

# ULTRAVOLT C SERIES

## HIGH VOLTAGE CAP-CHARGING SUPPLIES



The UltraVolt® C series of high voltage regulated DC-to-DC converters are designed for fast rise time/charging applications utilizing state-of-the-art power conversion topology. This high power density module is especially suited to high-energy pulsers, amplifiers, and discharge devices with large capacitance, fast repetition rates, or high current loads. Surface-mount technology and encapsulation techniques provide high reliability and low cost.

### PRODUCT HIGHLIGHTS

- 7 models from 0 to 125 V through 0 to 6 kV
- 20 or 30 W output power
- Maximum lout capability down to 0 V
- Maximum lout during charge/rise time
- Indefinite output short circuit protection
- Very fast rise with very low overshoot
- Output voltage and current monitors
- > 400,000 h MTBF at 65°C
- Fixed-frequency, low-stored-energy design
- UL/cUL recognized component; CE Mark (LVD and RoHS)

### TYPICAL APPLICATIONS

- Cap-charging
- Pulsed power
- Test equipment
- Mass spectrometry
- Automated test equipment (ATE)
- Lasers and electro-optics
- HV pulse generator bias
- HV amplifier bias

ELECTRICAL SPECIFICATIONS

| Parameter               | Conditions                          | Models                |       |             |       |             |       |            |        | Units          |
|-------------------------|-------------------------------------|-----------------------|-------|-------------|-------|-------------|-------|------------|--------|----------------|
| <b>Input</b>            |                                     | <b>All Types</b>      |       |             |       |             |       |            |        |                |
| Voltage Range           | Full Power                          | +23 to 30             |       |             |       |             |       |            |        | VDC            |
| Voltage Range           | Derated Power Range                 | +9 to 32              |       |             |       |             |       |            |        | VDC            |
| Current                 | Standby/Disable                     | < 30                  |       |             |       |             |       |            |        | mA             |
| Current                 | No Load, Max Eout                   | < 90                  |       |             |       |             |       |            |        | mA             |
| Current                 | Max Load, Max Eout                  | 20 W: 950, 30 W: 1425 |       |             |       |             |       |            |        | mA             |
| AC Ripple Current       | Nominal Input, Full Load            | < 80                  |       |             |       |             |       |            |        | mA<br>pk to pk |
| <b>Output</b>           |                                     | <b>1/8C</b>           |       | <b>1/4C</b> |       | <b>1/2C</b> |       |            |        |                |
| Voltage Range           | Nominal Input                       | 0 to 125              |       | 0 to 250    |       | 0 to 500    |       | VDC        |        |                |
| Power                   | Nominal Input, Max Eout             | 20                    | 30    | 20          | 30    | 20          | 30    | W          |        |                |
| Current                 | Iout, Entire Output Voltage Range   | 160                   | 240   | 80          | 120   | 40          | 60    | mA         |        |                |
| Current Scale Factor    | Full Load                           | 2540                  | 4210  | 1096        | 2000  | 1142        | 1667  | mA/V       |        |                |
| Voltage Monitor Scaling |                                     | 100:1 ±2% into 10 MΩ  |       |             |       |             |       |            |        |                |
| Ripple                  | Full Load, Max Eout, Cload ≥ 0.5 uF | < 1.0                 | < 1.0 | < 1.0       | < 1.0 | < 1.0       | < 1.0 | V pk to pk |        |                |
| Overshoot               | C Load, 0 Eout to Full Eout         | < 1.0                 | < 1.0 | < 1.0       | < 1.0 | < 2.0       | < 2.0 | V pk       |        |                |
| Rise Time               | Max Iout, Various C Loads and Eout  | Figure A              |       |             |       |             |       |            |        | -              |
| Storage Capacitance     | Internal                            | 0.50                  | 0.50  | 0.15        | 0.15  | 0.16        | 0.16  | uF         |        |                |
| Line Regulation         | Nominal Input, Max Eout, Full Power | < 0.01 %              |       |             |       |             |       |            |        | VDC            |
| Static Load Regulation  | No Load to Full Load, Max Eout      | < 0.01%               |       |             |       |             |       |            |        | VDC            |
| Stability               | 30 Min Warmup, Per 8 h, Per Day     | < 0.01%/< 0.02%       |       |             |       |             |       |            |        | VDC            |
| <b>Output</b>           |                                     | <b>1C</b>             |       | <b>2C</b>   |       | <b>4C</b>   |       | <b>6C</b>  |        |                |
| Voltage Range           | Nominal Input                       | 0 to 1000             |       | 0 to 2000   |       | 0 to 4000   |       | 0 to 6000  |        | VDC            |
| Power                   | Nominal Input, Max Eout             | 20                    | 30    | 20          | 30    | 20          | 30    | 20         | 30     | W              |
| Current                 | Iout, Entire Output Voltage Range   | 20                    | 30    | 10          | 15    | 5           | 7.5   | 3.3        | 5      | mA             |
| Current Scale Factor    | Full Load                           | 307                   | 476   | 159         | 259   | 94          | 112   | 51         | 86     | mA/V           |
| Voltage Monitor Scaling |                                     | 100:1 ±2% into 10 MΩ  |       |             |       |             |       |            |        |                |
| Ripple                  | Full Load, Max Eout, Cload ≥ 0.5 uF | < 1.0                 | < 1.0 | < 1.0       | < 1.0 | < 1.0       | < 1.0 | < 1.0      | < 1.0  | V pk to pk     |
| Overshoot               | C Load, 0 Eout to Full Eout         | < 1.0                 | < 1.0 | < 1.0       | < 1.0 | < 4.0       | < 4.0 | < 6.0      | < 6.0  | V pk           |
| Rise Time               | Max Iout, Various C Loads and Eout  | Figure A              |       |             |       |             |       |            |        | -              |
| Storage Capacitance     | Internal                            | 0.033                 | 0.018 | 0.0019      | 0.009 | 0.010       | 0.010 | 0.0064     | 0.0064 | uF             |
| Line Regulation         | Nominal Input, Max Eout, Full Power | < 0.01 %              |       |             |       |             |       |            |        | VDC            |
| Static Load Regulation  | No Load to Full Load, Max Eout      | < 0.01%               |       |             |       |             |       |            |        | VDC            |
| Stability               | 30 Min Warmup, Per 8 h, Per Day     | < 0.01%/< 0.02%       |       |             |       |             |       |            |        | VDC            |

C = uF  
V = Volts  
I = mA  
T = mS

$$T = \frac{C \times V}{I}$$

C = uF  
V = kV  
I = mA  
F = Hz

$$I = C \times V \times F$$

C = uF  
V = kV  
I = mA  
F = Hz

$$F = \frac{I}{C \times V}$$

C = uF  
E² = kV  
J = Ws

$$J = \frac{C \times E^2}{2}$$

Figure A - Rise time formulas

Note: Capacitance must include HVPS internal capacitance.

ELECTRICAL SPECIFICATIONS (CONTINUED)

| Programming And Controls     |                                    | All Types   | Units |
|------------------------------|------------------------------------|---|-------|
| Input Impedance              | Nominal Input                      | +Output models 1.1 MΩ to ground, -output models 1.1 MΩ to +5 vRef.          | MΩ    |
| Adjust Resistance            | Typical Potentiometer Values       | 10 to 100 K (potentiometer across vRef. and signal ground, wiper to adjust) | Ω     |
| Adjust Logic                 | 0 to +5 for +Out, +5 to 0 for -Out | +4.64 VDC for +output or +0.36 for -output = nominal Eout                   | -     |
| Output Voltage and Impedance | T = +25°C                          | +5.00 VDC ±2%, Zout = 464 Ω ±1%   | -     |
| Enable/Disable               |                                    | 0 to +0.5 disable, +2.4 to 32 enable (default = enable)                     | VDC   |

| Environmental |   | Standard  | -25 PPM Option | Units  |
|---------------|---|---|----------------|--------|
| Operating     | Full Load, Max Eout, Case Temp.         | -40 to +65  | +10 to +45     | °C     |
| Coefficient   | Over The Specified Temperature          | ±50   | ±25            | PPM/°C |
| Thermal Shock | Mil-Std 810, Method 503-4, Proc. II     | -40 to +65  |                | °C     |
| Storage       | Non-operating, Case Temp.               | -55 to +105   |                | °C     |
| Humidity      | All Conditions, Standard Package        | 0 to 95% non-condensing   |                | -      |
| Altitude      | All Conditions, Standard Package        | Sea level through vacuum (vacuum may require -P2 option, contact factory for details) |                | -      |
| Shock         | Mil-Std-810, Method 516.5, Proc. IV     | 20 (standard), 40 (-C option)   |                | Gs     |
| Vibration     | Mil-Std-810, Method 514.5, Fig.514.5C-3 | 10 (standard), 20 (-C option)   |                | Gs     |

MECHANICAL SPECIFICATIONS

| Physical Specifications |   |
|-------------------------|---|
| Construction            | Epoxy-filled DAP box certified to ASTM-D-5948 with -C option, aluminum box, chem film per MIL-A-8625 Type II (anodizing)              |
| Volume                  | 70.5 cc (4.30 in <sup>3</sup> ), with -C option: 131.1 cc (8.00 in <sup>3</sup> )   |
| Weight                  | 142 g (5.0 oz), with -C Option: 284 g (10.0 oz)   |
| Tolerance               | Overall 1.27 mm ( $\pm 0.050$ " ), pin to pin 0.38 mm ( $\pm 0.015$ " ), mounting hole location 0.64 ( $\pm 0.025$ " ) (plastic case) |
|                         | Overall 0.64 mm ( $\pm 0.025$ " ), pin to pin 0.38 mm ( $\pm 0.015$ " ), hole to hole location 0.64 mm ( $\pm 0.025$ " ) (metal case) |

20 and 30 W versions are an additional 157 mm (0.062") in height.  
 -M equipped units are an additional 0.76 mm (0.030") for each dimension.  
 Contact Advanced Energy for drawings of models equipped with -E or -H options.



## INTERFACE

| Connections |                           |
|-------------|---------------------------|
| Pin         | Function                  |
| 1           | Input Power Ground Return |
| 2           | Positive Power Input      |
| 3           | Iout Monitor              |
| 4           | Enable/Disable            |
| 5           | Signal Ground Return      |
| 6           | Remote Adjust Input       |
| 7           | +5 VDC Reference Output   |
| 8           | HV Ground Return          |
| 9           | Eout Monitor              |
| 10 and 11   | HV Output                 |

All grounds joined internally. Power supply mounting points isolated from internal grounds by  $> 100 \text{ k}\Omega$ ,  $0.01 \text{ }\mu\text{F}/50 \text{ V}$  (max) on all models except -M, -M-C, -M-E, and -M-H configurations which are  $0 \text{ }\Omega$ .

# ULTRAVOLT C SERIES

## ORDERING INFORMATION

|                   |                                       |            |
|-------------------|---------------------------------------|------------|
| Type              | 0 to 125 VDC Main Output              | 1/8C       |
|                   | 0 to 250 VDC Main Output              | 1/4C       |
|                   | 0 to 500 VDC Main Output              | 1/2C       |
|                   | 0 to 1,000 VDC Main Output            | 1C         |
|                   | 0 to 2000 VDC Main Output             | 2C         |
|                   | 0 to 4000 VDC Main Output             | 4C         |
|                   | 0 to 6000 VDC Main Output             | 6C         |
| Input             | 24 VDC Nominal (20 and 30 W)          | 24         |
| Polarity          | Positive Output                       | -P         |
|                   | Negative Output                       | -N         |
| Power             | W Output                              | 20         |
|                   | W Output                              | 30         |
| Case              | Plastic Case - Diallyl Phthalate      | (Standard) |
|                   | 'Eared' Heatsink Plate (Plastic Case) | -E         |
|                   | RF-Tight Aluminum Case                | -C         |
| Heatsink          | 0.400" High (Sized-to-Fit Case)       | -H         |
| Shield            | Six-sided Mu-Metal Shield             | -M         |
| Temp. Coefficient | 25 PPM Temperature Coefficient        | -25 PPM    |



Popular accessories ordered with this product include CONN-KIT and BR-1 mounting bracket kit.



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## ABOUT ADVANCED ENERGY

Since 1981, UltraVolt® — now part of the Advanced Energy (AE) family — 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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