

Intelligent MP Series

Up to 1500 Watts

Total Power: Up to 1500 Watts
Input Voltage: 85 - 264 VAC
120-300 VDC
of Outputs: Up to 21

iMP™



Rev. 1.30.06
iMP Series
1 of 8

Special Features

- Full Medical EN60601 Approval
- Intelligent I²C Control
- Configurable Current Share on all outputs >10A
- Voltage adjustment on all outputs (Manual or I²C)
- Configurable Input and Output OK signals and indicators
- Configurable Inhibit/Enable
- Configurable Output UP/DOWN sequencing
- Intelligent fan (speed control/fault status)
- Customer Provided Air Option
- μ P Controlled PFC input with active Inrush protection
- I²C monitor of Voltage, Current, and Temp
- IPMI Compliant
- Programmable Voltage, Current Limit, Inhibit/Enable through I²C
- Optional Extended Hold-up Module (Semi F47 compliance)
- Power density increased by 50%
- Backward compatibility with standard MP
- External switching frequency sync input
- Optional Conformal Coating
- Industrial Temp Range
- No preload required

Electrical Specifications

Input

Input range	85-264 VAC; 120-350 VDC (Limited to 300VDC in medical applications)
Frequency	47-440 Hz
Inrush current	40A peak max. (soft start)
Efficiency	up to 85% @ full case load
Power Factor	0.99 typ. meets EN61000-3-2
Turn-on time	AC on 1.5 sec typ., Inhibit / Enable 150 ms typ. Programmable
EMI Filter	CISPR 22 / EN55022 Level "B"
Leakage current	300 μ A max. @ 240 VAC; 47-63Hz
Radiated EMI	CISPR 22 / EN55022 Level "B"
Holdover storage	20 ms minimum (independent of input VAC) additional 34mSEC holdover storage with optional HUP module (Semi F47 compatible)
AC OK	>5 ms early warning min. before outputs lose regulation. Programmable. Full cycle ride thru (50 Hz)
Harmonic distortion	Meets EN61000-3-2
Isolation	Meets EN60950 and EN60601
Global Inhibit/Enable	TTL, Logic "1" and Logic "0". Configurable.
Input fuse (internal)	iMP4: 10A; iMP8: 20A; iMP1: 20A (both lines fused)
Warranty	2 years



Output

Adjustment range*	±10% minimum all outputs (manual) (full module adjustment range using I ² C)
Margining	±4-6% nominal analog (single output module only)
Overall reg	0.4% or 20 mV max. (36W modules 4% max.)
Ripple	RMS: 0.1% or 10 mV, whichever is greater Pk-Pk: 1.0% or 50 mV, whichever is greater Bandwidth limited to 20 MHz
Dynamic response	<2% or 100 mV, with 25% load step
Recovery time	To within 1% in <300 µsec.
Overcurrent protection*	Configurable through I ² C. Single output module and main output of the dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current Triple output module internally protected
Short circuit protection	Protected for continuous short circuit Recovery is automatic upon removal of short
Overvoltage protection*	Configurable through I ² C
Single output module	2-5.5V 122-134% ; 6-60V 110-120%
Dual output module	2-6V 122-134% ; 8-28V 110-120%
Triple output module	No overvoltage protection provided
Reverse voltage protection	100% of rated output current
Thermal protection*	Configurable through I ² C All outputs disabled when internal temp exceeds safe operating range. >5 ms warning (AC OK signal) before shutdown
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Singlewire parallel	Configurable through firmware Current share to within 2% of total rated current
DC OK*	+/-5% of nominal. Configurable through I ² C
Minimum load	Not required
Housekeeping bias voltage	5 VDC @1.0Amp max. present whenever AC input is applied
Module inhibit*	Configured and controlled through I ² C
Switching frequency	250 kHz accepts external sync signal
Output/Output isolation	>1 Megohm, 500V
VME signal*	DC OK signal programmable through I ² C to function as POR signal

*Can be controlled via I²C

Environmental Specifications

Operating temperature	-40° to 70°C ambient. Derate each output 2.5% per degree from 50° to 70°C. (-20°C start up)
Storage temperature	-40°C to +85°C
Electromagnetic susceptibility	Designed to meet EN61000-4; -2, -3, -4, -5, -6, -8, -11 Level 3
Humidity	Operating; non-condensing 10% to 95% RH
Vibration	IEC68-2-6 to the levels of IEC721-3-2
MTBF demonstrated	>550,000 hours at full load, 220VAC and 25°C ambient conditions

Safety

UL	UL60950/UL2601
CSA	CSA22.2 No. 234 Level 5
VDE	EN60950/EN60601
BABT	Compliance to EN 60950/EN60601 BS 7002
CB	Certificate and report
CE	Mark to LVD

Output Module Line-up

Module Code	1	2	3	4	None
Module Type	Single	Single	Single	Dual	Triple
Max output power	210W	360W	750W	144W	36W
Max output current	35A	60A	150A	10A	2A
Output voltages available*	2-60V	2-60V	2-60V	5, 12-15, 28-30V 2-6, 12-15, 28-30V	8-15V 8-28V 2-28V
Standard voltage increments	25	25	25	19	18
Remote sense	Yes	Yes	Yes	Yes	Yes
Remote margin	Yes	Yes	Yes	No	No
V-Program - I ² C Control	Yes	Yes	Yes	Yes	Yes
Active Current Share	Yes	Yes	Yes	Yes	No
Module Inhibit - I ² C Control	Yes	Yes	Yes	Yes	Yes
Module Inhibit - Analog	Yes	Yes	Yes	No	No
Over voltage / Over current protection	Yes	Yes	Yes	Yes	Yes
Minimum load required	No	No	No	No	No
Slots occupied in any iMP case	1	2	3	1	1

*Programmable

Ordering Information

PARALLEL CODES							
Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	iMP4 available slots
Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1		iMP8 available slots
Slot 5	Slot 4	Slot 3	Slot 2	Slot 1			iMP1 available slots
7	6	5	4	3	2	1	
0 = no parallel							
1 = 1 & 2							
2 = 2 & 3							
3 = 3 & 4							
4 = 4 & 5							
5 = 3 & 4 & 5							
6 = 5 & 6							
7 = 4 & 5 & 6							
8 = 6 & 7							
9 = 3 & 4, 6 & 7							

Output Module Voltage/Current

Voltage	Voltage Code	Single Output Module Code			Dual Output		Triple Output			PC Adjustment Ranges
		1	2	3	V1	V2	V1	V2	V3	
2V	A	35A	60A	150A	—	10A	—	—	2A	1.8 - 6.1
2.2V	B	35A	60A	150A	—	10A	—	—	2A	
3V	C	35A	60A	150A	—	10A	—	—	2A	
3.3V	D	35A	60A	150A	—	10A	—	—	2A	
5V	E	35A	60A	150A	10A	10A	—	—	2A	
5.2V	F	35A	60A	150A	—	10A	—	—	2A	
5.5V	G	34A	58A	137A	—	10A	—	—	2A	
6.0V	H	23A	42A	80A	—	10A	—	—	2A	5.4 - 13.2
8.0V	I	20A	36A	80A	—	—	1A	1A	1A	
10V	J	18A	32A	75A	—	—	1A	1A	1A	
11V	K	17A	31A	68A	—	—	1A	1A	1A	
12V	L	17A	30A	62.5A	10A	4A	1A	1A	1A	
14V	M	14A	21A	53.5A	9A	4A	1A	1A	1A	12.6 - 22.0
15V	N	14A	20A	50A	8A	4A	1A	1A	1A	
18V	O	11A	19A	41.6A	—	—	—	0.5A	0.5A	
20V	P	10.5A	18A	37.5A	—	—	—	0.5A	0.5A	
24V	Q	8.5A	15A	31.3A	4A	2A	—	0.5A	0.5A	21.6 - 39.6
28V	R	6.7A	12.8A	26.8A	3A	2A	—	0.5A	0.5A	
30V	S	6.5A	12A	25A	—	—	—	—	—	
33V	T	6.2A	11A	22.7A	—	—	—	—	—	
36V	U	5.8A	10A	20.8A	—	—	—	—	—	37.8 - 60.0
42V	V	4.2A	7.5A	17.9A	—	—	—	—	—	
48V	W	4.0A	7.5A	15.6A	—	—	—	—	—	
54V	X	3.7A	6.0A	13.9A	—	—	—	—	—	
60V	Y	3.5A	6.0A	12.5A	—	—	—	—	—	
Non-std*	Z	Special Voltage - Consult Factory for specifications								

* Note: Increments of current not shown can be achieved by paralleling modules (add currents of each module selected).

Case Size	Module/Voltage/Option Codes	Case Option Codes	Software Code	Hardware Code
iMP1*	3L0 - 2E2 - 1Q1 - 4LL0	00	A	###
<p>Case Size (mm) 4 = 2.5" x 5" x 10"; 750W - 1100W, 5 Slots (63.5 x 127 x 254) 8 = 2.5" x 7" x 10"; 1000W - 1200W, 6 Slots (63.5 x 177.8 x 254) 1 = 2.5" x 8" x 11"; 1200W - 1500W, 7 Slots (63.5 x 203.2 x 279.4)</p> <p>* Note: Add "-E" after iMP4 to denote IEC input option. eg. iMP4-E-... (Not available on iMP8 or iMP1.)</p>	<p>Module Codes Module/Voltage/Option Codes Module Codes: (None) = 36W Triple O/P (1 slot) 1 = 210W Single O/P (1 slot) 2 = 360W Single O/P (2 slot) 3 = 750W Single O/P (3 slot) 4 = 144W Dual O/P (1 slot) 5 - 9 = Future</p> <p>Voltage Codes: See Output Module Voltage/Current table above</p> <p>Option Codes: 0 = Standard 1 = Module Enable 2 = Constant Current 3 - 9 = Future</p>	<p>Case Option Codes First Digit 0 - 9 = Parallel Code</p> <p>Second Digit 0 = No Options 1 = Reverse Air 2 = Extended Hold Up (1 slot)* 3 = Global Enable 4 = Fan Off w/Inhibit 5 = Opt 1 + Opt 3 6 = Opt 1 + Opt 4 7 = Opt 3 + Opt 4 8 = Opt 1 +3 +4 9 = Future *Meets Semi F47</p>	<p>Factory Assigned for Modified Standards Standard is "A" - Software Code "Blank" - Hardware Code</p>	

Drawings

iMP Modules

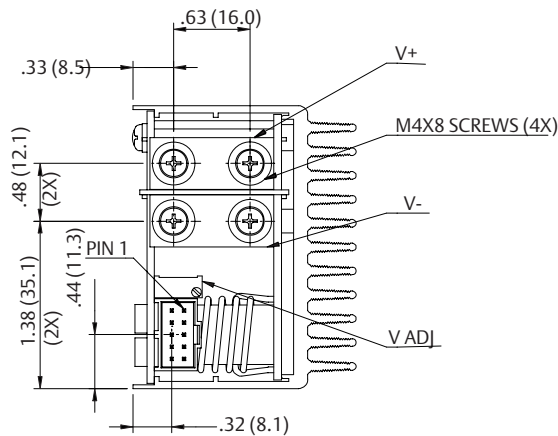
DC-DC Converter Output Modules

Control Signal Information, J1 Control Connector

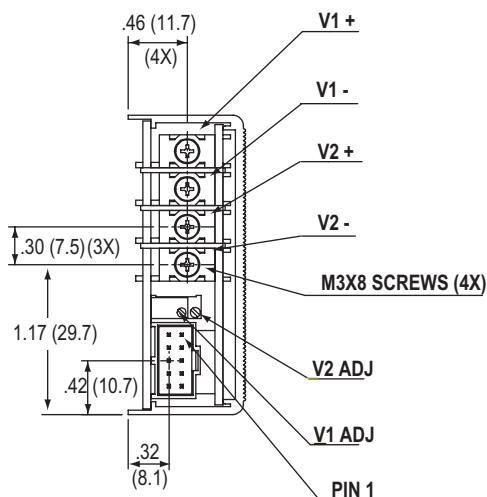
Pin No.	Function	
1	+ Remote Sense	single or dual o/p main
2	Remote Margin / V. Program	single o/p
3	Margin High	single o/p
4	- Remote Sense / Margin Low	single or dual o/p main
5	Spare	
6	Module, Isolated Inhibit	single or dual o/p
7	Module Inhibit return	single or dual o/p
8	Current Share (SWP)	single or dual o/p main
9	+ Remote Sense V2	dual o/p, single is spare
10	- Remote Sense V2	dual o/p, single is spare

*Note: All iMP modules have a green DCOK LED.

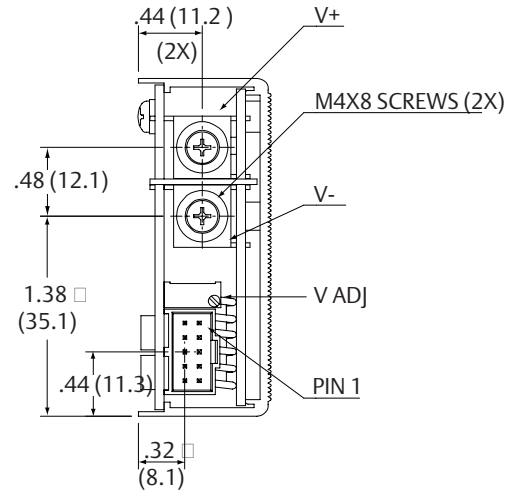
Single 360 Watt



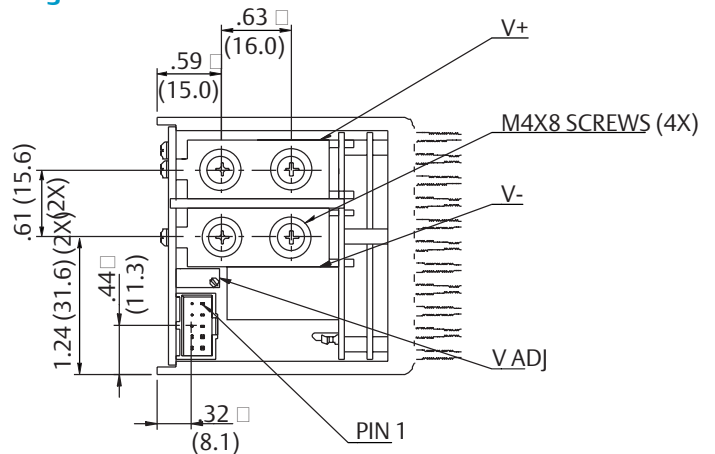
Dual 144 Watt



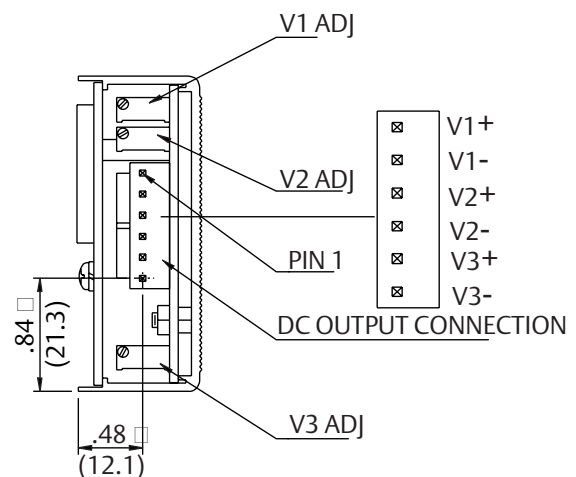
Single 210 Watt



Single 250 Watt



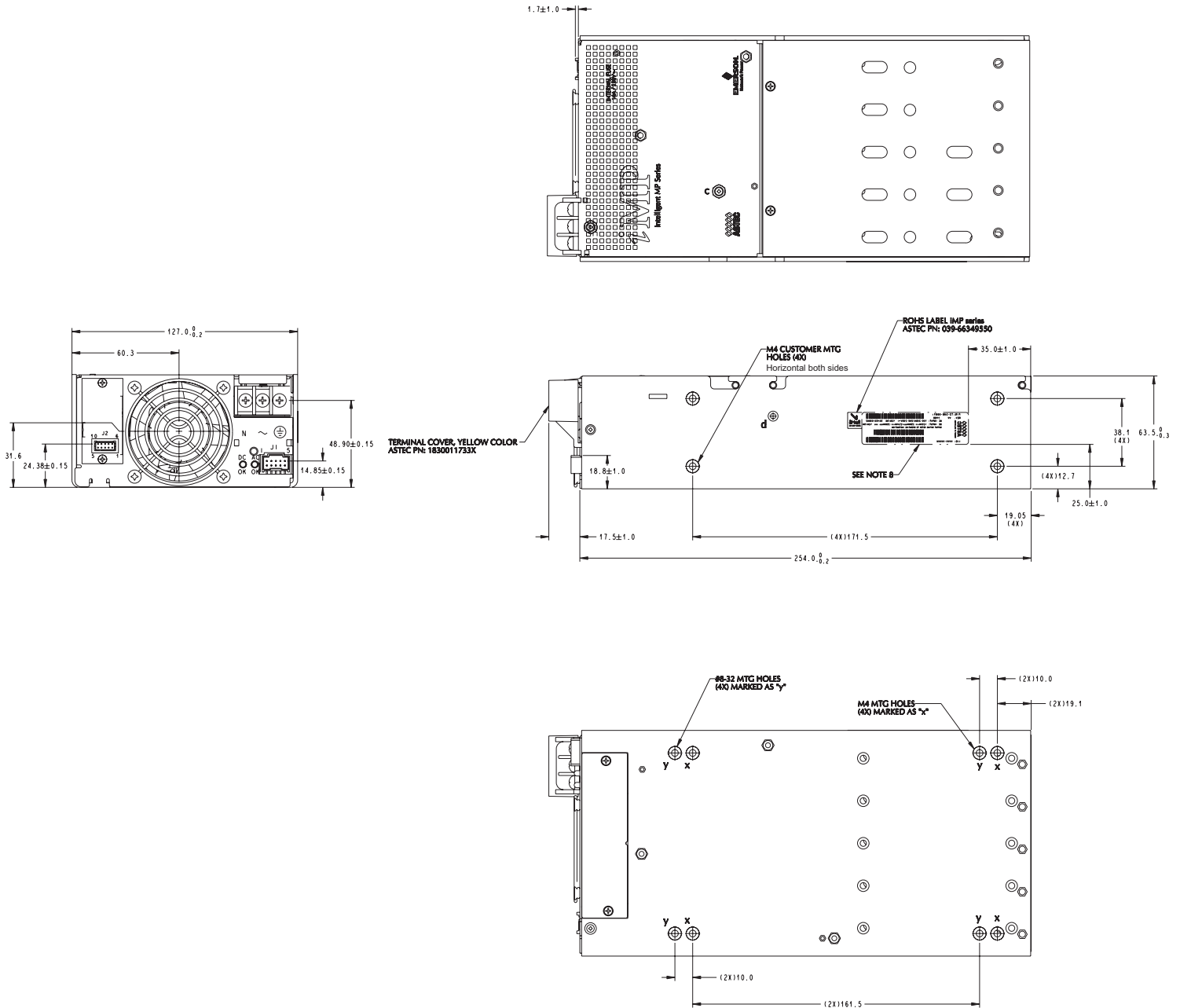
Triple 36 Watt



iMP Series
iMP4 (750/1100 Watts Max)

5-Inch Case Size: iMP4: 2.5" x 5" x 10" (63.5mm x 127mm x 254mm)
Weight: iMP4 Case: 2.6 lbs. • 36 W Triple: 0.5 lb. 210 W Single: 0.6 lb.
• 360 W Single 1.0 lb. • 600 W Single: 2.0 lbs. 144 W Dual: 0.6 lb.

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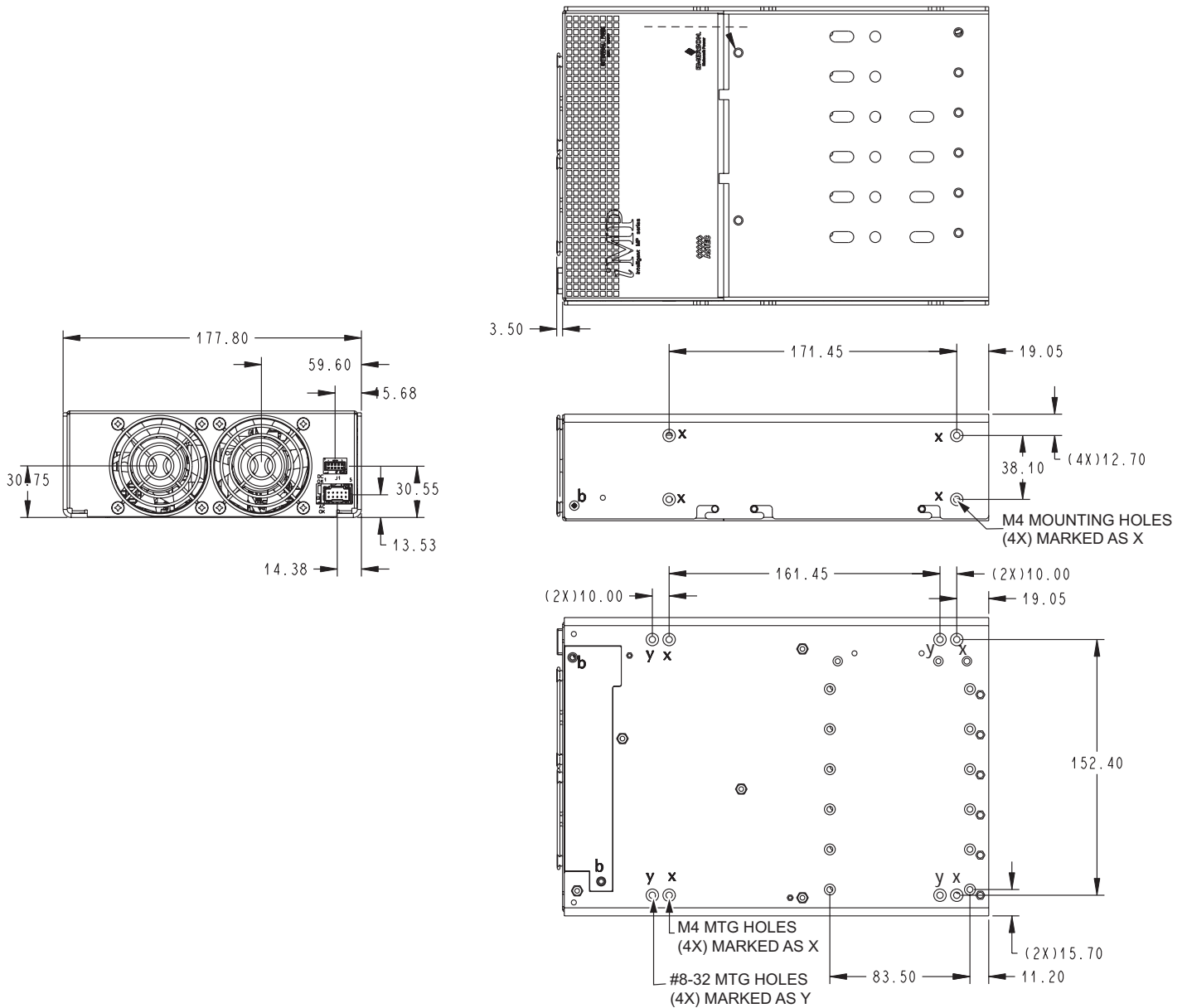
Notes

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C-Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, Astec part #70-841-004. J2 10 position housing (Landwin 2051P1000T). Mates with housing 205051000 (Landwin) with 2053T011P (Landwin) pins.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs. Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs. Triple O/P module is .045" square pins on .156" centers. Mates with Molex 09-50-8063 or equivalent.

iMP Series
iMP8 (1000/1200 Watts Max)

7-Inch Case Size: iMP8: 2.5" x 7" x 10" (63.5mm x 177.8mm x 254mm)
Weight: iMP8 Case: 4.1 lbs. • 36 W Triple: 0.5 lb. • 210 W Single: 0.6 lb.
• 360 W Single: 1.0 lb. • 600 W Single: 2.0 lbs. 144 W Dual: 0.6 lb.

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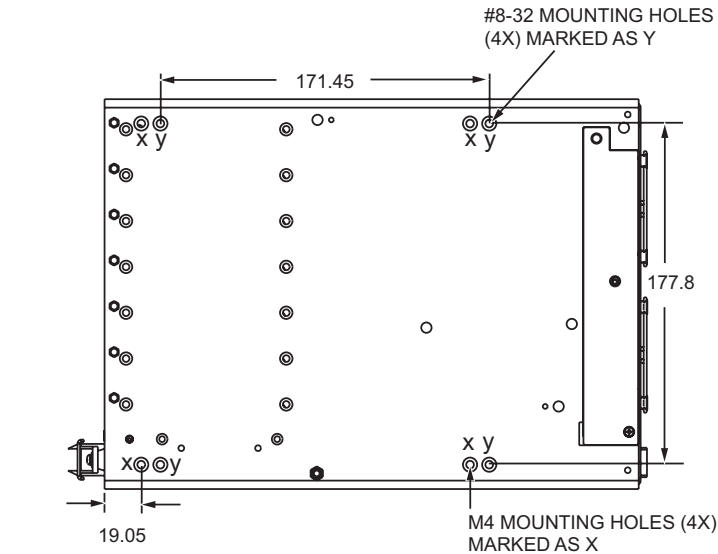
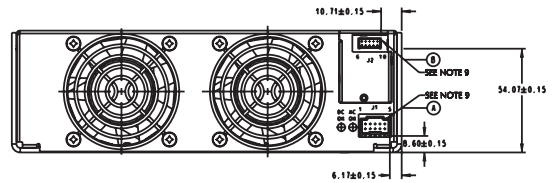
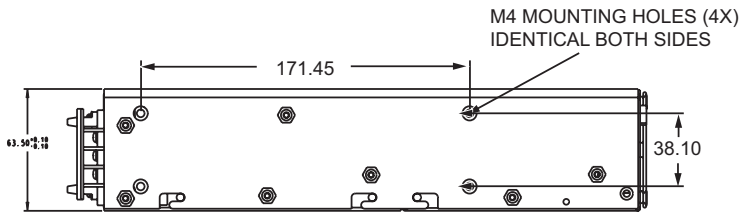
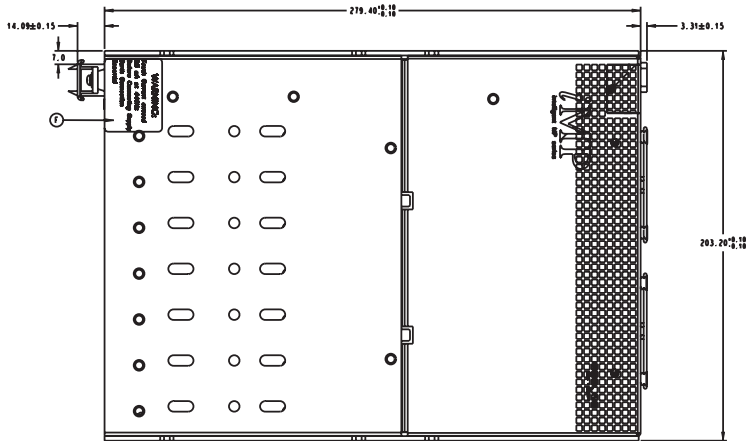
Notes

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m).
2. Control connectors: (J1) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, Astec part #70-841-004. J2 10 position housing (Landwin 2051P1000T). Mates with housing 205051000 (Landwin) with 2053T011P (Landwin) pins.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs.
Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs.
Triple O/P module is .045" square pins on .156 centers. Mates with Molex 09-50-8063 or equivalent.

iMP Series
iMP1 (1200/1500 Watts Max)

8-Inch Case Size: iMP1: 2.5" x 8" x 11" (63.5mm x 203.2mm x 279.4mm)
Weight: iMP1 Case: 5.0 lbs. • 36 W Triple: 0.5 lbs. • 210 W Single: 0.6 lbs.
• 360 W Single: 1.0 lb. • 600 W Single: 2.0 lbs. 144 W Dual: 0.6 lb.

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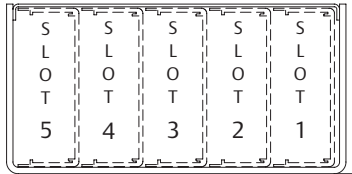


Notes

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs (0.67 N-m).
2. Control connectors: (J1) 10 position housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C-Grid III Series) or AMP Model number 87977-3 with 87309-8 pins. Connector kit includes mating connector and 10 pins, Astec part #70-841-004. J2 10 position housing (Landwin 2051P1000T). Mates with housing 205051000 (Landwin) with 2053T011P (Landwin) pins.
3. Chassis material: aluminum with chemical film coating (conductive).
4. All dimensions are in millimeters and inches, and are typical.
5. Customer mounting -3 sides M4, bottom also includes 8-32 mounting holes. Max. penetration is 0.150" (3.8mm). Max. torque: 5in-lbs.
6. Output module connections: All single O/P modules are M4 x 8mm screws. Max. torque: 10in-lbs.
Dual O/P module is M3 x 8mm screws. Max. torque: 5 in-lbs.
Triple O/P module is .045" square pins on .156 centers. Mates with Molex 09-50-8063 or equivalent.

iMP Case Specifications

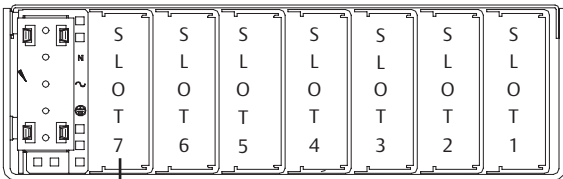
iMP4



iMP4 = 2.5" x 5" x 10" 5 available slots
(63.5 x 127 x 254)

Input	
90-264VAC	180-264VAC
750W max.	1100W max.

iMP8 and iMP1



iMP8 = 2.5" x 7" x 10" 6 available slots
(63.5 x 177.8 x 254)

Input	
85-264VAC	180-264VAC
1000W max.	1200W max.

iMP1 = 2.5" x 8" x 11" 7 available slots
(63.5 x 203.2 x 279.4)

1200W max.	1500W max.
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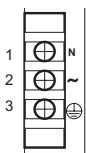
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Pin Connectors

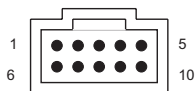
Figure 1. AC Input



AC Input

Pin No.	Function
1	AC Neutral
2	AC Line (Hot)
3	Chassis (Earth) Ground

Figure 2. Connector J1

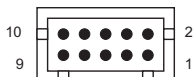


Mates with
Molex 90142-0010
Amp 87977-3

PFC Input Connector (control and signals)

Pin No.	Function
1	Input AC OK - "Emitter"
2	Input AC OK - "Collector"
3	Global DC OK - "Emitter"
4	Global DC OK - "Collector"
5	External Sync
6	Global Inhibit / Optional Enable Logic "0"
7	Global Inhibit / Optional Enable Logic "1"
8	Global Inhibit / Optional Enable Return
9	+5VSB Housekeeping
10	+5VSB Housekeeping Return

Figure 3. Connector J2



Mates with
Landwin 2050S/000 Housing
2053T011P Pin

I²C Bus Output Connector

Pin No.	Function
1	5VCC External Bus
2	Serial Data Signal
3	Secondary Return
4	Serial Clock Signal
5	Address Bit 2
6	Address Bit 1
7	Address Bit 0
8	No connection