

**500 & 750 Watt  
AC Mid Power  
Modular Power Supplies**



Modular series product specification

model **Ax5-zzzz-nnnn (4 Slots)**

- where A = AC Power Input (90-264VAC)
- x = S for 8" model, or C for 9" model
- 5 = 500W Max. Output Power
- z = an alpha-numeric character designating choice of output modules
- n = an optional suffix indicating add-on semi-custom options. Inquire with APS

model **Ax7-zzzzz-nnnn (6 Slots)**

- where A = AC Power Input (90-264VAC)
- x = S for 8.25" model C for 9" model
- 7 = 750W Max. Output Power
- z = an alpha-numeric character designating choice of output modules
- n = an optional suffix indicating add-on semi-custom options. Inquire with APS

Specifications are subject to change without notice.

Unless otherwise stated , continued are at rated load, nominal Vdc out, 115Vac 60Hz line, 25°C ambient.

General

Parameter	Conditions	Limits
Maximum Output Loading	5" wide model, 4 modules 7.5" wide model, 6 modules	500 Watts average 750 Watts average
Input Voltage	All models	90-264 Vac, 47-63 Hz
Inrush Current	90VAC-264VAC at 20C 10 Second cool-down time required	<30Apk
Start-up Delay		< 1.5 sec
Input Fusing		provided on board
Conducted & Radiated EMI	FCC Part 15 CISPR 22 quasi-peak and average	class A class A
Switching Frequency	All modules	120KHz nominal
Power Factor	All models All models line current harmonics	0.99 (typical) at full rated load, 115 Vac, 60 Hz IEC1000-3-2 (IEC555-2) Class A waveform
ESD Immunity	IEC1000-4-2, 4kV contact / 8kV air dis-charge	Designed to pass when installed in users end system
Immunity to Radiated EMI	IEC1000-4-3, 10V/m field strength, 80M-1GHz	Designed to pass when installed in users end system
Fast Transient Bursts	IEC1000-4-4, 1kV mains, 5/50nsec, 5k pulse/sec	Designed to pass when installed in users end system
AC Line Surge	IEC1000-4-5 and IEEE C62.41, 2kV comm. 1kV diff.	Designed to pass when installed in users end system
Immunity to Conducted EMI	IEC1000-4-6, 10V 15-80MHz	Designed to pass when installed in users end system
Voltage Dips & Interruptions	IEC1000-4-11	Designed to pass when installed in users end system
Hold-Up Time	90 - 264 Vac (full load) Hold-up time is proportionally longer at less load.	> 20 m sec from last AC line peak

General, continued

AC Power Fail Warning	AC Fail warning before DC output loses regulation. Indication of AC "good":	> 3 m sec  470 $\Omega$ internal pull-up to 5V AUX <0.8V sinking 2mA to AUX RETURN
5V AUX Output	Useful for circuits that drive Sysytem Inhibit. Floating output can be grounded to any DC output in the user's system.	5Vdc +/- 5% tolerance, 100mA max
System Inhibit	Apply 5Vdc to INH+ with INH- grounded at AUXRTN.	Shuts down all modules to zero output. 5V AUX remains on. Fan stops during inhibit
Efficiency	depends on output module configuration	70% typical
Safety Agency Approvals, see output selection	UL60950 3rd Edition CSA 60950 3rd Edition TUV EN60950 3rd Edition	AX7: CSA/CUS, TUV AX5: CSA/CUS, TUV
Hi-pot	Input - Output (per safety agency) Input - Chassis (per safety agency)	4.25KVdc for 1 minute 2.12KVdc for 1 minute
Earth Leakage Current	264Vac, 63Hz	<1.75mA
Operating Temperature	All models	0°C - 50°C, de-rate o/p currents and total power to 50% @ 70°C
Over-temperature Protection	blocked fan or high ambient air temperature	Outputs are inhibited. Fan power and 5V AUX continue.
Fan		Dual ball bearing, 19CFM, 12Vdc, 60mm, 50,000hrs.
Air Flow Direction		Intake through fan, exhaust out DC end
Storage Temperature		- 25°C to 85°C
Reletive Humidity	non-condensing	0% - 95%
Altitude	operating non-operating	< 10,000 ft above sea level < 50,000 ft above sea level
Dimensions	length, model AC5- / AC7- length, model AS5- length, model AS7- width height	9.0" 8.0" 8.25" 5.0" 4 Slots (500Watt), 7.5" 6 Slots (750Watt) 2.5"
Mounting	4 Slot 500W model: 6 Slot 750W model: see outline / mounting drawing for locations	#8-32 UNC, 0.25" max penetration (M4 x0.7 available) M4 x 0.7, 6.35mm max penetration (#8-32 UNC available)
Weight	4 Slot 500W model: 6 Slot 750W model:	< 4 lbs. < 6 lbs.
Shock and Vibration	Mil Std 810E	designed to meet
AC Input Terminals		Line, Neutral, and Field Ground on 7/16" spacing barrier strip with captive clamps for wire or lugs
DC Output Terminals	standard: custom:	#6-32 Phil-slot screw terminals on 0.4" spacing. Inquire to APS.

**Output Modules**

Parameter	Conditions					
Module Designation		<b>A</b>	<b>B</b>	<b>C</b>	<b>I</b>	<b>P</b>
Nominal Output Voltage	user connected for +/- polarity as desired	2V	2V	2V	2.5V	2.5V
Rated Output Current		35A	25A	12A	35A	25A
Max. Continuous Watts	( ++ )	70W	50W	24W	87.5W	62.5W
Voltage Adjust Setpoint	factory standard, consult APS for custom pre-sets	1.980-2.020	1.980-2.020	1.980-2.020	2.475-2.525	2.475-2.525
Voltage Adjust Range		1.8-2.2	1.8-2.2	1.8-2.2	2.25-2.75	2.25-2.75
Load Regulation	no load-rated load, @ term: with Remote Sense:	<2.5% <0.2%	<2.5% <0.2%	<2.5% <0.2%	<2.0% <0.2%	<2.0% <0.2%
Line Regulation	90- 132 / 180- 264 Vac	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%
Cross Regulation	from other modules	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%
Ripple & Noise	20MHz BW measure differential noise at load end of cable	50mVpp	50mVpp	50mVpp	50mVpp	50mVpp
Overvoltage Protection Latching Shutdown	Reset by cycling AC line	2.7-3.3	2.7-3.3	2.7-3.3	3.3-4.0	3.3-4.0
Overload Current Limit	Instantaneous	<52.5A	<37.5A	<18A	<52.5A	<37.5A
Short Circuit Current		<35A rms	<25A rms	<18A rms	<35A rms	<37.5A rms
Overload Protection		Survive any overload including short circuit, automatic recovery when load fault is removed.				
Temperature Coefficient	after 30 min. warm up	0.07% / °C	0.07% / °C	0.02% / °C	0.07% / °C	0.07% / °C
Remote Sense		Yes	Yes	Yes	Yes	Yes
DC OK Signal	logic 1 = "OK" logic 0 = "NOT OK"	1.92<Vo<2.39 2.53<Vo<1.80	Yes	No	2.4<Vo<3.0 3.3<Vo<2.0	Yes
Current Share / Monitor		Yes	Yes	No	Yes	Yes
Safety Agency Approvals	UL, CSA, TUV	Yes	Yes	Pending	Yes	Yes

**Output Modules**

Parameter	Conditions					
Module Designation		D	E	F	G	H
Nominal Output Voltage	user connected for +/- polarity as desired	3.3V	3.3V	3.3V	5V	5V
Rated Output Current		35A	25A	12A	35A	25A
Max. Continuous Watts	( ++ )	115.5W	82.5W	40W	175W	125W
Voltage Adjust Setpoint	factory standard, consult APS for custom pre-sets	3.267-3.333	3.267-3.333	3.267-3.333	4.950-5.050	4.950-5.050
Voltage Adjust Range		3.0-3.6	3.0-3.6	3.0-3.6	4.5-5.5	4.5-5.5
Load Regulation	no load-rated load, @ term: with Remote Sense:	<1.5% <0.2%	<1.5% <0.2%	<1.5% <0.2%	<1% <0.2%	<1% <0.2%
Line Regulation	90- 132 / 180- 264 Vac	<0.2%	<0.2%	<0.2%	<0.1%	<0.1%
Cross Regulation	from other modules	<0.2%	<0.2%	<0.2%	<0.1%	<0.1%
Ripple & Noise	20MHz BW measure differential noise at load end of cable	50mVpp	50mVpp	50mVpp	50mVpp	50mVpp
Overvoltage Protection Latching Shutdown	Reset by cycling AC line	4.2-4.9	4.2-4.9	4.2-4.9	5.9-6.7	5.9-6.7
Overload Current Limit	Instantaneous	<52.5A	<37.5A	<18A	<52.5A	<37.5A
Short Circuit Current		<35A rms	<25A rms	<18A rms	<35A rms	<25A rms
Overload Protection		Survive any overload including short circuit, automatic recovery when load fault is removed.				
Temperature Coefficient	after 30 min. warm up	0.07% / °C	0.07% / °C	0.02% / °C	0.07% / °C	0.07% / °C
Remote Sense		Yes	Yes	Yes	Yes	Yes
DC OK Signal	logic 1 = "OK" logic 0 = "NOT OK"	3.2<Vo<3.9 4.2<Vo<2.9	3.2<Vo<3.9 4.2<Vo<2.9	No	4.9<Vo<5.5 5.9<Vo<4.5	4.9<Vo<5.5 5.9<Vo<4.5
Current Share / Monitor		Yes	Yes	No	Yes	Yes
Safety Agency Approvals	UL, CSA, TUV	Yes	Yes	Pending	Yes	Yes

**Output Modules**

Parameter	Conditions					
Module Designation		<b>J</b>	<b>K</b>	<b>L</b>	<b>M</b>	<b>N</b>
Nominal Output Voltage	user connected for +/- polarity as desired	5V	9V	12V	12V	15V
Rated Output Current		12A	13A	12.5A	5A	8A
Max. Continuous Watts	( ++ )	60W	117W	150W	60W	120W
Voltage Adjust Setpoint	factory standard, consult APS for custom pre-sets	4.950-5.050	8.910-9.090	11.880-12.120	11.880-12.120	14.850-15.150
Voltage Adjust Range		4.5-5.5	8.1-9.9	10.8-13.2	10.8-13.2	13.5-16.5
Load Regulation	no load-rated load, @ term: with Remote Sense:	<1% <0.2%	<1% <0.2%	<0.5% <0.2%	<0.5% <0.2%	<0.5% <0.2%
Line Regulation	90- 132 / 180- 264 Vac	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Cross Regulation	from other modules	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Ripple & Noise	20MHz BW measure differential noise at load end of cable	50mVpp	90mVpp	100mVpp	100mVpp	100mVpp
Overvoltage Protection Latching Shutdown	Reset by cycling AC line	5.9- 6.7	10.2-11.4	14.7-15.6	13.4-15.0	18.0-20.0
Overload Current Limit	Instantaneous	<18A	<19.5A	<19A	<7.5A	<19.2A
Short Circuit Current		<18A rms	<13A rms	<19A rms	<7.5A rms	<19.2A rms
Overload Protection		Survive any overload including short circuit, automatic recovery when load fault is removed.				
Temperature Coefficient	after 30 min. warm up	0.02% / °C	0.07% / °C	0.07% / °C	0.02% / °C	0.07% / °C
Remote Sense		Yes	Yes	Yes	Yes	Yes
DC OK Signal	logic 1 = "OK" logic 0 = "NOT OK"	No	8.75<Vo<9.50 10.20<Vo<8.15	11.7<Vo<13.6 13.4<Vo<10.9	No	14.4<Vo<16.8 18.0<Vo<13.2
Current Share / Monitor		No	Yes	Yes	No	Yes
Safety Agency Approvals	UL, CSA, TUV	Pending	Yes	Yes	Pending	Yes

**Output Modules**

Parameter	Conditions					
Module Designation		<b>R</b>	<b>S</b>	<b>T</b>	<b>Q</b>	<b>U</b>
Nominal Output Voltage	user connected for +/- polarity as desired	18V	24V	28V	36V	48V
Rated Output Current		7A	5A	5A	4A	3A
Max. Continuous Watts	( ++ )	126W	120W	140W	144W	144W
Voltage Adjust Setpoint	factory standard, consult APS for custom pre-sets	14.850-15.150	23.760-24.240	27.720-28.280	35.640-36.360	47.520-48.480
Voltage Adjust Range		16.2-19.8	21.6-26.4	25.2-30.8	32.4-39.6	43.2-52.8
Load Regulation	no load-rated load, @ term: with Remote Sense:	<0.5% <0.2%	<0.5% <0.2%	<0.5% <0.2%	<0.5% <0.2%	<0.5% <0.2%
Line Regulation	90- 132 / 180- 264 Vac	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Cross Regulation	from other modules	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Ripple & Noise	20MHz BW measure differential noise at load end of cable	100mVpp	100mv Vpp	100mVpp	100mVpp	100mVpp
Overvoltage Protection Latching Shutdown	Reset by cycling AC line	21.66-23.94	29.0-32.0	33.25-36.75	41.0-47.0	54.0-62.0
Overload Current Limit	Instantaneous	<10.5A	<12A	<10.5A	<6A	<4.5A
Short Circuit Current		<10.5A rms	<12A rms	<10.5A rms	<4A rms	<4.5A rms
Overload Protection		Survive any overload including short circuit, automatic recovery when load fault is removed.				
Temperature Coefficient	after 30 min. warm up	0.07% / °C	0.07% / °C	0.07% / °C	0.07% / °C	0.07% / °C
Remote Sense		Yes	Yes	Yes	Yes	Yes
DC OK Signal	logic 1 = "OK" logic 0 = "NOT OK"	17.30<Vo<20.04 21.72<Vo<15.82	23.52<Vo<25.00 27.00<Vo<21.60	27.40<Vo<29.12 31.54<Vo<25.30	35.4<Vo<38.0 41.0<Vo<33.0	47.04<Vo<50.00 54.00<Vo<43.20
Current Share / Monitor		Yes	Yes	Yes	Yes	Yes
Safety Agency Approvals	UL, CSA, TUV	Yes	Yes	Yes	Yes	Yes

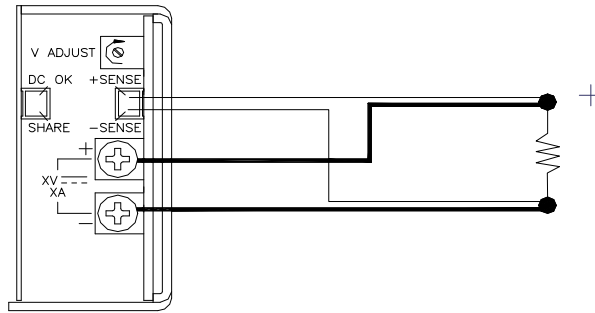
**Dual Output Modules: These modules are designed for balanced loads & operate with total output voltage regulated**

Parameter	Conditions	V	W	X	Y
<b>Module Designation</b>		<b>V</b>	<b>W</b>	<b>X</b>	<b>Y</b>
Nominal Output Voltage	+ & - polarity have an un-grounded common terminal	+5V & -5V	+12V & -12V	+15V & -15V	+24V & -24V
	load can be connected from + to -, for output Vdc:	10V	24V	30V	48V
Rated Output Current		12A / 12A	5A / 5A	4A / 4A	2.5A / 2.5A
Max.Continuous Watts	++	120W	120W	120W	120W
Voltage Adjust Setpoint	at + & - rated load: factory standard, consult APS for custom pre-sets	4.950-5.050	11.880-12.120	14.850-15.150	23.760-24.240
Voltage Adjust Range		4.5-5.5	10.8-13.2	13.5-16.5	21.6-26.4
Load Regulation	No load-rated load, @ term.	<5%	<5%	<5%	<5%
Cross Regulation See note 1	From other polarity, No load-rated load	<5%	<5%	<5%	<5%
Cross Regulation	From other modules	<0.1%	<0.1%	<0.1%	<0.1%
Line Regulation	90 - 132 / 180-264 Vac	<0.1%	<0.1%	<0.1%	<0.1%
Ripple & Noise: measured from common to either output	20MHzBW measure differential noise at load end of cable	50mVpp	100mVpp	100mVpp	100mVpp
Overvoltage Protection, sensed from common to +ve terminal Latching Shutdown	Reset by cycling AC line, or a one second pulse to the System Inhibit	6.4-7.1	14.7-16.5	17.5-19.5	27.0-30.0
Overload current limit	Instantaneous	<18A	<7.5A	<6A	<3.75A
Short Circuit Current	Across + & - terminals	<36A rms	<15A rms	<12A rms	<7.5A rms
Overload Protection	Short on -VDC may activate OVP	Survive any overload including short circuit, automatic recovery when load fault is removed.			
Temperature Coefficient	after 30 minute warm-up	.02% / °C			
Remote Sense		No	No	No	No
DC OK Signal		4.7<Vo<5.7 6.1<Vo<4.3	Yes	Yes	23.5<Vo<25.0 27.0<Vo<21.6
Current Share / Monitor		No	No	No	No
Safety Agency Approvals	UL, CSA, TUV	Yes			

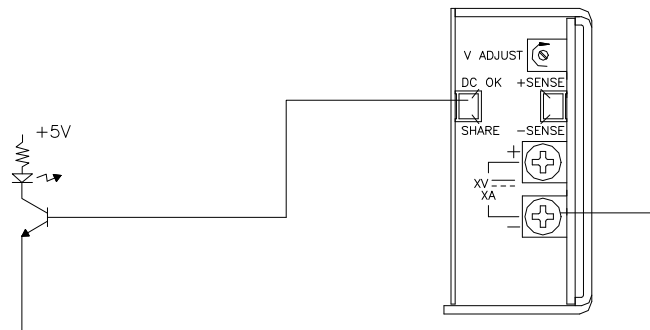
**Note 1. Load Regulation and Cross Regulation will nearly cancel each other when Loads are equal.  
(++) If output voltage is set above nominal, current must be de-rated to avoid exceeding max. power.**

# Application Notes

The remote sense feature feeds back into the voltage regulation of the module; the impedance of the feedback wire is not a factor. No RC or special network is needed. Just run 18-20 gauge wire along with load wires across the load. If multiple loads are in parallel, connect the remote sense wires to the common node.

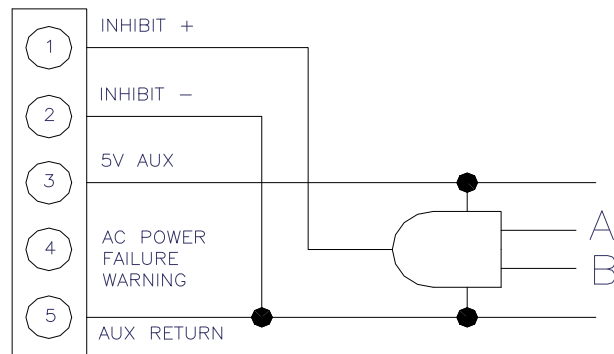


- There is NO adjustment for over-voltage protection. If the module is adjusted to a different voltage than Nominal, the OVP set point remains the same. They are independent of each other.
- When voltage sense lines are used with modules connected for current sharing, the voltage sense connectors of all shared modules must be connected together.
- When similar modules are connected together for current sharing, all the current share connectors must be connected together. Note that all modules in a current share mode of operation must have their output voltages adjusted to  $\pm 0.5\%$  of the nominal voltage before the current share, voltage sense terminals and output terminals are connected together.
- Never connect the common of the module(s) to chassis as ground. Typically the chassis will be grounded to earth ground, in which case all isolation is lost. This violates the safety agency approval of the supply, and can be potentially dangerous.
- For modules w/o remotes sense, the DC OK signal returns on same connector. Otherwise, the DC OK signal returns with common. This is a TTL level signal of less than 5 mA.

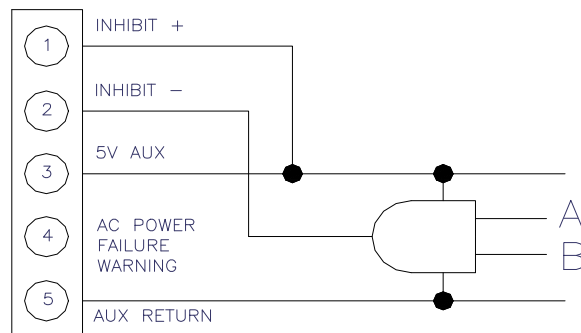


## Inhibit Function

The Inhibit Function allows the modules in the power supply to be shut down. The 5V AUX is always present, even when the module outputs are shut down by INHIBIT. The 5V AUX can supply up to 1A on the new units.



### Inhibit with a logic “HI”



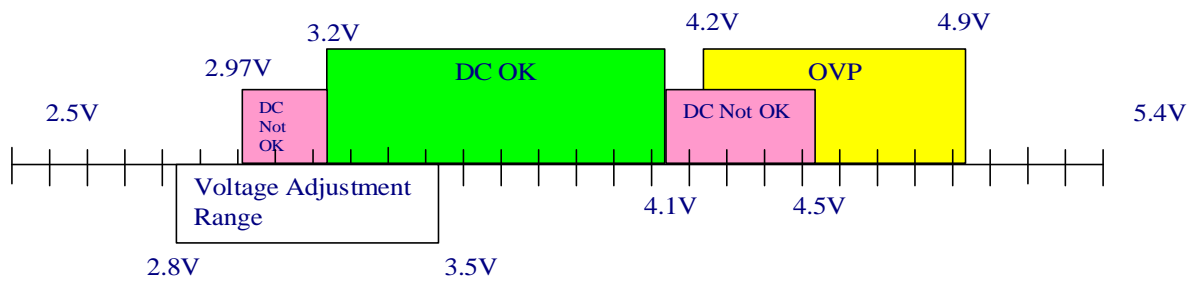
### Inhibit with a logic “LOW”

## Notes:

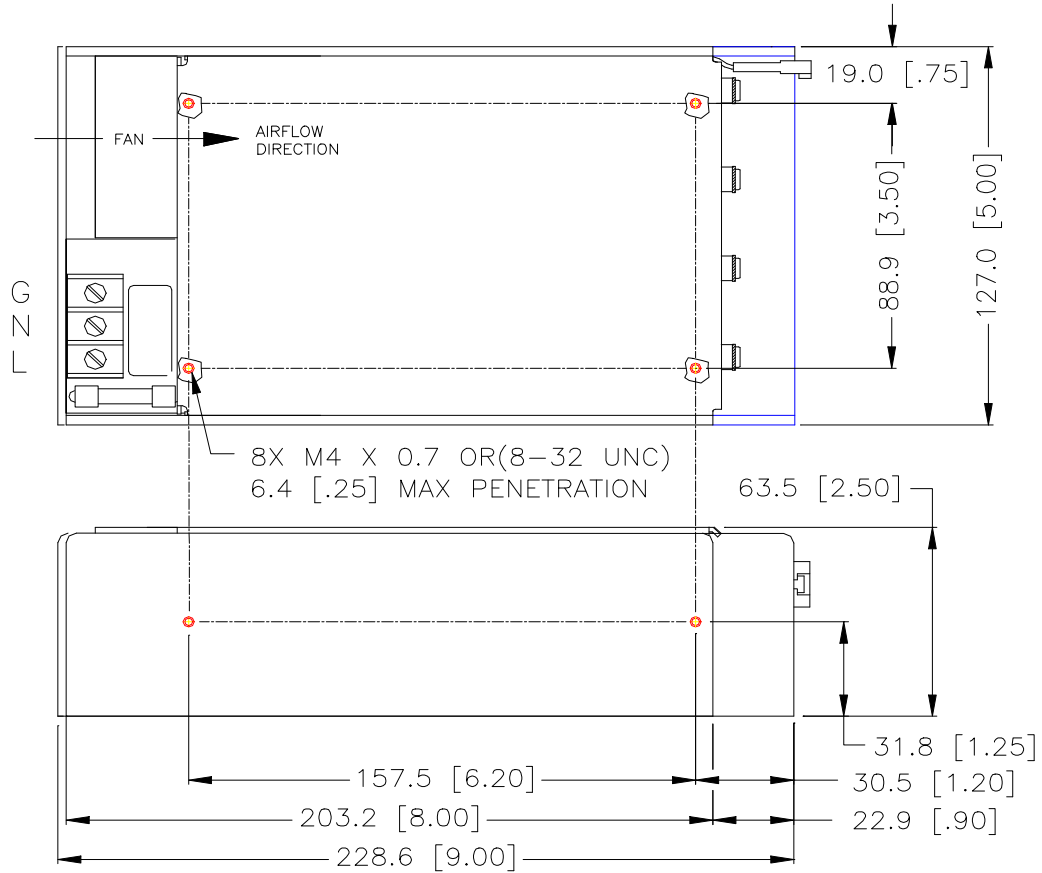
1. All single output modules are isolated and can be referenced as either positive or negative.
2. Each output can be used up to its rated capacity as long as the total unit wattage is Not exceeded.

## Sample Voltage Line, Module D (3.3V)

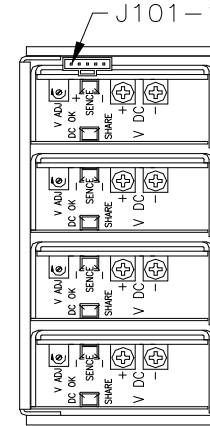
(see specification chart for the actual voltage ranges for your modules)



# MECHANICAL DRAWING MID POWER 500W



CHASSIS CONFIGURATION OPTIONAL  
CONTACT FACTORY FOR OPTIONS

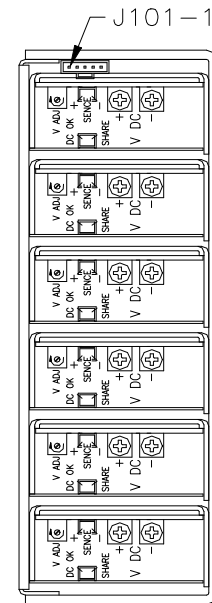
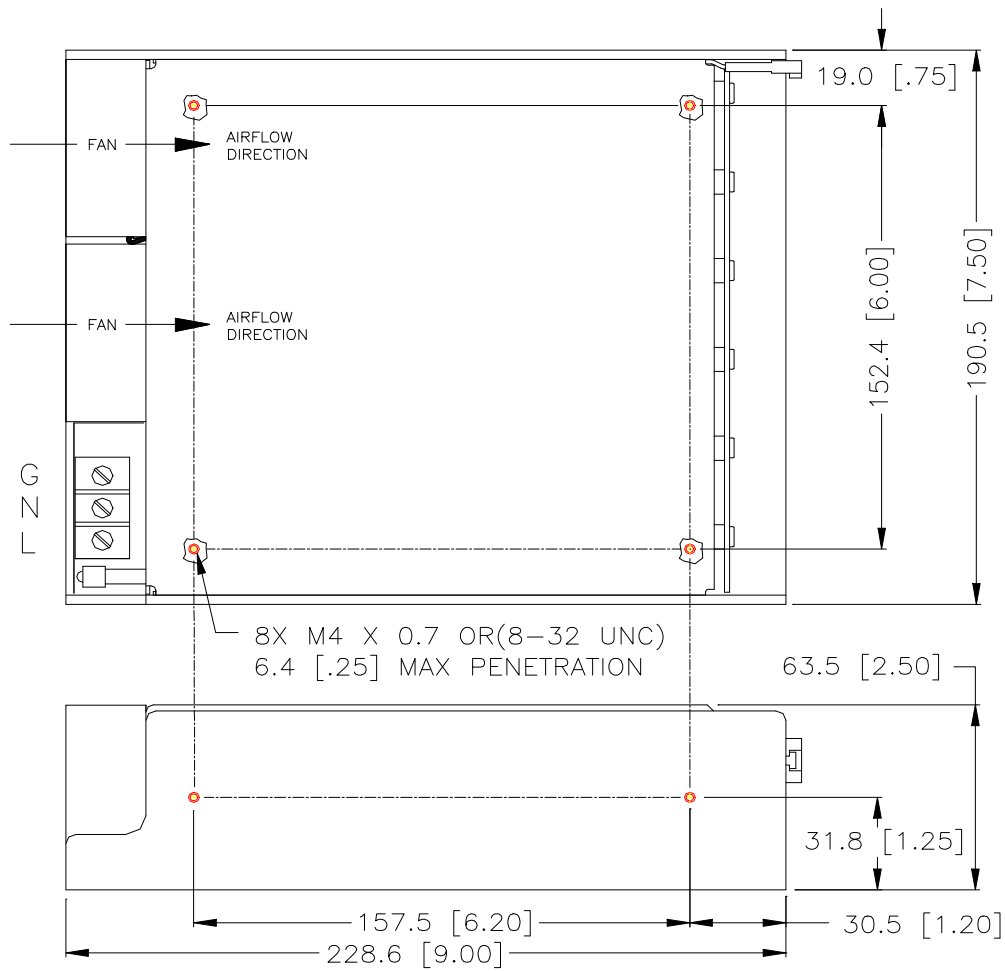


OUTPUT INTERFACE OPTIONS  
NOT SHOWN

J101 PINOUT  
 MOLEX #70107-0004  
 MATING: 70066-G SERIES.  
 PIN 70068 SERIES

PIN	SIGNAL
1	INHIBIT +
2	INHIBIT -
3	5V AUX
4	AC PF
5	AUX RTN

UNIT : mm [INCH]



OUTPUT INTERFACE OPTIONS NOT SHOWN

J101 PINOUT	
MOLEX #70107-0004	
MATING: 70066-G SERIES.	
PIN 70068 SERIES	
PIN	SIGNAL
1	INHIBIT +
2	INHIBIT -
3	5V AUX
4	AC PF
5	AUX RTN

UNIT : mm [INCH]