Advanced Energy®

# ULTRAVOLT® E SERIES

## PRECISION HIGH VOLTAGE POWER SUPPLIES

# **Single-output precision** high voltage power supply modules

**The 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.

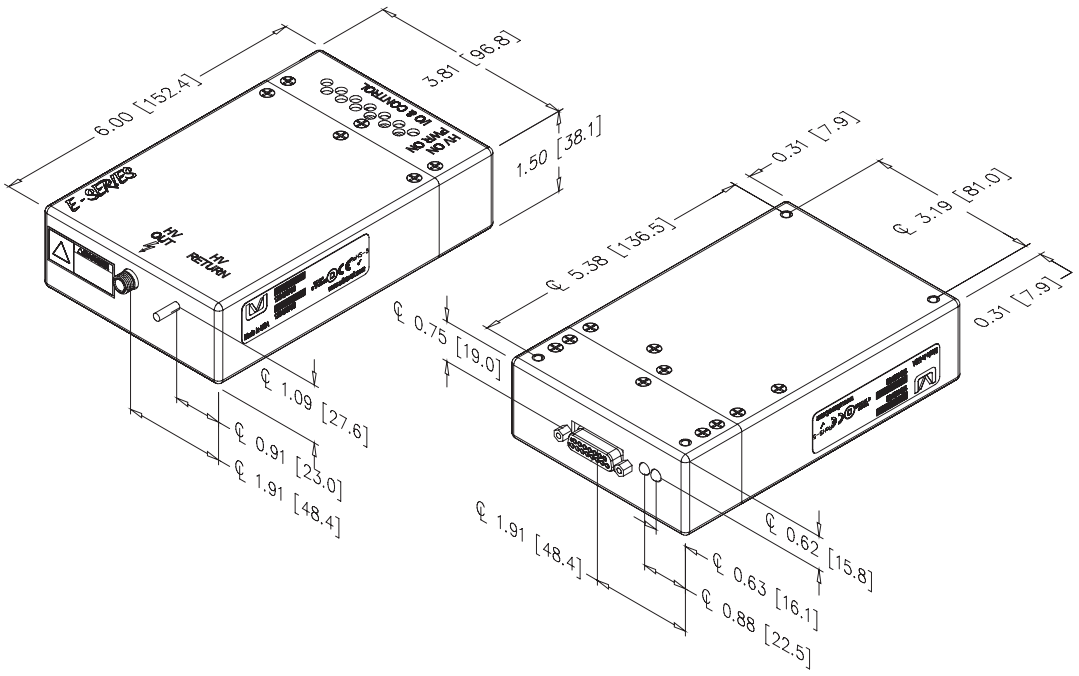
## Features

- 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 Iout 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

| PARAMETER | CONDITIONS | MODELS | | | | | | | | | | | | | | | | | UNITS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Input** | | **All Types** | | | | | | | | | | | | | | | | | |
| **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 |
| **Output** | | **1E** | | | **2E** | | | **4E** | | | **6E** | | | **10E** | | | **15E** | | |
| **Voltage Range** | Nominal Input | 0 to 1000 | | | 0 to 2000 | | | 0 to 4000 | | | 0 to 6000 | | | 0 to 10000 | | | 0 to 15000 | | | VDC |
| **Nominal Input Voltage/Model** | | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | VDC |
| **Power** | Nominal Input, Max Eout | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 15 | 30 | 4 | 15 | 30 | Watts |
| **Current** | Iout Entire Output Voltage Range | 4 | 20 | 30 | 2 | 10 | 15 | 1 | 5 | 7.5 | 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 | ≤ 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 |
| **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 |




*Note: Downloadable drawings (complete with mounting and pin information) and 3D models are available online.*

## PHYSICAL SPECIFICATIONS

| | |
|---|---|
| **Construction** | |
| **Material** | Aluminum alloy 5052-H32 |
| **Finish** | Anodize MIL-A-8625E blue |
| **Size** | |
| **Volume** | 561.9 cc (34.29 $in^3$) |
| **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 |

## E SERIES INPUT CONNECTOR PINOUT AND FUNCTIONS

| Pin | Description | Function |
|---|---|---|
| 1 | Reference Voltage | (+)10.00 V PRECISION REFERENCE |
| 2 | Voltage Programming - | 0 TO 10 V TO PROGRAM FULL OUTPUT VOLTAGE |
| 3 | Voltage Programming + | 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 | |
| 9 | Power Ground | INPUT POWER RETURN |
| 10 | Power Ground | |
| 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

| | | |
|---|---|---|
| **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 |

*Popular accessories ordered with this product include our full range of high voltage output connectors. (See Accessories and Connectors datasheet.)*

RoHS COMPLIANT

Non-RoHS compliant units are available. Please contact the factory for more information.

CE c UL us

IEC-60950-1

**For international contact information, visit**
**advanced-energy**.com.

ENG-HV-ESeries-230-I 5.16

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