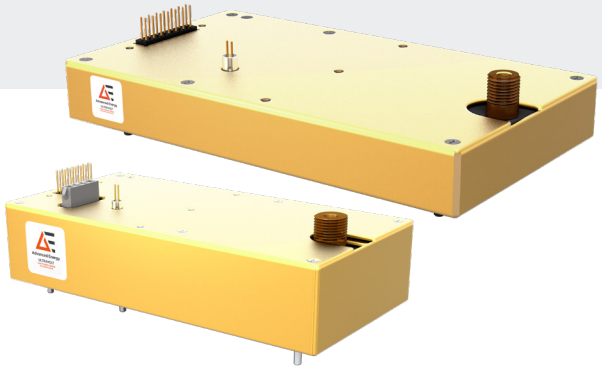
HIGH POWER 8C TO 30C SERIES

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



The 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 8 to 30 kV DC 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

8, 10, 12, 15, 20, 25, 30 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

ELECTRICAL SPECIFICATIONS

Model[1]		8C Series			10C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 8000 VDC			0 to 10,000 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24			24		
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	< 3.25	< 6.5	< 13	< 3.25	< 6.5	< 13
	A @ 100% HVout, 0% load	< 0.5			< 0.5		
	A @ disable/standby state	< .04			< .04		
DC Output							
HVout (Output Voltage)	VDC	0 to 8000			0 to 10,000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	7.5	15.5	31.2	6	12.5	25
Current Scale Factor	mA/V	4.7	14.2	6.25	4.1	10.9	5
Voltage Monitor Scaling	-	1000:1 ± 2% into 10 MΩ					
Pout (Output Power)	Watts (max)	60	125	250	60	125	250
Capacitance	Internal storage capacitance (pF)	4400	2200	3000	2900	1500	3000
Ripple[2]	%	< 1.0			< 1.0		

Model[1]		12C Series			15C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 12,000 VDC			0 to 15,000 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24			24		
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	< 3.25	< 6.5	< 13	< 3.25	< 6.5	< 13
	A @ 100% HVout, 0% load	< 0.5			< 0.5		
	A @ disable/standby state	< .04			< .04		
DC Output							
HVout (Output Voltage)	VDC	0 to 12,000			0 to 15,000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	5	10.5	20.8	4	8.3	16.7
Current Scale Factor	mA/V	4.0	7.4	4.17	4.0	7.5	3.33
Voltage Monitor Scaling	-	1000:1 ± 2% into 10 MΩ					
Pout (Output Power)	Watts (max)	60	125	250	60	125	250
Capacitance	Internal storage capacitance (pF)	2900	1500	2250	1700	1100	750
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]		20C Series			25C Series			30C Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative Output)		0 to 20,000 VDC			0 to 25,000 VDC			0 to 30,000 VDC		
High Voltage Outputs		Single Unipolar			Single Unipolar			Single Unipolar		
Input Voltage (VDC, Nominal)		24			24			24		
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	< 3.25	< 6.5	< 13	< 3.25	< 6.5	< 13	< 3.25	< 6.5	< 13
	A @ 100% HVout, 0% load	< 0.6			< 0.6			< 0.6		
	A @ disable/standby state	< .04			< .04			< .04		
DC Output										
HVout (Output Voltage)	VDC	0 to 20,000			0 to 25,000			0 to 30,000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	3	6.25	12.5	2.4	5	10	2	4.17	8.33
Current Scale Factor	mA/V	0.65	0.653	2.5	0.65	0.650	2	0.65	0.642	1.67
Voltage Monitor Scaling	-	1000:1 ± 2% into 10 MΩ								
Pout (Output Power)	Watts (max)	60	125	250	60	125	250	60	125	250
Capacitance	Internal storage capacitance (pF)	1300	800	750	940	630	500	830	550	500
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 5 for +Output, +5 to 0 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 = 464Ω ±1%	+5V, 3mA ±0.1% (I5), +10V, 3mA ±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)

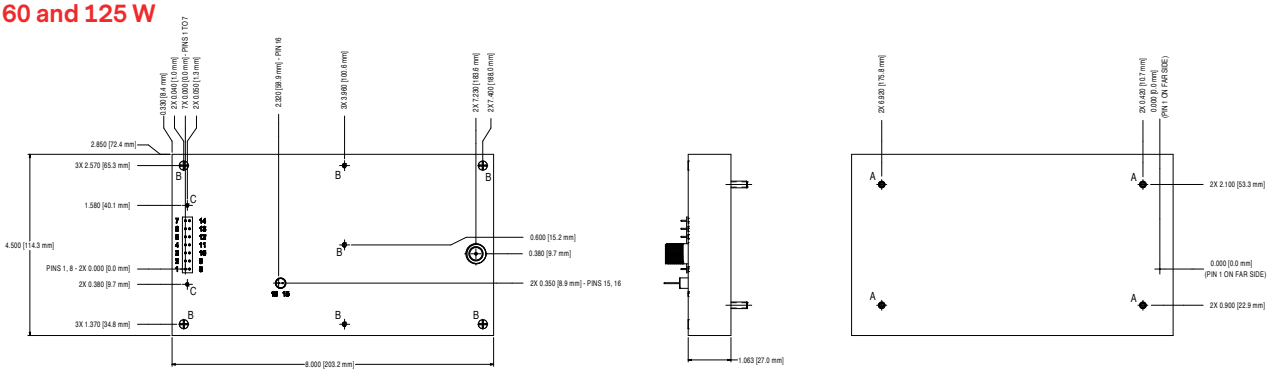
ELECTRICAL SPECIFICATIONS (CONTINUED)

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)

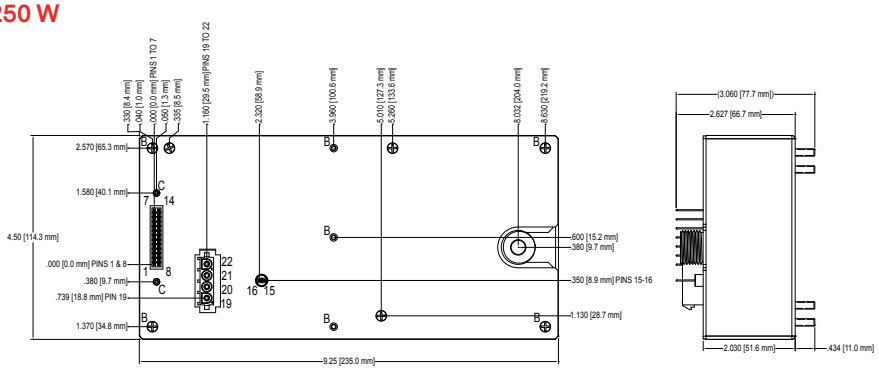
Regulatory	
Certifications	UL/cUL recognized, IEC-60950-1, CE mark (LVD and RoHS)

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
	634	38.7	634	38.7	1386	84.5
Weight (Standard Configuration)	g	oz	g	oz	g	oz
	1179	41.6	1179	41.6	2540	89.6

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	Iout Monitor
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 or Arc Detect Option
11	N/C	Current Mode Indicator
12	N/C	Voltage Mode Indicator
13	N/C	Current Programming
14	Output Voltage Monitor	Output Voltage Monitor
15 and 16	HV Ground Return	HV Ground Return
LGH1 (8C to 15C); LGH3 (20C to 30C)[1,2]	HV Output	HV Output

[1] LGH1 type connector requires cable CA-20KV-1000 to operate. (Sold Separately)

[2] LGH3 type connector requires cable CA-40KV-1007 to operate. (Sold Separately)

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 (5 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 or Arc Detect Option
11	N/C	Current Mode Indicator
12	N/C	Voltage Mode Indicator
13	N/C	Current Programming
14	Output Voltage Monitor	Buffered Voltage Monitor (5 mA max)

INTERFACE (CONTINUED)

Connections – 250 W Units (Continued)		
Pin	**Function : Standard**	**Function I5 or I10 option**
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
LGH3 (8C to 30C)[1]	HV Output	HV Output

[1] LGH3 type connector requires cable CA-40KV-1007 to operate. (Sold Separately)

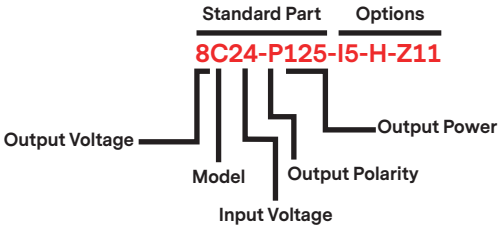
Connections — For -DA or -DAR Suffix		
Pin	**Function: Standard**	**Function: I5 or I10 option**
J1 - 1 and 2	Input Positive for 60 W & 125 W model (N/C for 250 W model)	Input Positive for 60 W & 125 W model (N/C for 250 W model)
J1 - 3 and 9	Signal Ground for 250 W model	Signal Ground for 250 W model
J1 - 4	N/C	Voltage Mode Indicator
J1 - 5	Output Voltage Monitor	Output Voltage Monitor
J1 - 6	Output Voltage Programming	Output Voltage Programming
J1 - 7	N/C	N/C
J1 - 8	+5 VDC Reference Output	+5 VDC (-I5) or +10 VDC (I10) Reference Output
J1 - 10	N/C	Current Mode Indicator
J1 - 11	N/C	Output Current Programming
J1 - 12	Output Current Monitor	Output Current Monitor
J1 - 13	Enable/Disable	Enable/Disable
J1 - 14 and 15	Input Return for 60 W & 125 W model (N/C for 250 W model)	Input Return for 60 W & 125 W model (N/C for 250 W model)
J4 - 1 and 2	Input Return for 250 W model (N/C for 60 W & 125 W model)	Input Return for 250 W model (N/C for 60 W & 125 W model)
J4 - 3 and 4	Input Positive for 250 W model (N/C for 60 W & 125 W model)	Input Positive for 250 W model (N/C for 60 W & 125 W model)

ORDERING INFORMATION

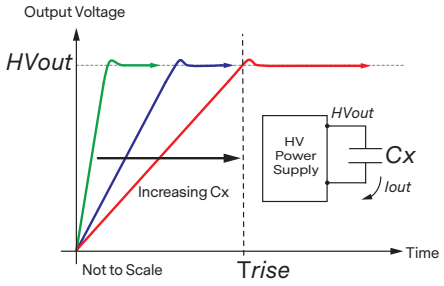
Type	0 to 8000 VDC Output	8C
	0 to 10,000 VDC Output	10C
	0 to 12,000 VDC Output	12C
	0 to 15,000 VDC Output	15C
	0 to 20,000 VDC Output	20C
	0 to 25,000 VDC Output	25C
	0 to 30,000 VDC Output	30C
Input	24 VC Nominal	24
Polarity	Positive Output	-P
	Negative Output	-N
Power	60 W Output	60
	125 W Output	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
Performance Options	Arc Detect*	-AD
	Arc Quench*(includes arc detect)	-AQ
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



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.
-Y11	Replaces Amp 4 pin power connector with Molex 4 pin connector (.045" Sq pins, .156" spacing).
-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.
-AD	Arc detection option. Only available with -I5 or -I10 interface.
-AQ	Arc quench option. Only available with -I5 or -I10 interface. Includes -AD.

ABOUT ADVANCED ENERGY

Since 1981, Advanced Energy (AE) 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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