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Proven Reliability

CA SERIES

PRECISION REGULATED, LOW RIPPLE HIGH VOLTAGE DC TO DC CONVERTERS

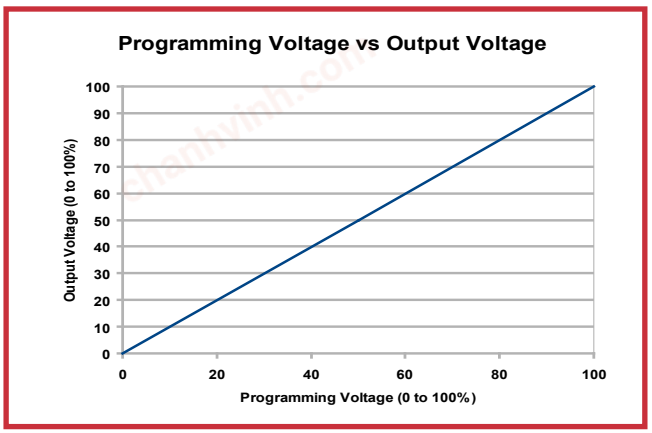
200V to 2000V @ 1 Watt

NOW UL RECOGNIZED



PRODUCT DESCRIPTION

Precision regulated, very low noise, high performance high voltage power supplies are fully programmable (0 to 100%) and feature high voltage monitor readback, on-board precision reference, wide input voltage range and protection against arcs and short circuits all in a miniature, shielded case. Please refer to our CA-T series data sheet for extended temperature.



APPLICATIONS

Photomultiplier Tubes
Avalanche Photodiodes
Solid State Detectors
Electrophoresis
EO Lenses
Piezo Devices
Capacitor Charging

PRODUCT SELECTION TABLE

MODEL	OUTPUT VOLTAGE (POSITIVE OR NEGATIVE)	MAXIMUM OUTPUT CURRENT*1
CA02	0 to 200V	0 to 5 mA
CA05	0 to 500V	0 to 2 mA
CA10	0 to 1,000V	0 to 1mA
CA12	0 to 1,250V	0 to 0.8 mA
CA20	0 to 2,000V	0 to 0.5 mA

Complete List of Models on page 2

FEATURES

- Very Low Ripple, as low as 5PPM!
- Precision Regulated
- Miniature Shielded Case, 1 cubic inch
- 0 to 100% Programmable output
- Voltage Monitor/ Readback
- High Stability, typically<25ppm/°C
- Wide Input Voltage Range
- Arc, Short Circuit Protected
  12 Vin; indefinite
  5 Vin; short duration, up to 1 minute
- Very Low EMI/RFI
- Precision On board Reference
- External Voltage or Potentiometer Programming
- Accessible Calibration Adjustment
- Sealed To Withstand Immersion Cleaning Processes
- Designed to meet the requirements of UL1950
- Proven Reliability, MTBF: >2.10 million hrs per Bellcore TR-332
- RoHS Compliant
- UL Recognized

OPTIONS

- Available with a 5VDC input voltage

ISO 9001:2008 CERTIFIED ISO 14001:2004 CERTIFIED RoHS COMPLIANT c UL us E344664 CE IPC Certified J-STD-001 Application Specialist

ELECTRICAL SPECIFICATIONS*2 CA02 - CA20 (200V to 2000V)

OUTPUT VOLTAGE	MODEL	MAXIMUM OUTPUT CURRENT*1	RIPPLE P-P FULL-LOAD*3	REGULATION		FREQUENCY*3
				LOAD 0 TO 100%*3	LINE 11.5 TO 15.5V*3	
12 VDC INPUT MODELS						
0 to +200V	CA02P	0 to 5 mA	<0.01 %	<0.05 %	<0.01 %	80 - 180 kHz
0 to -200V	CA02N	0 to 5 mA	<0.01 %	<0.05%	<0.01%	80 - 230 kHz
0 to +500V	CA05P	0 to 2 mA	<0.01 %	<0.01 %	<0.01%	200 - 400 kHz
0 to -500V	CA05N	0 to 2 mA	<0.01 %	<0.01 %	<0.01 %	100 - 250 kHz
0 to +1,000V	CA10P	0 to 1 mA	<0.001 %	<0.005 %	<0.001 %	80 - 250 kHz
0 to -1,000V	CA10N	0 to 1mA	<0.001 %	<0.005 %	<0.001 %	100 - 250 kHz
0 to +1,250V	CA12P	0 to 0.8 mA	<0.0005 %	<0.005 %	<0.001 %	80 - 250 kHz
0 to -1,250V	CA12N	0 to 0.8 mA	<0.0005 %	<0.005 %	<0.001 %	80 - 250 kHz
0 to +2,000V	CA20P	0 to 0.5 mA	<0.001 %	<0.01 %	<0.01 %	80 - 250 kHz
0 to -2,000V	CA20N	0 to 0.5 mA	<0.001 %	<0.01 %	<0.01 %	100 - 250 kHz
5 VDC INPUT MODELS						
0 to +200V	CA02P-5	0 to 5 mA	<0.01 %	<0.01 %	<0.01 %	100 - 250 kHz
0 to -200V	CA02N-5	0 to 5 mA	<0.01 %	<0.005 %	<0.003 %	100 - 250 kHz
0 to +500V	CA05P-5	0 to 2 mA	<0.005 %	<0.003 %	<0.002 %	100 - 250 kHz
0 to -500V	CA05N-5	0 to 2 mA	<0.005 %	<0.005 %	<0.002 %	87 - 350 kHz
0 to +1,000V	CA10P-5	0 to 1 mA	<0.001 %	<0.005 %	<0.001 %	100 - 250 kHz
0 to -1,000V	CA10N-5	0 to 1 mA	<0.001 %	<0.005 %	<0.001 %	100 - 250 kHz
0 to +1,250V	CA12P-5	0 to 0.8 mA	<0.001 %	<0.005 %	<0.001 %	150 - 300 kHz
0 to -1,250V	CA12N-5	0 to 0.8 mA	<0.001 %	<0.005 %	<0.001 %	150 - 300 kHz
0 to +2,000V	CA20P-5	0 to 0.5 mA	<0.001 %	<0.005 %	<0.003 %	45 - 250 kHz
0 to -2,000V	CA20N-5	0 to 0.5 mA	<0.001 %	<0.001 %	<0.001 %	100 - 250 kHz

	INPUT CURRENT			
	CA02-CA12		CA20	
VIN	NO-LOAD	FULL-LOAD	NO-LOAD	FULL-LOAD
5 VDC	< 65mA	<420mA	<155 mA	<550 mA
12 VDC	<80 mA	<220 mA	<100 mA	<220 mA

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ELECTRICAL SPECIFICATIONS*2 CA02 - CA20 (200V to 2000V)

PARAMETER	VALUE
INPUT VOLTAGE	INPUT MODELS: +11.5 TO +15.5v (STANDARD)
	5V INPUT MODELS: +4.75 TO +5.25V
STANDBY POWER	<25mW*3
INPUT CAPACITANCE	440uF
PROGRAMMING VOLTAGE	12V INPUT MODELS: 0 TO +5V, <150uA
	5V INPUT MODELS: 0 TO +2.048V <150uA
SET POINT ACCURACY*7	1%
GAIN ADJUST*7	1%
LINEARITY*7	<0.5% (15% TO 100% VOUT)
STABILITY	<0.005%/HR*3
VOLTAGE MONITOR*5	12V INPUT MODELS: 0 TO +5V = 0 TO 100% VOUT
	5V INPUT MODELS: 0 TO +2.048V = 0 TO 100% VOUT
REFERENCE OUTPUT	12V INPUT MODELS: +5V +/- 1% , UP TO 1 mA
	5V INPUT MODELS: +2.048V +/- 1% , UP TO 1 mA
TEMPCO	<25PPM/°C*3
THERMAL SHOCK LIMIT	1°C/10 SEC.
STANDARD TEMPERATURE RANGES	OPERATING: -10° TO +50°C*6 (CASE)
	STORAGE: -25° TO +95°C

APPLICATION NOTES

Sequencing
As is the case for all active electronics, the user should apply power prior to control inputs. For the CA Series, it is recommended to wait at least 100msec after input power is applied before sending a voltage programming command.

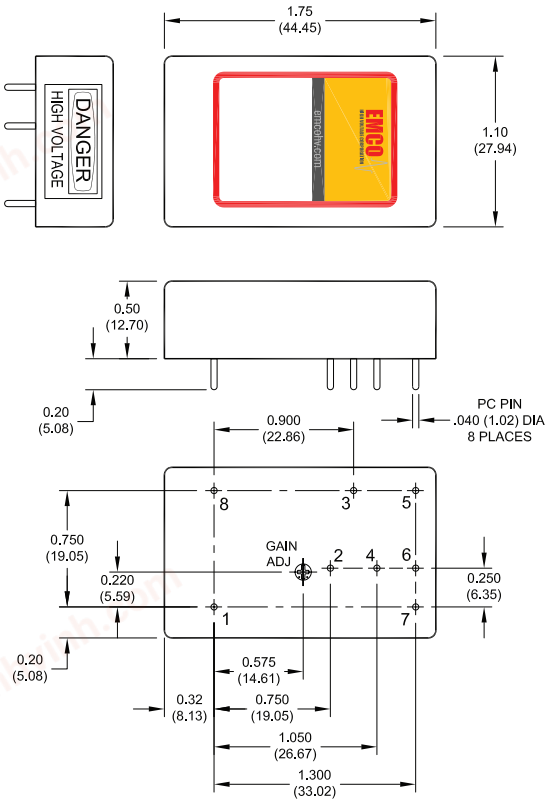
Dynamic Response
In cases where the output voltage rises above the voltage programming command then settles. To mitigate this effect, ramp the voltage programming input at a slower rate until satisfactory results are achieved.

DETAILED PRODUCT DESCRIPTION

The CA Series of high performance, precision regulated, high voltage power supplies offers improved performance and added features. Improvements in stability and ripple, along with an on board precision reference, a voltage monitor and increased protection, enable these modules to replace much larger, more expensive power supplies in many applications. Each model is programmed from 0 to 100% of rated output via a DAC compatible high impedance programming input. A voltage monitor is provided and is internally buffered to provide a low impedance (up to 1 mA) signal to external circuitry. The precision, on board reference can be used in conjunction with an external potentiometer or voltage divider to program the high voltage output. Each unit has an accessible potentiometer allowing for individual calibration after installation. A quasi-sinewave oscillator, internal transformer shielding, and an isolated steel case reduce EMI/RFI radiation to extremely low levels. Suitable for photomultiplier tubes, avalanche photodiodes, precision EO lenses, piezo devices and other applications requiring precision, low noise, high voltage in a miniature, pc or chassis mount, cost effective package. A proprietary encapsulation process and custom 94V-0 listed, high performance formula are used to achieve excellent high voltage and thermal properties.

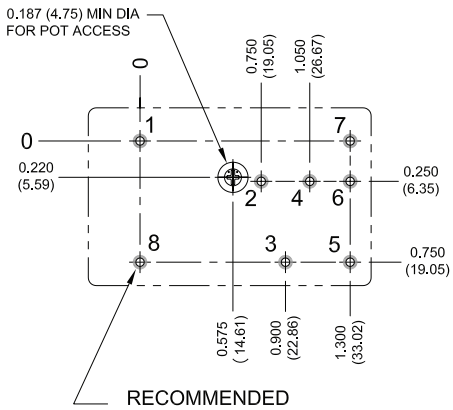
Also available with the CA Series are the CM Series adapter kits. For more details, refer to pages 7 and 8.

MECHANICAL SPECIFICATIONS



BOTTOM VIEW

PCB LAYOUT COMPONENT SIDE



RECOMMENDED
HOLE & PAD SIZE:
Ø 0.052 (1.32) & Ø 0.090 (2.29)
8 PLACES

SEALED TO WITHSTAND IMMERSION CLEANING PROCESSES

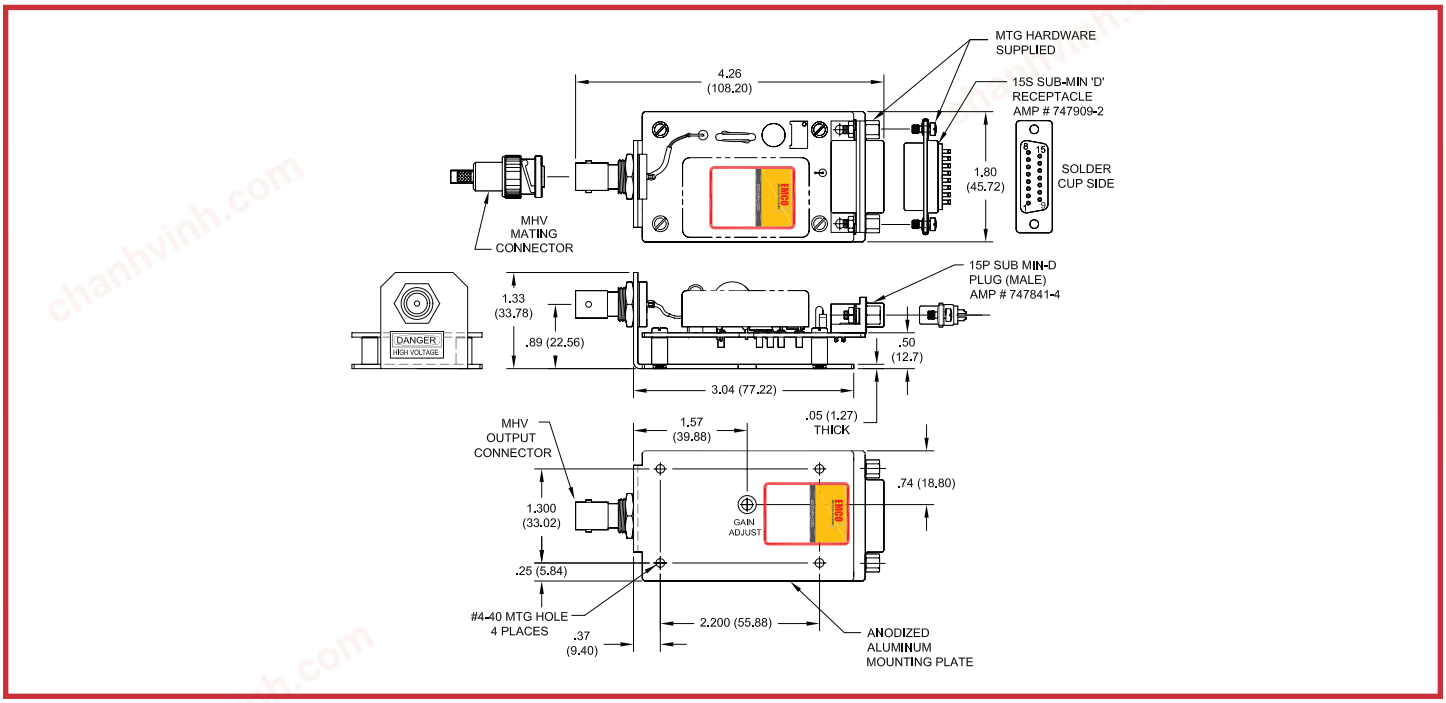
DIMENSIONS ARE IN INCHES (METRIC EQUIVALENTS ARE IN PARENTHESIS)
DIMENSIONAL TOLERANCES: .XX = ± 0.02 (0.51), .XXX = ± 0.005 (0.127)

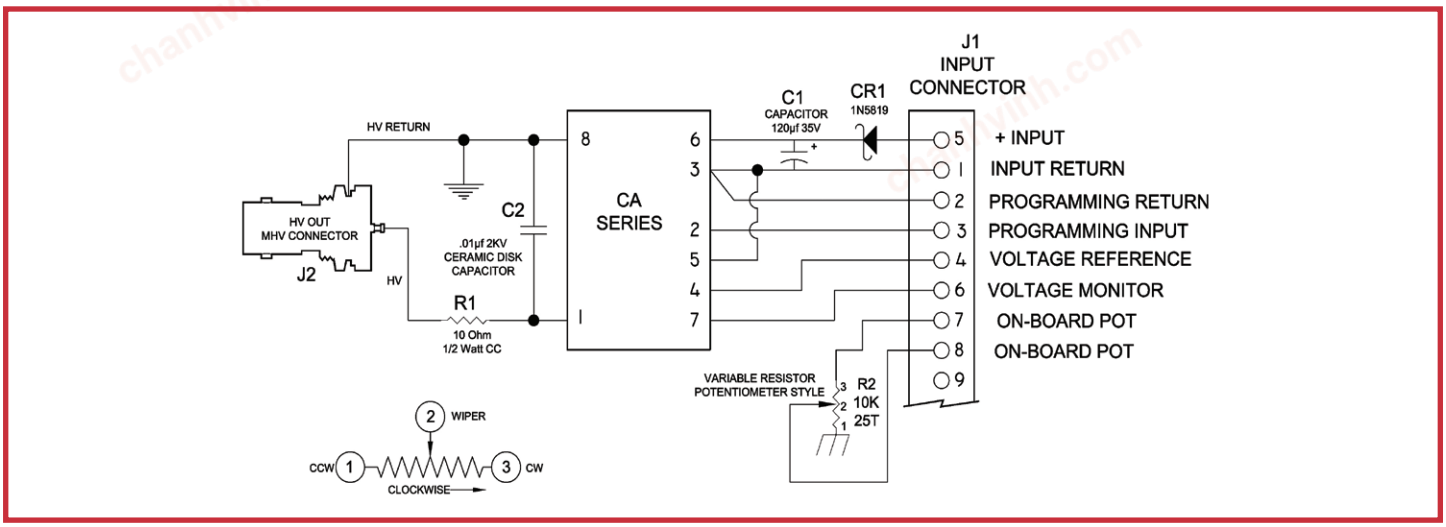
PARAMETER	VALUE
WEIGHT	1.4 OZ. (39.6 GRAMS)
VOLUME	0.96 CUBIC INCHES (15.77cm^3)
DIMENSIONS	1.75L (44.45) x 1.10W (27.94) x 0.50H (12.70)
CASE MATERIAL	ZINC PLATED STEEL

PIN #	FUNCTION
1	OUTPUT VOLTAGE
2	PROGRAMMING: 0 to +5V *5V Input models: 0 to +2.048V*
3	GROUND[*1, 2]
4	VOLTAGE REFERENCE: +5V *5V Input models: +2.048V*
5	CASE GROUND[*1, 2]
6	INPUT: +11.5V to 15.5V *5V Input models: +4.75 to +5.25V*
7	VOLTAGE MONITOR: 0 to +5V *5V Input models: 0 to +2.048V*
8	OUTPUT RETURN[*1, 2]

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CM1 (MHV): ALL CA MODELS





PRODUCT DESCRIPTION

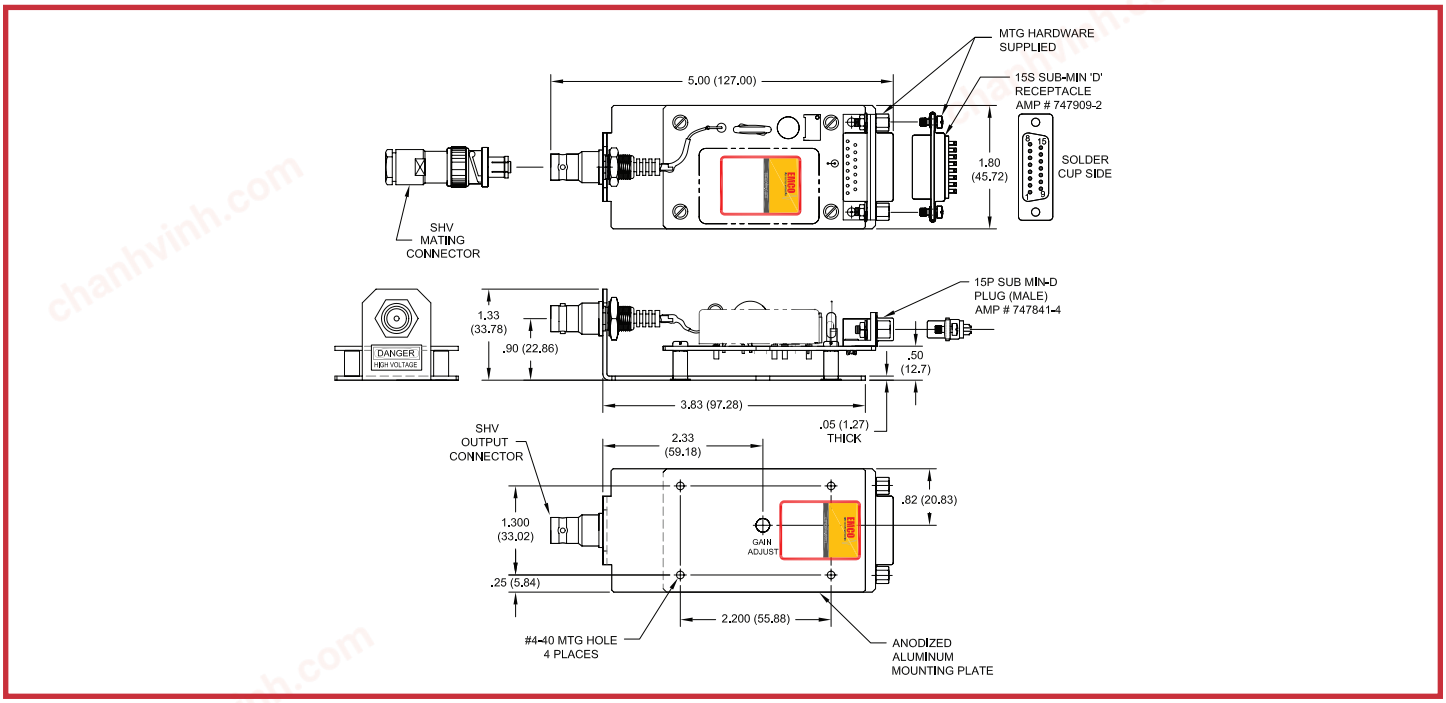
These adapters provide convenient proto-typing and evaluation during system development and integration, and allow these modules to be mounted to a chassis instead of designed in to a pc board.
Extra filtering on the input and output improves performance. A schottky diode on the input provides reverse polarity protection. Input connector is via a 15P SUB MIN-D plug (mate supplied) and output is via an MHV style coaxial connector (mate supplied).

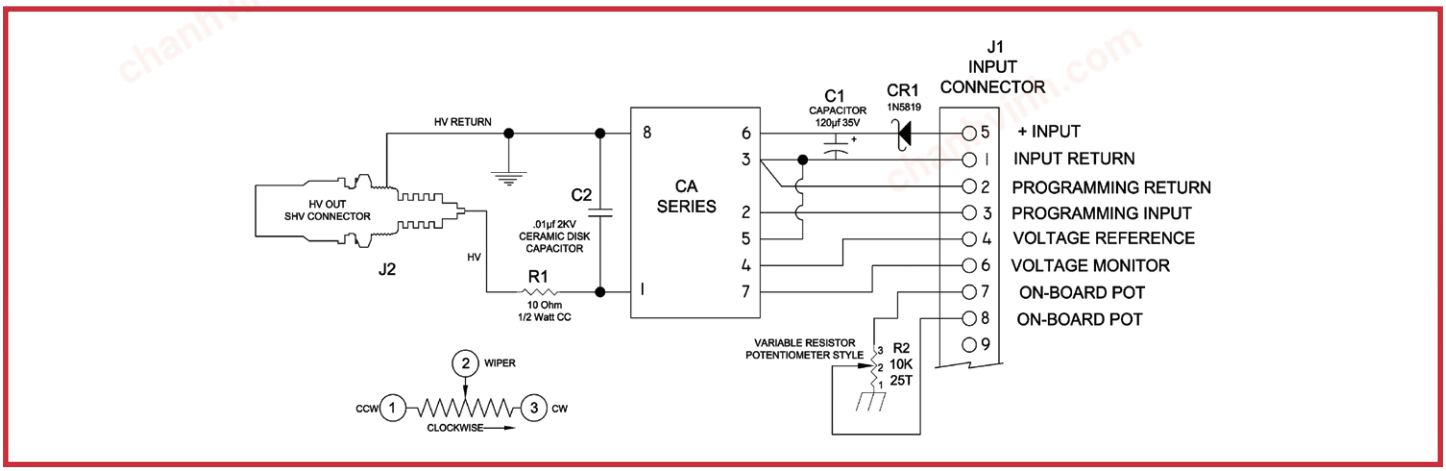
ORDERING INFORMATION:
Please note when ordering a CM1 the CA Series is not included and must be ordered separately.

PROGRAMMING OPTIONS / INSTRUCTIONS

1. Onboard Potentiometer: connect pins 7 to 4 and 8 to 3, turn potentiometer to adjust high voltage.
2. Remote Potentiometer: connect wiper arm to pin 3, other sides to pins 4 and 2.
3. Remote Analog Signal: apply programming voltage to pin 3, return to pin 2.

CM2 (SHV): ALL CA MODELS





PRODUCT DESCRIPTION

These adapters provide convenient proto-typing and evaluation during system development and integration, and allow these modules to be mounted to a chassis instead of designed in to a pc board.

Extra filtering on the input and output improves performance. A schottky diode on the input provides reverse polarity protection. Input connector is via a 15P SUB MIN-D plug (mate supplied) and output is via an SHV style coaxial connector (mate supplied).

ORDERING INFORMATION:
Please note when ordering a CM2 the CA Series is not included and must be ordered separately.

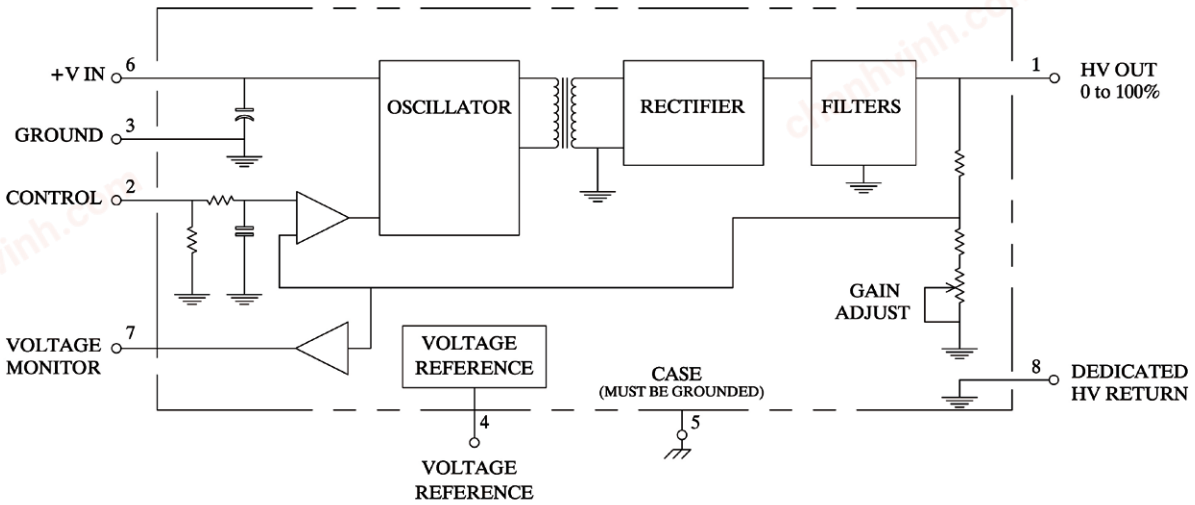
PROGRAMMING OPTIONS / INSTRUCTIONS

1. Onboard Potentiometer: connect pins 7 to 4 and 8 to 3, turn potentiometer to adjust high voltage.
2. Remote Potentiometer: connect wiper arm to pin 3, other sides to pins 4 and 2.
3. Remote Analog Signal: apply programming voltage to pin 3, return to pin 2.

We reserve the right to make changes without notification

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BLOCK DIAGRAM



OPTIONS

OPTION	ORDER CODE	
POLARITY DESIGNATOR	POSITIVE OUTPUT	p
	NEGATIVE OUTPUT	N
INPUT VOLTAGE	5 VDC	5
	12 VDC (STANDARD)	BLANK
TEMPERATURE	STANDARD OPERATING TEMP -10° TO +50°C*6 (CASE TEMP.)	BLANK

HOW TO ORDER

PART NUMBER SELECTOR:

Model Number:

CA 10 N - 5

CA - Model
10 - Output Voltage (See table)
5 - Input Voltage
N - Polarity Designator

EXAMPLE: **CA10N-5** (**CA** - Model, **10** - Output Voltage, **N** - Negative, **5** - Input Voltage)

* Notes:
1. Maximum rated output current is typically available from 100% max output voltage to 50% max output voltage, and is derated below 50% max output voltage.
2. Specifications after 1 hour warm-up, full load, at 25°C unless other wise indicated.
3. Typical Performance
4. All grounds internally connected, except case. There should not be more than 50 volts potential between the case ground (pin 5) and the circuit ground (pins 3 and 8). Isolated case assists low noise design efforts. Case pin must be connected to ground for proper operation. For ultra-low noise applications the case can be grounded to a low noise shielding ground.
5. On negative output models, voltage monitor output is a buffered representation of the programming voltage.
6. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
7. SET POINT ACCURACY refers to the ability of the unit to accurately deliver the voltage intended by the applied programming. The resultant output voltage will be within +/-1% of that programmed.
   GAIN ADJUSTMENT refers to the ability to alter the gain of the circuit to bring the resultant output voltage to the programmed setpoint. This is intended to allow compensation for set point accuracy error.
   LINEARITY refers to how much the transfer function can deviate from a straight line in the absence of any set point error.

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