"A" SERIES

HIGH VOLTAGE POWER SUPPLY

- 8 models from 0 to 62V through 0 to 6kV
- 4, 20, or 30 watts of output power
- Maximum Iout capability down to 0 Volts
- Wide input voltage range
- Available with Ripple Stripper® Filter
- Indefinite output short-circuit protection
- Output current monitor
- Fixed-frequency, low-stored-energy design
- >430,000 hour MTBF @65°C
- **UL, CUL, DEMKO, and IEC-60950 Recognized**

GENERAL INFORMATION:

The "A" Series of high-voltage, regulated DC-DC converters address the needs of the miniature PCB-mount regulated high-voltage power supply user. 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.

DESIGN METHODOLOGY:

The "A" converters utilize a dual-ended forward converter topology with a nominal switch frequency of <100kHz. A precision reference is provided so the remote control can program the power supply for a specific voltage. Once input voltage stabilizes, under-voltage lockout is released. As soon as enable is raised above a TTL 1, the converter begins to switch. The soft-start circuit brings the converter to full power over a 1mS period, reducing surges on the source supply. A constant-frequency PWM regulation system controls the MOSFET push-pull power stage, which drives the high voltage transformer. The power stage is protected from output current overloads or short circuits via a secondary current limit circuit. High voltage is developed by a multistage multiplier while feedback voltage is developed and sent to the CTRL circuit to maintain regulation. Internal filters are provided to reduce input current ripple and output voltage ripple.

WIDE INPUT RANGE:

The "A" Series is designed for full power operation at up to 90% efficiency. A wide input range of +11 to +16VDC or +23 to +30VDC will maintain full power output without derating. The derated input range is +9 to +32VDC. See Application Note 16 for protection information.

WIDE OUTPUT RANGE:

The "A" Series is a non-isolated, unipolar converter. Positive or negative output must be specified. Output voltage is adjustable from 0 to 62, 125, 250, 500, 1kV, 2kV, 4kV, or 6kV. As the output voltage is reduced towards 0, the maximum current capability remains unchanged.

OUTPUT CURRENT MONITOR:

The "A" Series features an output current monitor. Current from the high-voltage multiplier can be monitored by reading the voltage appearing between Output Monitor pin 3 and Signal Ground Return pin 5. Internal voltage dividers create a small linear offset voltage. See Application Note13.

REMOTE CONTROL:

The "A" Series is remotely programmed with 0 to +5 VDC to produce an output voltage. Input may be from a control voltage, DAC, variable or fixed resistor. On a negative output converter the programming logic of the remote adjust would be inverted, i.e.: +5 to 0VDC. Connections are on the converter for the internal reference, analog remote adjust and the signal ground. The reference is +5.0VDC, temperature compensated with a 464Ω output impedance. See Figure E & F or Application Note 1 for more information.

STANDBY MODE:

The "A" converters also have an enable function. When the enable is TTL 0 (<+0.7V Isink=1mA) the converter is in a standby mode and input current is reduced to <30 mA. All functions other than the internal reference are shut down. If the enable pin is left unconnected, TTL 1, or at greater voltages up to +32VDC the converter operates normally. The open circuit output voltage from the Enable pin is <+5VDC. In the inhibit mode, 1 mA will have to be sunk for proper shutdown.

MECHANICAL:

"A" Series converters are in PCB mountable plastic cases requiring a footprint of 5.5 in^2 and only 4.3 in^3 of volume. Mounting plates and brackets are available for chassis mounting. This Series is also available in an RF-tight metal PCB/chassis mount package. See Application Note 6 for thermal considerations and mounting configurations. All models are available with optional six-sided wrap-around Mu-Metal Shielding.

ENVIRONMENTAL:

The "A" Series provides full power operation at case temperatures from -40 to +65°C. All units receive a 24-hour burn-in prior to final testing. Extended temperature range is available along with other enhanced capabilities. Please contact the factory.

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"A" SERIES

HIGH VOLTAGE POWER SUPPLY

Typical Characteristics:

Parameter	Conditions	Models																						Units
Input:		**12V**												**24V**										
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	< 100												< 90										mA
Current	Max Load, Extended Input Voltage	Figures A & B												Figures A & B										Graph
AC Ripple Current	Nominal Input, Full Load	< 80												< 80										mA p-p
Output:		**1/16A**			**1/8A**			**1/4A**			**1/2A**			**1A**			**2A**			**4A**			**6A**		
Voltage Range	Nominal Input	0 to 62			0 to 125			0 to 250			0 to 500			0 to 1,000			0 to 2,000			0 to 4,000			0 to 6,000		VDC
Nominal Input Voltage / Model		12	24	24	12	24	24	12	24	24	12	24	24	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	4	20	30	4	20	30	4	20	30	4	20	30	Watts
Current	Iout Entire Output Voltage Range	64	320	480	32	160	240	16	80	120	8	40	60	4	20	30	2	10	15	1	5	7.5	0.67	3.3	5	mA
Ripple	Full Load, Max Eout	.02	.03	.05	.02	.015	.04	.01	.14	.2	.003	.02	.03	.02	.10	.15	.01	.05	.15	.025	.075	.18	.035	.20	.30	%V p-p
Dynamic Load Regulation	½to Full Load, Max Eout per .1mA	<.12	<.12	<.12	<.12	<.12	<.12	<.20	<.20	<.20	<.50	<.50	<.50	<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
Voltage Derating	Max Iout, Extended Input Voltage	Figures C & D																								Graph
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
Remote Programming:		**All Types**																								
Input Impedance	Nominal Input	+ Output Models 1.1MΩ to GND, - Output Models 1.1MΩ to +5 Vref																								MΩ
Adjust Resistance	Typical Potentiometer Values	10K to 100K (Pot across Vref. & Signal GND, Wiper to Adjust)																								Ω
Adjust Linearity	0% to 100%	Figure E																								Graph
Adjust Voltage	Referenced to signal ground	Figure E (0 to +5 VDC)																								Graph
Adjust Logic	0 to +5 for +Out, +5 to 0 for -Out	+4.64 VDC for +Output or +0.36 for -Output = Nominal Eout																								
Reference:		**All Types**																								
Output Voltage	T=+25°C, Initial Value	+ 5.00 ± 2%																								VDC
Output Impedance	T=+25°C	464 ± 1%																								Ω
Stability	Over Full Temperature Range	Figure F																								Graph
Enable:		**All Types**																								
Power Supply On	Floated, or voltage ≥ TTL High	+2.4 to 32																								VDC
Power Supply Off	Grounded, or voltage ≤ TTL Low	0 to + 0.7 ± 0.2 (Isink 1mA minimum)																								VDC
Temperature:		**All Types**																								
Operating	Full Load, Max Eout, Case Temp.	-40 to +65																								°C
Storage	Non-Operating, Case Temp.	-55 to +105																								°C
Coefficient	Over the Specified Temperature	± 50																								PPM/ °C
Thermal Shock	Mil-Std 810, Method 504, Class 2	-40 to +65																								°C
Altitude:		**All Types**																								
Operating	Standard Package	Sea Level through Vacuum																								
Non-operating	Standard Package	Sea Level through Vacuum																								
Shock & Vibration:		**Standard**												**- C Option**												
Shock	Mil-Std-810, Method 516, Proc. 4	20												40												G's
Vibration	Mil-Std-810, Method 514, Fig. 514-3	10												20												G's
Packaging:		**Standard**												**- C Option**												
Material	Outer construction	Plastic (DAP) Mil-M-14F SDG-F												6063T52 Aluminum Mil-C-5541 Class 1A												
Length	Not including pins or mounting pts	3.70 ± 0.050 (94.0)												4.00 ± 0.025 (101.6)												In (mm)
Width	Not including pins or mounting pts	1.50 ± 0.050 (38.1)												2.00 ± 0.025 (50.8)												In (mm)
Height	Not including pins or mounting pts	0.77 ± 0.050 (19.6)												1.00 ± 0.025 (25.4)												In (mm)
Volume	Not including pins or mounting pts	4.30 (70.5)												8.00 (131.1)												In^3 (cc)
Weight	Overall	5.0 (142)												10.0 (284)												Oz (g)

Specifications subject to change without notice

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Typical Performance Characteristics:

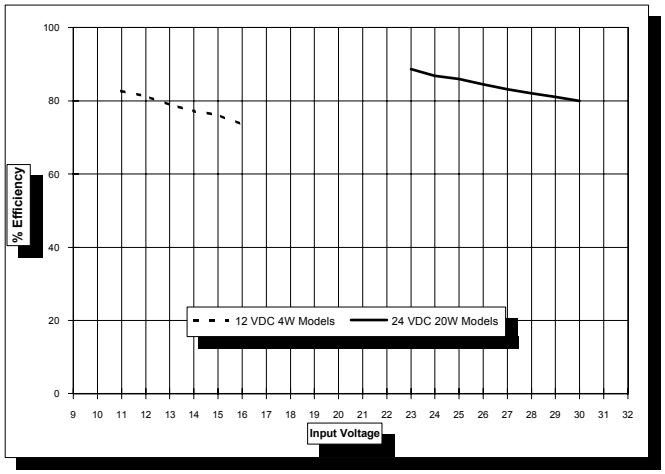


Fig. A
DC Efficiency vs. Input Voltage Range

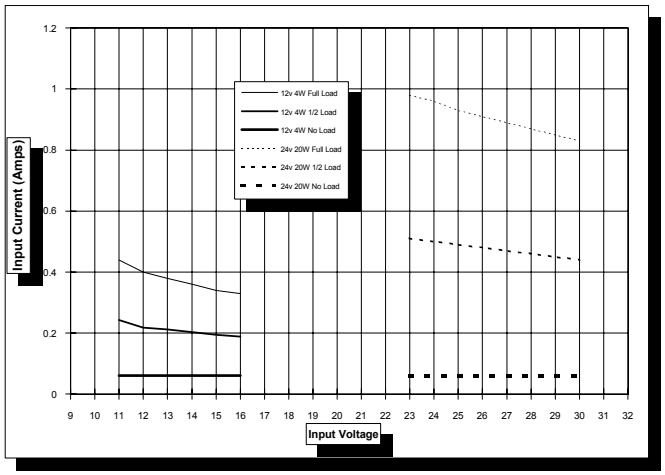


Fig. B
Input Current vs. Input Voltage Range

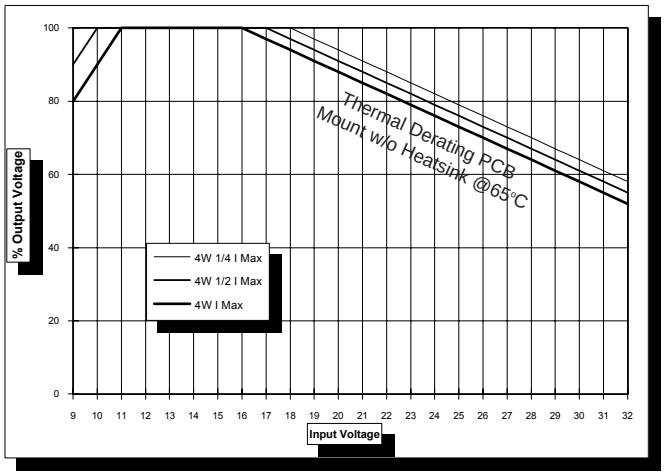


Fig. C
Output Voltage vs. 12V/4 Watt Extended Input Voltage
(Up to 65°C Chassis Mount w/o Heatsink)

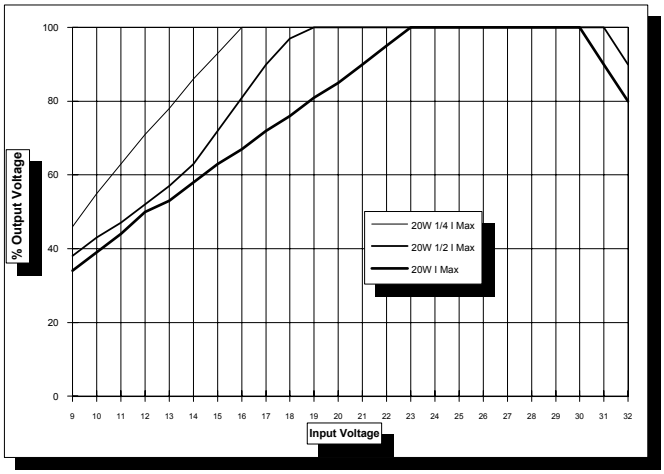


Fig. D
Output Voltage vs. 24V/20 Watt Extended Input Voltage
(Up to 65°C Chassis Mount w/o Heatsink)

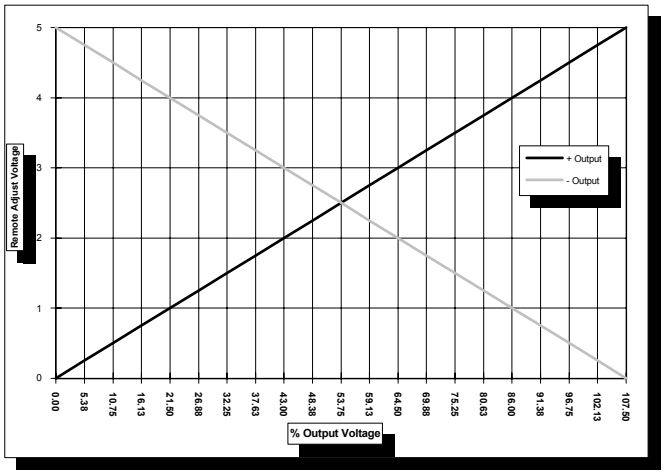


Fig. E
Remote Control Characteristics

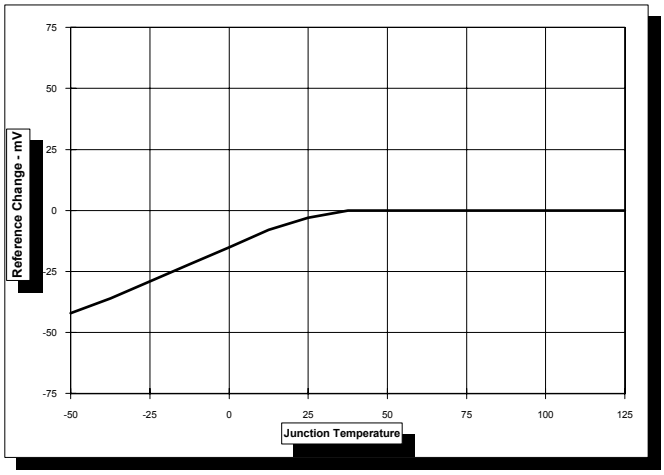


Fig. F
Reference Stability

“A” SERIES

HIGH VOLTAGE POWER SUPPLY

PLASTIC CASE

CONSTRUCTION:

Epoxy-filled DAP box
Certified to MIL-M-14F
SDG-F

TOLERANCE:

Overall ± 0.050”
Pin to Pin ± 0.015”

#2-56 standoffs may not be flush to cover

NOTE:

20 & 30 watt versions are an additional 0.062” in height.

-M equipped units are an additional 0.030” in height.

Contact UV customer service for drawings on models equipped with -E or -H options.

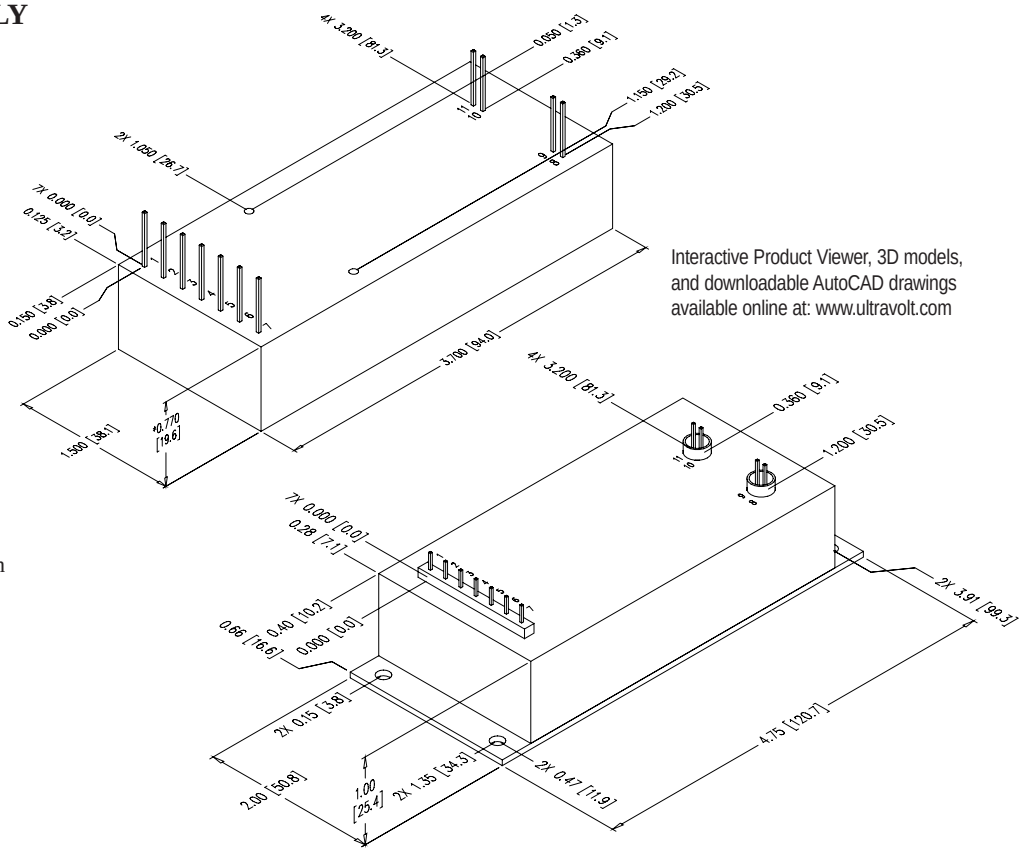
METAL CASE

CONSTRUCTION:

Epoxy-filled aluminum box
Chem film per MIL-C-5541
Class 1A

TOLERANCE:

Overall ±0.025”
Pin to Pin ±0.015”



Interactive Product Viewer, 3D models, and downloadable AutoCAD drawings available online at: www.ultravolt.com

Connections

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

All grounds joined internally. Power-supply mounting points isolated from internal grounds by >100kΩ, .01uF / 50V (Max) on all models except -M, -C, and -M-E configurations which are 0Ω.

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 1,000 VDC Output	**1A**
	0 to 2,000 VDC Output	**2A**
	0 to 4,000 VDC Output	**4A**
	0 to 6,000 VDC Output	**6A**
Input:	12VDC Nominal	**12**
	24VDC Nominal	**24**
Polarity:	Positive Output	**-P**
	Negative Output	**-N**
Power:	Watts Output (12V only)	**4**
	Watts Output (24V only)	**20**
	Watts Output (24V only)	**30**
Case:	Plastic Case - Diallyl Phthalate	**STD**
	‘Eared’ Chassis Mounting Plate	**-E**
	RF-Tight Aluminum Case	**-C**
Heat Sink:	.400” High (sized to fit case)	**-H**
Shield:	Six-Sided Mu-Metal Shield	**-M**
Ripple Stripper®:	Integral Output Filter(see ”F” Series DS)	**-F**
Voltage Monitor:	Optional Eout Monitor	**-Y5**
Iout Monitor Boost:	Boosted Iout Monitor Signal Level	**-Y10**

Example: 1/2A24-P20-C

Type — Voltage — Model — Input — Option (Case) — Power — Polarity

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