American Power Design, Inc.

"The best high voltage design solution"

RoHS

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

FEATURES

- Customer Selects Output Voltage
- Fully Regulated Outputs to + or - 25,000 Vdc
- 0-100% Programable Output
- Output Voltage Monitor
- High Stability (<0.005%/°C)
- Low Output Noise & EMI/RFI
- Onboard 10V Precision Reference
- Continuous Short Circuit Protection
- UL Certified Encapsulant, Meets 94V-0 Flammability

The G10 Series regulated high voltage DC/DC converter offers a 100% programable high voltage output using a 0-10Vdc analog signal. Ideally suited for CRT's, lasers, Q switches, PMT's, detectors, electron and ion guns, capacitor charging, test equipment, and many other applications. Remote on/off, output voltage monitor and 10V precision reference are standard. All models will tolerate a short circuit indefinitely.

ELECTRICAL SPECIFICATIONS

Input Voltage Range	22.8V - 28.8Vdc
Output Voltage Accuracy	< 1.5%
Line Regulation	<0.1%
Load Regulation	<0.2%
Output Ripple	< 0.1% P-P
Onboard Precision Reference	10Vdc @ 1mA
Programming Voltage	0 - 10Vdc @ <100uA
Programming Linearity (5% to 100% Vout)	<0.5%
Input Filter	Low ESR Capacitor
Reverse Input Protection	30A @ 5mS (Shunt)
Short Circuit Protection	Continuous
Switching Frequency	150 - 350 kHz
Response Time	<900 ms (Full Load, full scale response)
Programming Voltage Shutdown	> 10.2Vdc
Output Voltage Monitor	0 to 10 V = 0 to 100%
On/Off	ON=N.C. or 0Vdc / OFF=5Vdc

GENERAL SPECIFICATIONS

Stability	< 0.01% / Hr.
Temp. Stability	+/- 0.005%/°C
Temp. (Operating , Case)	-10 to +60°C
Temp. (Storage)	-40 to +125°C
Humidity	0 to 95% (Non-Condensing)
Thermal Shock Limit	1°C / 10 Seconds
EMI/RFI	Six Sided Shield
Derating	None
Cooling	Free-Air Convection

PHYSICAL SPECIFICATIONS

Dimensions	3.1 x 4.1 x 1.4 inches
Weight	18.6 Oz
Encapsulation Material	UL 94V-0 Epoxy
Case Material	Aluminum

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

OUTPUT VOLTAGES FROM 100V TO 10,000VDC

REPRESENTATIVE MODEL LISTING								
MODEL NUMBER		INPUT CURRENT		OUTPUT SPECIFICATIONS				
Non-RoHs	RoHs	NO LOAD	FULL LOAD	VOLTAGE	RIPPLE	CURRENT	REGULATION	
							LOAD	LINE
G10-P10	G10-P10/Y	<90 mA	<650 mA	0V to +100Vdc	<0.1% (100mV p-p)	0 - 100mA	<0.2%	<0.1%
G10-N10	G10-N10/Y	<90 mA	<650 mA	0V to -100Vdc	<0.1% (100mV p-p)	0 - 100mA	<0.2%	<0.1%
G10-P50	G10-P50/Y	<90 mA	<650 mA	0V to +500Vdc	<0.1% (500mV p-p)	0 - 20mA	<0.2%	<0.1%
G10-N50	G10-N50/Y	<90 mA	<650 mA	0V to -500Vdc	<0.1% (500mV p-p)	0 - 20mA	<0.2%	<0.1%
G10-P100	G10-P100/Y	<90 mA	<650 mA	0V to +1000Vdc	<0.1% (1V p-p)	0 - 10mA	<0.2%	<0.1%
G10-N100	G10-N100/Y	<90 mA	<650 mA	0V to -1000Vdc	<0.1% (1V p-p)	0 - 10mA	<0.2%	<0.1%
G10-P200	G10-P200/Y	<90 mA	<700 mA	0V to +2000Vdc	<0.1% (2V p-p)	0 - 5mA	<0.2%	<0.1%
G10-N200	G10-N200/Y	<90 mA	<700 mA	0V to -2000Vdc	<0.1% (2V p-p)	0 - 5mA	<0.2%	<0.1%
G10-P300	G10-P300/Y	<100 mA	<700 mA	0V to +3000Vdc	<0.1% (3V p-p)	0 - 3.3mA	<0.2%	<0.1%
G10-N300	G10-N300/Y	<100 mA	<700 mA	0V to -3000Vdc	<0.1% (3V p-p)	0 - 3.3mA	<0.2%	<0.1%
G10-P400	G10-P400/Y	<100 mA	<700 mA	0V to +4000Vdc	<0.1% (4V p-p)	0 - 2.5mA	<0.2%	<0.1%
G10-N400	G10-N400/Y	<100 mA	<700 mA	0V to -4000Vdc	<0.1% (4V p-p)	0 - 2.5mA	<0.2%	<0.1%
G10-P500	G10-P500/Y	<100 mA	<700 mA	0V to +5000Vdc	<0.1% (5V p-p)	0 - 2mA	<0.2%	<0.1%
G10-N500	G10-N500/Y	<100 mA	<700 mA	0V to -5000Vdc	<0.1% (5V p-p)	0 - 2mA	<0.2%	<0.1%
G10-P600	G10-P600/Y	<100 mA	<700 mA	0V to +6000Vdc	<0.1% (6V p-p)	0 - 1.67mA	<0.2%	<0.1%
G10-N600	G10-N600/Y	<100 mA	<700 mA	0V to -6000Vdc	<0.1% (6V p-p)	0 - 1.67mA	<0.2%	<0.1%
G10-P700	G10-P700/Y	<110 mA	<700 mA	0V to +7000Vdc	<0.1% (7V p-p)	0 - 1.4mA	<0.2%	<0.1%
G10-N700	G10-N700/Y	<110 mA	<700 mA	0V to -7000Vdc	<0.1% (7V p-p)	0 - 1.4mA	<0.2%	<0.1%
G10-P800	G10-P800/Y	<110 mA	<700 mA	0V to +8000Vdc	<0.1% (8V p-p)	0 - 1.25mA	<0.2%	<0.1%
G10-N800	G10-N800/Y	<110 mA	<700 mA	0V to -8000Vdc	<0.1% (8V p-p)	0 - 1.25mA	<0.2%	<0.1%
G10-P900	G10-P900/Y	<120 mA	<700 mA	0V to +9000Vdc	<0.1% (9V p-p)	0 - 1.11mA	<0.2%	<0.1%
G10-N900	G10-N900/Y	<120 mA	<700 mA	0V to -9000Vdc	<0.1% (9V p-p)	0 - 1.11mA	<0.2%	<0.1%
G10-P1000	G10-P1000/Y	<120 m A	<700 mA	0V to +10000Vdc	<0.1% (10V p-p)	0 - 1mA	<0.2%	<0.1%
G10-N1000	G10-N1000/Y	<120 mA	<700 mA	0V to -10000Vdc	<0.1% (10V p-p)	0 - 1mA	<0.2%	<0.1%

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G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

OUTPUT VOLTAGES FROM 11,000V TO 25,000VDC

REPRESENTATIVE MODEL LISTING								
MODEL NUMBER		INPUT CURRENT		OUTPUT SPECIFICATIONS				
Non-RoHs	RoHs	NO LOAD	FULL LOAD	VOLTAGE	RIPPLE	CURRENT	REGULATION	
							LOAD	LINE
G10-P1100	G10-P1100/Y	<120 m A	<700 mA	0V to +11000Vdc	<0.1% (11V p-p)	0 - 0.9mA	<0.2%	<0.1%
G10-N1100	G10-N1100/Y	<120 mA	<700 mA	0V to -11000Vdc	<0.1% (11V p-p)	0 - 0.9mA	<0.2%	<0.1%
G10-P1200	G10-P1200/Y	<150 mA	<800 mA	0V to +12000Vdc	<0.1% (12V p-p)	0 - 0.8mA	<0.2%	<0.1%
G10-N1200	G10-N1200/Y	<150 mA	<800 mA	0V to -12000Vdc	<0.1% (12V p-p)	0 - 0.8mA	<0.2%	<0.1%
G10-P1300	G10-P1300/Y	<170 mA	<850 mA	0V to +13000Vdc	<0.1% (13V p-p)	0 - 0.77mA	<0.2%	<0.1%
G10-N1300	G10-N1300/Y	<170 mA	<850 mA	0V to -13000Vdc	<0.1% (13V p-p)	0 - 0.77mA	<0.2%	<0.1%
G10-P1400	G10-P1400/Y	<170 mA	<850 mA	0V to +14000Vdc	<0.1% (14V p-p)	0 - 0.71mA	<0.2%	<0.1%
G10-N1400	G10-N1400/Y	<170 mA	<850 mA	0V to -14000Vdc	<0.1% (14V p-p)	0 - 0.71mA	<0.2%	<0.1%
G10-P1500	G10-P1500/Y	<170 mA	<850 mA	0V to +15000Vdc	<0.1% (15V p-p)	0 - 0.67mA	<0.2%	<0.1%
G10-N1500	G10-N1500/Y	<170 mA	<850 mA	0V to -15000Vdc	<0.1% (15V p-p)	0 - 0.67mA	<0.2%	<0.1%
G10-P1600	G10-P1600/Y	<170 mA	<850 mA	0V to +16000Vdc	<0.1% (16V p-p)	0 - 0.63mA	<0.2%	<0.1%
G10-N1600	G10-N1600/Y	<170 mA	<850 mA	0V to -16000Vdc	<0.1% (16V p-p)	0 - 0.63mA	<0.2%	<0.1%
G10-P1700	G10-P1700/Y	<180 mA	<900 mA	0V to +17000Vdc	<0.2% (34V p-p)	0 - 0.59mA	<0.2%	<0.1%
G10-N1700	G10-N1700/Y	<180 mA	<900 mA	0V to -17000Vdc	<0.2% (34V p-p)	0 - 0.59mA	<0.2%	<0.1%
G10-P1800	G10-P1800/Y	<180 mA	<900 mA	0V to +18000Vdc	<0.2% (36V p-p)	0 - 0.56mA	<0.2%	<0.1%
G10-N1800	G10-N1800/Y	<180 mA	<900 mA	0V to -18000Vdc	<0.2% (36V p-p)	0 - 0.56mA	<0.2%	<0.1%
G10-P2000	G10-P2000/Y	<180 mA	<900 mA	0V to +20000Vdc	<0.2% (40V p-p)	0 - 0.5mA	<0.2%	<0.1%
G10-N2000	G10-N2000/Y	<180 mA	<900 mA	0V to -20000Vdc	<0.2% (40V p-p)	0 - 0.5mA	<0.2%	<0.1%
G10-P2500	G10-P2500/Y	<180 mA	<900 mA	0V to +25000Vdc	<0.2% (50V p-p)	0 - 0.5mA	<0.2%	<0.1%
G10-N2500	G10-N2500/Y	<180 mA	<900 mA	0V to -25000Vdc	<0.2% (50V p-p)	0 - 0.5 mA	<0.2%	<0.1%

G10-P1000/Y

Product Family

Total Output Power

Positive/Negative Output

/Y RoHS Compliance

Customer Selects Output Voltage *

The G10 Series are designed such that the customer may order any output voltage (positive or negative) from 100Vdc to 25000Vdc at no additional charge.

****ACTUAL OUTPUT VOLTAGE IS 10X***

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

Dimensions are in Inches
[Metric equivalents in brackets]

PIN #	FUNCTION
1	On/Off
2	Gnd / Case
3	+ Input
4	10V Reference
5	Control / Programming Voltage
6	Internal Potentiometer
7	Output Voltage Monitor

MATING CONNECTOR: Molex 009503071 (Supplied)
18-24 AWG CRIMP TERMINALS: Molex 008500106 (Supplied)

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

APPLICATION NOTES

INRUSH CURRENT

The inrush current has been kept as low as possible. However, a series resistor may be inserted in the input line to limit this current further.

REVERSE INPUT PROTECTION

The G10 is equipped with a shunt diode placed in parallel with + Input (Pin 3) and GND (Pin 2) of the converter, this allows high current to flow if the incorrect polarity is applied.

SHORT CIRCUIT PROTECTION

The converter will fold-back the input power whenever a short circuit is applied to its output and automatically recover after the overload condition is removed.

NOTE:
Input fuse must not exceed 30A otherwise the supply may be permanently damaged.

RIPPLE AND NOISE

External low ESR capacitors may be added across output to further reduce ripple.

REMOTE ON/OFF CONTROL

The On/Off control pin allows the user to shut down the converter mechanically or logically using a relay or a TTL or CMOS logic signal.
ON= 0Vdc / OFF=5Vdc

Connect Remote On/Off pin to Gnd when not in use to ensure proper operation.

PROGRAMMING VOLTAGE

A 0V to +10V signal will program the power supply for 0 to 100% rated output voltage. The input impedance for this control pin is typically 100KΩ. If the programming signal exceeds 10.2Vdc the converter will shutdown and automatically recover when the programming signal returns to within normal operating range.

OUTPUT VOLTAGE TRACKING

The output voltage tracks the Control pin (Pin 5) within 0.5% from 5% to 100% of output voltage.

Figure below show a typical plot of both the actual and calculated output voltage as a function of control voltage.

Operating Conditions:

Nominal Input Voltage = Fixed
Output Load = Resistive (fixed at full output current @ 100% output voltage)

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APPLICATION NOTES

INTERNAL POTENTIOMETER

The G10 Series is equipped with a internal multi-turn potentiometer and can be utilized to control the output voltage.

Figures below shows the typical connections needed.

NOTE:

The Voltage Monitor polarity matches the high voltage output polarity

EXTERNAL / REMOTE POTENTIOMETER

The output voltage of the G10 Series can be controlled with and external or remote potentiometer .

Figures below shows the typical connections needed.

NOTE:

The Voltage Monitor polarity matches the high voltage output polarity

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

APPLICATION NOTES

EXTERNAL / REMOTE VOLTAGE SOURCE

The output voltage of the G10 Series can be controlled with an external or remote voltage source .

Figures below shows the typical connections needed.

NOTE:

The Voltage Monitor polarity matches the high voltage output polarity

CONNECTION IN PARALLEL

Multiple G10 Series converters can be connected in parallel to achieve output power greater than 10 Watts.

Figures below shows the typical connections needed for connecting (2) + output converters in parallel.

NOTE:
The ratings of Dx should be 1.5 times the maximum current and voltage expected in each branch.

Diode polarity shown should be reversed for negative output voltages

WARNING:
Do not connect Pins 4, 6 or 7 in parallel. otherwise, the supply may be permanently damaged.

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

BIPOLAR CONNECTION

Multiple G10 Series converters can be configured to provide a programable bipolar output.

Figures below shows the typical connections needed for connecting a positive output and negative output converter to create a bipolar output converter.

NOTE:
The ratings of Dx should be 1.5 times the maximum current and voltage expected in each branch.

Diode polarity shown should be reversed for negative output voltages

WARNING:
Do not connect Pins 4, 6 or 7 in parallel. otherwise, the supply may be permanently damaged.

G10 SERIES 10 WATT PROGRAMABLE REGULATED HV DC/DC CONVERTER

APPLICATION NOTES

CLEANING AGENTS

In order to avoid possible damage, any penetration of cleaning fluids must be prevented, since the power supplies are not hermetically sealed.

NUCLEAR AND MEDICAL APPLICATIONS

American Power Design products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of American Power Design, Inc.

TECHNICAL REVISIONS

The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

SAFETY REQUIREMENTS

The converters are designed to meet North American and International safety regulatory requirements per UL 60950-1/CSA 22.2 No. 60950-1-07 Second Edition, IEC 60950-1: 2005, and EN 60950-1:2006. To comply with safety agencies requirements, an input line fuse must be used external to the converter. The table below provides the recommended fuse rating for use with this family of products.

Input Voltage Range	Fuse Rating
22.8V - 28.8V	1.5A

If one input fuse is used for a group of modules, the maximum fuse rating should not exceed 30A.

WARRANTY

All products manufactured by American Power Design, Inc. (APD) are warranted to be free of defects due to material or workmanship for a period of one year from date of shipment. At our option, APD will repair or replace any non-conforming product.
APD expressly disclaims any liability for consequential or incidental damages resulting from the use or misuse of its products by the purchaser or others.
This warranty is in lieu of all warranties expressed or implied, including the warranties of merchantability. No other warranties, obligations, or liabilities are expressed or implied.
All products being returned for repair require a return material authorization(RMA) assigned by APD prior to return shipment.