

# HVA SERIES

## Precision High-Voltage Amplifier

The HVA Series of DC-to-DC high-voltage power supplies operates a precision filter/divider & linear HV switch to produce a High-Voltage Amplifier (HVA). These modules provide a high-resolution, programmable, high-voltage DC to full scale waveform capability greater than 1kHz output. The HVA Series is optimized for bias applications while providing excellent line regulation, load regulation, dynamic response, and stability. The HVA Series can both source and sink current!

Typical applications for this series include the following:

**Drivers** for PZT actuators, MEMS devices, electroactive polymers, electrorheological materials, electrohydrodynamics, electrostatic chuck, pockels cells, laser & electro-optic modulation, electrophoresis.

**Amplifiers** for beam devices such as mass spectrometry, and electron microscopes as well as electrostatic deflection/focusing, flocking, coating, electrospinning, precipitation and electrocoalescence.



- Can both source and sink current
- PPM level line & load regulation
- Bipolar models available at 0 to 5kV
- Differential precision 0 to 10VDC control input
- Precision voltage and current monitors
- Unipolar models available at 0 to 10kV
- 25ppm temperature coefficient (15ppm optional)
- Operates in DC, reversible, and amplifier modes
- Fast slew rate (40V/μs) and high bandwidth
- Reduced ripple option available

PARAMETER	CONDITIONS	MODELS						UNITS
<b>INPUT</b>		<b>ALL TYPES</b>						
Voltage Range	Full Power	24VDC $\pm$ 10%						VDC
Current	Standby / Disable	<70 unipolar, <105 bipolar						mA
Current	Full Load, Max Eout	<420						mA
Current	No Load, Max Eout	<400						mA
<b>OUTPUT*</b>		<b>1kV/<math>\pm</math>1kV</b>	<b>2kV/<math>\pm</math>2kV</b>	<b>4kV/<math>\pm</math>4kV</b>	<b><math>\pm</math>5kV</b>	<b>6kV</b>	<b>10kV</b>	
Power	Nominal Input, Max Eout	0.25	0.5	1	1	1	1	W
Current	Iout Entire Voltage Range	250	250	250	200	167	100	μA
Ripple	Full Load, Max Eout	0.05	0.05	0.05	0.03	0.03	0.01	%V pp
Ripple with -F Option	Full Load, Max Eout	0.0125	0.0125	0.0125	0.0075	0.0075	0.0025	%V pp
Voltage Monitor	Normal Operating Conditions	0 to 10 $\pm$ 0.5%						VDC
Current Monitor	Normal Operating Conditions	0 to 10 $\pm$ 1%						VDC
Line Regulation	Vin Min to Vin Max, Max Eout	<0.01						%
Load Regulation	No Load to Full Load, Max Eout	<0.01						%
<b>PROGRAMMING &amp; CONTROLS</b>		<b>ALL TYPES</b>						
Input Impedance	Normal Operating Conditions	10						MΩ
Adjust Voltage	Differential	0 to +10						VDC
HV ON/OFF (Enable/Disable)		0 to +0.8V Disable, +2.5 to +10 Enable (Default = Disable)						VDC
Reference Voltage	T = +25°C, Initial Value	+10.00 $\pm$ 0.05%						VDC
Max Source Current	T = +25°C	1						mA
<b>ENVIRONMENTAL</b>		<b>ALL TYPES</b>						
Operating	Full Load, Max Eout, Case Temp.	+10 to +45						°C
Temperature Coefficient	Over the Specified Temperature	$\pm$ 25PPM or $\pm$ 15PPM (Optional)						PPM/°C
Thermal Shock	Mil-Std 810, Method 503.4-2	-40 to +65						°C
Storage	Non-Operating, Case Temp.	-40 to +100						°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						G's
Vibration	Mil-Std-810, Method 514, Fig. 514-3	10						G's

\*Units listed without polarity can be ordered as positive (+) or negative (-). Units listed as ( $\pm$ ) are bipolar. Specifications subject to change without notice.



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Sample "HVA" Series Waveforms:

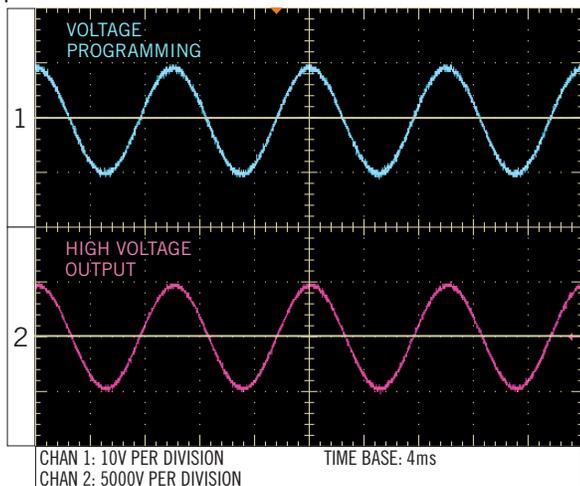


Figure A:  
5HVA24-BP1 Sine Wave Input

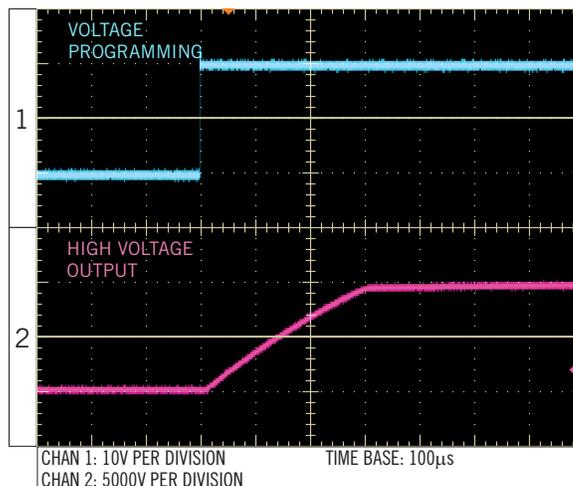


Figure B:  
5HVA24-BP1 10kV Step Wave Input w/ No Load

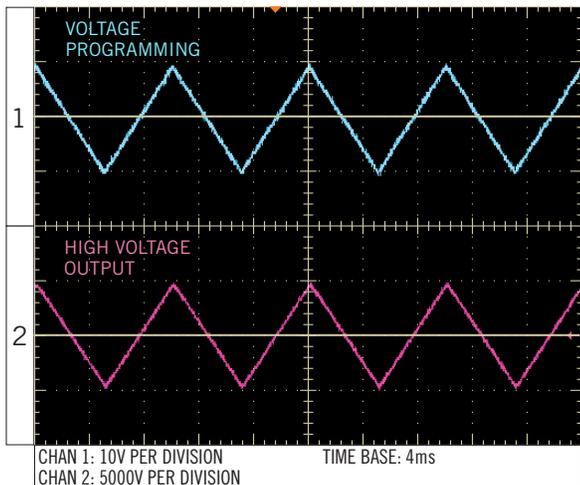


Figure C:  
5HVA24-BP1 Triangle Wave Input

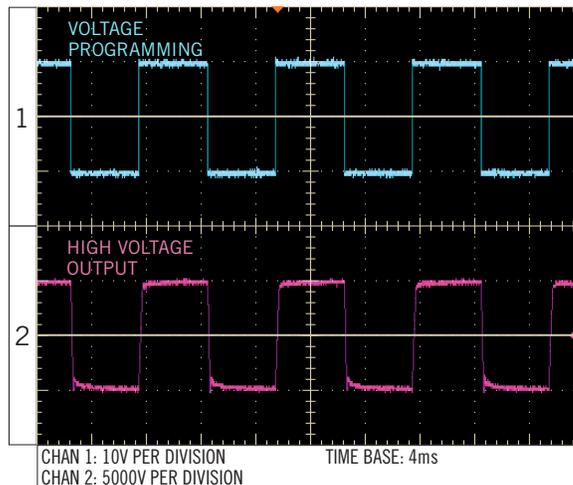


Figure D:  
5HVA24-BP1 Square Wave Input

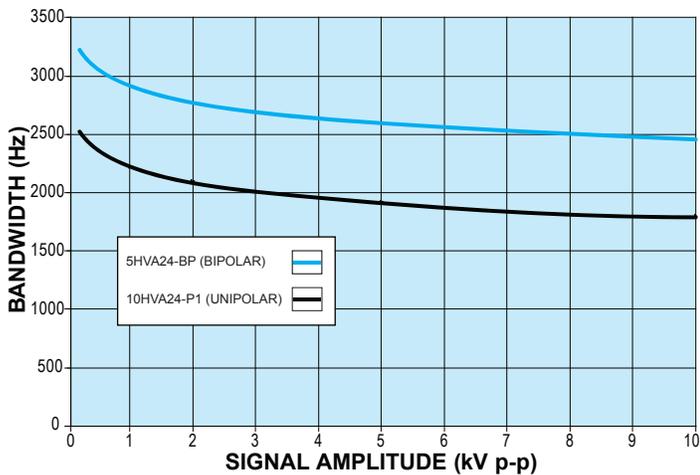


Figure E:  
Bandwidth vs. Signal Amplitude with No Load

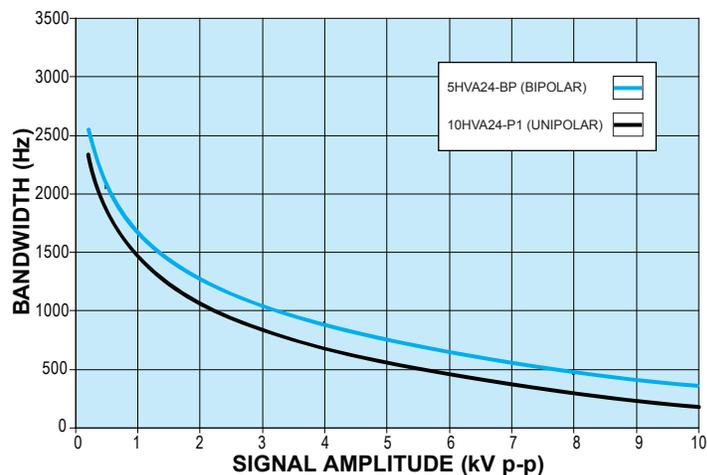


Figure F:  
Bandwidth vs. Signal Amplitude with 100pF Load



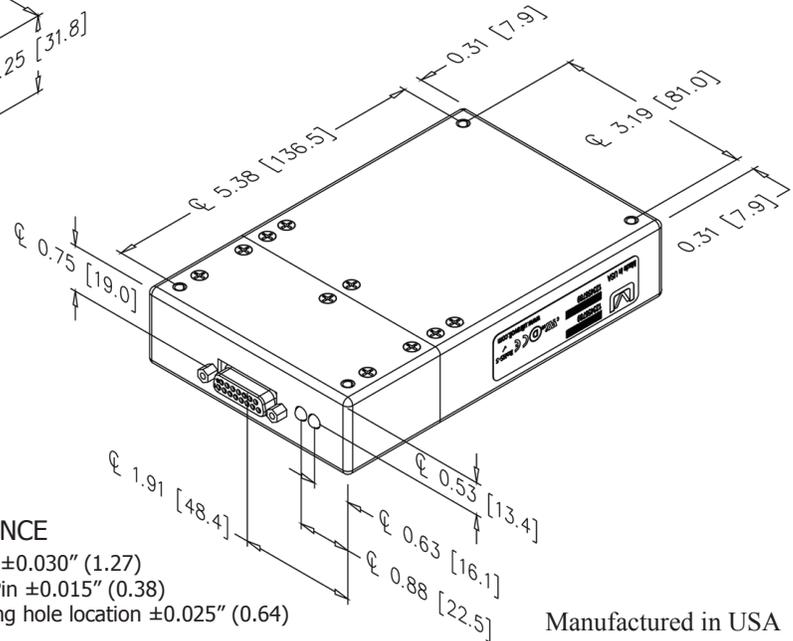
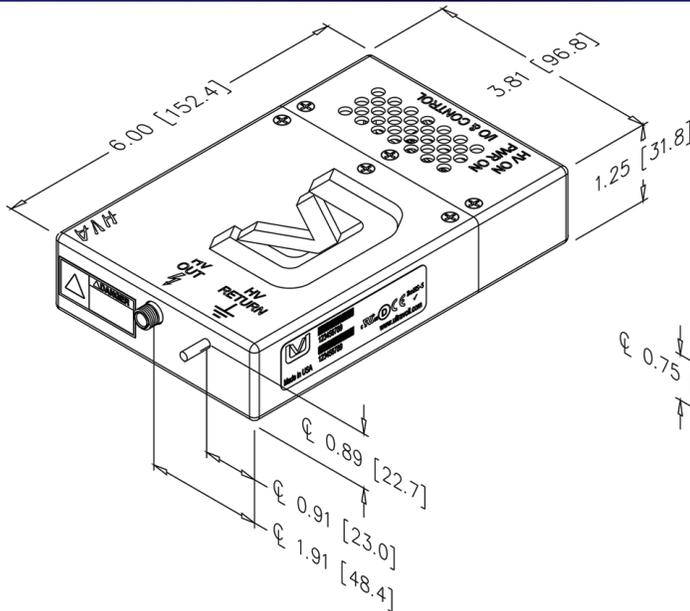
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# HVA SERIES

## Precision High-Voltage Amplifier

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



### CONSTRUCTION

Material: Aluminum Alloy 5052-H32  
Finish: Anodize MIL-A-8625E Blue

### SIZE

Volume 28.58 in<sup>3</sup> (468.34cc)  
Weight 1.5 lbs. (0.68kg)

### TOLERANCE

Overall ±0.030" (1.27)  
Pin to Pin ±0.015" (0.38)  
Mounting hole location ±0.025" (0.64)

### CONNECTIONS

D-Sub 15 Pin Female  
HV Connector, LGH1/2L  
HV Return, #6-32 x 0.437 Long Threaded Post

Manufactured in USA



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

### UV-HVA INPUT CONNECTOR PINOUT FUNCTIONS

PIN	DESCRIPTION	FUNCTION
1	Reference Voltage	+10.00V precision reference
2	Voltage Programming -	0 to +10V or 0 to -10V to program full output voltage, depending on polarity. Programming input is differential between pins 2 and 3.
3	Voltage Programming +	
4	Voltage Monitor	0 to ±10V represents 0 to ± full output voltage
5	N/C	No connection
6	Signal Ground	Reference all control signals here
7	Input Power	+24V Input Power
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 ±10V represents 0 to ± full output current
13	Current Limit Adjust	0 to +10V sets current limit from 0 to full rated output current
14	N/C	No connection
15	Signal Ground	Reference all control signals here

### ORDERING INFORMATION

Type	0 to 1,000 VDC Output	1HVA
	0 to 2,000 VDC Output	2HVA
	0 to 4,000 VDC Output	4HVA
	0 to 5,000 VDC Output (Bipolar Only)	5HVA
	0 to 6,000 VDC Output (Unipolar Only)	6HVA
	0 to 10,000 VDC Output (Unipolar Only)	10HVA
Input	24VDC Nominal	24
Polarity	Positive Output	-P
	Negative Output	-N
	Bipolar Output	-BP
Power	1 Watt Output	1
Option	Ripple Stripper® Output Filter	-F
	15ppm temperature coefficient	-15PPM
Connections	LGH	Standard
	5kV SHV Type	-SHV-5kV
	10kV, BNC Type	-BNC-10kV

Example: 1HVA24-P1-F



Rev. G 10/14

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



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