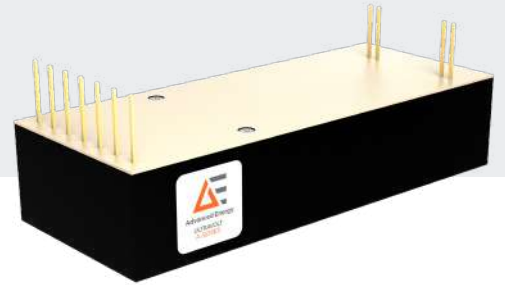


ULTRAVOLT A SERIES

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 load 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
- > 430,000 hour MTBF at 65°C (149°F)
- UL/cUL recognized component; CE Mark (LVD and RoHS)

TYPICAL APPLICATIONS

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

ULTRAVOLT A SERIES

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

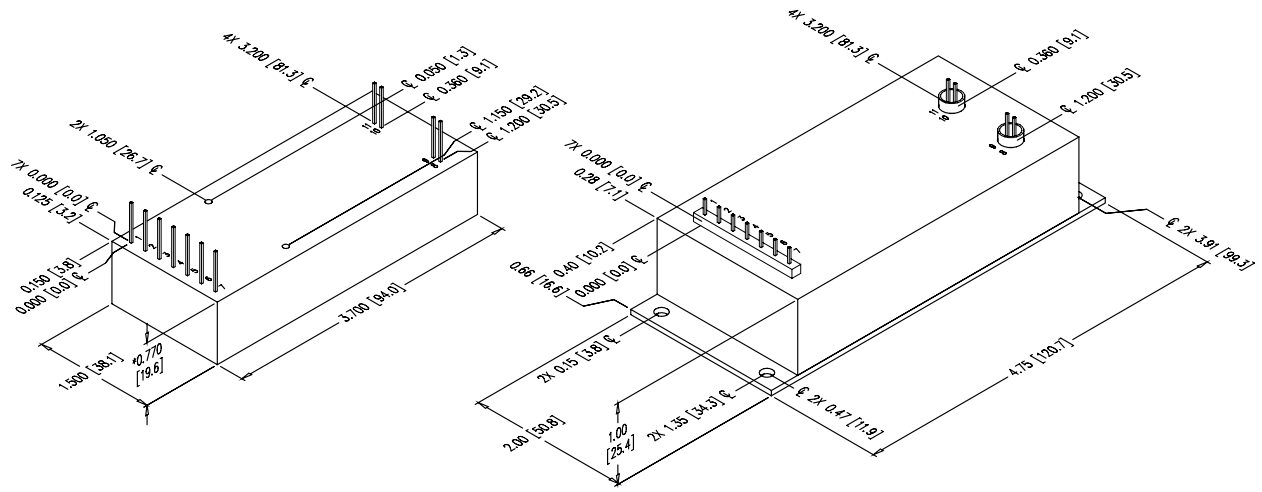
* For additional information on the reduced ripple option, see -F Option datasheet.

ULTRAVOLT A SERIES

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	
	cm ³	in ³	cm ³	in ³
Volume	70.5	4.30	131.1	8.00
	g	oz	g	oz
Weight	142	5.0	284	10.0

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)

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.

ULTRAVOLT A SERIES

INTERFACE

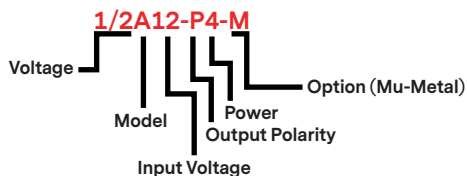
Connections	
Pin	Function
1	Input-Power Ground Return
2	Positive Power Input
3	Output Monitor
4	Enable/Disable
5	Signal Ground Return
6	Remote Adjust Input
7	+5 VDC Reference Output
8	HV Ground Return
9	HV Ground Return or Output Monitor (-Y5)
10 & 11	HV Output

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 (20 W and above), -M-E, -M-C, and -M-H configurations which are $0 \text{ }\Omega$. 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
Output Monitor Boost	Boosted Output 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.





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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

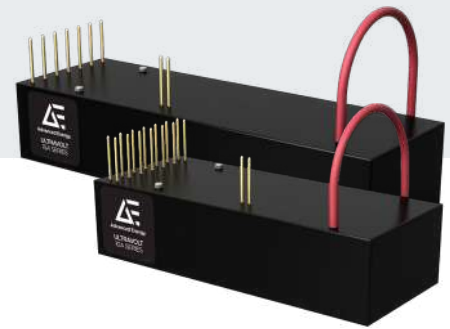
Read and understand all documentation before you install, operate, or maintain Advanced Energy high voltage power supplies. Follow all safety instructions and precautions to protect against property damage and serious or possibly fatal bodily injury. Never defeat safety interlocks or grounds.

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ULTRAVOLT 10A AND 15A SERIES

PRECISION DC TO HIGH VOLTAGE DC CONVERTERS



The UltraVolt® 10A and 15A series of regulated DC-to-DC converters provide general purpose high voltage power for a wide range of applications.

PRODUCT HIGHLIGHTS

- Regulated 0 to 10 kV or 0 to 15 kV DC high voltage output
- Single output: positive and negative polarity models
- Choice of 4, 15, or 30 W maximum output power
- 12 or 24 VDC input
- Maximum load capability down to 0 VDC
- Output ripple performance as low as 80 ppm (0.8 Vpp)
- Available temperature coefficients to 25 ppm/°C
- Ease of installation with PCB or chassis-mount options
- 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, CE mark (LVD and RoHS), IEC-60950-1

TYPICAL APPLICATIONS

- DC to high voltage DC bias supplies for general purpose uses
- High-potential testing
- PMT/APD detectors and optical spectrometers
- Electrostatics, electrophoresis, and electrospray
- Mass spectrometers

AT A GLANCE

Maximum Output Voltage

10 or 15 kV DC

Maximum Output Power

30 W

Type

Single Output

Ripple

To 80 ppm (0.8 Vpp)

Control Interface

Analog

Temperature Coefficient

To 25 ppm/°C

ULTRAVOLT 10A AND 15A SERIES

ELECTRICAL SPECIFICATIONS

Model		10A Series			15A Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative) ¹		0 to 10,000 VDC			0 to 15,000 VDC		
High Voltage Outputs		Single			Single		
Input Voltage (VDC, Nominal)		12 VDC	24 VDC		12 VDC	24 VDC	
Power Output (Watts, Nominal)		4 W	15 W	30 W	4 W	15 W	30 W
DC Input							
Vin (Input Voltage) Range	VDC (positive polarity only)	11 to 16	23 to 30		11 to 16	23 to 30	
Vin (Nominal)	VDC	12	24		12	24	
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 0.5	< 1.5	< 1.6	< 0.5	< 1.5	< 1.6
	A @ 100% HVout, 0% LOAD	< 0.2	< 0.25	< 0.25	< 0.2	< 0.25	< 0.25
	A @ disable/standby state	< 0.03			< 0.03		
DC Output							
HVout (Output Voltage)	VDC (positive polarity models = +HVout)	0 to +10,000			0 to +15,000		
	VDC (negative polarity models = -HVout)	0 to -10,000			0 to -15,000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	0.40	1.5	3.0	0.26	1.0	2.0
Pout (Output Power)	Watts (max)	4	15	30	4	15	30
Ripple ^{2,3}	ppm (standard configuration)	< 120	< 400	< 760	< 240	< 430	< 800
	ppm (with -F-M option)	< 80	< 340	< 720	< 210	< 280	< 730
	ppm (with -F-M-C option)	< 200	< 300	< 500	< 200	< 300	< 500
	Vpp (standard configuration)	< 1.2	< 4	< 7.6	< 3.6	< 6.5	< 12
	Vpp (with -F-M option)	< 0.8	< 3.4	< 7.2	< 3.2	< 4.2	< 11
	Vpp (with -F-M-C option)	< 2	< 3	< 5	< 3	< 4.5	< 7.5

¹ Standard product specifications shown unless noted. Custom configurations are available.

² Nominal ripple measured @ 100% HVout, 100% LOAD into 300 pF bypass capacitor. Valid for 10 to 100% HVout range.

³ ppm = parts per million @ 100% HVout. Vpp = VDC peak to peak @ 100% HVout.

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)
	25 ppm/°C (with -25PPM option over operating temperature range)
Power-On Rise Time	< 150 msec @ 100% LOAD, < 50 msec @ 0% LOAD
	Contact factory for other options.

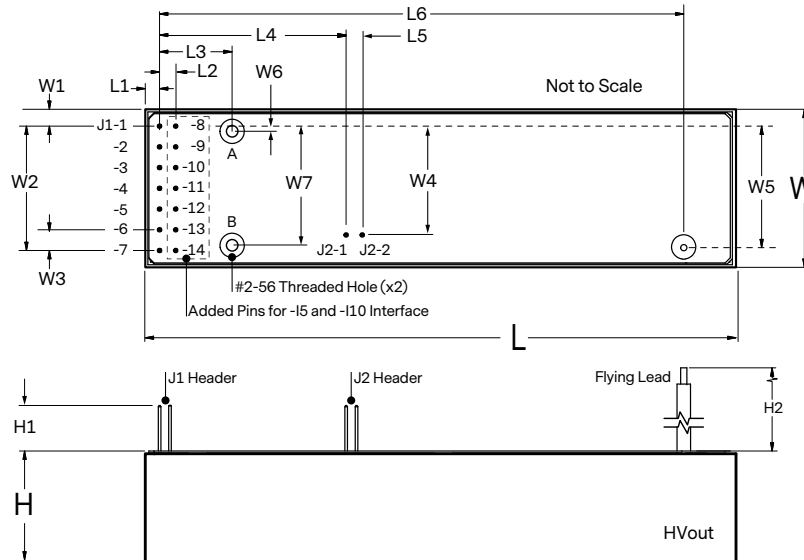
Environmental

Operating Temperature Range	-40 to 65°C (-40 to 149°F) 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)
	Sea level to high vacuum (with -P3 option)

Regulatory

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



Dimensions		10A Series		15A Series	
Key	Description ^{1, 2, 3}	mm	in	mm	in
L	Overall Length	94.6	3.73	119.4	4.70
L1	Case Exterior to J1-1	3.2	0.13	3.2	0.13
L2	Centerline, J1-1 to J1-8	2.5	0.10	2.5	0.10
L3	Centerline, J1-1 to Hole A (Hole B)	17.8	0.70	17.8	0.70
L4	Centerline, J1-1 to J2-1	45.7	1.80	45.7	1.80
L5	Centerline, J2-1 to J2-2	2.5	0.10	2.5	0.10
L6	Centerline, J1-1 to Flying Lead	77.5	3.05	102.5	4.04
W	Overall Width	38.7	1.53	38.7	1.53
W1	Case Exterior to J1-1	3.8	0.15	3.8	0.15
W2	Centerline, J1-1 to J1-7	30.5	1.20	30.5	1.20
W3	Centerline, J1-6 to J1-7	5.1	0.20	5.1	0.20
W4	Centerline, J1-1 to J2-1	26.7	1.05	26.7	1.05
W5	Centerline, J1-1 to Flying Lead	29.7	1.17	29.7	1.17
W6	Centerline, J1-1 to Hole A	1.3	0.05	1.3	0.05
W7	Centerline, Hole A to Hole B	27.9	1.10	27.9	1.10
H	Case Height (Case Exterior to PCB, max)	25.4	1.00	25.4	1.00
H1	Base of PCB to J1/J2 Header Tip	11.2	0.44	11.2	0.44
H2	Length of Standard Flying Lead	470	18.5	470	18.5

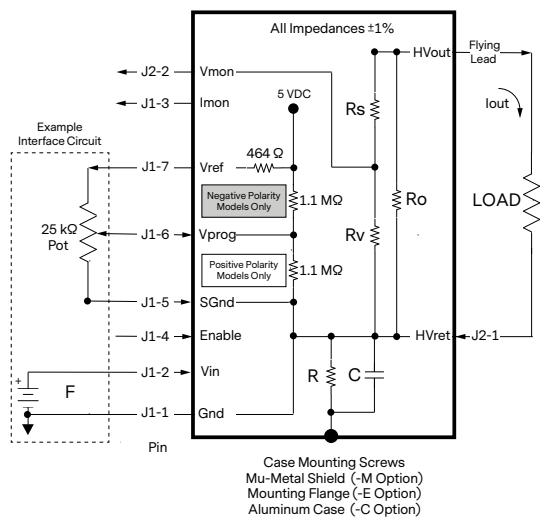
Construction	
Standard Case	Injection-molded plastic (Diallyl Phthalate, DAP, per ASTM-D-5948)
Optional Case	RF-tight aluminum (-C option) (Anodized per MIL-A-8625 Type II)
Optional Shield	Six-sided Mu-Metal (-M option)
Labels	Static-dissipative polyester
Cooling	Natural convection and conduction
Encapsulation	Silicone-based RTV (contact factory for other options)
Pins	Gold-plated bronze

- 1 Approximate nominal dimensions and weights for standard configuration shown. Contact factory for -M, -C or -E case options.
- 2 Standard case (DAP plastic) tolerances are ±1.27 mm (±0.050 in). Pin-to-pin tolerances are ±0.76 mm (±0.015 in).
- 3 Refer to outline drawings and 3D models for detailed information.

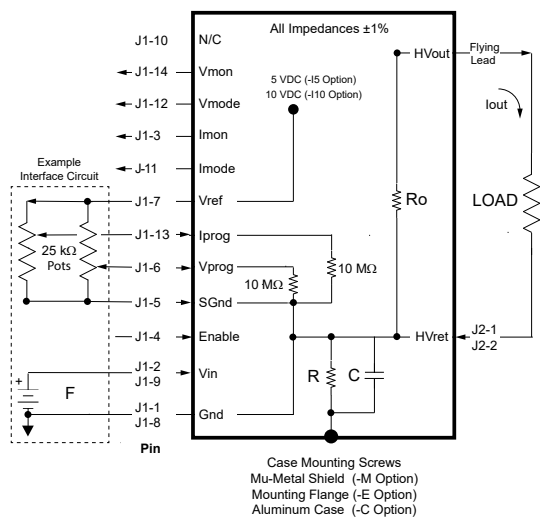
Volumes and Weights	10A Series		15A Series	
	cm ³	in ³	cm ³	in ³
Volume (Module Body Only)	93.1	5.7	117.5	7.2
	g	oz	g	oz
Weight (Standard Configuration)	183	6.5	209	7.4

INTERFACE

The 10A and 15A series' standard interface permits voltage control and monitoring of both voltage and current output using analog DC signals whose range and polarity vary by model. The 10A model also offers UltraVolt's optional -I5 or -I10 interface which provides simplified control and monitoring of both voltage and current using 0 to 5 VDC or 0 to 10 VDC full-scale analog signals.



Standard Interface			
Pin	Label	Type	Description
J1-1	Gnd	Ground	DC Input Power Ground
J1-2	Vin	Input	DC Input Power
J1-3	Imon	Output	Monitor HVout Current Level
J1-4	Enable	Input	Enable HVout ¹
J1-5	SGnd	Ground	Signal Ground
J1-6	Vprog	Input	Set HVout Voltage Level
J1-7	Vref	Output	Control Signal Reference ²
J2-1	HVret	Ground	High Voltage Return ⁹
J2-2	Vmon	Output	Monitor HVout Voltage Level
Flying Lead	HVout	Output	High Voltage Output



-I5 and -I10 Interface (Optional)			
Pin	Label	Type	Description
J1-1	Gnd	Ground	DC Input Power Ground
J1-2	Vin	Input	DC Input Power
J1-3	Imon	Output	Monitor HVout Current Level ^{3, 8}
J1-4	Enable	Input	Enable HVout ⁴
J1-5	SGnd	Ground	Signal Ground
J1-6	Vprog	Input	Set HVout Voltage Level
J1-7	Vref	Output	Control Reference Signal ^{5, 6}
J1-8	Gnd	Ground	DC Input Power Ground
J1-9	Vin	Input	DC Input Power
J1-10	N/C		No Connection
J1-11	Imode	Output	Current Mode Indicator ⁷
J1-12	Vmode	Output	Voltage Mode Indicator ⁷
J1-13	Iprog	Input	Set HVout Current Level
J1-14	Vmon	Output	Monitor HVout Voltage Level ^{3, 8}
J2-1	HVret	Ground	High Voltage Return ⁹
J2-2	HVret	Ground	High Voltage Return ⁹
Flying Lead	HVout	Output	High Voltage Output

¹ Signal inputs: LOW < 0.5 VDC, HIGH > 2.4 VDC (Default or N/C = ENABLED = HIGH)
² 5 VDC ±2% through 464 Ω impedance load
³ Can source an output impedance load > 10 kΩ
⁴ Signal input: LOW < 0.5 VDC, HIGH > 2.4 VDC (Default or N/C = DISABLED = LOW)
⁵ -I5 interface: 5 VDC ±0.1% @ 5 mA (nominal at case temperature = 25°C, 77°F)
⁶ -I10 interface: 10 VDC ±0.1% @ 5 mA (nominal at case temperature = 25°C, 77°F)

⁷ LOW = Mode ENABLED (open drain) will sink up to 30 mA.
⁸ Voltage/current monitors will source/sink to 2 mA.
⁹ For proper operation and safety, always route HVret signal through HVret connection.

INTERFACE CONTROL PARAMETERS

MODEL	10A Series			15A Series		
High Voltage Output Range	0 to 10,000 VDC			0 to 15,000 VDC		
Input Voltage (VDC, Nominal)	12 VDC	24 VDC		12 VDC	24 VDC	
Power Output (Watts, Nominal)	4 W	15 W	30 W	4 W	15 W	30 W
Standard Interface (Monitor/Control Voltage, Monitor Current)						
Scale Factors ^{1, 2, 3}	SVm (V/V) where HVout Monitor = SVm x Vmon			1000		
Positive Polarity Models	SVp (V/V) where HVout Control = SVp x Vprog			2155		
Negative Polarity Models	SVp (V/V) where HVout Control = SVp x (5 - Vprog)			-2155		
	Slm (mA/V) where Iout Monitor = Slm x Imon			0.167	0.184	0.381
	Slp (mA/V) where Iout Control = Slp x Iprog			N/A		
Impedances ⁴	Ro (HVout impedance, ±1%)			500 MΩ		
	Rs (Vmon upper tap impedance, ±1%)			500 MΩ		
	Rv (Vmon lower tap impedance, ±1%)			523 kΩ		
-I5 Interface (0 to 5 VDC, Monitor/Control Both Voltage and Current)						
Scale Factors ^{5, 6, 8, 9}	SVm (V/V) where HVout Monitor = SVm x Vmon			2000		
	SVp (V/V) where HVout Control = SVp x Vprog			2000		
	Slm (mA/V) where Iout Monitor = Slm x Imon			0.08	0.30	0.60
	Slp (mA/V) where Iout Control = Slp x Iprog			0.08	0.30	0.60
Impedances ⁴	Ro (HVout impedance, ±1%)			375 MΩ		
-I10 Interface (0 to 10 VDC, Monitor/Control Both Voltage and Current)						
Scale Factors ^{5, 7, 8, 9}	SVm (V/V) where HVout Monitor = SVm x Vmon			2000		
	SVp (V/V) where HVout Control = SVp x Vprog			2000		
	Slm (mA/V) where Iout Monitor = Slm x Imon			0.04	0.15	0.3
	Slp (mA/V) where Iout Control = Slp x Iprog			0.04	0.15	0.3
Impedances ⁴	Ro (HVout impedance, ±1%)			375 MΩ		
Other Interface Values						
Impedances ⁴	R (standard case via mounting screws, ±1%)			232 kΩ		232 kΩ
	R (standard case with -I5 /-I10 option, ±1%)			100 kΩ		N/A
	R (with -M option, ±1%)			232 kΩ	0 Ω	232 kΩ 0 Ω
	R (with -E option, ±1%)			232 kΩ		232 kΩ
	R (with -C option, ±1%)			232 kΩ		232 kΩ
	R (with -M-E option, ±1%)			0 Ω		0 Ω
	R (with -M-C option, ±1%)			0 Ω		0 Ω
Capacitance ⁴	C (@ 50 VDC ±10%, 1/8 W, max)			0.01 μF	0 μF	0.01 μF 0 μF
Input Voltage Protection	F (fuse or other protection recommended)			See note 10		See note 10

1 For positive polarity models, Vprog varies from 0 to 4.64 VDC. For negative polarity models, Vprog varies inversely from 5 to 0.36 VDC.
 2 Slm factor is ±2% @ 100% LOAD, 100% HVout. Valid for 10 to 100% Iout range.
 3 SVm factor is ±2% assuming a 10 MΩ measurement impedance. Valid from 10 to 100% HVout.
 4 See interface schematics for definition.
 5 For details on -I5/-I10 interfacing, see technical note TN-I5-I10-1.
 6 For the -I5 interface, Imon, Iprog, Vmon, and Vprog input/output signals vary from 0 to 5 VDC (full-scale).

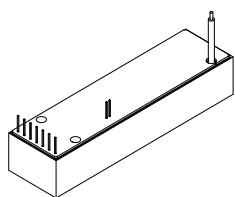
7 For the -I10 interface, Imon, Iprog, Vmon, and Vprog input/output signals vary from 0 to 10 VDC (full-scale).
 8 SVm factor is ±1% for both -I5 and -I10 Interfaces. SVp factor is also ±1% and is valid from 10 to 100% HVout.
 9 Slm factor is ±1% for both -I5 and -I10 Interfaces. Slp factor is also ±1% and is valid from 10 to 100% Iout.
 10 For details on fuse selection, see technical note TN-23.

ULTRAVOLT 10A AND 15A SERIES

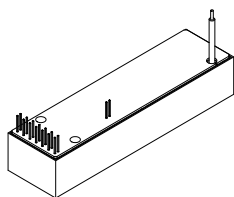
STANDARD OPTIONS

Both the 10A and 15A series can be configured with standard options that can adapt its performance and packaging for many application requirements. Customized models to meet specialized performance, packaging, or environmental needs are also available.

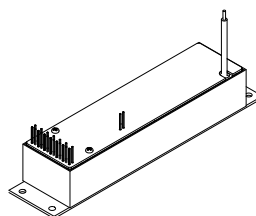
Featured Options	
-I5	Upgrades interface to provide more precise control and monitoring of both HVout and Iout using 0 to 5 VDC (full-scale) analog signals. Also adds Iout control and voltage/current mode indication capability not available on the standard interface. Cannot be ordered with the -I10 option. Available only on 10A series models.
-I10	Upgrades interface to provide more precise control and monitoring of both HVout and Iout using 0 to 10 VDC (full-scale) analog signals. Also adds Iout control and voltage/current mode indication capability not available on the standard interface. Cannot be ordered with the -I5 option. Available only on 10A series models with 24 VDC input.
-F	Reduces high voltage ripple when used together with the Mu-Metal shield and a user-supplied external capacitive load. Available only with the the Mu-Metal shield (-M option).
-M	Adds a Mu-Metal shield to reduce the effects of external RF noise sources. Installed on six sides, this shield option is available on both standard plastic (DAP) and optional aluminum (-C option) cases.
-E	Eared mounting flange that permits the standard plastic (DAP) case to be chassis-mounted.
-C	Aluminum alloy case with integrated mounting flange that provides both added RF and environmental protection.
-AP	Adds non-conductive braiding to the standard HVout flying lead for increased durability. Terminating connector is user-supplied. Not available with the -WS option.
-WS	Replaces the standard HVout flying lead with a 470 mm long shielded coaxial cable for added RF protection. Terminating connector is user-supplied. Not available with the -AP option.
-25PPM	Upgrades module temperature coefficient rating from 50 ppm/°C to 25 ppm/°C for enhanced high voltage output stability over standard operating temperature ranges.
-H	Heatsink option



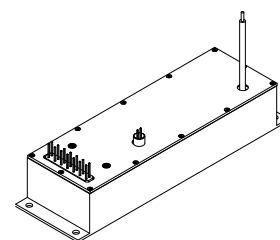
Standard Interface



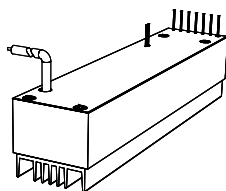
-I5 and -I10 Interface



-E Option (Eared Mounting Plate)



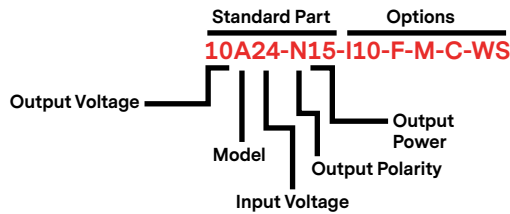
-C Option (Aluminum Case)



-H Heatsink

ORDERING INFORMATION

Standard Part		STANDARD CONFIGURATION										OPTIONS							Other Options	
		Electrical Performance					Standard Features					Interfaces		Ripple		Mechanical				Temp
		Number of High Voltage Outputs	High Voltage Output Range (HVout VDC, Adjustable)	Input Voltage (Vin, VDC)	High Voltage Output Polarity	High Voltage Output Power (Pout, Watts)	Standard Interface	Plastic Case (DAP)	Standard HVout Lead (No Connector, 470 mm)	50 ppm/°C Temperature Coefficient	Select One	Select One	Select One	Select One	Select One	Select One	Temp			
10A	10A12-P4	1	0 to +10,000	12	Pos	4	Included			-15		-F	-M	-E	-C	-H	-AP	-WS	-25PPM	Contact factory for other available options
	10A12-N4	1	0 to -10,000	12	Neg	4	Included			-15		-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	10A24-J15	1	0 to +10,000	24	Pos	15	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	10A24-N15	1	0 to -10,000	24	Neg	15	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	10A24-P30	1	0 to +10,000	24	Pos	30	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	10A24-N30	1	0 to -10,000	24	Neg	30	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
15A	15A12-P4	1	0 to +15,000	12	Pos	4	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	15A12-N4	1	0 to -15,000	12	Neg	4	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	15A24-J15	1	0 to +15,000	24	Pos	15	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	15A24-N15	1	0 to -15,000	24	Neg	15	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	15A24-P30	1	0 to +15,000	24	Pos	30	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	
	15A24-N30	1	0 to -15,000	24	Neg	30	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM	





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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

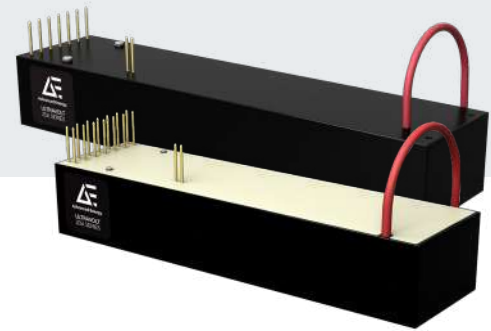
Read and understand all documentation before you install, operate, or maintain Advanced Energy high voltage power supplies. Follow all safety instructions and precautions to protect against property damage and serious or possibly fatal bodily injury. Never defeat safety interlocks or grounds.

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ULTRAVOLT 20A AND 25A SERIES

PRECISION HIGH VOLTAGE DC CONVERTERS



The UltraVolt® 20A and 25A series of regulated DC-to-DC converters provide general-purpose high voltage power for a wide range of applications.

PRODUCT HIGHLIGHTS

- Regulated 0 to 20 kV or 0 to 25 kV DC high voltage output
- Single output: positive and negative polarity models
- Choice of 4, 15, or 30 W maximum output power
- 12 or 24 VDC input
- Maximum lout capability down to 0 VDC
- Output ripple performance as low as 100 ppm (2.5 Vpp)
- Available temperature coefficients to 25 ppm/°C
- Ease of installation with PCB or chassis-mount options
- 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, CE mark (LVD and RoHS), IEC-60950-1

TYPICAL APPLICATIONS

- DC to high voltage DC bias supplies for general-purpose uses
- High-potential testing
- PMT/APD detectors and optical spectrometers
- Electrostatics, electrophoresis, and electrospray
- Mass spectrometers

AT A GLANCE

Maximum Output Voltage

20 or 25 kV DC

Maximum Output Power

30 W

Type

Single Output

Ripple

To 100 ppm (2.5 Vpp)

Control Interface

Analog

Temperature Coefficient

To 25 ppm/°C

ULTRAVOLT 20A AND 25A SERIES

ELECTRICAL SPECIFICATIONS

Model		20A Series			25A Series		
High Voltage Output Range (Adjustable Regulated, Positive or Negative) ¹		0 to 20,000 VDC			0 to 25,000 VDC		
High Voltage Outputs		Single			Single		
Input Voltage (VDC, Nominal)		12 VDC	24 VDC		12 VDC	24 VDC	
Power Output (Watts, Nominal)		4 W	15 W	30 W	4 W	15 W	30 W
DC Input							
Vin (Input Voltage) Range	VDC (positive polarity only)	11 to 16	23 to 30		11 to 16	23 to 30	
Vin (Nominal)	VDC	12	24		12	24	
Iin (Input Current, Nominal)	A @ 100% HVout, 100% LOAD	< 0.8	< 1.5	< 2.0	< 0.8	< 1.5	< 2.0
	A @ 100% HVout, 0% LOAD	< 0.25	< 0.21	< 0.21	< 0.25	< 0.20	< 0.20
	A @ disable/standby state	< 0.03			< 0.03		
DC Output							
HVout (Output Voltage)	VDC (positive polarity models = +HVout)	0 to +20,000			0 to +25,000		
	VDC (negative polarity models = -HVout)	0 to -20,000			0 to -25,000		
Iout (Output Current)	mA (max) @ 0 to 100% HVout, Vin (nominal)	0.20	0.75	1.5	0.16	0.6	1.2
Pout (Output Power)	Watts (max)	4	15	30	4	15	30
Ripple ^{2,3}	ppm (standard configuration)	< 600	< 700	< 800	< 200	< 800	< 510
	ppm (with -F-M option)	< 200	< 300	< 500	< 100	< 400	< 400
	ppm (with -F-M-C option)	< 200	< 300	< 500	< 200	< 300	< 500
	Vpp (standard configuration)	< 12	< 14	< 16	< 5	< 20	< 13
	Vpp (with -F-M option)	< 4	< 6	< 10	< 2.5	< 10	< 10
	Vpp (with -F-M-C option)	< 4	< 6	< 10	< 5	< 7.5	< 13

¹ Standard product specifications shown unless noted. Custom configurations are available.

² Nominal ripple measured @ 100% HVout, 100% LOAD into 300 pf bypass capacitor. Valid for 10 to 100% HVout range. For 20A models only, no bypass capacitor was used.

³ ppm = parts per million @ 100% HVout. Vpp = VDC peak to peak @ 100% HVout.

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)
	25 ppm/°C (with -25PPM option over operating temperature range)
Power-On Rise Time	< 150 msec @ 100% LOAD, < 50 msec @ 0% LOAD
	Contact factory for other options.

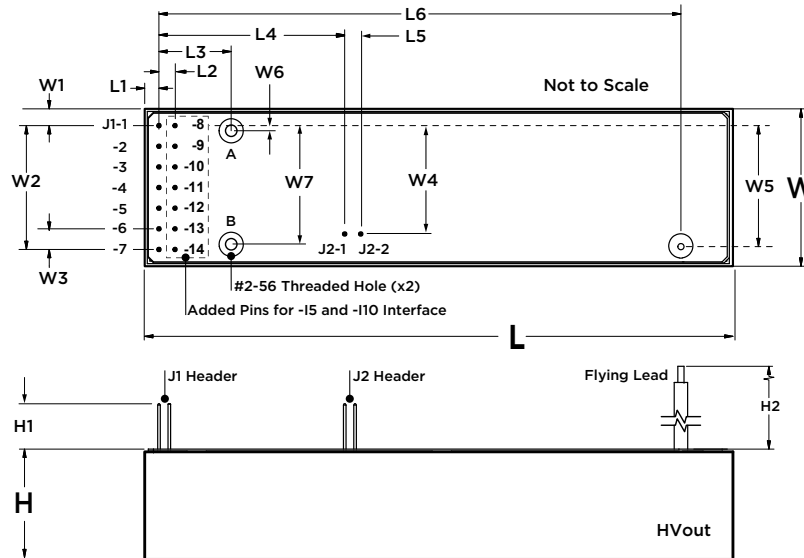
Environmental

Operating Temperature Range	-40 to 65°C (-40 to 149°F) 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)
	Sea level to high vacuum (with -P3 option)

Regulatory

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



Dimensions		20A Series		25A Series	
Key	Description ^{1, 2, 3}	mm	in	mm	in
L	Overall Length	144.8	5.70	176.8	6.96
L1	Case Exterior to J1-1	3.5	0.14	3.2	0.13
L2	Centerline, J1-1 to J1-8	2.5	0.10	2.5	0.10
L3	Centerline, J1-1 to Hole A (Hole B)	17.8	0.70	17.8	0.70
L4	Centerline, J1-1 to J2-1	45.7	1.80	45.7	1.80
L5	Centerline, J2-1 to J2-2	2.5	0.10	2.5	0.10
L6	Centerline, J1-1 to Flying Lead	128.5	5.06	154.3	6.08
W	Overall Width	38.7	1.53	40.6	1.60
W1	Case Exterior to J1-1	4.1	0.16	5.1	0.20
W2	Centerline, J1-1 to J1-7	30.5	1.20	30.5	1.20
W3	Centerline, J1-6 to J1-7	5.1	0.20	5.1	0.20
W4	Centerline, J1-1 to J2-1	26.7	1.05	26.7	1.05
W5	Centerline, J1-1 to Flying Lead	29.7	1.17	29.7	1.17
W6	Centerline, J1-1 to Hole A	1.3	0.05	1.3	0.05
W7	Centerline, Hole A to Hole B	27.9	1.10	27.9	1.10
H	Case Height (Case Exterior to PCB, max)	27.4	1.08	29.3	1.16
H1	Base of PCB to J1/J2 Header Tip	11.2	0.44	11.2	0.44
H2	Length of Standard Flying Lead	470	18.5	470	18.5

Construction	
Standard Case	Injection-molded plastic (Diallyl Phthalate, DAP, per ASTM-D-5948)
Optional Case	RF-tight aluminum (-C option) (Anodized per MIL-A-8625 Type II)
Optional Shield	Six-sided Mu-Metal (-M option)
Labels	Static-dissipative polyester
Cooling	Natural convection and conduction
Encapsulation	Silicone-based RTV (contact factory for other options)
Pins	Gold-plated bronze

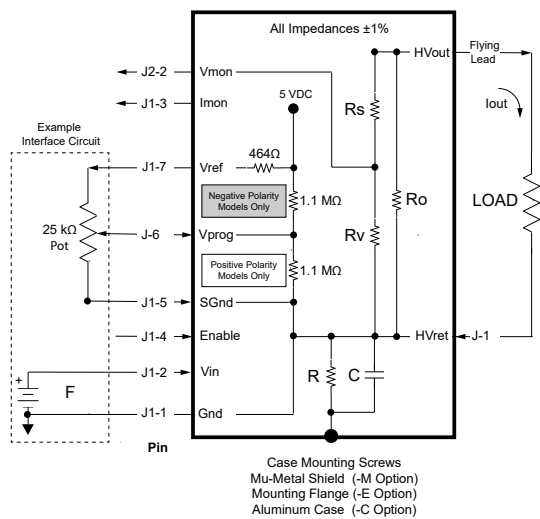
- 1 Approximate nominal dimensions and weights for standard configuration shown. Contact factory for -M, -C or -E case options.
- 2 Standard case (DAP plastic) tolerances are ±1.27 mm (±0.050 in). Pin-to-pin tolerances are ±0.76 mm (±0.015 in).
- 3 Refer to outline drawings and 3D models for detailed information.

Volumes and Weights		20A Series		25A Series	
		cm ³	in ³	cm ³	in ³
Volume (Module Body Only)		153.8	9.4	214.1	13.1
		g	oz	g	oz
Weight (Standard Configuration)		289	10.2	438	15.4

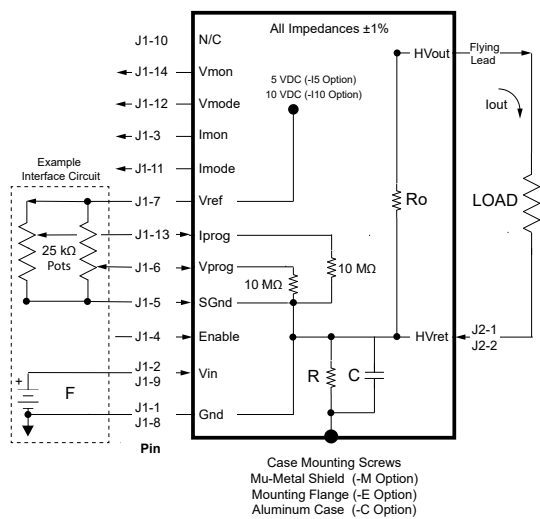
ULTRAVOLT 20A AND 25A SERIES

INTERFACE

The 20A and 25A series' standard interface permits voltage control and monitoring of both voltage and current output using analog DC signals whose range and polarity vary by model. The 20A model also offers UltraVolt's optional -I5 or -I10 interface which provides simplified control and monitoring of both voltage and current using 0 to 5 VDC or 0 to 10 VDC full-scale analog signals.



Standard Interface			
Pin	Label	Type	Description
J1-1	Gnd	Ground	DC Input Power Ground
J1-2	Vin	Input	DC Input Power
J1-3	Imon	Output	Monitor HVout Current Level
J1-4	Enable	Input	Enable HVout ¹
J1-5	SGnd	Ground	Signal Ground
J1-6	Vprog	Input	Set HVout Voltage Level
J1-7	Vref	Output	Control Signal Reference ²
J2-1	HVret	Ground	High Voltage Return ⁹
J2-2	Vmon	Output	Monitor HVout Voltage Level
Flying Lead	HVout	Output	High Voltage Output



-I5 and -I10 Interface (Optional)			
Pin	Label	Type	Description
J1-1	Gnd	Ground	DC Input Power Ground
J1-2	Vin	Input	DC Input Power
J1-3	Imon	Output	Monitor HVout Current Level ^{3, 8}
J1-4	Enable	Input	Enable HVout ⁴
J1-5	SGnd	Ground	Signal Ground
J1-6	Vprog	Input	Set HVout Voltage Level
J1-7	Vref	Output	Control Reference Signal ^{5, 6}
J1-8	Gnd	Ground	DC Input Power Ground
J1-9	Vin	Input	DC Input Power
J1-10	N/C		No Connection
J1-11	Imode	Output	Current Mode Indicator ⁷
J1-12	Vmode	Output	Voltage Mode Indicator ⁷
J1-13	Iprog	Input	Set HVout Current Level
J1-14	Vmon	Output	Monitor HVout Voltage Level ^{3, 8}
J2-1	HVret	Ground	High Voltage Return ⁹
J2-2	HVret	Ground	High Voltage Return ⁹
Flying Lead	HVout	Output	High Voltage Output

¹ Signal inputs: LOW < 0.5 VDC, HIGH > 2.4 VDC (Default or N/C = ENABLED = HIGH)
² 5 VDC ±2% through 464 Ω impedance load.
³ Can source an output impedance load > 10 kΩ.
⁴ Signal input: LOW < 0.5 VDC, HIGH > 2.4 VDC (Default or N/C = DISABLED = LOW)
⁵ -I5 interface: 5 VDC ±0.1% @ 5 mA (nominal at case temperature = 25°C, 77°F)
⁶ -I10 interface: 10 VDC ±0.1% @ 5 mA (nominal at case temperature = 25°C, 77°F)

⁷ LOW = Mode ENABLED (open drain) will sink up to 30 mA.
⁸ Voltage/current monitors will source/sink to 2 mA.
⁹ For proper operation and safety, always route HVret signal through HVret connection.

INTERFACE CONTROL PARAMETERS

MODEL		20A Series			25A Series		
High Voltage Output Range		0 to 20,000 VDC			0 to 25,000 VDC		
Input Voltage (VDC, Nominal)		12 VDC	24 VDC		12 VDC	24 VDC	
Power Output (Watts, Nominal)		4 W	15 W	30 W	4 W	15 W	30 W
Standard Interface (Monitor/Control Voltage, Monitor Current)							
Scale Factors ^{1, 2, 3}	SVm (V/V) where HVout Monitor = SVm x Vmon	1000			1000		
Positive Polarity Models	SVp (V/V) where HVout Control = SVp x Vprog	4310			5388		
Negative Polarity Models	SVp (V/V) where HVout Control = SVp x (5 - Vprog)	-4310			-5388		
	Slm (mA/V) where Iout Monitor = Slm x Imon	0.116	0.162	0.172	0.145	0.175	0.183
	Slp (mA/V) where Iout Control = Slp x Iprog	N/A			N/A		
Impedances ⁴	Ro (HVout impedance, ±1%)	600 MΩ			1250 MΩ		
	Rs (Vmon upper tap impedance, ±1%)	750 MΩ			1250 MΩ		
	Rv (Vmon lower tap impedance, ±1%)	806 kΩ			1.43 MΩ		
-I5 Interface (0 to 5 VDC, Monitor/Control Both Voltage and Current)							
Scale Factors ^{5, 6, 8, 9}	SVm (V/V) where HVout Monitor = SVm x Vmon	4000			N/A		
	SVp (V/V) where HVout Control = SVp x Vprog	4000			N/A		
	Slm (mA/V) where Iout Monitor = Slm x Imon	0.04	0.15	0.30	N/A		
	Slp (mA/V) where Iout Control = Slp x Iprog	0.04	0.15	0.30	N/A		
Impedances ⁴	Ro (HVout impedance, ±1%)	600 MΩ			N/A		
-I10 Interface (0 to 10 VDC, Monitor/Control Both Voltage and Current)							
Scale Factors ^{5, 7, 8, 9}	SVm (V/V) where HVout Monitor = SVm x Vmon	N/A	2000		N/A		
	SVp (V/V) where HVout Control = SVp x Vprog	N/A	2000		N/A		
	Slm (mA/V) where Iout Monitor = Slm x Imon	N/A	0.08	0.15	N/A		
	Slp (mA/V) where Iout Control = Slp x Iprog	N/A	0.08	0.15	N/A		
Impedances ⁴	Ro (HVout impedance, ±1%)	N/A	600 MΩ		N/A		
Other Interface Values							
Impedances ⁴	R (standard case via mounting screws, ±1%)	232 kΩ			232 kΩ		
	R (standard case with -I5 /-I10 option, ±1%)	232 kΩ			N/A		
	R (with -M option, ±1%)	232 kΩ	0 Ω		232 kΩ	0 Ω	
	R (with -E option, ±1%)	232 kΩ			232 kΩ		
	R (with -C option, ±1%)	232 kΩ			232 kΩ		
	R (with -M-E option, ±1%)	0 Ω			0 Ω		
	R (with -M-C option, ±1%)	0 Ω			0 Ω		
Capacitance ⁴	C (@ 50 VDC ±10%, 1/8 W, max)	0.01 μF	0 μF		0.01 μF	0 μF	
Input Voltage Protection	F (fuse or other protection recommended)	See note 10			See note 10		

1 For positive polarity models, Vprog varies from 0 to 4.64 VDC. For negative polarity models, Vprog varies inversely from 5 to 0.36 VDC.
 2 Slm factor is ±2% @ 100% LOAD, 100% HVout.
 3 SVm factor is ±2% assuming a 10 MΩ measurement impedance. Valid from 10 to 100% HVout.
 4 See interface schematics for definition.
 5 For details on -I5/-I10 interfacing, see technical note TN-I5-I10-1.
 6 For the -I5 interface, Imon, Iprog, Vmon, and Vprog input/output signals vary from 0 to 5 VDC (full-scale).

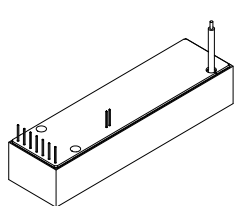
7 For the -I10 interface, Imon, Iprog, Vmon, and Vprog input/output signals vary from 0 to 10 VDC (full-scale).
 8 SVm factor is ±1% for both -I5 and -I10 Interfaces. SVp factor is also ±1% and is only valid from 10 to 100% HVout.
 9 Slm factor is ±1% for both -I5 and -I10 Interfaces. Slp factor is also ±1% and is only valid from 10 to 100% Iout.
 10 For details on fuse selection, see technical note TN-23.

ULTRAVOLT 20A AND 25A SERIES

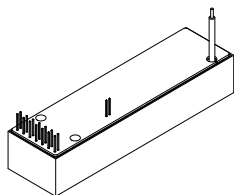
STANDARD OPTIONS

Both the 20A and 25A series can be configured with standard options that can adapt its performance and packaging for many application requirements. Customized models to meet specialized performance, packaging, or environmental needs are also available.

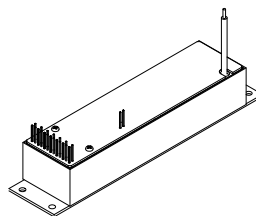
Featured Options	
-I5	Upgrades interface to provide more precise control and monitoring of both HVout and Iout using 0 to 5 VDC (full-scale) analog signals. Also adds Iout control and voltage/current mode indication capability not available on the standard interface. Cannot be ordered with the -I10 option. Available only on 20A series models.
-I10	Upgrades interface to provide more precise control and monitoring of both HVout and Iout using 0 to 10 VDC (full-scale) analog signals. Also adds Iout control and voltage/current mode indication capability not available on the standard interface. Cannot be ordered with the -I5 option. Available only on 20A series models with 24 VDC input.
-F	Reduces high voltage ripple when used together with the Mu-Metal shield and a user-supplied external capacitive load. Available only with the Mu-Metal shield (-M option).
-M	Adds a Mu-Metal shield to reduce the effects of external RF noise sources. Installed on six sides, this shield option is available on both standard plastic (DAP) and optional aluminum (-C option) cases.
-E	Eared mounting flange that permits the standard plastic (DAP) case to be chassis-mounted.
-C	Aluminum alloy case with integrated mounting flange that provides both added RF and environmental protection.
-AP	Replaces the standard HVout flying lead with a 470 mm (18.50 in) long non-conductive braid cable for added durability. Terminating connector user supplied. Not available with the -WS option.
-WS	Replaces the standard HVout flying lead with a 470 mm (18.50 in) long shielded coaxial cable for added RF protection. Terminating connector is user supplied. Not available with the -AP option.
-25PPM	Upgrades module temperature coefficient rating from 50 ppm/°C to 25 ppm/°C for enhanced high voltage output stability over standard operating temperature ranges.
-H	Heatsink option



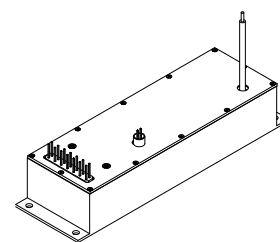
Standard Interface



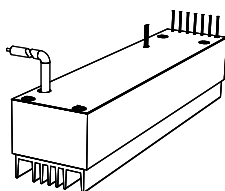
-I5 and -I10 Interface



-E Option (Eared Mounting Plate)



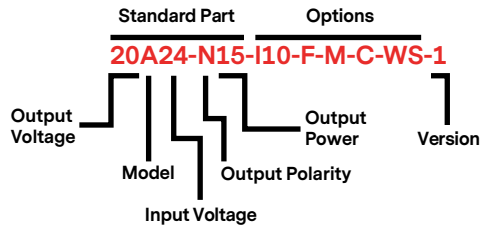
-C Option (Aluminum Case)



-H Heatsink

ORDERING INFORMATION

		STANDARD CONFIGURATION										OPTIONS										
		Electrical Performance				Standard Features		Interfaces		Ripple			Mechanical				Temp					
Standard Part		Number of High Voltage Outputs	High Voltage Output Range (HVout VDC, Adjustable)	Input Voltage (Vin, VDC)	High Voltage Output Polarity	High Voltage Output Power (Pout, Watts)	Standard Interface	Plastic Case (DAP)	Standard HVout Lead (No Connector, 470 mm)	50 ppm/°C Temperature Coefficient	-15 Interface (0 to 5 VDC Monitors/Controls)	-110 Interface (0 to 10 VDC Monitors/Controls)	Reduced Ripple Capability (-M Option Required)	Mu-Metal Shield (6 Sides)	Eared Mounting Flange (Standard Case Only)	Aluminum Case (RF Tight)	Heatsink	Non-Conductive Braid HVout Lead (No Connector, 470 mm)	Shielded Coaxial HVout Lead (No Connector, 470 mm)	25 ppm/°C Temperature Coefficient	Other Options	Version Code (if Required)
20A	20A12-P4	1	0 to +20,000	12	Pos	4	Included			-15		-F	-M	-E	-C	-H	-AP	-WS	-25PPM	Contact factory for other available options	-1	
	20A12-N4	1	0 to -20,000	12	Neg	4	Included			-15		-F	-M	-E	-C	-H	-AP	-WS	-25PPM		-1	
	20A24-J15	1	0 to +20,000	24	Pos	15	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM		-1	
	20A24-N15	1	0 to -20,000	24	Neg	15	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM		-1	
	20A24-P30	1	0 to +20,000	24	Pos	30	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM		-1	
	20A24-N30	1	0 to -20,000	24	Neg	30	Included			-15	-110	-F	-M	-E	-C	-H	-AP	-WS	-25PPM		-1	
25A	25A12-P4	1	0 to +25,000	12	Pos	4	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			
	25A12-N4	1	0 to -25,000	12	Neg	4	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			
	25A24-J15	1	0 to +25,000	24	Pos	15	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			
	25A24-N15	1	0 to -25,000	24	Neg	15	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			
	25A24-P30	1	0 to +25,000	24	Pos	30	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			
	25A24-N30	1	0 to -25,000	24	Neg	30	Included					-F	-M	-E	-C	-H	-AP	-WS	-25PPM			





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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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ULTRAVOLT 30A – 40A SERIES

30 KV TO 40 KV HIGH VOLTAGE BIASING SUPPLIES



The 30A – 40A series of regulated, high voltage DC-DC converters are an extension of the A Series, directly addressing the needs of the miniature PCB or chassis-mount ≥ 30 kV application. Designed and built utilizing state-of-the-art power conversion topology, these units feature surface-mount technology and encapsulation techniques providing high reliability and low cost.

PRODUCT HIGHLIGHTS

- 0 to 30 kV, 35 kV or 40 kV output
- 4, 15 or 30 watts of output power
- Maximum load capability down to 0 Volts
- Wide input voltage range
- Indefinite output short-circuit protection
- Output current and voltage monitors
- Fixed-frequency, low-stored-energy design
- >400,000 hour MTBF @ 65°C (149°F)
- UL/cUL Recognized Component; CE Mark (LVD and RoHS)

TYPICAL APPLICATIONS

- Electrostatic discharge testers
- Plasma, electrostatic, x-ray, and wire testers

ULTRAVOLT 30A - 40A SERIES

ELECTRICAL SPECIFICATIONS

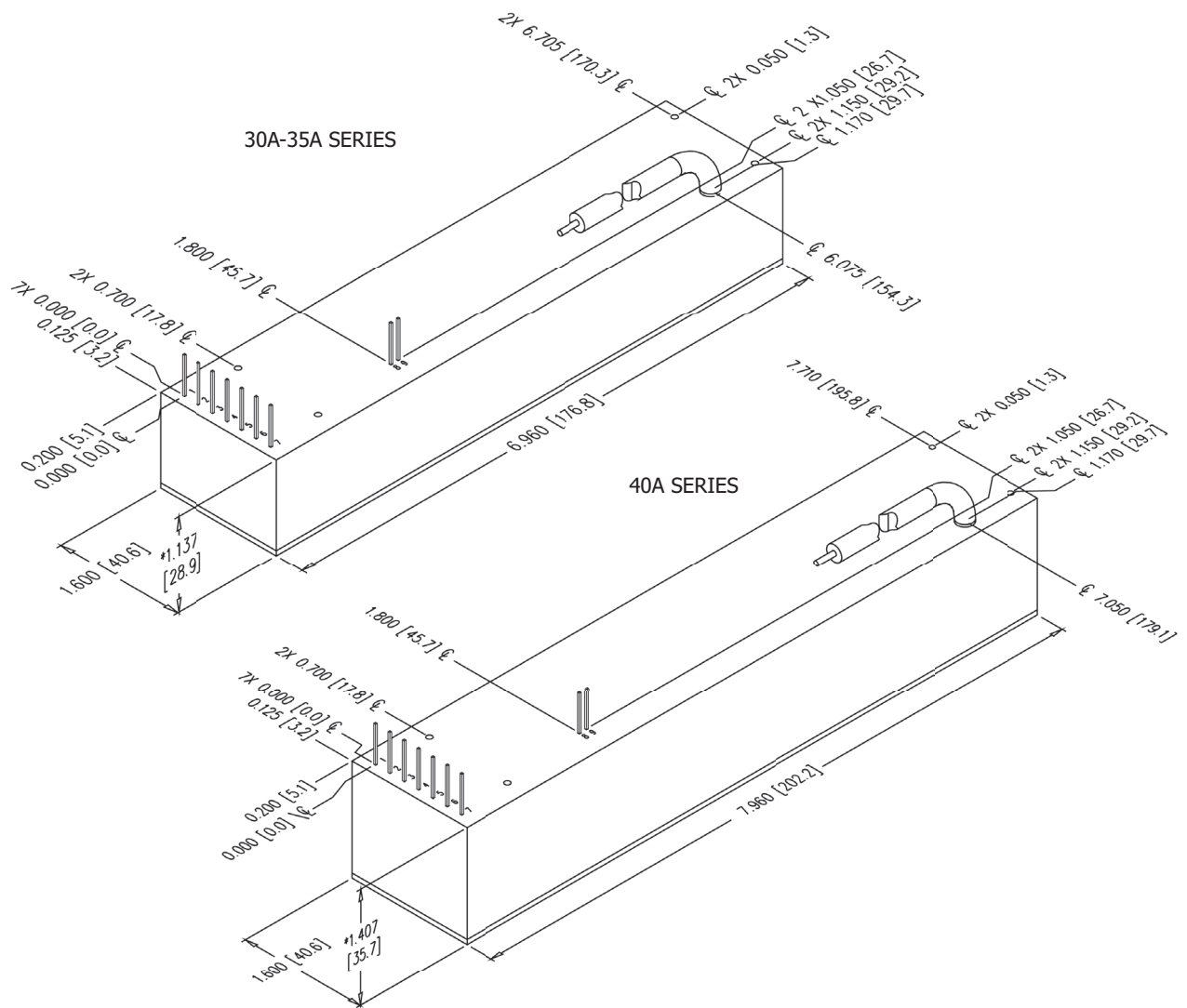
Parameter	Conditions	Models									Units
Input		12 V			24 V						
Voltage Range	Full Power	+11 to 16			+23 to 30						VDC
Voltage Range	Derated Power Range	+9 to 32			+9 to 32						VDC
Current	Standby / Disable	<30			<30						mA
Current	No Load, Max Eout	30A < 0.25, 35A < 0.35, 40A < 0.38			30A < 0.30, 35A < 0.20, 40A < 0.38						A
Current	Max Load, Max Eout	~800			~1800						mA
AC Ripple Current	Nominal Input, Full Load	<80			<80						mA p-p
Output		30A			35A			40A			
Voltage Range	Nominal Input	0 to 30,000			0 to 35,000			0 to 40,000			VDC
Nominal Input Voltage / Model		12	24	24	12	24	24	12	24	24	VDC
Power	Nominal Input, Max Eout	4	15	30	4	15	30	4	15	30	Watts
Current	Iout Entire Output Voltage Range	0.13	0.50	1.0	0.11	0.42	0.86	0.10	0.37	0.75	mA
Current Scale Factor	Full Load	0.140	0.173	0.181	0.158	0.179	0.184	0.077	0.089	0.092	mA/V
Voltage Monitor Scaling		1000:1 ±2% into 10 MΩ									-
Ripple	Full Load, Max Eout, 300 pF bypass Cap.	0.025	0.039	0.058	0.025	0.040	0.075	0.030	0.060	0.064	%V p-p
Ripple with -F-M Option	Full Load, Max Eout, 300 pF bypass Cap.	0.021	0.028	0.048	0.016	0.034	0.040	0.007	0.025	0.053	%V p-p
Dynamic Load Regulation	½ to Full Load, Max Eout per 0.1 mA	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	V pk
Line Regulation	Nom. 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 hr/ per day	<0.01% / <0.02%									VDC

ELECTRICAL SPECIFICATIONS (CONTINUED)

Parameter	Conditions	Models	Units
Programming and Controls		All Types	
Input Impedance	Nominal Input	+Output Models 1.1 M Ω to GND, -Output Models 1.1 M Ω to +5 Vref	M Ω
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 \pm 2%, Zout = 464 Ω \pm 1%	-
Enable/Disable		0 to +0.5 Disable, +2.4 to 32 Enable (Default = Enable)	VDC

Environmental		Standard	-25PPM Option	
Operating	Full Load, Max Eout, Case Temp.	-40 to +65	+10 to +45	°C
Coefficient	Over the Specified Temperature	\pm 50	\pm 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.514.5C-3	10 (Standard), 20 (-C Option)		Gs

MECHANICAL SPECIFICATIONS



	Volumes and Weights		w/-C Option	
	cm ³	in ³	cm ³	in ³
Volume				
30A / 35A	207.46	12.66	327.80	20.00
40A	293.66	17.92	442.53	27.00
	g	oz	g	oz
Weight				
30A / 35A	425.24	15.00	623.69	22.00
40A	595.34	21.00	850.49	30.00

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)

Tolerance	
Overall	Overall ±0.050" (1.27 mm)
Pin to Pin	±0.015" (0.38 mm)
Mounting Hole Locations	±0.025" (0.64 mm)

-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.

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

All grounds joined internally. Power supply mounting points isolated from internal grounds by $> 100 \text{ k}\Omega$, $.01 \mu\text{F} / 50 \text{ V}$ (Max) on all models except -M (15 W and above), -M-E, -M-C, and -M-H configurations which are 0Ω .



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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.

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