# ULTRAVOLT A SERIES

## HIGH VOLTAGE BIASING SUPPLY

The A Series consists of miniature, PCB-mount, high voltage, regulated DC-DC converters. Designed and built utilizing state-of-the-art power-conversion topology, these units feature surface-mount technology and encapsulation techniques that provide high reliability and performance.

### PRODUCT HIGHLIGHTS

- Eight models from 0 to 62 V through 0 to 6 kV
- 4, 20, or 30 W of output power
- Maximum Iout capability down to 0 V
- Wide input voltage range
- Available with Ripple Stripper® filter (-F option)
- Indefinite output short-circuit protection
- Output current monitor
- Fixed-frequency, low-stored-energy design
- UL/cUL recognized component; CE Mark (LVD and RoHS)

### TYPICAL APPLICATIONS

- Bias supplies
- Electrostatic detectors
- Mass spectrometers
- Photomultiplier tubes (PMTs)

©2020 Advanced Energy Industries, Inc.

## ELECTRICAL SPECIFICATIONS

| Parameter | Conditions | Models | | | | | | | | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Input** | | **12 V** | | | | | | | | | | | | |
| Voltage Range | Full Power | +11 to 16 | | | | | | | | | | | | VDC |
| Voltage Range | Derated Power Range | +9 to 32 | | | | | | | | | | | | VDC |
| Current | Standby / Disable | < 30 | | | | | | | | | | | | mA |
| Current | No Load, Max Eout | < 100 | | | | | | | | | | | | mA |
| Current | Max Load, Max Eout | ~ 400 | | | | | | | | | | | | mA |
| AC Ripple Current | Nominal Input, Full Load | < 80 | | | | | | | | | | | | mA p-p |
| **Output** | | **1/16A** | | | **1/8A** | | | **1/4A** | | | **1/2A** | | | |
| Voltage Range | Nominal Input | 0 to 62 | | | 0 to 125 | | | 0 to 250 | | | 0 to 500 | | | VDC |
| Nominal Input Voltage | | 12 | 24 | 24 | 12 | 24 | 24 | 12 | 24 | 24 | 12 | 24 | 24 | VDC |
| Power | Nominal Input, Max Eout | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | W |
| Current | Iout Entire Output Voltage Range | 64 | 320 | 480 | 32 | 160 | 240 | 16 | 80 | 120 | 8 | 40 | 60 | mA |
| Current Monitor Scaling | Full Load | 0.985 | 3.90 | 7.40 | 438.4 | 1860.5 | 2891.5 | 213.3 | 1000 | 1481.5 | 438.4 | 1860.5 | 2891.5 | mA/V |
| Voltage Monitor Scaling | With -Y5 option | 10:1 ± 2% into 10 MΩ | | | | | | 10:1 ± 2% into 10 MΩ | | | | | | - |
| Ripple | Full Load, Max Eout | 0.02 | 0.03 | 0.05 | 0.013 | 0.015 | 0.016 | 0.01 | 0.04 | 0.048 | 0.001 | 0.02 | 0.017 | %V p-p |
| Ripple with -F-M Option* | Full Load, Max Eout, 300 pF Bypass Cap | 0.002 | 0.004 | 0.006 | 0.0048 | 0.0056 | 0.006 | 0.0052 | 0.0028 | 0.005 | 0.001 | 0.0138 | 0.0016 | %V p-p |
| Dynamic Load Regulation | ½ to Full Load, Max Eout per 0.1 mA | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.20 | < 0.20 | < 0.20 | < 0.50 | < 0.50 | < 0.50 | V pk |
| Line Regulation | Nom. Input, Max Eout, Full Power | < 0.01 % | | | | | | < 0.01 % | | | | | | VDC |
| Static Load Regulation | No Load to Full Load, Max Eout | < 0.01% | | | | | | < 0.01% | | | | | | VDC |
| Stability | 30 Min. warmup, per 8 hr/ Per Day | < 0.01%/< 0.02% | | | | | | < 0.01%/< 0.02% | | | | | | VDC |
| **Programming & Controls** | | **All Types** | | | | | | | | | | | | |
| Input Impedance | Nominal Input | + output models 1.1 MΩ to GND, - output models 1.1 MΩ to +5 Vref | | | | | | | | | | | | MΩ |
| Adjust Resistance | Typical Potentiometer Values | 10 to 100 K (Pot. across Vref. and signal GND, 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 & 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 |

## ELECTRICAL SPECIFICATIONS (CONTINUED)

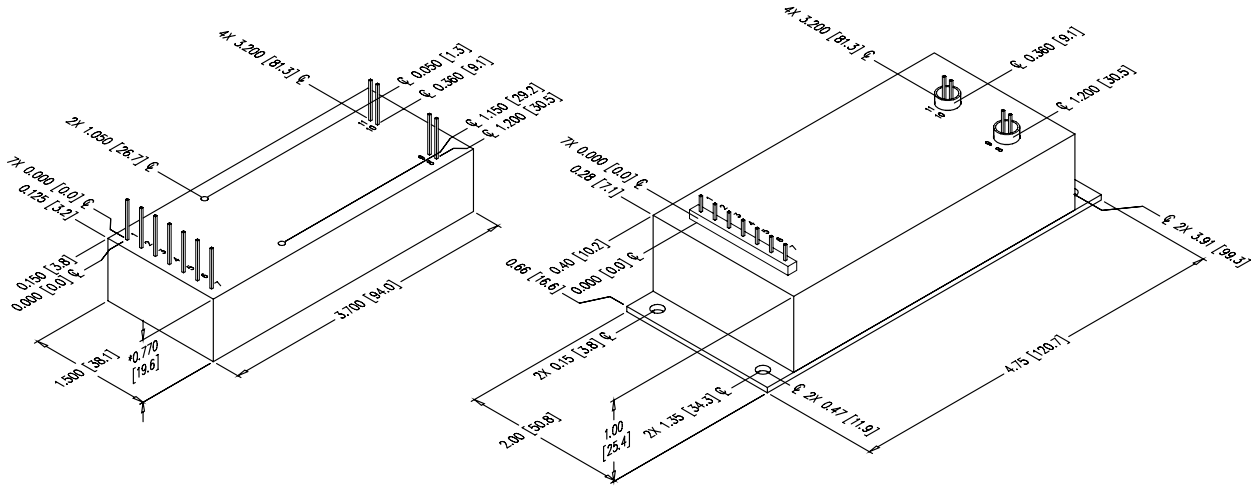
| Parameter | Conditions | Models | | | | | | | | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Input** | | **24 V** | | | | | | | | | | | | |
| Voltage Range | Full Power | +23 to 30 | | | | | | | | | | | | VDC |
| Voltage Range | Derated Power Range | +9 to 32 | | | | | | | | | | | | VDC |
| Current | Standby / Disable | < 30 | | | | | | | | | | | | mA |
| Current | No Load, Max Eout | < 90 | | | | | | | | | | | | mA |
| Current | Max Load, Max Eout | ~ 1350 | | | | | | | | | | | | mA |
| AC Ripple Current | Nominal Input, Full Load | < 80 | | | | | | | | | | | | mA p-p |
| **Output** | | **1A** | | | **2A** | | | **4A** | | | **6A** | | | |
| Voltage Range | Nominal Input | 0 to 1000 | | | 0 to 2000 | | | 0 to 4000 | | | 0 to 6000 | | | VDC |
| Nominal Input Voltage | | 12 | 24 | 24 | 12 | 24 | 24 | 12 | 24 | 24 | 12 | 24 | 24 | VDC |
| Power | Nominal Input, Max Eout | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | 4 | 20 | 30 | W |
| Current | Iout Entire Output Voltage Range | 4 | 20 | 30 | 2 | 10 | 15 | 1 | 5 | 7.5 | 0.67 | 3.3 | 5 | mA |
| Current Monitor Scaling | Full Load | 55.56 | 243.9 | 400 | 31.75 | 129.9 | 211.3 | 16.4 | 66.7 | 85.2 | 12.9 | 48.5 | 56.8 | mA/V |
| Voltage Monitor Scaling | With -Y5 option | 100:1 ±2% into 10 MΩ | | | | | | 100:1 ±2% into 10 MΩ | | | | | | - |
| Ripple | Full Load, Max Eout | 0.038 | 0.071 | 0.15 | 0.01 | 0.05 | 0.065 | 0.019 | 0.057 | 0.022 | 0.018 | 0.073 | 0.112 | %V p-p |
| Ripple with -F-M Option* | Full Load, Max Eout, 300 pF Bypass Cap | 0.001 | 0.008 | 0.002 | 0.007 | 0.0038 | 0.004 | 0.004 | 0.0088 | 0.0026 | 0.003 | 0.0012 | 0.004 | %V p-p |
| Dynamic Load Regulation | ½ to Full Load, Max Eout per 0.1 mA | < 1.0 | < 1.0 | < 1.0 | < 2.0 | < 2.0 | < 2.0 | < 4.0 | < 4.0 | < 4.0 | < 6.0 | < 6.0 | < 6.0 | V pk |
| Line Regulation | Nom. Input, Max Eout, Full Power | < 0.01 % | | | | | | < 0.01 % | | | | | | VDC |
| Static Load Regulation | No Load to Full Load, Max Eout | < 0.01% | | | | | | < 0.01% | | | | | | VDC |
| Stability | 30 Min. warmup, per 8 hr/ Per Day | < 0.01%/< 0.02% | | | | | | < 0.01%/< 0.02% | | | | | | VDC |
| **Programming & Controls** | | **All Types** | | | | | | | | | | | | |
| Input Impedance | Nominal Input | + output models 1.1 MΩ to GND, - output models 1.1 MΩ to +5 Vref | | | | | | | | | | | | MΩ |
| Adjust Resistance | Typical Potentiometer Values | 10 to 100 K (Pot. across Vref. and signal GND, 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 & 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 |

* For additional information on the reduced ripple option, see -F Option datasheet.

## ELECTRICAL SPECIFICATIONS (CONTINUED)

| Environmental | | Standard | -25PPM Option | |
|---|---|---|---|---|
| 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 | Standard Package, All Conditions | 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.14.5C-3 | 10 (standard), 20 (-C option) | | Gs |

## MECHANICAL SPECIFICATIONS




| Volumes and Weights | | | w/-C Option | |
|---|---|---|---|---|
| | cm³ | in³ | cm³ | in³ |
| Volume | 70.5 | 4.30 | 131.1 | 8.00 |
| | g | oz | g | oz |
| Weight | 142 | 5.0 | 284 | 10.0 |

20 W and 30 W versions are an additional 1.57 mm (0.062") in height.

-M equipped units are an additional 0.76 mm (0.030") for each dimension.

Contact AE for drawings of models equipped with -E or -H options.

| Construction | |
|---|---|
| Case | Epoxy-filled DAP box certified to ASTM-D-5948 with -C Option: |
| | Aluminum Alloy 5052-H32, Finish: MIL-A-8625 Type II (Anodizing) |

## INTERFACE

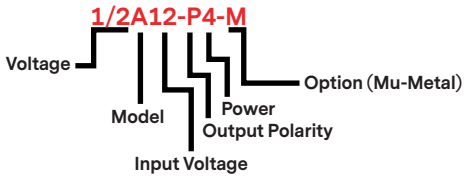
| Connections | |
|---|---|
| **Pin** | **Function** |
| 1 | Input-Power Ground Return |
| 2 | Positive Power Input |
| 3 | Iout Monitor |
| 4 | Enable/Disable |
| 5 | Signal Ground Return |
| 6 | Remote Adjust Input |
| 7 | +5 VDC Reference Output |
| 8 | HV Ground Return |
| 9 | HV Ground Return or Eout Monitor (-Y5) |
| 10 & 11 | HV Output |

All grounds joined internally. Power-supply mounting points isolated from internal grounds by > 100 kΩ, 0.01 µF/50 V (Max) on all models except -M (20 W and above), -M-E, -M-C, and -M-H configurations which are 0 Ω. Popular accessories ordered with this product include CONN-KIT and BR-1 mounting bracket kit.

## ORDERING INFORMATION

| | | |
|---|---|---|
| Type | 0 to 62 VDC Output | 1/16A |
| | 0 to 125 VDC Output | 1/8A |
| | 0 to 250 VDC Output | 1/4A |
| | 0 to 500 VDC Output | 1/2A |
| | 0 to 1000 VDC Output | 1A |
| | 0 to 2000 VDC Output | 2A |
| | 0 to 4000 VDC Output | 4A |
| | 0 to 6000 VDC Output | 6A |
| Input | 12 VDC Nominal | 12 |
| | 24 VDC Nominal | 24 |
| Polarity | Positive Output | -P |
| | Negative Output | -N |
| Power | Watts Output (12 V Only) | 4 |
| | Watts Output (24 V Only) | 20 |
| | Watts Output (24 V Only) | 30 |
| Case | Plastic Case - Diallyl Phthalate | (Standard) |
| | 'Eared' Chassis Mounting Plate | -E |
| | RF-Tight Aluminum Case | -C |
| Heat Sink | 0.400" High (Sized to Fit Case) | -H |
| Ripple Stripper® | Integral Output Filter* | -F |
| Shield | Six-Sided Mu-Metal Shield | -M |
| Voltage Monitor | Optional Eout Monitor | -Y5 |
| Iout Monitor Boost | Boosted Iout Monitor Signal Level | -Y10 |
| Temp. Coefficient | 25 PPM Temperature Coefficient | -25PPM |
| Enhanced Interface | 5 V Control and Monitors | -I5 |
| | 10 V Control and Monitors (24 Vin only) | -I10 |
| Option | Flying Lead for HV Output | -W |
| | Shielded Flying Lead for HV Output | -WS |

* For additional information on the reduced ripple option, see -F Option datasheet.



## 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.

Advanced Energy

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

uv-ca@aei.com
+1.970.221.0108

Specifications are subject to change without notice. Not responsible for errors or omissions. ©2020 Advanced Energy Industries, Inc. All rights reserved. Advanced Energy®, AE®, and UltraVolt® are U.S. trademarks of Advanced Energy Industries, Inc.

CE c US IEC-60950-1 RoHS

ENG-HV-Aseries-231-AG 12.20