	30mV	30mV	30mV
MPD20	40mV	40mV	40mV	40mV	40mV	40mV

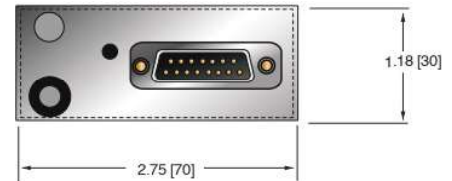
MPD EXTERNAL INTERFACE – 15 PIN MALE D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	Voltage Monitor Output	Voltage monitor 0-10Vdc for 0 to full scale output $\pm 1\%$ (wrt signal ground)
4	Voltage Reference Output	10Vdc @ 1mA maximum
5	Voltage Program Input	0 to 10Vdc=0 to 100% rated output, $Z_{in}=10M\Omega$
6	Voltage Program Differential Amplifier Output	0 to 10Vdc=0 to 100% rated output, $Z_{out}=10k\Omega$
7	Voltage Program Differential Amplifier Input—Positive	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of rated output, diode clamped to ground, $Z_{in}=38k\Omega$
8	Current Monitor Output	Voltage monitor 0-10Vdc for 0 to full scale output $\pm 1\%$ (wrt signal ground)
9	Voltage Program Differential Amplifier Input—Negative	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of rated output, diode clamped to ground, $Z_{in}=38k\Omega$
10	Voltage Program Digital Output	0 to 10Vdc = 0 to 100% rated output, $Z_{out}=10k\Omega$
11	Analog Signal Ground	Analog signal ground for control and monitoring
12	Enable Input	Low = Enable, TTL, CMOS, open collector compliant
13	Digital Mode	RS-232 or RS-485 configuration Low = RS-485, Open circuit = RS-232
14	RS-232 TxD/RS-485 (-)	Transmit data (output) wrt pin 1 or RS-485 inverting
15	RS-232 RxD/RS-485 (+)	Receive data (input) wrt pin 1 or RS-485 non inverting

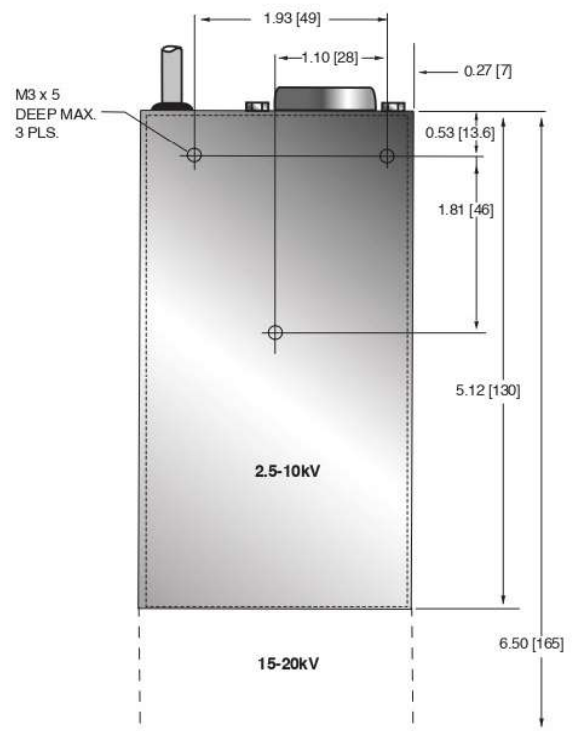
Digital Control – Connect pin 5 to pin 10
Analog Control – Connect pin 5 to pin 6

DIMENSIONS: in.[mm]

FRONT VIEW



BOTTOM VIEW



SIDE VIEW





- ***±8kV 25ms Polarity Reversing Speed***
- ***Precision Analog Voltage and Current Controls***
- ***Precision Analog Voltage and Current Monitors***
- ***High Stability***
- ***Low Ripple and Noise***
- ***High Voltage Inhibit Control***
- ***RoHS Compliant***

RoHS compliant MX8 Plus is a well-regulated high performance fast reversible supply featuring a 25ms "hot switchable" polarity reversing capability.

The MX8 Plus's low ripple specification is typical of the topologies that make High Voltage your ideal choice for mass spectrometry applications; especially security detection systems, dynodes, sample ionisation as well as capillary electrophoresis and electrostatic printing applications. The MX8 has been designed especially for EI and APCI applications.

The MX8 Plus can be easily tailored to an OEM's requirement, such as improved ripple performance, or different voltage and/or current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Capillary Electrophoresis
Electrostatic Printing

SPECIFICATIONS

Input Voltage:

+24Vdc, ±10%

Input Current:

<0.5A nominal continuous
<1.2A peak during reversing

Output Voltage:

0V to ±8kV (see note 1)

Output Current:

100µA

Output Polarity:

Bipolar

Voltage Regulation:

Line: <±0.1% for ±10% input voltage change
Load: <0.1% for 0 to full load

Current Regulation:

Line: ±0.1% for +1V input voltage change
for any load condition
Load: ±0.1% for full load to short circuit

Ripple:

<0.1% p-p @ 100µA

Temperature Coefficient:

≤100ppm per degree C

Environmental:

Temperature Range:
Operating: 5°C to 45°C
Storage: -35°C to 85°C
Humidity:
10% to 85%, non-condensing

Stability:

0.05% per hour after 1 hour warm up

Polarity Reversal Time:

<25ms from command to 90% into 100pF load capacitance
(see note 2)

Protection:

Arc and short circuit protected

Output Voltage Limit:

Output voltage must not exceed ±8kV ±250V
under any input or output conditions

Dimensions:

1.48" H X 3.23" W X 9.45" D (37.6mm X 82mm X 240mm)

Weight:

Approximately 3.3 pounds (1.5kg)

Input Connector:

14 way Molex housing p/n 39-01-2140 or
similar with female terminals. Cable length 508mm

Output Connector:

Alden F303RX12, mating connector not provided

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC
Low Voltage Directive. UL/CUL recognized file E227588.
RoHS compliant.

Note 1: Linearity not guaranteed below 200V. Maximum offset ±20V when programmed to zero or disabled using remote enable.

Note 2: Unit incorporates circuitry to minimize the effects of low programmed current on reversing time. Polarity reversal time applies when current is programmed to 3µA or above.

MX8 PLUS 14 PIN SOCKET

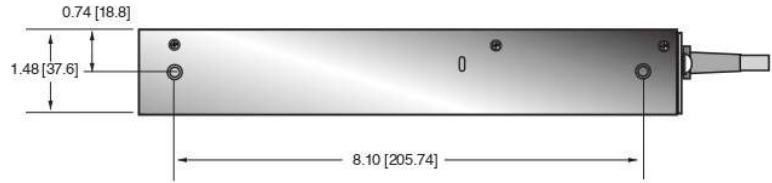
PIN	SIGNAL
1	+24Vdc Input
2	Chassis and 24Vdc Ground
3	Enable/Inhibit Input
4	8kV Voltage Monitor output
5	Voltage Control Input
6	Current Monitor Output
7	Current Control Input
8	Polarity Control Input
9	Analog Ground
10	Current/Voltage Control Indicator
11	N/C
12	N/C
13	N/C
14	N/C

How to Order:

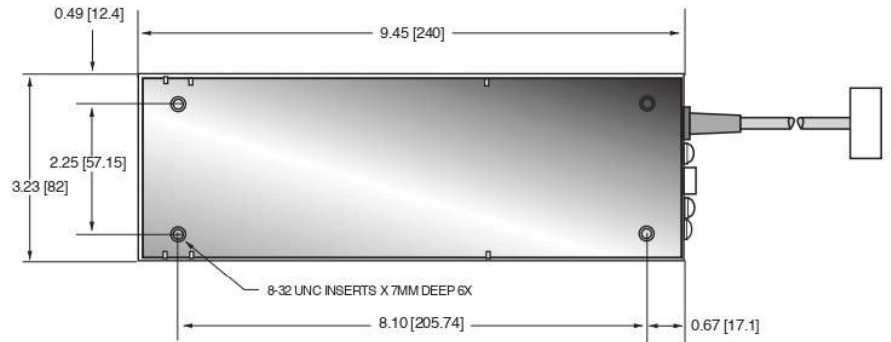
Standard: PART NO.:MXP8PN24

DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW



FRONT VIEW



MX10 HIGH PERFORMANCE DC-DC CONVERTER



MX10 is a well-regulated high performance DC-DC converter featuring a "hot switchable" polarity reversal capability. The MX10's low ripple specification makes it ideal for Mass Spectrometry applications; especially security detection systems, Dynodes, sample ionization as well as capillary electrophoresis and electrostatic printing applications.

The MX10 is rated at 10kV @ 100uA and is packaged in a shielded metal enclosure. This unit features a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MX10 can be provided with current control, improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Capillary Electrophoresis
Electrostatic Printing

OPTIONS

VCC: Voltage and Current Control

SPECIFICATIONS

Input Voltage:

+24Vdc, ± 1 volt

Input Current:

<400mA continuous
<1.2A during reversing

Output Voltage:

± 200 Vdc to ± 10 kV

Output Current:

0 to 100uA max.

Polarity:

Remotely reversible via logic signal, 250mS to settle to $\pm 2\%$, 1 Hz maximum switch rate

Voltage Regulation:

Load: 0.1% of maximum output voltage for a no load to full load change
Line: 0.1% of maximum output voltage for a 1 volt input line change

- **Hot Switchable Polarity Reversible Via a Logic Signal**
- **Well Regulated, Low Ripple**
- **Polarity Reversal Within 250mS (Option to Improve to 100mS)**
- **Voltage and Current Monitor Outputs**
- **Remote HV Inhibit**
- **Flying High Voltage Output Cable**
- **Voltage or Current Control Options**

Current Regulation: (VCC Option)

Load: 0.1% of maximum rated current for a 0 to 100% voltage change
Line: 0.1% of maximum rated current for a 1 volt input line change

Voltage/Current Programming:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Voltage/Current Monitor:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Programming and Monitor Accuracy:

$\pm 2\%$

Ripple:

$\leq 0.005\%$ Volts p-p

Stability:

0.1% per hour after 1 hour warmup

Temperature Coefficient:

≤ 100 ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90%, non-condensing.

Cooling:

Convection cooled

Dimensions:

1.63" H X 6.61" W X 4.53" D (41.5mm X 168mm X 115mm)

Weight:

Approximately 3 pounds (1.4kg)

Interface/Power Connector:

9 pin male D connector

HV Output Connector:

39.4" (1m) Flying Lead of URM76 LSF cable

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. UL/CUL recognized file E227588. RoHS Compliant.

MX10 TERMINAL BLOCK 9 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Voltage Monitor	0-10V-0-100% of Rated Output
2	External Inhibit Input	Open or >10V = "OFF"; <4V = "ON"
3	Current Programming Input	0-10Vdc = 0-100% of Rated Output (on VCC option)
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity Control Input	Open or >10V = "NEGATIVE"; <4V = "POSITIVE"
7	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
8	+24V Input	+24V Input
9	Power Ground	Power Ground

How to Order:

Standard: PART NO.:MX10PN24

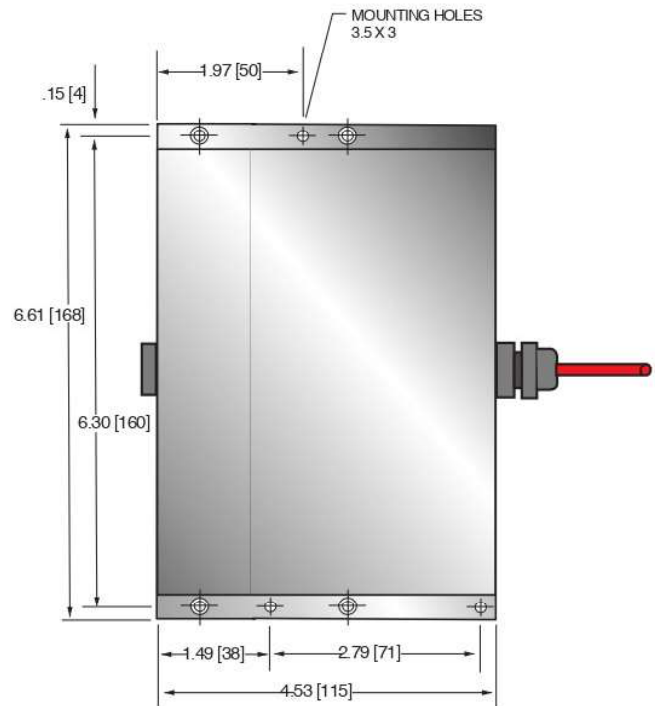
VCC Option: PART NO.:MX10PN24/VCC

DIMENSIONS: in. [mm]

SIDE VIEW



TOP VIEW





- **$\pm 10\text{kV}$ 25ms Polarity Reversing Speed**
- **Integrated Electron Multiplier Supply**
- **Precision Analog Voltage Control**
- **High Stability**
- **Low Ripple and Noise**
- **High Voltage Inhibit Control**
- **RoHS Compliant**

RoHS compliant MX10 Plus is a well-regulated high performance fast reversible dynode supply featuring a 25ms "hot switchable" polarity reversing capability with an integrated -2.3kV electron multiplier supply.

The MX10 Plus's low ripple specification is typical of the topologies that make High Voltage your ideal choice for mass spectrometry applications; especially security detection systems, dynodes, sample ionisation as well as capillary electrophoresis and electrostatic printing applications. The MX10 Plus has been designed especially for dynode detector applications.

The MX10 Plus can be easily tailored to an OEM's requirement, such as improved ripple performance, or different voltage and/or current capabilities.

TYPICAL APPLICATIONS

- Dynode Supply
- Electron Multiplier Supply

SPECIFICATIONS

Input Voltage:

+15Vdc, $\pm 0.75\text{Vdc}$

Input Current:

$\leq 500\text{mA}$ nominal continuous
 $< 2\text{A}$ during reversing

Temperature Coefficient:

$\leq 100\text{ppm}$ per degree C

Environmental:

Temperature Range:
Operating: 5°C to 45°C
Storage: -35°C to 85°C
Humidity:
10% to 85%, non-condensing

Stability:

(constant operating conditions)
 $\leq 300\text{ppm}$ per hour after 1 hour warm up

Protection:

Arc and Short circuit protected

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. RoHS Compliant.

DYNODE SPECIFICATIONS

Output Voltage:

$\pm 10\text{kV}$

Output Current:

$10\mu\text{A}$

Output Polarity:

Remotely reversible via TTL logic signal

Switching Speed:

25ms to settle 90% into 50pF load

Voltage Regulation:

Line: $\leq 0.02\%$ for a 1.5V input voltage change

Ripple:

≤ 10 Volts p-p

ELECTRON MULTIPLIER SPECIFICATIONS

Output Voltage:

Fixed: -2.3kV

Output Polarity:

Negative

Output Current:

$\leq 230\mu\text{A}$

Voltage Regulation:

Line: $\leq 0.02\%$ for a 1.5V input voltage change
Load: $< 5\text{V}$ for for no load to 22M Ohms load change

Ripple:

$\leq 200\text{mV}$ p-p @ 2.3kV into 22M Ohm load

Output Rise Time:

10ms

Output Fall Time:

10ms

Dimensions:

2.00" H X 5.30" W X 8.00" D (50.8mm X 134.6mm X 203mm)

Weight:

Approximately 3.3 pounds (1.5kg)

Interface/Power Connector:

20 pin flat ribbon connector

Output Connector:

$\pm 10\text{kV}$: modified Alden #A200 connector
 -2.3kV : MHV Kings bulkhead KV-79-15 or similar

MX10 PLUS TERMINAL BLOCK 20 PIN

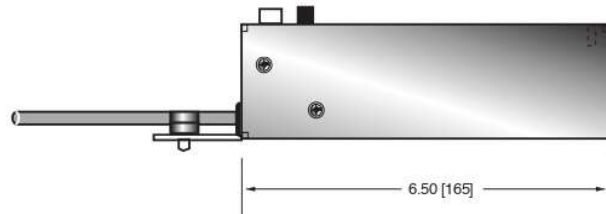
PIN	SIGNAL
1	+15Vdc Input
2	+15Vdc Input
3	N/C
4	N/C
5	Ground
6	Ground
7	Output Voltage Control
8	Signal Reference Ground
9	10kV On
10	10kV On
11	Output Polarity Control
12	EM Protect
13	-2.3kV Output Monitor
14	EM On
15	Ground
16	Ground
17	±10kV Output Monitor
18	N/C
19	+15Vdc Input
20	+15Vdc Input

How to Order:

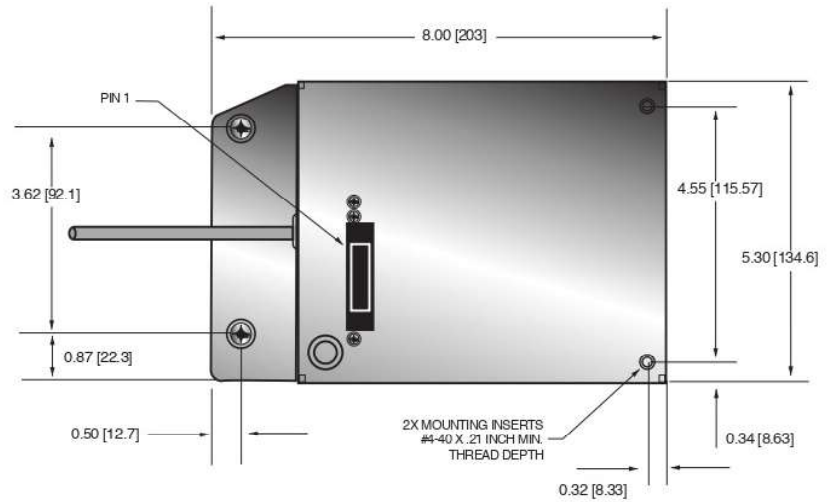
Standard: PART NO.:MXP10PN15

DIMENSIONS: in.[mm]

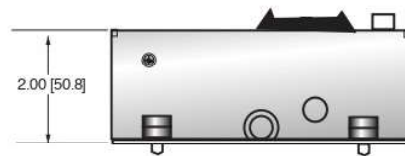
SIDE VIEW



TOP VIEW



FRONT VIEW





MX20 is a well-regulated high performance DC-DC converter featuring a "hot switchable" polarity reversal capability. The MX20's low ripple specification makes it ideal for Mass Spectrometry applications; especially security detection systems, Dynodes, sample ionization as well as capillary electrophoresis and electrostatic printing applications.

The MX20 is rated at 20kV @ 100uA and is packaged in a shielded metal enclosure. This unit features a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MX20 can be provided with current control, improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Capillary Electrophoresis
Electrostatic Printing

OPTIONS

VCC: Variable Current Control

SPECIFICATIONS

Input Voltage:

+24Vdc, ± 1.2 volts

Input Current:

<500mA continuous
<1.2A during reversing

Output Voltage:

± 500 Vdc to ± 20 kV

Output Current:

0 to 100uA max.

Polarity:

Remotely reversible via logic signal, 500mS to settle to $\pm 2\%$, 1 Hz maximum switch rate

Voltage Regulation:

Load: 0.02% of maximum output voltage for a no load to full load change
Line: 0.01% of maximum output voltage for a 1 volt input line change

- **Hot Switchable Polarity Reversible Via a Logic Signal**
- **Well Regulated, Low Ripple**
- **Polarity Reversal Within 500mS**
- **Voltage and Current Monitor Outputs**
- **Remote HV Inhibit**
- **Flying High Voltage Output Cable**
- **Current Control Option**

Current Regulation: (VCC Option)

Load: 0.1% of maximum rated current for a 0 to 100% voltage change
Line: 0.01% of maximum rated current for a 1 volt input line change

Voltage/Current Programming:

0 to 10 volts corresponds to 0 to 100% of rated output voltage/current

Voltage/Current Monitor:

0 to 10 volts corresponds to 0 to 100% of rated output voltage/current

Programming and Monitor Accuracy:

$\pm 2\%$ Voltage Programming/Monitor
 $\pm 5\%$ Current Programming/Monitor

Ripple:

$\leq 0.0025\%$ Volts p-p

Stability:

0.1% per hour after 1 hour warmup

Temperature Coefficient:

≤ 100 ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90%, non-condensing

Cooling:

Convection cooled

Dimensions:

2.05" H X 6.61" W X 6.50" D (52mm X 168mm X 165mm)

Weight:

Approximately 5.51 pounds (2.5kg)

Interface/Power Connector:

9 pin male D connector

HV Output Connector:

39.4" (1m) Flying Lead of URM76 LSF cable

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. RoHS Compliant.

MX20 TERMINAL BLOCK 9 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Voltage Monitor	0-10V-0-100% of Rated Output
2	External Inhibit Input	Open or >10V = "OFF"; <4V = "ON"
3	Current Programming Input	0-10Vdc = 0-100% of Rated Output (on VCC option)
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity Control Input	Open or >10V = "NEGATIVE"; <4V = "POSITIVE"
7	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
8	+24V Input	+24V Input
9	Power Ground	Power Ground

How to Order:

Standard: PART NO.:MX20PN24

VCC Option: PART NO.:MX20PN24/VCC

DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW

