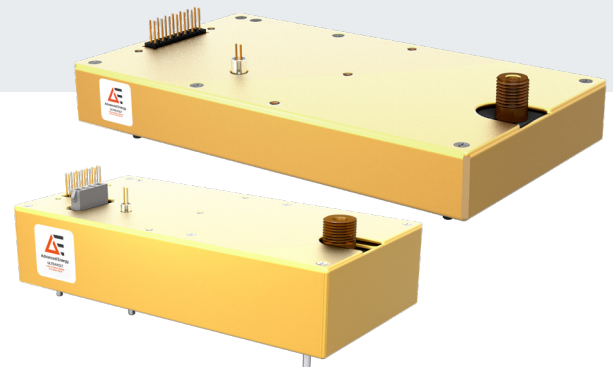


# ULTRAVOLT HIGH POWER 8C TO 30C SERIES

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

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 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

## ULTRAVOLT HIGH POWER 8C TO 30C SERIES

### ELECTRICAL SPECIFICATIONS

| Model <sup>1</sup>  |   | 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 VDC          |        |        | 24 VDC          |        |        |
| Power Output (Watts, Nominal)   |   | 60 W            | 125 W  | 250 W  | 60 W            | 125 W  | 250 W  |
| <b>DC Input</b>   |   |                 |        |        |                 |        |        |
| 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           |        |        |
| <b>DC Output</b>  |   |                 |        |        |                 |        |        |
| 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     |
| Pout (Output Power)   | Watts (max)                               | 60 W            | 125 W  | 250 W  | 60 W            | 125 W  | 250 W  |
| Capacitance   | Internal storage capacitance              | 4400pF          | 2200pF | 3000pF | 2900pF          | 1500pF | 3000pF |
| Ripple <sup>2</sup>   | %   | < 1.0           |        |        | < 1.0           |        |        |

| Model <sup>1</sup>  |   | 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 VDC          |        |        | 24 VDC          |        |        |
| Power Output (Watts, Nominal)   |   | 60 W            | 125 W  | 250 W  | 60 W            | 125 W  | 250 W  |
| <b>DC Input</b>   |   |                 |        |        |                 |        |        |
| 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           |        |        |
| <b>DC Output</b>  |   |                 |        |        |                 |        |        |
| 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   |
| Pout (Output Power)   | Watts (max)                               | 60 W            | 125 W  | 250 W  | 60 W            | 125 W  | 250 W  |
| Capacitance   | Internal storage capacitance              | 2900pF          | 1500pF | 2250pF | 1700pF          | 1100pF | 7500pF |
| Ripple <sup>2</sup>   | %   | < 1.0           |        |        | < 1.0           |        |        |

<sup>1</sup> Standard product specifications shown unless noted. Custom configurations are available.

<sup>2</sup> Nominal ripple measured @ 100% HVout, 100% LOAD. Valid for 10 to 100% HVout range.

ELECTRICAL SPECIFICATIONS (CONTINUED)

| Model <sup>1</sup>  |   | 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 VDC          |       |       | 24 VDC          |       |       | 24 VDC          |       |       |
| Power Output (Watts, Nominal)   |   | 60 W            | 125 W | 250 W | 60 W            | 125 W | 250 W | 60 W            | 125 W | 250 W |
| <b>DC Input</b>   |   |                 |       |       |                 |       |       |                 |       |       |
| 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           |       |       |
| <b>DC Output</b>  |   |                 |       |       |                 |       |       |                 |       |       |
| 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  |
| Pout (Output Power)   | Watts (max)                               | 60 W            | 125 W | 250 W | 60 W            | 125 W | 250 W | 60 W            | 125 W | 250 W |
| Capacitance   | Internal storage capacitance              | 1300pF          | 800pF | 750pF | 940pF           | 630pF | 500pF | 830pF           | 550pF | 500pF |
| Ripple <sup>2</sup>   | %   | < 1.0           |       |       | < 1.0           |       |       | < 1.0           |       |       |

<sup>1</sup> Standard product specifications shown unless noted. Custom configurations are available.

<sup>2</sup> Nominal ripple measured @ 100% HVout, 100% LOAD. Valid for 10 to 100% HVout range.

| Programming and Controls        | Standard  | I5/I10 Interface   |
|---------------------------------|---|--|
| Input Impedance                 | +Output Models: 1.1 MΩ to GND<br>-Output Models: 1.1 MΩ to +5 Vref                                | 10 MΩ  |
| 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 and Impedance | +5.00 VDC ±1%, Zout = 464Ω ±1%  | +5V 3mA (I5), +10V 3mA (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) |

# ULTRAVOLT HIGH POWER 8C TO 30C SERIES

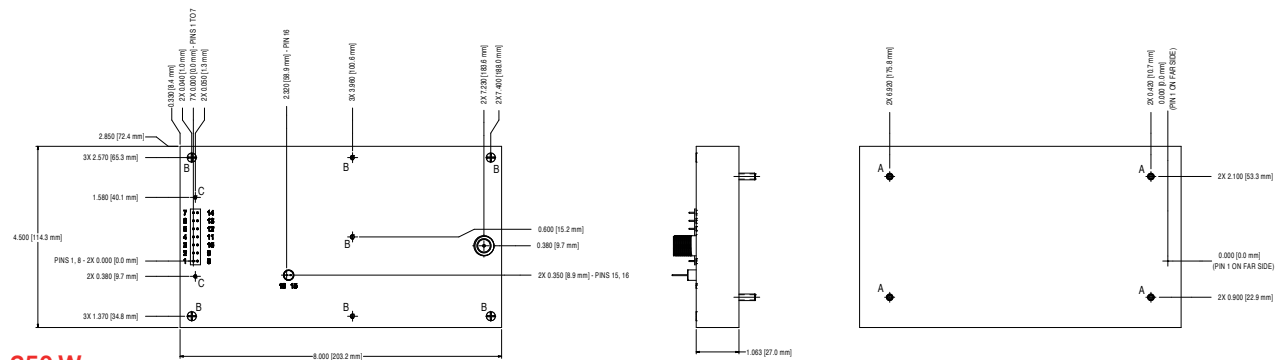
## ELECTRICAL SPECIFICATIONS (CONTINUED)

| 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)                    |

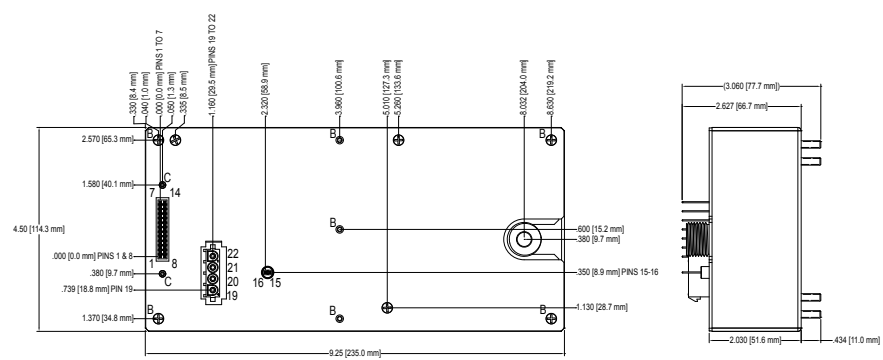
| Regulatory     |  |
|----------------|--|
| Certifications | UL/cUL recognized, IEC-60950-1, CE mark (LVD and RoHS) |

## MECHANICAL SPECIFICATIONS

### 60 and 125 W



### 250 W



| Construction          |  |
|-----------------------|--|
| Standard Case         | Aluminum (Anodized per MIL-A-8625 Type II)             |
| Heatsink              | Aluminum (Anodized, -H Option)                         |
| Bottom Mounting Studs | Four #8-32 steel threaded standoffs                    |
| 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           |                 |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                 | cm <sup>3</sup> | in <sup>3</sup> | cm <sup>3</sup> | in <sup>3</sup> | cm <sup>3</sup> | in <sup>3</sup> |
| Volume (Module body only)       | 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;<br>LGH3 (20C to 30C) <sup>1,2</sup> | HV Output                 | HV Output                                       |

<sup>1</sup> LGH1 type connector requires cable CA-20KV-1000 to operate. (Sold Separately)

<sup>2</sup> LGH3 type connector requires cable CA-40KV-1007 to operate. (Sold Separately)

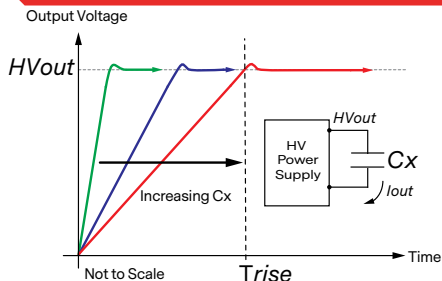
| Connections – 250 W Units |                         |  |
|---------------------------|-------------------------|--|
| Pin                       | Function: Standard      | Function: I5 or I10 option                     |
| 1 and 8                   | N/C                     | N/C  |
| 2 and 9                   | 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) <sup>1</sup>         | HV Output                 | HV Output                 |

<sup>1</sup> LGH3 type connector requires cable CA-40KV-1007 to operate. (Sold Separately)

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.

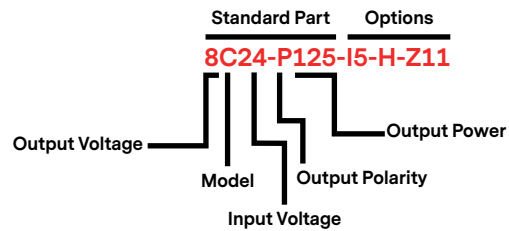
| Option | Description   |
|--------|---|
| -I5    | Upgrades analog interface to provide more precise control and monitoring of both HVout and Iout using 0 to 5 VDC (full scale) signals. Also adds Iout control and voltage/current mode indication capability not available on the Standard Interface. Not 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.   |
| -AD    | Arc detection option. Only available with -I5 or -I10 interface.  |
| -AQ    | Arc quench option. Only available with -I5 or -I10 interface. Includes -AD.   |

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





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## 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



**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.

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