AMERICAN HIGH VOLTAGE

ST Series
High Voltage Power Supply

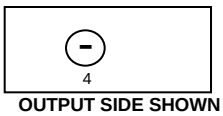
General Description

The ST Series high voltage power supplies are designed to provide very high output voltages especially for image intensifiers tubes. They provide of up 25 kV with power levels to 3 Watts depending on model selected. The output voltage of the ST power supply is directly proportional to the input voltage (0 – 15 VDC). The output ripple is typically less than 0.1% at full power load. The high voltage output lead is returned to the ground of the power supply. All models are encapsulated in a thermosetting epoxy for high reliability and protection against moisture. The ST series are reverse input voltage, short circuit and arc protected.

Features

- Output proportional to Input
- Encapsulated
- 5,000 VDC to 25,000 VDC available
- 3 Watts power (models under 30kV)
- Metal case for low ripple: 0.1% Vpp

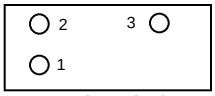
Connection Diagram



OUTPUT SIDE SHOWN

Wire:

4. - HV output



INPUT SIDE SHOWN

Pins:

1. Chassis
2. Ground
3. + 15 VDC

AMERICAN HIGH VOLTAGE

Electrical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions		Value			Units
			Min	Typical	Max	
Supply Voltage:	(all models)		1	15	18	VDC
Input Current:	No Load:		35	35	40	mA
	Full Load (3W models):		275	300	365	mA
Output Ripple:	No Load (all models): Full Load (all models):		0.05 % 0.1 %	0.06 % 0.1 %	0.07 % 0.1 %	Vpp Vpp
Load Regulation:	No Load to Full Load Half Load to Full Load		25% 10%	30% 15%	35% 20%	V_{NL}/V_L VNL/VL
Output Linearity	No Load			1%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (ideal)}}$
Output Linearity	Full Load (all models):			1%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (Ideal)}}$
Short Circuit Current:				200	300	mA
Power Efficiency:	Full Load		55%	65%	70%	$\frac{P_{OUT}}{P_{IN}}$
Reverse Input Polarity	Protected to 50 VDC					
Temperature Drift:	No Load Full Load				500 500	ppm/DegC ppm/Deg C
Thermal Rise:	No Load (case) Full Load (case)				5 15	degrees C degrees C
Slew Rate (10% - 90%)	No Load Full Load				100 120	mS mS
Slew Rate (90% - 10%)	No Load Full Load				200 100	mS mS
Drain Out Time	No Load (5 TC)				250	mS

AMERICAN HIGH VOLTAGE

Physical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Dimensions	MKS	50.8 W x 101.6L x 20.6 H	mm
	English	2.0 W x 4.0 L x 0.81 H	inches
Volume:	MKS	105	cm^3
	English	6.4	$inch^3$
Mass:	MKS	156	grams
	English	5.6	oz
Packaging:	Black anodized aluminum case with epoxy encapsulation		
Finish	Smooth brushed aluminum		
Terminations:	Input and control: Teflon terminals (2)		
	HV Output: Flying lead (Alden HV connector)		

Environmental Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Temperature Range	case temperature	-40 degrees to + 71 degrees	Celsius
	case temperature	-40 degrees to + 160 degrees	Fahrenheit
Shock:	MIL-STD-810 Method 516	40 g's	Proc IV
Altitude:	pins sealed against corona	-350 to + 16,700	meters
	pins sealed against corona	-1,000 to +55,000	feet
Vibrations:	MIL-STD-810 Method 514	20 g's	Curve E
Thermal Shock	MIL-STD-810 Method 504	-40 deg C to + 71 deg C	Class 2

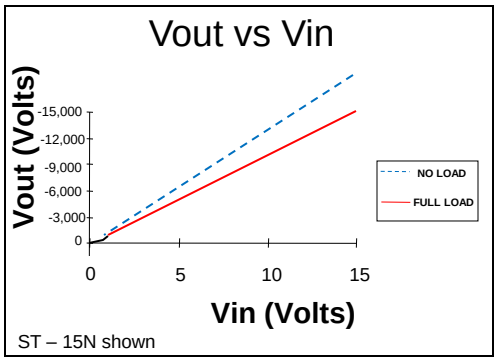
AMERICAN HIGH VOLTAGE

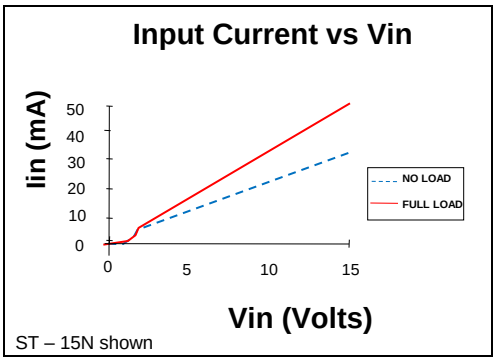
Models Available (as of August 2019):

(Vin = 0 - 15 VDC)

Model	Output Voltage Range	Power	Ripple (max)
ST-10N	0 – 10,000 VDC	3 Watts	10 Vpp
ST-15N	0 – 15,000 VDC	3 Watts	15 Vpp
ST-20N	0 – 20,000 VDC	3 Watts	20 Vpp
ST-25N	0 – 25,000 VDC	3 Watts	25 Vpp

ST Series Performance Charts





ST Series Application Notes

The ST Series high voltage power supplies are driven by an input voltage of 1.5 to 15 VDC. The input current and output voltage as a function of input is shown in the above graphs. The high voltage output return is connected to the power input return. As can be seen from the above charts, the output voltage is approximately linear with respect to input voltage except near the lower input voltage region (Vin < 2V). Here, the output drops off rapidly as the input voltage approaches zero with the absolute minimum input voltage needed for reliable starting being 1.3 VDC. As shown in Figure 1 below, the simple connection of a ST unit to a DC source of voltage will provide a high voltage stepped-up output. The input AC bypass capacitor C1 is optional and is utilized to prevent switching spikes from riding back on the input power lines. Values of 0.1 uF to 10 uF are commonly used.

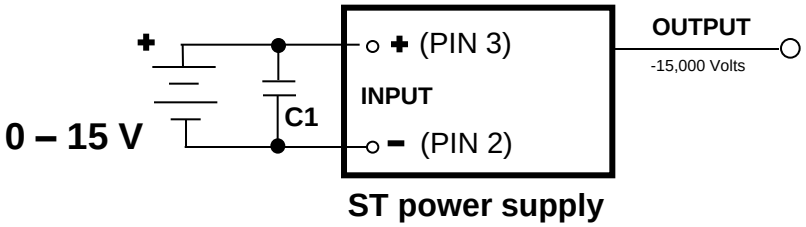


Figure 1: Basic ST hookup schematic

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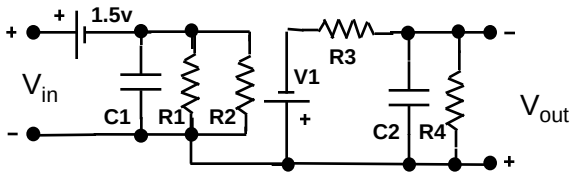
Equivalent SC Circuit Model



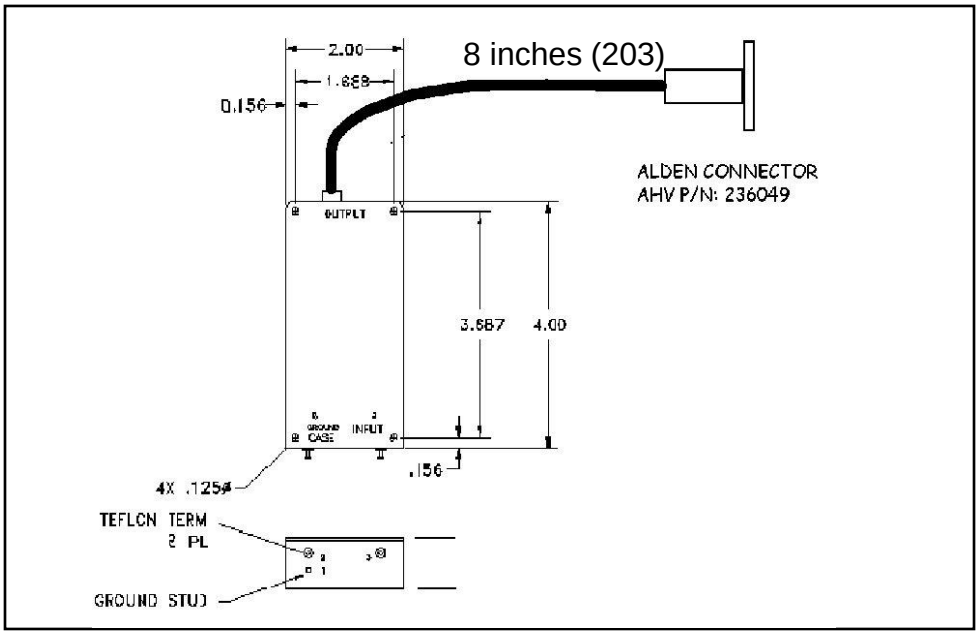
Equivalent ST-15N HVPS Circuit Model

R1 = (500) *Ohms*
R2 = (600) *Ohms*
R3 = (0.1 x Vout $_{max}$ / Iout $_{max}$) *Ohms*
R4 = (100 x Vout $_{max}^{2}$) *Ohms*
C1 = (10 x 10^{-6}) *Farads*
C2 = (0.005 x Iout$_{max}$ / Vout$_{max}$) *Farads*
V1 = (V$_{R2}$ x Vout$_{max}$ / 15) *Volts*

For example, for an ST-15N:

Vout**max** = 15,000 V
Pout**max** = 3 W
Iout**max** = 0.0002 A
R1 = 500 Ohms
R2 = 600 Ohms
R3 = 7.5 MegOhms
R4 = 22.5 Gigohm
C1 = 10 uF
C2 = 66 pF

Outline Drawing: (inches (millimeters))



Ordering Information:

ST – XXN

Example:

ST – 10N: Maximum output = 10,000 V 3 Watts 15 VDC input

XX = Output voltage

10 = 10kV
15 = 15 kV
20 = 20 kV
25 = 25 kV