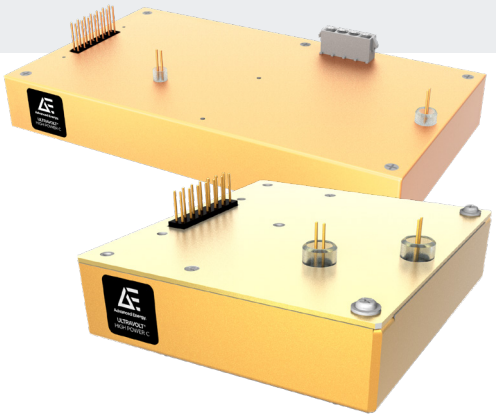
ULTRAVOLT HIGH POWER 1/8C TO 6C SERIES

SINGLE OUTPUT 60, 125, OR 250 W CAPACITOR CHARGING SUPPLY



The UltraVolt® High Power C Series of regulated DC-to-DC converters are designed for high voltage capacitor charging applications that demand fast rise times with controlled voltage overshoot

PRODUCT HIGHLIGHTS

- Regulated high voltage outputs ranging from 125 to 6000 VDC maximum
- Single output: positive or negative polarity models
- Choice of 60, 125, or 250 W maximum power
- 24 VDC input
- Output ripple performance < 1.0 %
- Controlled high voltage overshoot enhances longevity of external load components
- Temperature coefficient 50 ppm/°C
- Simplified integration with available 0 to 5 VDC or 0 to 10 VDC interface
- Reliable modular design
- Factory-configured performance, control and integration options
- UL/cUL recognized, IEC-60950-1, CE Mark (LVD and RoHS)

TYPICAL APPLICATIONS

- Capacitive charging and pulsed power applications
- High potential testing and Electrostatic Discharge (ESD)
- Automated Test Equipment (ATE)
- Lasers and opto-electronics
- Ultrasonic pulse generators

AT A GLANCE

Maximum Output Voltage

125, 250, 500, 1 kV, 2 kV, 4 kV, or 6 kV DC

Maximum Output Power

60, 125, or 250 W

Type

Single Output

Ripple

< 1.0 %

Control

Analog

Temperature Coefficient

50 ppm/°C

Ordering Information on Page 7

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ELECTRICAL SPECIFICATIONS

Model[1]		1/8C Series			1/4C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 125 VDC			0 to 250 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24 VDC			24 VDC		
Power Output (Watts, Nominal)		60	125	250	60	125	250
DC Input							
Vin (Input Voltage) Range	VDC	23 to 30			23 to 30		
Vin (Nominal)	VDC	24			24		
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 3.3	< 6.9	< 13.5	< 3.3	< 6.9	< 13.5
	A @ 100% HVout, 0% LOAD	< 0.5		< 0.8	< 0.5		< 0.8
	A @ disable/standby state	< .075			< .075		
DC Output							
HVout (Output Voltage)	VDC	0 to 125 VDC			0 to 250 VDC		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	480	1000	2000	240	500	1000
Current Scale Factor	mA/V	400	833	1667	200	417	833
Pout (Output Power)	Watts (max)	60	125	250	60	125	250
Capacitance	Internal storage capacitance (µF)	0.66		1.32	0.20		0.33
Ripple[2]	%	< 1.0			< 1.0		

Model[1]		1/2C Series			1C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 500 VDC			0 to 1000 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24 VDC			24 VDC		
Power Output (Watts, Nominal)		60	125	250	60	125	250
DC Input							
Vin (Input Voltage) Range	VDC	23 to 30			23 to 30		
Vin (Nominal)	VDC	24			24		
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	<3.3	< 6.9	< 13.5	<3.3	< 6.9	< 13.5
	A @ 100% HVout, 0% LOAD	< 0.5		< 0.8	< 0.5		< 0.8
	A @ disable/standby state	< .075			< .075		
DC Output							
HVout (Output Voltage)	VDC	0 to 500			0 to 1000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	120	250	500	60	125	250
Current Scale Factor	mA/V	109	208	417	50	114	227
Pout (Output Power)	Watts (max)	60	125	250	60	125	250
Capacitance	Internal storage capacitance (µF)	0.094		0.328	0.034		0.072
Ripple[2]	%	< 1.0			< 1.0		

[1] Standard product specifications shown unless noted. Custom configurations are available.

[2] Nominal ripple measured @ 100% HVout, 100% LOAD . Valid for 10 to 100% HVout range.

ELECTRICAL SPECIFICATIONS (CONTINUED)

Model[1]		2C Series			4C Series			6C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 2000 VDC			0 to 4000 VDC			0 to 6000 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24 VDC			24 VDC			24 VDC		
Power Output (Watts, Nominal)		60	125	250	60	125	250	60	125	250
DC Input										
Vin (Input Voltage) Range	VDC	23 to 30			23 to 30			23 to 30		
Vin (Nominal)	VDC	24			24			24		
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 3.3	< 6.9	< 13.5	< 3.3	< 6.9	< 13.5	< 3.3	< 6.9	< 13.5
	A @ 100% HVout, 0% LOAD	< 0.5		< 0.8	< 0.5		< 0.8	< 0.5		< 0.8
	A @ disable/standby state	< .075			< .075			< .075		
DC Output										
HVout (Output Voltage)	VDC	0 to 2000			0 to 4000			0 to 6000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	30	62	125	15	31	62	10	21	42
Current Scale Factor	mA/V	26	52	104	11.5	26	52	6.2	17.7	35
Pout (Output Power)	Watts (max)	60	125	250	60	125	250	60	125	250
Capacitance	Internal storage capacitance (µF)	0.0168		0.0224	0.0084		0.0112	0.0056		0.0075
Ripple[2]	%	< 1.0			< 1.0			< 1.0		

[1] Standard product specifications shown unless noted. Custom configurations are available.

[2] Nominal ripple measured @ 100% HVout, 100% LOAD. Valid for 10 to 100% HVout range.

Programming and Controls	Standard	I5/I10 Interface
Control Input Impedance	+Output Models: 1.1 MΩ to GND	10 MΩ
	-Output Models: 1.1 MΩ to +5 Vref	
Adjust Resistance	10 to 100 K (Pot. across Vref. and signal GND, wiper to adjust)	Same as Standard
Adjust Logic	0 to 4.64 for +Output, +5 to 0.36 V for -Output, +4.64 VDC for +output or +0.36 VDC for -output = nominal	0 to +5 (I5), 0 to +10 (I10)
Reference Voltage	+5.00 VDC ±1%, Zout = 464 Ω ±1%	+5 V, 3 mA ±0.1% (I5), +10 V, 3 mA ±0.1% (I10)
Enable/Disable	0 to +0.8 disable, +2.0 to 30 enable (default = enable)	0 to +0.8 disable, +2.0 to 30 enable (default = disable)

Stability and Regulation	
Stability	0.01% (100 ppm) @ 100% HVout (after 30 min warmup interval)
	0.02% (200 ppm) @ 100% HVout (per 8 h interval)
Line Regulation	0.01% (100 ppm) @ 100% HVout, 100% Pout, Vin (nominal)
Static Load Regulation	0.01% (100 ppm) @ 100% HVout, 0 to 100% LOAD
Temperature Coefficient	50 ppm/°C (Standard configuration over operating temperature range)
Power-On Rise Time	Application dependent (See Rise Time / Capacitor Charging Equations)

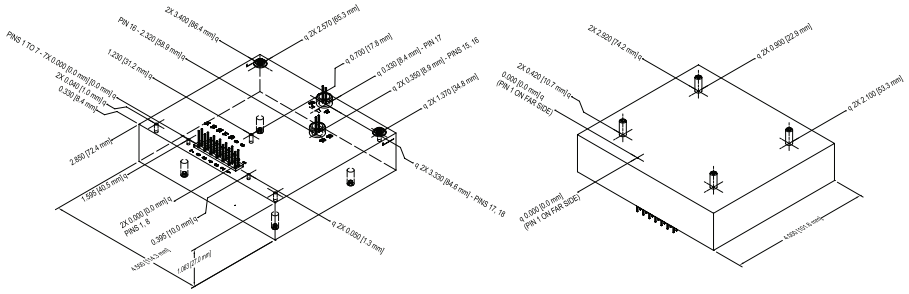
ELECTRICAL SPECIFICATIONS (CONTINUED)

Environmental	
Operating Temperature Range	-40 to 65°C (-40 to 149°F) bottom case temperature
Storage	-55 to 105°C (-67 to 222°F) case temperature
Humidity	0 to 95% RH, non-condensing
Altitude	Sea level to 3000 m (10,000 ft)

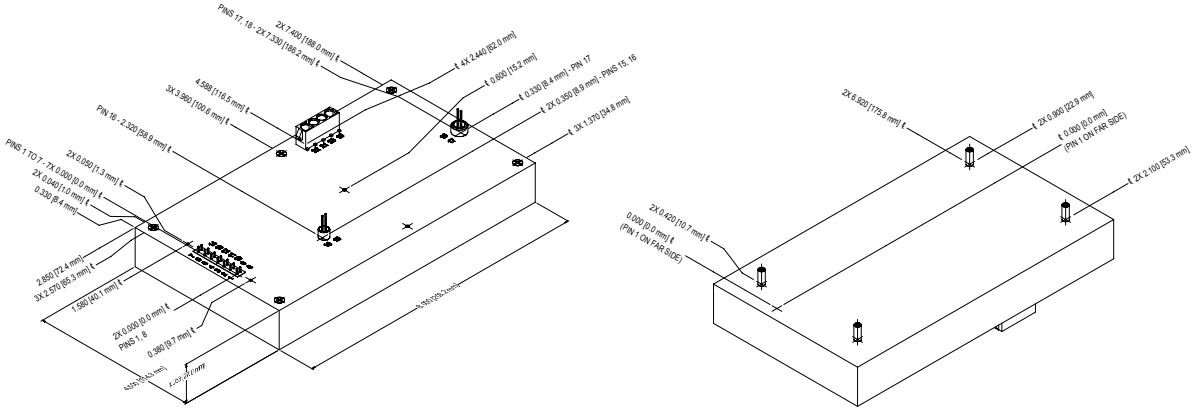
Regulatory	
Certifications	UL/cUL recognized, IEC-60950-1, CE mark (LVD and RoHS)

MECHANICAL SPECIFICATIONS

60 and 125 W



250 W



Construction	
Standard Case	Aluminum (Anodized per MIL-A-8625 Type II)
Heatsink	Aluminum (Anodized, -H Option)
PCB Standoffs	Zinc-plated steel (-Z11 Option)
Labels	Static-dissipative polyester
Cooling	Natural convection and conduction
Encapsulation	Silicone-based RTV (contact factory for other options)
Pins	Gold-plated bronze

MECHANICAL SPECIFICATIONS (CONTINUED)

Volumes and Weights	60 W		125 W		250 W	
Volume (Module body only)	cm^3	in^3	cm^3	in^3	cm^3	in^3
	313.55	19.13	313.55	19.13	634	38.7
Weight (Standard Configuration)	g	oz	g	oz	g	oz
	603	21.3	603	21.3	1220	43

INTERFACE

Connections — 60 W and 125 W Units

Pin	Function: Standard	Function: I5 or I10 option
1 and 8	Input Power Ground Return	Input Power Ground Return
2 and 9	Positive DC power input	Positive DC power input
3	Iout Monitor	Buffered Current Monitor (3mA max)
4	Enable/Disable	Enable/Disable
5	Signal Ground	Signal Ground
6	Voltage Programming	Voltage Programming
7	+5 VDC Reference Output	+5 VDC (-I5) or +10 VDC (I10) Reference Output
10	N/C	N/C
11	N/C	Current Mode Indicator
12	N/C	Voltage Mode Indicator
13	N/C	Current Programming
14	Output Voltage Monitor	Buffered Voltage Monitor (3mA max)
15 and 16	HV Ground Return	HV Ground Return
17 and 18	HV Output	HV Output

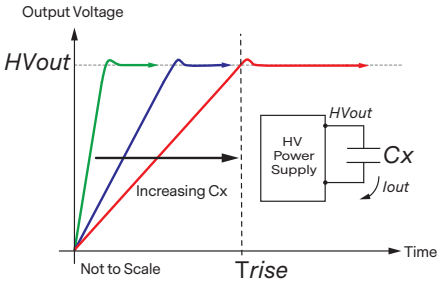
Connections — 250 W Units

Pin	Function: Standard	Function: I5 or I10 option
1 and 8	N/C	N/C
2 and 9	N/C	N/C
3	Iout Monitor	Buffered Current Monitor (3 mA max)
4	Enable/Disable	Enable/Disable
5	Signal Ground	Signal Ground
6	Voltage Programming	Voltage Programming
7	+5 VDC Reference Output	+5 VDC (-I5) or +10 VDC (I10) Reference Output
10	N/C	N/C
11	N/C	Current Mode Indicator

INTERFACE (CONTINUED)

Connections — 250 W Units (Continued)		
Pin	**Function: Standard**	**Function: I5 or I10 option**
12	N/C	Voltage Mode Indicator
13	N/C	Current Programming
14	Output Voltage Monitor	Buffered Voltage Monitor (3 mA max)
15 and 16	HV Ground Return	HV Ground Return
19 and 20	Positive DC Power Input	Positive DC Power Input
21 and 22	Input Power Ground Return	Input Power Ground Return
17 and 18	HV Output	HV Output

RISE TIME / CAPACITOR CHARGING



$$Trise = \frac{(Co + Cx) \times HVout}{Iout}$$

$$Iout = (Co + Cx) \times HVout \times freq$$

$$Pout = \frac{(Co + Cx) \times (HVout)^2}{2 \times Trise}$$

Trise = Rise time (Seconds)
Co = Internal storage capacitance (Farads)
Cx = External capacitive load (Farads)
freq = Switching frequency (Hz)
HVout = Output voltage (VDC)
Iout = Output current (Amps)
Pout = Output power (Watts)

STANDARD OPTIONS

The High Power C series can be configured with options that adapt its performance and packaging to many application requirements. Customized models to meet specialized voltage ranges, packaging and environmental needs are also available. For a complete list of available options, contact factory.

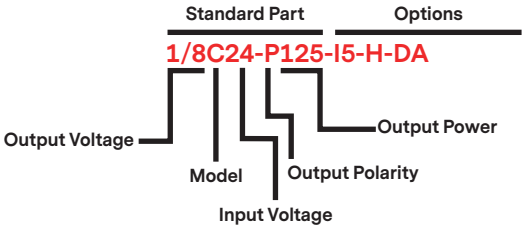
Option	Description
-I5	Upgrades analog interface to provide more precise control and monitoring of both HVout and Iout using 0 to 5 VDC (full scale) signals. Also adds Iout control and voltage/current mode indication capability not available on the Standard Interface. Not available with -I10 option.
-I10	Upgrades analog interface to provide more precise control and monitoring of both HVout and Iout using 0 to 10 VDC (full scale) signals. Also adds Iout control and voltage/current mode indication capability not available on the Standard Interface. Not available with -I5 option.
-H	Mounts a heatsink onto the case bottom to assist in convective heat dissipation.
-DA	Replaces header with D-sub connector (Type DA-15, Male). Not available with -DAR or -Z11 option.
-DAR	Replaces header with right-angle D-sub connector (Type DA-15, Male). Not available with -DA or -Z11 option.
-Z11	Permits PCB mounting by adding seven 4.8 mm (0.188 in) x #4-40 threaded standoffs to the case top. Not available with -DA or -DAR option.

ORDERING INFORMATION

Type	0 to 125 VDC Output	1/8C
	0 to 250 VDC Output	1/4C
	0 to 500VDC Output	1/2C
	0 to 1000 VDC Output	1C
	0 to 2000 VDC Output	2C
	0 to 4000 VDC Output	4C
	0 to 6000 VDC Output	6C
Input	24 VDC Nominal	24
Polarity	Positive Output	-P
	Negative Output	-N
Power	60 W Output	60
	125 W Output	125
	250 W Output	250
Heatsink	1.02 cm (0.400") high (sized to fit case)	-H
PCB Support	(6) 0.47 cm (0.187") standoffs on top of cover	-Z11
Enhanced Interface	5 V Control and Monitors	-I5
	10 V Control and Monitors	-I10
Connection Options	Straight 15-Pin D-sub connector (Type DA-15Male)	-DA
	Right-angle 15-Pin D-sub connector (Type DA-15Male)	-DAR

* Available only with I5 or I 10 options

* -DA and -DAR not available with a -Z11 option



ABOUT ADVANCED ENERGY

Since 1981, Advanced Energy (AE) — and its UltraVolt® family of products — 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 | TRUST



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.

Advanced Energy

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