

## Intelligent MP Series

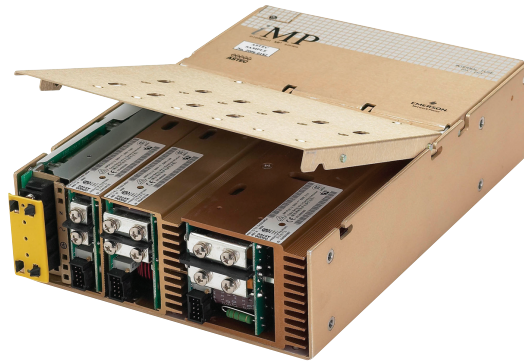
Up to 1500 Watts

**Total Power:** Up to 1500 Watts

**Input Voltage:** 85 - 264 VAC  
120-300 VDC

**# of Outputs:** Up to 21

iMP™



### Special Features

- Full Medical EN60601 approval
- Intelligent I<sup>2</sup>C control
- Voltage adjustment on all outputs (Manual or I<sup>2</sup>C)
- Configurable input and output (case and module) OK signals and indicators
- Configurable inhibit/enable
- Configurable output UP/DOWN sequencing
- Configurable current limit (foldback or constant current)
- High power density (8.8 W/cu-in)
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- Customer provided air option
- uP controlled PFC input with active inrush protection
- I<sup>2</sup>C monitor of voltage, current, and temp
- Programmable voltage, current limit, inhibit/enable through I<sup>2</sup>C
- Optional extended hold-up module (SEMI F47 compliance)
- Increased power density to 50% over standard MP
- External switching frequency sync input
- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- No preload required
- Industrial shock/vibration (>50G's)

## Electrical Specifications

### Input

Input range:	85-264 Vac 120-350 Vdc (limited to 300 Vdc in medical applications)
Frequency:	47-440 Hz
Inrush current:	40 A peak max. (soft start)
Efficiency:	Up to 85% @ full case load
Power Factor:	0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz)
Turn-on time:	AC on 2.0 sec typ., inhibit/enable 150ms typical Programmable delay; 50ms internal turn-on delay (Dual Output only)
EMI filter:	CISPR 22/EN55022 Level "B"
Leakage current:	300µA max. @ 240 Vac; 47 - 63 Hz
Radiated EMI:	CISPR 22/EN55022 Level "B"
Holdover storage:	20 ms minimum (independent of input Vac) additional 34ms holdover storage with optional HUP module (SEMI F47 compatible). For iMP4 15 ms (low-line), 10 ms (high-line)
AC OK:	>5 ms early warning min. before outputs lose regulation Full cycle ride thru (50 Hz) (n/a on iMP4> 750 W @ 90 Vac)
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: 16 A; iMP8: 20 A; iMP1: 25 A (both lines fused)
Warranty:	2 years

### Safety

- UL** UL60950/UL2601
- CSA** CSA22.2 No. 234 Level 5
- VDE** EN60950/EN60601-1
- BABT** Compliance to EN60950/EN60601 BS7002
- CB** Certificate and report
- CE** Mark to LVD



Output	
Adjustment range:*	±10% minimum all outputs (manual) (full module adjustment range using I <sup>2</sup> C)
Margining:	±4-6% nominal analog (single output module only)
Overall regulation:	0.4% or 20mV max. (36 W modules 4% maximum)
Ripple:	RMS: 0.1% or 10mV, whichever is greater Pk-Pk: 1.0% or 50mV, whichever is greater Bandwidth limited to 20 MHz
Dynamic response:	<2% or 100mV, with 25% load step
Recovery time:	To within 1% in <300 μsec
Overcurrent protection:**	Configurable through I <sup>2</sup> C (calibration required). 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
Short-circuit protection:	Protected for continuous short-circuit Recovery is automatic upon removal of short
Overvoltage protection:*	Configurable through I <sup>2</sup> C
Single output module:	2-5.5 V 122-134% ; 6-60 V 110-120%
Dual output module:	2-6 V 122-134% ; 8-28 V 110-120%
Triple output module:	110-120% of highest voltage rating
Reverse voltage protection:	100% of rated output current

Output (cont.)	
Thermal protection:*	Configurable through I <sup>2</sup> C All outputs disabled when internal temp exceeds safe operating range. >5ms warning (AC OK signal) before shutdown
Remote sense:	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel:	Current share to within 2% of total rated current
DC OK:*	±5% of nominal. Configurable through I <sup>2</sup> C
Minimum load:	Not required
Housekeeping standby:	5 Vdc @ 1.0 A max. present whenever AC input is applied (Optional 2.0 A available)
Module inhibit:*	Configured and controlled through I <sup>2</sup> C
Switching frequency:	250k Hz accepts external sync signal
Output/Output isolation:	>1 Megohm, 500 V
External sync:	TTL clock input signal used to adjust switching frequency. Frequency 500 kHz ±20%; Duty cycle 40 - 55%
* Can be controlled via I <sup>2</sup> C	
** Controlled via I <sup>2</sup> C but requires load calibration	

## Environmental Specifications

Operating temperature:	-40 ° to 70 °C ambient. Derate each output 2.5% per degree from 50 °C 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, 220 Vac and 25 °C ambient conditions

## Output Module Line-up

Module Code	1	2	3	4	-
Module Type	Single	Single	Single	Dual	Triple
Max output power	210 W	360 W	750 W	144 W	36 W
Max output current	35 A	60 A	150 A	10 A	2 A
Output voltages available*	2-60 V	2-60 V	2-60 V	6 - 15, 24 - 28; 6 - 15, 6 - 15; 6 - 15, 2 - 6; 2 - 6, 2 - 6; 24 - 28, 24 - 28; 24 - 28, 2 - 6	8-15, 8-15, 2-6; 8-15, 8-15, 8-15; 8-15, 8-15, 18-28; 8-15, 18-28, 2-6
Standard voltage increments	25	25	25	16	18
Remote sense	Yes	Yes	Yes	Yes	No
Remote margin	Yes	Yes	Yes	No	No
V-Program - I <sup>2</sup> C control	Yes	Yes	Yes	Yes	No
Active current share	Yes	Yes	Yes	Yes	No
Module Inhibit - I <sup>2</sup> C control	Yes	Yes	Yes	Yes	Yes
Module Inhibit - analog	Yes	Yes	Yes	Yes	No
Overvoltage / overcurrent 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

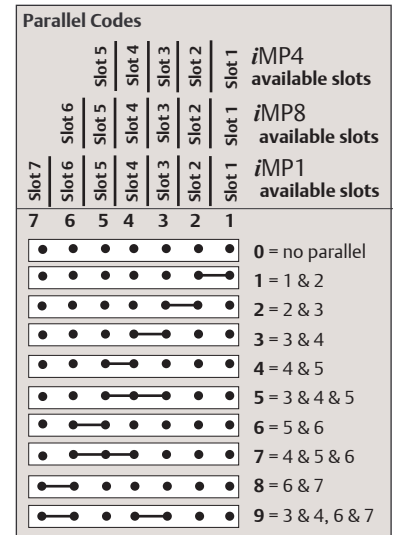
# Output Module Voltage/Current

Voltage	Voltage Code	Single Output Module Code			Dual Output**		Triple Output			i <sup>2</sup> C Adjustment Ranges***
		1	2	3	V1	V2	V1	V2	V3	
2 V	A	35 A	60 A	150 A	10 A	10 A	—	—	2 A	1.8-6.1
2.2 V	B	35 A	60 A	150 A	10 A	10 A	—	—	2 A	
3 V	C	35 A	60 A	150 A	10 A	10 A	—	—	2 A	
3.3 V	D	35 A	60 A	150 A	10 A	10 A	—	—	2 A	
5 V	E	35 A	60 A	150 A	10 A	10 A	—	—	2 A	
5.2 V	F	35 A	60 A	144 A	10 A	10 A	—	—	2 A	
5.5 V	G	34 A	58 A	136 A	10 A	10 A	—	—	2 A	
6.0 V	H	23 A	42 A	97.5 A	10 A	10 A	—	—	2 A	5.4-13.2
8.0 V	I	20 A	36 A	84.4 A	10 A	4 A	1 A	1 A	1 A	
10 V	J	18 A	32 A	75 A	10 A	4 A	1 A	1 A	1 A	
11 V	K	17 A	31 A	68 A	10 A	4 A	1 A	1 A	1 A	
12 V	L	17 A	30 A	62.5 A	10 A	4 A	1 A	1 A	1 A	
14 V	M	14 A	21 A	53.5 A	9 A	4 A	1 A	1 A	1 A	
15 V	N	14 A	20 A	50 A	8 A	4 A	1 A	1 A	1 A	
18 V	O	11 A	19 A	41.6 A	—	—	—	0.5 A	0.5 A	12.6-22.0
20 V	P	10.5 A	18 A	37.5 A	—	—	—	0.5 A	0.5 A	
24 V	Q	8.5 A	15 A	30 A	4 A	2 A	—	0.5 A	0.5 A	21.6-39.6
28 V	R	6.7 A	11 A	26.8 A	3 A	2 A	—	0.5 A	0.5 A	
30 V	S	6.5 A	11 A	25 A	—	—	—	—	—	
33 V	T	6.2 A	10.9 A	22.7 A	—	—	—	—	—	
36 V	U	5.8 A	10 A	20.8 A	—	—	—	—	—	
42 V	V	4.2 A	7.5 A	16 A	—	—	—	—	—	
48 V	W	4.0 A	7.5 A	15.6 A	—	—	—	—	—	37.8-60.0
54 V	X	3.7 A	6.0 A	13.9 A	—	—	—	—	—	
60 V	Y	3.5 A	6.0 A	12.5 A	—	—	—	—	—	
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).  
 \*\* Total output power on dual module must not exceed 144 W.  
 \*\*\* For single output modules only.

## Ordering Note:

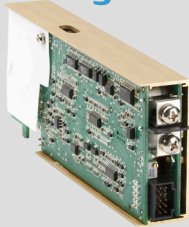
- The cases and modules of both MP and iMP series can be interchanged to allow more flexibility. If intelligent modules are used with non-intelligent cases, a numeric code "4" is placed at the end of the module code (ex. 4LL0 becomes 4LL4).
- USB to i<sup>2</sup>C module order code 73-769-001



## Ordering Information

Case Size	Module/Voltage/Option Codes	Case Option Codes	Software Code	Hardware Code
<p><b>iMP1*</b></p> <p><b>Case Size (mm)</b>            4 = 2.5" x 5" x 10"; 750 W-1100 W, 5 Slots (63.5 x 127 x 254)            8 = 2.5" x 7" x 10"; 1000 W-1200 W, 6 Slots (63.5 x 177.8 x 254)            1 = 2.5" x 8" x 11"; 1200 W-1500 W, 7 Slots (63.5 x 203.2 x 279.4)</p> <p>*Note: Add "E" after iMP4 to denote IEC input option. e.g. iMP4E (Not available on iMP8 or iMP1)</p>	<p>First - Module Code            Second - Voltage Code            Third - Option Code</p> <p><b>3L0 - 2E2 - 1Q1 - 4LL0</b></p> <p><b>Module Codes</b>            Module/voltage/option codes            Module codes:            (None) = 36 W triple O/P (1 slot)            1 = 210 W single O/P (1 slot)            2 = 360 W single O/P (2 slot)            3 = 750 W single O/P (3 slot)            4 = 144 W dual O/P (1 slot)            5 - 9 = future</p> <p><b>Voltage Codes:</b>            See Output Module Voltage/Current table above</p> <p><b>Option Codes:</b>            0 = Standard            1 = Module enable            2 = Constant current            3 = 1 &amp; 2 combined            4 = Set for use in standard (non-intelligent case)            5 - 9 = Future</p>	<p><b>00</b></p> <p><b>Case Option Codes</b></p> <p>First digit            0 - 9 = parallel code (See Parallel Codes table above)</p> <p>Second digit            0 = No options            1 = Reverse air            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</p>	<p><b>A</b></p> <p>Software code used for configuration change. "A" is standard</p>	<p><b>###</b></p> <p>Factory assembled for hardware of firmware mods.</p>

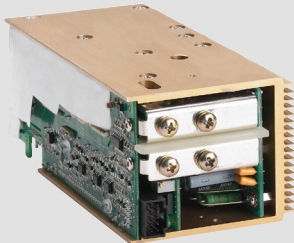
### Single



210 W

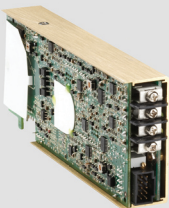


360 W



750 W

### Dual



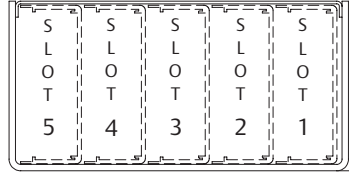
144 W

### Triple



36 W

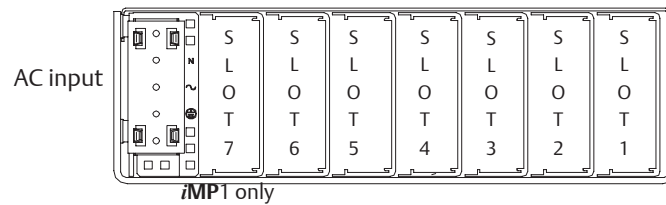
#### iMP4 (AC input on opposite side)



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

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

#### iMP8 and iMP1



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

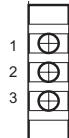
Input	
85-264 Vac	180-264 Vac
1000 W max.	1200 W max.

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

1200 W max.	1500 W max.
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## Pin Connectors

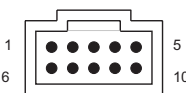
Figure 1. AC Input



### AC Input

Pin No.	Function
1	AC neutral
2	AC line (hot)
3	Chassis (earth) ground

Figure 2. Connector J1

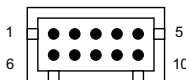


Mates with  
Molex 90142-0010 Housing  
90119-2110 Pin

### 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	+5 VSB housekeeping
10	+5 VSB housekeeping return

Figure 3. Connector J2



Mates with  
Landwin 2050S1000 Housing  
2053T011P Pin  
Connector Kit  
order # 73-841-023

### PC Bus Output Connector

Pin No.	Function
1	No connection
2	No connection
3	No connection
4	Serial clock signal (SCL)
5	Serial data signal (SDA)
6	Address bit 0 (A0)
7	Address bit 1 (A1)
8	Address bit 2 (A2)
9	Secondary return (GND)
10	5 Vcc external bus (5 VCC. Bus)

Mechanical Drawings

iMP Modules

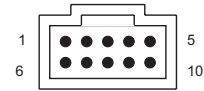
DC-DC Converter Output Modules

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

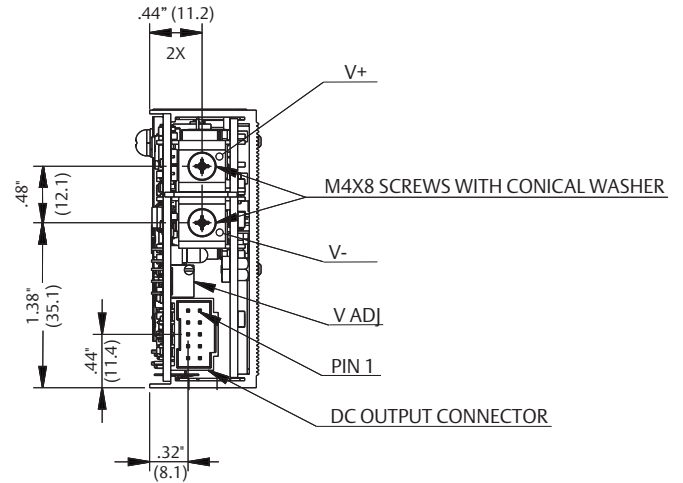
\* Note: All iMP modules have a green DCOK LED.  
(except for 36 W module)

Figure 4. Connector J1

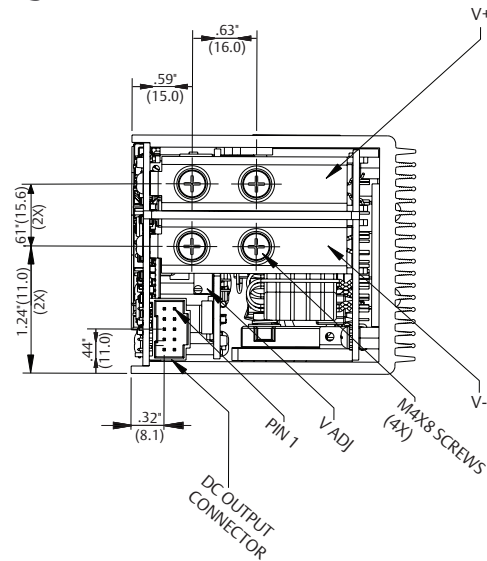


Mates with  
Molex 90142-0010 Housing  
90119-2110 Pin

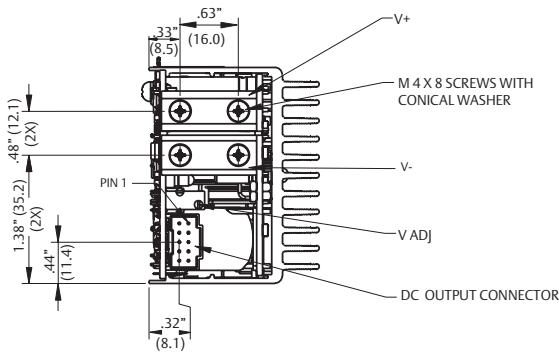
Single 210 Watt



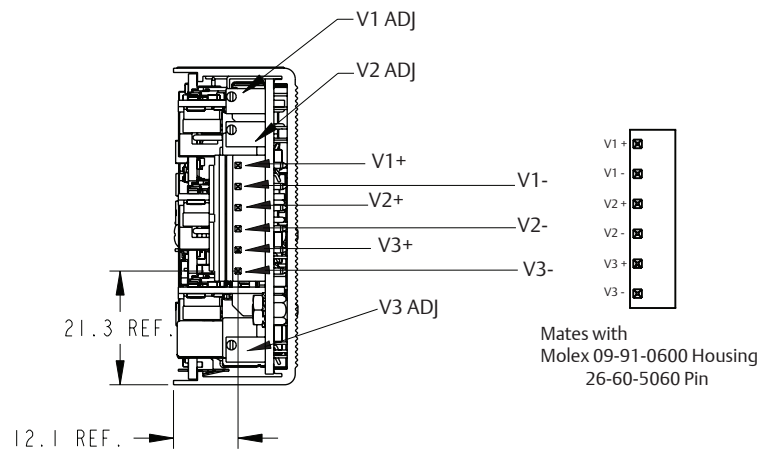
Single 750 Watt



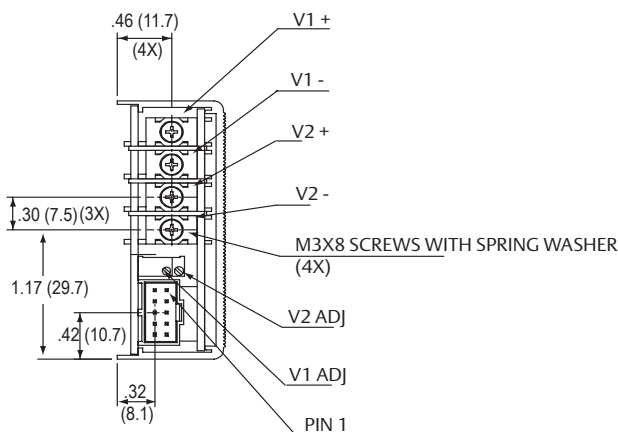
Single 360 Watt



Triple 36 Watt



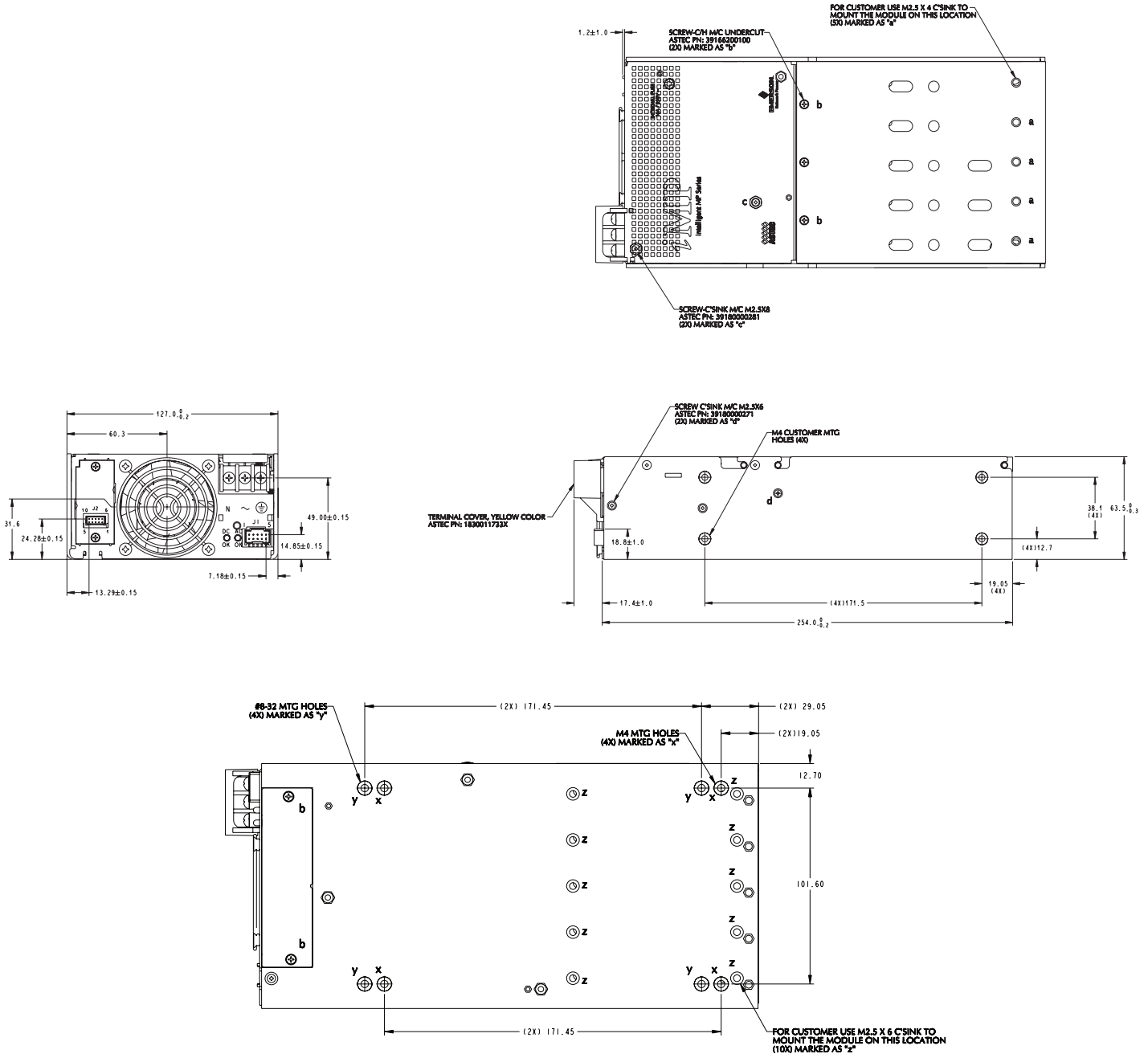
Dual 144 Watt



**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: 3 lbs. • 360 W Single 1.0 lb.  
• 750 W Single: 1.6 lbs. 144 W Dual: 0.6 lb.

Rev. 10.09.08\_77  
iMP Series  
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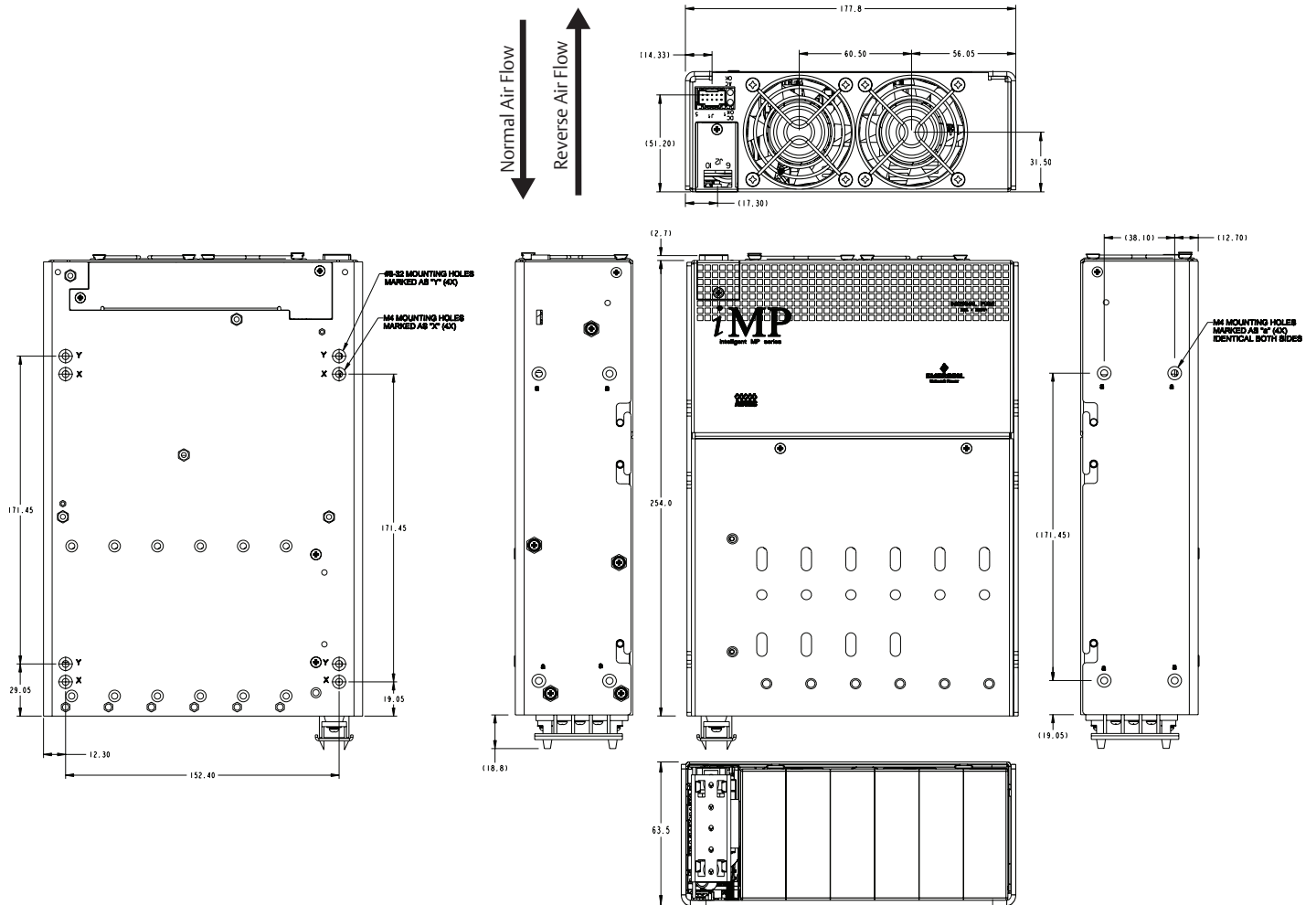
**Notes**

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs. (0.67 N-m). (Optional IEC input connector)
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). Connector kit includes mating connector and 10 pins, Astec part #70-841-004. J2 10 position housing (Landwin 2051P1000T). Mates with housing 2050S1000 (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.

**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. • 210 W Single: 0.6 lb. • 360 W Single: 1.0 lb.  
• 750 W Single: 1.6 lbs. 144 W Dual: 0.6 lb.

Rev. 10.09.08\_77  
iMP Series  
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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) Connector kit includes mating connector and 10 pins, Astec part #70-841-004. J2 10 position housing (Landwin 2051P1000T). Mates with housing 2050S1000 (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.

**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 lb. • 210 W Single: 0.6 lb.  
• 360 W Single: 1.0 lb. • 750 W Single: 1.6 lb.  
• 144 W Dual: 0.6 lb.

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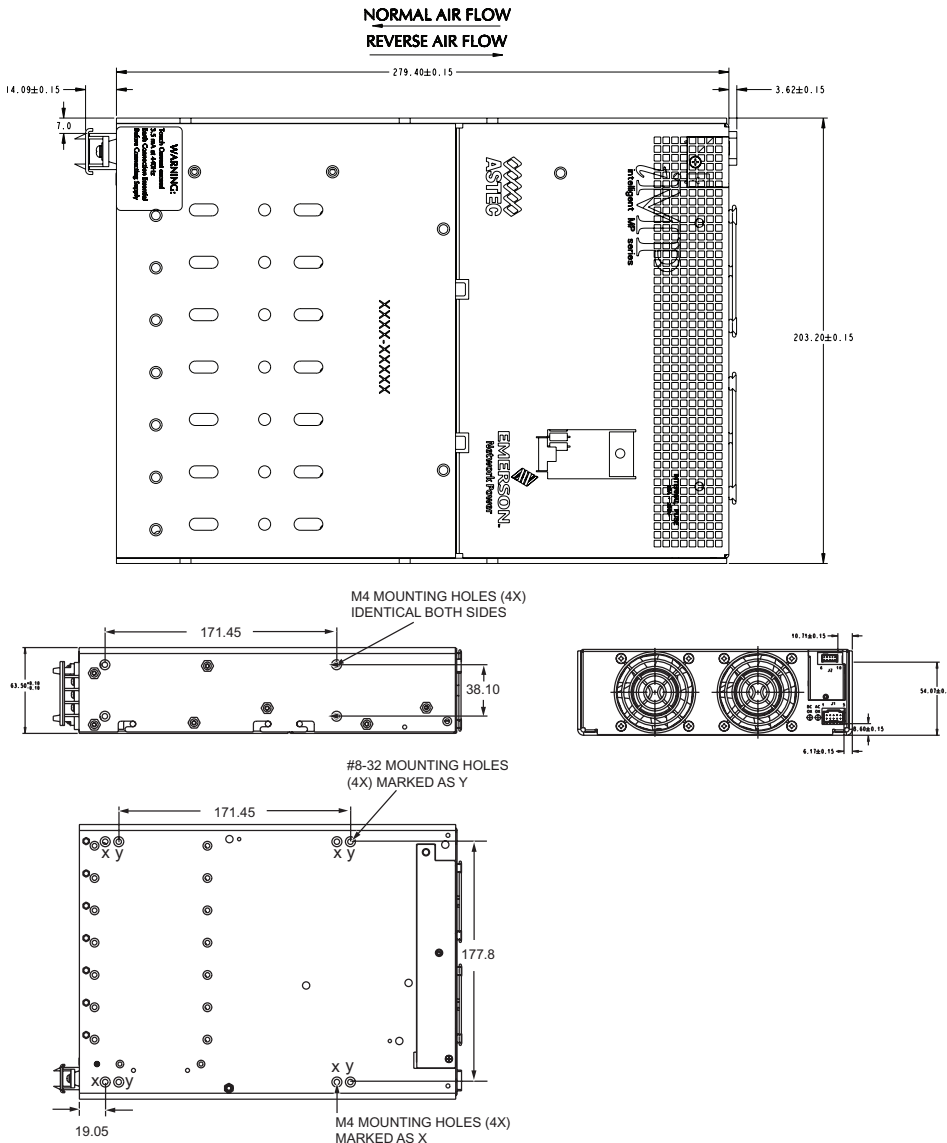
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**Notes**

1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). Max torque: 6 in-lbs (0.67 N-m).
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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.