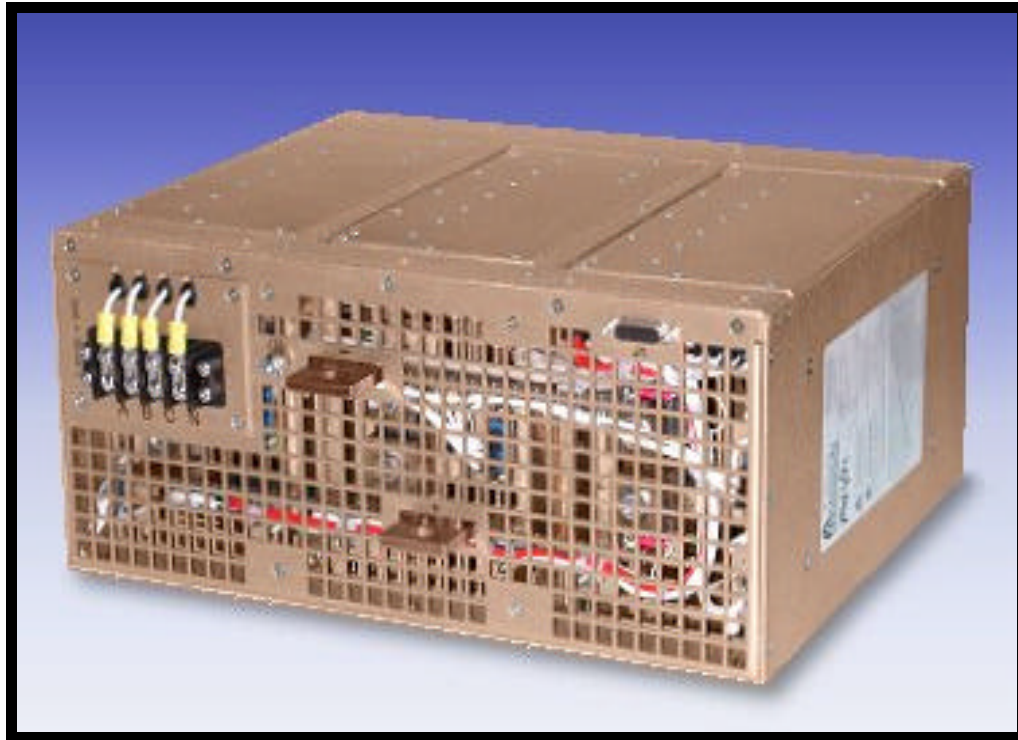


III Power Supply

Power Factor Corrected AC-DC Switcher



Operator's Manual and "Quick Install" Instructions



www.mpwrs.com

Javelin III Power Supply AC-DC Switcher

Javelin III Power Supply "Quick Install" Instructions

Mounting the Javelin III Power Supply

- The Javelin III can be mounted at either of two surfaces (top or bottom).
- Use #8-32 mounting screws. Maximum penetration should not exceed 0.21" (5.33mm).
- Maintain 2" (50,8mm) clearance at either end for airflow.

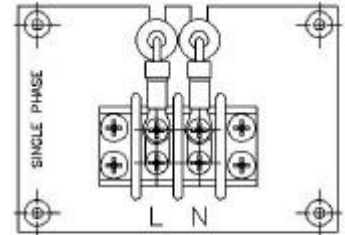
Input Connections

Input Barrier Strip (TB1)

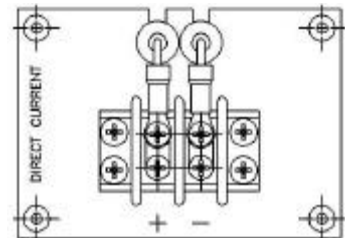
- Input AC or DC power is applied to barrier strip TB1. See Table 1 for single phase, DC, 3 phase/3 wire, or 3 phase/4 wire.
- To connect, use #8 ring lugs with 30A rating.
- Grounding stud provided for ground connection(s) to the right of TB1.
- **A fault-clearing device, such as a fuse or circuit breaker, with a maximum rating per Table 1 at the power supply input is required for safety agency compliance.**

1 Single Phase	2 DC	3 3 Phase/3 Wire	4 3 Phase/4 Wire
TB1-1 L1	TB1-1 +	TB1-1 A	TB1-1 A
TB1-2 L2/N	TB1-2 -	TB1-2 B	TB1-2 B
		TB1-3 C	TB1-3 C
			TB1-4 N
Current Requirements			
30A AC	30A DC	17A AC per phase	10A AC per phase
Maximum Fuse Rating			
45A	45A	25A per phase	15A per phase

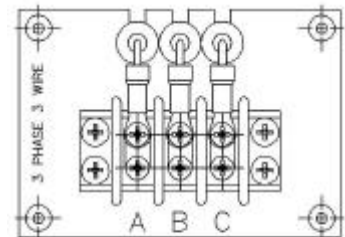
Table 1. AC and DC Input Connections



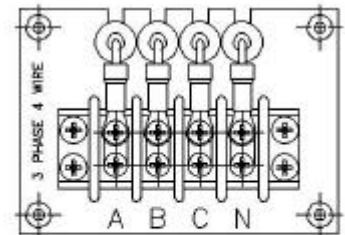
TERMINAL BLOCK
TYPE 1
(SINGLE PHASE)



TERMINAL BLOCK
TYPE 2
(DIRECT CURRENT)



TERMINAL BLOCK
TYPE 3
(3 PHASE 3 WIRE)



TERMINAL BLOCK
TYPE 4
(3 PHASE 4 WIRE)

Status/Control/Sense Connector (J1)

- J1-1 and J1-9 are Signal Return pins.
- J1-2 is VCC +5V @ 300mA.
- J1-3 is AC Power OK (+5V = True).
- J1-4, 5 and 12 are not connected
- J1-5 is +12V fan power.
- J1-6 is +5V DC (in).
- J1-7 is DC OK and J1-8 is DC OK'.
- J1-10 and J1-11 are used in conjunction according to Table 2.
- J1-13 is +Remote Sense and J1-14 is -Remote Sense.

J1-11 INHIBIT'	J1-10 ENABLE'	POWER SUPPLY STATE
1	X	ON
0	0	ON
0	1	OFF

1= TTL High or Open Circuit
 0= TTL Low or Closed Circuit
 X= Don't Care

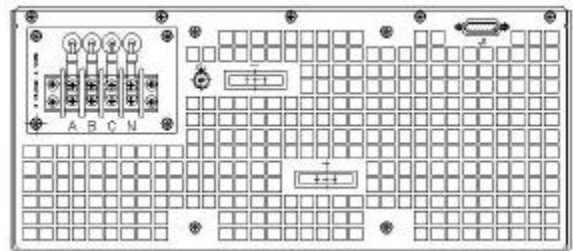
Table 2. Inhibit/Enable Logic Table

- Use ITT/Cannon mating connector P/N DE15PK87.
- Use 20-24 AWG stranded wire.

Output Connections

Installing ring lugs on output bus bars:

- When viewed from the rear, the upper left output lug is Return and the lower right output lug is Positive.
- Place ½" or smaller bolt through output lug and ring lugs from load cables and install retaining nut.
- Tighten the nut to a torque of **10 ft/lbs.**



Sense Connections

- The Javelin III is equipped with Auto-Sense (load sensed at output lugs if remote sense is not connected).
- Connector pin J1-13 is the +Remote Sense and J1-14 is the -Remote Sense.
- If Remote Sense is desired, connect pin J1-13 to the positive load connection and pin J1-14 to the negative load connection at the point where regulation is desired.
- Attach sense terminals to load using 20-24 AWG stranded, twisted pair wire.
- **Verify that sense lines are not cross-connected.**

- J1-1 Signal Return
- J1-2 VCC +5V @ 300mA
- J1-3 AC Power OK
- J1-4 N/C
- J1-5 N/C
- J1-6 +5Vdc (in)
- J1-7 DC OK
- J1-8 DC OK'
- J1-9 Signal Return
- J1-10 PS Enable'
- J1-11 PS Inhibit'
- J1-12 N/C
- J1-13 +Remote Sense
- J1-14 - Remote Sense
- J1-15 +5Vdc Return (in)



Javelin III Power Supply

Power Factor Corrected AC-DC Switcher

Overview

The Javelin III is a ruggedized, switching power supply that combines the advantages of power factor correction and power density with user-selectable output voltage and power. Accepting input voltages of 85 to 254 Vac and 85 to 380 Vdc, the Javelin III can provide up to 5400 watts in a 7.00"H x 16.0"W x 13.0"L package. Its inherent flexibility comes from its use of Vicor 2nd Generation DC-DC converters. Javelin III has three 90 CFM fans for cooling.

Standard Features

- Power Factor Correction: .99 at 115 Vac; .95 at 230 Vac.
- Universal Input: 85-254 Vac, 47-500 Hz, or 85-380 Vdc.
- Power Output: Approximately 5400W at 230 Vac for selected outputs; 3600W at 220 Vac; 2400W at 115 Vac. See chart (Pg. 11) for breakdown of input voltage vs. output power.
- Full power to 55°C; half power at 70°C.
- Soft start for limiting inrush current.
- EMI Compliance: FCC Class A & EN 55022 Class B; MIL-STD-461E.
- Transient Protection: MIL-STD-704E.
- Environmental: MIL-STD-810E.
- MIL-STD-1399 (300A); 115Vac, 60Hz, Single Phase; =1KVA<5KVA.
- Harmonic Distortion to EN61000-3-2.
- AC Power OK status signal.
- Fan cooled.
- Equipped with Auto-Sense.
- Output overcurrent, overvoltage and overtemperature protection.
- Ride-through (holdup) time: >20 ms at 3600W load.
- Size: 7.00"H x 16.0" W x 13.0"L.
- Heavy-duty "ruggedized" enclosure designed for a high shock and vibration environment.
- Extra cooling provided for higher output with increased altitude capability.
- "D" shell connector for interface connections.
- Optional conformal coating for PCBs.

Technical Description

The Javelin III consists of an off-line single phase or three phase power-factor-corrected front end (or optional DC), with EMI filter, cooling fans, customer interface, associated housekeeping circuits, and a selection of Vicor's DC-DC converters. Three power supply units are placed in parallel to provide the final output current capability.

Input AC mains (or DC) voltage is applied to a 2-, 3-, or 4-pin power terminal strip (see Table 1, Pg. 2). The input current is passed through three individual EMI filters designed to meet conducted noise limit "A" specification of FCC Part 15 and EN55022 level "B."

At start-up, inrush current is limited in each power supply unit by a PTC thermistor. The PTC is shunted out shortly after initial power-up by a DC bus voltage sense circuit driving a thyristor. After rectification, the input voltage is applied to a boost converter that keeps the AC input current sinusoidal and synchronized with the input AC voltage (in compliance with EN61000-3-2). The boost converter delivers a regulated input to the hold-up capacitors and a high voltage backplane. The backplane supplies power to the DC-DC converters that provide the desired low voltage, regulated output.

Voltage conversion is achieved by Vicor's family of Zero-Current-Switching (ZCS) DC-DC converters. These are forward converters in which the main switching element switches at zero current. This patented topology has a number of unique attributes: low switching losses, high frequency operation (resulting in reduced size for magnetics and capacitors), excellent line and load regulation, wide output adjustment range, low EMI/RFI emission, and high efficiency.

At initial power-up, the Javelin III output is disabled to limit the inrush current and to allow the DC bus potential to settle out to the correct operating level. A low-power flyback converter operating with PWM current-mode control converts the high voltage DC bus into regulated low voltage to power the internal housekeeping circuits and DC cooling fans.

The internal housekeeping Vcc comes up within 1 second after the application of input power. Once the high voltage bus is within operating limits, the AC Power OK signal changes its output to a TTL "1," which indicates the input power is OK and allows the power output to come up 15-30 ms later. An auxiliary Vcc output of 5Vdc, capable of sourcing up to 300mA, is provided for peripheral use.

An output Inhibit/Enable function is provided by using an optocoupler to control Vicor's DC-DC converters. If the Inhibit control pin is pulled low and the Enable pin is high or open, the optocoupler will turn on and disable the output. The delay for an output to come up when measured from release of the Enable pin is 5-10 ms. See Table 2 (Pg. 3) for a logic table.

To utilize trim capabilities, consult Mission Power Solutions' Engineering Department.

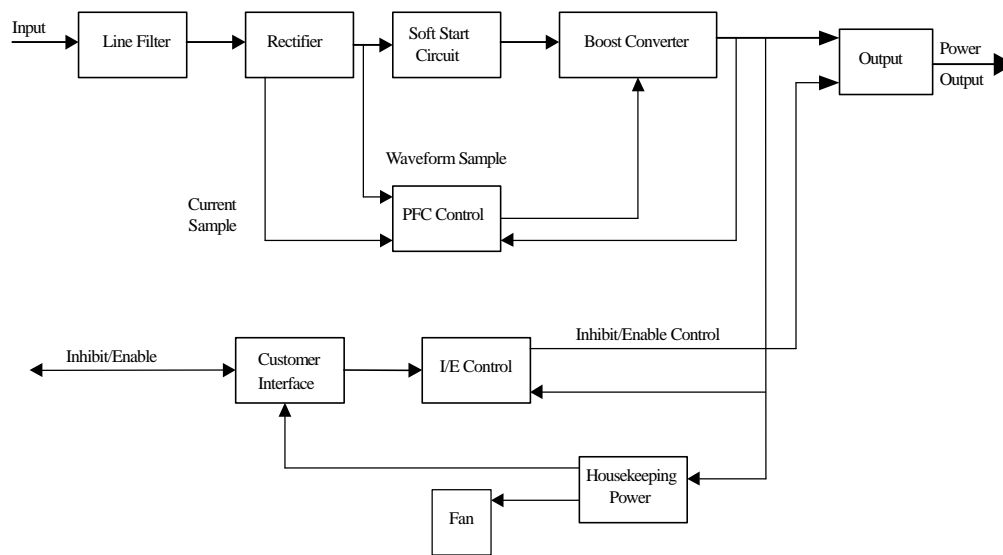


Figure 1. Javelin III Architecture

Interface Connections

Input Power Terminal (TB1)

Input AC (and DC) Power is applied to connector TB1 using a #8 ring lugs. See Table 1 (Pg. 2) for input connector assembly instructions.

A fault-clearing device, such as a fuse or circuit breaker, with a maximum rating per Table 1 (Pg. 2) at the power supply input is required for safety agency compliance.

Output Power Connections

The output power lugs available on the Javelin III are 1.5" x .25" with .516 holes accommodating up to ½"-13 bolts with flanged nuts. The positive polarity of the output is the lower right lug, and the return is on the upper left when viewed from the output end. In order to minimize parasitic cable inductance and reduce EMI, the output power cables should be routed in close proximity to one another, and large current loops should be avoided. To avoid excessive voltage drop, do not undersize load cables, especially for high current outputs. Excessive cable inductance, coupled with large capacitive loading, can introduce instability in switching power supplies. This problem can be avoided with proper system design. Consult Mission Power Solutions' Engineering Department for assistance with applications that use long cable lengths and excessive load capacitance.

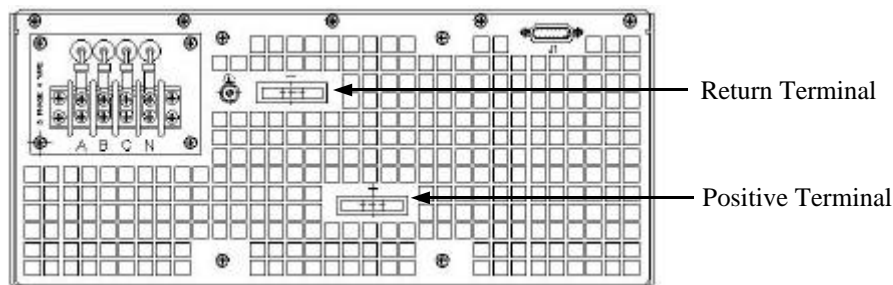


Figure 2. Output Connections for Javelin III

Signal Return (J1-1, 9)

Signal Return on J1-1 & 9 is an isolated secondary ground reference for all J1 interfacing signals.

Inhibit/Enable (J1-10 & J1-11)

The Inhibit/Enable control pins allow the output to be controlled with either “inhibit” or “enable” logic. Connecting Inhibit (J1-11) and Enable (J1-10) to ground causes the Javelin III to operate. With Inhibit (J1-11) open, the Javelin III will operate, and the Enable pin has no effect. Connecting Inhibit to ground and leaving Enable open will disable the output of the Javelin III. Refer to Table 2 (Pg. 3).

AC OK (J1-3)

AC OK is an active high TTL-compatible signal and provides a status indication of the AC input power. It is capable of sinking 16 mA maximum. This signal switches to a TTL “1” when the high voltage bus exceeds low-line condition during turn-on. Upon loss of input power, the bus voltage will drop, causing the AC OK signal to go low. A minimum of 3 ms holdup time is provided for a 3600W load following the loss of the AC OK signal.

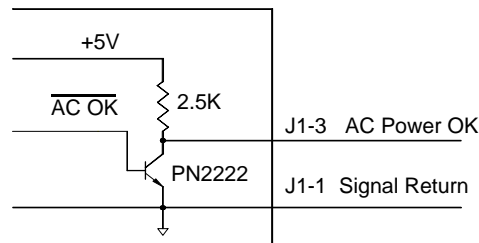


Figure 3. AC OK Output Circuit

Auxiliary Vcc +5V/0.3A (J1-2)

The Vcc on J1-2 is an auxiliary 5V regulated power source. It is +5Vdc +/- 5% with respect to Signal Return (J1-1 or J1-9) and can supply 300 mA maximum. It is short-circuit proof, but if shorted, all outputs will shut down through the Inhibit/Enable circuitry.

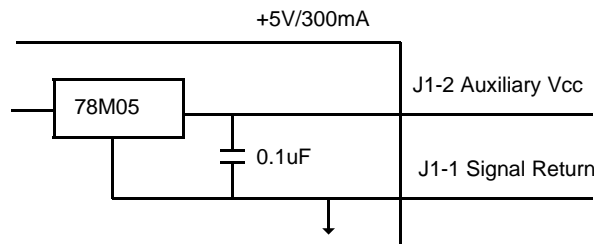


Figure 4. Auxiliary Vcc

Remote Sense

The Javelin III is shipped from the factory with Auto-Sense installed. If Remote Sense is desired, sense leads must be connected from J1-13 (+sense) and J1-14 (-sense) to the load point where regulation is required.

When Auto-Sense is used, the power supply will regulate the output at the output terminals. The voltage appearing at the load may drop slightly due to voltage drop in the power cables. If it is necessary to compensate for voltage drop along the output power cables, the output can be configured for Remote Sense. Use stranded, twisted pair 20-24 AWG wire for the Remote Sense lines. Remote Sense can compensate for a voltage drop of up to 0.5V, or 0.25V on each leg. For trim capabilities, consult Mission Power Solutions' Engineering Department.

DC OK/DC OK' (J1-7 and J1-8)

DC OK and DC OK' are logic signals provided to indicate with either TTL logic "1" or "0" that the correct output voltage is available. DC OK (J1-7) is a logic "1" when output voltage is within specification and a logic "0" when output is out of tolerance. A logic "0" is capable of sinking 16 mA in either circuit. The inverse signal, DC OK', is available at J1-8. The circuit is operated with a +5V_{cc} provided by either the customer or taken from J1-2 (+5V V_{cc}) and J1-1 (+5V Return).

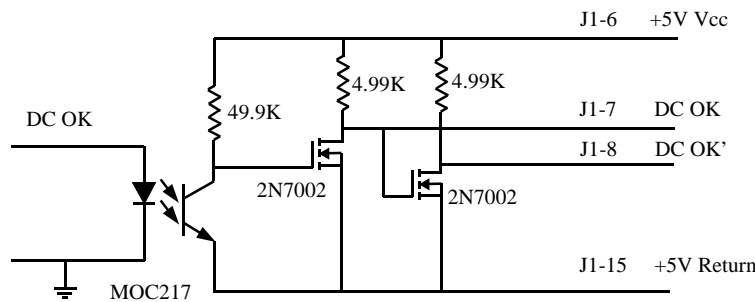


Figure 5. DC OK Circuit

Mechanical Considerations

The Javelin III can be mounted on either of two surfaces (top or bottom) using standard 8-32 size screws. Maximum allowable torque is 20 in/lbs., and the maximum penetration is 0.21 in. (5,33mm).

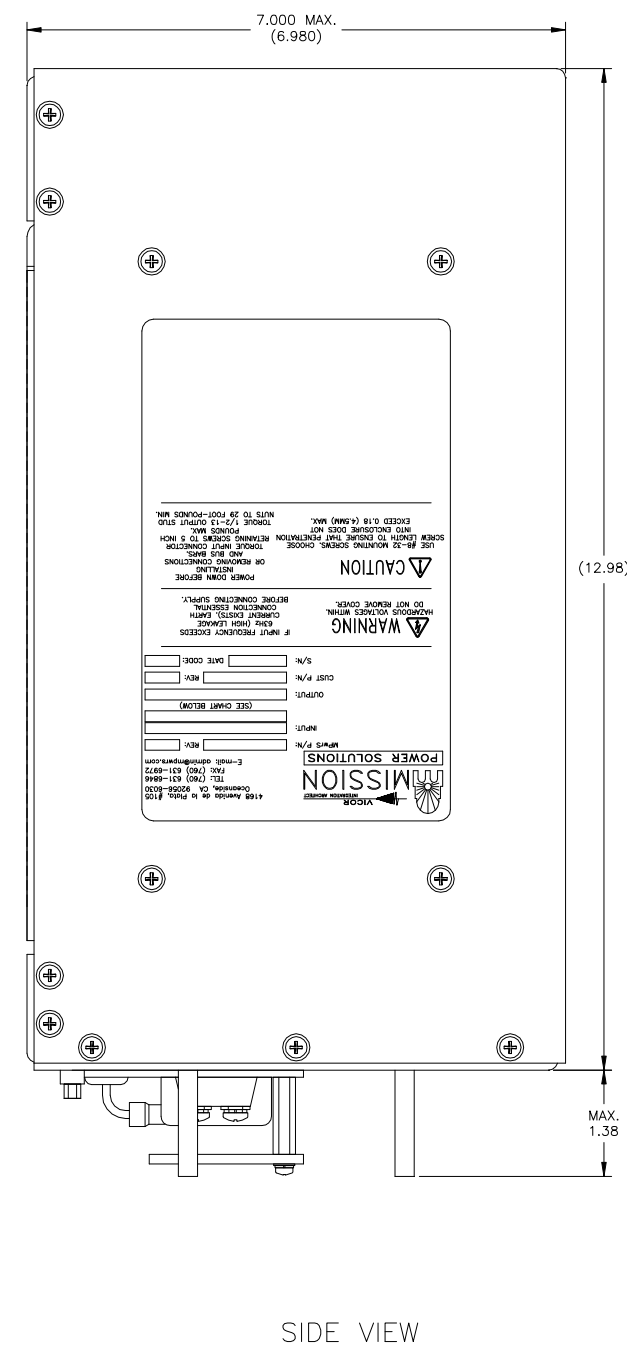
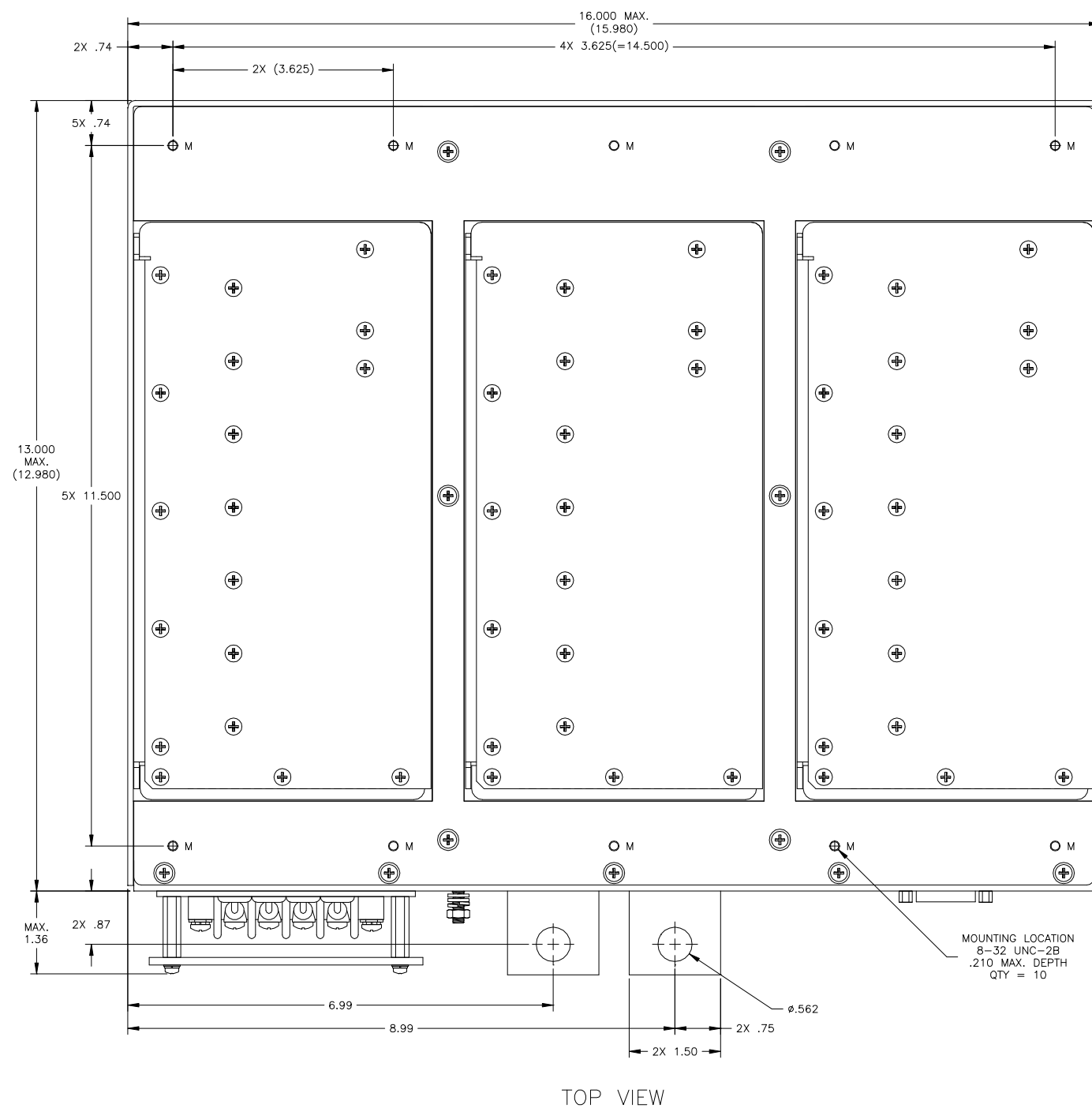
When selecting a mounting location and orientation, the unit should be positioned so that airflow is not restricted. Maintain a 2" (50,8mm) minimum clearance at both ends of the Javelin III, and route all cables so airflow is not obstructed. The power supply draws air in at the front side and exhausts air out the load/input side. If airflow ducting is used, avoid sharp turns that could create backpressure. The 3 fans move approximately 270 to 300 CFM of air.

Avoid excessive bending of output power cables after they are connected to the output terminals. For high-current outputs, use cable ties to support heavy cables and minimize mechanical stress on connectors. The maximum torque recommended on output bolts and nuts is 10 ft/lbs.

Javelin III Do's and Don'ts

- Run the output (+/-) power cables next to each other to minimize inductance.
- Insert proper fault protection at power supply input terminals (i.e., a fuse or circuit breaker).
- Use proper size wires to avoid overheating and excessive voltage drop.
- Do not attempt to repair or modify the power supply in any manner.
- **Do not restrict airflow to the unit.** The cooling fans draw air into the front of the unit and force it out at the input/output terminal (rear) side.

Mechanical Drawing - Javelin III



Specifications

(Typical at 25°C, nominal line and 75% load, unless otherwise specified)

General

Number of Outputs	1
Efficiency	>75%
Safety Approvals	N/A
MIL-STD's	461E; 704E; 810E; 1399
Maximum Output Power	2400W, 115 Vac 3600W, 230 Vac 5400W, 230 Vac (Selected Output Voltages)

Input

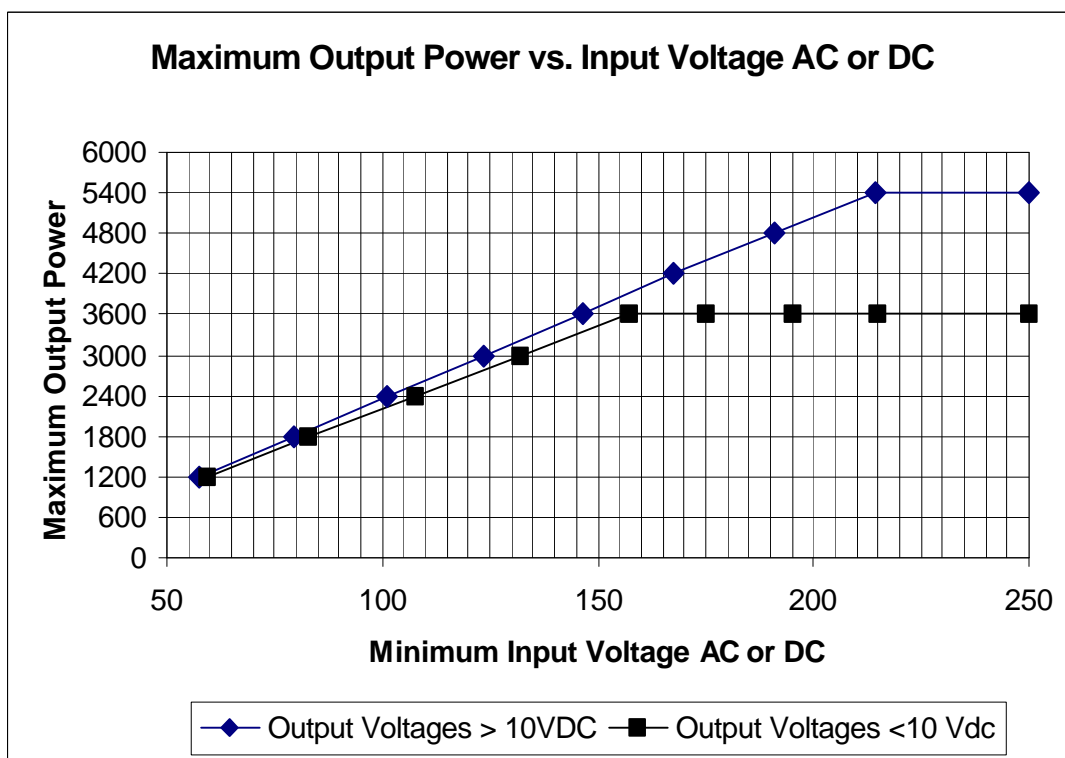
Input	85-254 Vac, 47-500Hz 85-380 Vdc
Line Regulation	± 0.2% from 10% load to full load
Inrush Current	90A rms. max. @ 115 Vac 180A rms. max. @ 230 Vac 60A rms. Max @ 230 Vac, three phase
Ride-Through Time	20 ms at 3600W load
Conducted EMI	FCC Class A, EN 55022 Class B MIL-STD-461E
Power Factor	.99 (115 Vac 800W load) .95 (230 Vac 1200W load)
Transient Surge	IEC 801-5 level 3 (Common Mode & Normal Mode)
Dielectric Withstand	Primary to Chassis GND = 2121 Vac Primary to Secondary = 4242 Vdc Secondary to Chassis GND = 50 Vdc

Output

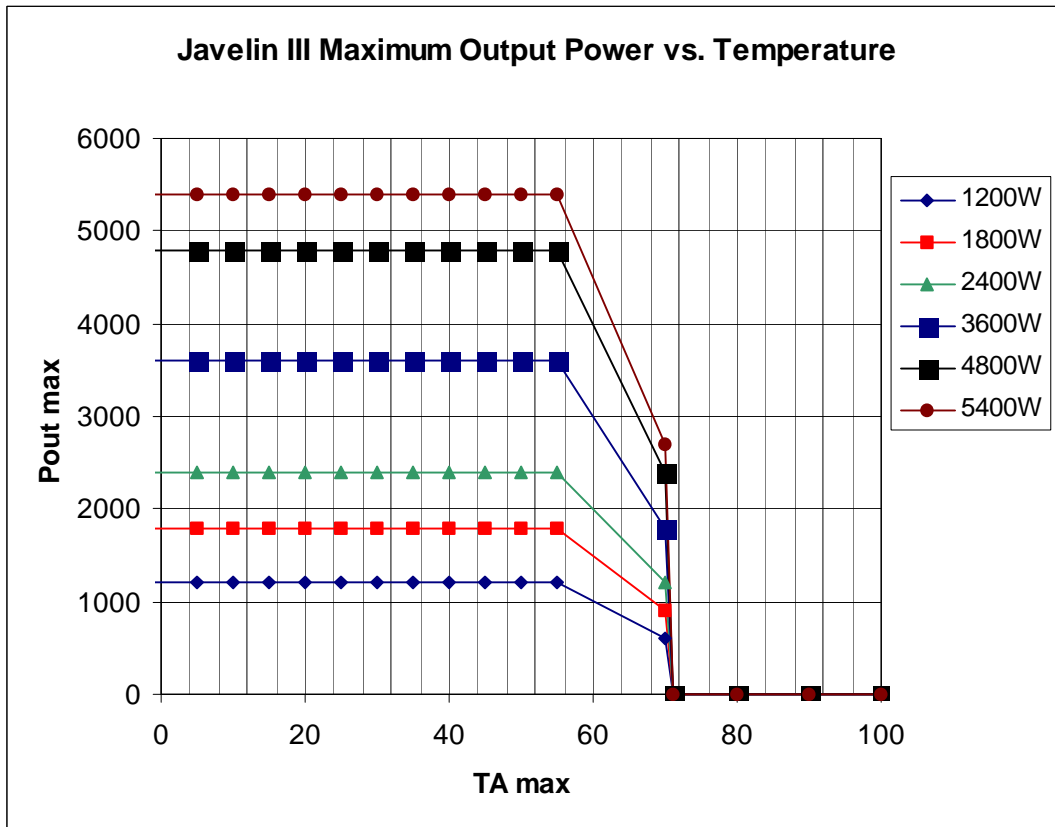
Parameter	MIN.	TYP.	MAX.	UNITS	NOTES
Setpoint Accuracy		±0.5	±1	% of V _{NOM}	
Load/Line Regulation		±0.02	±0.2	% of V _{NOM}	0% to 100%
Temperature Regulation		0.002	0.005	%/°C	-20 to 100°C
Long Term Drift		0.02		%/1K hours	
Output Ripple – pp:					
2V, 3.3V		100		mV	20 MHz bandwidth
5V		2		%	20 MHz bandwidth
12-95V		1		%	20 MHz bandwidth
Trim		N/A			Consult Factory
Total Remote Sense Compensation	0.5			Volts	0.25V max. each leg
OVP Set Point	112		135	% of V _{NOM}	Recycle power
Current Limit	102		135	% of I max	Automatic restart
Over-Temperature Protection					Varies according to power level

Environmental

MIL-STD	810E
Storage Temperature	
C Grade	-40°C to +125°C
T Grade	-40°C to +125°C
H Grade	-55°C to +125°C
M Grade	-65°C to +125°C
Operating Temperature	
C Grade, Full Power	-20°C to +55°C
C Grade, Half Power	-20°C to +70°C
T Grade, Full Power	-40°C to +55°C
T Grade, Half Power	-40°C to +70°C
H Grade, Full Power	-40°C to +55°C
H Grade, Half Power	-40°C to +70°C
M Grade, Full Power	-55°C to +55°C
M Grade, Half Power	-55°C to +70°C
Product Weight	45.50 lbs.
Dimensions	7.0" H (177,8mm) x 16.0" W (406,4mm) x 13.0" L (330,2mm) (See Outline Drawing)
Warranty	1 Year Limited



Graph 1. Maximum Output Power Vs. Input Voltage



Graph 2. Maximum Output Power Vs. Temperature

Notes
