

# ULTRAVOLT E SERIES

## PRECISION HIGH VOLTAGE POWER SUPPLIES

The UltraVolt® E series of precision high voltage power supplies has very low ripple, excellent linearity, and very stable temperature characteristics. Models in this series are offered at two levels of performance; the best delivers 10 ppm characteristics. This series is ideal for applications where system performance is directly linked to high voltage power quality and performance.



### AT A GLANCE

#### PRODUCT HIGHLIGHTS

- Precision output voltage from 0 to 1 kV through 0 to 15 kV
- PPM level ripple, regulation, and stability
- As low as 10 ppm temperature coefficient and reference
- 0 to 4, 15/20, or 30 W of output power
- Maximum lout capability down to 0 V
- Voltage and current regulation/limit capability
- Precision output voltage and current monitors

#### TYPICAL APPLICATIONS

- Bias supplies
- Mass spectrometry
- SEM/FIB
- Electron beams
- Ion beams

#### Output Voltage

To 15 kV

#### Output Power

To 30 W

#### Type

Single Output

#### Ripple

To 10 ppm

#### Control

Analog

#### Temperature Coefficient

25 ppm/°C

## ELECTRICAL SPECIFICATIONS

| Parameter                   | Conditions                       | Models               |      |      |            |      |      |            |      |      | Units       |
|-----------------------------|----------------------------------|----------------------|------|------|------------|------|------|------------|------|------|-------------|
| <b>Input</b>                |                                  | <b>All Types</b>     |      |      |            |      |      |            |      |      |             |
| Voltage Range               | Full Power                       | +23 to 30            |      |      |            |      |      |            |      |      | VDC         |
| Current                     | Standby/Disable                  | < 50                 |      |      |            |      |      |            |      |      | mA          |
| Current                     | No Load, Max Eout                | < 325                |      |      |            |      |      |            |      |      | mA          |
| Current                     | Full Load, Max Eout              | 2.5                  |      |      |            |      |      |            |      |      | A           |
| AC Ripple Current           | Nominal Input, Full Load         | < 10                 |      |      |            |      |      |            |      |      | mA pk to pk |
| <b>Output</b>               |                                  | <b>1E</b>            |      |      | <b>2E</b>  |      |      | <b>4E</b>  |      |      |             |
| Voltage Range               | Nominal Input                    | 0 to 1000            |      |      | 0 to 2000  |      |      | 0 to 4000  |      |      | VDC         |
| Nominal Input Voltage/Model |                                  | 24                   | 24   | 24   | 24         | 24   | 24   | 24         | 24   | 24   | VDC         |
| Power                       | Nominal Input, Max Eout          | 4                    | 20   | 30   | 4          | 20   | 30   | 4          | 20   | 30   | Watts       |
| Current                     | lout Entire Output Voltage Range | 4                    | 20   | 30   | 2          | 10   | 15   | 1          | 5    | 7.5  | mA          |
| Voltage Monitor             | Normal Operating Conditions      | 0 to 10 ±0.5%        |      |      |            |      |      |            |      |      | VDC         |
| Current Monitor             | Normal Operating Conditions      | 0 to 10 ±0.5%        |      |      |            |      |      |            |      |      | VDC         |
| Ripple                      | Full Load, Max Eout              | ≤ 10                 | ≤ 10 | ≤ 10 | ≤ 10       | ≤ 10 | ≤ 10 | ≤ 10       | ≤ 10 | ≤ 10 | ppm         |
| Line Regulation             | Nom Input, Max Eout, Full Power  | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |
| Static Load Regulation      | No Load to Full Load, Max Eout   | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |
| Stability                   | 30 Min Warmup, Per 8 h, Per Day  | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |
| <b>Output</b>               |                                  | <b>6E</b>            |      |      | <b>10E</b> |      |      | <b>15E</b> |      |      |             |
| Voltage Range               | Nominal Input                    | 0 to 6000            |      |      | 0 to 10000 |      |      | 0 to 15000 |      |      | VDC         |
| Nominal Input Voltage/Model |                                  | 24                   | 24   | 24   | 24         | 24   | 24   | 24         | 24   | 24   | VDC         |
| Power                       | Nominal Input, Max Eout          | 4                    | 20   | 30   | 4          | 15   | 30   | 4          | 15   | 30   | Watts       |
| Current                     | lout Entire Output Voltage Range | 0.67                 | 3.3  | 5    | 0.4        | 1.5  | 3    | 0.26       | 1    | 2    | mA          |
| Voltage Monitor             | Normal Operating Conditions      | 0 to 10 ±0.5%        |      |      |            |      |      |            |      |      | VDC         |
| Current Monitor             | Normal Operating Conditions      | 0 to 10 ±0.5%        |      |      |            |      |      |            |      |      | VDC         |
| Ripple                      | Full Load, Max Eout              | ≤ 10                 | ≤ 10 | ≤ 10 | ≤ 10       | ≤ 10 | ≤ 10 | ≤ 10       | ≤ 10 | ≤ 10 | ppm         |
| Line Regulation             | Nom Input, Max Eout, Full Power  | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |
| Static Load Regulation      | No Load to Full Load, Max Eout   | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |
| Stability                   | 30 Min Warmup, Per 8 h, Per Day  | < 25 ppm or < 10 ppm |      |      |            |      |      |            |      |      | VDC         |

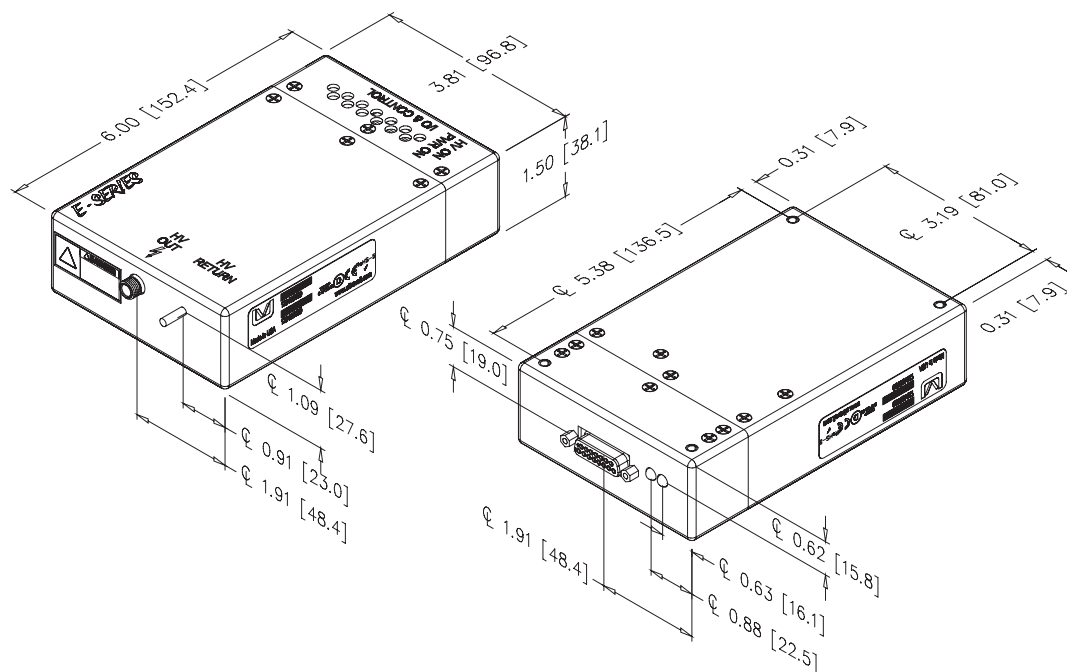
## ELECTRICAL SPECIFICATIONS (CONTINUED)

| Programming and Controls             |                             | All Types                                                 |     |
|--------------------------------------|-----------------------------|-----------------------------------------------------------|-----|
| Input Impedance                      | Nominal Input               | 10                                                        | MΩ  |
| Adjust Accuracy and Adjust Linearity | 10 to 100%                  | ±0.05%                                                    | %   |
| Adjust Voltage                       | Differential                | 0 to +10                                                  | VDC |
| Output Voltage                       | T = +25°C, Initial Value    | +10.00 ±0.05%                                             | VDC |
| Max Source Current                   | T = +25°C                   | 5                                                         | mA  |
| Output Impedance                     | Normal Operating Conditions | Buffered, low impedance, 2 mA max for source/sink current | -   |
| Enable/Disable                       |                             | 0 to +0.8 disable, +2.5 to 10 enable (default = disable)  | VDC |

| Environmental           |                                     | All Types                |        |
|-------------------------|-------------------------------------|--------------------------|--------|
| Operating               | Full Load, Max Eout, Case Temp.     | +10 to +45               | °C     |
| Temperature Coefficient | Over the Specified Temperature      | ±25 or ±10               | ppm/°C |
| Thermal Shock           | Mil-Std-810, Method 504, Class 2    | -40 to +65               | °C     |
| Storage                 | Non-Operating, Case Temp.           | -55 to +105              | °C     |
| Humidity                | All Conditions, Standard Package    | 0 to 95%, non-condensing | -      |
| Altitude                | Standard Package, All Conditions    | Sea level through 10,000 | ft     |
| Shock                   | Mil-Std-810, Method 516, Proc. 4    | 20                       | Gs     |
| Vibration               | Mil-Std-810, Method 514, Fig. 514-3 | 10                       | Gs     |

## MECHANICAL SPECIFICATIONS

| Construction           |                                   |
|------------------------|-----------------------------------|
| Material               | Aluminum alloy 5052-H32           |
| Finish                 | Anodize MIL-A-8625E blue          |
| Size                   |                                   |
| Volume                 | 561.9 cc (34.29 in <sup>3</sup> ) |
| Weight                 | 1.1 kg (2.4 lb)                   |
| Tolerance              |                                   |
| Overall                | ±1.27 mm (0.030")                 |
| Pin to Pin             | ±0.38 mm (0.015")                 |
| Mounting Hole Location | ±0.64 mm (0.025")                 |
| Connections            |                                   |
| D-Sub                  | 15-pin, female                    |
| HV Connector           | LGH1/2L                           |
| HV Return              | #6-32 x 0.437 long threaded post  |



## INTERFACE

| E Series Input Connector Pinout and Function |                        |                                                                                                    |
|----------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------|
| Pin                                          | Description            | Function                                                                                           |
| 1                                            | Reference Voltage      | (+)10.00 V precision reference                                                                     |
| 2                                            | Voltage Programming -  | 0 to 10 v to program full output voltage<br>Programming input is differential between pins 2 and 3 |
| 3                                            | Voltage Programming +  | 0 to 10 v to program full output voltage<br>Programming input is differential between pins 2 and 3 |
| 4                                            | Voltage Monitor        | 0 to +10 v represents 0 to full output voltage                                                     |
| 5                                            | Voltage Mode Indicator | Open drain active low when in voltage control                                                      |
| 6                                            | Signal Ground          | Reference all control signals here.                                                                |
| 7                                            | Input Power            | +23 to +30 V                                                                                       |
| 8                                            | Input Power            | +23 to +30 V                                                                                       |
| 9                                            | Power Ground           | Input Power Return                                                                                 |
| 10                                           | Power Ground           | Input Power Return                                                                                 |
| 11                                           | Enable                 | TTL high to enable, low to disable, default is OFF                                                 |
| 12                                           | Current Monitor        | 0 to +10 v represents 0 to full output current                                                     |
| 13                                           | Current Programming    | 0 to +10 v sets current from 0 to full rated output current                                        |
| 14                                           | Current Mode Indicator | Open drain active low when in current control                                                      |
| 15                                           | Signal Ground          | Reference all control signals here.                                                                |

NOTE: Use stud next to high voltage output connector as HV return. A secure ground connection here is critical to safety and proper operation.

## ORDERING INFORMATION

| Ordering Information |                                                               |            |
|----------------------|---------------------------------------------------------------|------------|
| Type                 | 0 to 1000 VDC Output                                          | 1E         |
|                      | 0 to 2000 VDC Output                                          | 2E         |
|                      | 0 to 4000 VDC Output                                          | 4E         |
|                      | 0 to 6000 VDC Output                                          | 6E         |
|                      | 0 to 10,000 VDC Output                                        | 10E        |
|                      | 0 to 15,000 VDC Output                                        | 15E        |
| Input                | 24 V Input                                                    | 24         |
| Polarity             | Positive Output                                               | -P         |
|                      | Negative Output                                               | -N         |
| Power                | 4 W Output                                                    | 4          |
|                      | 15 W Output (10 and 15 kV only)                               | 15         |
|                      | 20 W Output (1 to 6 kV only)                                  | 20         |
|                      | 30 W Output                                                   | 30         |
| Performance          |                                                               |            |
| Level                | 10 ppm Line/Load Regulation, Stability, and Temp. Coefficient | -10 ppm    |
|                      | 25 ppm Line/Load Regulation, Stability, and Temp. Coefficient | -25 ppm    |
| Connectors           | LGH                                                           | (Standard) |
|                      | 5 kV, SHV Type                                                | -SHV-5 kV  |
|                      | 10 kV, BNC Type                                               | -BNC-10 kV |



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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 | 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.

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